CITY OF CAPE TOWN
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City of Cape Town

Coastal Management Programme

2014

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1. Introduction

The City of Cape Town has a coastline of 307km, of which it administers approximately 260km, the longest stretch of coastline of all local authorities in South Africa. The sustainable and integrated management of this coastline is central to Cape Town's economy, its future growth, social opportunities and environmental health and resilience.

On the 27th of November 2009, the President of South Africa signed the Integrated Coastal Management Act (Act 24 of 2008) into law. The Act came into operation on the 1st of December 2009. This Act for the first time provides a regulatory framework for the management of South Africa's coastline. Central amongst the regulatory frameworks within the Act is the requirement (section 48) that:

(1) a coastal municipality must -
   (a) within four years of the commencement of the Act, prepare and adopt *a municipal coastal management programme for managing the coastal zone or specific parts of the coastal zone in the municipality;*
   (b) must review any programme adopted by it at least once every five years; and
   (c) may, when necessary, amend the programme.

(2) Before adopting a programme contemplated in subsection (1)(a), a municipality must by notice in the Gazette invite members of the public to submit written representations on or objections to the programme in accordance with the procedure contemplated in Chapter 4 of the Municipal Systems Act.

(3) A municipality must, within 60 days of the adoption of the municipal coastal management programme or of any substantial amendment to it—
   (a) give notice to the public—
      (i) of the adoption of the programme; and
      (ii) that copies of, or extracts from the programme are available for public inspection at specified places; and
   (b) publicise a summary of the programme.

(4) A municipality may prepare and adopt a coastal management programme as part of an integrated development plan and spatial development framework adopted in accordance with the Municipal Systems Act and if it does so, compliance with the public participation requirements prescribed in terms of the Municipal Systems Act for the preparation and adoption of integrated development plans will be regarded as compliance with public participation requirements in terms of this Act.

Contents of municipal coastal management programmes (section 49)

(1) A municipal coastal management programme must—
   (a) be a coherent municipal policy directive for the management of the coastal zone within the jurisdiction of the municipality; and
   (b) be consistent with—
      (i) the national and provincial coastal management programmes; and
      (ii) the national estuarine management protocol.

(2) A municipal coastal management programme must include—

(a) a vision for the management of the coastal zone within the jurisdiction of the municipality, including the sustainable use of coastal resources;
(b) the coastal management objectives for the coastal zone within the jurisdiction of the municipality;
(c) priorities and strategies—
(i) to achieve the coastal management objectives of the municipality; and
(ii) to assist in the achievement of the national and provincial coastal management objectives as may be applicable in the municipality;
(iii) to address the high percentage of vacant plots and the low occupancy levels of residential dwellings;
(iv) to equitably designate zones as contemplated in section 56(1)(a)(i) for the purposes of mixed cost housing and taking into account the needs of previously disadvantaged individuals;
(v) to address coastal erosion and accretion; and
(vi) to deal with access issues.
(d) performance indicators to measure progress with the achievement of those objectives.

(3) A municipal coastal management programme may include—
(a) a programme of projected expenditure and investment by the municipality in coastal management infrastructure or in order to implement any coastal management programme;
(b) a description of specific areas within the coastal zone that require special coastal management, and management strategies for those areas;
(c) estuarine management plans; and
(d) any other matter that may be prescribed.

This document presents the City of Cape Town's Coastal Management Programme (CMP), as prescribed within the Act, but also as the overarching management framework for the City's coastline.

2. Overview and Structure of City of Cape Town's CMP

Management of the City's coastline is spread across a number of departments and line functions each providing specific management roles and services for various aspects of the coastline. As a result it is essential that the City's CMP provide an integrating framework to ensure that these management roles and responsibilities collaborate and coordinate to achieve a collective vision and standard for the coastline.

The City of Cape Town's approach to its CMP is to compile an extensive document that is a combination of four key elements:

- Sets policy where appropriate
- Clearly defines departmental roles and responsibilities for all aspects of coastal management
- Local coastal regulation and enforcement through the by-law
- Outlines and details a number of management protocols

In structuring and ordering the chapters, the City's CMP follows a logical flow of policy and principles, institutional accountability and responsibility, legislative components, and then specific management and operational protocols. The document therefore not only provides a clear management framework for the City in its approach to managing the coastline, but serves equally as a substantial document to the City's public that clarifies the various roles and responsibilities across the City and the various approaches.

3. Structure of the CMP

The CMP should be considered at all times as an evolving document that will be updated, added to and amended as need be. As such, the City's CMP has been structured as a single document comprising a

number of individual chapters dedicated to specific aspects of the overall approach to and management of the coast line. This approach allows the amendment, review or addition of individual chapters as needed without having to review and revise the entire document.

Notwithstanding this approach of ongoing improvement, the entire CMP will undergo a review as required by the Act, five years after adoption by the City.

3.1. List of chapters:

1. Coastal Institutional Roles and Responsibilities
2. Integrated Coastal Management Policy
3. Coastal Land Policy: Purchasing and Leasing
4. Coastal Edge and Setback Line
5. Coastal By-law
6. Economic and Spatial Plan
7. Coastal Overlay Zone
8. Coastal Access Land
9. Coastal Development Nodes
10. Coastal and Sea Defence Decision Framework
11. Marine and Coastal Law Enforcement Strategy
12. Coastal Emergencies (ship stranding and oil spill)
13. Large Marine Animal Stranding Protocol
14. Coastal Risk Register
15. Marine Access Points
16. Coastal Recreational Use Zones
17. Shark Safety
18. Blue Flag Strategy
19. Trek-net Fishing Protocol
20. Dune Management
21. Helderberg MPA Management Plan
22. Coastal Conservancies
23. Estuary Management Plans
24. Water Quality Monitoring and Public Health Protocol
25. Coastal Signage and Information
26. Coastal Cleaning Protocol
27. Coastal Monitoring Programme
28. Education, Awareness and Training
29. City of Cape Town Events Policy
30. Coastal Committee(s)
31. Monitoring and Reporting

4. Cape Town's Coastal Context: Social

Cape Town's coastline is at the core of its sense of place, identity, heritage and cultural history. Two large bays – Table Bay and False Bay – define the coastline and two sets of mountain ranges run alongside the coast, creating a unique landscape found in few other places in the world. The historic development of Cape Town is directly linked to the establishment of a refreshment station in Table Bay in 1652. For millennia prior to that event, indigenous people have been utilising the coastal resources for food.

The coastline remains socially central to Cape Town's communities within a broad context as well as within local community based contexts with direct associations between communities and their adjacent coastal environments. The Kalk Bay and Hangberg fishing communities are examples of inseparable links between Cape Town's people and their coastline.

4.1. Sense of Place and Identity

Cape Town as both a city and community has a unique and strong sense of place and identity. This sense of place and identity is linked to the varied and diverse coastline that surrounds Cape Town, the coastal landscapes and vistas, and the cultural heritage of a city that developed from sea trade, and is one that remains closely embedded in the coastal environment.

Globally recognised as one of the world's most beautiful cities, Cape Town's coastal environment is internationally recognised as central to that beauty and desirability.

This sense of place and identity has a localised diversity that contributes significantly to the overall social value of the coastline. Influenced by cultural, historical, community and physical factors, Cape Town's coastal sense of place is diverse and varied. Kalk Bay presents a unique coastal village feel strongly entrenched in a fishing heritage, Camps Bay presents a more global fast paced and dynamic coastal space, Muizenberg Corner provides a sense of cultural diversity and coastal recreation while Misty Cliffs provides a rural coastal feel of untouched coastal spaces. It is this localised diversity of varied and unique coastal spaces that collectively create the strong sense of place and identity.

4.2. Social wellbeing

Quality of life is highly dependent on social wellbeing which in turn is dependent on a variety of factors. Cape Town has emerged from a difficult and unequal history with many inequalities remaining. Beyond the central social wellbeing factors of access to quality services, employment, health, housing and safety, access to quality natural environments and spiritual spaces are imperative. Cape Town's coastline is central to the overall social wellbeing of its citizens and visitors through:

- Extraordinary landscapes and vistas
- Open and free access to a diverse coastline
- Multiple recreation opportunities
- Marine access
- Presence of marine fauna and flora
- Freely accessible amenities and facilities

Loss or degradation of the coastline would severely diminish social wellbeing across all population groups.

4.3. Recreation

Coastal recreation is at the heart of the social value of the City's coastline. Freely accessible coastal and marine environments provide a host of recreational opportunities across the City. From simple leisure activities such as family time, sunbathing, swimming and beach walks through to open water sailing, surfing and recreational fishing, the coast offers diverse recreational opportunity for everyone.

Maintaining and retaining quality coastal environments and the associated amenities is central to optimising the recreational potential of the coastline, while planned and directed future investment and infrastructure development along the coastline will further enhance the recreational value and potential. In addition,

securing and guaranteeing free access to the coastline as a shared, common space, for all is essential to retain the social recreational value

4.4. Integration and Community

Cape Town is a city that has emerged from a history of legislated racial segregation. Although the birth of democracy ended legislated segregation, historical Apartheid urban planning has left the city with a legacy of inequality and social segregation. The coastline is one of key the spaces in Cape Town where communities from across the cultural, social and economic spectrums converge and interact. Muizenberg Corner is an example of this where on any given day individuals from across Cape Town's diverse social and economic groups interact and share a common space through simple recreation. This integration at coastal spaces is not uniform, but given the City's investment in public transport and urban transformation, coastal areas will increasingly reflect Cape Town's diversity.

5. Cape Town's Coastal Context: Economic

Global recognition that Cape Town is one of the world's most beautiful cities, as well as the recent New York Times, Guardian and National Geographic articles that rank Cape Town as one of the world's top tourist destinations, re-affirms that tourism and our city's natural and cultural beauty and social diversity is at the core of its economy.

In a study commissioned by the City of Cape Town in 2009, it was estimated then that, conservatively, Cape Town's natural assets contribute between R2 billion and R6 billion per annum to the economy. In this study the economic value alone of recreation on Cape Town's beaches was estimated at over R70 million per year while the coastline as a whole contributed over R375 million per year. These estimated values do not include the economic contribution of port activities, shipping, fishing or their associated economies, or other tourist spending that occurs when tourists visit the coast. The economic value and importance of the City's coastline cannot be over-estimated.

5.1. Wider Economy

As a coastal city, substantial components of our economy are directly linked to the marine and coastal environment. These economic activities not only drive the financial economy but contribute significantly to employment opportunities. These economic drivers include but are not limited to:

- Cape Town Port and shipping traffic
- Marine vessel, servicing, building and repairs
- Commercial fishing industry
- Small scale commercial fishing industry
- South African Navy
- Koeberg Power Station

5.2. Tourism

Between 2009 and 2012 the city received approximately 1.3 million international tourists per year, and approximately 1.2 million local tourists per year. In a 2007 survey, 35% of tourists highlighted the coast as the central reason for their choice of Cape Town as a destination. A recent study in 2013 estimated the total contribution of tourism to Cape Town's economy as approximately R14.6 billion in 2012.

Since 2002, the Victoria and Alfred Waterfront has contributed almost R200 billion to the economy and a similar amount is expected over the next decade.

5.3. Property Values

Property values in Cape Town are directly linked to proximity of desirable environments and landscapes. Along the City's Atlantic Seaboard are some of the highest property values on the African continent, primarily determined by the proximity of these properties to the coastline as well as the coastal view sheds. This pattern of value associated with the coastline extends beyond the Atlantic Seaboard across the City's coastline.

High property values not only contribute to the economy but are a key component of the City's rates base as well as highlighting Cape Town as an international investment location of choice.

5.4. Future Economic Growth

The coastline has substantial potential to unlock further economic growth within Cape Town. Planned, directed and risk–averse investment and appropriate development along the City's coastline will enhance economic activity in multiple ways. However, future development and investment must be planned and directed in such a way as to not erode the existing economic value of the coastline, but rather to enhance it further by retaining the natural capital and integrating a natural systems approach towards development and infrastructure.

5.5. Risk Reduction

Finally, it is important to recognise that the City's coastline is a buffer between hard infrastructure and a marine environment notorious for large waves, strong seas and high winds. The role and function of our coastline as a buffer to storm surge and predicted mean sea level rise in economic terms is extensive. A 2010 study by the City estimated that private and public property at risk from storm surge events was in excess of R55 billion.

A protected, well-functioning and healthy coastal system provides the most effective protection for property at risk. If the natural functioning of the coastline is lost, replacement of the natural buffer of the coastline with engineered coastal defences is likely to be unaffordable. The loss of coastal space to storm surges and sea level rise will have substantial economic impacts across the City's economy. As such, the economic importance of the coastal system as a natural defence to storm surge must not be under-estimated.

6. Cape Town's Coastal Context: Physical

Approximately 43% of Cape Town's coastline consists of sandy beaches, with the remaining extent comprising rocky shores. A number of important physical processes affect the coastal zone. These include wave processes, nearshore currents and circulation, sediment transport and sea level rise.

The intersection of two ocean currents – the warm Agulhas and the cold Benguela current - contributes to the unique local ecology of Cape Town's coastline. Strong south-easterly winds, predominant in summer, additionally contribute to the marked difference in temperature between False Bay and the west coast. The southeaster, which reaches gale-force at times, pushes and pulls the surface layer of seawater along with it. In False Bay, this has the effect of piling warm water up along the coast, so summer water temperatures generally stay within the 16-22°C range. West of Cape Point, the southeaster pushes surface water in a northerly direction, but it is deflected offshore due to the earth's rotation to the east. Cold water from the deeper ocean rises up to replace it in a process known as upwelling, and sea temperatures typically hover in the10-15°C range.

6.1. Upwelling

Upwelling ensures that the West Coast is South Africa's most productive marine environment. Upwelled water is rich in nutrients, especially nitrates formed as a by-product of the decomposition of organic matter, which constantly sinks down to the seafloor. The nitrates act as a fertiliser for phytoplankton, which forms dense 'blooms' that are grazed by zooplankton. Plankton are consumed by pelagic fish which are in turn food for larger fish as well as seabirds, seals and dolphins. The abundance of fish supports South Africa's purse seine and trawl fisheries, while the region's dense kelp beds provide habitat for West Coast rock lobster and abalone.

6.2. Rocky shores

Rocky shores range from headlands with vertical rock faces and steep cliffs, to wide wave-cut rock platforms, landscapes of varied-sized boulders, or pebble beaches of smooth stones. In some areas rocky shores extend for many kilometres along the coast, while in others they occur as outcrops separated by river mouths or sandy beaches.

Animals and plants that live within the intertidal zone of rocky shores are adapted to survive the harsh and variable conditions associated with high and low tides, and the distribution of species on rocky shores is largely determined by their ability to withstand these physical stresses. Those found low on the shore, where they are only exposed for a short time at low tide, are not adapted to survive conditions higher up, where only the hardiest species occur. Shell middens associated with the harvesting of mussels by indigenous people are often found close to rocky shores.

6.3. Sandy beaches

Sandy beaches are extremely dynamic systems, constantly reshaped by wind, waves and currents.
In the sea, waves and currents continually move sediment along the shore, as well as onshore and offshore, whereas on land, wind blows sand up and along the beach. Sand trapped by plants growing near the drift line forms mounds called hummocks, which initiate the development of foredunes. Sandy beach systems therefore consist of a marine wave-driven ecosystem and a terrestrial wind-driven ecosystem that together make up the littoral active zone – the area in which sand exchange occurs.

Although sand exchange is an ongoing process, it varies throughout the year. During stormy weather, rough seas erode sand from the beach and foredunes and the sand is deposited as an offshore sandbar. When calm conditions return, gentle waves carry the sand back to replenish the beach. In this way, the beach undergoes seasonal cycles of erosion and accretion, although major storm events can cause long-term changes. Structures in the littoral active zone, such as breakwaters and buildings impede this natural process of sand exchange, and may result in erosion or sand inundation problems. Similarly, destroying the foredunes through development or mining removes the reservoir that supplies sand to the beach during periods of erosion. The same applies to artificial sand stabilisation with vegetation.

6.4. Estuaries

Estuaries – where rivers meet the sea – represent a transition zone between the freshwater and marine environments. Their salinities fluctuate on a daily and seasonal basis according to the tide and the strength of river flow. While many estuaries are permanently open to the sea, others are closed by sandbars during periods of low rainfall, when river flow is too weak to scour away sand accumulating at the mouth. Animals and plants living in estuaries are adapted to survive these variable conditions. However, evaporation from closed estuaries may result in exceptionally saline conditions, while high freshwater input during floods causes a dramatic reduction in salinity. Extremes of salinity that are beyond the tolerance range of estuarine plants and animals have been known to cause mass mortalities.

Most of Cape Town's estuaries are surrounded by intense development, which has had a variety of impacts on these fragile systems. Activities and development in the broader catchment areas also affect estuaries.

6.5. Dunes[1]

Dunes are a key coastal feature along many parts of the City of Cape Town's coastline. They are accumulations of sediment bounded at their seaward edge by the upper line of the beach, at approximately the annual highest tide mark, and extending landward until they are no longer subject to gain or loss of sediment due to coastal and aeolian processes. Dune formation (in the case of vegetated coastal dunes) is initiated when aeolian sediment (entrained beach sediment) is trapped by vegetation growing above the high water mark resulting in an accumulation in the form of a foredune.

Cycles of sediment deposition and accumulation, combined with the growth of vegetation adapted to the influx of aeolian sediment, eventually lead to the formation of complex dune systems. Dunes serve as a protective buffer for the coast against storm seas and high spring tides. Under eroding conditions, sand trapped in a dune system can be returned to the nearshore environment, thus preventing long term beach erosion. Vegetated dunes protect houses, roads and recreational facilities against corrosive sea spray, sand blasting and inundation by sand blown inland from the beach and therefore deserve special management attention (protection).

The structure and dynamics of dune systems depend on where and how the sand is supplied to them either from the beach or from landward sediment reservoirs (in the case of transgressive, mobile dune systems). Dune blow-outs and mass aeolian sediment movement, such as at Witsands (between Kommetjie and Scarborough) or Hout Bay (a now deactivated headland bypass dune system) also constitute natural processes, most of which have now been interrupted by development, alien invasive plants and both necessary and unnecessary dune management (stabilization). A dune cordon situated closest to the beach is generally described as a primary or frontal dune while those situated further landward are called secondary or backdunes. The frontal dune comprises a very fragile environment. Any disturbance of the vegetation due to human activities can destabilise dunes resulting in both the elimination of rare coastal ecosystem features and windblown sand problems in adjacent developed areas. Historically, developments have often been sited too close to the beachfront, often in or immediately behind the foredunes.

6.6. Sediment transport[2]

The littoral active zone comprises dunes, beaches, sand bars in the surf zone and river and estuary mouths. It is essentially unstable and dynamic. The presence of structures requiring stable, fixed foundations is therefore incompatible with the dynamic nature of the littoral active zone. The structures also interfere with the natural patterns of sediment movement both within and between dune and beach systems. This can cause or aggravate problems such as beach erosion. The littoral active zone is a high-risk area for development as fixed structures are also subject to the encroachment of windblown sand. Sand found close inshore and particularly that associated with the formation of beaches along the coast, originates from fluvial sources and the disintegration of rocks and shells in the nearshore environment. The major input sources of sediment to the study area are beach and dunes, possible offshore sources and the larger rivers in the area (e.g. the Eerste, Diep and Lourens Rivers). Periodic flood-derived pulses of sediment are transported into the study area from these rivers, but the amounts are relatively small and somewhat intermittent.

Beaches consist of sediments (mostly sand and shell fragments) and therefore beach changes (in terms of the profile and shoreline recession/progradation) can only occur if there is movement (or transport) of the sediment. Sediment transport in the nearshore region is usually categorized as *longshore* (parallel to the

[1] CSIR, 2001. State of the Coast: First Edition. City of Cape Town Coastal Zone Strategy Development – Phase 1.CSIR Report No. ENV-S-C 2001-071, Stellenbosch
[2] Ibid

shoreline) or *cross-shore (*perpendicular to the shoreline) sediment transport. On an exposed beach, *aeolian* (windblown) sediment transport also plays a role. In general, sediment is very rarely moved by only one mode of transport; longshore, cross-shore and aeolian sediment transport occur simultaneously. Even on a long straight beach, the current circulation pattern (including rip currents) and the associated sediment transport patterns are very complex and variously influence different sections of a beach. Furthermore, marine sediment transport is dependent on wave and tide conditions with the result that it changes continually, not only in direction and rate, but also in the location where it takes place in the nearshore zone. The three main modes of sediment transport in the nearshore region are described below:

Longshore sediment transport

When waves that advance towards the coast reach the nearshore zone, sediment (predominantly sand) is stirred up. Although nonbreaking waves also move sediment, most of the sand is transported inside the surf zone where wave breaking is the primary agent for suspending sand and moving sand along the bottom. Longshore currents can usually not entrain sediment on their own; however, sand stirred up by the breaking waves is transported alongshore by these currents. The combined effect of breaking waves and a longshore current creates the potential for significant transport of sediment alongshore within the littoral zone. Along an exposed beach, most of the longshore sediment transport occurs from about +2 m to Mean Sea Level (MSL) and to depths of less than about 8 m to 10 m to MSL. It is has been established that more sediment is transported in the surf zone than outside it. Depending on the environmental conditions, sediment is transported alongshore both upcoast and downcoast. The net longshore transport is the difference between the upcoast and downcoast transport rate. The gross transport is the sum of the upcoast and downcoast transport rates. Actual sediment transport also depends upon the availability of movable material. Thus, extensive rocky areas within the surf zone may significantly reduce the transport rate. It should also be taken into account that the longshore transport rates fluctuate considerably from year to year (Schoonees, 2000). A gradient in the longshore transport rate along a coastline can, in the long term, cause either erosion or accretion problems. These gradients can sometimes be identified by analysing long-term coastline changes. If the longshore sediment transport is interrupted by an obstruction such as a groyne or a breakwater, accretion will occur on the updrift side and erosion on the downdrift side. The latter is due to the fact that the sand that previously fed the downdrift beach is trapped and thereby prevented from reaching the downdrift beach.

Cross-shore transport

Cross-shore transport may result from any water movement that has a component in the cross-shore direction and which has sufficient velocity to transport sediment. A typical example of cross-shore transport is the on/offshore sediment transport resulting from (shorter-term) changes in the incident wave conditions. Cross-shore sediment transport is usually a swift process whereby a beach is eroded near the waterline during a storm. The sand is transported seawards and deposited in deeper water where it forms an underwater bar on which the storm waves break. When the sea calms down again, sand is slowly transported back to the beach, thus re-establishing approximately the original beach profile if no net loss of sand has occurred. Most of the transport occurs in depths less than 10 m to MSL and typically, insignificant volumes of sand are transported cross-shore in depths greater than 10 m to 15 m to MSL along exposed beaches. Beach profile slopes can be directly related to sediment grain sizes (Wiegel, 1964) and are usually also indicative of the wave energy distribution along the coast. To determine the degree of exposure of a beach, it is therefore important to know both the beach slope and the median grain size, because these parameters are interlinked.

Aeolian or windblown sediment transport

Aeolian, or windblown sediment transport, occurs when sufficiently strong winds blow over sandy areas (e.g. beaches and mobile dunes), putting the sediment into motion. Most of this windblown sand is usually transported in a layer of up to a metre high above the beach or dune surface. Optimum conditions for windblown sand transport are the availability of dry, loose sand, strong winds, no vegetation, and a long wind

fetch (i.e. a long expanse of sand over which the wind can blow). Usually, the rate of aeolian sediment transport is orders of magnitude lower than the wave-driven transport rate along an exposed coast. However, the windblown component can be critical to the maintenance of both shoreline stability and the natural equilibria within dune systems. A wrongly located development, such as a parking area or other structure placed within or adjacent to an area subject to aeolian sediment transport, can also result in high ongoing maintenance costs.

6.7. Biological features[3]

The coastal zone of the City of Cape Town occurs at the intersection of the cool-temperate west coast and the warm-temperate south coast of the subcontinent. The region experiences a Mediterranean climate with warm, dry summers and cool, wet winters (DEAT, 1998), creating a specific environment within which the terrestrial ecosystems that are represented locally have evolved. The area has a particularly high biodiversity. For example, the beach surf zone of False Bay is an important nursery for juvenile fish such as the Cape Silverside and the Sand Steenbras (Taljaard *et al.,* 2000). Furthermore, the seaweed flora of False Bay is remarkably diverse, most likely because of the varied water temperature regime of the bay (Taljaard *et al.,* 2000). One of the few mainland breeding sites of the African (Jackass) Penguin, which is rated as "vulnerable" in the South African Red Data Book, is located at Boulders Beach south of Simon's Town. Kelp beds, seals and species such as pilchards, anchovies, rock lobsters and abalone are found in the cold coastal waters (DEAT, 1998).

There are two main types of vegetation represented within the City of Cape Town's coastal zone: Cape Flats Dune Strandveld and various types of Fynbos (McDowell and Low, 1990, CMC, 1999, Heijnis *et al.,* 1999). Cape Flats Dune Strandveld is found primarily on alkaline (calcareous i.e. lime-rich) sandy soils, and Fynbos on the acidic sandy soils derived from sandstones and granites and acidic dune sands. Both rocky and sandy shorelines also support a narrow strip of strand or littoral vegetation.

Strand vegetation consists of a sparse and patchy cover of a few characteristic, highly salt- and wind-resistant plant species. On rocky shores they form a narrow fringe between the exposed rocky shore and the terrestrial vegetation. On sandy shores, their ability to colonise open, windblown sand plays a key role in stabilising windblown sand where the prevailing movement is from the sea to the land. Once they have stabilised the sand (foredune formation has been initiated) then other dune species (Strandveld or Fynbos) can also become established and a natural succession to complex dune plant communities follows. Dune vegetation is sensitive to disturbance, for example trampling by people, so it is critical to control access and zone usage.

Cape Flats Dune Strandveld vegetation is dominated by evergreen shrubs and has an understorey dominated by herbaceous species (grasses, geophytes, annuals) which are dormant in the summer. The shrubs and herbaceous species are able to re-establish from seeds or by sprouting after a fire but the vegetation does not require fire to maintain it in a healthy condition. Shrubs are generally dominant where the soils are well-drained and herbs and grasses where the water-table is shallow, either seasonally or permanently. Reeds dominate areas where the water table is permanently shallow or where there is surface water for most of the time. When the vegetation is cleared or removed by burning, the sand is easily destabilised (CMC, 1999). This can lead to blow-outs and problems with windblown sand.

Both Cape Flats Dune Strandveld and Fynbos ecosystems are threatened by invading alien plant species (Van Wilgen *et al.,* 1992, Richardson *et al.,* 1996, Heijnis *et al.,* 1999). The most important invaders in the coastal areas are the Australian wattles: Rooikrans (*Acacia cyclops*) and Port Jackson (*A. cyanophylla*). In some areas Kikuyu (*Pennisetum clandestinum*) is an important invader. If the invading species are not controlled then they will displace the natural plant and animal communities. Sand mining is an important threat to the remaining Strandveld and dune or sand-plain Fynbos ecosystems. Agriculture is not viewed as a threat

[3] Ibid

in the coastal zone (as defined here) because either the exposure to wind and sea influences makes the area unsuitable or the agricultural potential is inherently low.

The Fynbos and Strandveld communities provide a habitat for a wide variety of fauna including many rare and threatened species (Picker and Samways 1996, CMC, 2000). Many of these species (e.g. frogs, mongooses) are also found inland, with the coast being the natural limit of their distributions. There are some species whose habitat is confined to the coastal zone as defined in this report, including Black Oystercatchers and a number of species of waders (Ryan *et al.,* 1991, Hockey, 1998). Some birds roost or nest, or both, in the coastal zone; these will be described in the relevant coastal units. Cape clawless otters (*Aonyx capensis*) make extensive use of the inshore coastal environment and river mouth areas and the adjacent terrestrial ecosystems of the coastal zone may be important for their survival.

Chapter 1: Coastal Management Roles and Responsibilities

1. Introduction

The City has a coastline of 307km of which it administers approximately 240km with the remaining 67 km being under the control of the Table Mountain National Park. The City's jurisdictional boundary ends at the high-water mark. However, beyond its jurisdictional boundary, the City retains a strong interest in its inshore marine environment as economic activity, risk factors, and social and ecological components are not confined to, nor adhere to these administrative boundaries.

Central to tourism, recreation, sense of place, economic activities and industry, Cape Town's coastline is arguably is greatest economic, social and environmental asset. However, due to the dynamic nature of the coastline, development pressure resulting from desirability, external factors such as climate change, natural hazards such as coastal storms and human induced hazards such as vessel stranding's and oil spills, the coastline must be managed in an integrated and proactive manner to ensure that the social, economic and environmental values are retained.

Further, in December 2009, the President signed the Integrated Coastal Management Act (ICMA) into law. This Act places a number of legal requirements and responsibilities on the City in terms of Integrated Coastal Management. These requirements must be met within a specified timeframe.

As such, clearly defined roles and responsibilities for coastal management across responsible line departments is central to the effective and appropriate Integrated Coastal Management in the City of Cape Town.

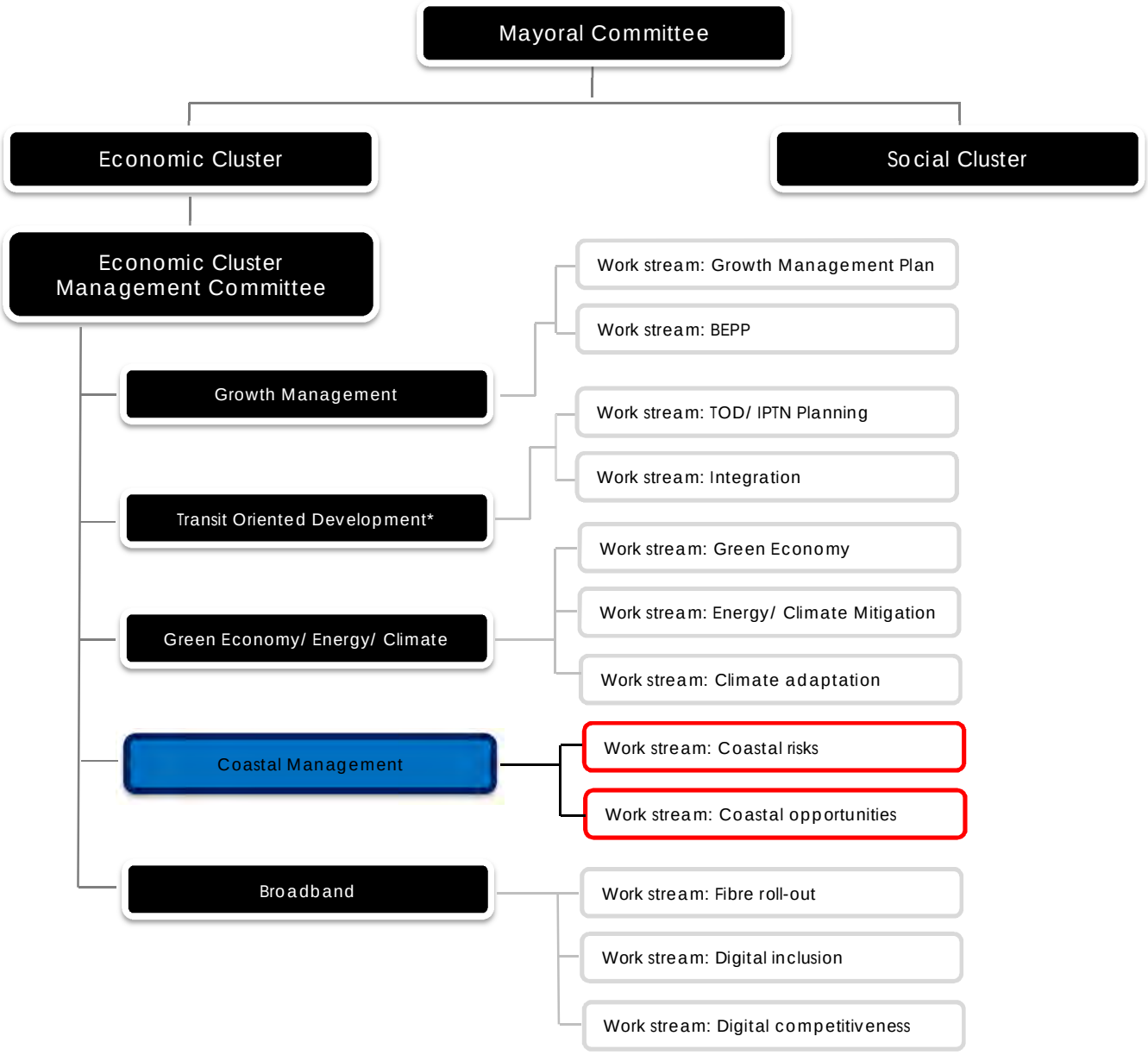
2. Integrated Coastal Management Unit

On the 7th November 2012 the City's Executive Management Team (EMT) approved the establishment of a small Integrated Coastal Management (ICM) Unit within the Environmental Resource Management Department. The primary role of this ICM Unit is to coordinate Integrated Coastal Management across City line functions and with Provincial and National Government. In addition, the City's EMT requested that detailed and defined coastal roles and responsibilities be mapped across all line functions to ensure appropriate accountability and responsibility.

3. Coastal Management Working Group

The Integrated Coastal Management Unit within the Environmental Resource Management Department forms part of a City wide Coastal Management Working Group that reports directly to the Economic Cluster. Work Groups (See Figure 1 for institutional structure of the Economic Cluster Working Group) comprise members from multiple departments, and are formed around specific issues requiring a transversal approach towards resolving these issues. Work Groups report to and operate under the guidance of the Economic Cluster Management Committee (ECMC).

The following structure is proposed for Work Groups in the Economic Cluster:



The intention of the Coastal Working Group is to:

- Facilitate the implementation of the City's Integrated Coastal Management Policy and the Coastal Management Programme.
- Ensure collaboration and shared decision making between all line functions as it relates to coastal management.
- Make decisions on coastal management and operational issues, referring decisions to relevant line departments for responses where required.
- Make recommendations on matters relating to coastal management to the Economic Cluster Management Committee and Economic Cluster.
- Identify coastal priority projects, programmes and interventions.
- Ensuring budget allocation for agreed coastal projects, interventions and programmes.

Membership of the Coastal Working Group

Name	Department
Amy Davison	Environmental Resource Management
Arne Purves	Environmental Resource Management: Compliance
Ben de Wet	Transport for Cape Town
Candice Haskins	Transport for Cape Town
Claire McKinnon	Solid Waste
Darryl Colenbrander	Environmental Resource Management
David Gretton	Ald. Walker's Office
Gert Bam	Sport and Recreation
Greg Pillay	Disaster Risk Management
Gregg Oelofse	Environmental Resource Management
Hanief Tiseker	Economic Development
Helen Jordaan	Sport and Recreation
Henry du Plessis	Transport for Cape Town
Howard Gold	Environmental Resource Management
Ian McDonald	Transport for Cape Town
Joe Olivier	Sport and Recreation
Kier Hennessy	Spatial Planning and Urban Development
Megan Lukas	Sport and Recreation
Pauline van der Spuy	Tourism
Peter Daniels	Disaster Risk Management
Richard Kotze	City Health
Rod Arnold	Transport for Cape Town
Sue Mosdell	Legal Services
Ted Knott	Sport and Recreation
Wilfred Solomons-Johannes	Disaster Risk Management
Representatives: Strategic Policy Unit	
Delyno du Toit	Strategic Policy Unit
Frouwien Bosman	Strategic Policy Unit

Terms of reference of the Coastal Management Working Group

PURPOSE

The CWG will:

1) Be responsible for ensuring the implementation of the City's Integrated Coastal Management Policy and the Coastal Management Programme
2) Ensuring collaboration and shared decision making between all line functions as it relates to coastal management
3) Where appropriate make decisions on coastal management and operational issues. Where required refer a decision formally to the relevant line department for response
4) Make recommendations on matters relating to coastal management to the Economic Cluster Management Committee and Economic Cluster
5) Identify coastal priority projects, programmes and interventions
6) Ensure budget allocation for agreed coastal projects, interventions and programmes

MEMBERS

NAME	TITLE	ROLE
G. Oelofse	Environmental Corporate Governance	Chairperson
S Chippendale	ERMD	Secretariat
G. Bam, J Olivier, H Jordaan, T Knott, M Lucas	Sport, Recreation and Amenities	Members
D Colenbrander, H Gold	ERMD	Members
A Roux, K Cooke	Councillor Support	Members
R Kotze	City Health	Member
B De Wet, C Haskins	TCT (Storm Water)	Member
G Pillay, P Daniels	Disaster Risk Management	Member
A Purves	Law Enforcement	Member
C McKinnon	Solid Waste	Member
P Van Der Spuy	Tourism, Events & Economic Development	Member
H Tiseker	Economic Development	Member
M Vulindlu	Scientific Services	Member
K Hennessy	Spatial Planning	Member
S Mosdell	Legal Services	Member
F. Bosman	Strategic Policy Unit	Policy Analyst
D. du Toit	Capital Programme Monitoring Support	Project Manager
By Invite	Wastewater	As neede
By Invite	Landuse Management	As needed

FOCUS AREAS

Ensure the implementation of the City's CMP, specifically:

i. City of Cape Town Integrated Coastal Management Policy
ii. Coastal Land Policy: Purchase and Leasing
iii. Coastal Set-Back Delineation: Method And Process
iv. Coastal By-law
v. Economic and Spatial Development Framework for the City's Coast
vi. City of Cape Town Zoning Scheme General Coastal Overlay Zone
vii. Coastal Access Land
viii. Coastal Development Nodes – Connecting Communities to the Coast
ix. Coastal Management Roles and Responsibilities
x. Coastal and Sea Defence Decision Framework
xi. Marine and Environmental Law Enforcement Strategy
xii. Coastal Emergency Plans
xiii. Large Marine Animal Stranding Protocol
xiv. Coastal Risk Register
xv. Marine Access Points
xvi. Recreational Use Zones and Regulations
xvii. Shark Safety
xviii. Blue Flag Strategy
xix. Trek-net Fishing Protocol
xx. Dune Management
xxi. Helderberg Marine Protected Area Management Plan
xxii. Coastal Conservancies
xxiii. Estuary Management Plans
xxiv. Water quality monitoring and public health protocol
xxv. Coastal Signage and Information
xxvi. Coastal Cleaning Protocol
xxvii. Coastal Monitoring Programme
xxviii. Education, Awareness, and Training
xxix. City of Cape Town Events Policy

FREQUENCY of MEETINGS

- The Work Group will meet every month
- The Project Team Owners will meet with the Project Manager once a month
- The Project Teams will determine the frequency of meetings depending on the deliverable

REPORTING

- The Work Group will report to the Economic Cluster on the progress of the deliverables every second sitting, i.e. every four months
- The Work Group will report to the ECMC on the progress of the deliverables every second sitting, i.e. every two month
- The Project Teams will report to the Work Group on the progress of the deliverables every month

	DELIVERABLES	OWNER	YEAR
1	**Coastal Risk Registers**: Instill the Coastal Risk Register within the City line departments to record accepted responsibility, rectify within timeframes, close out and monitor a range of issues along the City's coastline	All	Ongoing
2	**Amendments to the Integrated Coastal Management Act:** Ensure implementation of amendments to the Integrated Coastal Management Act. Implications for the City - lease agreements, unlawful structures, coastal access land, coastal outlets and Coastal Protection Zone.	D. Colenbrander and H Jordaan	2015
3	**Coastal Economic and Spatial Development Plan:** Prepare the City's Coastal Economic and Spatial Development Plan	K Hennesy and J Olivier	2015
4	**Coastal Erosion:** Develop a plan to address erosion occurring on the southern end of Table Bay and prepare a financial model as it relates to private coastal properties	D Colenbrander	2015
5	**Boat Launch Permits:** Include beach launch training as part of the skipper's ticket at Zonwabe	G Oelofse	2015
6	**National Environmental Management Act (NEMA) Training:** Train district officers and depot managers on NEMA to improve their understanding of environmental legislation.	G Oelofse, G Bam and H Du Plessis	2015
7	**Muizenberg Parking Area:** Prepare a proposal for a management agreement between the City and the MID, for discussion with Property Management, the MID and with the relevant Sub Council.	G Oelofse	2015
8	**PRASA land:** (coastal corridor between Muizenberg and Simon's Town) Either 1) Enter into a long-term agreement with PRASA around the management of the land, or 2) PRASA allocates land back to the City as coastal public land.	G Oelofse	2015
9	**Luchannon Drive:** Close off the road as a through-road, with bollards placed at either end.	H Jordaan	2015
10	**Fisherman's Lane** Remove the hard infrastructure of the retaining wall and restore this section of the coastline to a more natural state.	H Jordaan	2015
11	**Hout Bay Dune Rehabilitation:** Rehabilitate the Hout Bay Beach area by dealing with sand management	Megan Lukas, Amy Davison	2015
12	**Tidal Pool Management Plan:** Assess the City's tidal pools into the long term, with a specific focus on the identification of those pools that should be maintained and those that should be let go, as well as a tourism/marketing strategy around tidal pools.	Megan Lukas, Nicole du Plessis	2015

4. Coastal Roles and Responsibilities: key principles

The effective and efficient management of the City's coastline is and will always remain dependent on integrated and shared management between and amongst a number of City line functions and departments. A central principle of shared responsibility, collective effort, accountability, common vision and support amongst relevant line departments must remain at the core of coastal management. Within this central principle a number of sub-principles have been applied and form part of the allocation of roles and responsibilities

(1) The primary purpose, role or function of coastal spaces/locations must determine the management of those spaces. Two clear management approaches exist with distinct priorities:

a) **Beach recreation nodes and coastal resorts** are those coastal spaces with direct and associated amenities that are managed primarily as social spaces for the purpose of recreation. These well-defined and explicit beach recreation nodes with direct amenity facilities require significant daily management, investment and upkeep. The overall lead department for responsibility in these spaces must be Sport Recreation and Amenities.

b) **Coastal Zone** which is the remaining coastal space and coastal system beyond the immediate recreational amenity nodal points. The coastal zone must be managed primarily as a system where the coastal processes and ecology are the primary management function. The overall lead department for responsibility for the management and administration of the natural system spaces must be the Integrated Coastal Management Unit in the Environmental Resource Management Department.

(2) Whilst the functionality of City assets determines the lead department responsible for management and administration of these assets, the core principle remains that the coastline is a shared responsibility, requires collective effort, accountability, common vision and as such support amongst relevant line departments to the lead department is critical.

(3) The coastline is a complex space, often requiring specialist technical expertise for management. This process of defining coastal roles and responsibilities has recognised that roles and responsibilities should be assigned wherever possible according to the key functional responsibility, mandate, skills set and capacity of City departments

(4) Ongoing communication and coordination between departments must be entrenched through the establishment of a quarterly coastal coordination meeting

5. Coastal Roles and Responsibilities: per line department

The defined departmental roles and responsibilities for Integrated Coastal Management are listed in the table below.

INTEGRATED COASTAL MANAGEMENT ROLES AND RESPONSIBILITIES

Policy, Legislation and Strategy

Outcome / issue / policy / regulation / risk / management	Lead Responsible Dept. / Unit	Key Partner and implementer Dept. / Unit	Budget
Coastal Management Programme as per ICMA	ICM unit to coordinate, compile and complete	• SRA, City Parks, Stormwater and Sustainability Dept, Safety and Security, Solid Waste, DRM, City Health, Transport for Cape Town (TCT) – Maintenance and Planning Departments. • The CMP to reflect the needs, operating protocols and responsibilities of all line departments. • ICM Unit to work with relevant line departments to develop protocols and operational plans as needed to be included in the CMP	Internal compilation - public advertising (ERMD)
Coastal Setback Line	ICM unit to coordinate, compile and complete	SPUD, PBDM	Internal
Coastal Policy	ICM unit to coordinate, compile and complete	• SRA, City Parks, Stormwater and Sustainability Dept,, Safety & Security, Solid Waste, DRM, City Health, TCT – Maintenance and Planning Departments, SPUD, PBDM • ICM Policy to reflect needs and inputs from all relevant departments.	Internal compilation - public advertising (ERMD)
Coastal Bylaw	ICM unit to coordinate, compile and complete	• SRA, City Parks, Stormwater and Sustainability Dept,, Safety & Security, Solid Waste, DRM, City Health, TCT – Maintenance and Planning Departments, SPUD, PBDM • Bylaw to reflect needs and inputs from all relevant departments.	Internal compilation - public advertising (ERMD)

Estuary management	• ICM unit to coordinate development of Estuary Management Plans. • Estuaries managed in accordance with line responsibilities as in plans - ERMD, TCT – Maintenance and Planning Departments, and Water & Sanitation. • Estuary Management Plans to be incorporated into CMP	TCT – Maintenance and Planning Departments, Water & Sanitation, Safety & Security, ERMD, SRA, City Parks, DRM	ERMD for plans, operating budget as per line responsibilities defined in plans
ICMA Exemptions for existing infrastructure below high water	ICM unit to coordinate, compile and complete	All relevant line departments to provide correct and up-to-date information	Internal work - no budget required
Monitoring of implementation and compliance to ICMA	ICM Unit to monitor	ICM Unit to prepare an annual ICMA compliance report. This to be formally submitted to EMT, DMAF, MAYCO and Council.	Internal work not budget required
Coastal Scenic Routes	SPUD	ERMD, City Parks, PBDM, SRA	Internal
Coastal Signage Standards and Template	• SRA and Corporate Communications	Departments to implement as per their needs using the standards and template	Design and template - ERMD
Coastal Access Land and Management Plan	ICM unit	SRA, TCT – Maintenance and Planning Departments, City Parks, SPUD and PBDM to comment and confirm	Internal work not budget required
Quarterly Coastal Coordinating Committee	ICM Unit to coordinate,	All relevant line departments	Internal

National and Provincial Coordination			
Outcome / issue / policy / regulation / risk / management	**Lead Responsible Dept. / Unit**	**Key Partner and implementer Dept. / Unit**	**Budget**
Marine related issues: MLRA (animals and plants), Trek Netting, Commercial and Recreational Fishing	ICM Unit to coordinate City perspective	DEA, DAFF, SOS, WWF	None at a national coordination level
Marine related issues - oil, pollution and shipping	ICM Unit and DRM to coordinate City position	DEA, DAFF, DoT, SAMSA	None at a national coordination level
Marine related issues - animal stranding and carcasses	ICM Unit to coordinate with national	DEA	None at a national coordination level
Coastal issues - Vehicles on Beaches (Off Road Vehicle Legislation)	ICM Unit to coordinate City perspective, comment on permit applications	DEA	None at a national coordination level
Provincial Coastal Committee	ICM Unit to represent City	DEADP	None at a provincial coordination level
Marine Protected Areas	ICM Unit to coordinate City perspective	DEA	None at a national coordination level
Law Enforcement and anti-poaching	Marine and Environmental Law Enforcement Unit	DAFF, SAPS, TMNP, SARS	Safety & Security and ERMD
Working for the Coast	ERMD	National Department of Social Development	ERMD
TMNP Marine and Coastal Coordination			
Outcome / issue / policy / regulation / risk / management	**Lead Responsible Dept. / Unit**	**Key Partner and implementer Dept. / Unit**	**Budget**
Liaison and coordination	ICM Unit	TMNP	None

City Functions: Daily			
Outcome / issue / policy / regulation / risk / management	**Lead Responsible Dept. / Unit**	**Key Partner and implementer Dept. / Unit**	**Budget**
Preparation of Dune Management Plans	ICM Unit to prepare dune management plans for all areas that require active and ongoing dune management by the City	Input as needed by all relevant departments	• Dune management budget must be allocated as a line item on SRA budget. • ICM Unit to be given access to budget for planning purposes
River mouth management - infrastructure or coastal risk	ICM Unit, Stormwater and Sustainability dept		TCT – Maintenance and Planning Departments vehicles
Coastal pedestrian walkways that run along the coastline	• Where the primary functionality is that of a pedestrian walkway, in areas defined as natural coastal areas the ICM Unit will be responsible. • In high intensity beach nodal points SRA will be responsible. • Where the walkway is on top of a sea wall or infrastructure the primary function of which is to protect property, walkway rests with the relevant department responsible for the sea wall. • To ensure clarity these walkways and responsibility are to be listed by name and location.	All relevant departments	Budget allocation as minuted in EMT Minutes to be provided to ICM unit for this new operational responsibility
Sharks and shark safety	• ICM unit to coordinate and manage all aspects of shark safety, research and awareness as well as respond to shark attacks. • ICM unit to undertake review of shark safety and roles of all parties from national to local	• SRA to be consulted, informed and kept up-to-date at all times. • SRA to actively increase their role and participation in the City's shark safety programmes over time. • DRM to manage the SMS notification and coordinate	ERMD Budget allocated to ICM Unit

		emergency response to shark attacks	
Coastal alien invasive species management	• ICM in natural coastal areas and SRA at recreational beach areas. • Alien Invasive Species Unit will implement the required management action utilising responsible department budget.	• Alien Invasive species unit to implement management programmes. • ICM Unit to ensure budget availability to Alien Invasive Species Unit in natural coastal areas. • SRA to ensure budget availability to the Alien Invasive Species Unit in nodal points and Coastal Resorts	ERMD Budget, SRA budget
Non-indigenous and exotic plant use for landscaping and dune management on the City's coastline	ICM Unit to coordinate the development of a Coastal Flora Protocol as part of the CMP to guide and regulate the use of non-indigenous and exotic plants on the City's coastline and for the purpose of dune management	SRA and City Parks to work with the ICM Unit in developing the Coastal Flora Protocol	Internal
Marine animal stranding	ICM Unit to coordinate and update marine animal stranding policy, retain overall responsibility for the policy and protocol, liaise with DEA and other agencies.	DRM, SRA, Safety & Security, Fleet Services, and Solid Waste Management to respond and operate in accordance with policy and protocol	Spectrum of budgets as per policy and protocol
Management of marine sands on roads and stormwater infrastructure	TCT Maintenance Department	ICM Unit, SRA	

City Land-use Management, City-Wide Programmes and Economic Development			
Outcome / issue / policy / regulation / risk / management	**Lead Responsible Dept. / Unit**	**Key Partner and implementer Dept. / Unit**	**Budget**
Coastal Overlay Zone	• ICM Unit in conjunction with PDBM to coordinate the preparation of the Coastal Overlay Zone as per the new City Zoning Scheme. • **Stormwater and Sustainability Department to determine the flood risk regulations in the Overlay Zones** • Council and zoning scheme approval to apply	Stormwater and Sustainability dept., PDBM, SPUD and SRA to provide input and review	ERMD for public comment
Ad hoc set back line applications	ICM unit to coordinate City comment on ad hoc setback line applications	ERMD, SPUD, PBDM, SRA	None
Coastal Education and awareness	ERMD's Communication and Environmental Education branches to coordinate coastal information and awareness at the broadest level and provide input to individual projects	• ICM unit, SRA and Safety & Security to undertake issue/programme specific education and awareness as well as location specific education and awareness. • ERMD's Coms and EE branch to advise and assist where appropriate	Various and all
Coastal Heritage Management	ERMD District Environmental and Heritage Branch	• District ERMD Office , SANParks, Heritage Western Cape, South African Heritage Resource Agency.	Various and all
Coastal encroachments	ICM unit via the proposed Coastal Bylaw	Implementation in conjunction with City Parks, ERMD District offices, SRA, Legal Services, PBDM, and Law Enforcement	Various and all
EIA and Building Plan comments	ERMD District Environmental and Heritage Branch	Inputs from line functions as per the standard procedure	None

Coastal Access Land and Management Plan	ICM unit to determine and map coastal access land and incorporate into the new Coastal Overlay Zone as part of the City's Zoning Scheme.	• Regulated through the ICMA as well as the City's Zoning Scheme. • All relevant line departments consulted prior to access land finalisation	None

Coastal Risk Management			
Outcome / issue / policy / regulation / risk / management	**Lead Responsible Dept. / Unit**	**Key Partner and implementer Dept. / Unit**	**Budget**
Coastal Monitoring Programme	ICM Unit	• GIS and Land Survey. • Coastal Monitoring Database to be made available on request to all line departments	ERMD
Risk assessment and determination across the coast	ICM Unit to determine risks at a City level to retain a coastal risk register with priority areas for intervention	• Line departments to be involved on a location by location basis. • Responsibilities for remedial action determined on a risk by risk basis • Stormwater and Sustainability dept. to determine risk for roads and stormwater infrastructure. Risks at and adjacent to estuaries to be determined by Stormwater and Sustainability	• None, internal process for determining risk. • Remedial action budget determined on a risk by risk basis
Risk remedial plans / interventions	• ICM Unit to prepare, coordinate or facilitate the development of risk remedial plans and interventions based on the Coastal Risk Register. • This must include a register of degraded or inappropriate infrastructure for demolition	Line departments to be involved on a location by location basis.	• On small interventions, responsible line departments to provide budgets. • On larger scale interventions, unique funding mechanisms likely due to scale of costs and these must be taken through a Council process

Localised infrastructure damage from storm events or erosion	• ICM unit to maintain and up-to-date "Coastal Infrastructure Damage" register. • Line functions to provide information on an ongoing basis to ICM Unit	• ICM Unit to assist and advise on appropriate solutions, responsible line department to undertake repair and maintenance in line with recommendations. • Register to be updated accordingly with solutions	Relevant line department to budget for repairs and maintenance
Approvals and compliance of private property who are doing "self-protection"	ERMD District Environmental Staff in consultation with ICM Unit	ERMD District Environmental Staff	No budget needed

BEACH AND COASTAL RESORT MANAGEMENT ROLES AND RESPONSIBILITIES

Policy, Legislation and Strategy			
Outcome / issue / policy / regulation / risk / management	**Lead Responsible Dept. / Unit**	**Key Partner and implementer Dept. / Unit**	**Budget**
Informal trading and markets on the coastline	• SRA to determine and lead a single City policy. • Must align with the City's Economic Development and Social Development Strategies and consider environmental conditions and constraints. • Policy should include informal trading that occurs beyond beach areas and cover informal traders operating in spaces and lay-byes along the coastal scenic routes	All relevant City Departments to provide input as needed	SRA Budget where needed
Coastal Resort Development and Upgrades	SRA in accordance with the CSEDP, overlay zones and legislation	All relevant City Departments to provide input as needed	SRA

Recreational use zones and activities (kayaking, surfing, kite-surfing, jetskis etc.)	• SRA to prepare standards, define use zone and guidelines for entire coastline.	• All relevant departments to provide input. • Law Enforcement to oversee compliance and manage non-compliance	Internal planning
Domestic animals on beaches / coastline	• SRA to prepare standards, define use zone and guidelines for entire coastline.	• All relevant departments to provide input. • Law Enforcement to oversee compliance and manage non-compliance	Internal
Facility and amenity development and upgrades on the coastline	SRA	• ICM unit to assist where appropriate with advising and guidance on compliance with national legislation such as NEMA and the ICMA • SPUD and PBDM to assist from a land-use and planning perspective	SRA
New Slipway development	SRA	ICM Unit to provide input, guidance and support.	SRA as well as various funding partnership possibilities
Blue Flag	SRA	SRA with assistance from all relevant and responsible departments	SRA with contributions (i.e. EE) from ERMD and others

National and Provincial Coordination			
Outcome / issue / policy / regulation / risk / management	**Lead Responsible Dept. / Unit**	**Key Partner and implementer Dept. / Unit**	**Budget**
Life Saving	SRA to finalise operating, partnership and funding agreements with lifesaving.	SRA to assess that lifesaving activities and actions comply with recreational use zones standards and regulations	SRA Budget

City Functions: Daily			
Outcome / issue / policy / regulation / risk / management	**Lead Responsible Dept. / Unit**	**Key Partner and implementer Dept. / Unit**	**Budget**
Dune management at beach nodal points and in Coastal Resorts	SRA District Management with new Beach Coordination Capacity to implement and manage Dune Management Plans and Programmes as developed by the ICM Unit	ICM unit to assist, support and advise on an ongoing basis where needed.	SRA
Wind Blown Sand at beach nodal points	SRA District Management with new Beach Coordination Capacity	ICM unit to assist, support and advise where needed.	SRA
Road infrastructure within Coastal Resorts	SRA and TCT Maintenance Dept.		SRA budget
Tidal Pool Management	Managed as part of the SRA area amenity	ICM unit to provide advice, guidance and technical input as to the maintenance and repair of tidal pools as and when requested by SRA	SRA Budget
Facility and amenity management and maintenance on the coastline	SRA	All other departments as needed	SRA Budget
Landscaping management at beach nodal points and in coastal resorts	SRA	SRA	City Parks
Slipways Management	SRA to manage and maintain existing slipways and where possible meet the requirements of the slipway permits	ICM unit to provide technical input to maintenance and repair programmes while also assisting with programmes and partnerships that would result in law enforcement presence being located at key slipways	SRA Budget
Implementation and Booking of approved events and filming	SRA District Offices	Line departments as needed	SRA

SPECIALIST AND TECHNICAL COASTAL ROLES AND RESPONSIBILITIES: VARIOUS

Policy, Legislation and Strategy			
Outcome / issue / policy / regulation / risk / management	**Lead Responsible Dept. / Unit**	**Key Partner and implementer Dept. / Unit**	**Budget**
Coastal Spatial and Economic Development Plan	• SPUD in conjunction with SRA, Economic Development, • ICM Unit to prepare a City wide CSEDP	PBDM, SRA, Tourism and Economic Development to give input	Co-funded

City Functions: Daily			
Outcome / issue / policy / regulation / risk / management	**Lead Responsible Dept. / Unit**	**Key Partner and implementer Dept. / Unit**	**Budget**
Coastal and Beach cleaning	• Solid Waste in accordance with Coastal and Beach Cleaning Protocol.	ICM Unit, SRA and TCT Maintenance	Solid Waste
River mouth management - terrestrial flood risk	Stormwater and Sustainability	TCT – Maintenance and Planning Departments, and ICM unit	TCT
Events and filming permits across coastline	Economic Development: Filming and Events office to coordinate application assessment and approval	• ICM Unit, ERMD and SRA to provide comment and conditions on individual permit applications. • Law enforcement and ERMD to monitor compliance. • SRA to provide ad hoc permits for various beach uses such as weddings etc.	Economic Development
Formal and paved parking areas and associated edging and walls	TCT	TCT as per their own management and operational plans	TCT budget
Sea Walls where the primary function of the sea wall is protection of infrastructure and property	TCT	TCT as per their own management and operational plans	TCT budget

Oil spill	DRM has overall responsibility for the Oil Spill Contingency Plan as well as line function coordination	• All relevant departments to respond as per the Oil Contingency Plan. • ICM unit to sit on the national oil spill task team	Spectrum of budgets as per policy and protocol
Pollution event	DRM has overall responsibility for line function coordination in response to a pollution event	All relevant departments to respond in line with DRM coordination	Spectrum of budgets as per policy and protocol
Ship wreck / stranding	• DRM to coordinate between agencies and city line functions • ICM unit to coordinate environmental response and control. • Both DRM and ICM unit to sit on the JOC as per the draft shipping protocol	Relevant departments to respond in accordance with DRM needs and coordination	Spectrum of budgets as per policy and protocol
Enforcement, policing and compliance at nodal points and coastal resorts	Safety & Security	SRA	Safety & Security
Land-use change approval	PBDM in accordance with the Coastal Overlay Zone, SDF, Coastal Policy, CSEDP, Coastal Bylaw and Setback Line	ICM Unit, ERMD and SPUD to provide comment and input	None
Culverts, stormwater drains	TCT, in addition the coastal overlay zone must reference service infrastructure	TCT with input from ICM unit as needed	TCT
Coastal law enforcement for environmental and marine compliance	Marine & Coastal law enforcement unit	Safety & Security, ERMD, SRA, City Parks, DRM	Safety and Security
Water quality monitoring	Scientific Services	Stormwater and Sustainability Dept	Stormwater and Sustainability dept.
Health Warnings	City Health as per signage guidelines and template	TCT and SRA where appropriate	City Health

List of abbreviations:

CMP – Coastal Management Programme
CSEDP – Coastal Spatial and Economic Development Plan
DAFF – Department of Agriculture, Forestry and Fisheries
DEA – Department of Environmental Affairs
DEADP – Department of Environmental Affairs and Development Planning
DMAF – Disaster Management Advisory Forum
DoT – Department of Transport
DRM – Disaster Risk Management
EE – Environmental Education
EIA – Environmental Impact Assessment
EMT – Executive Management Team
ERMD – Environmental Resource Management Department
ICM Unit – Integrated Coastal Management Unit – based within ERMD
ICMA – Integrated Coastal Management Act
JOC – Joint Operations Centre
MAYCO – Mayoral Committee
MLRA – Marine Living Resources Act
NEMA – National Environmental Management Act
PBDM – Planning and Building Development Management
SAMSA – South African Maritime Safety Authority
SAPS – South African Police Service
SARS – South African Revenue Service
SOS – Save our Seas Foundation
SPUD – Spatial Planning and Urban Design
SRA – Sports, Recreation and Amenities
TCT – Transport for Cape Town
TMNP – Table Mountain National Park
WWF – World Wide Fund for Nature

Chapter 10: Coastal and Sea Defence Decision Framework

1. Introduction

Much of the City's coastline has been developed with fixed infrastructure, leaving little room to accommodate coastal changes resulting from coastal erosion and accretion or the predicted effects of anthropogenic climate change. These two coastal risks are in fact what may be considered as compounding risks where coastal erosion exacerbates the risks associated with climate change.

Coastal erosion is occurring at a number of points along the City's coastline as a direct result of urban altered coastal processes through urban development. An example is the southern end of Table Bay where erosion (recession) of the coastline has been calculated at a little over 35m in the last 45 years.

Climate change on the other hand, predicts that a number of co-acting processes present long term risk to the City's coastline. These co-acting processes are the predicted increase in both the intensity and frequency of coastal storms in association with a slow and gradual increase in mean sea level. There is some uncertainty over the extent and rate of climate change induced sea-level rise. What is clear is that globally sea-levels are rising, the rate of rise is increasing and relatively small increases in mean sea-level have disproportionately large impacts on the damage that storms cause to the coastal zone. Current global consensus suggests mean sea level will rise by 0.76cm by the year 2100.

Brundrit et al., 2008 estimated that 25 km^2 of land interior to the City of Cape Town's 307 kilometre coastline is currently exposed to high sea-events 2.5 metres above land levelling datum (LLD), caused by a coinciding extreme high tide and storm surge.

As a result, the City will at some point in the medium term have to consider coastal and sea defences to protect the coastline and infrastructure. How these decisions are made, the type of coastal and sea defences implemented and the mechanisms for doing so have substantial implications for the city's coastal environment. Poor or ill-informed decision making may well exacerbate the problem and increase risk and accelerate erosion, while inappropriate decisions may lead to the permanent loss of existing beaches and coastal environments. As such, a well-considered and structured framework for making these decisions is presented here to ensure that when coastal and sea defences are justified, the most appropriate decision in the best interests of the long term future of the coastline are made.

Finally, coastal and sea defences are notoriously costly and this financial issue is further compounded by the complexity of private property and its exposure to risk. As a result, unique and novel financial mechanisms for coastal and sea defences will also need to be considered on a case by case basis.

2. Context: Risk is not equal across the coastline

Risk requiring likely intervention in the medium term is determined by a number of factors which give an indication of vulnerability, namely:

a) **Wave set-up** as influenced by bathymetry, swell direction, swell conversion and shoaling. Wave set-up is a function of wind, swell direction and the extent to which waves are refracted by the coastal topography; refraction reduces wave energy. Brundrit shows that most significant sea-surges off the Cape Town coast approach from the south-west (200 - 260°). Coastlines that front directly to these seas are the most vulnerable. Offshore reefs, islands and wave refraction typically reduce exposure to wave set-up.

b) **Wave run-up** as influenced by the topography of the coast and bathymetry. Wave run-up is defined by the extent to which waves advance inland once they have broken, and the energy with which they

advance. Wave run-up is reduced by bottom friction and accordingly coastlines with gradual gradients, coarse shallow sea-surface bottoms (such as those with reefs) and beaches protected by kelp tend to be less prone to wave run-up. Conversely where deep water is found close to the coastline, wave run-up can cause aggressive coastal erosion and damage. Wave run-up can be influenced by "wave focusing" – the convergence of waves from different angles, as is the case at Kogelbaai in False Bay.

c) **Geological predisposition** of the coastline as influenced by the hardness or softness of the coastline. Coastal geology determines the hardness or softness of the coastline. The hardness (rockiness or sea-wall) or softness (sand or vegetation) of a coastline in turn determines its "natural" ability to withstand or recover from sea-level rise risks and its predisposition to storm damage. As a rule of thumb soft coastlines are more able to absorb wave energy and withstand sea-level rise impacts than hard coastlines, with the exception of high elevation cliff areas such as Chapmans Peak. Well engineered coastlines can, of course, reduce sea-level rise risk but the danger is that poorly engineered coastlines either transfer or concentrate wave energy onto a single point or are over-topped by high seas. The engineering of coastlines usually takes place at the expense of natural buffers, and where (hard) engineered defences are breached the coast is particularly vulnerable. In this way some of the most vulnerable coastlines are those that involve a combination of hard and soft surfaces. Roads built on beaches and sea-walls in conjunction with sand dunes, are particularly vulnerable.

d) **The extent and nature of coastal development**. From the City of Cape Town's perspective, coastal vulnerability is a function of the assets (natural or constructed) that the coastline contains. This is true in two ways. Firstly the assets, whether houses, roads or wetlands, are a part of the coastline's composition and secondly, it is these assets that are vulnerable to damage and thus determine the value (both economic and strategic) that is at risk from sea-level rise.

3. Options

There are a wide range and variety of what could be considered coastal and sea defence options. These can however be categorised into three broad categories:

- Infrastructure engineered interventions – sea-walls, groynes, barrages and barriers, raising infrastructure, revetments, rock armour, dolosse and gabions, off shore reefs, water pumps, beach drainage.
- Biological interventions – dune cordons with vegetation, dune manipulation, estuary and wetland rehabilitation, kelp beds, beach nourishment
- Socio-institutional interventions – managed retreat, external insurance market corrections, land expropriation

4. Decision Making Framework: Principles

- Risk averse decision making
- Decisions centred on the common good
- Apply Multi-Criteria Assessment to decision making

5. Multi-criteria assessment (MCA)

Multi-criteria assessment is a robust means of decision making in the complex space of coastal and sea defences. Under this approach options are interrogated in terms of an agreed upon set of assessment criteria, with the intention being to create multi-disciplinary consensus on the most appropriate course of action. Crucially MCA is well suited to create the type of institutional capacity that is required for effective decision making in complex and dynamic environments such as the coastline.

MCAs have been criticised for their subjectivity. The questions, “Who gets to select the criteria?” and “Who gets to perform the assessment?” are legitimate, but crucially MCAs are capable of bringing together South Africa’s particularly divergent development needs and integrating the needs of private land owners, local governments, provincial governments, various departments within national government and conservation authorities all of which have responsibilities towards Cape Town’s coastline.

For the City of Cape Town the range of criteria that are relevant include:

- **Risk reduction:** The extent to which the options reduce risk.
- **Ease of implementation:** Not all desirable responses are possible, either due to the institutional complexity involved in implementing them or their cost. In the case of the City of Cape Town, it is particularly important to identify who is responsible and who will pay for the intervention. Options should be selected commensurate with capacity to deliver them effectively.
- **Positive externalities:** The extent of positive externalities associated with the option. Does the implementation yield, or make more likely, benefits that are not related to coastal erosion or sea-level rise.
- **Scope for mal-adaptation:** Some options, and particularly infrastructural options, are more difficult to execute correctly. Options should be selected cognisant of the need to avoid unintended negative consequences. This should include unintended negative consequences of uncoordinated private efforts.
- **Cost:** Budget constraints inform decisions and the extent of reduced impact per unit investment over the long term remains crucial.
- **Reversibility and flexibility:** Given that the precise extent and nature of erosion and sea-level rise impacts is not known, those options that can be reversed or altered as more information becomes available should be considered preferable.
- **Retention of complementary options:** Combinations of options tend to be more effective than single approaches but not all options permit complementary solutions. Where possible complementarily options are favourable.

Effective options should be socio-economically progressive and transfer risk away from Cape Town’s communities.

6. The City’s Coastal and Sea Defence Decision Making Framework

The following process will be applied when it has been determined that an intervention of coastal and sea defences is required to protect the City’s coastline from erosion or increased infrastructural damage and risk arising from sea level rise and/or storm surge events.

a) Determination of extent and special scale of the problem
   - Property ownership
   - Type of coastline – cliff/rocky/sandy
   - Nature and degree of risk

b) Determination of responsibility and roleplayers
   - Government organisations
   - Private property owners

c) Determine lead agency responsibility. Where this is deemed to be the City, the lead line department responsibility must be determined and agreed
d) Establishment of project task team representing all relevant roleplayers
e) Undertake relevant coastal studies to assess coastal dynamics and possible protection measures
f) Application of the Multi-Criteria Assessment as per the matrix below to outcomes of studies in e) above:

	Risk reduction	Positive externalities	Institutional complexity	Scope for maladaptation	Cost	Contribution to GHG mitigation	Reversibility and flexibility	Retention of complementary options	Equality implications	SUM
Sea walls										
Groynes										
Barrage to lagoon										
Raising infrastructure										
Dolosse										
Off shore reef										
Beach nourishment										
Dune cordons and vegetation										
Estuary and wetland rehabilitation										
Kelp beds										
Vulnerability mapping										
Apply coastal buffer zone										
Early warning										
Insurance market correction										
Risk communication										
Disaster management focus										
Managed retreat										

1= poor, 2= neutral/ moderate, 3= excellent

Note: The quantification should not, however, be exploited for inference purposes. In drawing inference, however, the distinction between a cumulative score of 18 and 19 should not be seen as the basis for decision making. MCAs are useful in identifying generally better options, and screening the options confronting decision makers. It is possible to refine the screen, scrutinise options under new criteria and even re-weight specific criteria that are deemed more important than others.

g) Based on the MCA, propose top two most suitable options
h) For each of the two most suitable options, determine formal financial scenarios:
   - Budget allocation from a responsible City department where the City is deemed solely responsible for implementation
   - If multiple stakeholder responsibility (especially in the case of private landowner involvement) or other government agency, propose a financial model for financing implementation. This may require a number of agreements to be established and to date is a novel approach that will require development.
i) Determine environmental authorisation requirements and responsibilities

j) Submit detailed report on all options, recommending preferred option, to Council for decision making
k) Financial and implementation options must include long term maintenance and management budgeting and responsibility
l) Implement

7. Long Term Monitoring

As part of the Coastal Monitoring Programme, long term monitoring of the coastal impacts (positive and negative) must be recorded annually in the Coastal Monitoring Database.

Where negative impacts are established, such as increased or associated erosion, remedial measures must be applied as per this standard protocol.

Chapter 11: Marine and Environmental Law Enforcement Strategy

1. Introduction

The City of Cape Town has over 300km's of coastline, one of its greatest economic, social and environmental assets. The City's jurisdiction is determined by the high-water mark; however, economic, recreational, environmental and illegal activities operate across these jurisdictional boundaries.

The inshore marine and coastal environment including the adjacent terrestrial environment is a central component to Cape Town offering many positive opportunities and attributes. Unfortunately, the increasing trend of illegal activities and the lack of adherence to our country's laws and City's by-laws are impacting negatively on the marine and coastal environment, with a subsequent negative impact on residents, local livelihood opportunities and the ecotourism potential of the City.

2. Rationale

Marine and coastal management is a national government competency, but lack of resources, institutional complications, and an extensive national coastal and marine environment has resulted in limited actual and visible policing in the inshore marine and coastal environment, including the small boat harbours in Cape Town.

The Department of Agriculture, Forestry and Fisheries (DAFF) has an active programme in supporting municipalities to become operationally effective in the near inshore marine and coastal environment within the municipal boundaries in order that they may support DAFF's law enforcement and compliance efforts.

There is increasing recognition that poor inshore coastal and marine law enforcement has a direct relationship with Cape Town's many social challenges, including:

- Loss of recreational areas for the general public due to criminal activity and related safety concerns.
- Lawlessness across the spectrum from minor offences to serious offences being considered the societal norm with little or no consequences.
- Poor public perception of the authorities' ability to regulate and manage society in an equitable and fair manner.
- Natural resource depletion, through unsustainable practices, impacting on economic and employment sustainability.

The City of Cape Town has prioritised law enforcement and compliance as one of the key strategies to create the Opportunity City, the Safe City, the Caring City, the Inclusive City and the Well-run City. In this regard Mayoral Committee Member for Safety and Security, Alderman J.P Smith has provided his support and approval for the development of a City of Cape Town Marine and Environmental Law Enforcement Strategy and an associated specialised Marine and Environmental Law Enforcement Unit.

This draft strategy outlines the elements and priorities of the Marine and Environmental Law Enforcement Strategy for the City.

3. Strategic Objectives

The following five key strategic objectives collectively form the Marine and Environmental Law Enforcement Strategy. Progress and success of the strategy will be measured and monitored both in the law enforcement achievements on the ground as well as in meeting and implementing each of these five strategic objectives:

Strategic Objective 1:

In partnership with DAFF, Table Mountain National Park (TMNP), CapeNature, Dept. Environmental Affairs (DEA), SAPS Border Police, South African Maritime Safety Authority (SAMSA), SARS Customs and Dept. Environmental Affairs and Development Planning (DEADP) develop and formalise a joint Cooperative Marine and Environmental Law Enforcement Strategy that includes formal partnership agreements between relevant agencies as required for collaborative action and operations.

This strategy is to be developed to focus on joint operations that target and focus on marine poaching, compliance with the Marine Living Resources Act (Act 18 of 1998) by commercial rights/ permit holders and recreational fishers and to improve inter-agency cooperation and actions.

Strategic Objective 2:

Establish a specialist City Marine and Environmental Law Enforcement Unit, within Law Enforcement and Specialised Services that is highly visible, effective and able to respond to marine and coastal transgressions throughout the City's jurisdictional area.

In collaboration with the Environmental Resource Management Department, develop the Marine and Environmental Law Enforcement unit into a specialised unit that is properly equipped, capacitated and trained to handle all coastal, marine and terrestrial environmental law enforcement transgressions, with clearly branded and identifiable City vessels and vehicles.

The specialised unit would be tasked with addressing the following key enforcement priority areas:

1. Public Safety and security at coastal facilities and amenities by addressing hotspots through targeted actions, general awareness raising and communication with the public and public water safety and rescue.
2. Visible coastal inshore boat patrols and policing, especially during peak season and during periods of increased activity in the inshore coastal environment (ecotourism, fishing etc.)
3. Interface and management of recreational/commercial fishing conflict areas (e.g. jetski's, trek netters etc.)
4. Policing and regulating off road vehicles in the coastal zone.
5. Inspecting recreational fishing permits and activities.
6. Application of the Marine Living Resources Act (Act 18 of 1998) regulations.
7. Proactive approach to identifying and responding to new threats and hot spot areas.
8. Application of environmental legislation and regulations in the coastal zone.
9. React and manage all coastal law enforcement emergencies and issues as they arise.
10. Provide access control, support and policing at slipways during peak activity times.

Strategic Objective 3:
Establish a coastal and marine hotline reporting number through City's central call centre that is widely communicated to the public. Ensure that all calls are answered, recorded and responded to.

Strategic Objective 4:
Complete an assessment of coastal infrastructure development and requirements that would facilitate improved marine and environmental law enforcement, reduce pressure on existing infrastructure and increase legal economic and social opportunities thereby taking back the space from criminal elements.

Strategic Objective 5:
Complete an assessment of regulatory coastal signage to ensure that the coast line is adequately and appropriately regulated and the public are well informed.

4. Steps to Achieving the Five Strategic Objectives

In working towards achieving the five Strategic Objectives, the following requirements have been prioritised for action:

1. **Governing Legislation**
   Assessment of applicable legislation and current mandates in terms of the legislation.

2. **Define Roles and Responsibilities**
   The roles and responsibilities of the various City branches in dealing with marine and coastal law enforcement and compliance must be clearly defined and communicated.

3. **Staff Assessment**
   An initial audit of the current resources and capacity within the existing Law Enforcement Section's Marine Unit and other relevant branches within the City is required:
   a) Number of personnel
   b) Structure, responsibility, reporting lines and contact details.
   c) Current operating budget allocations
   d) Available resources and equipment
   e) Current areas of operation
   f) Current hours of operation
   g) Current "*modus operandi*" of day to day operational effectiveness.

4. **Priority training interventions**
   a) Skippers license
   b) Boat and jet ski handling
   c) Fisheries Inspectorate Training
   d) Marine and boating regulations
   e) Marine Living Resources Act regulations
   f) Other marine and coastal regulations/by-laws
   g) Life saving and first aid

5. Roles and Responsibilities

ERMD will assist with coordination, facilitation and support to the specialised Marine and Environmental Law Enforcement Unit and lead the collaboration with partner agencies such as DAFF, DEA, SAPS Border Unit, CapeNature and TMNP.

Law Enforcement and Specialised Services branch will provide the financial and human resources identified in the strategy and together with ERMD investigate potential future funding sources to expand, capacitate, equip and maintain the effectiveness of the specialised Marine and Environmental Law Enforcement Unit.

Chapter 12: Coastal Emergency Plans

1. **Shipping Incident Disaster Risk Management Plan**
2. **Cape Zone Coastal Oil Spill Contingency Plan**

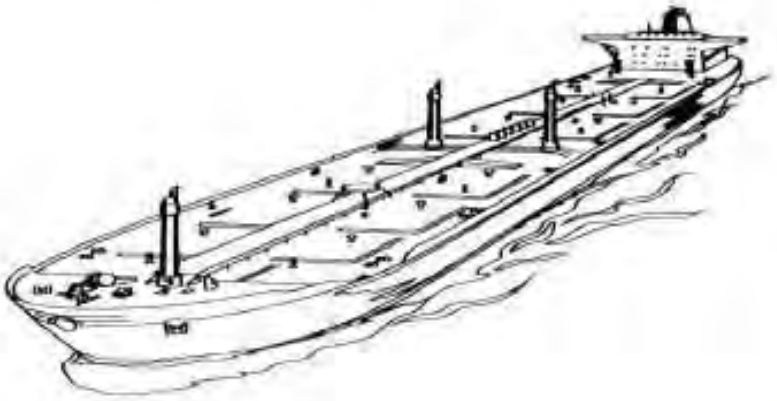
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DISASTER RISK MANAGEMENT - CAPE TOWN -

D. Plan – T3

SHIPPING INCIDENT DISASTER RISK MANAGEMENT PLAN



REV 0 **FEBRUARY 2014**

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Date: 2014-01-27	Date: 2014-01-28	Date: 2014-02-04

DISTRIBUTION

The Shipping Incident Disaster Risk Management Plan is produced by the City of Cape Town's Disaster Risk Management Centre (DRMC) as part of its responsibility in terms of the Disaster Management Act, 57 of 2002. This document is intended for the internal use of the Entities and Organisations concerned and should therefore be treated as restricted and confidential and must not be displayed in whole or in part in any public place or to the Media.

The Role-players will be advised by the DRMC when the DRM Plan is amended or updated. Amendments and updates must then be incorporated into each Organisation's / Discipline's own Plan copy and into any relevant SOP's, as applicable.

DRM PLAN DISTRIBUTION LIST

Copy Number	Date of Distribution	Name of Organisation
1	February 2014	City Manager - CoCT
2	February 2014	Executive Director: Safety & Security - CoCT
3	February 2014	CoCT Disaster Risk Management Centre
4	February 2014	CoCT Fire & Rescue Service
5	February 2014	107 Public Emergency Communications Centre
6	February 2014	CoCT Metropolitan Police Department (MPD)
7	February 2014	CoCT Traffic Services
8	February 2014	CoCT Law Enforcement & Security Services
9	February 2014	CoCT Communications
10	February 2014	CoCT Environmental Resource Management Department (ERMD)
11	February 2014	CoCT Solid Waste Management
12	February 2014	CoCT Sport, Recreation & Amenities
13	February 2014	CoCT Legal Services
14	February 2014	WCG Emergency Medical Services (EMS)
15	February 2014	WCG Forensic Pathology Services
16	February 2014	WCG Disaster Management (WC DMC)
17	February 2014	South African Police Service (SAPS)
18	February 2014	SASAR – Maritime Rescue Co-ordination Centre (MRCC)
19	February 2014	South African Maritime Safety Authority (SAMSA)
20	February 2014	National Department of Transport (DoT)
21	February 2014	South African National Defence Force (SANDF) – J Tac HQ. W. Cape
22	February 2014	South African National Defence Force (SANDF) – SA Navy, Simonstown
23	February 2014	South African National Defence Force (SANDF) – SA Air Force, OC AFB Ysterplaat
24	February 2014	Transnet National Ports Authority (TNPA) – Port of Cape Town Harbour Master
25	February 2014	National Sea Rescue Institute (NSRI)
26	February 2014	Robben Island Museum
27	February 2014	National Dept. of Environmental Affairs (DEA) – Oceans and Coasts

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DOCUMENT AMENDMENTS / UPDATE LISTINGS

New amendments or updates will be added to the Amendments and Updates Listing below and it is the responsibility of the individual to regularly check the currency of their Plan copy.

Proposals for amendment or additions to the text of this DRM Plan should be forwarded to :-

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AMENDMENTS AND UPDATE LISTINGS

REV. NO.	DATE OF ISSUE	DETAILS OF PAGE(S) AMENDED OR REPLACED

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CITY OF CAPE TOWN
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SHIPPING INCIDENT DISASTER RISK MANAGEMENT PLAN

1. SCOPE

1.1 PURPOSE

The purpose of the CoCT Shipping Incident Disaster Risk Management (DRM) Plan is to describe the organisation and functioning of activities in dealing with this identified hazard and its effect – direct or indirect socio-economic or environmental impacts - on the City of Cape Town. All hazards related to shipping and maritime operations at sea adjacent to the municipal area of the City of Cape Town are covered by this DRM Plan, viz. a major shipping incident, accident or any other type of emergency involving one or more vessels or marine structures and which has *some effect* on the City's community.

***** Note that a coastal oil spill hazard is dealt with under a separate Plan, viz. the Cape Zone (No.3) Coastal Oil Spill Contingency Plan led by the DEA – Oceans & Coasts, and that it may run concurrently with this DRM Plan if any oil is released through any shipping incident occurrence *****

1.2 BACKGROUND

- The marine and coastal environment is central to Cape Town's economy, sense of place, heritage, identity and recreational value and holds significant potential for contributing to further economic growth, job creation, social opportunities, development, social well-being and resilience towards climate change;
- Cape Town has a highly sensitive and rich coastal environment where a major oil or shipping accident may have catastrophic impacts;
- Shipping accidents and strandings impact across coastal jurisdictional boundaries, ecosystems and the marine and terrestrial environment and have the potential to cause significant negative impacts on the economic, environmental and social value of the coastline in Cape Town over extended periods of time;
- Shipping accidents and strandings have historically created significant financial burden on public funds administered by the different government departments and organs of state; including government agencies; and instances of default by owners and insurers have been high;
- Due to Cape Town's geographic location at the tip of Africa and the Port of Cape Town being a core economic hub, it forms a key international shipping route and as such the potential for shipping accidents and strandings remains high;
- The severe weather and sea conditions to which Cape Town is exposed further increases the risks of shipping accidents and strandings;

A shared and co-ordinated approach between the different government departments and organs of state; including government agencies, and a clear understanding of roles and responsibilities across the various agencies will significantly mitigate the risk of further shipping accidents and strandings and where these do occur, increase the effective and efficient resolution of such events and reduce the long term impacts.

The **(DRAFT) IMPLEMENTATION PROTOCOL FOR COOPERATION IN PREVENTING AND RESPONDING TO SHIPPING ACCIDENTS AND STRANDINGS OFF THE COASTLINE OF THE CITY OF CAPE TOWN** is the proposed formalisation of collaboration and co-operation Protocol Agreement between the DoT, DEA, TNPA, SAMSA and the CoCT – refer to ***ADDENDUM 1*** for a copy of this Draft Implementation Protocol.

To supplement the (strategic) Implementation Protocol the **CoCT Shipping Incident DRM Plan has been formulated at the tactical level** to co-ordinate the preparatory and response activities of all Services/Organisations, both Civil and Military, which are available to render assistance in the event of an shipping accident/incident/emergency in one of the City's harbours or at sea bordering the City, Robben Island or any other off-shore islands and which are within reach of

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Cape Town's Rescue Services. **The Standard Operating Procedures (SOPs) of each of the Role-players will further supplement this DRM Plan on the operational side.**

The objectives of the Implementation Protocol referred to above are:-

- to reduce the potential for inshore shipping accidents, strandings, sinkings and other types of maritime incidents and to increase efficiency in responding to them;
- to establish long-term, on-going, clear and effective working relationships and build shared resources and capacity between the Parties relating to effective salvage operations that require reactions and assistance from the Parties;
- to ensure that the correct and appropriate delegations, authority and mandates are in place to allow for the collaboration, co-operation, joint operations and information sharing between officials from all Parties across jurisdictional boundaries in the event of shipping accidents, strandings or sinkings;
- to ensure that mechanisms are in place for legally compliant joint operations and activities by officials from all Parties using infrastructure, assets and resources which belong to one or all of the Parties.

To facilitate this arrangement the CoCT Shipping Incident Disaster Risk Management Plan sets out at the tactical level, the establishment, organisation and functioning of both the preparatory and response activities required by the various stakeholders to enable the City to deal with this hazard. There may be procedural differences depending on whether a Civil or Military ship is involved in an accident. This DRM plan will focus of civil shipping and, where possible, will indicate where there are differences in civil and military procedures / systems. The CoCT Shipping Incident DRM Plan will therefore ensure that:-

- where a shipping incident occurs ***at a major port / harbour*** **with a developed and exercised Emergency Response Plan, i.e. the Port of Cape Town and Simonstown Naval Base, the respective local Emergency Response Plan for the harbour is to be used (refer to APPENDIX 2) as this Plan is also integrated into the CoCT Shipping Incident Disaster Risk Management Plan;**
- for a shipping incident occurring at any ***off-port area***, i.e. out to sea, the standard response and recovery procedures which are covered by this Plan will apply; and
- the CoCT Shipping Incident DRM Plan will **strive to complement the existing Port / Harbour Emergency Response Plans by providing for a standardised approach to the <u>hazard assessment, risk-reduction and preparedness elements</u>** as per the Disaster Risk Management Continuum and to address these in more detail. This will allow for greater co-operation between all Stakeholders and a **co-ordinated response to shipping or maritime emergencies,** as required by the Disaster Management Act, 57 of 2002 and the National Disaster Management Framework of 2005.

2. REFERENCES

2.1 LEGISLATION

The following legislation impacts on the Disaster Risk Management planning effort for hazards affecting shipping and maritime operations:-

Constitution of the Republic of South Africa Act, 108 of 1996
Municipal Systems Act, 32 of 2000
International Convention for Safety of Life at Sea (SOLAS), as amended
Marine Pollution (Control and Civil Liability) Act, 6 of 1981
Regulations Relating to the Prevention and Combating of Pollution of the Sea by Oil, 1984
Marine Pollution (Intervention) Act, 64 of 1987
Marine Pollution (Prevention of Pollution from Ships) (MARPOL) Act, 2 of 1986 & Garbage from Ships Regulations
Marine Pollution (BCH Code) Regulations, 1998
Prevention of Pollution by Garbage from Ships Regulations, 1992
National Environmental Management: Waste Act, 59 of 2008
Dumping at Sea Control act, 73 of 1980
National Environmental Management Act (NEMA), 107 of 1998
National Environmental Management: Biodiversity Act, 10 of 2004
Marine Living Resources Act, 18 of 1998
Integrated Coastal Management Act, 24 of 2008
Sea Shore Act, 21 of 1935, as amended in 1993
Atmospheric Pollution Prevention Act, 4 of 1965
National Environmental Management: Air Quality Act, 39 of 2004
Merchant Shipping - Marine Pollution (IBC Code) Regulations, 1998

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Merchant Shipping (Safe Containers Convention) Act, 2011
Merchant Shipping Act, 57 of 1951
Merchant Shipping Amendment Bill, 2009
Merchant Shipping (Carriage of Charts and Nautical Publications) Regulations, 2002
Merchant Shipping (Collision & Distress Signals) Regulations, 1996
Merchant Shipping (Dangerous Goods) Regulations, 1997
Merchant Shipping (EPIRB Registration) Regulations, 2002
Merchant Shipping (IGC Code) Regulations, 1998
Merchant Shipping (INF Code) Regulations, 2003
Merchant Shipping (Licensing of Vessels) Regulations, 2003
Merchant Shipping (Mandatory Ships' Routeing) Regulations, 1998
Merchant Shipping (National Small Vessel Safety) Regulations, 2007 (as amended)
Merchant Shipping (Notification of Building of Vessels) Regulations, 2002
Merchant Shipping (Radio Installations) Regulations, 2002
Merchant Shipping (Safe Manning) Regulations, 1999
Merchant Shipping (Safety Management) Regulations, 2003
Merchant Shipping (Seafarer Compensation) Regulations, 1998
Merchant Shipping (Seamen's Documents) Regulations, 2000
Merchant Shipping (Ship Identification Number) Regulations, 2004
Merchant Shipping (Training and Certification) Regulations, 1999
Merchant Shipping (Long Range Identification and Tracking of Ships) Regulations, 2009
Marine Traffic Act, 2 of 1981
Marine Traffic Regulations, 1985
Marine Traffic (Inshore Vessel Traffic Services) Regulations, 2000
Instrument of Designation as Marine Traffic Regulator (by SAMSA), 1 June 2000
Carriage of Goods by Sea Act, 1 of 1986
Amendment of Tonnage Regulations, 1986
Courts of Marine Enquiry Regulations, 1961
Life-saving Equipment Regulations, 1968
Sea Transport Documents Act, 65 of 2000
Admiralty Jurisdiction Regulation Act, 105 of 1983
Safety of Navigation Regulations, 1968
Maritime Security Regulations, 2004
Maritime Occupational Safety Regulations, 1994
Ship Registration Act, 58 of 1998
Ship Registration Regulations, 2002
Ship Identification Regulations, 2004
South African Maritime Safety Authority (SAMSA) Act, 5 of 1998
SAMSA Regulations, 1998
South African Maritime and Aeronautical Search and Rescue Act (SASAR), 44 of 2002
Charges Determination, 2009
South African Maritime Safety Authority Levies Act, 6 of 1998
Levy Determination, 2009
Wreck and Salvage Act, 94 of 1996
National Ports Act, 12 of 2005
Regulatory Principals of the Ports Regulator, 2009
Dept. of Transport – Port Rules & Harbour Master's Written Instruction, GN 255 of 2009
Fire Brigade Services Act, 99 of 1987
City of Cape Town Community Fire Safety By-law, 2004 & Amendment of 2008
SANS 10090: Community protection against fire
NFPA 291: Fire flow testing and marking of hydrant
NFPA 1201: Developing fire protection services for the public
NFPA 1500: Fire department occupational health and safety program
NFPA 1561: Standard on Emergency Services Incident Management System
NFPA 1670: Standard on Operations and Training for Technical Rescue Incidents (USAR)
NFPA 1710: Standard for the organization and deployment of fire suppression, emergency Medical operations and special operations to the public by career fire departments
NFPA 1901: Automotive fire apparatus
National Building Regulations and Building Standards Act, 103 of 1977, as amended
SANS 10400:1990 – Application of the National Building Regulations, incl. Part T
SANS 10252:2004 – Hose Reel and Hydrant Installations Standard
SANS 10287:2000 – Automatic Sprinkler Systems Standard
Occupational Health and Safety Act, 85 of 1993
Major Hazardous Installations Regulations of the Occupational Health and Safety Act
SANS 10234:2007 - Globally Harmonized System of classification and labelling of chemicals (GHS)

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SANS 10265:1999 - Classification & labelling of dangerous substances prep. for sale and handling
Disaster Management Act, 57 of 2002, with ref. to the National Disaster Risk Management Framework 2005, Western Cape Provincial DM Policy Framework & CoCT DRM Policy Framework.
Intergovernmental Relations Framework Act, 13 of 2005
International Health Regulations Act, 28 of 1974 and Regulations
National Health Act, 61 of 2003
SA Police Service Act, 68 of 1995
SAPS Amendment Act, 83 of 1998
Arms and Ammunition Act, 75 of 1969
Explosives Act, 15 of 2003
Immigration Act, 13 of 2000
General Notice: Joint management of incidents involving chemical or biological agents or radio-active chemicals – Govt. Gazette No. 28437 of 3 Feb. 2006
Fund Raising Act, 107 of 1978
Social Assistance Act, 59 of 1992
Western Cape Provincial Department of Social Development: Outline for the proposed interim policy for the provisioning of social relief in the event of a disaster
The Animals Protection Act, 71 of 1962
City of Cape Town: Animal By-law, 2010
City of Cape Town: Air Quality Management By-Law of 2009
City of Cape Town: Air pollution Control By-Law, 2003

REMARK :- The Disaster Management Act, 2002, specifically requires the Local Authority to take the necessary remedial steps to prevent and / or mitigate the occurrence or re-occurrence of disasters in its area of jurisdiction and this forms the basis for the drafting of this DRM Plan.

2.2 LINKED DOCUMENTS / DRM PLANS / PROCEDURES / GUIDES (in separate files)

Implementation Protocol for Co-operation in preventing and responding to Shipping Accidents and Strandings off the Coastline of the City of Cape Town – between the DoT, DEA,TNPA,SAMSA and CoCT (Draft) ***NOTE*:** this Protocol document is being finalised for eventual signature by all the Parties – refer to Attachment 1 for details.
City of Cape Town Municipal Disaster Risk Management Plan
City of Cape Town's Multi-disciplinary Incident Management Plan (MIMP)
Western Cape Government Disaster Management Plan
The Standard Operating Procedures (SOPs) of ALL Role-players involved – the SOPs will include references to the applicable hazard(s) to be dealt with **by the respective Role-players i.r.o. their own mandates.**
SA Search & Rescue (SASAR) Manual
MRCC Operations Plan
South Africa's National Oil Spill Contingency Plan (NOSCP) – DEA / DoT / SAMSA
Cape Zone (No.3) Coastal Oil Spill Contingency Plan –- DEA
WCG EMS - Plan Delta
WCG Forensic Pathology Services – Major Incident Plan (Metro Region)
SAPS Emergency Response Plan and Procedures
(SANDF) J Ops HQ Operational Instruction 219/06, dd Nov 2006
(SANDF) CJ Ops/C/309/1 OPS NO99 Disaster Management Guidelines, dd 17 June 1999

In a possible CONSEQUENTIAL and/or MULTI-HAZARD SCENARIO after the occurrence of an aircraft incident, other hazards *may* also occur at or near to this incident location and one or more of the following hazard-specific DRM Plans will then be activated:-
Cape Zone (No.3) Coastal Oil Spill Plan (T10)
Environmental Pollution Hazards DRM Plan (E1)
Flooding & Storms Hazards DRM Plan (H1)
Climate Change and Coastal Zone Process Hazards DRM Plan (H2/G3) – incl. storm surges, tsunamis, etc. along the coastline
Accidental HazMat Incident DRM Plan (T9)
Koeberg Nuclear Power Station (KNPS) Radiological Release Hazard DRM Plan (T8)
Disruption of Essential Services and Critical Infrastructure DRM Plan (T11)
Structural Fire Hazards DRM Plan (T6)
Structural Failure Hazards DRM Plan (T7)
Aircraft Incident DRM Plan (T1) –incl. an aircraft crashing or ditching at sea off Cape Town
Social Disorder Hazards DRM Plan (S1)
Human Disease Hazards' Outbreak DRM Plan (B2)
Animal Disease Hazards' Outbreak DRM Plan (B3)
Pest Infestation Hazards DRM Plan (B4)

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3. ABBREVIATIONS AND DEFINITIONS / GLOSSARY OF TERMS

3.1 ABBREVIATIONS USED IN DISASTER RISK MANAGEMENT AND IN SHIPPING OPERATIONS

ACSA – Airports Company of South Africa
ACFT - Aircraft
AFB – Air Force Base (SAAF)
ALERFA – Alert Phase
ALT – Altitude
AMVER – Automated Mutual Assistance Vessel Rescue
ARCC – Aeronautical Rescue Co-ordination Centre (located in Gauteng & part of the SASAR Organisation)
ATC – Air Traffic Control (either ATNS or SAAF, depending on location)
ATNS – Air Traffic Navigation Service Company Limited
ATS – Air Traffic Services
BOO – Base Operations Officer (at AFB Ysterplaat)
CAR – Civil Aviation Regulations
CoCT – City of Cape Town
CTIA – Cape Town International Airport
DAFF – National Department of Agriculture, Forestry and Fisheries
DCT – Disaster Co-ordination Team (for the City of Cape Town – convened during a disaster)
DEA – National Department of Environmental Affairs
DETRESFA – Distress Phase
DisRes - Disaster Resources Database
DMAF – Disaster Management Advisory Forum for the City of Cape Town
DOC – Disaster Operations Centre (part of CoCT DRMC)
DoT – National Department of Transport
DRA – Disaster Risk Assessment
DRMC – Disaster Risk Management Centre (CoCT)
DRMP – Disaster Risk Management Plan
DVI – Disaster Victim Identification
ELR – Extra Long Range
ELT – Emergency Locator Transmitter (aviation)
EMS – Emergency Medical Services (WCG) – also known as METRO-EMS
EP – Emergency Planning
EPIRB – Emergency Position Indication Radio Beacon (maritime)
ERMD – Environmental Resource Management Dept. (CoCT)
ERP – Emergency Response Preparedness
ETA – Estimated Time of Arrival
ETD – Estimated Time of Departure
EXCOM – Extended Communication Search
F&RS – Fire & Rescue Service (CoCT)
FCP – Forward (Field) Command Post (see also ICP)
FIC – Flight Information Centre
FIR – Flight Information Region
FL – Flight Level
FOB – Fuel on Board (an aircraft or a ship)
FPS – Forensic Pathology Services (WCG)
GIS – Geographical Information System
GPS – Global Positioning System
HF – High Frequency (radio signal)
HRAVA* - Hazard, Risk and Vulnerability Assessment (* the same process as that of a Comprehensive DRA)
HOD – Head of Department
ICAO – International Civil Aviation Organisation
ICP – Incident Command Post (see also FCP)
IDP - Integrated Development Plan
IFR – Instrument Flight Rules
IMO – International Maritime Organisation
IMT – Incident Management Team (On-site)
INCERFA – Uncertainty Phase
JDRRMC - Joint Disaster Risk Reduction Management Committee
JMC – Joint Media Centre
JOC – Joint Operations Centre
J Tac HQ WC – Joint Tactical Headquarters Western Cape (SANDF)
KT - Knot
LRG – Long Range
LUT – Local User Terminal (for Search & Rescue satellite beacon monitoring)
MCC – Mission Control Centre (done by the MRCC)
MERSAR – Merchant Search and Rescue
METRO-EMS – Emergency Medical Services (see also EMS)
MIMP – Multi-disciplinary Incident Management Plan
MPD – Metropolitan Police Department (CoCT)
MRCC – Maritime Rescue Co-ordination Centre (at Tygerberg Office Park & part of the SASAR Organisation)

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MRG – Medium Range
MSL – Mean Sea Level
NDB – Non-Directional (radio) Beacon (for navigation)
NDMC - National Disaster Management Centre
NGO – Non-governmental Organisation(s)
NHS – Non-hospitalised Survivors
NKP – National Key Point
NM – Nautical Mile
NOTAM – Notice to Airmen
NSRI – National Sea Rescue Institute
OSC – On-Scene Co-ordinator
PAX - Passengers
PECC – Public Emergency Communications Centre of the CoCT (using the 107 call number)
PIC – Pilot-in-Command
PLB – Personal Locator Beacon (on land)
PTSC – Post-traumatic Stress Counselling
RADAR – Radio Direction and Ranging (used for shipping & aircraft location)
RCC – Rescue Co-ordination Centre
RSC – Rescue Sub-Centre
RV – Rescue Vessel
RVP – Rendezvous Point
SAAF – South African Air Force (part of SANDF)
SACAA – South African Civil Aviation Authority
SAMSA – South African Maritime Safety Authority
SAN – South African Navy (part of SANDF)
SANCCOB – South African National Foundation for the Conservation of Coastal Birds
SANDF – South African National Defence Force
SAPS – South African Police Service
SAR – Search and Rescue
SASAR – South African Search and Rescue (for both Maritime & Aviation operations)
SCP – Service Command Post (at the Incident Site)
SEC – Security (at the Port of Cape Town)
SITREP – Situation Report
SM or RM – Search or Rescue Master
SMS – Safety Management System
SMS – Short Message System (on the GSM Cellular System)
SOP – Standard Operating Procedure(s)
SPCA – Society for the Prevention of Cruelty to Animals
SPOC – Search & Rescue Points of Contact
SRA – Survivor Reception Area
SRG – Short Range
SRR – Search and Rescue Region
SRU – Search and Rescue Unit
SUB-SRR – Sub-Search and Rescue Region
TNPA – Transnet National Ports Authority
TSS – Traffic Separation Schemes
UHF – Ultra High Frequency (radio signal)
VFR – Visual Flight Rules
VHF – Very High Frequency (radio signal)
VIP – Very Important Person(s)
VLR – Very Long Range
VSA – Vehicle Staging Area
VTS – Vessel Traffic Separation (also called TSS)
YPLT – Ysterplaat Air Force Base
WC DMC – WCG Disaster Management Centre
WCG – Western Cape Government

3.2 DEFINITIONS / GLOSSARY OF CERTAIN TERMS USED IN DISASTER RISK MANAGEMENT AND IN SHIPPING OPERATIONS

ACCIDENT - An occurrence in which a person/s is/are fatally or seriously injured or any other serious / substantial damage is incurred to a ship or other maritime facility, property and/or equipment. A person is considered to be fatally injured if he/she dies of causes related to the accident – refer also to the ***INCIDENT*** definition.

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ACTS OF UNLAWFUL INTERFERENCE - means acts or attempted acts that jeopardise the safety of maritime operations, such as –

(a) unlawful seizure of a ship or vessel;
(b) hostage-taking on board an aircraft or on aerodromes;
(c) forcible intrusion on board a ship or vessel at a harbour or on the premises of a maritime facility;
(d) introduction on board a ship or vessel or at a port/harbour of a weapon or hazardous device or material intended for criminal purposes;
(e) communication of false information as to jeopardize the safety of a ship or vessel, of passengers, crew, ground personnel or the general public, at a port/harbour or on the premises of a maritime facility;
(f) forcible intrusion of a maritime facility;
(g) threatening to do harm to any maritime facility;
(h) unlawful transmissions on a maritime frequency;
(j) unlawful interference, electronically or physically, with a maritime frequency;
(k) unlawful destruction of a maritime facility.

AERONAUTICAL RESCUE CO-ORDINATION CENTRE (ARCC) – A Centre established within each SRR for the purpose of directing search and rescue operations, which specifically caters for those situations involving aircraft requiring search, assistance and rescue and the provision of assistance to the ***MRCC*** i.r.o. aeronautical search action.

AIRCRAFT – The term generally used in this DRM Plan which represents all types of vehicle designed to operate in the air, viz. heavier-than-air aeroplane, helicopter, microlight, autogyro, glider, motor glider, hot-air (free) balloon, paraglider, parachute, model sport aeroplane, etc.

AIRPORT / AERODROME / AIRFORCE BASE - A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

AIR TRAFFIC CONTROL / SERVICE - A generic term for managing air traffic, meaning variously: air traffic advisory service, area control service, approach control service, aerodrome control service, a surveillance service, flight information service or an alerting service run by licenced and validated Air Traffic Controllers.

ALERFA (SASAR Terminology) – Refers to the Alert Phase and is a situation wherein apprehension exists as to the safety of an aircraft or vessel and its occupants. It can be assigned any time apprehension exists for the safety of an aircraft because of definite information that serious difficulties exist which do not amount to distress, or because of a continued lack of information concerning progress or position. The key word is *apprehension*.

ALERT - An “Alert” is an incident that currently does not affect the local or general population but has the potential to a more serious emergency. The situation is unresolved and should be monitored closely. Some limited protective actions may be implemented and additional assistance requested from the relevant specialist Agencies.

ALERT PHASE - a situation wherein apprehension exists as to the safety of an aircraft or vessel and its occupants.

ALERTING POST - a post which provides an alerting service.

ALERTING SERVICE - means a service provided to notify and assist the appropriate organisations regarding aircraft in need of search and rescue aid and to assist such organisations as appropriate.

ALTITUDE - the vertical distance of a level, a point or an object considered as a point measured from mean sea level.

AMPHIBIOUS AEROPLANE - means an aeroplane designed and constructed to take-off from and land on land surfaces as well as water surfaces.

AMPHIBIOUS AIRCRAFT - means amphibious aeroplanes and amphibious helicopters.

AMPHIBIOUS HELICOPTER - means a helicopter equipped with wheels, skids, floats or other devices, but excluding emergency flotation equipment, enabling it to land and take-off from land as well as water surfaces.

ASSEMBLY AREA - A designated area established in the vicinity of any Venue which has a large population occupancy, for the purpose of temporarily accommodating evacuees exiting that Venue after an emergency or as a precaution to any hazard which might develop. This area will be regarded as being “safe” from the prevailing hazard inside the Venue. The affected Venue’s Emergency and Evacuation Plans should provide details of the Assembly Area(s) location(s) and utilisation.

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AUTOMATED MUTUAL ASSISTANCE VESSEL RESCUE - a computerised system which plots vessels worldwide at sea and is able to provide information on the location of shipping and its SAR potential for use in search and rescue operations.

BAGGAGE – Property of passengers and crew carried on board a ship by agreement with the operator or owner.

BIOLOGICAL HAZARD (ex UNISDR) - Process or phenomenon of organic origin or conveyed by biological vectors, including exposure to pathogenic micro-organisms, toxins and bioactive substances that may cause loss of life, injury, illness or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. *Comment: Examples of biological hazards include outbreaks of epidemic diseases, plant or animal contagion, insect or other animal plagues and infestations.*

BOMB THREAT – A communicated threat, anonymous or otherwise, which suggest, or infers, whether true or false, that the safety of an aircraft in flight or on the ground, and includes any airport or air navigation facility, or any persons, may be in danger from an explosive or other item or device.

BULK CARRIER – A specially designed vessel to carry cargo "in bulk" and the hatch cover and hold design is focused on the carriage of raw dry cargo goods such as coal, grain, iron ore and bauxite, which are simply poured into cavernous holds then grabbed and bulldozed out at the port of discharge.

CAPACITY – The ability or the resource availability of one or more Services/Organisations to respond to any given Incident, Emergency or Disaster situation.

CAPACITY (ex UNISDR) - The combination of all the strengths, attributes and resources available within a community, society or organization that can be used to achieve agreed goals. *Comment: Capacity may include infrastructure and physical means, institutions, societal coping abilities, as well as human knowledge, skills and collective attributes such as social relationships, leadership and management. Capacity also may be described as capability. Capacity assessment is a term for the process by which the capacity of a group is reviewed against desired goals, and the capacity gaps are identified for further action.*

CAPACITY DEVELOPMENT (ex UNISDR) - The process by which people, organizations and society systematically stimulate and develop their capacities over time to achieve social and economic goals, including through improvement of knowledge, skills, systems, and institutions. *Comment: Capacity development is a concept that extends the term of capacity building to encompass all aspects of creating and sustaining capacity growth over time. It involves learning and various types of training, but also continuous efforts to develop institutions, political awareness, financial resources, technology systems, and the wider social and cultural enabling environment.*

CARGO – Any property carried on a vessel which may be contained in various forms, i.e. container, bulk, tanks, in open hold, etc.

CONTAINER SHIP – Vessels that carry their cargo is standard size containers, normally either 20ft units (TEU) or 40ft units (FEU) for speed of loading and discharge. Container ships may carry from just a few hundred to many thousands of containers.

CONTINGENCY PLANNING (ex UNISDR) - A management process that analyses specific potential events or emerging situations that might threaten society or the environment and establishes arrangements in advance to **enable timely, effective and appropriate responses** to such events and situations. *Comment: Contingency planning results in organized and co-ordinated courses of action with clearly identified institutional roles and resources, information processes, and operational arrangements for specific actors at times of need. Based on scenarios of possible emergency conditions or disaster events, it allows key actors to envision, anticipate and solve problems that can arise during crises. Contingency planning is an important part of overall preparedness. Contingency plans need to be regularly updated and exercised.*

CONTROL AREA - The total area where the Incident occurred within the outer perimeter, and includes the inner perimeter and danger zone, as well as all aircraft wreckage, the triage and any other designated areas.

CO-ORDINATION - The bringing together of organisations and elements to ensure effective emergency / disaster management response and is primarily concerned with the systematic acquisition and application of resources (organisation, manpower and equipment) in accordance with the requirements imposed by the threat or impact of an emergency or disaster. Co-ordination relates primarily to resources, and operates vertically, within an organisation as a function of the authority to command; and horizontally, across organisations, as a function of the authority to control – refer also to the ***UNIFIED COMMAND*** definition.

CONTROL COPY

COPING CAPACITY (ex UNISDR) - The ability of people, organizations and systems, using available skills and resources, to face and manage adverse conditions, emergencies or disasters – also called *MANAGEABILITY*. *Comment: The capacity to cope requires continuing awareness, resources and good management, both in normal times as well as during crises or adverse conditions. Coping capacities contribute to the reduction of disaster risks.*

CORRECTIVE DISASTER RISK MANAGEMENT (ex UNISDR) - Management activities that address and seek to correct or reduce disaster risks which are already present. *Comment: This concept aims to distinguish between the risks that are already present, and which need to be managed and reduced now, and the prospective risks that may develop in future if risk reduction policies are not put in place. (Refer also to **PROSPECTIVE RISK MANAGEMENT**).*

CREW MEMBER - means a person assigned by an operator to carry out duties on board a vessel during its voyage.

CRITICAL FACILITIES (ex UNISDR) - The primary physical structures, technical facilities and systems which are socially, economically or operationally essential to the functioning of a society or community, both in routine circumstances and in the extreme circumstances of an emergency. *Comment: Critical facilities are elements of the infrastructure that support essential services in a society. They include such things as transport systems, air and sea ports, electricity, water and communications systems, hospitals and health clinics, and centres for fire, police and public administration services.*

CROWD BARRIER (CORDON) – Temporary or permanent structure/s that prevents access to demarcated areas as identified by the risk assessment.

CRUISE LINER – A specially designed passenger vessel serving the tourism sector and carrying from a few hundred to thousands of passengers and crew members.

DANGER ZONE (HOT ZONE) – The cordoned off area immediately around the crash site where emergency operations take place.

DANGEROUS GOODS – Articles or substances, which are capable of posing significant risk to health, safety, property or the environment, and which are shown in the list of dangerous goods as per ICAO Doc 9284 (Technical Instructions for the Safe Transportation of Dangerous Goods by Air) or which are classified according to those instructions.

DANGEROUS GOODS ACCIDENT - means an accident associated with and related to the conveyance of dangerous goods by sea.

DANGEROUS GOODS INCIDENT - means an incident, other than a dangerous goods accident, associated with and related to the conveyance of dangerous goods by sea, and includes injury to a person, property damage, fire, breakage, spillage, leakage of fluid or radiation or other evidence that the integrity of the packaging has not been maintained or which seriously jeopardises the vessel or its occupants.

DETRESFA (SASAR Terminology) – Refers to the Distress Phase and is a situation wherein there is reasonable certainty that grave and imminent danger threatens an aircraft or vessel and its occupants and requires immediate assistance, or because of a continued lack of information concerning progress or position. *The key words are grave or imminent danger and immediate assistance required.*

DISASTER – A progressive or sudden, widespread or localised, natural phenomena or human-caused occurrence which –

(a) causes or threatens to cause -
  (i) death, injury or disease;
  (ii) damage to property, infrastructure or the environment; or
  (iii) disruption of a community; and
(b) is of a magnitude that exceeds the ability of those affected by the disaster to cope with its effects using only their own resources.

DISASTER (ex UNISDR) - A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources. *Comment: Disasters are often described as a result of the combination of: the exposure to a hazard; the conditions of vulnerability that are present; and insufficient capacity or measures to reduce or cope with the potential negative consequences. Disaster impacts may include loss of life, injury, disease and other negative effects on human physical, mental and social well-being, together with damage to property, destruction of assets, loss of services, social and economic disruption and environmental degradation.*

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DISASTER MITIGATION (EX INISDR) - Disaster mitigation refers to structural and non-structural measures that are undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards on vulnerable areas, communities and households. These efforts can target the hazard or threat itself (for example, the positioning of firebreaks on the urban/wildland interface). This is often referred to as 'structural mitigation', since it requires infrastructure or engineering measures to keep the hazard away from those at risk. Disaster mitigation efforts can also target people who are at risk, by reducing their vulnerability to a specific threat (for instance, promoting community responsibility for controlling fire risk in an informal settlement). This is often called 'non-structural mitigation', as it promotes risk-avoidance behaviours and attitudes.

DISASTER OPERATIONS CENTRE (DOC) - A fully equipped dedicated facility within the Municipal, Provincial or National Disaster (Risk) Management Centre. Such a facility must be capable of accommodating any combination of emergency and essential services representatives, including all relevant role players and stakeholders identified in response and recovery plans for the purpose of multidisciplinary strategic management of response and recovery operations, when a local, provincial or national disaster occurs or is threatening to occur.

DISASTER RECOVERY - Disaster recovery (including rehabilitation and reconstruction) focuses on the decisions and actions taken after a disaster to restore lives and livelihoods, services, infrastructure and the natural environment. In addition, by developing and applying risk reduction measures at the same time, the likelihood of a repeated disaster event is reduced. Disaster recovery includes:-

* rehabilitation of the affected areas, communities and households
* reconstruction of damaged and destroyed infrastructure
* recovery of losses sustained during the disaster event, combined with the development of increased resistance to future similar occurrences.

DISASTER RISK (or RISK) - The measure of potential harm from a hazard or threat. Risk is usually associated with the human inability to cope with a particular situation. In terms of disaster management it can be defined as the probability of harmful consequences, or expected losses death, injury, damage to property and the environment, jobs, disruption of economic activity or social systems. Hazards will affect communities differently in terms of ability and resources with which to cope. Poorer communities will be more at risk than others.

DISASTER RISK (ex UNISDR) - The potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over some specified future time period. *Comment: The definition of disaster risk reflects the concept of disasters as the outcome of continuously present conditions of risk. Disaster risk comprises different types of potential losses which are often difficult to quantify. Nevertheless, with knowledge of the prevailing hazards and the patterns of population and socio-economic development, disaster risks can be assessed and mapped, in broad terms at least.*

DISASTER RISK ASSESSMENT - Assessment of the threat posed by any identified hazard with a disaster potential.

DISASTER (RISK) MANAGEMENT - means a continuous and integrated multi-sectoral, multi-disciplinary process of planning and implementation of measures aimed at – *(a)* preventing or reducing the risk of disasters; *(b)* mitigating the severity or consequences of disasters, *(c)* emergency preparedness, *(d)* a rapid and effective response to disasters, and (e) post-disaster recovery and rehabilitation.

DISASTER RISK MANAGEMENT (ex UNISDR) - The systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster. *Comment: This term is an extension of the more general term "risk management" to address the specific issue of disaster risks. Disaster risk management aims to avoid, lessen or transfer the adverse effects of hazards through activities and measures for prevention, mitigation and preparedness.*

DISASTER RISK MANAGEMENT CENTRE - A Centre specializing in Disaster (Risk) Management established in a Municipality, Province or at National level in terms of the Disaster Management Act, No. 57 of 2002.

DISASTER (RISK) MANAGEMENT PLAN - A document describing the organisational structure, its roles and responsibilities and concept of operation covering all aspects of the Disaster Risk Management Continuum and placing an emphasis on measures that reduce vulnerability, viz. hazard identification, risk and vulnerability assessment, risk reduction and mitigation, planning and preparedness, emergency response, relief and recovery efforts.

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DISASTER RISK REDUCTION - Disaster risk reduction can be seen as the systematic development and application of policies, strategies and practices to minimize vulnerabilities and disaster risks throughout a society to prevent and limit negative impacts of hazards, within the broad context of sustainable development. In South Africa, disaster risk reduction is an integral and important part of disaster management.

DISASTER RISK REDUCTION (ex UNISDR) - The concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events. *Comment: A comprehensive approach to reduce disaster risks is set out in the United Nations-endorsed Hyogo Framework for Action, adopted in 2005, whose expected outcome is "The substantial reduction of disaster losses, in lives and the social, economic and environmental assets of communities and countries." The International Strategy for Disaster Reduction (ISDR) system provides a vehicle for cooperation among Governments, organisations and civil society actors to assist in the implementation of the Framework. Note that while the term "disaster reduction" is sometimes used, the term "disaster risk reduction" provides a better recognition of the on-going nature of disaster risks and the on-going potential to reduce these risks.*

DISASTER RISK REDUCTION PLAN* (ex UNISDR) - A document prepared by an authority, sector, organisation or enterprise that sets out goals and specific objectives for reducing disaster risks together with related actions to accomplish these objectives. *Comment: Disaster risk reduction plans should be guided by the Hyogo Framework and considered and coordinated within relevant development plans, resource allocations and programme activities. National level plans need to be specific to each level of administrative responsibility and adapted to the different social and geographical circumstances that are present. The time frame and responsibilities for implementation and the sources of funding should be specified in the Plan. Linkages to climate change adaptation plans should be made where possible.*

DISTRESS PHASE - a situation wherein there is reasonable certainty that an aircraft or vessel and its occupants are threatened by grave and imminent danger and require immediate assistance.

EARLY WARNING SYSTEM (ex UNISDR) - The set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organizations threatened by a hazard to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss. *Comment: This definition encompasses the range of factors necessary to achieve effective responses to warnings. A people-centred early warning system necessarily comprises four key elements: knowledge of the risks; monitoring, analysis and forecasting of the hazards; communication or dissemination of alerts and warnings; and local capabilities to respond to the warnings received. The expression "end-to-end warning system" is also used to emphasize that warning systems need to span all steps from hazard detection through to community response.*

EMERGENCY - A hazard occurrence or an event, actual or imminent, that requires the prompt implementation of actions through the co-ordination of a number of significant emergency management activities, or the special regulation of persons or property, to limit the risk to health, safety or welfare of people, or to limit damage to property or the environment - refer also to the ***INCIDENT***, ***MAJOR INCIDENT*** and ***DISASTER*** definitions.

EMERGENCY EXIT - Structural means whereby a safe route is provided for people to travel from any point in a building or structure to a place of safety without assistance.

EMERGENCY LOCATOR TRANSMITTER - means equipment which broadcast distinctive signals on designated frequencies and, depending on application, may either sense a crash and operate automatically or may be manually activated. An ELT may be any of the following:
(a) Automatic fixed ELT (ELT(AF)). An automatically activated ELT which is permanently attached to an aircraft;
(b) Automatic portable ELT (ELT(AP)). An automatically activated ELT which is rigidly attached to an aircraft but readily removable from the aircraft;
(c) Automatic deployable ELT (ELT(AD)). An ELT which is rigidly attached to an aircraft and which is automatically deployed and activated by impact, and, in some cases, also by hydrostatic sensors. Manual deployment is also provided; or
(d) Survival ELT (ELT(S)). An ELT which is removable from an aircraft, stowed so as to facilitate its ready use in an emergency, and manually activated by survivors.

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EMERGENCY MANAGEMENT (ex UNISDR) - The organization and management of resources and responsibilities for addressing all aspects of emergencies, in particular preparedness, response and initial recovery steps. *Comment: A crisis or emergency is a threatening condition that requires urgent action. Effective emergency action can avoid the escalation of an event into a disaster. Emergency management involves plans and institutional arrangements to engage and guide the efforts of government, non-government, voluntary and private agencies in comprehensive and coordinated ways to respond to the entire spectrum of emergency needs. The expression "disaster management" is often used in SA instead of "emergency management" but is essentially the same function.*

EMERGENCY PLAN - A document developed by an Airport Operator describing the organisational structure, its roles and responsibilities, concept of operation, means and principles for intervention during an emergency occurring at that specific Airport.

EMERGENCY POSITION INDICATING RADIO BEACON - a beacon which emits an emergency signal and enables those executing a search to locate its source.

EMERGENCY PROCEDURES - A set of documents describing the detailed actions to be taken by response personnel during an emergency.

EMERGENCY RESPONSE PLAN - The section of a Disaster Risk Management Plan developed to deal specifically with the organisational structure, its roles and responsibilities, concept of operation, means and principles for intervention during an incident or emergency occurring at a specific venue or event.

EMERGENCY SERVICES (ex UNISDR) - The set of specialized agencies that have specific responsibilities and objectives in serving and protecting people and property in emergency situations. *Comment: Emergency services include agencies such as civil protection authorities, police, fire, ambulance, paramedic and emergency medicine services, Red Cross and Red Crescent Societies, and specialized emergency units of electricity, transportation, communications and other related services organizations.*

EMERGENCY SHELTER - Refer to ***MASS CARE CENTRE***.

ESTIMATED TIME OF ARRIVAL - the time at which the aircraft or vessel estimates arriving at a specified location or facility.
ESTIMATED TIME OF DEPARTURE - the time at which the aircraft or vessel has been planned to leave the point of departure.
EVACUATION – The controlled, rapid and directed withdrawal of a population, during an emergency, from a place of danger to a place of safety in order to avoid acute exposure to any Incident.

EVACUATION CONTROL PROCEDURES - The plans made by the various Services to outline their duties and to ensure the orderly movement of people during the evacuation period.

EVACUEES, SPONTANEOUS - Persons who might leave an area in periods of intense crisis in response to a real or feared threat, whether or not they are advised to do so.

EVENT - Entertainment (including live acts), recreational, educational, cultural, religious, business (including marketing, public relations and promotional), charitable, exhibition, conference, organisational and similar activities, hosted at a stadium or a venue or along a route or its precinct.

EXERCISE - An evaluation of major portions of emergency response capabilities. An exercise tests the integrated capability of the emergency response organisation, to identify weaknesses that could affect the response to an actual emergency.

EXPOSURE (ex UNISDR) - People, property, systems, or other elements present in hazard zones that are thereby subject to potential losses. *Comment: Measures of exposure can include the number of people or types of assets in an area. These can be combined with the specific vulnerability of the exposed elements to any particular hazard to estimate the quantitative risks associated with that hazard in the area of interest.*

EXTENDED COMMUNICATION SEARCH - a search employing telephonic or other communication means over an abnormal period.

EXTENSIVE RISK (ex UNISDR) - The widespread risk associated with the exposure of dispersed populations to repeated or persistent hazard conditions of low or moderate intensity, often of a highly localized nature, which can lead to debilitating cumulative disaster impacts. *Comment: Extensive risk is mainly a characteristic of rural areas and urban margins where communities are exposed to, and vulnerable to, recurring localised floods, landslides, storms and drought. Extensive risk is often associated with poverty, urbanization and environmental degradation. See also "**INTENSIVE RISK".***

EXTRA LONG RANGE - refers to an aircraft whose radius of action is 1 200 nautical miles with two and a half hours' search remaining.

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FINAL APPROACH AND TAKE-OFF AREA - means a defined area over which the final phase of the approach manoeuvre by helicopter to hover or landing is completed and from which the take-off manoeuvre is commenced, where the final approach and take-off area is to be used by performance Class 1 helicopters, the defined area includes the rejected take-off area available.

FINAL EXIT - Termination of an escape route from a venue or structure giving direct access to a place of safety such as a street, passageway, walkway or open space and positioned to ensure that people can disperse safely from the vicinity of the building or structure and from the effects of a hazard.

FLIGHT / IN FLIGHT - Means from the moment an aircraft commences take-off until the moment it completes its next landing.

FLIGHT CREW MEMBER - A person licensed in terms of the Civil Aviation Regulations, assigned by an operator to do duty on an aircraft during flight time.

FLIGHT INFORMATION REGION - an airspace of defined dimensions within which flight information service and alerting services are provided.

FLIGHT PLAN - means specified information provided to air traffic services units, relative to an intended flight or portion of a flight of an aircraft**.**

FLIGHT RECORDER - means any type of recorder installed in an aircraft for the purpose of complementing accident/incident investigation**.**

FOOT (ft) - is the measure of length equal to 0.3048 metres exactly.

FORECAST (ex UNISDR) - A definite statement or statistical estimate of the likely occurrence of a future event or conditions for a specific area. *Comment: In meteorology a forecast refers to a future condition, whereas a warning refers to a potentially dangerous future condition.*

FOREIGN AIR OPERATOR - means any operator, other than a South African air operator, which undertakes on a scheduled or charter basis, whether directly or indirectly, by lease or any other arrangement, to engage in commercial air transport operations within the borders or airspace of South Africa;

FOREIGN STATE AIRCRAFT - means any aircraft owned or operated by any State other than the Republic of South Africa.

FORWARD COMMAND (or CONTROL) POST (FCP) - This is the single point of **joint command** for all on-site operations during the response phase of an emergency incident and it will be located at an appropriate location at or near the scene of the emergency, normally within the ***INNER PERIMETER / RESTRICTED ZONE***. Incident Commanders / Managers from key response agencies as the Incident Management Team, will jointly operate under ***UNIFIED COMMAND*** to co-ordinate incident operations and standard protocols will be used by the Responders. **The FCP may also be referred to as the *ON-SITE JOINT OPERATIONS CENTRE (ON-SITE JOC)*** or as the ***INCIDENT COMMAND POST.***

FREIGHT - means ***CARGO.***

GENERAL AVIATION OPERATION - All civil aviation operations other than scheduled air passenger services and non-scheduled air transport operations (charters) for remuneration or hire.

HAZARD - a potentially damaging physical event including human injury or death, social and economic disruption or environmental degradation or some combination of these. Alternatively, it means any act, omission, event or condition or a combination thereof that could lead to or result in an accident or incident.

HAZARD (ex UNISDR) - A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. *Comment: The hazards of concern to disaster risk reduction as stated in footnote 3 of the Hyogo Framework are " … hazards of natural origin and related environmental and technological hazards and risks." Such hazards arise from a variety of geological, meteorological, hydrological, oceanic, biological, and technological sources, sometimes acting in combination. In technical settings, hazards are described quantitatively by the likely frequency of occurrence of different intensities for different areas, as determined from historical data or scientific analysis.* ***Other (specific) hazard-related terms which are used in the UNISDR Terminology are: Biological hazard; Geological hazard; Hydro-meteorological hazard; Natural hazard; Socio-natural hazard; Technological hazard.***

HAZARD AREA - Area(s) designated by the Disaster Risk Management services, or locally through a hazard risk and vulnerability analysis, which are relatively more likely to experience the direct effects of natural or man-made disasters.

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HAZARD MITIGATION - All methods and measures employed during the response phase to eliminate or make less severe / reduce the effects of a major disaster or emergency, or through pro-active risk reduction initiatives.

HAZARDOUS MATERIAL - Is any substance or material in a quantity or form which may be harmful or injurious to humans, animals, economical crops, or property when released into the environment. There are 4 traditional classes:- chemical, biological, radiological and explosive.

HELIPORT - means an aerodrome or any defined area on land or water, incl. vessels and other maritime structures, (including any buildings, installations and equipment) intended or designated to be used either wholly or in part for the landing, departure and surface movement of helicopters.

HELIPORT OPERATING MINIMA - means the limits of usability of a heliport for –
(a) take-off, expressed in terms of RVR and/or visibility and, if necessary, cloud conditions;
(b) landing in precision approach and landing operations, expressed in terms of visibility and/or RVR and DA/H as appropriate to the category of the operation;
(c) landing in approach and landing operations with vertical guidance, expressed in terms of visibility and/or RVR and DA/H; and
(d) landing in non-precision approach and landing operations, expressed in terms of visibility and/or RVR, MDA/H and, if necessary, cloud conditions.

HOT ZONE - refer to the ***DANGER ZONE*** definition.

INCERFA (SASAR Terminology) – Refers to the Uncertainty Phase and is a situation wherein uncertainty exists as to the safety of an aircraft or vessels and its occupants. It can be assigned any time doubt exists as to the safety of an aircraft because of lack of information concerning progress or position - *the key word is **doubt**.*
INCIDENT - A general description of a hazard occurrence or situation which impacts upon a localized community or geographical area, requiring intervention ranging from a limited co-ordination of emergency resources to a more extensive multi-disciplinary operation. This scenario may also develop into an emergency or disaster situation. (Refer also to the ***ACCIDENT, MAJOR INCIDENT***, ***EMERGENCY*** and ***DISASTER*** *definitions*).

INCIDENT ACTION PLAN (ex MIMP) - The incident should function under a single, co-ordinated Incident Action Plan in dealing with the situation. The **lead** Discipline / Service / Agency's Senior Officer i.r.o. the particular hazard being responded to will have responsibility for implementing the Incident Action Plan and will be assisted by the Incident Management Team (IMT) and off-site structures to ensure effective integration. The Incident Action Plan should strive to follow standard protocols but take into consideration the incident's particular response factors, such as intensity of hazard, capacities and resources of responders, terrain, weather conditions, etc.

INCIDENT COMMAND POST (ICP) - The single point of command for all on-site operations during the response phase of an emergency and will be located at an appropriate location at or near the scene of the emergency, normally within the INNER PERIMETER / RESTRICTED ZONE. Incident Commanders / Managers from key response agencies will operate under UNIFIED COMMAND to co-ordinate incident operations. **The ICP may also be referred to as the *ON-SITE JOINT OPERATIONS CENTRE (ON-SITE JOC)***, or as the ***FORWARD COMMAND (or CONTROL) POST (FCP).***

INCIDENT COMMANDER – the most senior staff member present of **a responding Discipline who will manage that Discipline's tactical and operational deployment according to the parameters and specialisation of that Discipline.** He / she will liaise with all other Disciplines on scene through the On-site Incident Management Team so that Unified Command can be achieved. If necessary, the Discipline with the most active role in combating the hazard will assume the role of the Leading Discipline(s).

INCIDENT MANAGEMENT - Policies and procedures developed for the municipal area of the City of Cape Town to ensure effective inter-discipline / inter-service co-operation at incidents, emergencies or disasters that require multi-disciplinary operations refer also to the ***SITE CO-ORDINATION*** definition.

INCIDENT MANAGEMENT TEAM (IMT) (also known as the Bronze Co-ordinating Group) - The multi-disciplinary team convened at the designated On-Site JOC, under direction of the nominated / selected IMTC, which co-ordinates the effective execution of all line-function responsibilities during the response, relief and rehabilitation phases of any incident, emergency or disaster, using the Unified Command approach.

INCIDENT MANAGEMENT TEAM CO-ORDINATOR (IMTC) - The responsible role-player at the designated On-Site JOC, who is selected to head the Incident Management Team (IMT) which is tasked to co-ordinate and control all the operational response, relief and rehabilitation efforts at any incident, emergency or disaster site, using the Unified Command approach.

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INCIDENT SITE OPERATIONAL AREA - The area, defined by the Incident Commanders, incorporating the localized community or geographical area impacted by the incident.

INNER PERIMETER (RESTRICTED ZONE) – A cordoned off area around the ***DANGER ZONE*** where restricted access is allowed. Only authorised persons will be allowed in this area.

INFRASTRUCTURE – Planned and organised system that is incorporated within everyday management activities, to ensure an acceptable level of emergency incident preparedness.

INNER PERIMETER (RESTRICTED ZONE) – A cordoned off area around the ***DANGER ZONE*** where restricted access is allowed. Only authorised persons will be allowed in this area.

INSTRUMENT FLIGHT RULES - apply when a flight is conducted in accordance with the Instrument Flight Rules as described in the relevant ICAO documents and in the South African Air Navigation Regulations.

INTEGRATED DISASTER (RISK) MANAGEMENT – A concept that applies mitigation, preparedness, response and recovery activities to all hazards in a local / provincial / national partnership.

INTENSIVE RISK * (ex UNISDR) - The risk associated with the exposure of large concentrations of people and economic activities to intense hazard events, which can lead to potentially catastrophic disaster impacts involving high mortality and asset loss. *Comment: Intensive risk is mainly a characteristic of large cities or densely populated areas that are not only exposed to intense hazards such as strong earthquakes, active volcanoes, heavy floods, tsunamis, or major storms but also have high levels of vulnerability to these hazards. See also* ***EXTENSIVE RISK****.*

INVESTIGATION - in relation to accidents and incidents, means a process conducted for the purpose of accident prevention and includes the gathering and evaluation of information, the drawing of conclusions, including the determination of the cause, causes, probable cause or probable causes of an accident or the underlying cause or causes and/or contributing factors leading to an incident and, when appropriate, the making of recommendations in connections with maritime safety.

JOINT MEDIA CENTRE – A Centre established to receive first hand and updated information on the situation with input from all the stakeholders and to co-ordinate all liaison with the media.

KNOT (kt) - is the measurement of speed equal to 1 nautical mile per hour.

LANDING ZONE (LZ) - An area demarcated at a scene for landing helicopters for the primary objective of evacuating emergency patients.

LIAISON OFFICER - the officer responsible for liaison between the RCC, departmental authorities, operating agencies, the Press and the public.

LONG RANGE - refers to an aircraft whose radius of action is 750 nautical miles with two and a half hours' search remaining.

MAIL – Dispatched of correspondence and other objects tendered by and intended for delivery to postal authorities and which may be transported in an aircraft.

MAJOR INCIDENT - A more complex hazard occurrence situation which impacts upon a localized community or geographical area, requiring the co-operation and co-ordinated response of multiple emergency disciplines, resources and operations. This scenario may also develop into an emergency or disaster situation. (Refer also to the ***INCIDENT***, ***EMERGENCY*** and ***DISASTER*** definitions).

MARITIME RESCUE CO-ORDINATION CENTRE (MRCC) – A Centre established within each SRR for the purpose of directing search and rescue operations, which specifically caters for those situations involving vessels at sea requiring search, assistance and rescue and the provision of assistance to the ARCC as required.

MASS CARE CENTRE (or EMERGENCY SHELTER) – A Centre established to provide shelter and other basic needs of a person affected by an emergency or disaster who has no other place of refuge.

MEDEVAC - the evacuation of a seriously injured or ill person from a vessel at sea where the person's condition is such that he obtains medical treatment sooner than when his vessel would be able to get him to a suitable medical facility.

MEDIUM RANGE - refers to an aircraft whose radius of action is 400 nautical miles with two and a half hours' search remaining.

MERCHANT SEARCH AND RESCUE - the search and rescue operation in respect of merchant shipping.

METRE (m) - is the distance travelled by light in a vacuum during 1/299 792 458 of a second.

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MITIGATION (refer also to DISASTER MITIGATION) - Activities designed to reduce or eliminate risks to persons or property or to lessen the actual or potential effects or consequences of an incident.

MITIGATION (ex UNISDR) - The lessening or limitation of the adverse impacts of hazards and related disasters. *Comment: The adverse impacts of hazards often cannot be prevented fully, but their scale or severity can be substantially lessened by various strategies and actions. Mitigation measures encompass engineering techniques and hazard-resistant construction as well as improved environmental policies and public awareness. It should be noted that in climate change policy, "mitigation" is defined differently, being the term used for the reduction of greenhouse gas emissions that are the source of climate change.*

MAYDAY – A radio term used by the pilot of an aircraft or vessel in distress to indicate an imminent emergency situation which requires immediate and appropriate assistance from the ground services.

NATIONAL KEY POINT – Any place or area which has been so-declared under the National Key Points Act.

NATIONAL PLATFORM FOR DISASTER RISK REDUCTION (ex UNISDR) - A generic term for national mechanisms for coordination and policy guidance on disaster risk reduction that are multi-sectoral and inter-disciplinary in nature, with public, private and civil society participation involving all concerned entities within a country. *Comment: This definition is derived from footnote 10 of the Hyogo Framework. Disaster risk reduction requires the knowledge, capacities and inputs of a wide range of sectors and organisations, including United Nations agencies present at the national level, as appropriate. Most sectors are affected directly or indirectly by disasters and many have specific responsibilities that impinge upon disaster risks. National platforms provide a means to enhance national action to reduce disaster risks, and they represent the national mechanism for the International Strategy for Disaster Reduction (ISDR).*

NATIONAL SEA RESCUE INSTITUTE (NSRI) - a voluntary South African sea rescue organisation equipped to undertake sea rescue operations.

NATURAL HAZARD (ex UNISDR) - Natural process or phenomenon that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. *Comment: Natural hazards are a sub-set of all hazards. The term is used to describe actual hazard events as well as the latent hazard conditions that may give rise to future events. Natural hazard events can be characterized by their magnitude or intensity, speed of onset, duration, and area of extent. For example, earthquakes have short durations and usually affect a relatively small region, whereas droughts are slow to develop and fade away and often affect large regions. In some cases hazards may be coupled, as in the flood caused by a hurricane or the tsunami that is created by an earthquake.*

NATURAL PHENOMENA - Natural phenomena are extreme weather, water or geological (earth) processes that do not pose a threat to people or properties. When they occur in a deserted place, they are merely natural phenomena and nothing else. However, once they affect human beings, due to location or poor planning by the human beings, they are a potential hazard and could become a disaster.

NAUTICAL MILE - means the length equal to 1 852 metres exactly.

NON-RESTRICTED AREA - Areas of an airport to which the public have access or to which access is otherwise unrestricted.

OCCUPANT CAPACITY - The maximum number of people who can be safely accommodated at a Venue or in a Facility.

OFFSHORE OPERATIONS - with respect to helicopter operations, means operations which routinely have a substantial proportion of the flight conducted over sea areas to or from offshore locations. Such operations include, but are not limited to, support of offshore oil, gas and mineral exploitation and sea-pilot transfer.

OIL / LIQUID CARGO TANKER – Vessel which carries liquid cargo in tanks. It is specifically designed to carry a particular type of liquid cargo, i.e. crude oil, petroleum products, chemicals, Liquefied Natural Gas (LNG), Liquefied Petroleum Gas (LPG), etc.

ON-SCENE COMMANDER - the official designated by the SMC for controlling a specific SAR mission at the scene of an SAR incident.

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ON-SITE JOINT OPERATIONS CENTRE (ON-SITE JOC) - this may also be referred to as the *FORWARD COMMAND POST (FCP).* *The On-site JOC* is designated on-site facility, established at either an acceptable structure in the vicinity or a mobile JOC which can be provided by the DRMC or any other designated Discipline, during a major incident, emergency or disaster situation. It will be the single point where JOINT ON-SITE OPERATIONS (INCIDENT) MANAGEMENT takes place through a multi-disciplinary Incident Management Team (BRONZE COMMAND). Incident / Bronze Commanders from the key response Disciplines will operate under **Unified Command** as specified in the MIMP to ensure collaboration, co-ordination and communication during incident operations at the incident site. The On-site JOC will be linked to the various established ***Service Command Posts (SCPs) / Bronze Command*** on-site and as well as to the DCT in the CoCT DOC. It should be located at an appropriate and safe location at or near the scene of the emergency and within the INNER PERIMETER / RESTRICTED ZONE for security reasons.

OPERATOR – A person, organization or enterprise engaged in or offering to engage in a maritime operation.

OUTER PERIMETER (SAFE ZONE) – The area outside of the Restricted Zone / Inner Perimeter, still with limited public access, to act as a safety (buffer) zone from the public.

PASSENGER - means a person, other than a crew member, who is carried on board a vessel.

PASSENGER AREA - All the ground space and facilities provided for passenger processing. It includes aprons, passenger buildings, vehicle parks and roads.

PERSONAL LOCATOR BEACON - an emergency locater beacon small enough to be carried on a person. It operates on 121.5, 243 or 406 MHZ and is intended solely for distress signalling.

PILOT-IN-COMMAND – means the pilot responsible for the operation and safety of the aircraft in flight, without regard to whether or not he/she is manipulating the controls.

PLACE OF SAFETY – Place away / outside of danger.

PORT CAPTAIN (HARBOUR MASTER) - the person designated as the official to exercise authority over operations at a port or harbour.

PREPAREDNESS - The range of deliberate, critical tasks and activities necessary to build, sustain, and improve the operational capability to prevent, protect against, respond to, and recover from incidents. Preparedness contributes to **disaster risk reduction** through measures taken in advance to ensure effective response to the impact of hazards, including timely and effective early warnings and the temporary evacuation of people and property from threatened locations. Preparedness enables organs of state and other institutions involved in disaster risk management, the private sector, communities and individuals to mobilise, organise, and provide relief measures to deal with an impending or current disaster, or the effects of a disaster. Preparedness differs from prevention and mitigation, as it focuses on activities and measures taken in advance of a specific threat or disaster.

PREPAREDNESS (ex UNISDR) - The knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions. *Comment: Preparedness action is carried out within the context of disaster risk management and aims to build the capacities needed to efficiently manage all types of emergencies and achieve orderly transitions from response through to sustained recovery. Preparedness is based on a sound analysis of disaster risks and good linkages with early warning systems, and includes such activities as contingency planning, stockpiling of equipment and supplies, the development of arrangements for coordination, evacuation and public information, and associated training and field exercises. These must be supported by formal institutional, legal and budgetary capacities. The related term "readiness" describes the ability to quickly and appropriately respond when required.*

PREVENTION (ex UNISDR) - The outright avoidance of adverse impacts of hazards and related disasters. *Comment: Prevention (i.e. **disaster prevention**) expresses the concept and intention to completely avoid potential adverse impacts through action taken in advance. Examples include dams or embankments that eliminate flood risks, land-use regulations that do not permit any settlement in high risk zones, and seismic engineering designs that ensure the survival and function of a critical building in any likely earthquake. Very often the complete avoidance of losses is not feasible and the task transforms to that of mitigation. Partly for this reason, the terms prevention and mitigation are sometimes used interchangeably in casual use.*

PROSPECTIVE DISASTER RISK MANAGEMENT (ex UNISDR) - Management activities that address and seek to avoid the development of new or increased disaster risks. *Comment: This concept focuses on addressing risks that may develop in future if risk reduction policies are not put in place, rather than on the risks that are already present and which can be managed and reduced now. See also **CORRECTIVE DISASTER RISK MANAGEMENT**.*

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PROTECTION - Actions to mitigate the overall risk to critical infrastructure people, assets, systems, networks and functions and their interconnecting links, from exposure, injury, destruction, incapacitation or exploitation.

PUBLIC AWARENESS (ex UNISDR) - The extent of common knowledge about disaster risks, the factors that lead to disasters and the actions that can be taken individually and collectively to reduce exposure and vulnerability to hazards. *Comment: Public awareness is a key factor in effective disaster risk reduction. Its development is pursued, for example, through the development and dissemination of information through media and educational channels, the establishment of information centres, networks, and community or participation actions, and advocacy by senior public officials and community leaders.*

RCC CHIEF – an official in the Rescue Co-ordination Centre responsible for ensuring the requirements are met to enable SAR operations within a given geographical are to be co-ordinated.

RECOVERY (ex UNISDR) - The restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors. *Comment: The recovery task of rehabilitation and reconstruction begins soon after the emergency phase has ended, and should be based on pre-existing strategies and policies that facilitate clear institutional responsibilities for recovery action and enable public participation. Recovery programmes, coupled with the heightened public awareness and engagement after a disaster, afford a valuable opportunity to develop and implement disaster risk reduction measures and to apply the "build back better" principle.*

REGISTERED AIRCRAFT - Aircraft on the register of the South African Civil Aviation Authority (SACAA) will display a 5-letter registration commencing with the letters ZS- or ZU-, or, if registered in another country, the appropriate registration letters allocated by that country.

RENDEZVOUS POINT(S) (or RV POINT) – location(s) where the responding Services will meet to jointly proceed to the Incident area.

RESCUE CO-ORDINATION CENTRE - a centre established within each SRR for the purpose of directing search and rescue operations

RESCUE SERVICE - means a service a defined in Section 1 of the Fire Brigade Services Act, 1987 (Act No. 99 of 1987), a medical service or any other related service.

RESCUE SUB-CENTRE - is a suitable, appointed unit tasked to carry out duties of the RCC when it is found that the RCC cannot exercise direct and effective control over search and rescue facilities in certain sectors of an SRR. This would happen in the following instances:
1) where the communication facilities in a sector of an SRR are not adequate for direct and close co-ordination between the RCC and the rescue units in that sector; and
2) where the SRR encompasses a number of States or territorial divisions of a State in which, for political, administrative and similar reasons, local facilities can only be directed and controlled through designated local authorities. (This would occur, for example, in respect of Lesotho, Namibia and Swaziland).

RESCUE VESSEL - a long-range sea-going craft with reasonable speed.

RESIDUAL RISK (ex UNISDR) - The risk that remains in unmanaged form, even when effective disaster risk reduction measures are in place, and for which emergency response and recovery capacities must be maintained. *Comment: The presence of residual risk implies a continuing need to develop and support effective capacities for emergency services, preparedness, response and recovery together with socioeconomic policies such as safety nets and risk transfer mechanisms.*

RESILIENCE (ex UNISDR) - The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions. *Comment: Resilience means the ability to "resile from" or "spring back from" a shock. The resilience of a community in respect to potential hazard events is determined by the degree to which the community has the necessary resources and is capable of organizing itself both prior to and during times of need.*

RESILIENCY - The capability of people, assets and systems to maintain functions during a disaster and to expeditiously recover and reconstitute essential services after the event.

RESPONSE (DISASTER RESPONSE) – Response is the implementation of measures that are necessary to protect against a hazard. Disaster response refers to the provision of assistance or intervention during or immediately after a disaster to meet the life preservation and basic subsistence needs of those people affected. It can be of an immediate, short-term or protracted duration.

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RESPONSE (ex UNISDR) - The provision of emergency services and public assistance during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected. *Comment: Disaster response is predominantly focused on immediate and short-term needs and is sometimes called "disaster relief". The division between this response stage and the subsequent recovery stage is not clear-cut. Some response actions, such as the supply of temporary housing and water supplies, may extend well into the recovery stage.*

RESTRICTED ZONE – refer to ***INNER PERIMETER*** **RETROFITTING (ex UNISDR) -** Reinforcement or upgrading of existing structures to become more resistant and resilient to the damaging effects of hazards. *Comment: Retrofitting requires consideration of the design and function of the structure, the stresses that the structure may be subject to from particular hazards or hazard scenarios, and the practicality and costs of different retrofitting options. Examples of retrofitting include adding bracing to stiffen walls, reinforcing pillars, adding steel ties between walls and roofs, installing shutters on windows, and improving the protection of important facilities and equipment.*

RISK (or DISASTER RISK) – The measure of potential harm from a hazard or threat. Risk is usually associated with the human inability to cope with a particular situation. In terms of disaster management it can be defined as the probability of harmful consequences, or expected losses death, injury, damage to property and the environment, jobs, disruption of economic activity or social systems. Hazards will affect communities differently in terms of ability and resources with which to cope. Poorer communities will be more at risk, i.e. more vulnerable, than others.

RISK (ex UNISDR) - The combination of the probability of an event and its negative consequences. *Comment: This definition closely follows the definition of the ISO/IEC Guide 73. The word "risk" has two distinctive connotations: in popular usage the emphasis is usually placed on the concept of chance or possibility, such as in "the risk of an accident"; whereas in technical settings the emphasis is usually placed on the consequences, in terms of "potential losses" for some particular cause, place and period. It can be noted that people do not necessarily share the same perceptions of the significance and underlying causes of different risks.* **** Refer to other risk-related terms in the Terminology:- Acceptable risk; Corrective disaster risk management; Disaster risk; Disaster risk management; Disaster risk reduction; Disaster risk reduction plans; Extensive risk; Intensive risk; Prospective disaster risk management; Residual risk; Risk assessment; Risk management; Risk transfer.***

RISK ANALYSIS - The systematic use of information to identify risk sources and to estimate risk.

RISK ASSESSMENT - Assessment of the threat posed by any identified hazard.

RISK ASSESSMENT (ex UNISDR) - A methodology to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability that together could potentially harm exposed people, property, services, livelihoods and the environment on which they depend. *Comment: Risk assessments (and associated risk mapping) include: a review of the technical characteristics of hazards such as their location, intensity, frequency and probability; the analysis of exposure and vulnerability including the physical social, health, economic and environmental dimensions; and the evaluation of the effectiveness of prevailing and alternative coping capacities in respect to likely risk scenarios. This series of activities is sometimes known as a risk analysis process.*

RISK MANAGEMENT (ex UNISDR) - The systematic approach and practice of managing uncertainty to minimize potential harm and loss. *Comment: Risk management comprises risk assessment and analysis, and the implementation of strategies and specific actions to control, reduce and transfer risks. It is widely practiced by organizations to minimise risk in investment decisions and to address operational risks such as those of business disruption, production failure, environmental damage, social impacts and damage from fire and natural hazards. Risk management is a core issue for sectors such as water supply, energy and agriculture whose production is directly affected by extremes of weather and climate.*

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RISK TRANSFER (ex UNISDR) - The process of formally or informally shifting the financial consequences of particular risks from one party to another whereby a household, community, enterprise or state authority will obtain resources from the other party after a disaster occurs, in exchange for on-going or compensatory social or financial benefits provided to that other party. *Comment: Insurance is a well-known form of risk transfer, where coverage of a risk is obtained from an insurer in exchange for on-going premiums paid to the insurer. Risk transfer can occur informally within family and community networks where there are reciprocal expectations of mutual aid by means of gifts or credit, as well as formally where governments, insurers, multi-lateral banks and other large risk-bearing entities establish mechanisms to help cope with losses in major events. Such mechanisms include insurance and re-insurance contracts, catastrophe bonds, contingent credit facilities and reserve funds, where the costs are covered by premiums, investor contributions, interest rates and past savings, respectively.*

RUNWAY - means a defined rectangular area on a land aerodrome prepared for the landing and take-off of aeroplanes.

SAFETY - means the freedom from risk of bodily injury or death and the freedom from risk of loss or damage to property.

SAFETY MANAGEMENT SYSTEM - means a systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.

SAFE ZONE – refer to ***OUTER PERIMETER*.**

SAR MISSION CO-ORDINATOR - the official designated by the RCC Chief for co-ordinating and controlling a specific Search and Rescue mission.

SAR PLAN - a detailed plan formulating the basis of search and rescue operations.

SEARCH AND RESCUE FACILITIES - are the manpower and equipment suitable for search and rescue operations drawn or developed from several sources.

SEARCH OR RESCUE MASTER - the official designated by the SMC to exercise control over SRUs at the distress scene.

SEARCH AND RESCUE REGION (SRR) – an area in which the co-ordination of search and rescue is effected by a single RCC. South Africa has two Search and Rescue Regions, one landward for aviation search and rescue and one seaward for maritime search and rescue.

SEARCH AND RESCUE UNIT - any unit assigned by the SMC to perform search, rescue or similar operations during a Search and Rescue mission.

SECURITY – a combination of measures and human and material resources intended to safeguard shipping against acts of unlawful interference.

SERVICE COMMAND POST (SCP) (also known as Service's Bronze Command (ex MIMP) - An on-site facility where OPERATIONAL COMMAND OF A SPECIFIC RESPONDING SERVICE / DISCIPLINE takes place. It is linked to the designated ON-SITE JOC / FCP where joint (inter-disciplinary) decision-making and co-ordination takes place, as well as to the respective Service's / Discipline's own off-site Control Centre **(**refer also to ***UNIFIED COMMAND*)**.

SHORT RANGE - refers to an aircraft which has a radius of action of 150 nautical miles with half an hour's search remaining.

SITE CO-ORDINATION (ex MIMP) - This term refers to the bringing together of organisations and elements to ensure effective major incident, emergency or disaster response on site and is primarily concerned with the systematic acquisition and application of resources (organisation, manpower and equipment) in accordance with the requirements imposed by the hazard (threat) or the resultant impact of any incident, emergency or disaster. This co-ordination / incident management relates primarily to resources, and operates vertically, within an organisation, as a function of the authority to command (SCP) and horizontally, across organisations, as a function of the authority to control (On-Site JOC).

SITUATION REPORT - an up-to-date report on a situation in respect of the progress of search and rescue.

STANDARD OPERATING PROCEDURES (SOP's) - A set of instructions having the force of a directive, covering those features of operations which lend themselves to a definite or standard procedure without loss of effectiveness.

STATE AIRCRAFT - means aircraft used in military, customs and police services.

ORT DRM Plan - T3

STRUCTURAL AND NON-STRUCTURAL MEASURES (ex UNISDR) –
 # Structural measures: Any physical construction to reduce or avoid possible impacts of hazards, or application of engineering techniques to achieve hazard-resistance and resilience in structures or systems; **# Non-structural measures**: Any measure not involving physical construction that uses knowledge, practice or agreement to reduce risks and impacts, in particular through policies and laws, public awareness raising, training and education. *Comment: Common structural measures for disaster risk reduction include dams, flood levies, ocean wave barriers, earthquake-resistant construction, and evacuation shelters. Common non-structural measures include building codes, land use planning laws and their enforcement, research and assessment, information resources, and public awareness programmes. Note that in civil and structural engineering, the term "structural" is used in a more restricted sense to mean just the loadbearing structure, with other parts such as wall cladding and interior fittings being termed non-structural.*

SUB-SEARCH AND RESCUE REGION - an area in which the co-ordination of search and rescue is affected by a single Rescue Sub-centre (RSC).

SURVIVOR RECEPTION AREA – An area, managed by the Airline involved in the Incident to manage patient tracking in association with the LIC – refer to the CTIA ERP Plan.

TECHNOLOGICAL HAZARD (ex UNISDR) - A hazard originating from technological or industrial conditions, including accidents, dangerous procedures, infrastructure failures or specific human activities, that may cause loss of life, injury, illness or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. *Comment: Examples of technological hazards include industrial pollution, nuclear radiation, toxic wastes, dam failures, transport accidents, factory explosions, fires, and chemical spills. Technological hazards also may arise directly as a result of the impacts of a natural hazard event.*

TELECOMMUNICATIONS - is any transmission, emission or reception of signs, signals, written images and sound or intelligence of any nature by wire, radio, visual or other electromagnetic systems.

THREAT - The intention and capability of an adversary (i.e. people and nature) to undertake actions that would be detrimental to critical infrastructures – refer also to the ***HAZARD*** definition.

THREAT - as used in the context of operating a vessel, means events or errors, as defined, that occur beyond the influence of the crew, increase operational complexity, and which must be managed to maintain the margin of safety.

THREAT MANAGEMENT - means the process of detecting and responding to the threats with countermeasures that reduce or eliminate the consequences of threats, and mitigate the probability of errors, as defined, or undesired ship conditions.

TRAFFIC CONTROL POINTS – Places along access or egress routes to / from the Incident Site and primarily used by emergency vehicles and / or places along evacuation routes that are manned by law enforcement officials to direct and control to and from the area being evacuated

TRIAGE – Means the medical sorting of casualties into treatment priority.

UNCERTAINTY PHASE - a situation wherein uncertainty exists as to the safety of an aircraft or vessel and its occupants

UNIFIED COMMAND (JOINT BRONZE CO-ORDINATING GROUP) (ex MIMP) - The system of effectively managing an incident, emergency or disaster site so that joint decision-making and co-ordination for operational functions is established between the responding Services / Disciplines, while still retaining each Service's / Discipline's internal command structures.

VEHICLE STAGING AREA(S) – An area demarcated for all primary emergency vehicles of the responding Services' to assemble and deploy their vehicles on an organised basis.

VERY LONG RANGE - refers to an aircraft which has a radius of action of 1 000 nautical miles with two and a half hours' search remaining.

VULNERABILITY – The degree to which people, property, the environment or social and economic activity - in short, all elements-at-risk - are susceptible to injury, loss of life, damage, disruption, exploitation or incapacitation by all hazards.
VULNERABILITY (ex UNISDR) - The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard. *Comment: There are many aspects of vulnerability, arising from various physical, social, economic, and environmental factors. Examples may include poor design and construction of buildings, inadequate protection of assets, lack of public information and awareness, limited official recognition of risks and preparedness measures, and disregard for wise environmental management. Vulnerability varies significantly within a community and over time. This definition identifies vulnerability as a characteristic of the element of interest (community, system or asset) which is independent of its exposure. However, in common use the word is often used more broadly to include the element's exposure.*

COPT ERM Plan - T3

4. LEAD AND SUPPORTING ROLE-PLAYERS INVOLVED IN THE CoCT SHIPPING INCIDENT DRM PLAN

South African Maritime Safety Authority (SAMSA), with the National Department of Transport (DoT)
Transnet National Ports Authority (TNPA) – Harbour Master of the Port of Cape Town,
Cape Town Radio – maritime communications
South African Search and Rescue (SASAR) = Maritime Rescue Co-ordination Centre (MRCC), in association with the Aeronautical Rescue Co-ordination Centre (ARCC), as applicable to the nature of the search, if this is required
National Sea Rescue Institute (NSRI)
National Dept. of Environmental Affairs – Oceans & Coasts South African National Defence Force (SANDF) = Joint Tactical Headquarters (J Tac HQ), Western Cape; SA Navy; SAAF Airspace Management; SA Military Health Service; SA Army, as appropriate.
CoCT Disaster Risk Management Centre, incorporating the Disaster Operations Centre (DOC)
CoCT Law Enforcement & Security Services
CoCT Fire & Rescue Service
CoCT Metropolitan Police Department
CoCT Traffic Services
CoCT 107 Public Emergency Communications Centre (PECC)
CoCT Environmental Resource Management Department - Marine Environmental Compliance and Coastal Management Unit
CoCT Communications
CoCT Solid Waste Department
CoCT – various other supporting Departments i.r.o. their mandated functions - to <u>support</u> the response, relief and rehabilitation phases of any maritime incident, as and where applicable
WCG Emergency Medical Services (EMS) & Provincial Hospitals - also linked to Private EMS's & Hospitals, as applicable
WCG Forensic Pathology Services
WCG Disaster Management Centre
South African Police Service (SAPS), incl. Sea Border Unit, Diving & Water Policing Unit, BCOCC (with Customs) & land-based policing support units (VisPol)
National Dept. of Agriculture, Forestry & Fisheries (DAFF) – incl. small harbour & fishing management
South African Civil Aviation Authority (SACAA)
Air Traffic and Navigation Service (ATNS)
Plus various other National Government Departments, viz., Dept. of Health (Port Health), Dept. of Home Affairs, Dept. of Finance – Customs, Dept. of Tourism, the SSA, and other Provincial Departments, as applicable to the prevailing situation.
V & A Waterfront, as applicable to the prevailing situation
Various NGO's i.r.o. their Disaster Relief and Recovery assistance, Trauma Counselling, etc.
The Vessel Owner(s) or Shipping Agent(s) involved
Applicable Foreign Embassy/Consular Personnel (if a foreign vessel is involved).

Other Contracted Entities and Private Enterprises *may also be able to assist, as applicable to the prevailing situation – some of the <u>current</u> Contracted Entities are:-*

- **Servest Marine -** specialise in providing dedicated and reliable transport solutions to the marine industry. Has a fleet of dedicated and reliable offshore supply vessels operate on a 24/7 basis providing the following services:-
  - Offshore - off port limits rendezvous with vessels to transfer personnel, stores, ships spares, airfreight and any other urgent requirements
  - Towing and Salvage for vessels in distress
  - Fresh water deliveries offshore
  - Receiving and disposal of sludge
  - Contract services on offshore construction and pipelines
  - Launches for logistic supplies to offshore rigs and mining vessels.
- **Smit Amandla Marine -** provides various marine solutions, i.e. tugs & refloating a grounded vessel; manage a ship's fuel transfer; risk management on a bunker barge to ensure effective bunker delivery; client support to ensure fuel supply; etc.
- **Svitzer -** provides various marine solutions, i.e. 24-hour emergency rescue, tugs & refloating of a grounded vessel; manage a ship's fuel transfer; risk management on a bunker barge to ensure effective bunker delivery; client support to ensure fuel supply; etc.
- **AAL-SA (Advanced Aviation Logistics SA)** – based at CTIA and using a Port of Cape Town heliport, (using Mi-8MTV, Eurocopter AS365 & Puma helicopter types), provides helicopter logistics support and supplies to off-shore shipping near Cape Town.

CoCT Shipping DRM Plan - T3

5. SHIPPING OPERATIONS' HAZARD AND RISK INFORMATION: - SPECIFIC HAZARD DESCRIPTIONS & GENERAL CHARACTERISTICS - DISASTER RISK ASSESSMENT = HAZARD PREDICTABILITY / IMPACT (CONSEQUENCES) / VULNERABILITY / ABILITY TO COPE

5.1 HAZARD DESCRIPTIONS, GENERAL CHARACTERISTICS & CAUSAL PHENOMENA OF THE HAZARDS AND RISKS ASSOCIATED WITH SHIPPING OPERATIONS IN THE VICINITY OF CAPE TOWN

Vessels, ships, boats and small craft have been plying the seas for centuries and have been developed for a particular use, i.e. carrying passengers (cruise liners, ferries, yachts, etc.), cargo (container ships, fishing boats, bulk carriers, various liquid tankers, refrigerated cargo ships, livestock carriers, dry cargo vessels, heavy lift vessels, Ro-Ro vessels, etc.), tugs, drilling platforms and various other types. Each of these shipping-types has its own characteristics and these factors will need to be considered when dealing with any incident involving a shipping vessel.

Possible Shipping Incidences and Hazards

A shipping/maritime incident can be defined as any occurrence on board a vessel or involving a ship or any other maritime structure whereby any one or more of the following incidents occur:-

- there is loss of life or major injury to any person on board, or any person is lost or falls overboard from the ship or from one of the ship's boats or from any other marine structure;
- the ship/vessel or any other marine structure:-
  - causes any loss of life, major injury or material damage,
  - is lost or is presumed to be lost,
  - is abandoned,
  - is materially damaged by fire, explosion, weather or other cause,
  - grounds (especially during stormy or foggy weather conditions and/or navigational error at sea, etc.),
  - is in a collision with another vessel or an obstacle,
  - is not under control or under command,
  - is disabled,
  - is high-jacked,
  - has a significant structural failure,
  - sinks, or
  - causes significant harm to the environment through oil spills and/or other substance or agent's release – these spills not only affect the marine environment but also the nearby coasts and adjacent land areas (refer to Cape Zone (No.3) Coastal Oil Spill Plan (T10);
- or any of the following occur:-
  - a collapse or bursting of any pressure vessel, pipeline or valve,
  - a collapse or failure of any lifting equipment, access equipment, hatch-cover, staging or boatswain's chair or any associated load-bearing parts,
  - a collapse of cargo, unintended movement of cargo or ballast sufficient to cause a list, or loss of cargo overboard,
  - a snagging of fishing gear which results in the vessel heeling to a dangerous angle,
  - a contact by a person with loose asbestos fibre except when full protective clothing is worn, or
  - an escape of any harmful substance or agent,
  - if the occurrence might have caused serious injury or damage to the health of any person.

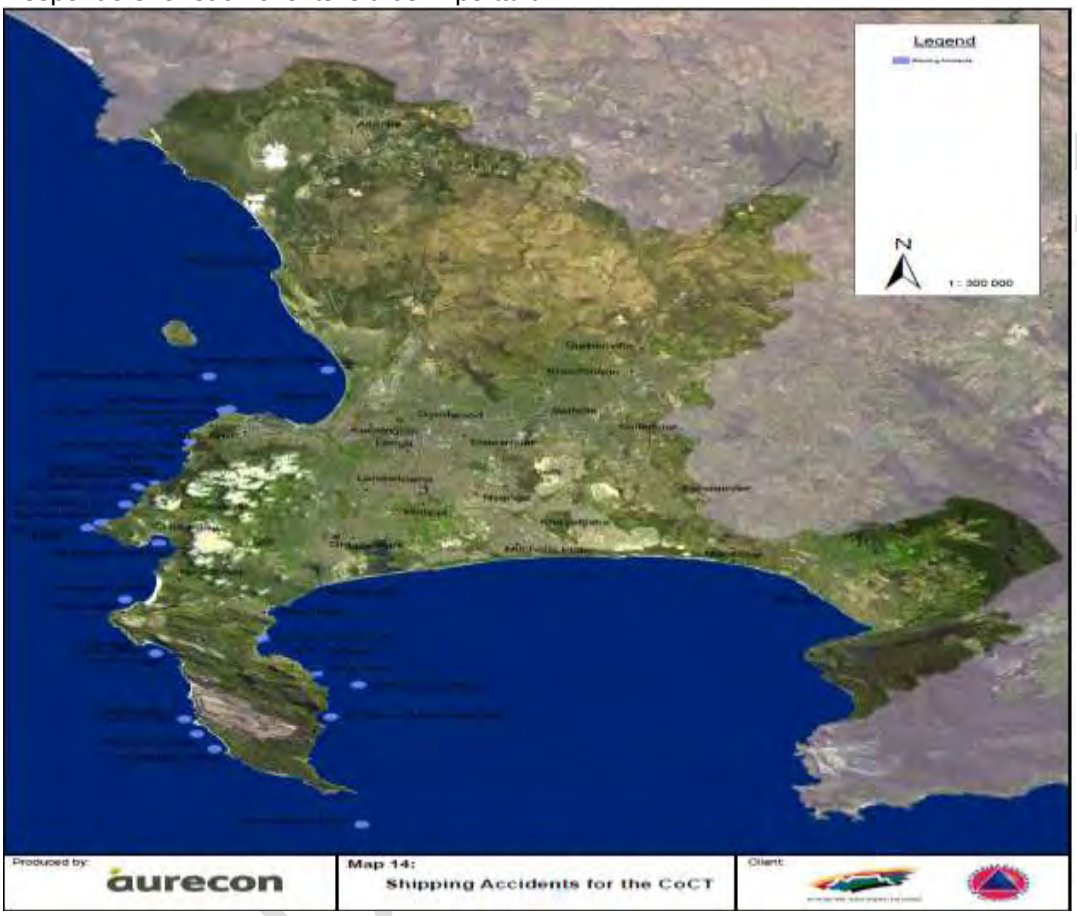


Sealand Express grounded on Sunset Beach, Table Bay,19 August 2003
Source: www.containershipping.nl/casualties.html

CoCT DRM Plan T5

Affected Areas

Wrecks around the Cape Peninsula are evidence of shipping accidents that have taken place. Map 14 below gives an indication of SOME of the shipping accidents that have occurred within the past 400 years along the Cape Town coastline or adjacent marine area. Many lives have been lost and the economic and environmental losses incurred in these incident occurrences, which serves to emphasise that shipping incidents are generally unpredictable, especially due to the “Cape of Storms” weather conditions which may prevail during many days of the year, notwithstanding the higher safety standards, and that they may still occur at any time!! Constant readiness by all the Responders for such events is thus important.



Shipping Lanes

Shipping lanes came to be by analysing the prevailing winds. It is well known that the trade winds allowed ships to sail towards the west quickly, and that the westerly winds allowed ships to travel to the east quickly. As such, the sea lanes are mostly chosen to take full advantage of these winds. Currents are also similarly followed as well, which also gives an advantage to the vessel. It should be noted however, that the sea lanes were chosen based on the importance of cities as well, which could explain some anomalies towards the currents/winds, such as the fact that the shipping lanes are not optimally chosen for the route from Cape town towards Rio de Janeiro (passing Tristan da Cunha).

Main sea lanes may also attract pirates. *Pax Britannica* was the period 1815–1914 during which the British Royal Navy controlled most of the key maritime trade routes, and also suppressed piracy and the slave trade. In World Wars I and II as German U-boats began hitting American and British shipping, the Allied trade vessels began to move out of the sea lanes to be escorted by Naval ships.

Advantages

Although most ships no longer use sails (having switched them for engines), the wind still creates waves / sea swells, and this can cause heeling. Therefore, the following of the overall direction of the trade winds and the westerly’s are still very useful. However, any vessel that is not engaged in trading, or is smaller than a certain length, is best to avoid the shipping lanes. This is not only because the slight chance of a collision with a large ship can easily cause a smaller ship to sink, but also because large vessels are much less maneuverable than smaller ships, and need much more depth. Smaller ships can thus easily take courses that are nearer to the shore. As, (unlike with road traffic), there is no exact "road" a ship must follow, this can easily be done. Shipping lanes are the busiest parts of the sea, thus being a useful place for stranded boaters whose boats are sinking or people on a life raft to be rescued by a passing ship.

Threats from shipping lanes

Although the shipping lanes are useful, they do pose threats to some people:

- Divers should stay clear of shipping lanes when performing dives.
- Small boats also do best to avoid the lanes.
- As the shipping lanes are very large, sections of the lane exist which can be shallow or have some kind of obstruction (e.g. sand bank). This threat is greatest when passing some narrows, such as between certain islands in the Indian and Pacific Oceans.
- Some shipping lanes, such as the Straits of Malacca off Indonesia and the waters off Somalia are notorious pirate havens, and passing ships run a risk of being attacked and held for ransom!!



The shipping lanes of the world – Cape Town may also serve as an alternate routing when there are problems in the Red Sea and Suez Canal

Shipping Frequency and Ports

Major shipping lanes pass along the South African coastline in the south Atlantic and Indian oceans. Cape Town is situated on the sea route halfway between the USA / Europe and the Indian Ocean / Far Eastern destinations and the southern Africa – South America and Antarctic routes are also popular. Although this route carries large volumes of traffic, not all ships call at the Cape Town Port (SAMSA 2005). Approximately 96% of the country's exports are conveyed by sea, and the eight commercial ports are the conduits for trade between South Africa and its southern African partners as well as hubs for traffic to and from Europe, Asia, the Americas and the east and west coasts of Africa.

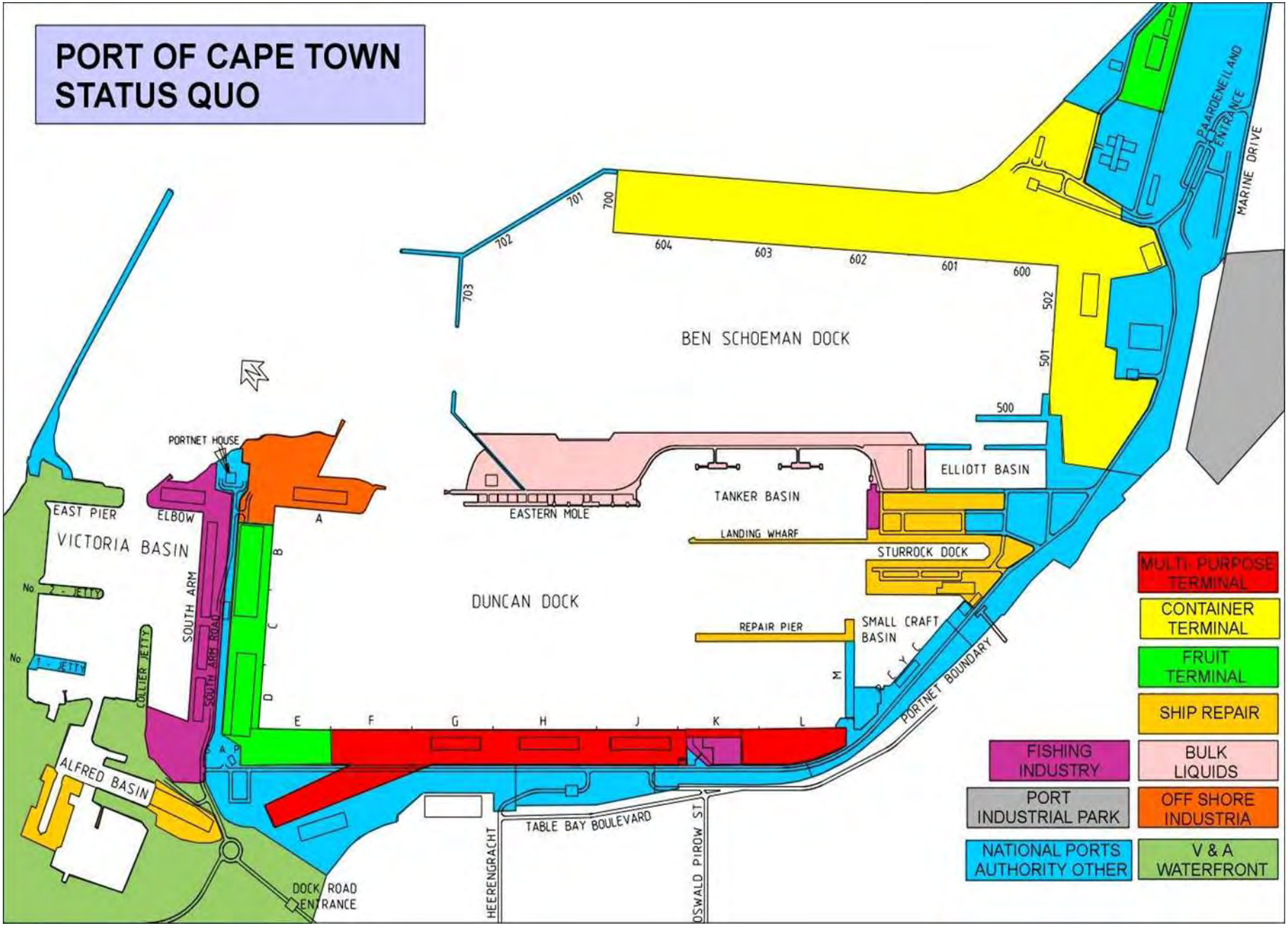
Over 120 million tons of crude oil passes around the Cape Peninsula per year – this amount may even be greater during times of political instability leading to the closure of the Suez Canal which forces shipping around the Cape. Due to the stormy weather conditions and the high level of marine traffic, the Port of Cape Town and the City of Cape Town coastline and adjacent marine environments are continuously at risk of marine pollution caused by shipping accidents. In addition, there are fuel storage tanks and pipelines to service shipping in all the harbours and these may also present a hazard to shipping whilst in port.

The commercial ports are: the Port of Cape Town, the Port of Saldanha and the Port of Mossel Bay in the Western Cape; the Port of Richards Bay and the Port of Durban in KwaZulu-Natal; the Port of East London, the Port of Port Elizabeth and the Port of Ngqura in the Eastern Cape.

The state-owned Transnet National Ports Authority (NPA) manages these ports, while Transnet Port Terminals, formerly known as SAPO, is responsible for managing port and cargo terminal operations.

The SA Navy Bases in Cape Town are: Simonstown and a section of Gordon's Bay Harbour. Other significant harbours in the Cape Town Municipal Area catering for the fishing fleet, private yachts, tourist boats and other commercial boats are:- the Royal Cape Yacht Club (located within the Port of Cape Town), V & A Waterfront Harbour, Granger Bay Yacht Club Harbour, Robben Island Harbour, Hout Bay Harbour, Kommetjie Harbour, Kalk Bay Harbour, Harbour Island Marina (Gordon's Bay) and Gordon's Bay Harbour. Various smaller boat launch sites are also located along the Cape Town coastline.

CONFIRM


PORT OF CAPE TOWN
STATUS QUO
BEN SCHOEMAN DOCK
DUNCAN DOCK
VICTORIA BASIN
ALFRED BASIN
EAST PIER
ELBOW
SOUTH ARM
SOUTH ARM ROAD
COLLIER JETTY
No 2 JETTY
No 1 JETTY
PORTNET HOUSE
EASTERN MOLE
TANKER BASIN
ELLIOTT BASIN
LANDING WHARF
STURROCK DOCK
REPAIR PIER
SMALL CRAFT BASIN
PORTNET BOUNDARY
TABLE BAY BOULEVARD
HEERENGRACHT
OSWALD PIROW ST
DOCK ROAD ENTRANCE
MARINE DRIVE
BLAAUWENLAND ENTRANCE
700
701
702
703
600
601
602
603
604
500
501
502
A
B
C
D
E
F
G
H
J
K
L
M
MULTI-PURPOSE TERMINAL
CONTAINER TERMINAL
FRUIT TERMINAL
SHIP REPAIR
FISHING INDUSTRY
BULK LIQUIDS
PORT INDUSTRIAL PARK
OFF SHORE INDUSTRIA
NATIONAL PORTS AUTHORITY OTHER
V & A WATERFRONT

5.2. EXPLANATION OF THE DISASTER RISK ASSESSMENT QUANTIFICATION AND RELATIVE PRIORITISATION OF THE HAZARDS, AS PER THE COMPREHENSIVE DISASTER RISK ASSESSMENT FOR CAPE TOWN (BY AURECON IN 2010)

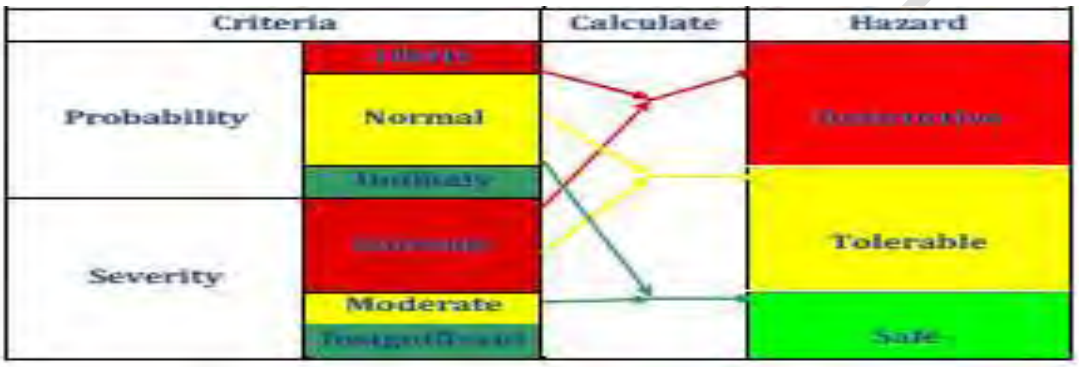
Disaster Risk Quantification

The disaster risk profiling assessment normally produces so many hazards that must be addressed that the sheer volume of work tends to be overwhelming. Consequently, a ***Relative Disaster Risk Prioritisation Assessment*** is conducted to assist the Municipality in their disaster risk management planning. The ***Relative Disaster Risk Prioritisation Assessment*** involves the following action steps:-

- **Quantify the Hazard**
- **Quantify Vulnerabilities**
- **Quantify the Disaster Risk Manageability / Coping Capacity**
- **Determine the Overall Disaster Risk Score**

Hazard Score Quantification

The hazard score is determined by quantifying the probability and severity of a hazard (refer to the **Table** below).



= <u>Probability</u>: The probability of a hazard occurring is assessed and classified in three categories, namely:-

- ***Likely*** ~ hazards in this category will have a very high probability of occurring (score = 3)
- ***Normal*** ~ hazards in this category will have a normal probability of occurring (score = 2)
- ***Unlikely*** ~ hazards in this category will have an unlikely probability of occurring (score = 1)

= <u>Severity</u> (incl. impact & consequences): The severity of the hazard, should it occur, will be accessed and the hazards will be classified into the following three categories:-

- ***Extreme -*** hazards in this category will hold extreme consequences to a community (score = 3)
- ***Moderate -*** hazards in this category will hold moderate consequences to a community (score = 2)
- ***Insignificant -*** hazards in this category will hold insignificant consequences to a community (score = 1)

Vulnerability Score Quantification

Create Hazard Vulnerability Analysis Directory Structure: A directory structure should be created to assist in determining the degree to which a community is vulnerable to each of the hazards in the region.

Quantify Vulnerabilities: To enable risk quantification the Vulnerabilities of the area should also be calculated. The model has assessed ***environmental***, ***economical***, ***societal*** and ***critical facilities***

N.B. ***Political*** and **legal vulnerabilities** may also be required to be assessed, depending on the Community's circumstances. A map of the study area should be used and GIS layers should be used to indicate areas that are vulnerable. Each area on the map must be allocated a vulnerability score for ***each of the four vulnerabilities*** and a vulnerability score of 1, 2 or 3 should be used, where:-

1 = not vulnerable
2 = moderately vulnerable
3 = extremely vulnerable

A total vulnerability score (VT), which is the sum of the Environmental (VENV), economical (VEC), societal (VS) and critical facility (VCF) vulnerabilities, can then be calculated for each geographical area or specific study area, i.e. **VT = VENV + VEC + VS + VCF (+VP + VL, as applicable).** Vulnerability scoring will be based on the following:-

Vulnerability Score ≥ 10: Should the vulnerability score of a particular hazard event impacting on a community be higher than or equal to 10, that community is extremely vulnerable to that hazard.
Vulnerability Score 7 to 9: Should the vulnerability score of a particular hazard event impacting on a community is between or equal to 7 and 9, the community is moderately vulnerable.
Vulnerability Score < 7: Should the vulnerability score of a particular hazard event impacting on a community be less than 7, the vulnerability is considered to be low.

Disaster Risk Manageability (or Coping Capacity) Score Quantification

The degree to which a society or institution can intervene and manage / cope with the negative consequences of a hazard event will depend on the following, each rated on a score in a three-point scale where: good = 3; modest =2; poor = 1; viz.:-
Awareness: The over-all awareness of people living in a potential impact area of a hazard to that hazard is one of the factors that determine the risk manageability of a community.
Legislative Framework: The legislative framework that governs a particular hazard event is one of the factors that determines the risk manageability of a community.
Early Warning Systems: The early warning systems for a hazard event.
Government Response: The response of the municipality and the provincial government to a hazard.
Government Resources: The resources available to the municipality and the provincial government for a hazard event.
Existing Risk Reduction Measures: The existing risk reduction measures of the municipality and the provincial government to a hazard event.
Public Participation Measures: The existing public participation measures of the municipality and the provincial government to a hazard event.
Municipal Management Capabilities: The over-all management capability of the municipality for a hazard event.

A simple mathematical model (formula given below) can be utilised to quantify the degree to which a community can intervene and manage the negative consequences of a hazard event :-
Risk Manageability Score ≥ 18: Should the risk manageability score of a particular hazard event impacting on a community be higher than 18 that community has a very ***high*** level of manageability and it is unlikely that the hazard event will impact negatively on the community.
Risk Manageability Score 8 to 18: If the risk manageability score of a particular hazard event impacting on a community is between 8 and 18, that community has a ***modest*** level of manageability and it is likely that the hazard event will impact negatively on the community.
Risk Manageability Score ≤ 8: Risk manageability scores of a particular hazard event impacting on a community lower than 8 account for a community with a ***poor*** level of manageability and it is highly likely that the hazard event will impact negatively on the community.

Relative Disaster Risk Score and Priorities

This analysis focuses on **calculating the relative risk priorities of a hazard event, using a simplified risk prioritisation model to calculate the relative priorities of the risk to which communities in a specific area are exposed,** viz. :-

The Relative Disaster Risk Priority Score = Hazard score X Vulnerability score / Manageability score.

Very High (intolerable) Risks (Relative Risk Priority ≥ 10): Should the relative risk priority of a particular hazard event impacting on a community is higher than or equal to 10, that community faces a potentially ***destructive*** risk with a high probability of occurrence, for which they are ***unprepared*****.** This combination equates to an ***intolerably high risk*** and may be a disaster in the making. For these ***very high risks*** **urgent risk reduction interventions are required!**

High Risk *(Relative Risk Priority 4.1 to 9.9)*: If the relative risk priority of a particular hazard event impacting on a community is between 4 and 10, the risks to which these communities are exposed are potentially ***destructive,*** but the community is modestly prepared for the hazard event occurrence. This combination equates to a ***high risk*** and a combination of ***risk reduction interventions*** and ***preparedness plans*** must be initiated for these risks.

Tolerable / Moderate Risk *(Relative Risk Priority 3.6 to 4):* Relative risk priorities of a particular hazard event impacting on a community lower than 4 translate in very little risk for a largely prepared community. This combination equates to a ***tolerable / moderate risk*** and ***preparedness plans*** for these risks must be prepared.

Low Risk (*Relative Risk Priority ≤ 3.5):* Relative risk priorities of a particular hazard event impacting on a community lower than or equal to 3.5 translate in a **low risk** indicating a prepared community, but on-going preparedness is still required.

Draft DRM Plan - T3

5.3. SHIPPING INCIDENT HAZARDS' DISASTER-RISK ASSESSMENT RATINGS = THEIR PREDICTABILITY / IMPACT (CONSEQUENCES) / VULNERABILITY / ABILITY TO COPE (MANAGEABILITY)

A. DETERMINATION OF RISK SCORE OF SHIPPIMNG / MARITIME INCIDENT HAZARDS

(Reference: Aurecon's 2009/10 CoCT Comprehensive Disaster Risk Assessment Report)

CITY OF CAPE TOWN COMPREHENSIVE DISASTER RISK ASSESSMENT REPORT IN 2010 by AURECON

Hazard Type	Category	Area(s)	Hazard Score			Vulnerability Indices					Manageability Indices										
			3 = Likely 2 = Possible 1 = Unlikely	3 = Extreme 2 = Moderate 1 = Insignificant		3 = Extremely Vulnerable 2 = Vulneravble 1 = Not Vulnerable					1 = Poor 2 = Modest 3 = Good									
			Probability	Severity	HAZARD RATING	Societal	Economical	Environmental	Critical Facilities	VULNERABILITY RATING	Awareness	Leglislative Framework	Early Warning Systems	Government Response	Government Resources	Existing Risk Reduction Measures	Public Participation Measures	Municipal Management Capabilities	MANAGE-ABILITY RATING	OVERALL RISK RATING	RELATIVE PRIORITY RATING
SHIPPING INCIDENT HAZARDS (VARIOUS)	Technological	Possible in ALL coastal areas, including ports, harbours, shipping lanes & anchoring zones	2	2	4	1	2	3	2	8	3	3	3	3	3	3	1	3	22	1,455	Lower

**** TO REDUCE THIS RISK all Role-players should deal with this hazard through their specific mandates by continuously striving to reduce its probability, limit the impact if it does occur, reduce the vulnerability to it, increase the preparedness to respond and to further improve the ability to cope/manageability of the hazard.**

CoCT DRAFT Plan - T5

B. SOME COMMENTS BY AURECON ON THE SHIPPING INCIDENT DISASTER RISK ASSESSMENT THAT WAS UNDERTAKEN IN 2010

Hazard Rating

The probability of a shipping accident is *possible* and the severity is moderate to extreme (possible when larger ships are involved).

Vulnerability

Societal

Communities are not vulnerable to shipping accidents except if the grounding of ships and an oil or chemical spillage poses a risk to the community.

Economic

Where a major accident could take place within the port area, the access to and from the harbour could be restricted, affecting the economy not only of the Port and the City but the work force as well.

Environmental

The environment is extremely vulnerable to shipping accidents especially where the spillage of hazardous materials, such as oils and other transported substances, takes place.

Critical Facilities

Shipping accidents may pose a risk to the critical Koeberg Nuclear Power Station facility, the strategic Port of Cape Town and the Simonstown Naval Base, the Robben Island Museum and possibly other institutions, should such an accident occur in close vicinity to the facility.

Capacity to Cope / Manageability

Awareness

Shipping accidents usually have a limited impact on communities living along the coast, unless the ship goes to ground along the coast or an oil spillage reaches the coast line. The overall handling of shipping accidents is a combined rescue effort between various role players such as the Department of Transport (DOT), the Department of Environmental Affairs (DEA), the Department of Agriculture, Forestry & Fisheries (DAFF), Transnet National ports Authority (TNPA), Smit-Amandla Rescue Tugs, National Sea Rescue Institute (NSRI) and various others, incl. the SA Navy, as applicable, all operating under the co-ordination of South African Maritime Safety Authority (SAMSA). For the land-based operations and support, the relevant Municipality, other Govt. Departments, etc. will also be involved.

Legislative Framework

There exists a thorough legislative framework. Coastal Oil Spill Contingency Plans exist, incorporating the various role-players – DEA, SAMSA, DoT, SANCCOB, CoCT Disaster Risk Management Centre and other Municipal Entities, private contractors, etc. (Ref. DEA)

Early Warning Systems

Early warning systems are modest. In cases of oil spillage there is no existing early warning system. Incidents are reported by ships that detect oil slicks on the sea surface or oiled birds (Ref. SAMSA 2005).

Government Responses and Resources

Government response and resources are good. Various government departments are incorporated in to the contingency plans for oil spillage.

Existing Risk Reduction Measures

Existing risk reduction measures are good. SAMSA is responsible for ensuring that the highest standard maritime safety is adhered to on both South African and foreign vessels (Ref. News24).

Public Participation Measures

Public participation measures are good especially in the case of an oil spillage. SANCCOB makes use of public participants in the cleaning and rehabilitation of oiled seabirds (Ref. SANCCOB).

Municipal Management Capabilities

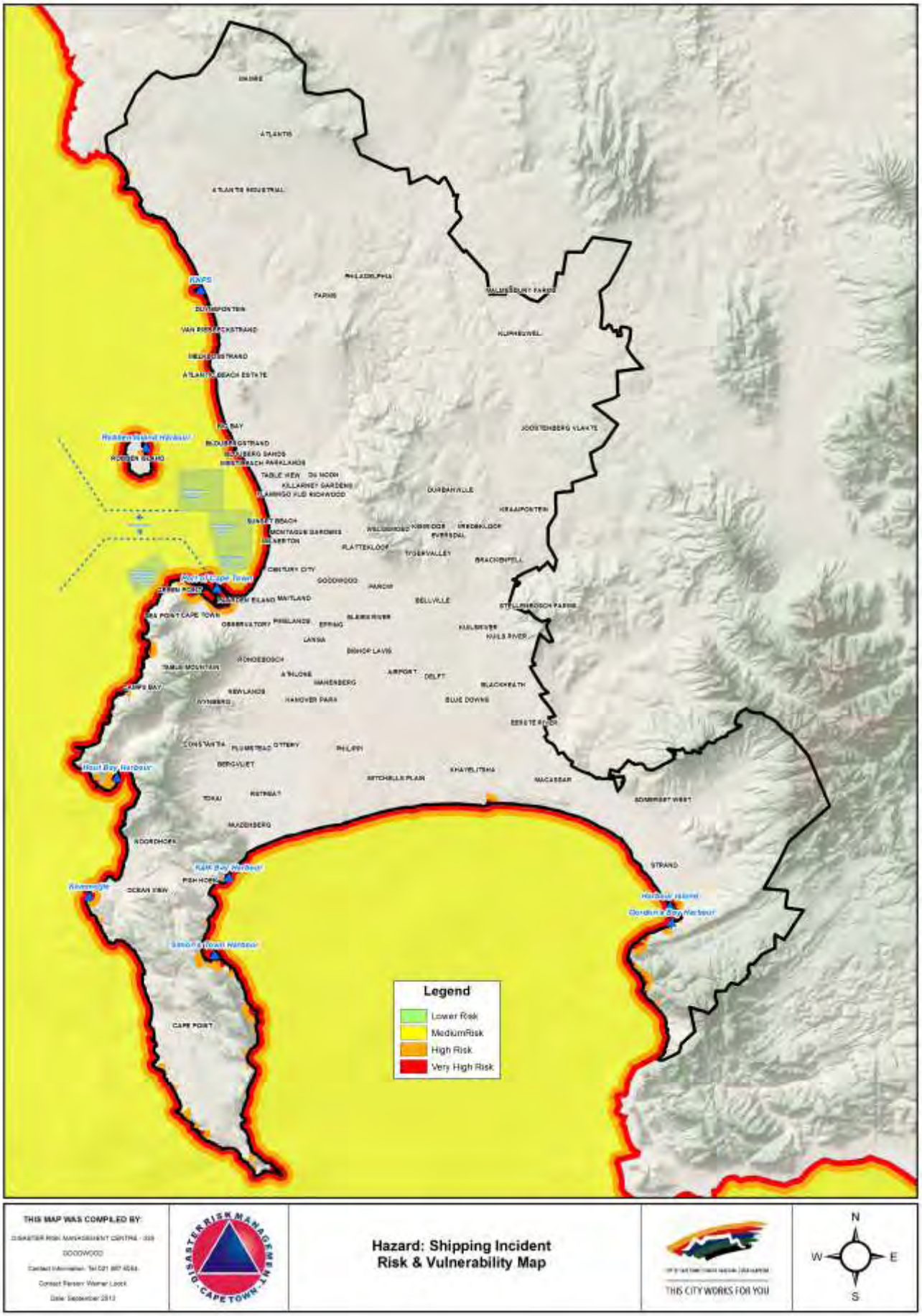
The municipal management capabilities are good. The CoCT Disaster Risk Management Centre has thorough contingency plans, including coastal oil spills, in place that involve all relevant role-players (CoCT DRM, 2009).

Conclusion

The major focus in shipping accidents is the resultant oil spillage that may take place which could have the most impact on the environment. Various contingency plans have been compiled by the various Role-players involved in dealing with an oil spillage – refer to Cape Zone (No.3) Coastal Oil Spill Plan (DRM Plan T10).

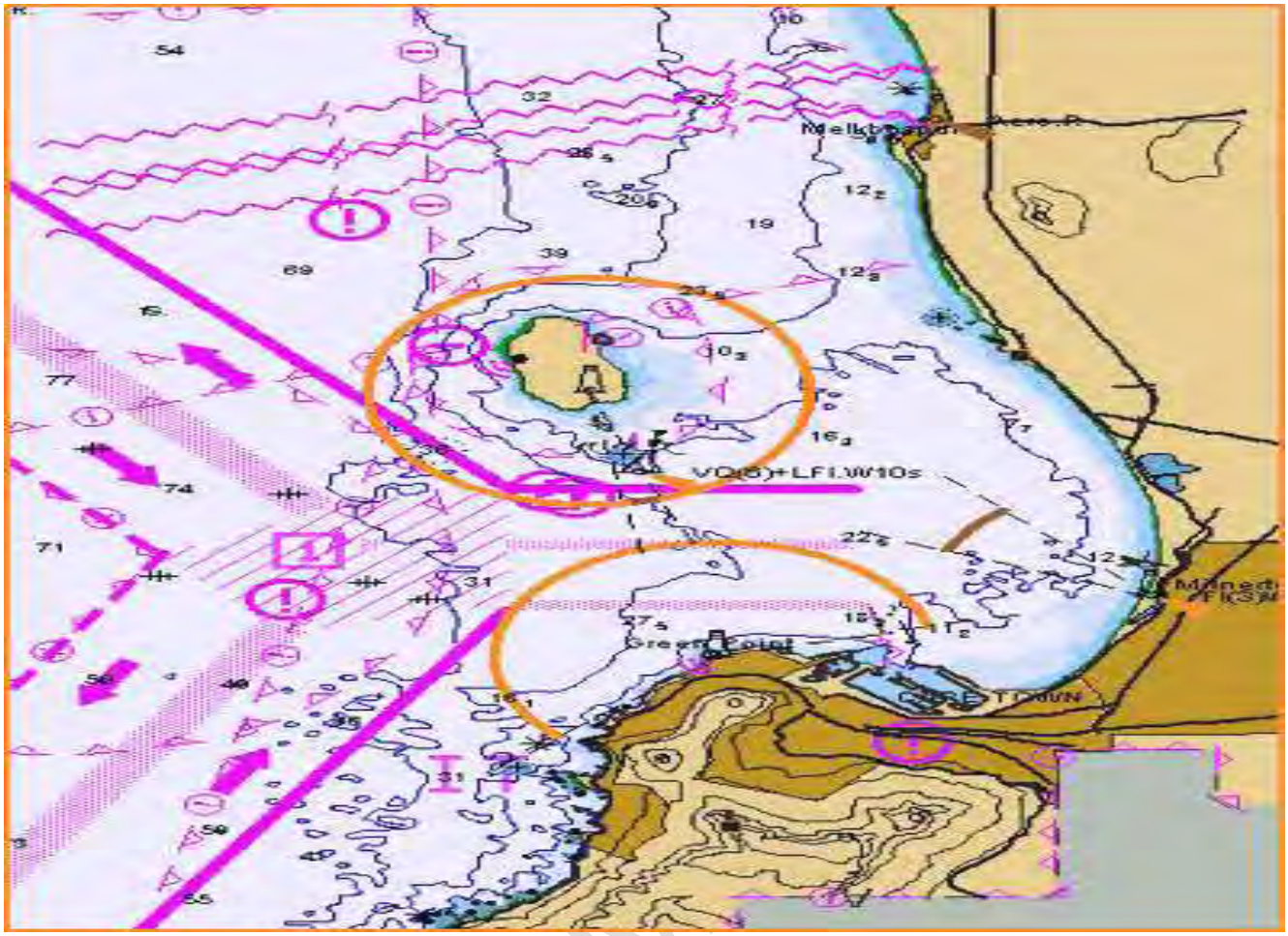
CoCT DRM Plan - T3

C. SHIPPING INCIDENT HAZARDS' RISK AND VULNERABILITY MAPS

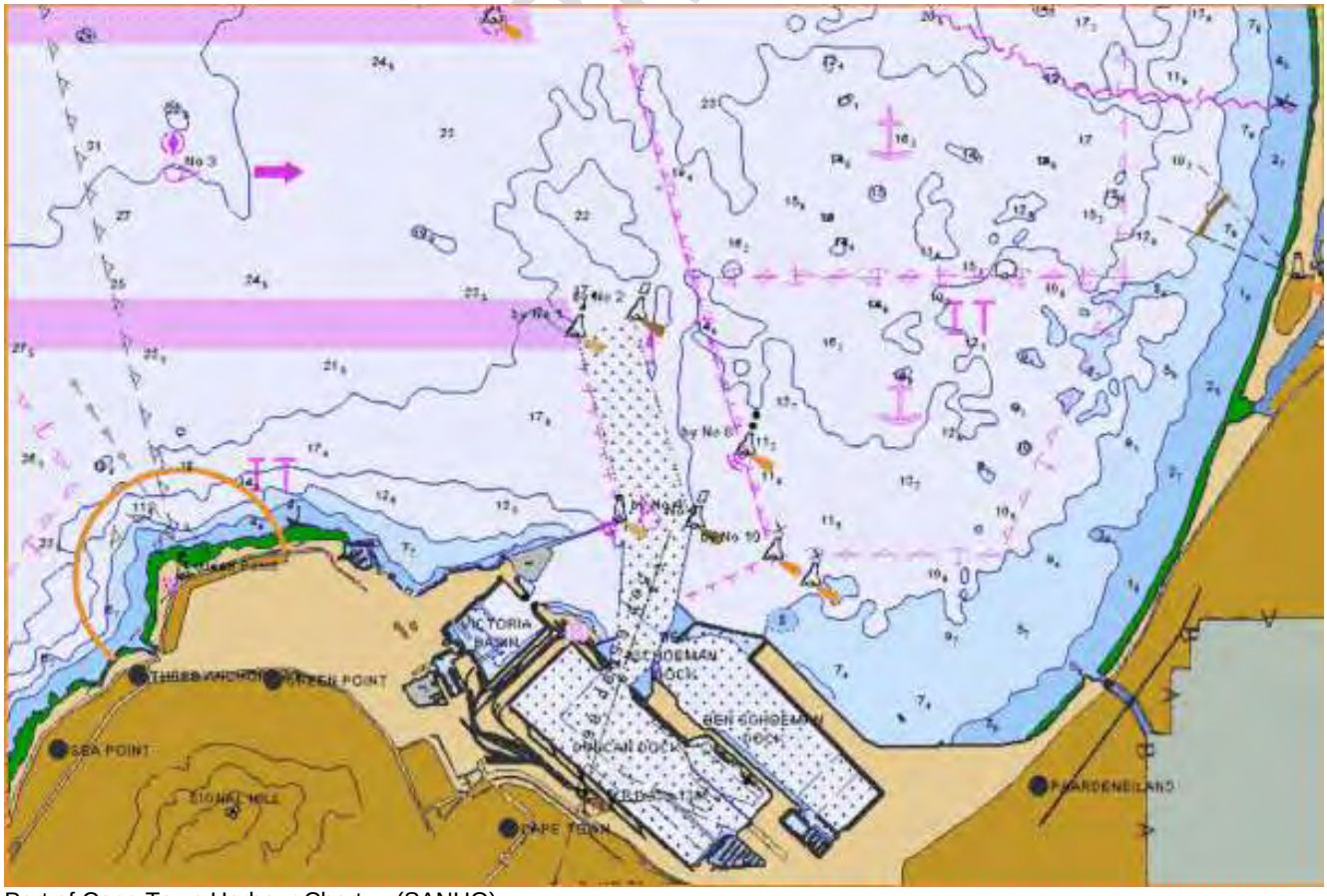




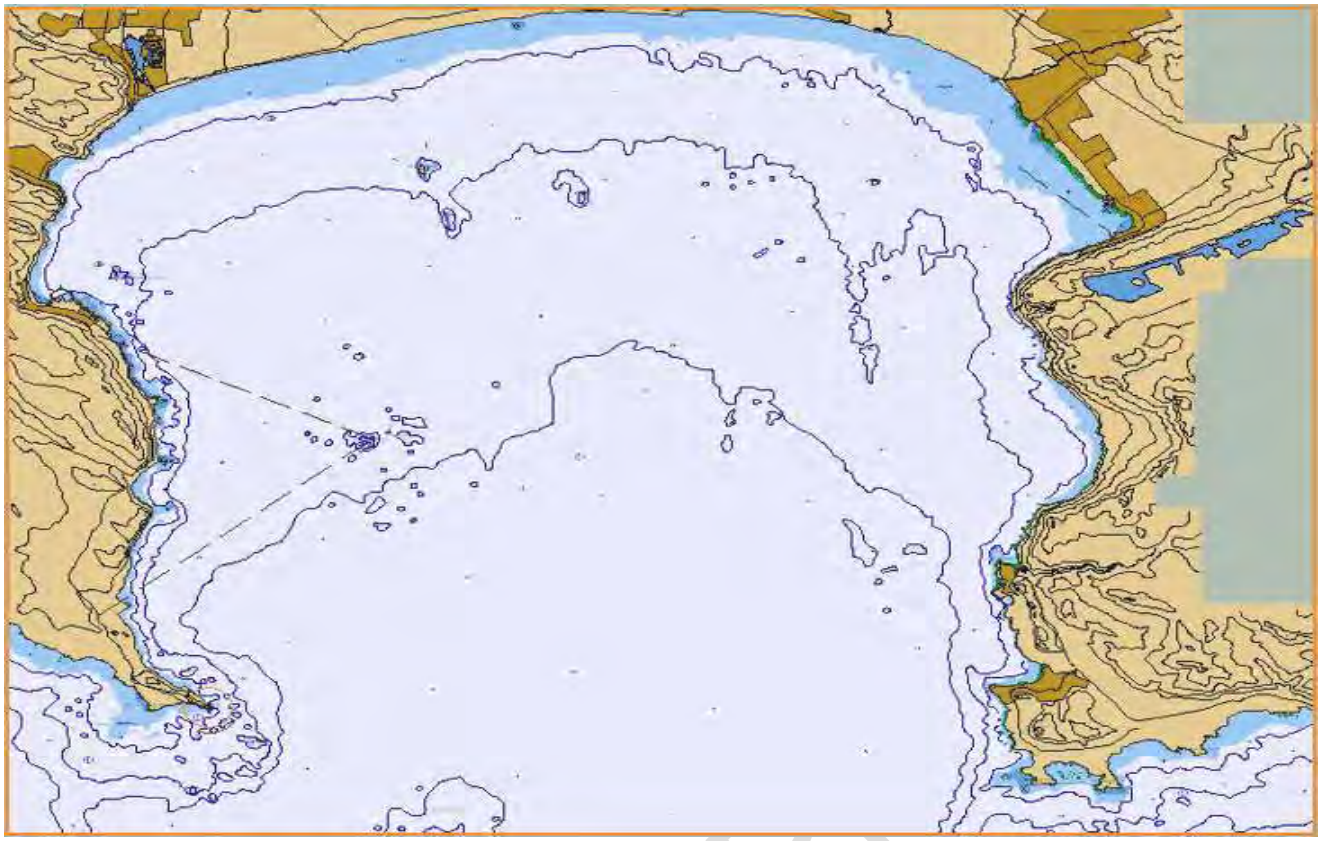
Coastal Chart – Dassen Island to Cape Hangklip (SANHO)



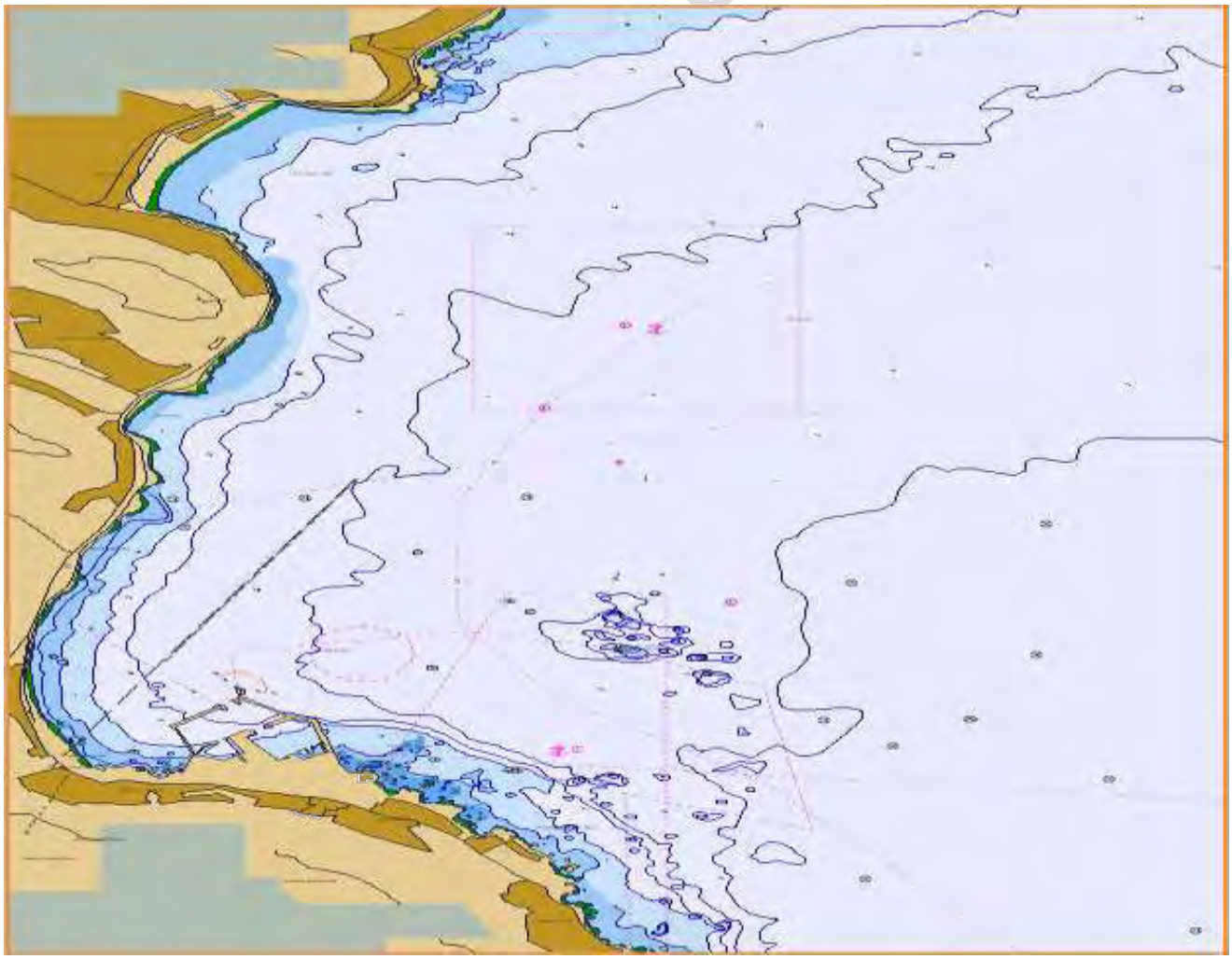
Approaches to Table Bay Chart (SANHO)



Port of Cape Town Harbour Chart (SANHO)



False Bay Chart (SANHO)



Simon's Bay Harbour Chart (SANHO)

6. PRO-ACTIVE DISASTER RISK MANAGEMENT EFFORTS: HAZARD PREVENTION / RISK REDUCTION / MITIGATION & PREPAREDNESS MEASURES

Due to the nature of the Shipping Industry and its inherent high level of safety consciousness the various local stakeholders are already operating in a relatively safe environment, hence the lower risk assessment in this sector. However, there can be no room for complacency and with the constant increase in shipping due to South Africa's increasing trade with other countries plus many foreign-registered vessels (some with dubious safety records) passing our shores, as well as our sometimes unpredictable weather conditions, shipping disasters will still occur from time to time. The local maritime role-players need to regularly assess their own operations and strive to meet international benchmarks, standards and protocols. They should initiate any new developments in their respective fields at an early stage in order to prevent and mitigate the consequences of any shipping incident in this part of the world.

An example of shipping safety management and collision risk-reduction are the Vessel Traffic Separation (VTS) or Traffic Separation Schemes (TSS) being used off Cape Town and many other parts of the world. A Traffic Separation Scheme or TSS is a traffic-management route-system ruled by the International Maritime Organization or IMO. The traffic-lanes (or clearways) indicate the general direction of the ships in that zone; ships navigating within a TSS all sail in the same direction or they cross the lane in an angle as close to 90 degrees as possible.

TSSs / VTSs are used to regulate the traffic at busy, confined waterways or around capes. Within a TSS you normally see at least one traffic-lane in each main-direction, turning-points, deep-water lanes and separation zones between the main traffic lanes. In most cases you can find an "inshore traffic zone" between the traffic-lanes and the coast. A ship navigating in a traffic-lane should sail in the general direction of that lane. The body of water between two opposite lanes are *no-go* areas: shipping is not allowed in these areas (compare this with the central reservation of a road), so the risks for head-on collisions is greatly reduced.

The TSS rules are incorporated in the International Regulations for Preventing Collisions at Sea (under Rule 10). As said, when sailing within a lane of a TSS that ship has to follow the general direction of the lane. Where needed there are special zones where a lane splits into two channels: one ongoing and the other to the nearby port(s). In most TSS schemes you will find *Inshore Traffic Zones* between the traffic-lanes and the coast. The inshore traffic zone is unregulated and shouldn't be used for ongoing traffic. It is meant for local traffic, fishing and small craft.

It is also recommended by the proposed Implementation Protocol that a SAFETY EXCLUSION ZONE be instituted a.s.a.p. to increase safety of vessels by having them operate further offshore. This Zone should ideally have the following parameters:-

- the Parties of the Implementation Protocol will define a Safety Zone (excluding the entry channels/shipping lanes to the Cape Town Port) along the length of Cape Town's coastline. This Safety Zone must be set at a minimum of at least three nautical miles off shore and the entire False Bay will be included in the Safety Zone. This new Safety Zone will be monitored as part of the TNPA radar and reporting system;
- this new Safety Zone will be formally entered onto all national and international shipping charts as a Safety Exclusion Zone;
- any vessel entering this Safety Zone shall trigger the following response:-
  - the TNPA shall notify SAMSA and the City's Disaster Risk Management Centre
  - the vessel shall be contacted and requested to alter course out of the Safety Zone
  - in the event that the vessel does not respond, the TNPA shall inform SAMSA and the City's Disaster Risk Management Centre of the exact location of the vessel
  - the City's Marine and Environment Law Enforcement Unit's vessel shall be dispatched to intercept the vessel and ensure that the vessel is operating safely, is within control of the vessel's captain and to escort the vessel out of the Safety Zone
  - the TNPA shall record all radar and communication transmissions for the purpose of investigations
  - in the event that the vessel is unable to respond due to mechanical failure, steering failure or mutiny, SAMSA shall coordinate an emergency response to prevent the ship stranding on the City's coastline. This may include assistance from the South African Navy or the South African Police Services in physically taking control of the vessel;
- all South African military, safety and emergency vessels are excluded from the conditions of the Safety Zone, as are all small-scale fishing vessels and yachts registered and operating out of the Port of Cape Town, Granger Bay, Kommetjie, Hout Bay, Simonstown, Kalk Bay and the Gordon's Bay Harbours.

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<u>Some</u> of the other pro-active (risk reduction / mitigation & preparedness) measures that can be undertaken by the various role-players should include:-

- adherence to strict and internationally acceptable maritime vessel seaworthiness and crew licensing standards, high level technical specifications, maintenance standards and operations which are based on the best protocols, as well as continuous safety monitoring by SAMSA;
- cargo and passenger safety = as great volumes of cargo/freight is carried by shipping everyday this sector too requires very strict safety and security protocols, especially where hazardous cargoes/dangerous goods are concerned. Regulatory agencies such as the SAMSA in South Africa and all foreign maritime regulatory agencies need to continue to take any transgressions of the dangerous goods regulations extremely seriously. The latest technology should also be used in this sector to increase safety levels;
- an adequate resource capacity to be able to deal with any maritime incidents, including equipment, communications systems, training and insurance cover.
- Identification by the Lead and Supporting Role-players of Project Managers within their respective organisations to manage these initiatives on an on-going basis;
- Use GIS and other mapping initiatives to highlight and reference the highest risk and vulnerability areas and mapping past major incident occurrences;
- Strive for engineering improvements and environmental upgrades of all areas where possible;
- Regular Project reviews i.r.o. of the validity of risk reduction / mitigation initiatives;
- Staff training to include risk reduction and response requirements;
- Overview of preparedness initiatives to ensure OPTIMAL RESPONSE should the hazard(s) occur – these are to include adequate coping capacity comprising of sufficient and trained staff, that there is an excess of minimum of the required standard of equipment available, that the sourcing of supplementary resources has been identified, that there is contingency planning regarding these issues, etc.;
- Overview of own Entity's disaster-risk management plans and the adjustment of related Standard Operating Procedures (SOP's) **by each of the Lead and Supporting Disciplines for all identified hazards which fall within their respective mandates;**
- Support the drafting of integrated Disaster Risk Management Plans for these Hazards to ensure City-wide communication, integration and co-ordination between all the Disciplines/Entities involved.

As effective co-ordination between all of the Stakeholders is vital, both during the pro-active phase (prevention, risk reduction and preparedness) and during any response phase, this Shipping Incident Disaster Risk Management Plan has been produced to cover the whole Disaster Risk Management Continuum at the tactical level. Continuous communication at various forums between the Stakeholders will ensure that regular updates can be incorporated into this Plan and that each of the Stakeholders' own Procedures/SOP's are regularly tested and updated and that regular integrated exercises and simulations are undertaken to measure the degree of their preparedness. The proposed signing by the Lead Role-players of the ***Implementation Protocol for Co-operation in Preventing and Responding to Shipping Accidents and Strandings off the Coastline of the City of Cape Town*** will also assist in the co-ordination between role-players at the strategic level to this type of hazard.

The vulnerable communities of Cape Town, especially those living on the coastline, should also be made aware of this and any other disaster risks which they may face on a consistent basis. The direct or indirect socio-economic or environmental impacts to the City of Cape Town of any major shipping incident must also be taken into consideration.

AN EXAMPLE OF A CRUISING COMPANY'S SAFETY POLICY …

CRYSTAL CRUISES

Safety Policy

We want to assure everyone that Crystal Cruises puts the utmost priority on the safety and security of our guests, crew and vessels. Our safety policies and procedures meet or exceed the SOLAS (International Convention for the Safety of Life at Sea) requirements and the STCW (Standards of Training, Certification and Watchkeeping) regulations, as mandated by the IMO (International Maritime Organization). Among our safety standards are:-

- Guest lifeboat drills conducted prior to our ships' departures.
- Weekly crew safety drills.
- Lifeboat commanders undergo a lifeboat commander training course, in addition to their on-going practical experience.
- Deck watch officers receive Bridge Resource Management (BRM) training which is carried out in a simulator that can mimic virtually any navigational scenario including emergencies.

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- Passage planning meetings are held prior to departure from port during which clear instructions are given by the Captain to all deck watch officers on the specific courses to follow and the minimum safe closest point of approach to land or navigational dangers.
- English designated as the working language aboard our ships. As such, prior to employment on board, all crew members must pass an English proficiency test.
- Safety videos are broadcast in multiple languages on all stateroom televisions on embarkation day, prior to departure from port.
- Proactive audits:- As part of our Safety Management System (written policies and procedures for the safe operation of our ships) we conduct a comprehensive program of audits, both shipboard and ashore. Safety is a continual improvement process. On an on-going basis, we highlight best practices and areas for improvement.

Crystal Cruises want to remind everyone that accidents are an extremely rare occurrence in the cruise industry, and cruising continues to be one of the safest means of travel among all types of vacationing.

MANDATES OF THE LEAD ROLE-PLAYERS

South African Maritime Safety Authority – SAMSA

MISSION

To promote South Africa's maritime interests and development and position the country as an international Maritime Centre while ensuring maritime safety, health and environmental protection.
In line with its objectives, as stated in Section 3 of the SAMSA Act, the Organisation's primary areas of responsibility include:-

- Participating in the development and implementation of national and international maritime safety and marine environment protection standards;
- Enforcing technical and operational standards for all shipping operations in South African waters and for South African ships anywhere, to promote responsible operations in terms of seaworthiness, safety and pollution prevention;
- Enforcing training standards and competency of seafarers;
- Managing the national capability to respond to marine pollution incidents and other maritime emergencies;
- Operating the Maritime Rescue Co-ordination Centre to coordinate maritime assistance services and to detect, and coordinate the location and rescue of people in maritime distress situations throughout the internationally agreed South African Search and Rescue Region;
- Overseeing the provision of maritime distress and safety communications services to discharge South Africa's responsibilities under the Global Maritime Distress and Safety System;
- Administering South Africa's voluntary ship reporting system (SAFREP) for identifying and tracking ships at sea for safety purposes and to provide a ships' database for responding to marine emergencies;
- Investigating maritime casualties; and
- Delivering related services including:
- Public awareness and education in marine safety and pollution prevention;
- Administration of South Africa's ship registration system; and
- Publication of, and access to, ship safety and environmental standards.

SAMSA delivers four main outputs consistent with its mandate and responsibilities:

- Safety and environment protection standards for responsible maritime transport operations;
- An infrastructure for monitoring and enforcing compliance with safety and environment protection standards;
- The capability to respond to marine pollution incidents and other maritime emergencies; and
- The capability to detect, locate and rescue people in maritime distress situations.

OVERVIEW OF SAMSA's SERVICES:-

Services on behalf of Government:

- Advice to the Minister of Transport on maritime issues affecting South Africa
- Maintenance and proposals on legislation and policy
- Liaison with other governments and international institutions on behalf of Government
- Liaison with other state departments and South African institutions on behalf of the Minister of Transport
- Flag State Implementation
- Providing a maritime Search and Rescue (SAR) capability in the South African area of responsibility through the management, on behalf of the DoT and the Maritime Rescue Coordination Centre (MRCC)
- Port State control

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- Accident investigations and Emergency Casualty Response
- Administration of government maritime contracts
- Management of the DoT contracted pollution prevention and response capability
- Representation at international forums

Technical services to the maritime Industry, locally and abroad:-

- Statutory surveys and Safety certification of ships
- Certification of Seafarers
- Assistance and advice on maritime legislation
- Advice and approval for the construction and refitting of vessels
- Evaluation and approval of fittings and equipment used in the construction and fitting out of vessels
- Consultancy to industry on technical matters, safety and qualifications

Services to stakeholders:-

- Safety equipment approval
- Port State Control Inspections
- Inspections of ships and cargoes of timber, grain and hazardous goods
- Accreditation of maritime training institutions and maritime training programmes
- Examination of Seafarers
- Monitoring of South African seafarers' welfare and conditions of service
- Registration of Ships
- Provision of maritime safety information to shipping
- Ensuring a reliable radio service to shipping in respect of maritime safety information
- Casualty investigation and management
- Oil pollution incident response and investigations
- Ensuring that navigational aids are in place around the South African coastline
- Maintenance of a maritime Search and Rescue organisation in co-operation with the Department of Transport
- Promoting seafarer training in South Africa
- Collection and maintenance of shipping information and statistics
- Pro-active development and promotion of maritime safety in South Africa's territorial waters

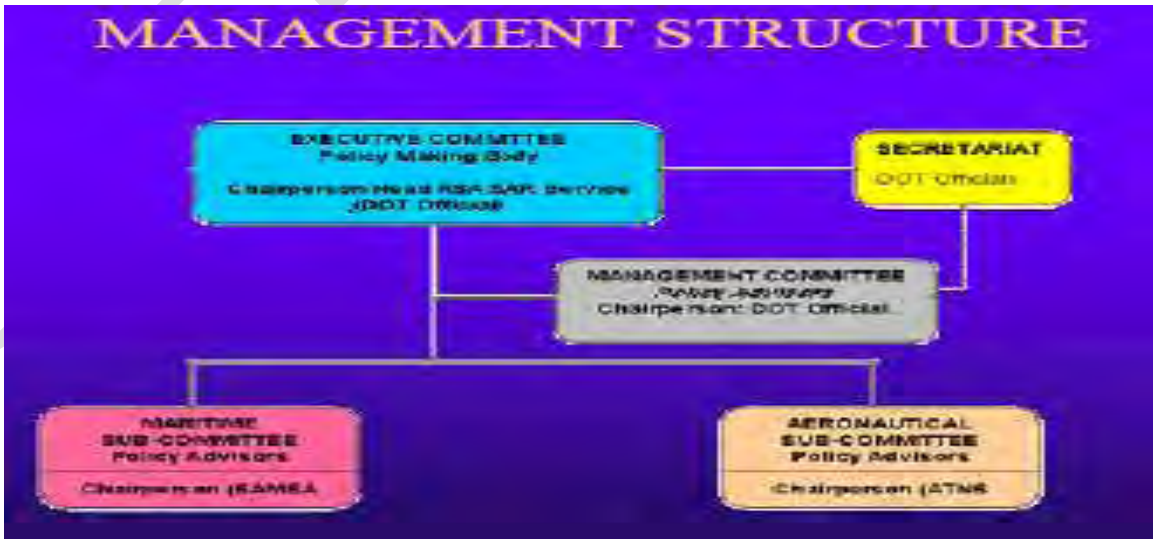
SOUTH AFRICAN SEARCH AND RESCUE (SASAR) ORGANISATION.

The SASAR Organisation will, within its means and capabilities, search for, assist and if necessary, rescue:-

a) Survivors of aircraft accidents or forced landings;

b) The crew and passengers of vessels in distress and survivors of maritime casualties, civilian or military aircraft and ships, that finds themselves in distress in the South African area of responsibility.

1. AREA OF RESPONSIBILITY

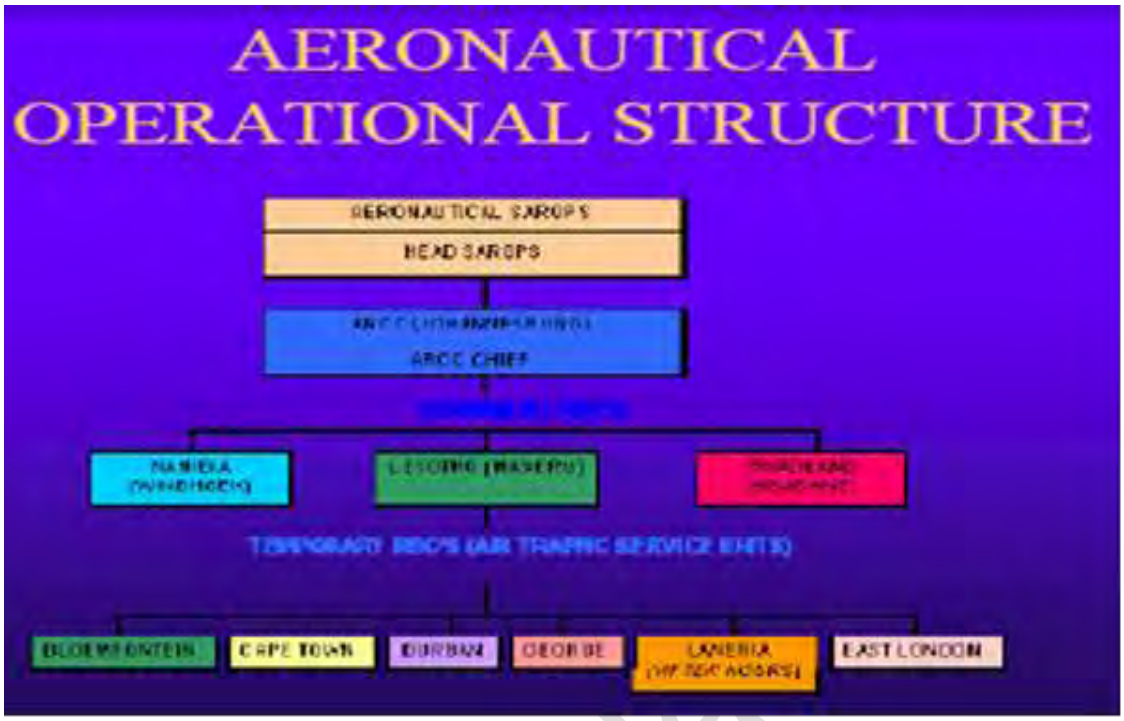


The National area of responsibility, which corresponds with that, laid down by both ICAO and IMO (International Maritime Organisation), includes countries encircled by the Republic of South Africa. This Area is divided into two Search and Rescue Regions (SRRs):

a) **The Aeronautical Region – co-ordinated by the ARCC**
(Tel. +27(0)11 928 6454/5 / Fax. +27(0)11 9343829

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This covers the continental area of the Republic of South Africa, Namibia, Swaziland and Lesotho and associated flight information and oceanic regions.



b) **The Maritime Region – co-ordinated by the MRCC**
Tel. +27 (0) 21 938 3300 / Fax: +27(0)21 938 3309
This area covers the sea area bordering the continental area mentioned in the Aeronautical Region above, commencing at the position where the international borders between Namibia and Angola, coincide on the coast proceeding in a westerly direction to 18S010W, then to the South Pole, then to 50S075E, then to 50S045E, then to 30S045E, then to 30S040E, then to 26.5S040E and then to a position where the international borders between the RSA and Mozambique coincide on the coast (26.5S035E)

2. ICAO's CRITERIA FOR LONG RANGE AERONAUTICAL SEARCH CAPABILITIES

a) Long Range (LRG) Aircraft with a radius of action 1 390KM (750NM) plus 2hr 30" search capability remaining.
b) Very Long Range (VLR) Aircraft with a radius of action of more than 1 850KM (1000NM) plus 2hr 30" search capability remaining.
c) Extra Long Range (ELR) Aircraft with a radius of action of 2 780KM (1500NM) or more, plus 2hr 30" search capability remaining.

3. SOUTH AFRICAN LONG RANGE AERONAUTICAL CAPABILITY

South Africa has the following internal long range capabilities:-

a) Long Range (LRG) Aircraft with a radius of action of more than 1390KM (1 000NM) plus 02HR30 search remaining.

b) Very Long Range (VLR) Aircraft with a maximum radius of action of 2593KM (1 400NM) plus 02HR30 search remaining.

NOTE: In the event of search and rescue operations having to be conducted beyond 2 593KM (1400NM), external assistance, as contained in any Agreements, will be activated and use made of surface SAR Units, where applicable.

INFORMATION ON MARITIME SASAR REGION – CO-ORDINATED BY THE MRCC AND SUB-COMMITTEES, IN ASSOCIATION WITH THE TRANSNET NATIONAL PORTS AUTHORITY (TNPA), THE ARCC AND THE NSRI

Role

The area of responsibility falling under the control of the MRCC that is adjacent to the coastline of the RSA is hereby divided into seven sub regions. The sub regions shall fall under the control of the Harbour Masters (National Ports Authority) of Saldahna, Cape Town, Port Elizabeth, East London, Durban, Richards Bay and the Port Captain of Walvis Bay. Within each sub-region the Harbour Master's office acts as a Rescue Sub Centre (RSC). The RSCs are accountable to the head of maritime search and rescue operations.

COST PRINCIPLE

Within the sub region of a Harbour Master (National Ports Authority), the various NSRI bases, harbour masters of minor ports act as secondary-rescue sub-centre (sec-RSCs) for the area that falls within their responsibility. The sec-RSCs are accountable to the Chief of the RSC in whose area of responsibility they are stationed and/or operate.

Other objectives of SASAR/Sub committees are inter alia the following:-

1. To minimize loss of life and personal injury to aviators and mariners.
2. To minimize time spent searching for persons in distress by using technology,
3. Improve co-operation between aeronautical and maritime search and rescue authorities;
4. To promote or enhance regional search and rescue capacity or capability;
5. To promote and ensure the optimal use of the limited available search and rescue resources; and to ensure the implementation of the international standards and recommended practices (SARPS) where appropriate.

SASAR must, within its means and capabilities, co-ordinate its resources to:-

(a) Search for, assist and, where appropriate, effect a rescue operation for:
   (i) Survivors of aircraft crashes or forced landings;
   (ii) Survivors of any military aircraft or vessel accident or incident if such aircraft or vessel is not engaged in an act of war.

(b) Make available telecommunication facilities in line with provisions made in Telecommunications Act, 103 of 1996.

(c) Perform its functions in a manner which promotes efficient, economic and effective use of all resources.

(d) Endeavour to co-operate with Disaster Management Agencies established in terms of any law providing for the management of disasters.

Reference: ARTICLE 17 - MEMBERS RESPONSIBILITIES …. ***"***Each Member undertakes and commits to carry out the responsibilities assumed and outlined in paragraph 4 of the SASAR Manual, and as amended from time to time".

MARITIME OPERATIONAL STRUCTURE

♦Manager: SAROPS serves as the Head of SAROPS
♦Permanent RSC's strategically placed along the coast with Harbour Masters' offices serving as RSC's
♦Within the sub-region of a Harbour Master, Secondary RSC's have been created.
♦Various NSRI stations and some smaller Harbour Master's offices act as secondary RSC's

ALERTING POSTS

♦Air Traffic Service Units
♦Harbour Master's Offices
♦Coastal Radio Stations
♦SA Police Stations
♦MRCC
♦ARCC

REGIONS

♦SRR's prescribed by both ICAO and the IMO
♦Aeronautical covers the continental areas of the sovereign territory of SA, Swaziland and Lesotho and associated Flight Information Regions

SEARCH AND RESCUE REGIONS

The Maritime SRR is as follows:-
♦On the Western side, approximately halfway between SA and South America
♦Eastern side, approximately halfway SA and Australia
♦Northern side, borders on Namibia, SA and Mozambique and then proceed to the South Pole
Total SRR for both is approx. 28.5 m square kilometres

SAR COMMUNICATIONS

♦DoT, responsible department to ensure that MSI services including distress alert is provided
♦Telkom provide above services on a contractual basis
♦Services provided I.t. o. relevant international conventions and the Cospas-Sarsat Programme
♦SA became member of Cospas-Sarsat as Ground Segment Provider in November 2000
♦LUT installed in Milnerton, Cape Town by Telkom on behalf of DoT
♦Telkom manage and run the MCC on behalf of the DoT
♦SAMSA is the agency appointed to ensure that Telkom as a service provider provides an efficient and effective SAR communications

CONCLUSION

♦The execution of SAROPS devolved to SASAR, but the DoT remains responsible and accountable
♦SASAR gets its mandate from international conventions, domestic legislation, national and international SAR manuals

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♦The management and control of SASAR rests with the Executive Committee assisted by the Management Committee, the Secretariat and the two Subcommittees
♦Two separate RCC's have been created, namely, the ARCC situated in JHB and MRCC stationed in Cape Town
♦RSC's strategically stationed across the country
♦SA's total SRR, both aeronautical and maritime inclusive, 28.5 square kilometres and is prescribed by both IMO and ICAO
♦Telkom SA contracted to advise and render SAR communications on behalf of the DoT and SASAR
♦Services rendered include INMARSAT, Cospas-Sarsat
♦The DoT undertakes to continue co-operating with other countries, relevant UN and regional bodies in their quest to ensure compliance with and implementation of SARP's



Maritime Rescue Co-ordination Centre (MRCC)

In January 2007, a multilateral agreement was formally signed between the Governments of the Comoros, Madagascar, Mozambique and South Africa for the coordination of maritime search and rescue services in areas adjacent to the coast. During this time, H.E. Efthimio Mitropoulos, the Secretary-General of the International Maritime Organisation, visited South Africa with one of the primary objectives being to launch the sub-regional Maritime Rescue Coordination Centre at SAMSA's MRCC Cape Town.

The MRCC is operational 24/7 and must within its mean and capabilities coordinate its resources to search for, assist and, as required effect a rescue operation for:-

- Survivors of aircraft crashes or forced landings at sea;
- The crew and passengers of vessels in distress;
- Survivors of maritime accidents or incidents;
- Survivors of any military aircraft or vessel accident or incident if such aircraft or vessels is not engaged in an act of war; and
- The MRCC must also coordinate the evacuation of seriously injured or ill person from a vessel at sea when the person requires medical treatment sooner than the vessel would be able to get him or her to a suitable medical facility.

MRCC is also pro-actively involved in monitoring towing operations, vessels not under command, pollution reports and vessels aground around the South African coasts and report incidents to SAMSA for action as required. The average incident rate is 100 per year.

MRCC, CAPE TOWN

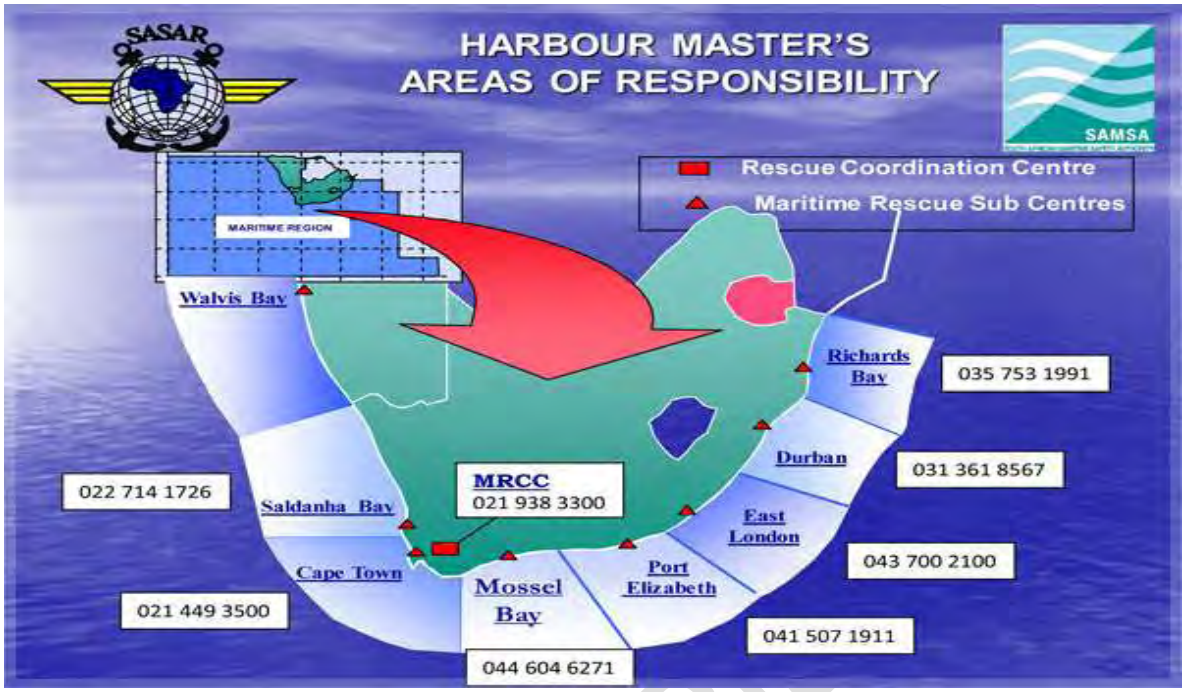
Assisting any person on a vessel in distress serves national interests, is an established international practice based on traditional humanitarian obligations, and is founded in international law.

The main operational unit of a maritime SAR service is the Maritime Rescue Co-ordination Centre (MRCC), which is established in the maritime Search and Rescue region (SRR). South Africa's contribution towards SAR services are viewed as part of a global safety system. To this end, in the South Africa context, all available resources co-operate in assisting persons in distress.

The SRR of South Africa covers the entire South African coastal area; extends down to the South Pole, half way to South America to the West, and half way to Australia in the East.

COPY DRM

The coastal area is divided into seven sub regions under the control of the TNPA - the Harbour Masters of Saldahna Bay, Cape Town, Port Elizabeth, East London, Durban, Richards Bay, as well as the Port Captain of Walvis Bay. Within each sub-region the Harbour Master's office acts as a Rescue Sub Centre (RSC) – refer to the map below.



In maintaining a state of full readiness the MRCC also performs the following functions:-

- it monitors and evaluates levels of risk from Maritime Safety Information (MSI) broadcasts to ensure an immediate response in case of life threatening situations developing;
- manages the South African Ship Reporting System (SAFREP) in order to keep track of vessels around the coast and within the EEZ to call upon for support during SAR operations;
- it provides a Maritime Assistance Service (MAS), to receive reports and notifications in the event of an non-SAR incident involving a ship and to monitor the ship's situation in case it needs assistance and to serve as the point of contact between the master and the local authorities;
- The MRCC receives, evaluates and passes on Maritime Security pre-arrival and alert information to the Maritime Security Co-ordination Centre (MSCC) for dissemination to National authorities involved with the International ship and port security (ISPS) measures, for their action;
- it ensures that International SAR standards are implemented and maintained by local SAR operators to ensure that SAR operations are conducted in accordance with laid down standards and recommended practices;
- it implements the requirements of bilateral SAR agreements with neighbouring States regarding procedures and training in accordance with the letter and spirit of these agreements and established a SAR co-ordinators training capability to assist local and neighbouring authorities and countries in the sub-region, in terms of bilateral agreements and as accepted by the SA Government.
- The MRCC is also the custodian of the South African EPIRB, ELT and PLB (emergency beacons) database and is responsible for keeping it up-to-date and accessible on 24 hour basis.

7. *RESPONSE PLAN* FOR A SIGNIFICANT SHIPPING INCIDENT OR EMERGENCY OCCURRING AT SEA *OFF THE CAPE TOWN MUNICIPAL AREA*

7.1 INTRODUCTION

The Disaster Management Act 57 of 2002, directs that the Head of the Municipal Disaster Risk Management Centre is the designated Entity for identifying and organising the preparation for, and response to, **all identified hazards in the City of Cape Town**, including Maritime Transport/Shipping Emergencies. As such, the Head: DRMC is responsible for the preparation of the overall CoCT Shipping Incident Disaster Risk Management Plan so that there can be preparation for and a controlled and co-ordinated response to, and initial recovery from, a shipping incident along our coastline and which may affect the community of Cape Town.

COPY FOR REVIEW

Co-ordinated and integrated preparedness and response to a shipping incident or emergency requires the assistance of a wide range of Response Entities and support organisations, each with its own statutory responsibilities/mandates but working together to achieve the set goals. The location of the incident/emergency site and distance from the shore, the availability of Emergency Response Entities, the time required to reach the incident site and the prevailing weather and sea conditions ***may complicate the manner*** in which most eventualities can be dealt with.

The CoCT Shipping Incident DRM Plan strives to provide a broad tactical framework for a multi-agency response to the occurrence of any shipping incident/emergency occurring off the shores of this City.

Specific operating procedures must be developed by all the Responding Entities to be able to deal with their mandated functions and tasks and they should be structured to facilitate a multi-disciplinary, co-operative, co-ordinated and rapid response to any shipping incident/emergency occurrence.

7.2 AIM & CONCEPT OF OPERATIONS

Response operations are the emergency management arrangements for the control and the co-ordination of the response to and recovery from a shipping incident/emergency utilising the resources available in the City, including the resources of the relevant National and Provincial Departments, the Municipality of City of Cape Town, Para-statal Entities, NGO's and Volunteer Groups, whose mandates and responsibilities are covered by relevant legislation and/or operating protocols concerning aspects of Maritime Operations, and more specifically, roles in dealing with the occurrence of any Shipping Incident or Emergency.

Generally the shipping incident/emergency management concept is based on the execution of the following phases, as and when applicable to a particular/prevailing situation:-

a. Search Phase –
This includes all efforts to locate the vessel and to respond with the necessary available Search and Rescue (SAR) resources. Co-ordination of this SAR phase for all civil aircraft is the responsibility of the South African Search and Rescue Organisation (SASAR) with the Maritime Rescue Co-ordination Centre (MRCC) acting as its Co-ordinating Agency. In the case of a military vessel the responsibility for the co-ordination of SAR remains with SASAR/MRCC but in conjunction with the SA Navy and the SAAF. In cases where aircraft are assisting with the maritime search and rescue mission or when an aircraft is missing over the sea, the Aeronautical Rescue Co-ordination Centre (ARCC) will work jointly with the MRCC.

***b.* Emergency Response Phase –**
Upon receipt from the MRCC or from the Transnet National Ports Authority (TNPA), or Cape Town Radio, or the NSRI or the public or any other source, **of a shipping emergency or significant incident where the location is known**, all the relevant First Response Entities will be activated in the appropriate manner and endeavour to respond to the incident site as rapidly as possible. The first Services / Agencies on the scene will strive analyse the prevailing situation and to co-ordinate follow-up activities through the establishment of the necessary incident site management structures and emergency management areas.

** **WARNING NOTICE TO ALL EMERGENCY RESPONSE PERSONNEL** **
The Incident Commander and all personnel involved in this phase should be made aware that a shipping emergency **MAY** also have an additional risk of hazardous material release and military vessels and certain cargo vessels may be carrying unexploded munitions, explosive devices, etc.

Therefore, only those persons considered essential to save life or minimise further destruction to the vessel or wreckage or property (if beached on shore) should enter an shipping emergency site, first ensuring that all appropriate precautions are taken to protect themselves and to safeguard all subsequent responders to the site.

c) *Rescue Phase after response –*
(1) render the vessel and the site safe from fire and hazardous substances, including unexploded ordinance, to enable the rescue and removal of victims;
(2) remove the victims to a safe area;
(3) rescue the trapped victims and proceed to a suitable landing area;
(4) carry out the triage, treatment and evacuation of all casualties to hospital, as appropriate;
(5) ensure immediate welfare of all uninjured victims;
(6) arrange for the removal of the deceased (ideally after investigators have had an opportunity to examine the scene) ; and
(7) the preservation of evidence where possible.

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d) ***Initial Recovery Phase –***
includes, but is not limited to such actions as:-
(1) the hospitalisation and treatment of injured,
(2) the identification and registration of all victims, and reunification with relatives where applicable;
(3) reconciliation and identification of the deceased; and
(4) hand over of the incident to the South African Maritime Safety Authority's (SAMSA) Accident Investigators or to the appropriate Military Authority, as applicable.

e) ***Subsequent Recovery Phases (as applicable) –***
includes, but is not limited to such actions as:-
(1) the safety of the affected vessel(s),
(2) deal with any ship fires, oil spills, cargo and debris spillage and related issues (as per the respective SOPs and Emergency/Disaster Management Plans,
(3) ship recovery operations.

7.3 RESPONSE ENTITIES

Due to shipping/maritime incidents or emergencies generally occurring out to sea which is outside the jurisdictional area of the Municipality of Cape Town – except for shipping incidents/emergencies occurring within a port or harbour – the National Departments of Transport, of Environmental Affairs, of Agriculture, Forestry and Fisheries and of Defence and the mandated safety authorities such as SAMSA (incl. the MRCC), the SAPS, Customs, NSRI and others, will assume their mandated roles in dealing with the Situation. Where the consequences of this type of incident/emergency impact on the City of Cape Town and on the South African mainland or off-shore islands, the CoCT DRMC, which has the primary responsibility for the co-ordination and management of any hazard with the potential of becoming a disaster, including a shipping emergency, will co-ordinate these land-based efforts, irrespective of whether a local state of disaster has been declared or not. Therefore, the relevant City Department role-players, in conjunction with the above-mentioned Entities plus various other responding Services/Agencies, including the Line or Ship's Agents, foreign embassies and any other land-based Entities involved, will respond to any significant incident or emergency in accordance with this (tactical) DRM Plan.

It must be noted that various laws and regulations govern specific aspects of the response, recovery, the investigation to such incidents and provide authority to specific Agencies/Services. Therefore, provision has been made to accommodate these aspects in the CoCT's Municipal Disaster Risk Management Plan (the "strategic" document under which this DRM Plan falls), as the Disaster Management Act ensures the co-ordinated application of all specific legislation and regulations in order to provide an optimum response to any disaster. However, the CoCT DRMC retains the responsibility for the overall co-ordination of any major Incident, as envisaged in the Disaster Management Act, 57 of 2002.

**** The TACTICAL DISASTER RESPONSE ACTIONS SUMMARY FOR AN INCIDENT is indicated overleaf.**

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TACTICAL DISASTER RESPONSE ACTIONS SUMMARY

SHIPPING INCIDENT(S) THAT MAY RESULT IN DIRECT OR INDIRECT SOCIO-ECONOMIC OR ENVIRONMENTAL IMPACTS TO THE CITY CAPE TOWN

**** NB: This Table only provides a *tactical summary* of the response activities that may be taken to deal with any incident – more detailed Emergency Response Procedures / SOPs will be used by each of the mandated Role-players involved for these Actions i.r.o. their mandated functions at the operational level**

BASIC ACTIONS (AS PER SOPs) ***Apply the MIMP system to deal with Incident ...***	**PRIMARY RESPONDERS: LEAD DISCIPLINES**	**SUPPORT SERVICES THAT MAY BE INVOLVED**
Notification of a significant Shipping / Maritime Incident off the Cape Town coastline & communication to all Role-players = ALERT or STANDBY or ACTIVATION (*dependant on the nature (location, magnitude & impact) of the Incident)* = through communication from the TNPA Port of Cape Town Harbour Master, SAMSA / MRCC or from another reliable source (subject to verification), giving as much Incident information as is available.	TNPA-Port of Cape Town Harbour Master; NSRI; MRCC; SAMSA; Cape Town Radio; DoT; DEA; Ship's Captain and available crew	Alert the following Organisations to be on standby: - CoCT DRMC (DOC); Ship's Owner/Shipping Agent; SANDF-SA Navy & SAAF, if necessary (via J Tac HQ); Additional land support by:- SAPS Waterwing; CoCT Fire & Rescue; CoCT ERMD-Marine Environmental Compliance & Coastal Management; CoCT Law Enforcement; MPD; CoCT Traffic; CoCT Communications; WCG EMS; WCG Forensic Pathology Services; Hospitals; plus any other CoCT Services; Customs; Dept. of Health; Dept. Home Affairs; Dept. Foreign Affairs; Embassies (incl. interpreters); AAL-SA; Disaster Relief NGO's; DM Vols. and Others, as required, depending on the location & impact of the Shipping Incident;
Activation of all Response Services to scene of the Shipping Incident out to sea – give location with details incl. map references and any immediate requirements/resources that are to be provided by the Responders. If Incident is very close to the shore or in the Port/Harbour, notification to the land-based law enforcement units as well. **NB: Port Incidents will be dealt with according to the prevailing hazard(s) using the appropriate Port's Emergency Plan, supported by the Hazard-specific DRM Plan(s) and the relevant SOPs of the Responders, dependant on the Situation.**	TNPA-Port of Cape Town Harbour Master; NSRI; MRCC; SAMSA; Cape Town Radio; DoT; DEA; Ship's Captain and available crew;	CoCT DRMC (DOC); Ship's Owner/Shipping Agent; SANDF-SA Navy & SAAF, if necessary (via J Tac HQ); Additional land support by:- SAPS-Water and/or Land Units; CoCT Fire & Rescue; CoCT ERMD-Marine Environmental Compliance & Coastal Management; CoCT Law Enforcement; MPD, as applicable; CoCT Traffic, as applicable ; CoCT Communications; WCG EMS; WCG Forensic Pathology Services; Hospitals; Private EMS; plus any other CoCT Services; Customs; Dept. of Health; Dept. Home Affairs; Dept. Foreign Affairs; Embassies (incl. interpreters); AAL-SA; Disaster Relief NGO's; DM Vols. and Others, as required, depending on the location & impact of the Shipping Incident;
First arrivals on scene of Incident to do a Rapid Impact Assessment of the prevailing Situation and to provide feedback to the Supporting Services on land via SAMSA, MRCC and the TNPA Port of Cape Town's Harbour Master for onward notification.	NSRI; TNPA-Port of Cape Town Harbour Master; MRCC; SAMSA; Cape Town Radio; SAAF (as applicable); DoT; DEA; Ship's Captain and available crew;	Other available sea rescue/transport services can assist, where applicable, in support of the Lead Role-players; *Additional land support by*:- CoCT DRMC (DOC); Ship's Owner/Shipping Agent; SANDF-SA Navy, if necessary (via J Tac HQ); SAPS-Waterwing; CoCT Fire & Rescue, as applicable; CoCT ERMD-Marine Environmental Compliance & Coastal Management; CoCT Law Enforcement; CoCT Communications; WCG EMS; WCG Forensic Pathology Services; Hospitals; Private EMS; *Further support, as applicable:-* Other CoCT Services; Customs; Dept. of Health; Dept. Home Affairs; Dept. Foreign Affairs; Embassies (incl. interpreters); AAL-SA; Disaster Relief NGO's; DM Vols. and Others, as required, depending on the location & impact of the Shipping Incident;

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If fire-fighting on board a vessel is required the TNPA Port of Cape Town's Harbour Master must notify the CoCT Fire & Rescue Service and the contracted Marine Tugs, as applicable, so that arrangements can be made to transport personnel and supplementary fire-fighting equipment to the vessel in distress, where this is possible	TNPA-Port of Cape Town Harbour Master; NSRI; MRCC; SAMSA; CoCT Fire & Rescue Service; DoT; Ship's Captain and available crew	CoCT DRM (DOC); Ship's Owner/ Shipping Agent; SANDF-SA Navy, if necessary (via J Tac HQ); WCG EMS; Others, as required; Contracted Marine Fire-fighting Tug(s), as applicable;
Responders to undertake co-ordinated searches, rescues, triage, treatment & evacuation from the ship of crew and passengers. Also search the surrounding sea and rescue other casualties / evacuees onto the rescue vessels, as applicable to the Situation. Transportation of casualties by quickest and best means to the nearest harbour or landing place. Recovery of the dead and other actions, such as firefighting and hazard mitigation, as applicable. Initiate area safety measures around the ship, as necessary. If close to shore, initiate land cordons and crowd control measures. Obtain passenger & crew lists from affected ship(s), record casualty/patient information on arrival on land or at hospitals of emergency shelters and compare the lists.	TNPA-Port of Cape Town Harbour Master; NSRI; MRCC; SAMSA; SAAF (as applicable); DoT; DEA; Ship's Captain and available crew; Ship's Owner/ Shipping Agent;	Other available sea rescue/transport services can assist, where applicable, in support of the Lead Role-players; *Additional land support by*:- CoCT DRMC (DOC)-assists with communications; SANDF-SA Navy, if necessary (via J Tac HQ); SAPS-Diving & Water Policing Unit and/or SAPS Land Units; CoCT Fire & Rescue, as applicable; CoCT ERMD-Marine Environmental Compliance & Coastal Management; CoCT Law Enforcement; MPD, as applicable; CoCT Traffic as applicable; CoCT Communications; WCG EMS; WCG Forensic Pathology Services; Hospitals; Private EMS; *Further support, as applicable:*- Other CoCT Services, incl. CoCT Sport & Rec. & Human Settlements Depts for Emergency Shelter organisation, if applicable; Customs; Dept. of Health; Dept. Home Affairs; Dept. Foreign Affairs; Embassies (incl. interpreters); AAL-SA; Disaster Relief NGO's; DM Vols. and Others, as required, depending on the location & impact of the Shipping Incident;
Establish an on-site JOC / Forward Command Post (FCP) aboard one of the vessels on the scene, as well as an Off-site JOC at the TNPA Port of Cape Town Harbour Master's Boardroom or at a place designed by *SAMSA* in order to co-ordinate incident activities. All Support Services participating in the Off-site JOC to be notified and activated.	TNPA-Port of Cape Town Harbour Master; NSRI; MRCC; SAMSA; SAAF (as applicable); DoT; DEA; Ship's Owner/ Shipping Agent;	CoCT DRMC (DOC)-assists with communications; DRMC Rep.; Ship's Owner / Shipping Agent; SANDF-SA Navy, if necessary (via J Tac HQ); SAPS-Waterwing and/or Land Units; CoCT Fire & Rescue, as applicable; CoCT ERMD-Marine Environmental Compliance & Coastal Management; CoCT Law Enforcement; MPD; CoCT Traffic ; CoCT Communications; WCG EMS; WCG Forensic Pathology Services; Others, as required, depending on the location & impact of the Shipping Incident
Supply the necessary SITREPs & the supply of "disaster intelligence" information to SAMSA and the MRCC; the TNPA Port of Cape Town's Harbour Master and to the CoCT DOC for relay to the DCT (when activated) & to own Service Control Rooms & management.	TNPA-Port of Cape Town Harbour Master; NSRI; MRCC; SAMSA; SAAF (as applicable); DoT; DEA; **All other** on-site/incident area Responders; CoCT DOC;	CoCT DRMC; **All** relevant Support Services; CoCT's DCT (when activated); Ship's Owner/ Shipping Agent;
A Joint Media Centre (JMC) is established at Port of Cape Town or at any other suitable venue to brief media of the evolving Situation.	SAMSA; DoT; NSRI; TNPA-Port of Cape Town Harbour Master; MRCC; DEA; Ship's Owner / Shipping Agent; CoCT DRMC; All Off-site JOC participants;	CoCT Communications; Others, as required

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Activation of the CoCT Disaster Co-ordinating Team (DCT) in the CoCT DOC, Goodwood, as required by the impact of the Incident on the City of Cape Town.	Head DRMC; CoCT DOC-assists with communications; DRMC Support Staff; SAMSA, TNPA-Port of Cape Town Harbour Master; MRCC; DoT; DEA; NSRI; Ship's Owner / Shipping Agent;	SANDF- J Tac HQ); SAPS-Waterwing and Land Units' Reps.; CoCT Fire & Rescue, as applicable; CoCT ERMD-Marine Environmental Compliance & Coastal Management; CoCT Law Enforcement; MPD & CoCT Traffic, as applicable ; CoCT Communications; 107 PECC; WCG EMS; WCG Forensic Pathology Services; CoCT Communications; Other CoCT Services and external Entities, as required by the nature of the Situation;
Arrange and monitor the land transport of all casualties to hospitals and/or to places of safety / emergency shelter(s) for survivors' welfare, trauma counselling and next of kin notifications. Securing of bodies / patient information / care for next of kin, as required by the Situation.	CoCT DRMC Staff; MPD; CoCT Traffic; SAPS; WCG EMS; WCG Forensic Pathology Services; Hospitals; Ship's Owner/Shipping Agent;	Setting-up of emergency shelters and casualty administration, as required:- CoCT Human Settlements Dept; CoCT Sport & Recreation; CoCT Law Enforcement; City Health; Dis. Relief NGO's; Trauma Counselling Centres; Customs; Dept. of Health; Dept. Home Affairs; Dept. Foreign Affairs; Embassies (incl. interpreters); Disaster Relief NGO's; DM Volunteers; Others, as required, depending on the location & impact of the Shipping Incident;
Continuing Media Liaison & further public notification / information, as required by the Situation.	Joint Media Centre - with SAMSA; NSRI; TNPA-Port of Cape Town Harbour Master; All Off-site JOC participants & supported by the DCT participants (as applicable) through CoCT Communications and the DRMC;	Others, as required;
Continue with local actions at sea or on adjacent land to mitigate further damage or disruption. Initiate oil, debris and other environmental clean-up operations if safe to do so (as per the DEA Coastal Oil Spill Plan) ** In the event of a sinking, stranding or wreck, SAMSA and DoT to initiate formal investigation into the Incident as per Protocol.	TNPA-Port of Cape Town Harbour Master; NSRI; MRCC; SAMSA; SAAF (as applicable); DoT; DEA; CoCT ERMD--Marine Environmental Compliance & Coastal Management; CoCT Solid Waste Management CoCT DRMC All other on-site/incident area Responders; All Off-site JOC participants;	Ship's Owner/Shipping Agent; SANCCOB; Others, as required;
Management of Recovery Resources - Tactical and Operational assistance of additional resources (via mutual aid agreements and or short-term contracts) as necessary – consider a Local State of Disaster Declaration, if applicable.	All on-site JOC/FCP and off-site JOC participants;	CoCT's DCT (if activated); CoCT DRMC; CoCT Solid Waste Management; SAPS; MPD, CoCT Traffic; SANCCOB; Others, incl. Private Services, as required; Senior City Management and Council/MAYCO; Provincial & National Government Departments & other identified supporting role-players;
POSSIBLE SUPPLEMENTARY ACTIONS / SUPPORT, DEPENDANT ON SITUATION:- Further impact assessments, asset /facilities & environmental protection.	SAMSA; NSRI; TNPA Port of Cape Town Harbour Master; DoT; DEA; CoCT DRMC; CoCT ERMD-Marine Environmental Compliance & Coastal Management; MPD; CoCT Law Enforcement (for the protection of Municipal Property); CoCT Solid Waste Management; SAPS; SANDF/SA Navy, if applicable; Other CoCT Services, as required; Other Facilities, as applicable.	WCG & National Government Departments, as & when they are required; Ship's Owner/Shipping Agent;
Stand down of response and rehabilitation activities. Continue with the Incident investigation, judicial & liability processes with the relevant Parties. Start with site rehabilitation, wreck removal, etc. (as applicable)	SAMSA; TNPA Port of Cape Town Harbour Master; DoT; DEA; CoCT ERMD-Marine Environmental Compliance & Coastal Management; SAPS; Ship's Owner/Shipping Agent; Others, as required;	Others, as applicable;

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<u>*SOME*</u> OF THE SPECIAL RESOURCES / LOGISTICS WHICH <u>*MAY*</u> BE REQUIRED FOR A SHIPPING INCIDENT RESPONSE - SOURCED FROM THE RESPONDING LEAD & SUPPORTING DISCIPLINES' RESOURCE AVAILABILITY AND FROM OTHER CONTINGENCY RESOURCE DATABASES:-

a) Sea-worthy Vessels and trained personnel for rescue & assistance / Divers / Lifejackets / Helicopters (where applicable) - for transportation to incident site & for casualty evacuation
b) Ship Rescue equipment, incl. high-angle equipment and ropes, plus necessary medical equipment / Stretchers
c) Rescue Teams / Paramedics / Doctors
d) Breathing Apparatus / Gas masks and the appropriate protective clothing
e) Fire-fighting teams & equipment, with chemical foam and water tanks, as applicable
f) Pumping Equipment / Generators / Emergency Lighting
g) Ambulances / Land Transport for evacuated casualties & other affected persons
h) Salvage crews & equipment
i) Cordoning-off / Site securing equipment (for land-based operations)
j) Tents & shelter areas (land-based operations)
k) Blood Supplies / hospitals
l) Food / Welfare / Data collection / Counselling / Temporary Shelters for evacuees & next of kin, as required
m) Refrigerator trucks or containers (land-based) for storage of bodies
n) Front-end loaders / trucks (for oil & debris removal – land-based)
o) Any other identified resources – dependant on the nature of the Situation and resource availability = refer to Stakeholders' Asset Databases.

A NOTE ON MEDICAL TRIAGE:

Many lives *may* be lost as a result of a shipping or maritime incident/accident. If this occurs closer to the shore and rescue units are available, then many could survive. An Advanced Trauma Life Support Doctor will respond close to the scene on-shore or at the designed casualty landing point and will assume the role of Chief Medical Officer. Once the Triage area has been set up, the Chief Medical Officer will assume control of the area. His sole responsibility would be to reclassify all arriving casualties and prioritise the casualties for transport to Hospitals.

The Critical Care Assistants from the various Services will move out into the field and act as Triage Officers. Their sole responsibility will be to assess the condition of the victims and classify them accordingly. Stretcher parties will accompany them into the field.

Once triage has been completed, they shall then assist with the treatment of the patients. Treatment of survivors should be limited to stabilisation of patients in order for them to be transported to hospitals for specialised treatment.

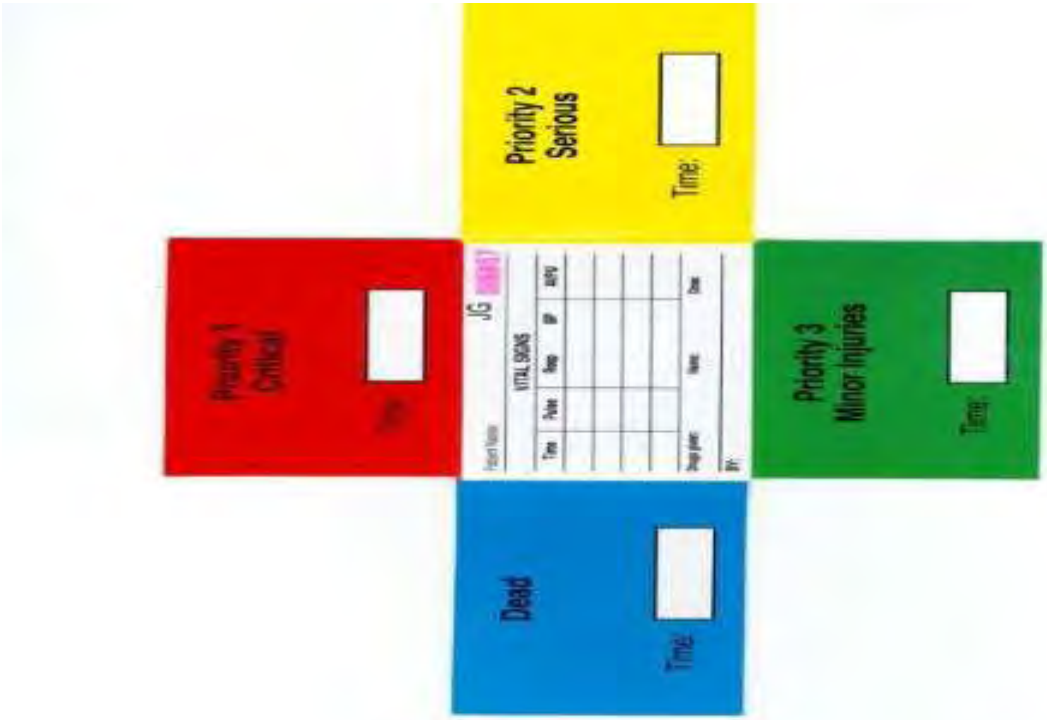
All patients will be categorised in order of the severity of his/her condition. The approved Triage Tags will be used. After completing as many details as possible, the triage tags will be fastened to the patient's body, never tie the tag to jewellery or clothing, as these may have to be removed during surgery. The tag, where possible, should be tied to the right wrist of the casualty, should this not be possible, the left wrist could be utilised, then the right ankle and finally the left ankle.

For all incidents the patients will be classified into four categories, each of which is easily identifiable. Each category is colour coded. The centre 'white' card has reference details of the patient.,

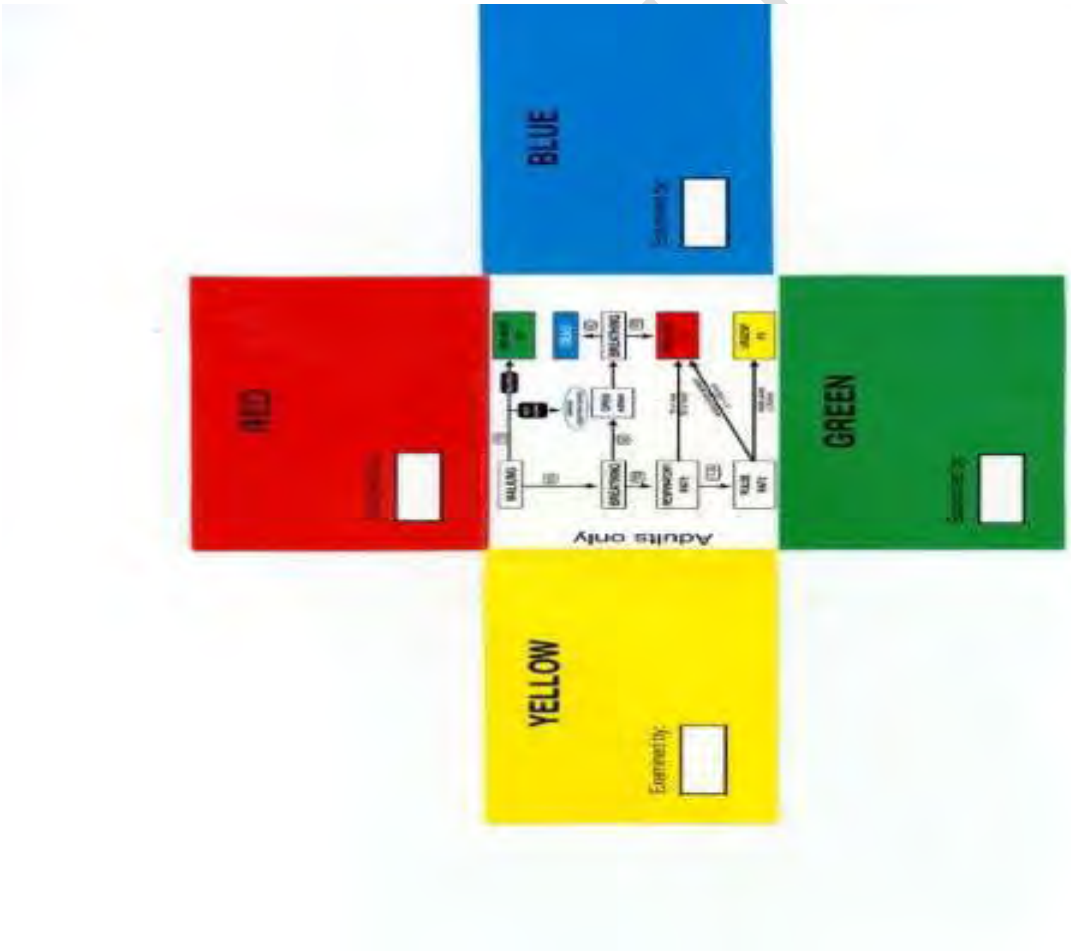
The following information should be collected at the Triage Area:-
a) Numbers: - How many people have been found and taken to the Triage Area?
b) Condition: - How serious are their injuries?
c) Where: - To which holding area or hospitals have they been sent?

An example of the approved triage tags, which will be used in the event of a major incident is shown overleaf …

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Front of Traige Card



Back of Triage Card

SPECIFIC RESPONSE PLAN FOR SHIP SINKING, STRANDING OR WRECKING NEAR THE HIGH-WATERMARK (INSHORE) OFF CAPE TOWN, WITH POSSIBLE ENVIRONMENTAL IMPACTS

- **AS PER ARTICLE 7 OF THE SIGNED MULTI-PARTY IMPLEMENTATION PROTOCOL (ATTACHED TO THIS DRM PLAN AS ADDENDUM 1) ...**

RESPONSE PLAN

7.1 ONCE AN INSHORE SINKING, STRANDING OR WRECK OCCURS THE FOLLOWING STANDARD RESPONSE PLAN WILL BE IMPLEMENTED:-

7.1.1 IMMEDIATE RESCUE OPERATIONS OF THE VESSEL'S CREW WILL BE INITIATED THROUGH SAMSA, THE CITY'S DISASTER RISK MANAGEMENT CENTRE AND THE NATIONAL SEA RESCUE INSTITUTE WITH THE ASSISTANCE OF THE SOUTH AFRICAN NAVY WHERE NECESSARY.

7.1.2 SAMSA WILL BE RESPONSIBLE FOR CO-ORDINATING THE IMMEDIATE CREW RESCUE ACTIONS.

7.1.3 ON NOTIFICATION OF AN INSHORE SINKING, STRANDING OR WRECK, A FORMAL AND MANDATED JOINT OPERATIONS COMMITTEE (JOC) WILL BE ESTABLISHED UNDER THE DIRECT COMMAND OF SAMSA.

7.1.4 THE JOC SHALL HAVE FORMAL ESTABLISHED REPRESENTATION FROM ALL PARTIES TO THE PROTOCOL.

7.1.5 EACH PARTY WILL AT THE TIME OF SIGNATURE OF THE PROTOCOL MANDATE ITS NOMINATED REPRESENTATIVES TO REPRESENT THE SAID PARTY ON THE JOC FULLY AND EXPLICITLY AND EACH PARTY WILL HAVE ITS OWN INTERNAL PROTOCOL IN THIS REGARD.

7.1.6 EACH JOC MEMBER WILL BE MANDATED BY THEIR ORGANISATION WITH REGARDS TO THE COMMITMENT OF RESOURCES AND CAPACITY TO RESOLVE THE INCIDENT AS EXPEDIENTLY AND EFFECTIVELY AS POSSIBLE.

7.1.7 THE JOC SHALL TAKE OVERALL CONTROL OF ALL SALVAGE AND REMEDIATION OPERATIONS AND ACTIONS.

7.1.8 SAMSA WILL CHAIR AND COORDINATE THE JOC.

7.1.9 NOMINATED REPRESENTATIVES TO THE JOC AND THEIR CONTACT DETAILS ARE LISTED IN ANNEXURE A TO THIS PROTOCOL.

7.1.10 THE CITY'S DISASTER RISK MANAGEMENT CENTRE SHALL CO-ORDINATE ALL COMMUNICATION AS PER THE CITY'S SHIPPING INCIDENT DISASTER RISK MANAGEMENT PLAN WHICH WILL BE BASED ON THIS PROTOCOL. THE DISASTER RISK MANAGEMENT PLAN WILL INCLUDE A NOTIFICATION SYSTEM AND ACTIVATION PROCEDURES TO ENSURE THAT ALL REPRESENTATIVES ARE NOTIFIED OF THE JOC FORMATION AND THE VENUE AND TIME OF MEETINGS. IF REQUIRED BY THE MAGNITUDE OF ANY SHIPPING INCIDENT, ESPECIALLY FOR THE RESPONSE AND RELIEF PHASES, THE DISASTER CO-ORDINATION TEAM WILL ALSO BE ACTIVATED BY THE CITY'S DISASTER OPERATIONS CENTRE TO DEAL WITH TACTICAL AND STRATEGIC DISASTER MANAGEMENT ASPECTS. THE DISASTER OPERATIONS CENTRE WILL LIAISE CLOSELY WITH THE JOC AND THE DISASTER COORDINATION TEAM WILL HAVE REPRESENTATIVES OF ALL RELEVANT ROLE-PLAYERS.

7.1.11 THE JOC WILL MAKE ALL DECISIONS WITH REGARDS THE SALVAGE AND REMEDIATION ACTION WITH PARTICULAR EMPHASIS ON THE EXPEDIENT, EFFECTIVE, SAFE AND APPROPRIATE PERMANENT RESOLUTION OF THE INCIDENT.

7.1.12 EACH JOC MEMBER MUST ENSURE THAT THEIR ORGANISATION AS WELL AS THEIR LEADERSHIP IS FULLY AND COMPLETELY BRIEFED AT ALL TIMES FOR THE DURATION OF THE INCIDENT.

7.1.13 EACH MEMBER OF THE JOC SHALL TAKE RESPONSIBILITY TO ENSURE THAT ALL DECISIONS CAN BE MADE AND ACTED UPON WITH IMMEDIATE EFFECT BY THE JOC IN THE KNOWLEDGE OF THE FULL SUPPORT OF THE RESPECTIVE ORGANISATIONS.

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7.1.14 COMMUNICATION WITH THE MEDIA, PUBLIC AND STAKEHOLDERS THROUGHOUT THE SALVAGE OPERATION WILL BE CENTRALLY CO-ORDINATED THROUGH THE JOC BY THE JOC CHAIRPERSON OR THE CHAIRPERSON'S NOMINATED SPOKESPERSON.

7.1.15 ALL COMMUNICATION SHALL REFLECT THE SITUATION AS A COLLECTIVE ACTION CO-ORDINATED THROUGH THE JOC AND WITH MULTIPLE-DISCIPLINARY CO-ORDINATION AND CO-OPERATION. IN THE EVENT OF A DISASTER SITUATION, THE CITY'S DISASTER OPERATIONS CENTRE AND THE DISASTER CO-ORDINATION TEAM WILL ASSIST WITH THIS PROCESS.

8. CLASSIFICATION OF DISASTERS

When an event / incident of disaster proportions occurs or is threatening to occur in any part of the City or in any adjacent area, the Head of the Disaster Risk Management Centre will determine whether the event can be classified as a Local State of Disaster in terms of the Disaster Management Act, 57 of 2002 and, if so, the DRM Centre will immediately:-

- initiate efforts to assess the magnitude and severity or potential magnitude and severity of the disaster;
- alert all the disaster risk management role-players in the municipal area that may be of assistance in the circumstances;
- initiate the implementation the disaster response plan or any contingency plans and emergency procedures that may be applicable under the circumstances of the threat; and
- inform the Western Cape Provincial and National Disaster Management Centres of the disaster and the initial assessment of the magnitude and severity or potential magnitude and severity of the disaster.

When informing the Western Cape Provincial and National Disaster Risk Management Centres, the Head of the DRM Centre may make recommendations regarding the classification of the disaster as may be appropriate in terms of Section 49 of the Disaster Management Act, 57 of 2002.

Irrespective of whether a local state of disaster has been declared or not, the City is primarily responsible for the co-ordination and management of local disasters that occur in its area, in terms of Section 55 (1) of the Disaster Management Act, 57 of 2002.

Whether or not an emergency situation is determined to exist, municipal and other agencies may take such actions under this plan as may be necessary to protect the lives and property of the inhabitants of the City of Cape Town.

Declaration of a local state of disaster :- In terms of Section 55 of the Disaster Management Act, 57 of 2002, in the event of a local disaster, the City Council may, by notice in the Provincial Gazette ***declare a local state of disaster*** if existing legislation and contingency arrangements do not adequately provide for the municipality to deal effectively with the disaster, or if there are any other prevailing or special circumstances that warrant the declaration of a local state of disaster.

If a local state of disaster has been declared, the City Council ***may*** make by-laws or issue directions, or authorise the issue of directions to:-

- Assist and protect the public;
- Provide relief to the public;
- Prevent or combat disruption; or
- Deal with the destructive and other effects of the disaster.

9. POST INCIDENT AND DISASTER RECOVERY ASPECTS

9.1 DISASTER RESPONSE CO-ORDINATION

The Disaster Co-ordination Team (DCT) shall be convened in the (off-site) Disaster Operations Centre (DOC)when an emergency or disaster has occurred or is likely to occur, in accordance with the following parameters :-

* where the size or seriousness of the emergency seems beyond the capability of a Service, in the opinion of the most senior on-duty official of that Service, the DRMC can be requested to activate the DCT,
* where the Head of the DRMC is of the opinion that it is necessary to activate the DCT in order to effectively manage an emergency which has occurred or is likely to occur, the DCT must convene in the DOC,

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* the activating Service shall, via the Disaster Operations Centre's, contact the Disaster Risk Management Duty Co-ordinator who shall immediately arrange to notify the designated members of the Disaster Co-ordination Team (DCT),
* the Disaster Risk Management Duty Co-ordinator shall request the DCT members to meet at the DOC in Goodwood or at any other viable alternate centre should the DOC not be available for whatever reason,
* the DCT will evaluate the situation and collaborate with the Head of the DRM Centre regarding the need for a declaration of a Local State of Disaster, as well as the continued activation or standing-down of the DCT.

All incidents will be managed by the Disaster Co-ordination Team in accordance with the principles and guidelines contained in the City of Cape Town Multi-Disciplinary Incident Management Plan (MIMP) and the DRMC DOC SOPs.

9.2 DISASTER OPERATIONS CENTRE (DOC)

All the co-ordination and response integration activities by the various responding disciplines will be managed from the City's Disaster Operations Centre (DOC) whose functions and responsibilities are described under DOC's Standard Operating Procedures.

9.3 REQUESTS FOR PROVINCIAL AND NATIONAL GOVERNMENT ASSISTANCE

Under certain circumstances, National (including SANDF), Provincial Department and even International assistance, may be requested from the Western Cape Provincial Disaster Management Centre or the National Disaster Management Centre. This will be in the instance where the ***emergency / disaster has been declared a provincial or national state of disaster***, when a ***joint disaster management co-ordination system will be put in place***.

9.4 RECOVERY AND REHABILITATION OPERATIONS

Post-disaster recovery and rehabilitation operations, which may include reconstruction or redevelopment efforts, will normally take on the nature of special programmes and projects.

The Disaster Risk Management Centre will assist with the identification of needs and will facilitate recovery and rehabilitation operations. The function or department with the most direct involvement in the operation will take responsibility for project management and delivery. Project Teams convened for these purposes must report to the CoCT Municipal Disaster Management Advisory Forum on a regular basis (as determined by the MDMAF).

In this regard the causal factors of disasters must be addressed and disaster prevention through risk elimination should be pursued in the rehabilitation, reconstruction or redevelopment efforts in order to avoid a repetition of the disaster.

CoCT DRM Plan IT3

ADDENDUM 1

(LATEST DRAFT) IMPLEMENTATION PROTOCOL

by and between

INSERT LOGO

THE DEPARTMENT OF TRANSPORT,

(Hereinafter referred to as "the DoT")

Duly represented by **Mr/Ms xxx** in his/her capacity as **xxx** and duly authorized thereto

and

INSERT LOGO

THE DEPARTMENT OF ENVIRONMENTAL AFFAIRS ,

(Hereinafter referred to as "the DEA")

Duly represented by **Mr/Ms xxx** in his/her capacity as **xxx** and duly authorized thereto

and

INSERT LOGO

THE TRANSNET NATIONAL PORTS AUTHORITY ,

(Hereinafter referred to as "TNPA")

Duly represented by **Mr/Ms xxx** in his/her capacity as **xxx** and duly authorized thereto

and

INSERT LOGO

THE SOUTH AFRICAN MARITIME SAFETY AUTHORITY,

(Hereinafter referred to as "SAMSA")

Duly represented by **Mr/Ms xxx** in his/her capacity as **xxx** and duly authorized thereto

and

THE CITY OF CAPE TOWN MUNICIPALITY,

(Hereinafter referred to as "the City")

Duly represented by **Mr/Ms xxx** in his/her capacity as **xxx** and duly authorized thereto

(Hereinafter sometimes referred to collectively as "the Parties" and individually as the "Party")

FOR COOPERATION IN PREVENTING AND RESPONDING TO SHIPPING ACCIDENTS AND STRANDINGS OFF THE COASTLINE OF THE CITY OF CAPE TOWN

CoCT DRM Plan - T3

PREAMBLE

A. **WHEREAS** the Parties recognise that:

- The marine and coastal environment is central to Cape Town's economy, sense of place, heritage, identity and recreational value and holds significant potential for contributing to further economic growth, job creation, social opportunities, development, social well-being and resilience towards climate change;
- Cape Town has a highly sensitive and rich coastal environment where a major oil or shipping accident may have catastrophic impacts;
- Shipping accidents and strandings impact across coastal jurisdictional boundaries, ecosystems and the marine and terrestrial environment and have the potential to cause significant negative impacts on the economic, environmental and social value of the coastline in Cape Town over extended periods of time;
- Shipping accidents and strandings have historically created significant financial burden on public funds administered by the different government departments and organs of state; including government agencies; and instances of default by owners and insurers have been high;
- Due to Cape Town's geographic location at the tip of Africa and the Cape Town harbour being a core economic hub, it forms a key shipping route and as such the potential for shipping accidents and strandings remains high;
- The severe weather and sea conditions to which Cape Town is exposed further increases the risks of shipping accidents and strandings;
- A shared and coordinated approach between the different government departments and organs of state; including government agencies, and a clear understanding of roles and responsibilities across the various agencies will significantly mitigate the risk of further shipping accidents and strandings and where these do occur, increase the effective and efficient resolution of such events and reduce the long term impacts; and
- Formalising a collaboration and co-operation between the Parties holds significant benefits for all Parties.

B. AND WHEREAS Section 35 of the Intergovernmental Relations Framework Act, 2005 (Act 13 of 2005) provides that where the implementation of a policy, the exercise of a statutory power, the performance of a statutory function or the provision of a service depends on the participation of organs of state in different governments, those organs must co-ordinate their actions in such a manner as may be appropriate or required in the circumstances, and may do so by entering into an Implementation Protocol;

C. AND WHEREAS *Section 35(c)* provides that an Implementation Protocol will materially assist the organs of state participating in the provisioning of a service in a specific area to co-ordinate their efforts;

D. AND WHEREAS the parties are committed in the spirit of co-operative governance to support each other in preventing the risk of and responding to shipping accidents and strandings off the coastline of the City of Cape Town;

E. The parties hereby enter into an Implementation Protocol for purposes of promoting co-operation, co-governance and joint operations in respect of preventing shipping accidents and to define respective

COCT DRM Plan - TS

roles and responsibilities so that where these do occur, they are responded to more efficiently and in a co-ordinated manner.

NOW THEREFORE THE PARTIES AGREE AS FOLLOWS:

ARTICLE 1

Objectives of the Protocol

1.1 The objectives of the Protocol are:

1.1.1 To reduce the potential for inshore shipping accidents, strandings and sinkings and to increase efficiency in responding to shipping accidents, strandings and sinkings.

1.1.2 To establish long-term, on-going, clear and effective working relationships and build shared resources and capacity between the Parties relating to effective salvage operations that require reactions and assistance from the Parties.

1.1.3 To ensure that the correct and appropriate delegations, authority and mandates are in place to allow for the collaboration, co-operation, joint operations and information sharing between officials from all Parties across jurisdictional boundaries in the event of shipping accidents, strandings or sinkings.

1.1.4 To ensure that mechanisms are in place for legally compliant joint operations and activities by officials from all Parties using infrastructure, assets and resources which belong to one or all of the Parties.

ARTICLE 2

Duration, Execution and Amending

2.1 This Protocol comes into effect upon signature and will remain effective unless and until terminated in writing by the Parties.

2.2 This Protocol shall be subject to a mandatory review within 2 (two) years from the date of coming into effect as well as a mandatory review following any shipping accident, stranding or sinking to which the provisions of this Protocol are applicable.

2.3 The Parties shall meet from time to time if deemed necessary by any Party to discuss the implementation of the Protocol and the need for any revision.

2.4 This Protocol including the Annexure/s hereto constitute the whole agreement between the Parties relating to the subject matter of this Protocol.

2.5 There are no other conditions, representations, whether oral or written and whether express or implied, applicable to this Protocol, save for those contained in this Protocol.

2.6 No amendment, alteration addition or variation of this Protocol shall be of any force or effect unless reduced to writing, signed by the Parties and attached hereto as an addendum.

2.7 This Protocol does not limit any Party from entering into cooperative or other agreements with any other Party in respect of shipping accidents, strandings or sinkings.

ARTICLE 3

Geographic Area

The Protocol applies to the municipal area of the City of Cape Town and to any other location that may result in direct or indirect socio-economic or environmental impacts to the City of Cape Town.

ARTICLE 4

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Lead Agencies

The DoT and SAMSA are recognised as the collective lead agency.

ARTICLE 5

Assessment of South Africa's Maritime Legislation

5.1 The DoT shall commission an independent specialist assessment of the current status of South African's national maritime legislation with regards to insurance, liability, compensation and financial protection of the country's marine and coastal assets insofar as these relate to shipping accidents, oil pollution, strandings and sinkings.

5.2 Making use of the findings and recommendations flowing from this specialist assessment, the DoT will initiate a process to make the necessary legislative amendments or to enact new legislative provisions to ensure that appropriate and adequate financial insurance and internationally funded cover is in place to prevent shipping accidents, strandings, sinkings and oil pollution incidents impacting on public funds.

ARTICLE 6

Safety Zone

6.1 The Parties will define a Safety Zone (excluding the entry channels/shipping lanes to the Cape Town Port) along the length of Cape Town's coastline. This Safety Zone must be set at a minimum of at least three nautical miles off shore and the entire False Bay will be included in the Safety Zone. This new Safety Zone will be monitored as part of the TNPA radar and reporting system.

6.2 This new Safety Zone will be formally entered onto all national and international shipping charts as a Safety Exclusion Zone.

6.3 Any vessel entering this Safety Zone shall trigger the following response:

6.3.1 The TNPA shall notify SAMSA and the City's Disaster Risk Management Centre.

6.3.2 The vessel shall be contacted and requested to alter course out of the Safety Zone.

6.3.3 In the event that the vessel does not respond, the TNPA shall inform SAMSA and the City's Disaster Risk Management Centre of the exact location of the vessel.

6.3.4 The City's Marine and Environment Law Enforcement Unit's vessel shall be dispatched to intercept the vessel and ensure that the vessel is operating safely, is within control of the vessel's captain and to escort the vessel out of the Safety Zone.

6.3.5 The TNPA shall record all radar and communication transmissions for the purpose of investigations.

6.3.6 In the event that the vessel is unable to respond due to mechanical failure, steering failure or mutiny, SAMSA shall coordinate an emergency response to prevent the ship stranding on the City's coastline. This may include assistance from the South African Navy or the South African Police Services in physically taking control of the vessel.

6.4 All South African military, safety and emergency vessels are excluded from the conditions of the Safety Zone as are all small scale fishing vessels registered and operating out of Kalk Bay and Hout Bay Harbours.

ARTICLE 7

Response Plan

7.1 Once an inshore sinking, stranding or wreck occurs the following standard Response Plan will be implemented:

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7.1.16 Immediate rescue operations of the vessel's crew will be initiated through SAMSA, the City's Disaster Risk Management Centre and the National Sea Rescue Institute with the assistance of the South African Navy where necessary.

7.1.17 SAMSA will be responsible for coordinating the immediate crew rescue actions.

7.1.18 On notification of an inshore sinking, stranding or wreck, a formal and mandated Joint Operations Committee (JOC) will be established under the direct command of SAMSA.

7.1.19 The JOC shall have formal established representation from all Parties to the Protocol.

7.1.20 Each Party will at the time of signature of the Protocol mandate its nominated representatives to represent the said Party on the JOC fully and explicitly and each Party will have its own internal protocol in this regard.

7.1.21 Each JOC member will be mandated by their organisation with regards to the commitment of resources and capacity to resolve the incident as expediently and effectively as possible.

7.1.22 The JOC shall take overall control of all salvage and remediation operations and actions.

7.1.23 SAMSA will Chair and coordinate the JOC.

7.1.24 Nominated representatives to the JOC and their contact details are listed in Annexure A to this Protocol.

7.1.25 The City's Disaster Risk Management Centre shall coordinate all communication as per the City's Shipping Incident Disaster Risk Management Plan which will be based on this Protocol. The Disaster Risk Management Plan will include a notification system and activation procedures to ensure that all representatives are notified of the JOC formation and the venue and time of meetings. If required by the magnitude of any shipping incident, especially for the response and relief phases, the Disaster Coordination Team will also be activated by the City's Disaster Operations Centre to deal with tactical and strategic disaster management aspects. The Disaster Operations Centre will liaise closely with the JOC and the Disaster Coordination Team will have representatives of all relevant role-players.

7.1.26 The JOC will make all decisions with regards the salvage and remediation action with particular emphasis on the expedient, effective, safe and appropriate permanent resolution of the incident.

7.1.27 Each JOC member must ensure that their organisation as well as their leadership is fully and completely briefed at all times for the duration of the incident.

7.1.28 Each member of the JOC shall take responsibility to ensure that all decisions can be made and acted upon with immediate effect by the JOC in the knowledge of the full support of the respective organisations.

7.1.29 Communication with the media, public and stakeholders throughout the salvage operation will be centrally coordinated through the JOC by the JOC Chairperson or the Chairperson's nominated spokesperson.

7.1.30 All communication shall reflect the situation as a collective action coordinated through the JOC and with multiple-disciplinary coordination and cooperation. In the event of a disaster situation, the City's Disaster Operations Centre and the Disaster Coordination Team will assist with this process.

ARTICLE 8

Insurance and Liability Determination

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8.1 In parallel to the establishment of the JOC and salvage operations in the event of a sinking, stranding or wreck, SAMSA and the DoT shall immediately initiate formal legal processes to ascertain, confirm and establish insurance cover, insurance liability, vessel ownership and associated company or ownership assets attachable for the purpose of recouping public expenditure, remediating environmental damage and rehabilitating environmental conditions.

8.2 As part of this assessment, SAMSA and the DoT shall establish and manage a formal cost database against which all costs by all members of the JOC are logged and verified for the explicit purpose of insurance claims, financial reclamation of public funds and asset disposal, applicable operating costs relevant to the incident and the provision of contracted services.

8.3 The DoT shall be responsible for coordinating the submission of a single collated claim against the insurance agent, owner or his/her assets for the reclamation of all funds utilised in the salvage and environmental remediation actions.

8.4 The DoT will refund all members of the JOC based on the costs as reflected in the central Cost Database upon payment by the owner or insurer of the vessel.

8.5 In the event that costs are not fully recoverable for any reason, the DoT shall take responsibility for submitting the full account from the Cost Database to National Treasury for the refunding of all monies to the members of the JOC who incurred costs as reflected on the Cost Database.

ARTICLE 9

Wreck Investigation

9.1 In the event of a sinking, stranding or wreck, SAMSA and DoT shall also immediately initiate a formal investigation into the incident.

9.2 This investigation will aim to:

9.2.1 Determine the cause of the incident;

9.2.2 Allocate and define responsibility and accountability where appropriate;

9.2.3 Determine if further legal, criminal or liability action is warranted; and

9.2.4 Clarify and ascertain the Protection and Indemnity (P&I) and responsibility that includes but not limited to diversion expenses, collision liabilities, loss or damage to property; pollution; towage contract liabilities; wreck liabilities; cargo liabilities; cargo's proportion of general average or salvage; expenses of salvors; fines and omnibus cover.

9.3 In the event that criminal or legal liability is determined, the DoT shall be responsible for initiating formal charges against responsible parties through the National Prosecuting Authority or the DoT's legal representatives.

9.4 The complete and formal investigation report will be made available to all member organisations of the JOC.

9.5 The investigation report must also determine through the incident investigation any recommendations that should be added to this Protocol to further prevent these events from occurring in the future.

ARTICLE 10

JOC Debriefing and Incident Reporting

10.1 On completion of the salvage and remedial action, the JOC shall compile a Salvage and Remediation Report.

10.2 This report shall detail the salvage and remedial operations, determine successes, failures and lessons learned.

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10.3 Full and complete expenditure incurred (financial and capacity) by all organisations in the JOC will also be detailed in this report.

10.4 This Report shall identify any negative environmental impacts that may have resulted or may result from the initial incident or subsequent salvage or remedial action and recommend suitable mitigation or remedial actions. All further expenses that may be incurred for any required remedial actions will be submitted by the DoT to the owner or insurer of the vessel.

10.5 This report shall stand as a record of the events, the actions taken and the costs of the actions.

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ARTICLE 11

Good Faith, Reasonableness and Dispute Resolution

11.1 In their dealings with each other for purposes of this Protocol, the Parties undertake to act in good faith and reasonably and warrant that they shall not do anything or shall refrain from doing anything that might prejudice or detract from the powers or functions of each other, or the implementation of this Protocol.

11.2 This Protocol does not make any legal or otherwise enforceable commitments on behalf of any of the Parties, nor does it in any way limit any statutory powers and functions of the Parties.

11.3 This Protocol defines a collaborative execution of activities. No Party has the authority to create any obligations, express or implied, on behalf of any of the others.

11.4 The Parties must seek to resolve any dispute concerning the implementation of this Protocol through dialogue and discussions in good faith.

11.5 Should there be no resolution in terms of Article 11.4 above, the Parties will further attempt to resolve the dispute through the engagement of representatives of the Parties nominated for this specific purpose.

11.6 Should the dispute remain unresolved, then the provisions of section 41 to section 45 of the Intergovernmental Relations Framework Act, 2005 (Act No. 13 of 2005) shall apply.

ARTICLE 12

Domicila and Notices

12.1 The parties choose as their *domicilia citandi et executandi* the following physical addresses for all purposes under this Protocol:

The Department of Transport: **Name/Title**

Address

The Department of Environmental Affairs: **Name/Title**

Address

Transnet National Ports Authority: **Name/Title**

Address

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The South African Maritime Safety Authority: **Name/Title**

Address

The City of Cape Town: **Name/Title**

Address

12.2 Any party shall be entitled by notice in writing to the other Parties, to change its *domicilium* to any other address within the Republic of South Africa, provided that the change shall become effective only fourteen (14) days after the service of the notice in question.

ARTICLE 13

Liaison

13.1 The Parties will liaise with the nominated representatives (as set out in Annexure A to this Protocol) in respect of all matters pertaining to this Protocol.

ARTICLE 14

Confidentiality

14.1 Any Party shall treat information furnished by another Party or another person for purposes of the execution of this Protocol, as confidential.

14.2 Subject to this clause, the Party (ies) so furnished with information shall not disclose such information to another person without the prior written consent of the other Party and shall take reasonable steps to ensure that such information is not disclosed to another person.

ARTICLE 15

Limitation of Liability / Indemnity

15.1 The Parties indemnify one another and hold one another harmless against any and all liabilities arising from any acts and/or omissions except for gross negligence or intentional acts and/or omissions of any of their servants, agents, members and/or appointed officers or representatives arising out of this Protocol.

15.2 The Parties have no authority to bind each other contractually, and hereby indemnify each other for any actions or applications, including all costs that arise in this regard.

Signed at on the day of 2014

WITNESSES

1. _____ for and on behalf of the Department of Transport

2. _____ _____

Name

TITLE

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Signed at on the day of 2014

WITNESSES

1. _____ for and on behalf of the Department of Environmental Affairs

2. _____ _____

Name

TITLE

Signed at on the day of 2014

WITNESSES

1. _____ for and on behalf of the Transnet National Ports Authority

2. _____ _____

Name

TITLE

Signed at on the day of 2014

WITNESSES

1. _____ for and on behalf of the South African Maritime Safety Authority

2. _____ _____

Name

TITLE

Signed at on the day of 2014

WITNESSES

1. _____ for and on behalf of the City of Cape Town

2. _____ _____

Name

TITLE

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DRM PLAN APPENDIX 1 **- MAIN ROLE-PLAYERS' CONTACT NUMBERS**

Name of Organisation	24-Hour Communications / Standby Personnel Contact Tel. Numbers	Contact No. for Emergency Planning queries only!!
Maritime Rescue Co-ordination Centre (MRCC) - Tygerberg	021 938 3300	*Jared Blows* - 021 938 3321 / *071 608 8621*
SAMSA	021 421 6170 (O) / 021 938 3300 (via MRCC)	*Capt. Gustav Louw* - 021 421 6075 (O) / 071 608 8579
TNPA Port of Cape Town - Harbour Master	021 449 3500 / 021 449 5752 (O) Other Port Control Contact Numbers: 021 449 2805 / 021 449 3666 / 021 449 3339	*Capt. Sabelo Mdlalose* - 021 449 5762 (O) / 083 318 0298 *Capt. Yael Wearley* - 073 600 0809 *Nazier Cassiem* - 021 449 3182 (O)
National Department of Transport (DoT)	-	DoT CT Regional Office = 021 465-7260 / *Mr Molakane* - 082 059 0033
National Department of Environmental Affairs (DEA) – Oceans & Coasts	-	*Dr Yazeed Peterson 021 819 2450 / 0835303127Feroza Albertus* - 021 819 2457 (O) / 072 1736 234
National Sea Rescue Institute (NSRI)	NSRI callout is via **TNPA Port of Cape Town's Harbour Master = 021 449 3500** (refer *APPENDIX 2* for individual NSRI Station details)	*Brad Geyser* - 082 372 8792 *Andy Connell* – 083 678 0072
CoCT Disaster Risk Management Centre - DOC	**Disaster Operations Centre (DOC) =** 080 911 4357 (HELP) / 021 597 6000	*Chris Konings (Planning)* - 084 711 7756 *Wilfred Solomons-Johannes (Head: DOC)* - 084 711 7709 *Mark Pluke (Area West)* - 084 711 7721
107 Public Emergency Communications Centre (PECC)	107 (Landlines only) / 021 480 7700 (from Cellphones)	Head of Operations - *Jaco Groenewald* = 021 487 2745 / 084 220 0072 *Estelle le Keur* = 021 480 7741 / 074 1335463
CoCT Fire & Rescue Service	**Goodwood Dispatch** = 021 590 1900 / 10	*Clinton Manuel – 071 687 8721* *Michael Abrahams – 084 225 1955* *CFO* = 021 590 1738 / 084 220 0214
SAPS – Sea Border Unit / Diving & Water Policing Unit / VisPol	10111	*Hubert Jack* – 079 506 8870 Col. Mark September – 082 567 2251 *Capt. White* – 082 576 2890 Lt Col. Dulozoni – 082 760 6001 Diving Unit = *Capt. PJ van der Merwe* – 082 469 1838
South African Police Service (SAPS)	Emergency = 10111 / 021 506 2018 Prov Ops Room = 021 466 0011 / 15 & 021 466 0025 / 27	*Col Olivier:* 082 7787 320 *Col Hugo:* 021 417 7109 / 082 469 1858 *Capt Venter:* 021 417 7226 / 082 444 4017
South African National Defence Force (SANDF) - J Tac HQ. Western Cape (for SA Navy and SAAF)	J Tac HQ W. Cape Ops Room = 021 787 2354 / 021 787 2222 *OC J Tac HQ WC: Col B. Mkula* = 021 787 2282 Cell - 082 720 5060 *SO1 Ops: Lt Col A. Lotriet* = 021 787 2380 Cell - 083 3268 756 *SO2 Ops Med: Maj M. Trauernicht* = 021 787 2336 Cell - 084 645 5340	SO2 Ops Med: *Maj M. Trauernicht* = 021 787 2336 / 021 787 2359 / 084 645 5340 SO1 Ops: *Lt. Col. A. Lotriet* = 021 787 2320 / 083 326 8756 SA Navy = *Capt. Mkhwanazi - 083 633 3169*
CoCT Law Enforcement & Security Services (incl. marine and beach law enforcement)	086 076 5423	Chief: Law Enf & Sec. Serv: R Wiltshire = 082 599 8884 *Area Mgr-North:* *J* van Schalkwyk = 084 220 0135 Asst Chief- West: *G Greeve* = 082 661 8434 Asst Chief-South: *L Wentzel* = 083 592 8883 Asst Chief-East: *G Crowster* = 083 525 0463 Asst Chief-RRU: *A Joseph* = 071 202 7751
CoCT Environmental Resource Management Department (ERMD), incl. marine environmental compliance	*Arne Purves* – P.O. Environmental Compliance = 021 713 0510 / 082 940 8937 *Head: Environmental Policy & Strategy* – Gregg Oelofse=021 487 2238 / 083 940 8143	*Arne Purves* – P.O. Environmental Compliance = 021 713 0510 / 082 940 8937 *Head: Environmental Policy & Strategy* – Gregg Oelofse = 021 487 2238 / 083 940 8143
WCG Dept. of Health - Emergency Medical Services (EMS)	10177 / 021 937 0300	*Dr Wayne Smith* = 082 991 0760 *Neville van Rensburg* = 021 948 9908 / 083 231 1535

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Name of Organisation	24-Hour Communications / Standby Personnel Contact Tel. Numbers	Contact No. for Emergency Planning queries only!!
WCG Dept. of Health - Forensic Pathology Services	Mr Kevin Jones: Deputy Director : PGWC Forensic Pathology Service = 083 446 0859 (24 Hrs) **or** via EMS Control = 021 937 0500 , as required by Situation	021 938 6796 021 448 4456 021 931 9142
CoCT Metropolitan Police Department (MPD)	086 076 5423 / 021 812 4492	Chief: *Wayne le Roux* = 021 427 5160
CoCT Traffic Services	086 076 5423 / 021 812 4580	*Brian Schippers* = 021 918 2572 / 084 220 0136
CoCT Communication	*Media Liaison Officer :* Jan Kruger = 021 400 1292 / 084 300 0630	*Media Liaison Officer:* Jan Kruger = 021 400 1292 / 084 300 0630
CoCT Specialised Technical Services - - Fleet & Mechanical Workshop - Radio Infrastructure	Quintin Dean = 084 808 0194 Via the **TOC =** 086 010 3054 Derek Alexander = 021 957 4703 / 082 799 8478	*Snr Sup – Operations, Workshop –* Quintin Dean = 021 400 6051 / 021 511 0480 / 084 808 0194 *Head: Radio Infrastructure –* Derek Alexander = 021 957 4703 / 082 799 8478
WCG Disaster Management Centre - provincial co-ordination, for the WC DMC JOC activation and links to the NDMC, if required	083 577 1100 (24 hrs Duty phone) or Lavenia Nicholson = 021 937 0813 / 083 277 4221 Jackie Pandaram = 021 937 0806 / 083 440 9698	*Lavenia Nicholson* = 021 937 0813 / 083 277 4221 *Jackie Pandaram* = 021 937 0806 / 083 440 9698 *Colin Deiner* = 021 937 0808 / 082 550 6770 *Schalk Carstens* = 083 273 1372
SANParks (Table Mountain National Park)	Regional Head Office (Westlake) - - 021 780 9100 (O) Control - Emergency No . = 0861 106 417 / 021 946 6414 / 5	*Paddy Gordon* = 021 701 8692 / 082 888 0353
Cape Nature	Tony Marshall = 082 740 7787 Peter Viljoen = 082 740 7736	Tony Marshall = 082 740 7787 Peter Viljoen = 082 740 7736
South African Weather Service	CT Weather Office = 082 233 9900	*Forecaster:* Carlton Fillis = 021 934 0836 *Forecaster:* Johan Stander = 021 934 0450 /084 264 4765
Eskom – Koeberg Nuclear Power Station	021 950 6111	Gary Thomson = 021 950 6111
Robben Island Museum (RIM)	021 409 5100	Frikkie Nel = 021 411 1921 / 076 903 3374
Robben Island – Nelson Mandela Gateway (Ferry) Office – Clock Tower, V & A Waterfront	021 413 4200 (office) Information: 021 413 4220 / 021 413 4215(o)	-
National Department of Agriculture, Forestry & Fisheries (DAFF)	-	*Forestry & Natural Resources Management* – Dr N. Motete = 012 309 5718
National Department of Home Affairs (DHA)	-	Petro Snyders – 076 304 0848
Smit Amandla Marine (currently contracted for emergency towing vessels (ETVs), crisis management, incl. emergency response, fire-fighting, fuel removal & refloating & demolition of vessels, environmental protection & pollution prevention services)	021 507 5777	021 507 5777
Svitzer Africa (currently contracted for towage services) & Svitzer Salvage Africa (currently contracted for salvage services)	021 408 6710 (O) 24-hour No. = +31 (0)255 562 666	021 408 6710
AAL-SA Helicopters (currently contracted for Off-shore Shipping Logistics & Supplies)	021 934 9127	021 934 9127
SA Red Cross Society, Western Cape	021 797 5360 (office) *or* 079 887 3259 / 078 450 4303	-
Salvation Army (Western Cape Division)	021 425 2138 (office) *or* 083 304 9493	-
Mustadafin Foundation	021 633 0010 / 60 (office) *or* 084 572 2355 / 076 422 1668	-

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Name of Organisation	24-Hour Communications / Standby Personnel Contact Tel. Numbers	Contact No. for Emergency Planning queries only!!
HDI Support	021 511 4153 (office) *or* 082 935 3353 / 079 879 9977	-
HAMNET (Cape Town – Goodwood Centre)	Via **Disaster Operations Centre (DOC) =** 080 911 4357 (HELP) / 021 597 6000	Paul Van Spronsen = 083 302 3366
SPCA (Society for the Prevention of Cruelty to Animals), Cape of Good Hope region in Grassy Park	CoGH SPCA = 24-hours = 021 700 4158 / 9 / 083 326 1604	Brett Glasby - *Wildlife Unit Mgr, COGH SPCA* = 021 700 4158/9

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DRM PLAN APPENDIX 2

NSRI's OPERATIONAL STATIONS & RESOURCES FOR RESCUES IN THE SOUTH-WESTERN CAPE AREA

*** THE CAPE TOWN MUNICIPAL AREA STATIONS ARE HIGHLIGHTED IN *YELLOW* & THE STATIONS LOCATED IN ADJACENT MUNICIPALITIES HIGHLIGHTED IN *GREEN* ***

SASAR Area	NSRI Station		Page No.
	Location	No.	
Saldanha	Lambert's Bay, W. Cape	24A	1 - 2
	Mykonos, W. Cape	4	3 – 5
	Yzerfontein, W. Cape	34	6 – 7
Cape Town	Melkbosstrand	18	8 - 10
	Table Bay	3	11- 12
	Bakoven	2	13
	Hout Bay	8	14 - 16
	Kommetjie	26	17 - 19
	Simon's Town	10	20 – 21
	Strandfontein	26	22 – 24
	Gordon's Bay	9	25 – 27
	Hermanus	17	28 – 30
	Agulhas	30	31 – 32
	Air-Sea Rescue Unit	H*	33
	Titan Hi-Line Team	H*	34
Port Elizabeth	Witsand, W. Cape	33	35 – 37
	Still Bay, W. Cape	31	38 – 39
	Mossel Bay, W Cape	15	40 - 42

H* = Helicopter Unit

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N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Saldanha

NSRI REGION:	1	**LOCATION:**	32° 05.000′ S 018° 18.000′ E

STATION NAME:	Lambert's Bay	**CALLOUT NO.:**	082 922 4334 082 457 0402 084 670 8436

NSRI STN. NO.:	24A	**STATION CELL:**	082 922 4334

BOATHOUSE TEL:	027 432 1715	**STATION E-MAIL:**	ronselley@kingsley.co.za

RESCUE UNIT:	"Condor" - 9.8m Renato Levi mono hull - Twin 150hp outboards - 3 crew - Marine VHF, 29MHz - Radar, GPS

CALL SIGN:		**STN ID:**	RESCUE 24	**REG. NO.:**	DTS 554 B

RANGE-COASTAL:	70 nm	**RANGE-OFFSHORE:**	40 nm

OPERATIONAL AREA:	Northwards : Doring Bay Southwards : Elands Bay Note: The operational area is indicative only. As required, Rescue 24 will respond north and south of the above limits.

HOURS OF OPERATION:	24 hours

ENDURANCE:	24 hours

TIME TO LAUNCH FROM CALLOUT:	15 minutes

HELICOPTER CO-OPERATION:	

SHORE SUPPORT VEHICLE:	Nil

STATION COMMANDER:	Ron Selley 082 922 4334

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	January 2010

COCT DRM Plan - T3

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Saldanha

NSRI REGION:	1	**LOCATION:**	32° 05.000′ S 018° 18.000′ E

STATION NAME:	Lambert's Bay	**CALLOUT NO.:**	082 922 4334 082 457 0402 084 670 8436

NSRI STN. NO.:	24A	**STATION CELL:**	082 922 4334

BOATHOUSE TEL:	027 432 1715	**STATION E-MAIL:**	ronselley@kingsley.co.za

RESCUE UNIT:	"Bynes" - West Coast Chukkie - Ford diesel engine - 3 crew - Marine VHF

CALL SIGN:		**STN ID:**	RESCUE 24 ALPHA	**REG. NO.:**	DTS 2400 D

RANGE-COASTAL:	15 nm	**RANGE-OFFSHORE:**	15 nm

OPERATIONAL AREA:	30nm radius from Lambert's Bay Note: The operational area is indicative only. As required, Rescue 24A will respond north and south of the above limits.

HOURS OF OPERATION:	24 hours

ENDURANCE:	12 hours

TIME TO LAUNCH FROM CALLOUT:	15 minutes

HELICOPTER CO-OPERATION:	

SHORE SUPPORT VEHICLE:	Nil

STATION COMMANDER:	Ron Selley 082 922 4334

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	January 2010

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Sea Rescue
NATIONAL SEA RESCUE INSTITUTE

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Saldanha

NSRI REGION:	1	**LOCATION:**	33° 02.842′ S 018° 02.388′ E

STATION NAME:	Mykonos	**CALLOUT NO.:**	022 714 1726 082 990 5966 083 561 1113

NSRI STN. NO.:	4	**STATION CELL:**	082 990 5966

BOATHOUSE TEL:	022 714 1858	**STATION E-MAIL:**	station4@searescue.org.za

RESCUE UNIT:	"Spirit of Freemasonry" - 9m Cape Craft monohull - Twin 200hp outboards - Minimum 4 crew, maximum 6 crew - Marine VHF, Metro VHF, 29MHz - Radar, GPS

CALL SIGN:	ZR 4515	**STN ID:**	RESCUE 4	**REG. NO.:**	DTC 3761 A

RANGE-COASTAL:	50 nm	**RANGE-OFFSHORE:**	40 nm

OPERATIONAL AREA:	Yzerfontein to Elands Bay .

HOURS OF OPERATION:	24 hours

ENDURANCE:	12 hours (rations carried)

TIME TO LAUNCH FROM CALLOUT:	Working hours : 30 minutes Other times : 30 minutes

HELICOPTER CO-OPERATION:	All types including long line transfers

SHORE SUPPORT VEHICLE:	Mitsubishi Colt

STATION COMMANDER:	Darius van Niekerk 083 561 1113

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	January 2010

GCT DRM Plan - T3

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Saldanha

NSRI REGION:	1	**LOCATION:**	33° 02.842′ S 018° 02.388′ E

STATION NAME:	Mykonos	**CALLOUT NO.:**	022 714 1726 082 990 5966 083 561 1113

NSRI STN. NO.:	4	**STATION CELL:**	082 990 5966

BOATHOUSE TEL:	022 714 1858	**STATION E-MAIL:**	station4@searescue.org.za

RESCUE UNIT:	"Gemini Rescue II" - 5.5m Gemini RIB - Twin 60hp outboards - 3 crew - Marine VHF - GPS

CALL SIGN:	ZR 2805	**STN ID:**	RESCUE 4 ALPHA	**REG. NO.:**	DTS 1618 C

RANGE-COASTAL:	20 nm	**RANGE-OFFSHORE:**	15 nm

OPERATIONAL AREA:	Yzerfontein to Elands Bay For rescues north of Jacobsbaai, the boat will be trailed and launched from a suitable safe site.

HOURS OF OPERATION:	24 hours

ENDURANCE:	4 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 30 minutes Other times : 30 minutes

HELICOPTER CO-OPERATION:	All types but NOT long line transfers

SHORE SUPPORT VEHICLE:	Mitsubishi Colt

STATION COMMANDER:	Darius van Niekerk 083 561 1113

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	January 2010

COCT DRM Plan - T3

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Saldanha

NSRI REGION:	1	**LOCATION:**	33° 02.842′ S 018° 02.388′ E

STATION NAME:	Mykonos	**CALLOUT NO.:**	022 714 1726 082 990 5966 083 561 1113

NSRI STN. NO.:	4	**STATION CELL:**	082 990 5966

BOATHOUSE TEL:	022 714 1858	**STATION E-MAIL:**	station4@searescue.org.za

RESCUE UNIT:	"Loved 1's 24" - 4.2m Gemini inflatable surf boat - Single 50hp outboard - 2 crew - Marine VHF

CALL SIGN:	Pending	**STN ID:**	RESCUE 4 BRAVO	**REG. NO.:**	DTS 3187 D

RANGE-COASTAL:	5 nm	**RANGE-OFFSHORE:**	1 nm

OPERATIONAL AREA:	Yzerfontein to Elands Bay For rescues beyond the coastal range, the boat will be trailed and launched from a suitable safe site.

HOURS OF OPERATION:	Daylight hours only

ENDURANCE:	3 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 30 minutes Other times : 30 minutes

HELICOPTER CO-OPERATION:	Small machines only

SHORE SUPPORT VEHICLE:	Mitsubishi Colt

STATION COMMANDER:	Darius van Niekerk 083 561 1113

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	January 2010

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Sea Rescue
NATIONAL SEA RESCUE INSTITUTE

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Saldanha

NSRI REGION:	1	LOCATION:	33° 20.760′ S 018° 08.990′ E

STATION NAME:	Yzerfontein	CALLOUT NO.:	022 714 1726 083 561 1113 082 990 5974

NSRI STN. NO.:	34	STATION CELL:	082 990 5974

BOATHOUSE TEL:		STATION E-MAIL:	station34@searescue.org.za

RESCUE UNIT:	"Rotary Onwards" - 7.3m Gemini RIB - Twin 115hp outboards - 4 crew - Marine VHF - Radar, GPS

CALL SIGN:	ZR 3742	STN ID:	RESCUE 34	REG. NO.:	DTC 8196 B

RANGE-COASTAL:	70 nm	RANGE-OFFSHORE:	40 nm

OPERATIONAL AREA:	Robben Island to Saldanha Bay Note: The operational area is indicative only. As required, Rescue 34 will respond north and south of the above limits, in co-operation with its flank stations: Station 4, Mykonos and Station 18, Melkbosstrand

HOURS OF OPERATION:	24 hours

ENDURANCE:	6 hours

TIME TO LAUNCH FROM CALLOUT:	20 minutes

HELICOPTER CO-OPERATION:	All types but NOT long line transfers

SHORE SUPPORT VEHICLE:	4 x 4 Toyota Hilux

STATION COMMANDER:	Darius van Niekerk 083 561 1113

AMENDMENT NO:	December 2011	PREV AMENDMENT	January 2010

COCT EOM Plan - T3

Sea Rescue
NATIONAL SEA RESCUE INSTITUTE

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Saldanha

NSRI REGION:	1	**LOCATION:**	33° 20.760′ S 018° 08.990′ E

STATION NAME:	Yzerfontein	**CALLOUT NO.:**	022 714 1726 083 561 1113 082 990 5974

NSRI STN. NO.:	34	**STATION CELL:**	082 990 5974

BOATHOUSE TEL:		**STATION E-MAIL:**	station34@searescue.org.za

RESCUE UNIT:	"Spirit of Iffley" - 4.2m Gemini inflatable surf boat - Single 50hp outboard - 3 crew - Marine VHF - GPS

CALL SIGN:	ZR 8418	**STN ID:**	RESCUE 34 A	**REG. NO.:**	DTS 2920 D

RANGE-COASTAL:	5 nm	**RANGE-OFFSHORE:**	1 nm

OPERATIONAL AREA:	Yzerfontein area

HOURS OF OPERATION:	Daylight hours only

ENDURANCE:	3 hours

TIME TO LAUNCH FROM CALLOUT:	20 minutes

HELICOPTER CO-OPERATION:	Small machines only

SHORE SUPPORT VEHICLE:	4 x 4 Toyota Hilux

STATION COMMANDER:	Darius van Niekerk 083 561 1113

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	January 2010

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N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	1	**LOCATION:**	33° 43.740′ S 018° 26.310′ E

STATION NAME:	Melkbosstrand	**CALLOUT NO.:**	021 449 3500 082 990 5958 082 575 6954

NSRI STN. NO.:	18	**STATION CELL:**	082 990 5958

BOATHOUSE TEL:	021 553 2146	**STATION E-MAIL:**	station18@searescue.org.za

RESCUE UNIT:	"Spirit of the Vines" - 6.5m Gemini RIB - Twin 90hp outboards - 4 crew - Marine VHF - Radar, GPS

CALL SIGN:	ZR 8533	**STN ID:**	RESCUE 18	**REG. NO.:**	DTC 3762 C

RANGE-COASTAL:	70 nm	**RANGE-OFFSHORE:**	40 nm

OPERATIONAL AREA:	Tableview to Yzerfontein

HOURS OF OPERATION:	24 hours

ENDURANCE:	4 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 20 minutes Other times : 15 minutes

HELICOPTER CO-OPERATION:	All types but NOT long line transfers

SHORE SUPPORT VEHICLE:	Mitsubishi Triton

STATION COMMANDER:	Rhine Barnes 082 990 5958

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	December 2010

COCT DRM Plan - T3

Sea Rescue
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N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	1	**LOCATION:**	33° 43.740′ S 018° 26.310′ E

STATION NAME:	Melkbosstrand	**CALLOUT NO.:**	021 449 3500 082 990 5958 082 575 6954

NSRI STN. NO.:	18	**STATION CELL:**	082 990 5958

BOATHOUSE TEL:	021 553 2146	**STATION E-MAIL:**	station18@searescue.org.za

RESCUE UNIT:	"Mens Health Rescuer" - 4.2m Zap-Cat inflatable surf boat - Single 50hp outboard - 2 crew - Marine VHF

CALL SIGN:	ZR 5150	**STN ID:**	RESCUE 18 ALPHA	**REG. NO.:**	DTC 3704 D

RANGE-COASTAL:	10 nm	**RANGE-OFFSHORE:**	5 nm

OPERATIONAL AREA:	Tableview to Yzerfontein For rescues north of Silverstroom Strand and south of Big Bay Beach, the boat may be trailed and launched from a suitable safe site.

HOURS OF OPERATION:	Daylight hours only

ENDURANCE:	3 hours

TIME TO LAUNCH FROM CALLOUT:	At Melkbos Slipway: Working hours : 20 minutes Other times : 15 minutes

HELICOPTER CO-OPERATION:	Small machines only

SHORE SUPPORT VEHICLE:	Mitsubishi Triton

STATION COMMANDER:	Rhine Barnes 082 990 5958

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	December 2010

CoCT D: M Plan - T3

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	1	**LOCATION:**	33° 43.740′ S 018° 26.310′ E

STATION NAME:	Melkbosstrand	**CALLOUT NO.:**	021 449 3500 082 990 5958 082 575 6954

NSRI STN. NO.:	18	**STATION CELL:**	082 990 5958

BOATHOUSE TEL:	021 553 2146	**STATION E-MAIL:**	station18@searescue.org.za

RESCUE UNIT:	"Discovery IV" - Rescue Runner (Jetski) - 140hp petrol inboard jet - 2 crew - Marine VHF

CALL SIGN:	Pending	**STN ID:**	RESCUE 18 CHARLIE	**REG. NO.:**	

RANGE-COASTAL:	5 nm	**RANGE-OFFSHORE:**	1 nm

OPERATIONAL AREA:	Melkbossstrand local area. Can be trailed to adjacent areas.

HOURS OF OPERATION:	Daylight hours only

ENDURANCE:	6 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 20 minutes Other times : 15 minutes

HELICOPTER CO-OPERATION:	Nil

SHORE SUPPORT VEHICLE:	Mitsubishi Triton

STATION COMMANDER:	Rhine Barnes 082 990 5958

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	December 2010

CCT DRM Plan - T3

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N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	1	**LOCATION:**	33° 54.550′ S 018° 25.417′ E

STATION NAME:	Table Bay	**CALLOUT NO.:**	021 449 3500 082 990 5963 083 409 9271

NSRI STN. NO.:	3	**STATION CELL:**	082 990 5963

BOATHOUSE TEL:	021 419 3517	**STATION E-MAIL:**	station3@searescue.org.za

RESCUE UNIT:	"Spirit of Vodacom" - 12m Rodman monohull - Twin Volvo 425hp diesel engines - 5 crew - Marine VHF, Marine HF, 29MHz - Radar, GPS, VHFDF

CALL SIGN:	ZR 7269	**STN ID:**	RESCUE 3	**REG. NO.:**	DTC 8097 A

RANGE-COASTAL:	150 nm	**RANGE-OFFSHORE:**	150 nm

OPERATIONAL AREA:	Dassen Island to Bakoven Note: The operational area is indicative only. As required, Rescue 3 will respond north and south of the above limits, in co-operation with its flank stations: Station 4, Saldanha and Station 8, Hout Bay.

HOURS OF OPERATION:	24 hours

ENDURANCE:	+24 hours - rations carried

TIME TO LAUNCH FROM CALLOUT:	Working hours 06h15 - 18h45 : 60 - 120 minutes depending on traffic conditions Other times : 30 - 50 minutes

HELICOPTER CO-OPERATION:	All types including long line transfers

SHORE SUPPORT VEHICLE:	Mitsubishi Triton

STATION COMMANDER:	Paula Leach 083 409 9271

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	December 2010

CoCT EMP Plan - T3

Sea Rescue
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N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	1	**LOCATION:**	33° 54.550′ S 018° 25.417′ E

STATION NAME:	Table Bay	**CALLOUT NO.:**	021 449 3500 082 990 5963 083 409 9271

NSRI STN. NO.:	3	**STATION CELL:**	082 990 5963

BOATHOUSE TEL:	021 419 3517	**STATION E-MAIL:**	station3@searescue.org.za

RESCUE UNIT:	"Rotary Endeavour" - 5.5m Gemini RIB - Twin 60hp outboards - 3 crew - Marine VHF - GPS

CALL SIGN:	ZR 5333	**STN ID:**	RESCUE 3 ALPHA	**REG. NO.:**	DTC 7015 C

RANGE-COASTAL:	20 nm	**RANGE-OFFSHORE:**	15 nm

OPERATIONAL AREA:	Bakoven to Dassen Island Can be trailed and launched from a suitable safe site.

HOURS OF OPERATION:	24 hours

ENDURANCE:	4 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours 06h15 - 18h45 : 60 - 120 minutes depending on traffic conditions Other times : 30 - 50 minutes

HELICOPTER CO-OPERATION:	All types but NOT long line transfers

SHORE SUPPORT VEHICLE:	Mitsubishi Triton

STATION COMMANDER:	Paula Leach 083 409 9271

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	December 2010

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SASAR AREA:	Cape Town

NSRI REGION:	1	**LOCATION:**	33° 57.635′ S 018° 22.382′ E

STATION NAME:	Bakoven	**CALLOUT NO.:**	021 449 3500 082 990 5962 082 491 1547

NSRI STN. NO.:	2	**STATION CELL:**	082 990 5962

BOATHOUSE TEL:	021 438 9710	**STATION E-MAIL:**	station2@searescue.org.za

RESCUE UNIT:	"Spirit of Rotary Table Bay" - 6m Mallard Swift 190WT ski boat - Twin 90hp outboards - 4 crew - Marine VHF - GPS

CALL SIGN:	ZR 4330	**STN ID:**	RESCUE 2	**REG. NO.:**	DTC 3684 B

RANGE-COASTAL:	45 nm	**RANGE-OFFSHORE:**	40 nm

OPERATIONAL AREA:	Llandudno to Robben Island Note: The operational area is indicative only. As required, Rescue 2 will respond north and south of the above limits, in co-operation with its flank stations: Station 3, Table Bay and Station 8, Hout Bay.

HOURS OF OPERATION:	24 hours

ENDURANCE:	6 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 20 minutes Other times : 10 minutes

HELICOPTER CO-OPERATION:	All types including long line transfers

SHORE SUPPORT VEHICLE:	Nil

STATION COMMANDER:	Mark Thompson 082 491 1547

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	January 2010

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N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	1	**LOCATION:**	34° 03.015′ S 018° 20.720′ E

STATION NAME:	Hout Bay	**CALLOUT NO.:**	021 449 3500 082 372 8792 071 678 0523

NSRI STN. NO.:	8	**STATION CELL:**	082 372 8792

BOATHOUSE TEL:	021 790 3170	**STATION E-MAIL:**	station8@searescue.org.za

RESCUE UNIT:	Brede class - "Nadine Gordimer - MTU" - 10m monohull - Twin MTU 400hp diesel engines - 5 crew - Marine VHF, Marine HF, Metro, 29 Mhz - Radar, GPS, VHFDF Commercial vessels who also offer their services (Area of operation : 10nm radius of Hout Bay): - Nauticat : can be used as a primary medical base because of her stability - Drumbeat

CALL SIGN:	ZR 6298	**STN ID:**	RESCUE 8	**REG. NO.:**	DTC 7068 A

RANGE-COASTAL:	120 nm	**RANGE-OFFSHORE:**	120 nm

OPERATIONAL AREA:	Cape Point to Bakoven Note: The operational area is indicative only. As required, Rescue 8 will respond north and south of the above limits, in co-operation with its flank stations: Station 3, Table Bay and Station 10, Simon's Town.

HOURS OF OPERATION:	24 hours
ENDURANCE:	+24 hours - rations carried
TIME TO LAUNCH FROM CALLOUT:	Working hours : 60 minutes Other times : 20 minutes
HELICOPTER CO-OPERATION:	All types including long line transfers
SHORE SUPPORT VEHICLE:	4 x 4 Colt
STATION COMMANDER:	Brad Geyser 082 372 8792

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	January 2010

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N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	1	**LOCATION:**	34° 03.015′ S 018° 20.720′ E

STATION NAME:	Hout Bay	**CALLOUT NO.:**	021 449 3500 082 372 8792 071 678 0523

NSRI STN. NO.:	8	**STATION CELL:**	082 372 8792

BOATHOUSE TEL:	021 790 3170	**STATION E-MAIL:**	station8@searescue.org.za

RESCUE UNIT:	"Albie Matthews" - 7.3m Gemini RIB - Twin 115hp outboards - 4 crew - Marine VHF - GPS

CALL SIGN:	ZR 7728	**STN ID:**	RESCUE 8 ALPHA	**REG. NO.:**	DTC 8176 B

RANGE-COASTAL:	70 nm	**RANGE-OFFSHORE:**	40 nm

OPERATIONAL AREA:	Cape Point to Bakoven Note: The operational area is indicative only. As required, Rescue 8 will respond north and south of the above limits, in co-operation with its flank stations: Station 3, Table Bay and Station 10, Simon's Town.

HOURS OF OPERATION:	24 hours

ENDURANCE:	6 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 60 minutes Other times : 15 minutes

HELICOPTER CO-OPERATION:	All types but NOT long line transfers

SHORE SUPPORT VEHICLE:	4 x 4 Colt

STATION COMMANDER:	Brad Geyser 082 372 8792

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	Dec-08

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N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	1	**LOCATION:**	34° 03.015′ S 018° 20.720′ E

STATION NAME:	Hout Bay	**CALLOUT NO.:**	021 449 3500 082 372 8792 071 678 0523

NSRI STN. NO.:	8	**STATION CELL:**	082 372 8792

BOATHOUSE TEL:	021 790 3170	**STATION E-MAIL:**	station8@searescue.org.za

RESCUE UNIT:	"Nedbank Rescuer" - 4.2m Gemini inflatable surf boat - Single 50hp outboard - 2 crew - Marine VHF (hand held)

CALL SIGN:	Pending	**STN ID:**	RESCUE 8 BRAVO	**REG. NO.:**	DTC 7098 E

RANGE-COASTAL:	5 nm	**RANGE-OFFSHORE:**	1 nm

OPERATIONAL AREA:	Hout Bay & Chapman's Bay

HOURS OF OPERATION:	Daylight hours only

ENDURANCE:	3 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 60 minutes Other times : 15 minutes

HELICOPTER CO-OPERATION:	Small machines only

SHORE SUPPORT VEHICLE:	4 x 4 Colt

STATION COMMANDER:	Brad Geyser 082 372 8792

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	January 2010

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N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	1	**LOCATION:**	34° 08.450′ S 018° 19.730′ E

STATION NAME:	Kommetjie	**CALLOUT NO.:**	021 449 3500 082 782 2001 082 990 5979

NSRI STN. NO.:	26	**STATION CELL:**	082 990 5979

BOATHOUSE TEL:	Nil	**STATION E-MAIL:**	station26@searescue.org.za

RESCUE UNIT:	"Spirit of Winelands" - 5.5m Gemini RIB - Twin 60hp outboards - 3 crew - Marine VHF - GPS

CALL SIGN:	ZR 7662	**STN ID:**	RESCUE 26	**REG. NO.:**	DTC 8116 C

RANGE-COASTAL:	20 nm	**RANGE-OFFSHORE:**	15 nm

OPERATIONAL AREA:	Chapman's Peak to Cape Point Can be trailed and launched from a suitable safe site.

HOURS OF OPERATION:	24 hours

ENDURANCE:	4 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 45 minutes Other times : 10 minutes

HELICOPTER CO-OPERATION:	All types but NOT long line transfers

SHORE SUPPORT VEHICLE:	4 x 4 Toyota

STATION COMMANDER:	Tom Coetzee 072 754 3792

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	January 2010

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N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	1	**LOCATION:**	34° 08.450′ S 018° 19.730′ E

STATION NAME:	Kommetjie	**CALLOUT NO.:**	021 449 3500 082 782 2001 082 990 5979

NSRI STN. NO.:	26	**STATION CELL:**	082 990 5979

BOATHOUSE TEL:	Nil	**STATION E-MAIL:**	station26@searescue.org.za

RESCUE UNIT:	"FNB Wavescapes" - 4.7m Gemini RIB - Single 60hp outboard - 3 crew - Marine VHF - GPS

CALL SIGN:	ZR 4586	**STN ID:**	RESCUE 26 ALPHA	**REG. NO.:**	DTC 8050 E

RANGE-COASTAL:	5 nm	**RANGE-OFFSHORE:**	1 nm

OPERATIONAL AREA:	Chapman's Peak to Cape Point For rescues outside the coastal range, can be trailed and launched from a suitable safe site.

HOURS OF OPERATION:	Daylight hours only

ENDURANCE:	3 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 45 minutes Other times : 10 minutes

HELICOPTER CO-OPERATION:	Small machines only

SHORE SUPPORT VEHICLE:	4 x 4 Toyota

STATION COMMANDER:	Tom Coetzee 072 754 3792

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	December 2010

COCT DRM Plan - T3

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	1	**LOCATION:**	34° 08.450′ S 018° 19.730′ E

STATION NAME:	Kommetjie	**CALLOUT NO.:**	021 449 3500 082 782 2001 082 990 5979

NSRI STN. NO.:	26	**STATION CELL:**	082 990 5979

BOATHOUSE TEL:	Nil	**STATION E-MAIL:**	station26@searescue.org.za

RESCUE UNIT:	"Discovery 7" - Rescue Runner (Jetski) - 140hp petrol inboard jet - 2 crew - Marine VHF

CALL SIGN:	ZR 8752	**STN ID:**	RESCUE 26 BRAVO	**REG. NO.:**	DTC 8358 E

RANGE-COASTAL:	5 nm	**RANGE-OFFSHORE:**	1 nm

OPERATIONAL AREA:	Local Kommetjie area.

HOURS OF OPERATION:	Daylight hours only

ENDURANCE:	6 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 45 minutes Other times : 10 minutes

HELICOPTER CO-OPERATION:	Nil

SHORE SUPPORT VEHICLE:	4 x 4 Toyota

STATION COMMANDER:	Tom Coetzee 072 754 3792

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	December 2010

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SASAR AREA:	Cape Town

NSRI REGION:	2	**LOCATION:**	34° 11.537′ S 018° 26.062′ E

STATION NAME:	Simon's Town	**CALLOUT NO.:**	021 449 3500 082 990 5965 082 851 5062

NSRI STN. NO.:	10	**STATION CELL:**	082 990 5965

BOATHOUSE TEL:	021 786 1624	**STATION E-MAIL:**	station10@searescue.org.za

RESCUE UNIT:	Brede class - "Spirit of Safmarine III" - 10m monohull - Twin MTU 400hp diesel engines - 5 crew - Marine VHF. Marine HF, 29MHz - Radar, GPS, VHFDF

CALL SIGN:	ZR 6247	**STN ID:**	RESCUE 10	**REG. NO.:**	DTC 7069 B

RANGE-COASTAL:	120 nm	**RANGE-OFFSHORE:**	120 nm

OPERATIONAL AREA:	West half of False Bay (east half covered by Station 9, Gordons Bay) Note: The operational area is indicative only. As required, Rescue 10 will respond east and south of the above limits, in co-operation with its flank stations: Station 16, Strandfontein, Station 26, Kommetjie and Station 8, Hout Bay.

HOURS OF OPERATION:	24 hours

ENDURANCE:	+24 hours - rations carried

TIME TO LAUNCH FROM CALLOUT:	Working hours : 25 minutes Other times : 15 minutes

HELICOPTER CO-OPERATION:	All types including long line transfers

SHORE SUPPORT VEHICLE:	4 x 4 Colt

STATION COMMANDER:	Darren Zimmerman 084 402 7736

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	January 2010

CCT Ops Plan - T3

Sea Rescue
NATIONAL SEA RESCUE INSTITUTE

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	2	**LOCATION:**	34° 11.537′ S 018° 26.062′ E

STATION NAME:	Simon's Town	**CALLOUT NO.:**	021 449 3500 082 990 5965 082 851 5062

NSRI STN. NO.:	10	**STATION CELL:**	082 990 5965

BOATHOUSE TEL:	021 786 1624	**STATION E-MAIL:**	station10@searescue.org.za

RESCUE UNIT:	"Eddie Beaumont II" - 5.5m Gemini RIB - Twin 60hp outboards - 3 crew - Marine VHF - GPS

CALL SIGN:	ZR 2804	**STN ID:**	RESCUE 10 ALPHA	**REG. NO.:**	DTC3760 C

RANGE-COASTAL:	20 nm	**RANGE-OFFSHORE:**	15 nm

OPERATIONAL AREA:	Muizenberg to Cape Point Can be trailed and launched from a suitable safe site.

HOURS OF OPERATION:	24 hours

ENDURANCE:	4 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 25 minutes Other times : 15 minutes

HELICOPTER CO-OPERATION:	All types but NOT long line transfers

SHORE SUPPORT VEHICLE:	4 x 4 Colt

STATION COMMANDER:	Darren Zimmerman 084 402 7736

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	December 2010

GCT DRM Plan - T3

Sea Rescue
NATIONAL SEA RESCUE INSTITUTE

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	2	**LOCATION:**	34° 05.263′ S 018° 33.498′ E

STATION NAME:	Strandfontein	**CALLOUT NO.:**	021 449 3500 082 990 6753 071 594 5371

NSRI STN. NO.:	16	**STATION CELL:**	082 990 6753

BOATHOUSE TEL:	021 393 2321	**STATION E-MAIL:**	station16@searescue.org.za

RESCUE UNIT:	"Spirit of Grand West CSI" - 5.5m Gemini RIB - Twin 60hp outboards - 3 crew - Marine VHF - GPS

CALL SIGN:	ZR 4793	**STN ID:**	RESCUE 16	**REG. NO.:**	DTC 8042 C

RANGE-COASTAL:	20 nm	**RANGE-OFFSHORE:**	15 nm

OPERATIONAL AREA:	Strand to Muizenberg Note: The operational area is indicative only. As required, Rescue 16 will respond east and west of the above limits, in co-operation with its flank stations: Station 10, Simon's Town, and Station 9, Gordon's Bay. Can be trailed and launched from a suitable safe site.

HOURS OF OPERATION:	24 hours

ENDURANCE:	4 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 20 minutes Other times : 15 minutes

HELICOPTER CO-OPERATION:	All types but NOT long line transfers

SHORE SUPPORT VEHICLE:	4 x 4 Colt

STATION COMMANDER:	Mario Fredericks 082 990 6753

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	January 2010

CCT OPM Plan - T3

Sea Rescue
NATIONAL SEA RESCUE INSTITUTE

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	2	**LOCATION:**	34° 05.263′ S 018° 33.498′ E

STATION NAME:	Strandfontein	**CALLOUT NO.:**	021 449 3500 082 990 6753 071 594 5371

NSRI STN. NO.:	16	**STATION CELL:**	082 990 6753

BOATHOUSE TEL:	021 393 2321	**STATION E-MAIL:**	station16@searescue.org.za

RESCUE UNIT:	"I&J Rescuer III" - 4.7m Gemini Rigid Hull - Single 60hp outboard - 3 crew - Marine VHF

CALL SIGN:	ZR 8401	**STN ID:**	RESCUE 16 ALPHA	**REG. NO.:**	DTC 8213 E

RANGE-COASTAL:	5 nm	**RANGE-OFFSHORE:**	1 nm

OPERATIONAL AREA:	Strand to Muizenberg

HOURS OF OPERATION:	Daylight hours only

ENDURANCE:	3 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 20 minutes Other times : 15 minutes

HELICOPTER CO-OPERATION:	Small machines only

SHORE SUPPORT VEHICLE:	4 x 4 Colt

STATION COMMANDER:	Mario Fredericks 082 990 6753

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	December 2010

CCT DRM Plan - T3

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	2	**LOCATION:**	34° 05.263′ S 018° 33.498′ E

STATION NAME:	Strandfontein	**CALLOUT NO.:**	021 449 3500 082 990 6753 071 594 5371

NSRI STN. NO.:	16	**STATION CELL:**	082 990 6753

BOATHOUSE TEL:	021 393 2321	**STATION E-MAIL:**	station16@searescue.org.za

RESCUE UNIT:	"Discovery III" - Rescue Runner (Jetski) - 140hp petrol inboard jet - 2 crew - Marine VHF

CALL SIGN:	Pending	**STN ID:**	RESCUE 16 BRAVO	**REG. NO.:**	DTC 8202 E

RANGE-COASTAL:	5 nm	**RANGE-OFFSHORE:**	1 nm

OPERATIONAL AREA:	Strand to Muizenberg.

HOURS OF OPERATION:	Daylight hours only

ENDURANCE:	6 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 20 minutes Other times : 15 minutes

HELICOPTER CO-OPERATION:	Nil

SHORE SUPPORT VEHICLE:	4 x 4 Colt

STATION COMMANDER:	Mario Fredericks 082 990 6753

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	January 2010

CCT DRM Plan - T3

Sea Rescue
NATIONAL SEA RESCUE INSTITUTE

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	2	**LOCATION:**	34° 09.861′ S 018° 51.584′ E

STATION NAME:	Gordon's Bay	**CALLOUT NO.:**	021 449 3500 083 625 0481 083 275 2853

NSRI STN. NO.:	9	**STATION CELL:**	083 625 0481

BOATHOUSE TEL:	021 856 1992	**STATION E-MAIL:**	station9@searescue.org.za

RESCUE UNIT:	Phoenix class - "Jack Riley" - 14m monohull - Twin 600hp diesel engines - 5 crew - Marine VHF. Marine HF, 29MHz - Radar. GPS, VHFDF

CALL SIGN:	ZR 8630	**STN ID:**	RESCUE 9	**REG. NO.:**	DTC 8353 A

RANGE-COASTAL:	120 nm	**RANGE-OFFSHORE:**	120 nm

OPERATIONAL AREA:	East half of False Bay (west half covered by Station 10, Simon's Town) Note: The operational area is indicative only. As required, Rescue 9 will respond west and south of the above limits, in co-operation with its flank stations: Station 16, Strandfontein, Station 10, Simon's Town and Station 17, Hermanus.

HOURS OF OPERATION:	24 hours

ENDURANCE:	+24 hours - rations carried

TIME TO LAUNCH FROM CALLOUT:	Working hours : 20 minutes Other times : 20 minutes

HELICOPTER CO-OPERATION:	All types including long line transfers

SHORE SUPPORT VEHICLE:	Mazda Drifter

STATION COMMANDER:	Nigel Pepperell 083 625 0481

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	December 2010

CCT OPM Plan - T3

Sea Rescue
NATIONAL SEA RESCUE INSTITUTE

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	2	**LOCATION:**	34° 09.861′ S 018° 51.584′ E

STATION NAME:	Gordon's Bay	**CALLOUT NO.:**	021 449 3500 083 625 0481 083 275 2853

NSRI STN. NO.:	9	**STATION CELL:**	083 625 0481

BOATHOUSE TEL:	021 856 1992	**STATION E-MAIL:**	station9@searescue.org.za

RESCUE UNIT:	"Spirit of Surf Ski" - 5.5m Gemini RIB - Twin 60hp outboards - 3 crew - Marine VHF - GPS

CALL SIGN:	ZR 8768	**STN ID:**	RESCUE 9 ALPHA	**REG. NO.:**	DTC 8313 C

RANGE-COASTAL:	20 nm	**RANGE-OFFSHORE:**	15 nm

OPERATIONAL AREA:	East half of False Bay (west half covered by Station 10, Simon's Town) Note: The operational area is indicative only. As required and within its range limitations, Rescue 9A will respond west and south of the above limits, in co-operation with its flank stations: Station 16, Strandfontein and Station 10, Simon's Town.

HOURS OF OPERATION:	24 hours

ENDURANCE:	4 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 20 minutes Other times : 20 minutes

HELICOPTER CO-OPERATION:	All types including long line transfers

SHORE SUPPORT VEHICLE:	Mazda Drifter

STATION COMMANDER:	Nigel Pepperell 083 625 0481

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	December 2010

CCT Row Plan - T3

Sea Rescue
NATIONAL SEA RESCUE INSTITUTE

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	2	**LOCATION:**	34° 09.861′ S 018° 51.584′ E

STATION NAME:	Gordon's Bay	**CALLOUT NO.:**	021 449 3500 083 625 0481 083 275 2853

NSRI STN. NO.:	9	**STATION CELL:**	083 625 0481

BOATHOUSE TEL:	021 856 1992	**STATION E-MAIL:**	station9@searescue.org.za

RESCUE UNIT:	"Inge" - Rescue Runner (Jetski) - 140hp petrol inboard jet - 2 crew - Marine VHF

CALL SIGN:	Pending	**STN ID:**	RESCUE 9 BRAVO	**REG. NO.:**	DTM 1808 E

RANGE-COASTAL:	5 nm	**RANGE-OFFSHORE:**	1nm

OPERATIONAL AREA:	Gordon's Bay local area.

HOURS OF OPERATION:	Daylight hours only

ENDURANCE:	6 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 20 minutes Other times : 20 minutes

HELICOPTER CO-OPERATION:	Nil

SHORE SUPPORT VEHICLE:	Mazda Drifter

STATION COMMANDER:	Nigel Pepperell 083 625 0481

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	December 2010

CCT DRM Plan - T3

Sea Rescue
NATIONAL SEA RESCUE INSTITUTE

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	2	**LOCATION:**	34° 26.005′ S 019° 13.509′ E

STATION NAME:	Hermanus	**CALLOUT NO.:**	021 449 3500 082 568 1829 082 772 2984

NSRI STN. NO.:	17	**STATION CELL:**	082 568 1829

BOATHOUSE TEL:	028 312 3180	**STATION E-MAIL:**	station17@searescue.org.za

RESCUE UNIT:	Brede class - "South Star" - 10m monohull - Twin 203hp diesel engines - 5 crew - Marine VHF, Marine HF - Radar, GPS, VHFDF

CALL SIGN:	ZR 5709	**STN ID:**	RESCUE 17	**REG. NO.:**	DTC 2521 A

RANGE-COASTAL:	50 nm	**RANGE-OFFSHORE:**	50 nm

OPERATIONAL AREA:	Cape Hangklip to Cape Agulhas Note: The operational area is indicative only. As required, Rescue 17 will respond west and east of the above limits, in co-operation with its flank stations: Station 9, Gordon's Bay and Station 30, Agulhas.

HOURS OF OPERATION:	24 hours

ENDURANCE:	±12 hours depending on speed and conditions. Rations carried.

TIME TO LAUNCH FROM CALLOUT:	Working hours : 20 minutes Other times : 15 minutes

HELICOPTER CO-OPERATION:	All types including long line transfers

SHORE SUPPORT VEHICLE:	4 x 4 Isusu

STATION COMMANDER:	Henk Henn 082 568 1829

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	January 2010

CCT EPM Plan - T3

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	2	**LOCATION:**	34° 26.005′ S 019° 13.509′ E

STATION NAME:	Hermanus	**CALLOUT NO.:**	021 449 3500 082 568 1829 082 772 2984

NSRI STN. NO.:	17	**STATION CELL:**	082 568 1829

BOATHOUSE TEL:	028 312 3180	**STATION E-MAIL:**	station17@searescue.org.za

RESCUE UNIT:	"Hunter's Gold Rescuer" - 5.5m Gemini RIB - Twin 60 hp outboards - 3 crew - Marine VHF - GPS

CALL SIGN:	ZR 8902	**STN ID:**	RESCUE 17 ALPHA	**REG. NO.:**	DTC 2520 C

RANGE-COASTAL:	20 nm	**RANGE-OFFSHORE:**	15 nm

OPERATIONAL AREA:	Cape Hangklip to Danger Point Can be trailed and launched from a suitable safe site.

HOURS OF OPERATION:	24 hours

ENDURANCE:	4 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 20 minutes Other times : 15 minutes

HELICOPTER CO-OPERATION:	All types but NOT long line transfers

SHORE SUPPORT VEHICLE:	4 x 4 Isusu

STATION COMMANDER:	Henk Henn 082 568 1829

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	December 2010

GCT DRM Plan - T3

Sea Rescue
NATIONAL SEA RESCUE INSTITUTE

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	2	**LOCATION:**	34° 26.005′ S 019° 13.509′ E

STATION NAME:	Hermanus	**CALLOUT NO.:**	021 449 3500 082 568 1829 082 772 2984

NSRI STN. NO.:	17	**STATION CELL:**	082 568 1829

BOATHOUSE TEL:	028 312 3180	**STATION E-MAIL:**	station17@searescue.org.za

RESCUE UNIT:	"Le Jenmar II" - 4.2m Gemini inflatable surf boat - Single 50hp outboard - 2 crew - Marine VHF (hand held)

CALL SIGN:	Pending	**STN ID:**	RESCUE 17 BRAVO	**REG. NO.:**	DTC 8372 E

RANGE-COASTAL:	5 nm	**RANGE-OFFSHORE:**	1 nm

OPERATIONAL AREA:	Walker Bay Can be trailed and launched from a suitable safe site.

HOURS OF OPERATION:	Daylight hours only

ENDURANCE:	3 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 20 minutes Other times : 15 minutes

HELICOPTER CO-OPERATION:	Small machines only

SHORE SUPPORT VEHICLE:	4 x 4 Isusu

STATION COMMANDER:	Henk Henn 082 568 1829

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	December 2010

COCT DRM Plan - T3

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	2	**LOCATION:**	34° 47.914′ S 020° 03.566′ E

STATION NAME:	Agulhas	**CALLOUT NO.:**	028 435 7777 082 990 5952

NSRI STN. NO.:	30	**STATION CELL:**	082 990 5952

BOATHOUSE TEL:	Nil	**STATION E-MAIL:**	'station30@searescue.org.za

RESCUE UNIT:	"Vodacom Rescuer VII" - 8.5m Gemini RIB - Twin 150hp outboards - 4 crew - Marine VHF - Radar, GPS

CALL SIGN:	ZR 7420	**STN ID:**	RESCUE 30	**REG. NO.:**	DTM 1918 B

RANGE-COASTAL:	95 nm	**RANGE-OFFSHORE:**	40 nm

OPERATIONAL AREA:	Cape Infanta - Quoin Point

HOURS OF OPERATION:	24 hours

ENDURANCE:	7 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 30 minutes Other times : 20 minutes

HELICOPTER CO-OPERATION:	All types but NOT long line transfers

SHORE SUPPORT VEHICLE:	Mitsubishi Colt

STATION COMMANDER:	Reinard Geldenhuys 083 273 8234

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	December 2010

CCT DRM Plan - T3

Sea Rescue
NATIONAL SEA RESCUE INSTITUTE

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	2	**LOCATION:**	34° 47.914′ S 020° 03.566′ E

STATION NAME:	Agulhas	**CALLOUT NO.:**	028 435 7777 082 990 5952

NSRI STN. NO.:	30	**STATION CELL:**	082 990 5952

BOATHOUSE TEL:	Nil	**STATION E-MAIL:**	'station30@searescue.org.za

RESCUE UNIT:	"I&J Rescuer II" - 4.7m Gemini Rigid Hull - Single 60hp outboard - 3 crew - Marine VHF

CALL SIGN:	ZR 5416	**STN ID:**	RESCUE 30 ALPHA	**REG. NO.:**	DTC 3788 E

RANGE-COASTAL:	5 nm	**RANGE-OFFSHORE:**	1 nm

OPERATIONAL AREA:	Local Struisbaai area

HOURS OF OPERATION:	Daylight hours only

ENDURANCE:	3 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 30 minutes Other times : 20 minutes

HELICOPTER CO-OPERATION:	Small machines only

SHORE SUPPORT VEHICLE:	Mitsubishi Colt

STATION COMMANDER:	Reinard Geldenhuys 083 273 8234

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	December 2010

GOCT DRM Plan - T3

Sea Rescue
NATIONAL SEA RESCUE INSTITUTE

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	0	**LOCATION:**	22 SQDN AFB YSTERPLAAT

STATION NAME:	Air Sea Rescue Unit	**CALLOUT NO.:**	021 449 3500
NSRI STN. NO.:	ASRU	**STATION CELL:**	083 677 7946
BOATHOUSE TEL:	22 Sqdn (Base Ops) 021-508 6303	**STATION E-MAIL:**	statcomasru@gmail.com

RESCUE UNIT:	Oryx helicopter - Crew: 2 Pilots, Engineer, 2-4 NSRI Rescue Swimmers - Marine VHF - Aviation VHF - HF radio; Iridium satellite telephone - Cellphone

CALL SIGN:	Rescue + allocated number	**STN ID:**	#99	**REG. NO.:**	

RANGE-COASTAL:	As required	**RANGE-OFFSHORE:**	150 nm

OPERATIONAL AREA:	Alexander Bay (W Coast) to Plettenberg Bay (E coast) : Up to 150nm offshore
HOURS OF OPERATION:	24 hours depending on flying conditions
ENDURANCE:	3 hours
TIME TO LAUNCH FROM CALLOUT:	Working hours : 60 minutes Other times : 120 minutes
HELICOPTER CO-OPERATION:	- Searching for missing persons - Recovery of casualties from the water/ ships in distress - Swift water rescue i.e. flooding Limitations
SHORE SUPPORT VEHICLE:	Nil
STATION COMMANDER:	Andre Beuster 083 677 7946

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	December 2008

COCT DRM Plan - T3

Sea Rescue
NATIONAL SEA RESCUE INSTITUTE

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Cape Town

NSRI REGION:	0	**LOCATION:**	

STATION NAME:	Titan (Helitrans)Hi-Line Team	**CALLOUT NO.:**	021 449 3500 082 441 8448

NSRI STN. NO.:		**STATION CELL:**	082 441 8448

BOATHOUSE TEL:	021 421 5900	**STATION E-MAIL:**	

RESCUE UNIT:	Bell 212 helicopter with flotation - Crew: 2 x Pilots, Engineer, Metro paramedic, 1NSRI rescue swimmer - Marine VHF - Aviation VHF

CALL SIGN:		**STN ID:**	TITAN HELICOPTER	**REG. NO.:**	

RANGE-COASTAL:	100 nm	**RANGE-OFFSHORE:**	100 nm

OPERATIONAL AREA:	As required

HOURS OF OPERATION:	24 hours depending on flying conditions

ENDURANCE:	

TIME TO LAUNCH FROM CALLOUT:	Within 45 minutes

HELICOPTER CO-OPERATION:	- Medivac operations from and to ships * Advanced life support * Hi-line winching system * Full stretcher recovery - Recovery of casualties from ships in distress - Extended deep sea searches

SHORE SUPPORT VEHICLE:	

STATION COMMANDER:	Phil Ress 082 441 8448

AMENDMENT NO:	December 2010	**PREV AMENDMENT**	January 2010

CoCT DRM Plan - T3

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Southern Cape

NSRI REGION:	3	**LOCATION:**	34° 23.480′ S 020° 50.270′ E

STATION NAME:	Witsand	**CALLOUT NO.:**	082 990 5957 071 683 8162

NSRI STN. NO.:	33	**STATION CELL:**	082 990 5957

BOATHOUSE TEL:		**STATION E-MAIL:**	station33@searescue.org.za

RESCUE UNIT:	"Queenie Paine" - 5.5m Gemini RIB - Twin 60hp outboards - 3 crew - Marine VHF - GPS

CALL SIGN:	Pending	**STN ID:**	RESCUE 33	**REG. NO.:**	DTC 7076 B

RANGE-COASTAL:	20 nm	**RANGE-OFFSHORE:**	15 nm

OPERATIONAL AREA:	Cape Infanta area & Breede River

HOURS OF OPERATION:	24 hours

ENDURANCE:	4 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 15 minutes Other times : 15 minutes

HELICOPTER CO-OPERATION:	Small machines only

SHORE SUPPORT VEHICLE:	4 x 4 Colt

STATION COMMANDER:	Attie Gunter 071-683 8162

AMENDMENT NO:	December 2010	**PREV AMENDMENT**	January 2010

COCT DRM Plan - T3

Sea Rescue
NATIONAL SEA RESCUE INSTITUTE

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Southern Cape

NSRI REGION:	3	**LOCATION:**	34° 23.480′ S 020° 50.270′ E

STATION NAME:	Witsand	**CALLOUT NO.:**	082 990 5957 071 683 8162

NSRI STN. NO.:	33	**STATION CELL:**	082 990 5957

BOATHOUSE TEL:		**STATION E-MAIL:**	station33@searescue.org.za

RESCUE UNIT:	"Falcon Rescuer" - 4.5m Falcon inflatable surf boat - Single 40hp outboard - 2 crew - Marine VHF (hand held)

CALL SIGN:	Pending	**STN ID:**	RESCUE 33 ALPHA	**REG. NO.:**	DTM 1825 E

RANGE-COASTAL:	5 nm	**RANGE-OFFSHORE:**	1 nm

OPERATIONAL AREA:	Brede River / Witsand area

HOURS OF OPERATION:	Daylight hours only

ENDURANCE:	3 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 15 minutes Other times : 15 minutes

HELICOPTER CO-OPERATION:	Small machines only

SHORE SUPPORT VEHICLE:	4 x4 Colt

STATION COMMANDER:	Attie Gunter 071-683 8162

AMENDMENT NO:	December 2010	**PREV AMENDMENT**	January 2010

GCT DRM Plan - T3

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Southern Cape

NSRI REGION:	3	**LOCATION:**	34° 23.480′ S 020° 50.270′ E

STATION NAME:	Witsand	**CALLOUT NO.:**	082 990 5957 071 683 8162

NSRI STN. NO.:	33	**STATION CELL:**	082 990 5957

BOATHOUSE TEL:		**STATION E-MAIL:**	station33@searescue.org.za

RESCUE UNIT:	"Discovery 9" - Rescue Runner (Jetski) - 140hp petrol inboard jet - 2 crew - Marine VHF

CALL SIGN:	ZR 8760	**STN ID:**	RESCUE 33 BRAVO	**REG. NO.:**	DTM 2145

RANGE-COASTAL:	5 nm	**RANGE-OFFSHORE:**	1 nm

OPERATIONAL AREA:	Local Witsand area.

HOURS OF OPERATION:	Daylight hours only

ENDURANCE:	6 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 15 minutes Other times : 15 minutes

HELICOPTER CO-OPERATION:	Nil

SHORE SUPPORT VEHICLE:	4 x 4 Colt

STATION COMMANDER:	Attie Gunter 071-683 8162

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	December 2010

GCT DRM Plan - T3

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Southern Cape

NSRI REGION:	3	**LOCATION:**	34° 23.144′ S 021° 25.435′ E

STATION NAME:	Still Bay	**CALLOUT NO.:**	082 990 5978 028 754 1501 082 855 9460

NSRI STN. NO.:	31	**STATION CELL:**	082 990 5978

BOATHOUSE TEL:	028 754 2324	**STATION E-MAIL:**	station31@searescue.org.za

RESCUE UNIT:	"Spirit of St Francis" - 7.3m Gemini RIB - Twin 115hp outboards - 4 crew - Marine VHF, 29MHz - GPS

CALL SIGN:	ZR 5707	**STN ID:**	RESCUE 31	**REG. NO.:**	DTP 889 B

RANGE-COASTAL:	70 nm	**RANGE-OFFSHORE:**	40 nm

OPERATIONAL AREA:	Gouritz River mouth to Witsand Note : For rescues west of Cape Barracouta, the boat may be trailed and launched at the nearest safe launching site.

HOURS OF OPERATION:	24 hours

ENDURANCE:	6 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 15 minutes Other times : 15 minutes

HELICOPTER CO-OPERATION:	All types but NOT long line transfers

SHORE SUPPORT VEHICLE:	Mitsubishi Colt

STATION COMMANDER:	Enrico Menezies 082 855 9460

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	December 2010

COCT DRM Plan - T3

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Southern Cape

NSRI REGION:	3	**LOCATION:**	34° 23.144′ S 021° 25.435′ E

STATION NAME:	Still Bay	**CALLOUT NO.:**	082 990 5978 028 754 1501 082 855 9460

NSRI STN. NO.:	31	**STATION CELL:**	082 990 5978

BOATHOUSE TEL:	028 754 2324	**STATION E-MAIL:**	station31@searescue.org.za

RESCUE UNIT:	"Colorpress Two" - 4.2m Gemini inflatable surf boat - Single 40hp outboard - 2 crew - Marine VHF

CALL SIGN:	ZR 7386	**STN ID:**	RESCUE 31 ALPHA	**REG. NO.:**	DTM 3073 E

RANGE-COASTAL:	5 nm	**RANGE-OFFSHORE:**	1 nm

OPERATIONAL AREA:	Local area Can be trailed and launched from a suitable safe site.

HOURS OF OPERATION:	Daylight hours only

ENDURANCE:	3 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 15 minutes Other times : 15 minutes

HELICOPTER CO-OPERATION:	Small machines only

SHORE SUPPORT VEHICLE:	Mitsubishi Colt

STATION COMMANDER:	Enrico Menezies 082 855 9460

AMENDMENT NO:	December 2011	**PREV AMENDMENT**	December 2010

COCT DRM Plan - T3

Sea Rescue
NATIONAL SEA RESCUE INSTITUTE

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Southern Cape

NSRI REGION:	3	**LOCATION:**	34° 10.835′ S 022° 08.928′ E

STATION NAME:	Mossel Bay	**CALLOUT NO.:**	082 990 5954 044 604 6271 082 658 6242

NSRI STN. NO.:	15	**STATION CELL:**	082 990 5954

BOATHOUSE TEL:	044 690 4322	**STATION E-MAIL:**	station15@searescue.org.za

RESCUE UNIT:	'Vodacom Rescuer" - 9.0m Cape Craft monohull - Twin 200hp outboards - 4 crew - Marine VHF, 29MHz - Radar, GPS, Echo sounder

CALL SIGN:	ZR 5341	**STN ID:**	RESCUE 15	**REG. NO.:**	DTM 1807 B

RANGE-COASTAL:	50 nm	**RANGE-OFFSHORE:**	40 nm

OPERATIONAL AREA:	Gericke Point in the east to Gouritz River in the west. Note : The operational area is indicative only. As required, Rescue 15 will respond east and west of the above limits in co-operation with its flank stations: Station 23, Wilderness, Station 12, Knysna and Station 31, Still Bay.

HOURS OF OPERATION:	24 hours

ENDURANCE:	12 hours - rations carried

TIME TO LAUNCH FROM CALLOUT:	Working hours : 10 minutes Other times : 10 minutes

HELICOPTER CO-OPERATION:	All types

SHORE SUPPORT VEHICLE:	4x4 Colt

STATION COMMANDER:	Dawie Zwiegelaar 082 990 5954

AMENDMENT NO:	December 2010	**PREV AMENDMENT**	December 2008

COCT ERM Plan - T3

Sea Rescue
NATIONAL SEA RESCUE INSTITUTE

N.S.R.I. OPERATIONAL CAPABILITIES

SASAR AREA:	Southern Cape

NSRI REGION:	3	**LOCATION:**	34° 10.835′ S 022° 08.928′ E

STATION NAME:	Mossel Bay	**CALLOUT NO.:**	082 990 5954 044 604 6271 082 658 6242

NSRI STN. NO.:	15	**STATION CELL:**	082 990 5954

BOATHOUSE TEL:	044 690 4322	**STATION E-MAIL:**	station15@searescue.org.za

RESCUE UNIT:	"Vodacom Rescuer II" - 5.5m Gemini RIB - Twin 60hp outboards - 3 crew - Marine VHF - GPS

CALL SIGN:	ZR 5676	**STN ID:**	RESCUE 15 ALPHA	**REG. NO.:**	DTM 1726 B

RANGE-COASTAL:	20 nm	**RANGE-OFFSHORE:**	15 nm

OPERATIONAL AREA:	Gericke Point in the east to Gouritz River in the west. Can be trailed and launched from a suitable safe site.

HOURS OF OPERATION:	24 hours

ENDURANCE:	4 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 10 minutes Other times : 10 minutes

HELICOPTER CO-OPERATION:	All types

SHORE SUPPORT VEHICLE:	4x4 Colt

STATION COMMANDER:	Dawie Zwiegelaar 082 990 5954

AMENDMENT NO:	December 2010	**PREV AMENDMENT**	January 2010

GCT DRM Plan - T3

SASAR AREA:	Southern Cape

NSRI REGION:	3	**LOCATION:**	34° 10.835′ S 022° 08.928′ E

STATION NAME:	Mossel Bay	**CALLOUT NO.:**	082 990 5954 044 604 6271 082 658 6242

NSRI STN. NO.:	15	**STATION CELL:**	082 990 5954

BOATHOUSE TEL:	044 690 4322	**STATION E-MAIL:**	station15@searescue.org.za

RESCUE UNIT:	"Vodacom Rescuer IV" - 4.2m Gemini inflatable surfboat - Single 50hp outboard - 2 crew - Marine VHF

CALL SIGN:	ZR 6205	**STN ID:**	RESCUE 15 BRAVO	**REG. NO.:**	DTM 1778 E

RANGE-COASTAL:	5 nm	**RANGE-OFFSHORE:**	1nm

OPERATIONAL AREA:	Herolds Bay in the east to Gouritz River in the west. Can be trailed and launched from a suitable safe site.

HOURS OF OPERATION:	Daylight hours only

ENDURANCE:	3 hours

TIME TO LAUNCH FROM CALLOUT:	Working hours : 5 minutes Other times : 5 minutes

HELICOPTER CO-OPERATION:	Small machines (Alouette type) only

SHORE SUPPORT VEHICLE:	4x4 Colt

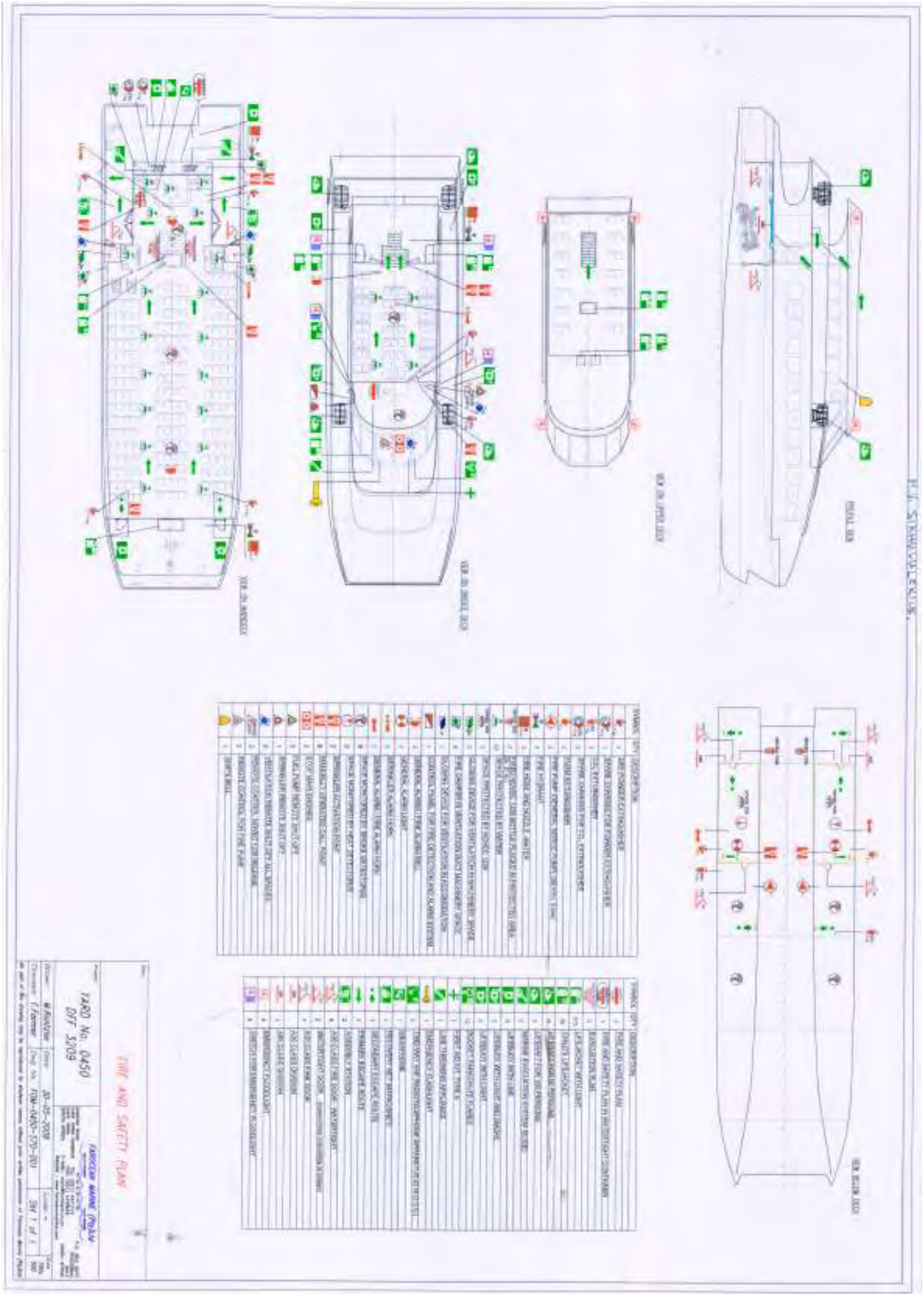
STATION COMMANDER:	Dawie Zwiegelaar 082 990 5954

AMENDMENT NO:	December 2010	**PREV AMENDMENT**	January 2010

CoCT DRM Plan - T3

DRM PLAN APPENDIX 3

ROBBEN ISLAND FERRY - m.v. SIKHULULEKILE - FIRE AND SAFETY PLAN AND SHIP'S LAYOUT



MAIN DECK

UPPER DECK

FORECASTLE

BOAT DECK

ACCOMMODATION PLAN

ACCOMMODATION PLAN - PORT

APPROVED
MARITIME AUTHORITY
OF TUVALU

M.V. "SEAWORLD EXPLORER"
SAFETY PLAN

TUVALU

COASTAL OIL SPILL CONTINGENCY PLAN

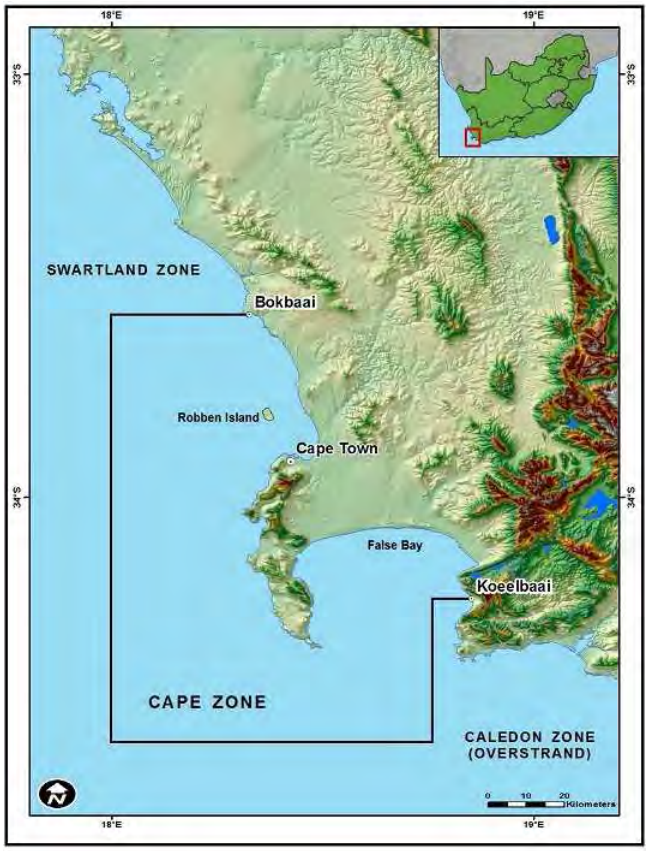


NO. 3: CAPE ZONE

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Plan No:
Date of Issue: December 2010

COASTAL OIL SPILL CONTINGENCY PLAN
NO. 3: CAPE ZONE



RESPONSIBLE LOCAL AUTHORITIES:

City of Cape Town Metropolitan Municipality	Eskom
South African National Parks	SA Navy
Transnet National Ports Authority	RD Munitions
Robben Island Museum	Heartland Leasing
Granger Bay Academy	V&A Waterfront
Granger Bay Water Club	CapeNature

DAFF: Hout Bay, Kalk Bay and Gordons Bay Fishing Harbours

Approved after due consultation with all stakeholders and authorities with the responsibility to respond to coastal oil spills in terms of this Plan.

.....

Deputy Director General: Oceans and Coasts
Department of Environmental Affairs
CAPE TOWN
Date: 7 February 2011

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

ACKNOWLEDGEMENTS

This Plan was prepared for:

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Due acknowledgement is given to DEA, SAMSA, local authorities, stakeholders and interested and affected parties, for their co-operation and the information that they made available.

Enact International: Cullinan and Associates provided the specialist input for the legal review.

The Maps were compiled by GEOSS (Pty) Ltd.

Special thanks are due to Anton Moldan, Environmental Advisor, SAPIA for his invaluable comments, advice and peer review.

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PREFACE

In terms of the Marine Pollution (Control and Civil Liability) Act 6 of 1981, the Department of Transport is charged with the responsibility of ensuring that the appropriate actions are taken in order to minimise the impact of discharges of harmful substances (e.g. oil) from ships, tankers, or offshore installations. In terms of the South African Maritime Safety Authority Act 5 of 1998, the majority of these responsibilities are transferred to the South African Maritime Safety Authority (SAMSA). Section 52 of the SAMSA Act, however, delegates the responsibility for combating pollution of the sea and shoreline by oil to the Minister of Environmental Affairs (DEA). The implication of this is that the DEA is responsible for protection and clean-up measures to be taken once oil has been released into the sea, while SAMSA's responsibilities are limited to those actions required while the oil is within the confines of the ship.

In effect this means that SAMSA is responsible for:

- overall co-ordination of the prevention and/or combating of an oil spill incident
- control of the technical aspects of shipping casualties
- supervision of oil transshipments
- prosecution of parties guilty of the deliberate discharge of oil
- compilation of contingency plans relating to the control of shipping casualties or potential casualties
- administering the Acts relating to oil pollution
- taking charge of the legal and financial aspects relating to oil spill incidents and casualties
- control of the use of the standby oil pollution prevention tug
- the issuing of pollution safety certificates for offshore installations.

The National Department of Environmental Affairs is responsible for:

- co-ordination and implementation of coastal environmental protection and clean-up measures
- control of the use of the pollution combating vessels and surveillance aircraft
- control of the use of oil spill dispersants and dispersant spraying operations
- maintenance and supply of oil dispersant stocks and other dedicated oil spill equipment
- compilation and maintenance of the DEA Local Coastal Oil Spill Contingency Plans
- the approval of contingency plans for offshore installations, in consultation with SAMSA.

The Provincial Departments of Environmental Affairs shall:

- assist the DEA in updating the Local Coastal Oil Spill Contingency Plans
- provide support in building capacity and awareness in the local authority organisations
- provide support to local authorities in the implementation of the Local Coastal Oil Spill Contingency Plans
- ensure that their MEC is kept informed of progress.

Local Authorities have an important role to play in dealing with oil spills. They are responsible for:

- taking specified measures to prevent or remedy adverse effects of the spill on the coastal environment
- providing assistance in the form of supervision, labour, transport and equipment for the protection and clean-up of their beaches, estuaries and other areas under their jurisdiction
- making arrangements with local Traffic and Police Officers to ensure traffic and crowd control in the vicinity of the impacted area.

DISTRIBUTION LIST

Doc. No.	Distribution
	NATIONAL AUTHORITIES
301	Director-General: Department of Environmental Affairs (DEA)
302	Chief Director: Integrated Coastal Management, DEA
303	Deputy Director: Marine and Coastal Pollution Management, DEA
304	Assistant Director: Marine and Coastal Pollution Management, DEA
305	Pollution Officer: Marine and Coastal Pollution Management, DEA
306	Director-General: Department of Transport
307	Executive Head, Centre of Ships: Shipping, SAMSA
308	Regional Manager: Eastern Region, SAMSA
309	Regional Manager: Western Region: Shipping, SAMSA
310	Principal Officer: Cape Town, SAMSA
311	Regional Manager: Southern Region, SAMSA
312	Principal Officer: Saldanha Bay, SAMSA
313	Principal Officer: Mossel Bay, SAMSA
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315	Chief Director: Pollution and Waste Management, DEA
316	Director: Compliance, Fisheries Branch, DAFF
317	Regional Representative: Coast Chief Directorate: Environmental Conservation Dept of Environmental Affairs
318	Manager: Pollution Combating Vessels, DAFF (Attn: Keith Govender)
319	

Doc. No.	Distribution
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322	Waste Manager: Dept of Environmental Affairs and Development Planning, Western Cape, Private Bag 908, CAPE TOWN 8000
323	Director: CapeNature, Private Bag 9086, CAPE TOWN, 8000
324	

	LOCAL AUTHORITIES
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326	Head: Disaster Risk Management Centre: City of Cape Town, PO Box 298, CAPE TOWN, 8000
327	Manager: Catchment, Stormwater and River Management Branch, City of Cape Town, PO Box 1694, CAPE TOWN,8000 (Attn Barry Wood)
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329	Co-ordinator: Sport and Recreation, City of Cape Town, 22nd Floor Civic Centre, Hertzog Boulevard, CAPE TOWN, 8000 (Attn: Sakhile Tsotsobe):
330	Harbour Master: TNPA Port of Cape Town, PO Box 4245, CAPE TOWN, 8000
331	SHEQ Manager: TNPA Port of Cape Town, PO Box 4245, CAPE TOWN, 8000
332	Harbour Master: V&A Waterfront, P O Box 50001, Waterfront, CAPE TOWN, 8002 (Attn: Steven Bentley)
333	Harbour Master: Robben Island (Attn: Anthony Thomas), c/o Port of Cape Town, PO Box 4245, CAPE TOWN, 8000 for delivery by hand.
334	Naval Harbour Master, Naval Base, Fleet Mail Office, Private Bag X1, Simonstown, 7995 (Attn: Warrant Officer Haywood)
335	Manager: Granger Bay Water Club, PO Box 2398, CAPE TOWN, 8000 Attn: Faried Sylvester
336	Power Station Manager: Koeberg, Private Bag X10, KERNKRAG, 7440
337	Harbour Master: CPUT, Granger Bay, PO Box 2880, CAPE TOWN, 8000 Attn: Wilfred Prince
338	Harbour Master: Gordon's Bay Boat Angling Club, Breakwater Lane, HARBOUR ISLAND, 7140.
339	Harbour Master: Kalk Bay Harbour Office, KALK BAY, 7975
340	Harbour Master: Hout Bay Fishing Harbour, P O Box 26781, HOUT BAY, 7872

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341	Harbour Master: Gordons Bay Fishing Harbour, Beach Road, GORDONS BAY, 7140
342	Manager: RD Munitions, PO Box 187, SOMERSET WEST, 7130
343	Manager: Heartland Leasing, Private Bag X101, SOMERSET WEST, 7129
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345	Area Manager: Marine, SANParks, PO Box 37, CONSTANTIA, 7848 (Attn: Paul Sieben)
346	Section Ranger, Boulders, SANParks, PO Box 62, SIMONSTOWN, 7995 (Attn: Monique Ruthenberg)
347	Senior Section Ranger- North, SANParks, PO Box 37, CONSTANTIA, 7848 (Attn: Hilton Blumeris)
348	
	INTERESTED AND AFFECTED PARTIES
349	Environmental Advisor: SAPIA, 31 Norfolk Street, Claremont, 7708 Attn: Anton Moldan
350	CEO: SANCCOB, PO Box 11116, BLOUBERGRANT, 7443 (Attn: Venessa Strauss)
351	Manager: Smit Amandla, P O Box 1339, CAPE TOWN 8000
352	Commodore: Royal Cape Yacht Club, P O Box 772, CAPE TOWN, 8000
353	Commodore: False Bay Yacht Club, St George's Way, SIMONTOWN, 7995

AMENDMENT LISTING

No:	Date of issue:	Pages Amended:

AMENDMENTS

All amendments to this document will be issued by the Deputy Director: Marine and Coastal Pollution Management, P. O. Box 52126, V & A Waterfront, 8002 in the form of new pages which are to replace the amended pages. The holder of each copy of this plan as named in the Distribution List will receive a copy of the new pages. The amendments are high-lighted by a vertical line in the left hand margin and amended pages will be dated with a foot note.

Upon receipt of the amendments, the recipient is to verify its completeness and update his copy of the Plan accordingly, and then mail, or fax, the tear-off slip to the addressee given at the top of the tear-off slip. (See Appendix II)

Holders of the plan are to advise the Deputy Director: Marine and Coastal Pollution Management of any pertinent changes of telephone numbers, organisational structure or other information immediately it comes to their notice.

LIST OF ACRONYMS

AD	-	Assistant Director
CLC	-	Civil Liability Convention for Oil Pollution Damage
CoCT	-	City of Cape Town
CPUT		Cape Peninsula University of Technology
CRU	-	Casualty Response Unit of SAMSA
CSRM	-	Catchment, Stormwater and River Management Branch: CoCT
DAFF	-	Department of Agriculture, Forestry and Fisheries
DEA	-	Department of Environmental Affairs
DEA&DP	-	Department of Environmental Affairs and Development Planning (W.Cape)
DD	-	Deputy Director
DMC	-	Disaster Management Centre
DOC	-	Disaster Operations Centre
DOT	-	Department of Transport
EBMO	-	Emergency Barriers from Materials of Opportunity (Report 1985)
ECO	-	Environmental Conservation Officer
EMP	-	Estuary/Environmental Management Plan
EPO	-	Environmental Protection Officer
IOPC	-	International Convention on the Establishment of an International Fund for Compensation for Oil Pollution
JOC	-	Joint Operations Centre
JRC	-	Joint Response Committee
MCM	-	Marine and Coastal Management (now called Oceans and Coast)
MCPM	-	Marine and Coastal Pollution Management (of Oceans and Coast)
O&C	-	Oceans and Coast (DEA), previously MCM
OPCSA-		Oil Pollution Control South Africa
OPRC	-	International Convention on Oil Pollution Preparedness, Response and Cooperation
OSC	-	On-Scene Co-ordinator
P&I Club	-	Ship Owners Protection and Indemnity Insurers
PEPSAE	-	Probable Effectiveness of Protection of the SA Estuaries by Oil Booms (Report 1986)
PO	-	Principal Officer (SAMSA)
SAMSA	-	South African Maritime Safety Authority
SANCCOB	-	South African National Foundation for the Conservation of Coastal Birds
SANParks	-	South African National Parks
SCC	-	Shore Control Centre
SLO	-	Shore Logistics Officer
TMNP		Table Mountain National Park
TNPA	-	Transnet National Ports Authority
UNCLOS	-	United Nations Convention on Law of the Sea
WWTW	-	Waste Water Treatment Works

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1. INTRODUCTION

This Coastal Oil Spill Contingency Plan covers the area for the Cape Zone, in the Western Cape. This Zone extends from Bokbaai in the north, along the Atlantic seaboard to Cape Point, and the whole of False Bay to Koeelbaai in the east. The entire area falls within the City of Cape Town Metro Municipality, and includes the suburbs of Blouberg, Milnerton, Simonstown and Gordon's Bay. The Port of Cape Town is located in Table Bay, and the V & A Waterfront, Robben Island and the Cape Point Nature Reserve are prime tourist destinations.

The Plan sets out the respective responsibilities of the South African Maritime Safety Authority (SAMSA) and the Department of Environmental Affairs (DEA) relating to an oil spill, the organisation that is to come into effect and the actions required of Local Authorities and other bodies (collectively referred to as Local Authorities for the purpose of this plan) to combat the impact of oil pollution on the shoreline in the event of an oil spill.

All operations will be co-ordinated by the DEA On-Scene Co-ordinator as outlined in Section 8 of this Plan.

2. OBJECTIVE

The primary objective of this Coastal Oil Spill Contingency Plan is to minimise loss of time and hence, environmental damage, in carrying out the appropriate remedial action. This is to be achieved by clearly stating the functions and responsibilities of the various authorities involved, the infrastructure to be set up, and the response required by such authorities for the duration of the incident.

3. INTERFACE WITH OTHER PLANS

South Africa's national oil spill preparedness and response strategy is guided by a suite of oil spill contingency plans; each dealing with a particular aspect of the spill situation. Although each plan is a stand alone document, it should be read in conjunction with the others, in order to ensure a co-ordinated approach. For the Cape Zone, the following Plans are applicable:

a. **"South Africa's National Contingency Plan for the Prevention and Combating of Pollution from Ships and Offshore Installations"**
This "National Plan" is an overall plan, setting out the policies of the Department of Environmental Affairs and SAMSA, for the Department of Transport towards their responsibilities for preventing and combating pollution of the sea by oil. It provides an overview of the actions to be taken by SAMSA, DEA and other relevant Authorities in preparation for, and in the event or the threat of an oil spill, and outlines the formation of a Joint Response Committee.

b. **The "Coastal Oil Spill Contingency Plans"** detail the actions to be taken when there is a threat of oil impacting the shoreline or an impact has occurred. The coastline from the Orange River mouth to the Mozambique border is divided into a number of zones, each of which has its own specific Local Coastal Plan. The **Cape Zone Plan** is one such Plan and covers the area from Bokbaai to Koeelbaai. The adjacent areas are covered by the West Coast Zone and Caledon (Overstrand) Zone Plans.

c. **The TNPA Oil Spill Contingency Plan for the Port of Cape Town.** This plan outlines the response required by TNPA for Tier 1 (minor) oil spills within the Port, and their role during Tier 2 and 3 oil spills.

d. **The "SANCCOB Contingency Plan for the Capture, Transport, Rehabilitation and Release of Oiled Seabirds Following a Major Oil Spill off the South African Coast."** This Plan covers all incidents where seabirds are oiled along the South African coastline and adjacent islands, but excludes the KwaZulu Natal coast (where stabilisation is undertaken by CROW etc). However, if requested, SANCCOB will assist with birds from both Namibia and KwaZulu Natal.

e. **Local Authority Disaster Management Plans** for the City of Cape Town Metro, which are linked to the Provincial and National Disaster Management Plans.

f. **SANParks Plans** for the protection, collection and transport of oiled seabirds from the major breeding colonies such as Boulders.

g. **Plans for Independent Installations** which detail the response actions that are to be undertaken in the event of oil spills at or near specific installations. These installations include offshore oil tanker discharge facilities, oil exploration and exploitation sites, power stations (Koeberg) etc.

The inter-relationship between all the Plans in the Cape Zone is illustrated in the diagram below (Fig. 1).

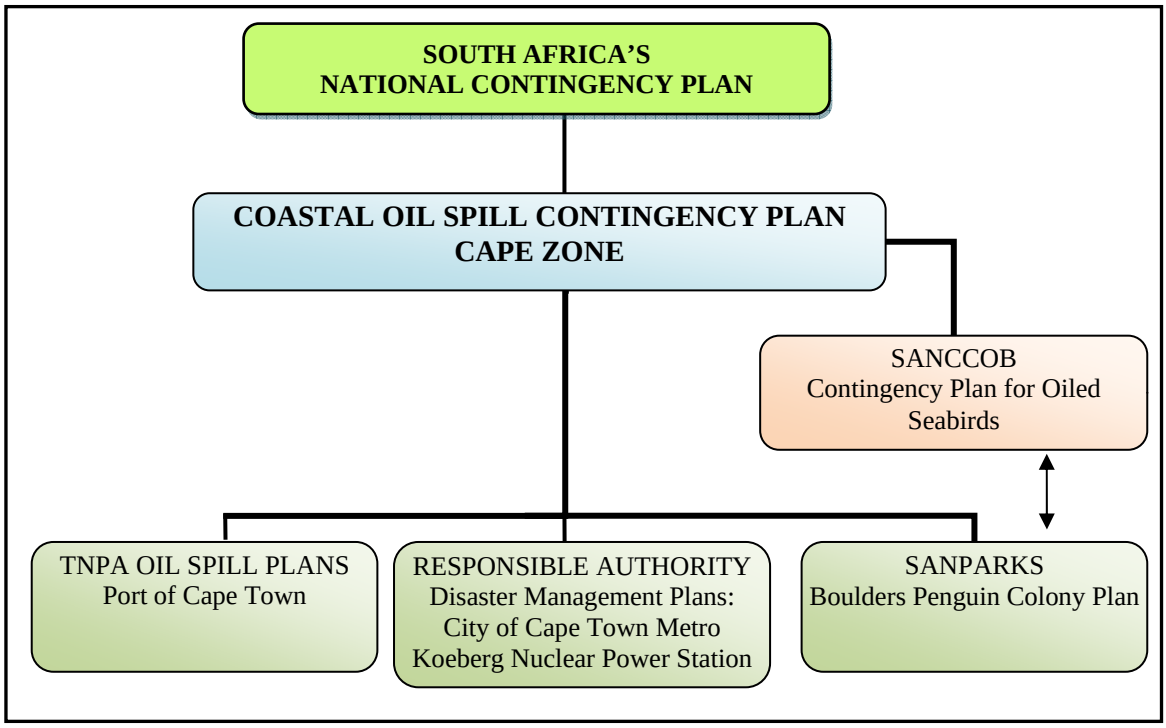


Figure 1: Inter-relationship between all the Oil Spill Contingency Plans in the Cape Zone.

4. ACTS AND AGREEMENTS RELATING TO THE COMBATING OF OIL POLLUTION

International and national legislation, relevant to combating and dealing with oil spills, is summarised below.

4.1 INTERNATIONAL CONVENTIONS *(and related South African Legislation)*

Below, are the main international conventions to which South Africa is a Party. For ease of reference, the conventions have been grouped according to the areas to which they are most relevant, namely, oil pollution, operational requirements in respect of oil pollution and compensation for oil pollution damage. Where applicable, the domestic legislation giving effect to the convention is provided.

4.1.1 Oil Pollution

United Nations Convention on Law of the Sea (UNCLOS)

UNCLOS is among the conventions ratified by South Africa. UNCLOS imposes a general obligation on states to protect and preserve the marine environment. It further provides that states shall take all measures to prevent, reduce and control pollution of the marine environment from any source, using for this purpose the best practicable means at their disposal and in accordance with their capabilities.

States, acting through the competent international organisation or general diplomatic conference are required to establish international rules and standards to prevent, reduce and control pollution of the marine environment from vessels and promote the adoption of routing systems designed to minimise the threat of accidents which might cause pollution of the marine environment, including the coastline, and pollution damage to the related interests of coastal states. Such rules and standards are required to be re-examined from time to time as necessary.

4.1.2 Compensation for Oil Pollution Damage

International Convention on Civil Liability for Oil Pollution Damage, 1992 (CLC)

This convention (originally adopted in 1969) aims to ensure that adequate compensation is available to persons exposed to oil pollution damage resulting from maritime casualties involving oil-carrying ships. It applies exclusively to pollution damage caused in the territory, including the territorial sea, of a contracting state and the exclusive economic zone of a contracting state.

It governs the liability of ship owners for oil pollution damage by laying down the principle of strict liability. The onus is on the owner to prove in each case that any of the exceptions should operate.

It also creates a system of compulsory liability insurance. Ships covered by the convention are required to maintain insurance or other financial security in sums equivalent to the owner's total liability for one incident. The ship owner is normally entitled to limit his liability to an amount which is linked to the tonnage of his ship, as stipulated in the Convention.

The convention applies to all sea going vessels actually carrying oil in bulk as cargo but only ships carrying more than two thousand tons of oil are required to maintain insurance in respect of oil pollution damage. An owner shall not be entitled to limit his or her liability if it is proved that the pollution damage resulted from his or her personal act or omission, committed with the intent to commit such damage, or recklessly and with knowledge that such damage would probably result. The 1992 CLC was adopted by South Africa in 2004.

Marine Pollution (Control and Civil Liability) Act 6 of 1981

This Act provides for the protection of the marine environment from pollution by oil and other harmful substances. It goes further than the CLC in that it deals with other harmful substances whereas the CLC is limited to oil pollution damage only. The Act provides for criminal as well as civil liability following a discharge which causes pollution of the sea.

While the Act is administered by the Department of Transport, the administration of the provisions of the Act regarding the combating of pollution of the sea by oil were assigned to the then Minister of Environmental Affairs and Tourism (now Minister of Water and Environmental Affairs) with effect from 20 May 1986. Furthermore, many of the administrative functions were transferred to the South African Maritime Safety Authority (SAMSA) in 1998.

An oil spill caused negligently or intentionally falls within the definition of discharge.

The Act sets out the powers of SAMSA to take steps to prevent the pollution of the sea where a harmful substance is being or is likely to be discharged from a ship or a tanker. Such steps include requiring the master or owner of such ship or tanker to unload the harmful substance from the ship or tanker, to dispose of any harmful substance so unloaded or to move the ship or tanker to a place specified by SAMSA. Where the master or the owner of a ship or tanker is not capable of complying with such requirements or cannot reasonably be expected to comply with these, SAMSA may cause such steps to be taken. Furthermore, where any harmful substance is discharged from a ship or tanker, the authority may cause any pollution of the sea caused thereby to be removed.

The owner of any ship, tanker or off-shore installation shall be liable for any loss or damage caused in the area of the Republic by pollution resulting from the discharge of oil, the cost of any measures taken by SAMSA after an incident has occurred for the purposes of reducing loss or damage caused or any loss or damage caused by measures so taken after a discharge has occurred.

The costs referred to shall include an amount deemed by the Director-General to be sufficient to compensate the South African National Foundation for the Conservation of Coastal Birds or any similar organisation approved by the Minister for expenses incurred in treating and rehabilitating coastal birds polluted by oil that has been discharged.

International Convention on the Establishment of an International Fund for Oil Pollution Damage, 1992 (1992 Fund Convention)

This convention establishes the International Oil Pollution Compensation Fund to provide compensation for pollution damage to the extent that the protection afforded by the 1992 CLC is inadequate. It applies exclusively to pollution damage caused in the territory, including the territorial sea of a contracting state and the exclusive economic zone of a contracting state.

South Africa acceded to the 1992 Fund Protocol which amended the 1972 Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage and is accordingly 1 of 103 states for which the 1992 Fund Convention is in force. This Convention has not yet been brought into effect locally. This means that, in monetary terms, South African claimants would be able to recover no more than R 196 million under the present legislation. Once the enabling legislation is passed, a combined total recoverable amount under the two Conventions (CLC and the Fund) would be approximately R 2,85 billion. Therefore it is essential that enabling legislation be passed as soon as possible.

4.1.3 Operational Requirements

The International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL)

South Africa is a signatory to the MARPOL convention which is the main international convention concerning the prevention of pollution of the marine environment from ships by operational or accidental causes. The Convention includes regulations aimed at preventing and minimising pollution from ships and contains 6 technical annexes which set out detailed rules and standards.

Annexure 1 contains regulations for the prevention of pollution by oil and is mandatory for state parties. The discharge into the sea of oil or oily mixtures is prohibited except when certain conditions are satisfied. The Marine Pollution (Prevention of Pollution from Ships) Act 2 of 1986 (discussed below) incorporates the convention and annexure 1 into South African domestic law.

Marine Pollution (Prevention of Pollution from Ships) Act, 2 of 1986 (the MARPOL Act)

The MARPOL Act gives effect to the MARPOL Convention, by providing for the protection of the sea from pollution by oil and other harmful substances discharged from ships. This Act is administered by the Department of Transport.

The Act provides for the Minister to make regulations to give effect to the provisions of the Convention. However this also extends to the Minister making regulations to exempt certain classes of ships from the provisions of the Convention thereby resulting in South Africa not being entirely restricted by the provisions of the Convention.

International Convention on Oil Pollution Preparedness, Response and Cooperation, 1990 (OPRC Convention)

The OPRC Convention is designed to facilitate international cooperation and mutual assistance in preparing for and responding to major oil pollution incidents and to encourage states to develop and maintain an adequate capability to deal with oil pollution emergencies.

Ships flying the flags of contracting states are required to have on board a shipboard oil pollution emergency plan. Operators of offshore units, authorities or operators in charge of sea ports and oil handling facilities must have oil pollution emergency plans or similar arrangements which are coordinated with the national system for responding promptly and effectively to oil pollution incidents.

Ships are required to comply with the oil pollution reporting procedures and the details of the actions to be taken in this regard are set out in the Convention.

The Convention makes provision for parties to cooperate and provide advisory services, technical support and equipment for the purpose of responding to an oil pollution incident and provision is made for the reimbursement of any assistance provided. South Africa has signed this convention, but has not yet brought it into effect locally.

4.2 NATIONAL LEGISLATION *(other than that associated with international conventions)*

Constitution of the Republic of South Africa Act, 1996

Section 24 of the Constitution states that everyone has a right to an environment that is not harmful to their health or well-being and to have the environment protected for the benefit of present and future generations through reasonable legislative and other measures that

(i) prevent pollution and ecological degradation;
(ii) promote conservation; and
(iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

The argument may be made that in order to give effect to this right, especially as it relates to preventing pollution of the marine environment, reasonable measures must be taken to combat oil spills as well as measures to remedy the effects of spills.

National Environmental Management Act, 107 of 1998 (NEMA)

NEMA is administered by the Department of Environmental Affairs and provides for cooperative environmental governance by establishing principles for decision-making on matters affecting the environment.

One of the most important principles relevant to the oil spill contingency plan is that the costs of remedying pollution, environmental degradation and consequent adverse health effects, and

controlling further pollution, environmental damage or adverse health effects must be paid for by those persons responsible for harming the environment.

Section 30 of NEMA is relevant to oil spills as it deals with the control of emergency incidents. An emergency incident is an unexpected sudden occurrence leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed.

The responsible person must as soon as reasonably practicable after knowledge of the incident, take all reasonable measures to contain and minimize the effects of the incident, undertake clean up procedures, remedy the effects of the incident and assess the immediate and long term effects of the incident on the environment and public health. A relevant authority (which includes a municipality, a provincial head of department, the Director-General or any other Director-General of a national department) may direct the responsible person to undertake specific measures within a specific time to fulfill his or her obligations in terms of this section.

Should the responsible person fail to comply or inadequately comply with a directive, the relevant authority may take the measures it considers necessary to contain and minimize the effects of the incident, undertake clean-up procedures and remedy the effects of the incident. The relevant authority may claim reimbursement of all reasonable costs incurred in the taking of such measures from every responsible person jointly and severally.

NEMA provides for a Duty of Care that requires reasonable measures to be taken for the prevention of pollution or environmental degradation. This is particularly relevant in dealing with responsibility for oil spill damage. The National Environmental Management: Integrated Coastal Management Act reaffirms this Duty of Care insofar as it relates to the coastal environment. The National Water Act, 36 of 1998 also imposes a similar Duty of Care. Below, we explain the Duty of Care provisions from these acts.

Section 28 of NEMA provides that every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from continuing or in so far as such harm to the environment is authorised by law or cannot be reasonably avoided or stopped, to minimize and rectify such pollution or degradation of the environment.

The steps required by this section include the taking of measures to control any activity causing the pollution, preventing the movement of pollutants, eliminating any source of the pollution or remedying the effects of the pollution.

Where a responsible person fails to take the required measures, the Director-General or a provincial head of department may direct the responsible person to commence taking specific reasonable measures before a given date and to complete them before a specified reasonable date. If the

responsible person fails to comply or inadequately complies with such a directive, the Director-General or provincial head of department responsible for Environmental Affairs may take reasonable measures to remedy the situation or apply to a competent court for appropriate relief. The Director-General or provincial head of department may recover the costs for reasonable remedial measures to be undertaken before such measures are taken and all costs incurred as a result of applying to court for appropriate relief.

Any person may after giving the Director-General or provincial head of department thirty days notice, apply to a competent court for an order directing the Director-General or any provincial head of department to take specific measures for the protection of the environment if the Director-General or provincial head of department fails to inform such person in writing that he or she has directed the person to take such steps.

National Water Act, 36 of 1998

The National Water Act deals with pollution of water resources and also provides for the control of ***emergency incidents***. Following an emergency incident such as an accident involving the spilling of a harmful substance that finds or may find its way into a water resource (water resource is defined to include a watercourse, surface water, estuary or aquifer), the responsibility for remedying the situation rests with the person responsible for the incident or the substance involved.

Measures to be taken by such person include taking all reasonable measures to contain and minimise the effects of the incident, undertaking clean-up procedures and remedying the effects of the incident. Where such person fails to act, the relevant catchment management agency may take the necessary steps and recover the costs from every responsible person. The Act is administered by the Department of Water Affairs.

The National Water Act also provides a duty of care similar to that in NEMA. This however deals more specifically with situations where pollution of a water resource occurs as a result of activities on land.

National Environmental Management: Integrated Coastal Management Act, 24 of 2008

Included among the aims of the Act is the control of dumping at sea and pollution in the coastal zone. The Act provides that in fulfilling the rights contained in section 24 of the Constitution, the state through its functionaries and institutions implementing the Act, must act as a trustee of the coastal zone and must in implementing the Act take reasonable measures to achieve the progressive realisation of those rights in the interest of every person.

The state in its capacity as the public trustee of all coastal public property must take whatever reasonable legislative and other measures it considers necessary to conserve and protect coastal public property for the benefit of present and future generations.

The Minister, an MEC or a municipality concerned may institute legal proceedings or take other appropriate measures to prevent damage or recover damages for harm suffered to coastal public property or the coastal environment or to abate nuisances affecting the right of the public in its use and enjoyment of coastal public property. Accordingly, these provisions can extend to damage caused or measures taken to prevent such damage as a result of oil spills.

This Act also provides that section 28 of NEMA applies to any impact caused by any person that has an adverse effect on the coastal environment. The persons to whom section 28 of NEMA apply include any person who produced or discharged a substance which caused, is causing or likely to cause an adverse effect and this may therefore include discharges from ships.

South African Maritime Safety Authority Act 5 of 1998

This Act provides for the establishment of SAMSA whose objectives are to ensure the safety of life and property at sea, to prevent and combat pollution of the marine environment by ships and to promote the Republic's maritime interests.

SAMSA may perform a function itself, in co-operating with another person or by delegating or assigning the power or duty concerned to another person. "Person" includes the state, a province, the government or an agency of the government of a foreign country or any juristic or natural person.

Certain functions of SAMSA are performed by the Department of Environmental Affairs. The responsibility for matters relating to the combating of pollution mentioned in Marine Notice No. 2 of 1996 issued by the Department of Transport on 24 January 1996 is regarded as having been assigned to the Department Environmental Affairs by this Act.

The Health Act, 63 of 1977

The Health Act provides that every local authority shall take all lawful, necessary and reasonably practicable measures to prevent the occurrence, within its district, of any condition which could be harmful or dangerous to the health of any person within its district or the district of any other local authority. Where such nuisance or condition has occurred, the authority must take measures to abate or remedy such condition. Accordingly where an oil spill could be harmful or dangerous to human health, the local authority may take measures to remedy its effects.

The Sea-Shore Act, 21 of 1935

The Sea-Shore Act makes specific provision for the protection of public health. The competent authority to whom the administration of the Health Act has been assigned, may declare that any local authority may exercise, in respect of the sea-shore and the sea situated within its area of jurisdiction or adjoining such area, any of the powers which are conferred by the Health Act on a local authority. This could therefore be extended to include the taking of measures to remedy an oil spill in cases where it could be harmful to human health.

The Minister of Transport may, in terms of this Act, make regulations or authorise any local authority to make regulations concerning the prevention or the regulation of the depositing or the discharging upon the sea-shore or in the sea of offal, rubbish or anything liable to be a nuisance or danger to health.

The Act will be repealed by section 98 of the National Environmental Management: Integrated Coastal Management Act when that section comes into force.

Other Relevant Legislation

The following legislation while not directly applicable in dealing with measures to be taken in cases of oil spills is still of relevance for purposes of the protection of the marine environment from oil spills.

Merchant Shipping Act, 57 of 1951
SAMSA is responsible for the administration of this Act. The Act imposes an obligation on an owner of a ship to secure the sea worthiness of a ship. Unseaworthy ships may be detained and where any ship is detained, it may be inspected by a surveyor who shall report on any supposed defects or deficiencies.

Dumping at Sea Control Act, 73 of 1980
This Act brings into force domestically the provisions of the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (the London Convention). It provides for the control of dumping at sea of various substances and structures, including vessels, platforms or other man-made structures.

South Africa is a signatory to the 1996 Protocol, which will eventually replace the current Convention. The Protocol introduces the precautionary and polluter pays principles and expands the objectives of the Convention to include the elimination of pollution where practicable.

The Act is administered by Department of Environmental Affairs. It will however be repealed by section 98 of the National Environmental Management: Integrated Coastal Management Act when that section comes into force.

Marine Pollution (Intervention) Act 64 of 1987:
This Act gives domestic effect to both the Intervention Convention Relating to the Intervention on the High Seas in Cases of Oil Pollution Casualties, 1969 as well as the Protocol Relating to Intervention on the High Seas in Cases of Marine Pollution by Substances other than Oil, 1973. It allows the Minister of Transport to make regulations to give effect to the provisions of the Convention and the Protocol.

Disaster Management Act, 57 of 2002
This Act provides for, among others, an integrated and co-ordinated disaster management policy that focuses on preventing or reducing the risks of disasters, mitigating the severity of disasters, emergency preparedness, rapid and effective response to disasters and post-disaster recovery.

Disaster is defined in Section 1 of the Disaster Management Act, and includes oil spills when this hazard causes or threatens to cause damage to property, infrastructure or the environment, or the disruption of the livelihood of the community, and is of the magnitude that exceeds the ability of those affected by disaster to cope with its effects using only their own resources.

The Act does not however apply to a disaster where such occurrence can be dealt with effectively in terms of other national legislation aimed at reducing the risk, and addressing the consequences of occurrences of that nature and identified by the Minister by notice in the Gazette. Accordingly, this Act would not be of direct application in cases of oil spills as the other Acts related to oil pollution response, provide measures that can be enforced in dealing with oil spills.

In other words, The Disaster Management Act is essentially over-arching and supportive legislation which enables the integration and co-ordination of all role-players in the event of a major incident. All role-players will still function according to their own legislation and mandates at addressing the risks and consequences of any occurrence. Should any situation, including any Coastal Oil Spill, escalate or exceed the local capacities, a local state of disaster may be declared under the Disaster Management Act, which will enable further facilitation and assistance to be obtained.

The Public Finance Management Act, 1 of 1999
This Act regulates financial management in the national government and provincial governments and ensures that all revenue, expenditure, assets and liabilities of these governments are managed efficiently and effectively. It provides for the establishment of a national treasury consisting of the Minister who is the head of treasury and the national department or departments responsible for financial and fiscal matters.

While the Act is not directly relevant to procedures in the event of oil spills, the Minister or MEC for finance in a province may authorize the use of funds from the respective national revenue fund or provinces provincial revenue fund respectively to defray expenditure of an exceptional nature which is not currently provided for and which cannot, without serious prejudice to the public interests be postponed to a future appropriation of funds. Thus in particular circumstances additional budget could possibly be allocated in cases of oil spills that threaten the public interests.

National Ports Acts, 12 of 2005
This Act relates to the establishment of the National Ports Authority and the Ports Regulator; to provide for the administration of certain ports by the National Ports Authority; and to provide for matters connected therewith. The Authority is required in the performance of its functions to ensure that a fair and reasonable balance is achieved between the protection of the environment and the establishment, development and maintenance of ports.

4.3 RESPONSIBLE AUTHORITIES

4.3.1 South African Maritime Safety Authority (SAMSA)

SAMSA was established on 1 April 1998 in terms of the South African Maritime Safety Authority Act, 5 of 1998 and it is accountable to the Minister of Transport. Its mission is to promote South Africa's maritime interests and development and position the country as an international maritime centre while ensuring maritime safety, health and environmental protection.

The responsibility for matters relating to the combating of pollution however, mentioned in Marine Notice no. 2 of 1996 issued by the Department of Transport on 24 January 1996, is regarded as having been assigned to the Department of Environmental Affairs by the Act.

Included among the services provided by SAMSA are accident investigations and emergency casualty response, management of the Department of Transport contracted pollution prevention and response capability, statutory surveys and safety certification of ships, inspections of ships and cargos of hazardous goods, casualty investigation and management, oil pollution incident response and investigation, and providing a maritime search and rescue capability in the South African area of responsibility through the management, on behalf of the Department of Transport, of the Maritime Rescue Coordination Centre.

The South African Maritime Safety Authority Act establishes SAMSA as a juristic person. It may perform its functions both within and outside the Republic and it may do so by itself, in cooperation with another person or by delegating or assigning a power or duty concerned to another person (including the state, a province, the government or an agency of the government of a foreign country or a juristic or natural person). SAMSA also has the power to institute and conduct civil proceedings in all matters relating to its functions.

4.3.2 Transnet National Ports Authority (TNPA)

The main functions of the TNPA are to own, manage, control and administer ports to ensure their efficient and economic functioning. This includes regulating and controlling pollution and the protection of the environment within the port limits.

The TNPA may give notice to the owner or other person legally responsible for the upkeep of any vessel within port limits to remove or otherwise dispose of such vessel, or part thereof, which is not seaworthy or is likely to become an obstruction, wreck or derelict or a threat to the environment or public safety. It may also recover from that owner or person all costs incurred for the removal or disposal should he or she fail to comply with such notice within the time specified therein.

The Harbour Master is, in respect of the port for which he or she is appointed, the final authority in respect of all matters relating to the movement of vessels within port limits. Accordingly the Harbour Master may give such written or verbal instructions for the detention of a vessel reasonably suspected of causing oil pollution in the port area and ensuring that the total cost of the pollution clean–up operation is recovered, or acceptable guarantees are provided, prior to the vessel being giving permission to leave the port.

The TNPA may with the approval of the Minister of Transport make rules for the control and management of ports and for the maintenance of safety, security and good order in ports, in particular regarding the protection of the environment within ports, the cleaning of land and waters of the ports and the prevention of oil, filth, rubbish or any other matter from being thrown into the sea.

Port Rules

The TNPA has developed Port Rules in terms of the National Ports Act, which came into effect on 6 March 2009. Chapter 4 of the port rules deals with the protection of the environment and provides that all persons within a port must take all reasonable steps to prevent, minimize and mitigate pollution or degradation of the environment.

Any person who pollutes or causes damage to the environment will bear the costs associated with the combating and cleaning up of that pollution, damage or degradation and the associated impacts relating thereto.

Furthermore, no oil may be discharged or dumped from a vessel or be allowed to escape from a vessel into any part of the port. The clean up of pollutants, including oil, which is spilled within port limits must be dealt with in accordance with the applicable Port Contingency Plan.

4.3.3 Department of Environmental Affairs

The Marine Pollution Division of the Department of Environmental Affairs is responsible for, among others, combating pollution incidents, and cleaning up of spills. The Department may also issue directives in terms of the NEMA requiring pollution and degradation to be remedied including the undertaking of clean-up procedures.

In terms of the Policy on the Use of Oil Spill Dispersants in South African Waters, the decision to use oil spill dispersants should only be taken by the Department Environmental Affairs. In the event of a spill incident, the Department's on-scene director in consultation with the scientific advisors, should only decide to use oil spill dispersants if such use will minimize the overall environmental impact.

Oceans and Coast (O&C) is one of the four branches of the Department and it is a regulatory authority responsible for managing all marine and coastal activities. O&C has invested in the development of an oil spill response capability. This allows equipment and man-power to be mobilised at short notice to protect beaches, estuaries, bird colonies and other sensitive areas.

Provincial Departments of Environmental Affairs, such as DEDEA and DEA&DP, have concurrent powers with the DEA in terms of environmental responsibilities.

4.3.4 Municipalities / Local Authorities

Municipalities and Local Authorities also have an important role to play in dealing with oil spills. There exist provisions in South African law that can be invoked to enable municipalities to take appropriate measures in dealing with oil spills.

In terms of the provisions of NEMA dealing with emergency incidents, a relevant authority, which includes a municipality, may direct that specific measures be taken. Where the responsible person fails to comply or inadequately complies with a directive or there is an immediate risk of serious danger to the public or potentially serious detriment to the environment, the municipality may take the measures it considers necessary and claim reimbursement of its reasonable costs incurred from the responsible persons. Such measures would include undertaking clean-up procedures and remedying the effects of the incident.

The National Environmental Management: Integrated Coastal Management Act makes provision for a municipality to institute legal proceedings or take other appropriate measures to prevent damage suffered to coastal public property or the coastal environment. The Health Act also requires local authorities to take measures to prevent the occurrence of any condition which could be harmful or dangerous to the health of any person.

A municipality may also be directed to take specified measures to prevent or remedy adverse effects on the coastal environment in terms of the National Environmental Management: Integrated Coastal Management Act. Where the MEC is satisfied that the municipality is not taking adequate measures, he or she may in writing direct a municipality to take specified measures. Where the municipality does not comply with this directive, the MEC may take measures to prevent or remedy the adverse effects.

4.3.5 South African National Parks (SANParks)

The National Environmental Management: Protected Areas Act, 57 of 2003 provides for the continued existence of SANParks which was established by the National Parks Act, 57 of 1976. SANParks manages all existing national parks as well as various types of protected areas including marine protected areas assigned to it by the Minister. Included among SANParks' functions is to protect, conserve and control the national parks and other protected areas assigned to it, including their biological diversity. SANParks functions would be relevant in relation to oil spills insofar as they relate to marine protected areas.

The Table Mountain National Park (TMNP) falls within the Cape Zone Plan. SANParks manages all activities, species and land within the boundaries of the Park, in terms of the National Environmental Management: Protected Areas Act (57/2003) and National Environmental Management: Biodiversity Act (10/2004). Should oil wash ashore within the boundaries of the Park, the Park is responsible for cleaning, or arranging for the cleaning of the affected area. SANParks has a co-management agreement with DEA (O&C) for the TMNP Marine Protected Area (MPA).

4.3.6 Provincial Nature Reserves

Provincial Nature Reserves are managed in accordance with Provincial Ordinances, as well as the National Legislation listed above. Their functions are to protect, conserve and control the protected areas, especially in terms of biological diversity.

5. FINANCIAL ARRANGEMENTS AND COMPENSATION OF COSTS

South Africa's National Contingency Plan for Prevention and Combating of Pollution from Ships states: "Any response arising from a shipping casualty, whether an intervention of sorts, or an actual clean up exercise, can be very costly and the Republic has no dedicated state pollution contingency fund in place. Initially the costs of such operations fall to those involved in the operations and in line with the "polluter pays" principle may subsequently be claimed as costs and damages from the owner. It is however accepted that small service providers cannot be expected to carry the costs of providing services to the state for any (length of) time and SAMSA, as the responsible authority will assist in enabling a response to get under way, by way of underwriting such actions as it considers necessary in the early phases of any response. This undertaking is severely limited and a better arrangement regarding underwriting the costs will have to be made in the event."

If response operations, as covered by this Plan, are centrally co-ordinated, professionally carried out, cost-efficient and effective, well documented and fully integrated with overall response activities, they have a good chance, in principle, to qualify for compensation of costs incurred. Close liaison with insurers, through SAMSA and DEA, from the start of the response operation is essential. So it is imperative that local authorities participate in the discussions of the Joint Response Committee (JRC) which is chaired by SAMSA during a major shipping incident.

South Africa has acceded to the CLC92 and Fund 1992 Conventions, and through SAMSA has access to claiming protocols of up to approximately R 2.85 billion once enabling legislation is passed. Until then the limit is set at approximately R196 million.

Identifiable Source

In many cases the source of the spill will be identified and the vessel will have P&I Club (3rd Party) insurance cover. This will make the recovery of costs and damages a strong probability, especially if the claims are reasonable and any expenditure has been properly audited and controlled. In the event of the source of oil pollution being identified, the Minister of Transport may require the owners/insurers to establish a fund from which claims can be paid. As soon as possible, DEA should provide SAMSA with an estimation of costs for protection and clean-up operations so that this can be included in the guarantee. Local Authorities should inform DEA of any major costs at the outset and they should be kept updated on costs as they are incurred. It is important to bear in mind the limitation of liability regime that is in place in South Africa. This means that the sum total of costs may therefore not be met in full.

It is quite possible however that there might be no response from the owner and any interventions and clean-ups must be carried out nevertheless. These actions need to be tempered, however, with the reality that these costs may not be recoverable from the owner and that the state would need to be approached for compensation. SAMSA will make every effort to secure assets or funds associated with the owner in cases such as this, in order to mitigate the cost to the state.

Source not identified

If the source of the oil spill is not identified, the cost of clean-up may have to be borne by the State, and SAMSA will approach Treasury for an advance of funds. However, if it can be proved that the oil is a crude oil then compensation can be sought through IOPC. It would therefore be necessary for samples of the oil, or oily sand to be collected for analysis. DEA/SAMSA is responsible for undertaking the oil finger printing analysis. The number of samples taken will depend on the extent of the spill and the requirements of the insurers. A guide on the collecting and storing of samples is provided in Addendum E.

5.1 POLICY ON PURCHASING

In normal circumstances prior approval of the Department of Environmental Affairs is required for the purchase or hire of anything by Local Authorities for which recompense is to be sought. However, in the interests of continuity of an operation where the resources of Local Authorities are insufficient to prevent or remove oil pollution, the Area Controllers (see Section 8.4.2) may, within reasonable limits, purchase or hire additional equipment, purchase consumable materials, employ additional labour or engage the services of contractors without such prior approval, but are to advise the DEA Shore Controller or the JRC immediately of such acquisitions. The purchase of capital equipment may, however, only be undertaken after approval through the JRC.

NOTE:
The attention of the Area Controller is drawn to the terms of Sections 5(5) and 5(6) of Act 6 of 1981, entitling the Minister of Transport to enquire into the reasonableness of costs incurred and claims made.

5.2 CLAIMS

The Claims Manual produced by IOPC (April 2005) provides specific information on claiming procedures. The main points are summarised below.

5.2.1 Loss or Damage

All claims for loss or damage shall be submitted to the DEA On-Scene Co-ordinator, who will take the necessary steps to establish that the claim is adequately substantiated and reasonable. Once the details of each claim have been verified, it will be forwarded to the SAMSA Administration Officer for processing.

These claims could include loss or damage to property, grazing lands, livestock, fishing nets, loss of livelihood etc., in the area of the Republic, resulting from the discharge of oil from a ship, tanker or offshore installation and also damage or loss caused by methods used to clean up polluted areas. All claims made must be submitted according to the requirements listed in Appendix I, where an expenditure log sheet template is also provided.

Depending on the nature of the claim, the following information may be required:

- Nature of loss, including evidence that the alleged loss resulted from the contamination.
- Monthly breakdown of income for the period of the loss and over the previous three years. Where possible, monthly breakdown of units (eg kilograms of fish caught and sold or number of hotel rooms let etc) for the period of the loss and over the previous three years.
- Saved overheads or other normal variable expenses.
- Method of calculation of loss.

5.2.2 Measures Taken

Claims for costs of measures taken in respect of protection from, and clean-up of oil pollution are to be submitted to the DEA On-Scene Co-ordinator and are to be fully substantiated by detailed time sheets for labour and machinery, and invoices for material and equipment purchased. Justification for the action taken must be included. It is essential that costs are well documented and that stringent records of expenditure are maintained. Claims should answer the questions: **Who? What? Where? When? and Why?** A brief summary report outlining the nature of the incident and the associated activities should be provided with the claims.

The following information should be provided:

- Delineation of area affected, describing the extent of the pollution and identifying those areas most heavily contaminated (maps, charts, photographs and video tapes).
- Analytical or other evidence linking the oil pollution with the ship (chemical analysis, relevant wind, tide and current data, observation and plotting of oil movement).
- Summary of events, including description and justification of work carried out at sea, in coastal waters and on shore, together with an explanation of why the various methods were selected.
- Dates on which work was carried out at each site.
- Labour costs at each site (number and categories of response personnel, name of employer, hours or days worked, regular or overtime rates, and other costs).
- Travel, accommodation and living costs for response personnel.
- Equipment costs at each site (types of equipment used, by whom supplied, rate of hire or cost of purchase, method of calculation of hire rates, quantity used, period of use).
- Cost of replacing damaged equipment beyond reasonable repair (type and age of equipment, original purchase price, and circumstances of damage, supported by photographs etc).
- Consumable materials (description, by whom supplied, quantity, unit cost and where used).
- Any remaining value at the end of the operations, of equipment and materials purchased specifically for the incident.
- Transport costs (number and types of vehicles, vessels or aircraft, number of hours or days operated, rate of hire or operating cost, method of calculating rates).
- Cost of temporary storage and of final disposal of recovered oil and oily material, including quantities disposed, unit cost and method of calculating the claimed rate.

5.2.3 Claims for environmental reinstatement measures and post spill studies.

In some instances it is possible to enhance the speed of natural recovery after a spill, through reasonable re-instatement measures. The cost of such measures may be accepted for compensation by the IOPC under certain conditions.

Such measures should:

- accelerate significantly the natural process of recovery;
- seek to prevent further damage as a result of the incident;
- not result in degradation of other habitats or adversely affect other natural or economic resources;
- be technically feasible;
- not result in costs being out of proportion to the extent and duration of the damage and the benefits likely to be achieved.

The IOPC Fund may contribute to the cost of studies to determine the nature and extent of environmental damage caused by an oil spill or to determine whether reinstatement measures are necessary. Usually this would be appropriate for major incidents only, and if the studies are likely to provide reliable and useful information. Strict conditions apply; the IOPC should be consulted at an early stage, and a scientific committee should be established to co-ordinate such studies.

5.2.4 Checklist for oil spill claims procedure

Item	Responsibility	Check
Identification of vessel owner/insurer	SAMSA	
Determine level and details of insurance	SAMSA	
Analysis of spilled oil. Crude oil / bunker oil?	SAMSA, DEA	
Owner/Insurer guarantee secured	SAMSA	
SA Treasury funding request (if no insurance cover)	SAMSA/DEA	
Owner/Insurer requested to attend JRC	SAMSA	
Response activities agreed at JRC	SAMSA, DEA, Owner/Insurer, Stakeholders (local authorities)	
Record of decision signed (template in Appendix V)	SAMSA, DEA (Insurer can be asked to sign, but not essential)	
Keep strict records of all activities undertaken. "Who? What? Where? When? Why?" (see Appendix I)	Each Claimant: SAMSA, DEA, Stakeholders (local authorities and individuals)	
Maintain file of all invoices and receipts	Each Claimant: SAMSA, DEA, Stakeholders (local authorities and individuals)	
Compile summary claim report	All Claimants: SAMSA, DEA, Stakeholders (local authorities and individuals)	
Submit claim to DEA for verification (to include summary report, record of activities and copies of invoices and receipts)	All claimants: Stakeholders (local authorities and individuals)	
Verification of all local authority and individual claims	DEA	
Compilation of summary claim report for environmental response.	DEA	
Approved claims submitted to SAMSA	DEA	
Claims submitted to Owner/Insurer or Treasury	SAMSA	
Negotiations and discussions of claims with Owner/Insurer or Treasury	SAMSA, DEA, Owner/Insurer, Treasury	
Payment of claims	Owner/Insurer, Treasury	

6. PREPARATORY ACTIVITIES

6.1 DEPARTMENT OF ENVIRONMENTAL AFFAIRS

The Deputy Director: Marine and Coastal Pollution Management and his delegated Marine Pollution Officers, marked with an (*) in Section 7.1.3, are responsible for the preparation, improvement and updating of the Local Coastal Plans on an ongoing basis. In addition, they must ensure that the departmental organisation is maintained at a sufficient state of readiness to cope with an incident, and also be available to assist the Local Authorities with training activities when so required. Concurrent powers are held by the Provincial Departments of Environmental Affairs.

6.2 MUNICIPALITIES / LOCAL AUTHORITIES

The Local Authorities in this area have nominated the Head: Disaster Risk Management Centre, City of Cape Town, to act as the Local Authority Co-ordinator, during an oil spill incident in this area (see Section 8.4.1 for job description). In addition to his/her duties during a spill, this officer will be responsible on an ongoing basis for ensuring that the Local Authorities in this Zone are fully prepared to respond to an oil spill incident. He/she therefore has to be fully conversant with this plan, and must ensure that information regarding equipment and material, telephone numbers etc, is kept up to date. His contacts within the Department of Environmental Affairs are the Marine Pollution Officers in Cape Town.

For each of the protection measures set out in Section 10, the relevant Municipality / Local Authority's Line Departments must each compile a plan detailing how the task can be completed in the shortest possible time. The authorisation for the release and allocation of emergency funds is an important factor to be considered during the planning process. Detailed plans are also required for clean-up operations if these are unique. The Department of Environmental Affairs (Marine Pollution Officers) will assess the viability of these proposed plans in relation to the availability, quantity and effectiveness of the materials, equipment and labour readily available, and make recommendations where necessary. The plans, once accepted, will then form part of this Oil Spill Contingency Plan.

6.3 TRAINING AND EXERCISES

The Department of Environmental Affairs is responsible for ensuring that training is undertaken by those bodies involved in carrying out this Contingency Plan. Without such training, the plan has little value. The Marine Pollution officers shall be trained to the relevant levels commensurate with their roles and responsibilities, as recommended in the table below.

Responsible officer	Role	Training
Deputy Director and Assistant Director: Marine and Coastal Pollution Management	On-Scene Co-ordinator	IMO Level 2 – Response to Marine Oil Spills: Course for On-Scene Commanders and Executive Commanders (having completed previous levels).
Pollution Officers	Shore Controller, Env. Liaison Officers	IMO Level 2 – Response to Marine Oil Spills: Course for On-Scene Commanders. Ability to control and put a specific contingency plan into action (having completed previous levels).
Pollution Officers, Pollution Technicians and Artisans	Logistics Officers, Beach supervisors,	IMO Level 1 – Ability to act as shoreline clean-up supervisor/beachmaster. IMO foundation level – Basic use of Tier 1 sorbents, booming and recovery techniques and understanding contingency plans.

Table showing level of training for DEA: Marine Pollution Officers

Local Authorities are required to ensure that persons appointed to the various tasks are familiar with their responsibilities, duties, powers and to whom they will be accountable during the incident. Enquiries regarding training should be addressed to the DEA (Marine Pollution Officers).

Simulated exercises are an excellent way to test the effectiveness of this Plan and train personnel in the emergency roles. In the absence of any large spill, DEA is committed to undertaking a desk-top exercise once a year to ensure that managers and responsible officers are aware of the procedures and response strategies incorporated in this Plan. Exercises will be arranged to test some or all of the following: call out procedures, contact details, equipment supply lists, setting up the response organisation and facilities, communications, media liaison and relationships with other authorities.

DEA will also commit to assist local authorities with training exercises in their respective zones. Bearing in mind that there are 25 Zones, it is prudent for DEA: Marine Pollution Officers to aim towards arranging or participating in training exercises every second year in each of the zones. These could take the form of desk-top exercises, video assisted training or clean-up/boom deployment exercises on the shoreline. By selecting one Zone and its neighbours for one trip, it may be a good idea to undertake a video training event in one Zone, a booming exercise in a neighbouring Zone and a desktop exercise in the other neighbouring Zone. By extending invitations to local authorities in all three zones, role players would have the opportunity to partake in various training events.

The proposed training exercise schedule is provided in the table below.

Time frame	Type of exercise	Participants
Every Year	Desk Top Exercise	DEA:O&C and invited partners
Year 1	Desk Top Exercise or Video Training or Beach cleanup or booming	Local authorities and associates in the following zones: West Coast, Swartland, Cape, Caledon (Overstrand); Humansdorp, Dias, Amathole (including Ciskei), Scottburgh, Amanzimtoti, Durban and Ballito.
Year 2	Desk Top Exercise or Video Training or Beach cleanup or booming	Local authorities and associates in the following zones: Agulhas, Langeberg, Mossel Bay, Knysna, Transkei, Port Edward, Margate, Port Shepstone Pennington, Lower Tugela, Tugela, Richards Bay and St Lucia.
Every 5 years	National exercise in one of the Zones to tie in with major revision of the Contingency Plans.	DEA:O&C, SAMSA, TNPA; and relevant local authorities

Table showing schedule for proposed training exercises.

Full debriefing sessions following the exercises should be undertaken in order to highlight deficiencies, improve or update this Contingency Plan. Lessons learnt should be shared with other local authorities.

An exercise and training template is provided in Appendix III and should be completed accordingly.

7. INITIAL REPORTING AND ACTIVATION OF THE PLAN

The initial procedures during an oil spill incident are of the utmost importance, since they can determine the success or failure of the response operation. It is essential that accurate information is obtained and that key personnel are notified accordingly.

All oil spills at sea are to be reported to SAMSA and DEA Marine and Coastal Pollution Management (MCPM). Oil spills on the shoreline, or oiled penguins must be reported to DEA: MCPM, who in turn will notify SAMSA. If the coastline or seabirds are likely to be effected, MCPM will notify the Local Authorities and SANCCOB accordingly. The notification regime is illustrated in figure 2 below.

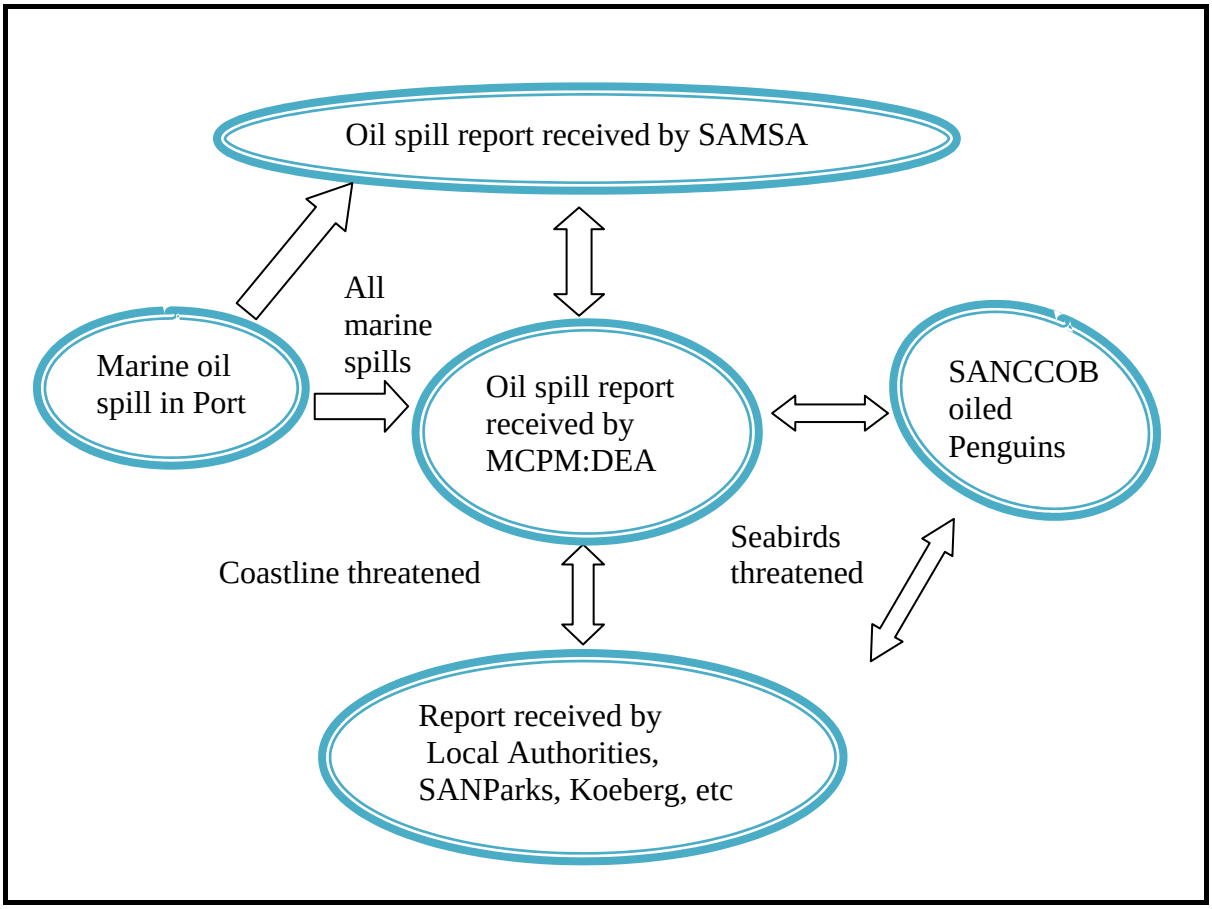


Figure 2: Requirements for initial reporting of oil spills.

7.1 REPORTING OF OIL SPILLS

The first indication of an oil spill may come either from a report from a vessel or the sighting of an oil slick at sea, or from an observation of stranding or stranded oil. Often, the first warning of an oil spill is through the observation of oiled penguins on the colonies, and subsequent reporting through island staff or SANCCOB.

7.1.1 Initial Reports by Local Authorities

Stranding or stranded oil and in some cases a sighting of oil at sea may be reported directly to Local Authorities. On receipt of such a report, the Local Authority should make an immediate investigation to obtain as much information as possible. Having assessed the validity of the report, the Local Authority is to inform the DEA Pollution Officers listed in Section 7.1.3. An incident report form to be used by the local authority is provided below

If contact cannot be made with any of the DEA Pollution Officers, then the Local Authority must make contact with one of the SAMSA Officers following the sequence listed. Failing this the **City of Cape Town's Disaster Operations Centre (DOC)** should be contacted.

LOCAL AUTHORITY OIL SPILL INCIDENT REPORT FORM

Date and Time of Spill, or Spill Sighting.....…….....……...……

Reported by: NAME:…...……..... TEL: .....……

Reported to: NAME……..... TEL: .....

Officer Responding: NAME:……..... TEL: .....…..

Precise location of where oil was seen: (e.g. name of beach or geographic co-ordinates)

.....

Description of location: (e.g. sandy beach/rocky shore, amenity value, environmental sensitivity etc)

.....

Extent and nature of oiling: (e.g. length, breadth, thickness, % area covered, tar balls, fresh liquid oil, penetration into the sand, colour etc)

.....

Estimated wind speed and direction: .....

Estimated quantity of oil spill.

less that 50 litres	50 to 100 litres	100 to 1000 litres	1 to 7 tonnes	7t to 70 t	more than 70 t

Cause of spill (if known): …….....…….....

Response required: | sorbents | booms | skimmers | manpower | beach clean-up, other..... |

Comments:

7.1.2 Initial Reports by Department of Environmental Affairs

In the event of SAMSA or the Department of Environmental Affairs receiving a report from a vessel or a report of a sighting of an oil slick at sea, they will assess the probability of the shoreline being impacted by oil. If such a threat exists the Department of Environmental Affairs will endeavour to determine:

- the stretch of coastline likely to be impacted,
- the probable time of the initial impact,
- the anticipated magnitude of the impact.

In the event of a major spill, the Department of Environmental Affairs will alert the Disaster Operations Centre: City of Cape Town, who in turn will alert all the relevant role-players.. The DEA Pollution Officers should follow up the notification process to ensure that all relevant local authorities have been advised.

The threat situation will be under constant review and the Local Authorities will be advised of each revision, by the DEA Deputy Director: Marine and Coastal Pollution Management, or his delegated officer.

Should the Department of Environmental Affairs receive the initial report of stranded oil, it will either send one of its own officers, or, when there is no such officer in the vicinity, request the appropriate Local Authority to verify such report before proceeding further. If necessary, aerial surveillance will be initiated by the DEA OSC. The initial response actions are illustrated in the diagram below.
(See Figure 3).

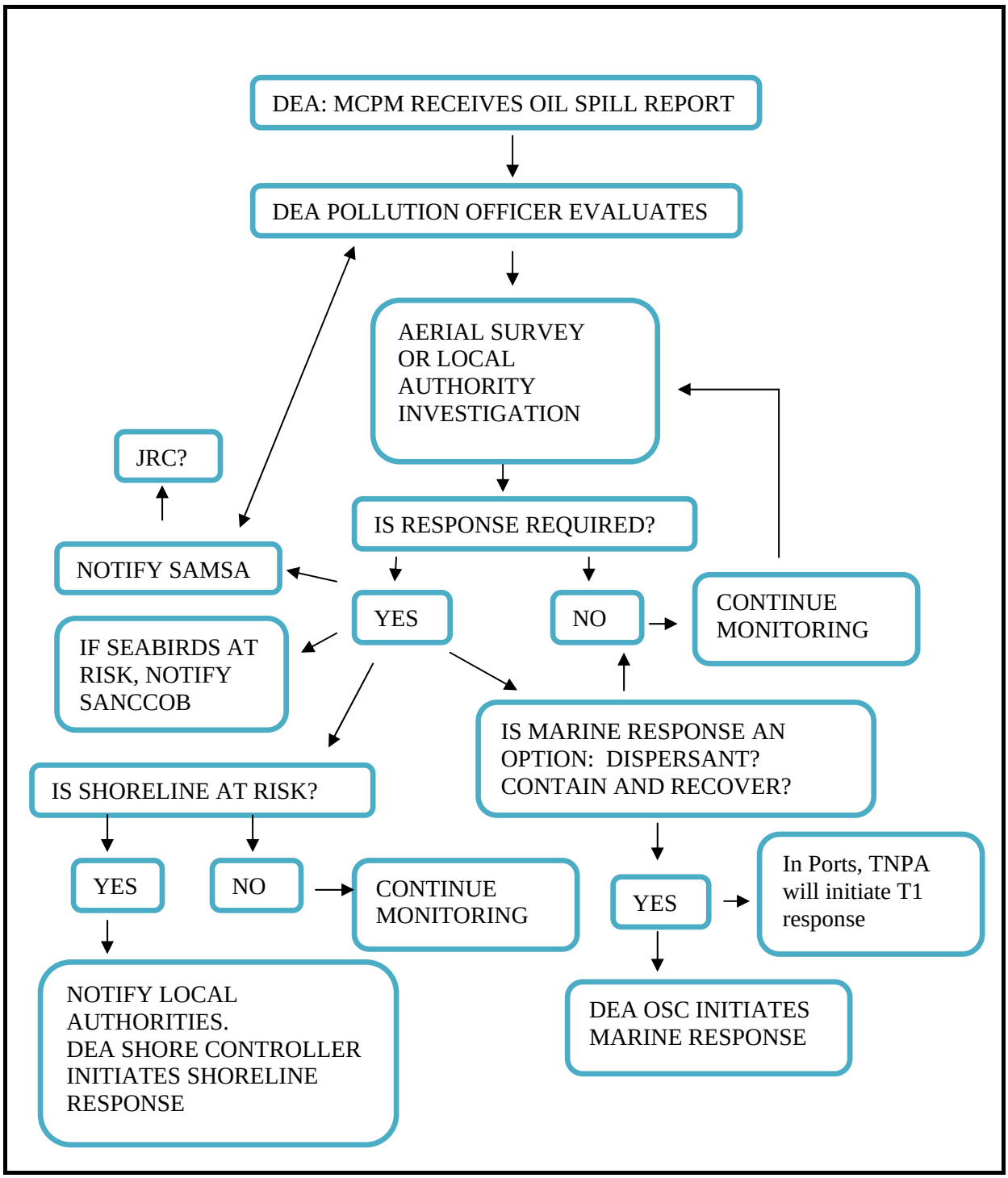


Figure 3: Diagram illustrating initial DEA response actions.

7.1.3 Initial Report Call Numbers

TELEPHONE LIST FOR REPORTING OIL SPILLS

Organisation	Office Tel	Fax	Cell
DEPARTMENT OF ENVIRONMENTAL AFFAIRS: MCPM			
* Marine Pollution Officers: Dr Yazeed Petersen (DD) Feroza Albertus-Stanley (AD) Marine Pollution Officer	 021 819 2450 021 819 2457	 021 819 2445 021 819 2445	 083 530 3127 072 173 6234
SAMSA			
WESTERN REGION Capt Dave Colly	 021 421 6170	 021 419 0730	 082 812 2997
Cape Town: Capt G Louw	 021 421 6170	021 419 0730 086 696 9074	083 227 0721
Saldanha Bay Mr. Martin Slabber	 022 714 1612	 022 714 3635	 082 789 6764
Southern Region Capt N. Campbell	 041 582 2138	 041 582 2130	 083 309 6053
Port Elizabeth: Mr B Colenutt (PO)	 041 585 0051	086 616 3205 041 582 1213	 082 445 3167
East London Capt P Kroon (PO)	 043 722 4120	086 615 8659 043 722 2264	 082 445 3166
Mossel Bay Mr. Dave Manley	 044 690 4201	086 616 3370 044 691 1206	 082 477 1813
EASTERN REGION. Capt. Saroor Ali	 031 307 1501	086 616 3205 031 306 4983	 071 686 9593
Durban: Mr. Grant Conway	 031 307 1501	086 615 7055 031 306 4983	 082 449 6350
SAMSA: Maritime Rescue Co-ordination Centre MRCC 24 Hours Operation 021 938–3300 24 Hours Operation 021 938 -3309 Fax			
Mr A Botes	021 - 938 3310	086 616 4415 021 938 3319	083 254 2944
Head: Centre of Sea Watch Mr. Karl Otto	 021 938 3317	086 654 4742 021 938 3319	 082 812 2991
Duty Controller (all hours)	021 938 3300	021 938 3309	
City of Cape Town: Disaster Operations Centre (DOC):			
Duty Officer (all hours) Alternate: 107 PEC	0800 911 4357 0800 112 4357 107 (from Telkom line) 021 480 7700(from cell)	021 597 5025	

7.2 LEVELS OF RESPONSE AND ACTIVATION

In this Plan, the combating response shall be organised according to the following levels of response as described in the National Plan and illustrated in the diagram below:

a) A **Tier 1** response is where the containment, clean-up and rescue of contaminated fauna can be dealt with within the boundaries of the vessel, berth or a small geographical area where the incident has no impact outside the operational area but poses a potential emergency condition. Such an incident covers a small spill that can be contained and cleaned-up by the ship, terminal, port, or local authority staff using their own resources. The most common type of Tier 1 response deals with an incident occasioned during a ship bunkering operation or a small quantity of oil from an unknown source impacting the shoreline.

b) A **Tier 2** response is where the nature of the incident puts it beyond the containment, clean-up and rescue of contaminated fauna capabilities of the ship, terminal operator or the Local Authority. The containment or clean-up requires the use of some of or all the government and industry resources. It could be near or some distance from operational centres. The incident is usually associated with shipping activities in ports or harbours, coastal waters, pipelines, tank failures or near shore explorations and production operations.

c) A **Tier 3** response is where the nature of the incident puts it beyond containment, clean-up and rescue of contaminated fauna capabilities of a national or regional response. It is usually a large spill which has the probability of causing severe environmental and human health problems. The response will require assistance from outside the country. Such an incident becomes a major international affair involving a number of aspects of government. When responding to an incident of this nature, strategies outlined in the National Plan should be engaged.

The Tiered Response *(from IPIECA)*

Large spill			TIER 3
Medium spill		TIER 2	
Small spill	TIER 1		
Response required	Local	Regional/ National	National/International

In reality, spills do not fall into convenient categories. It is therefore important to be prepared to initiate at the higher tier as soon as possible, as it is easier to stand down an alerted system than to try to escalate a response at the last moment.

7.2.1 Department of Environmental Affairs Response

Once the Department of Environmental Affairs has assessed the initial report, and found it necessary to initiate a response, the organisational structure outlined in Fig. 4 (Section 8.1) will come into effect. The functions of the officers concerned are described in Section 8.2.

7.2.2 Local Authorities Response

If, during the evaluation of the spill by the Department of Environmental Affairs, it is established that there is a threat to the coastline, the Department will inform the relevant Local Authorities accordingly. The sequence of steps that will take place and activities required of Local Authority Officers are described below and in Section 8.4. Their relationship to the Department of Environmental Affairs is described in Section 8.3.

ALERT - If a threat is present, but not imminent, the Department of Environmental Affairs will request the Local Authorities to inform their key personnel (i.e. those who may be involved) who are to remain contactable. SAMSA, in consultation with DEA will decide whether it is appropriate to assemble a Joint Response Committee

MOBILISATION - As the threat draws closer, the Local Authorities will be requested to begin moving equipment, materials and labour onto site.

IMPLEMENTATION - As the impact of oil becomes imminent, the Department of Environmental Affairs will authorise the deployment of equipment, labour and materials.

If the Local Authority feels the implementation of specific protection measures cannot be delayed, authority to proceed can be obtained from the Dept. of Environmental Affairs by telephone. It must then be confirmed later by fax or email to the Dept of Environmental Affairs, quoting date, time, person contacted, and action implemented. If difficulty is encountered in contacting the Dept. of Environmental Affairs such requests may be channelled through SAMSA or the Disaster Operations Centre of the City of Cape Town.

REVIEW - Local Authorities are to review the clean-up operations continually, to ensure that the operations being carried out are cost effective. The Department of Environmental Affairs or the Joint Response Committee, will continually review the overall threat situation, re-evaluate the response decisions, and advise the Local Authorities accordingly.

TERMINATION - Once the threat has passed, the Department of Environmental Affairs will decide, through the Joint Response Committee, at what stage the clean-up operations will cease and the protective works that were installed can be removed.

8. ORGANISATION

8.1 DEA and SAMSA ORGANISATION

The DEA Oil Spill Response Organisation and its linkage to SAMSA are presented schematically in Figure 4 below. This organisation is only effective for the duration of an oil spill. Depending on the spill scenario, individual personnel will undertake each of the following functions:

- DEA On-Scene Co-ordinator
- DEA Shore Controller
- DEA Logistics Officer
- DEA Environmental Liaison Officer
- DEA Media Officer
- SAMSA Operations Manager
- SAMSA Administration Officer

For limited spills, the functions above may be combined and undertaken by a smaller number of Departmental Officers. During a spill, this team will meet regularly through the JRC for the purpose of planning, reviewing and managing the operation.

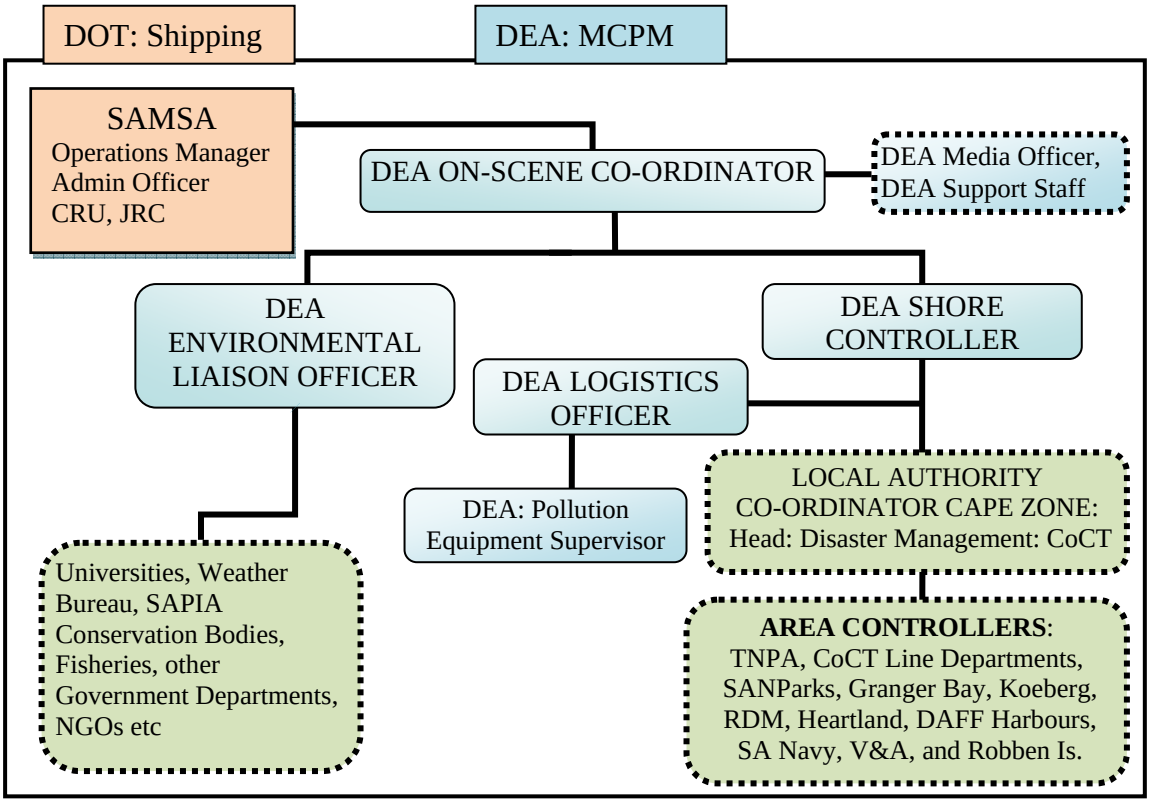


Figure 4: Diagram showing the DEA Response Team and Associated Links

8.1.1 Joint Response Committee (JRC)

The Joint Response Committee is convened on the instruction of the SAMSA Operations Manager, usually for Tier 2 or Tier 3 incidents, after consultation with DEA and other major role players. The JRC is chaired by SAMSA's Operations Manager or, the DEA OSC if no shipping casualty is involved. The role of the JRC is to:

- bring together all major role players to discuss and agree to plans for prevention and combating of oil pollution during the incident;
- co-ordinate all operations and approve expenditure to ensure prompt payment by insurers;
- meet regularly, usually daily, but will decrease as the urgency abates;
- provide a co-ordinated and factual response to the media and arrange press conferences with major stakeholders.

The convening of the JRC and establishing the JOC with communications and facilities will be undertaken by the Casualty Response Unit (CRU) if a shipping incident is involved. Where a CRU is not involved the DEA OSC and/or the SAMSA Operations Manager will establish the JOC.

The protocol for the management of the JRC is provided in the National Plan. A record of decisions taken at the JRC should be provided after each meeting. (See example in Appendix V)

The following representatives will make up the JRC, as relevant:

- SAMSA Operations Manager or delegated Officer (Chair)
- Ships Owner / Insurer
- Independent Auditor
- DEA On Scene Co-ordinator (Alternate Chair)
- DEA Environmental Officer
- SAMSA Admin Officer
- Local Authority Co-ordinator
- TNPA
- Area Controllers
- Media Officers
- SANCCOB representative

8.1.2 Casualty Response Unit (CRU)

In the event of there being a significant maritime involvement resulting from a shipping incident, such as salvage of stricken vessels, SAMSA will establish a Casualty Response Unit. This could either be set up in conjunction with JOC or at another convenient location such as the Port Control Centre located at the Port of Cape Town. This unit will be equipped with the necessary telephones, radios, maps, charts, state boards etc., and will serve as the operational headquarters for the following persons:

- SAMSA Operations Officer
- Senior ship surveyors
- Naval architect
- SAMSA legal officer
- SAMSA administration officer
- TNPA representative (if a Port is involved)

The SAMSA CRU team shall undertake the following actions:

- Determine the name and contact details of the vessel's owner;
- Establish the insurance status of the vessel and the name of the P&I Club, if any;
- Request details of the fuel oils and other harmful substances on board;
- Evaluate the specific threat of the pollution posed by the vessel in respect of her bunkers and/or cargo on board;
- Obtain any additional particulars, calculations or considerations required by the Operations Manager;
- Convene a JRC and establish a JOC with communications and facilities;
- Obtain a cargo manifest for the ship;
- Prepare press releases;
- Inform affected authorities and parties; and
- Where appropriate, represent SAMSA as part of any active intervention aboard the ship casualty.

8.2 JOB DESCRIPTIONS OF DEA AND RELEVANT SAMSA OFFICIALS

For convenience, the following are called Job Descriptions, but are solely to inform Authorities of the pertinent tasks that will be undertaken by the officers assigned these functions for the duration of the incident. For reasons of brevity and clarity, the responsibilities and tasks that fall outside the direct activities for preventing and combating pollution of the shoreline by oil are omitted.

8.2.1 DEA On-Scene Co-ordinator

- Determine whether the shoreline is at risk of being impacted by oil.
- Having established that the shoreline is at risk, determine:
  - the probable time and site of the initial impact;
  - the anticipated magnitude of the impact;
  - the probability of a fire hazard;
  - the level of response required: Tier 1, 2 or 3 and the response required by each local authority (ALERT, MOBILISATION or IMPLEMENTATION).
- Inform SAMSA and decide on the requirements of a Joint Response Committee. In light of the above, establish the departmental Response Team and decide on the location for the control centre as set out in Section 8.5.
- Agree on response actions required, with other stakeholders and monitor these activities.
- Decide on deployment of DEA equipment and resources: aerial surveillance, booms, skimmers etc., as required.
- Co-ordinate the subsequent activities of the Response Team, including setting up daily meetings, and representing DEA at the JRC.
- Activate the systems for receipt of air surveillance observations, weather forecasts, satellite imagery and other day-to-day information at the control centre.
- Continually gather facts for re-evaluating the situation, and inform other members of the Response Team and Local Authorities of any changes in the level or approach of response measures.
- Obtain approval for steps where financial implications are involved.
- Ensure that accurate records of events are being kept.
- Arrange for the disposal of collected oil and oily debris after consultation with the relevant authorities.
- Keep Shore Controller informed of all developments at the JRC.

8.2.2 DEA Shore Controller

- Advise the Local Authorities of the levels of response required.
- When necessary, establish a Shore Control Centre.
- Ensure, where possible, that the recommended priority protective measures are implemented timeously. Advise on boom deployment.
- Ensure that the protection and clean-up of the shoreline is commensurate with the minimum of environmental damage.
- Control the shoreline clean-up to achieve maximum cost effectiveness with the resources available.
- Ensure that the Area Controllers (See Section 8.4.2) keep proper and accurate records.
- Keep the DEA OSC and Environmental Liaison Officer informed of all shore-based response operations.

8.2.3 DEA Logistics Officer

- Immediately upon appointment, ascertain the availability of the equipment listed in Section 12 from the Local Authority Co-ordinator for this zone as well as for the adjoining zones and establish requirements for DEA equipment.
- Bring into operation and maintain the communications network at the extent authorised.
- Continually maintain an up-to-date data bank on the availability and deployment of equipment and materials in the zones under threat of impact of oil as well as in the adjoining zones.
- Arrange for procurement of additional materials and equipment as may be required by DEA Shore Controller.
- Within the framework of government policy make all the required arrangements for the transport and accommodation of Departmental Officers.

8.2.4 DEA Environmental Liaison Officer

- Co-ordinate collection of information regarding environmental matters e.g. ecological sensitivity of areas, weather predictions etc and ensure that the JRC remains informed.
- Supply DEA On-Scene Co-ordinator with all relevant information.
- Liaise with environmental experts, NGO’s and I&AP’s.

8.2.5 DEA Pollution Equipment Supervisor

The DEA pollution equipment is held at the DEA Pollution Store in Paarden Island in Cape Town. The store is manned by one supervisor and two artisans. The supervisor is responsible for:

- Maintaining a register of all equipment;
- Ensuring equipment is well maintained and ready for deployment;
- Adhering to maintenance schedules for all equipment;
- Loading and dispatching equipment when required;
- Assisting with deployment of equipment when required;
- Ensuring staff are adequately trained to handle equipment;
- Keeping records of where and when equipment is deployed;
- Ensuring equipment is cleaned or replaced after each incident.

8.2.6 DEA Media Officer

- Liaise with other organisations in terms of media response.
- Provide press releases, press meetings and photographic opportunities, working through JRC where appropriate.
- Participate in daily operational meetings.
- Ensure Website is maintained and updated.
- Co-ordinate VIP visits.
- Maintain archive of media response for permanent record.

8.2.7 SAMSA Operations Manager

- Where appropriate will set up a Casualty Response Unit.
- Convene a JRC and establish a JOC with all communications and facilities.
- Co-ordinate and supervise all technical activities relating to a shipping casualty.
- Supervise any oil transhipments.
- Co-ordinate legal and financial aspects relating to an incident, in collaboration with Legal Adviser and SAMSA Administration Officer.
- Consult with DEA On-Scene Co-ordinator in matters relating to environmental considerations connected to a potential or actual oil spill.

8.2.8 SAMSA Administration Officer

- When required, with the assistance of the DEA On-Scene Co-ordinator and the SAMSA Operations Manager, negotiate and arrange for guarantees/undertakings to be obtained from owner / agents / insurance representatives.
- Undertake the task of minute's secretary for meetings called by JRC.
- Maintain separate, complete and up to date records of all technical and environmental activities pertaining to the spill incident and of expenditure incurred by all parties involved.
- Attend to the purchase of consumables and capital equipment required by both the SAMSA and Department of Environmental Affairs after having obtained the necessary authorisation.
- Receive and authenticate all claims for loss or damage as envisaged either in Section 9(1)(a) or Section 9(1)(c) of Act No.6 of 1981 and process for payment.
- Receive and authenticate all statements of account for protection measures taken and clean-up costs incurred by Local Authorities and parties contracted to SAMSA or Department of Environmental Affairs and process for payment. (Claims relating to coastal protection and clean-up are to be channelled through the Department of Environmental Affairs before processing.)

8.3 LOCAL AUTHORITIES ORGANISATION

In the event of an oil spill, Local Authorities are required to take certain actions and nominate certain persons in order to be able to respond effectively to the spill.

In this Zone, the Head: Disaster Management Centre of the City of Cape Town will be the Local Authority Co-ordinator (See Section 6.2 and 8.4.1). In addition, when alerted, all Local Authorities concerned must nominate officers from within their organisations to become Area Controllers, Response Officers and Administration Officers for the duration of an incident. The inter-relationships of these officers, whose efforts will be supervised by the DEA Shore Controller, are depicted in the organogram in Figure 5. The Area Controllers (for areas A-H as indicated in Section 10) will co-ordinate the activities of the Site Officers.

In terms of response actions, the Local Authorities will be required to provide assistance in the form of supervision, labour, transport and equipment for the protection and clean-up of their beaches and estuaries as set out in Section 10. They will also be responsible for making arrangements with local Traffic and Police Officers to ensure traffic and crowd control in the vicinity of the impacted area.

8.4 JOB DESCRIPTIONS OF LOCAL AUTHORITY OFFICERS

As in Section 8.2, the Job Descriptions prescribed here include only those tasks to be undertaken by the appointed officers in the event of an oil spill incident.

8.4.1 Local Authority Co-ordinator

- Establish and maintain the communications network between DEA Shore Controller and Area Controllers.
- Provide the DEA Logistics Officer with information on the present deployment of equipment in the Zone and the availability of other equipment within the Zone.
- Represent local authorities at JRC if necessary.
- Co-ordinate the supply of equipment between Local Authorities.
- Ensure adequate traffic and crowd control.
- Issue permits to DEA personnel and scientific advisers to allow free access to shoreline.
- Undertake preparatory activities as listed in Section 6.2.

8.4.2 Area Controller

- Supervise shoreline protection and clean-up measures and ensure effective control of work parties on site.
- Obtain approval for purchase of capital equipment.
- Procure consumables, labour and machinery hire.
- Ensure that time sheets for charge hands, labour and machinery are kept on an hourly basis.

8.4.3 Site Officer

- Supervise clean-up teams.
- Keep log of manpower and equipment used.
- Collect samples.
- Keep Area Controller informed of progress and areas requiring special attention.

8.4.4 Area Administration Officer

- Maintain time sheets for charge hands, labour and machinery on an hourly basis and the tasks performed against these time sheets.
- At the end of the incident, provide a full report on the operations undertaken and detailed costing of each operation.

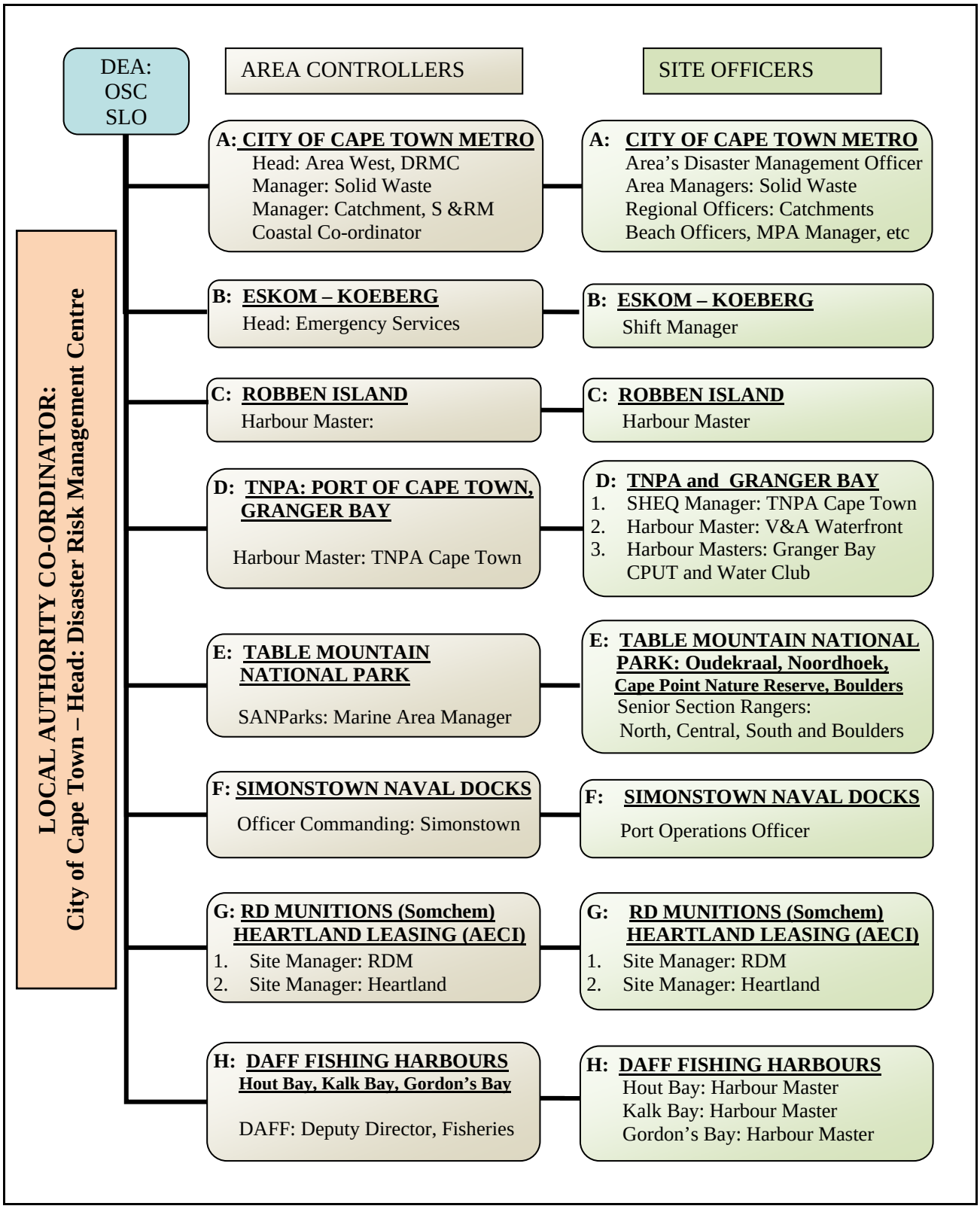


Figure 5. Diagram showing the Local Authority Organisation for Areas A-H (in Section 10)

8.5 FACILITIES

8.5.1 Joint Operations Centre (JOC)

The Joint Response Committee (JRC) which is described in Section 8.1.1 will operate from the Joint Operations Centre (JOC). The JOC will be established at a suitable venue as close as possible to the response operation, to deal with Tier 2 or Tier 3 spills. In the Cape Zone this would usually be the City of Cape Town's Disaster Operations Centre which is located in Goodwood.

The co-ordination of all shoreline protection and clean-up activities will take place from this Centre. The Centre comprises a sophisticated communications room and operations room from where the co-ordination of manpower and resources will be undertaken during a major oil spill situation. In terms of the CoCT Disaster Risk Management Plan, it acts as the centralised link between all Municipal Departments and Local Authorities involved with this plan, as well as numerous other bodies including the SAPS, SANDF, SABC, EMS / METRO etc.

For smaller incidents, other facilities could be used, such as the local municipality offices.

The JOC will provide the communications and facilities required for the Joint Response Committee. This facility will need to be equipped with telephones, fax machines, photocopier, white boards, computer and email facilities, and all conveniences to run meetings. It would also be useful to have a digital projector and screen for relaying photographic information.

8.5.2 Shore Control Centre (SCC)

In the event of large quantities of oil (Tier 2 or Tier 3 spills) impacting, or threatening to impact the shoreline, a Shore Control Centre will be established at a convenient location. Depending on the circumstances and extent of the operation, this Shore Control Centre may either be established in conjunction with the JOC or as a separate entity. Local Disaster Management Centres or Mobile JOC's or even offices or hotels could accommodate this centre. The co-ordination of all shoreline protection and clean-up activities will take place from this Centre. The same facilities as described for the JOC are required.

The following persons will operate from this facility:

- DEA Shore Controller
- DEA Logistics Officer
- Local Authority Co-ordinator (alternatively at JRC)
- Local Authority Area Controllers (alternatively at JRC)
- DEA On-Scene Co-ordinator (alternatively at JRC)
- DEA Environmental Liaison Officer (alternatively at JRC)

8.5.3 Local Shore Control Centres

In the event of lesser spill situations, where oil has impacted or is threatening to impact the shoreline in restricted localised areas, protection and clean-up operations may be co-ordinated from the Local Shore Control Centre to be established at the time. These Centres are in direct contact with the JOC. The number of officers operating from these centres will depend on the size and range of the spill.
The City of Cape Town Disaster Management is able to provide these detachment units, as needed, through their logistics department.

8.5.4 Mobile Control Units

The City of Cape Town's Disaster Management has mobile units which can be used for on- site co-ordination. These self-contained vehicles are well equipped with radio and conference facilities, and have access to the computer systems of the traffic control and fire departments. They could accommodate the Shore Logistics Officer, Area Controllers, and Area Administration Officers, depending on the circumstances. One of the vehicles has off road capabilities.

8.6 COMMUNICATIONS

8.6.1 Telephone and Cell Phone

This will be the main form of off-site communications between the control centres and other outside agencies or bodies. During high profile incidents, cell phone networks may become jammed due to extensive use by media and response personnel, and other forms of communications may have to be utilised.

8.6.2 E-mail and Website

E-mails are an effective way of distributing information such as press releases, weather reports and photographic accounts from on-site locations. Distribution groups can be set up in the address list at the beginning of the incident to facilitate circulation. Often, personnel are working remote from their normal offices, and hence receipt of emails should not be taken for granted. It is recommended that receipt of emails be confirmed either through follow up phone calls for urgent matters, or by requesting a "read receipt" option.

A website, managed by DEA, with all the relevant information pertaining to the incident is a useful tool for ensuring that the factual information is relayed correctly to the other stakeholders, the press and members of the public. This could be a website dedicated to oil spill response and contingency planning and could include all the oil spill contingency plans. Such a site would be invaluable in keeping local authorities informed of amendments to their plans and for sharing lessons learned.

8.6.3 Radio

Radio facilities may be utilised for communications among the various agencies involved in the oil spill response:

- DEA Officers may communicate between themselves and with the pollution vessels and aircraft by means of their own VHF sets, using the marine frequencies.
- The City of Cape Town Metro has an extensive radio network and, amongst others, is in communication with all the Local Authorities and neighbouring District Municipalities, the NSRI and skiboats via the Harbour Master. The Mobile JOCs are equipped with similar communication facilities.
- SANParks has a limited number of VHF two-way radios which can be used for communication.

8.6.4 Media Response and VIP Visits

A major oil spill is of immediate interest to the local and international media. It is in the public interest, and the interest of all concerned, to keep the media informed as fully and regularly as possible. Failure to consider the media response at an early stage may have serious implications for the management of the whole incident.

A designated DEA media officer (refer to Section 8.2.6) will arrange press conferences and issue regular news bulletins. Information provided should be consistent with other organisations and as accurate as possible. Good co-operation between all press officers is essential, and combined press conferences will be arranged through the JRC. The media must not be allowed to interfere with the operational activity of the emergency operation.

A strategy for interacting with the media should be developed pro-actively, and daily press conferences and news bulletins should be arranged. A media information pack should be prepared prior to any incident. This will facilitate good media relations during an event. An initial pro-forma press holding statement should be prepared by the media officer. A press release/sitrep template is provided in Appendix VI. A dedicated website will provide a reliable source of information, and should be updated regularly.

Whilst staff cannot be prevented from talking to the media, they should be advised to refer all queries to the media officer. If they are hounded by reporters, they should limit their comments to exactly what they are doing and not be tricked into making assumptions or discussing issues on which they are not fully informed. The media officer should be pro-active in facilitating opportunities for the press to interview response personnel.

It is inevitable that, in the case of a major incident, Ministers or other VIP's will wish to visit the site or response centres. The Media Officer should ensure that these visitors are properly escorted and informed, and should advise management and staff of these visits during the daily meetings.

9. RISK ASSESSMENT AND COASTAL SENSITIVITIES

9.1 IDENTIFICATION OF RISKS

The National Contingency Plan describes the risks associated with high volumes of shipping traffic passing around the South African Coast. All maritime traffic, calling at South African Ports or in transit around the coast, presents a risk of marine pollution resulting from collisions, groundings, oil cargo and bunker transfers, structural failure or other operational spills. Various types of oil from light crude to heavy bunker fuels can be released from these types of casualties.

The table below summarises a few of the major incidents which have occurred in or close to the Cape Zone.

Table 9.1 Some major incidents impacting the South African Coast

YEAR	INCIDENT	OIL SPILLED	ENVIRONMENTAL IMPACT
1968	*ESSO ESSEN*	15 000 tons crude oil	3 000 oiled penguins 500 oiled gannets Coastline impacted
1971	*WAFFRA*	15 000 tons crude oil	1 200 oiled penguins Coastline badly impacted
1972	Unidentified vessel	unknown	1 700 oiled penguins
1983	*CASTILLO DE BELLVER*	190 000 tons crude oil	1 800 oiled gannets No coastline impacted
1994	*APOLLO SEA*	2 400 tons heavy fuel oil	Major beach clean-up operation 10 000 oiled penguins
2000	*TREASURE*	1 300 tons heavy fuel oil	Major beach clean-up operation 19 000 oiled penguins 19 500 penguins relocated

Casualties involving bulk cargo carriers have resulted in significant spills of heavy fuel oil (Apollo Sea and Treasure) in the Cape Zone. Although such quantities are low by comparison to potential tanker spills, the heavy fuel oil is more persistent than crude oil and has resulted in major impacts on coastal areas and seabird populations. The length of time the oil has been at sea and the types of weathering it has been subjected to, will change its characteristics, and hence the level of response required.

9.2 HEALTH AND SAFETY

The health and safety of the people involved in the response operation is of paramount importance. All personnel should be made aware of the hazards associated with their activities. Often people will be working in unfamiliar surroundings and, where conditions are particularly hazardous, each participating organisation may need its own safety officer. Protective clothing should be provided. Training and exercises can be used to identify health and safety issues.

The following key risks are associated with oil spill response:

- toxic fumes in confined spaces;
- general stress and fatigue of personnel;
- risks associated with equipment handling;
- falling into the sea (hypothermia or drowning);
- slipping on oily decks or oily rocks;
- risks associated with handling oiled wild life;
- sunstroke;
- back injuries from lifting heavy items.

Stakeholders should identify all the health and safety risks associated with their operations and put suitable mitigatory measures in place.

9.3 VULNERABILITY OF THE CAPE COASTLINE

The stretch of coastline covered by this plan falls within a high-risk area in terms of oil pollution. The Cape is a focal point for all ships trading between the Indian and Atlantic Ocean ports and represents a hazardous area for strandings and collisions. The weather is often hazy and, particularly in winter, characterised by rough seas, mist, rain and fog.

The area falls within a “Special Area” as designated under MARPOL Annex 1. The designation was motivated on the basis that the area is “oceanographically unique and hosts a large number of endemic species. Some of these and other species are classified as threatened under the IUCN ‘Red List’ criteria. Significantly this includes the African penguin (now endangered), Cape gannet, and three cormorant species. Operational oil discharges and spills from international and domestic shipping constitute risks to these species and the environment sustaining them.”

Once oil has been spilled at sea, it drifts under the influence of winds, currents and waves. Since most of the surface and inshore currents around the coast of South Africa are themselves strongly influenced by wind direction and speed, a simplistic prediction of oil movement can be based purely on wind data. Oil tends to move at between 2 and 3% of the wind speed, and at a slight angle to the left of the wind direction.

Southerly to south-easterly winds predominate in summer and north to north-westerly winds in winter. South-east winds will cause oil to enter False Bay if the release of oil takes place to the South East of the Zone.

Conversely north-west winds will cause oil to impact the Atlantic seaboard if the release of oil takes place to the north-west of the Zone.

Flotsam at sea is subject to the same influences as oil. Beaches where such material tends to be deposited will therefore also be those where oil is most likely to come ashore.

The coast is known to be treacherous at times. Severe weather conditions, especially in winter when most incidents occur, can severely impede collection and transport of oiled seabirds, from coastal and island habitats. High seas and high energy surf zones increase the risks associated with oiled seabird response. Accessibility to some areas is often limited and this will determine the type of response required.

9.4 COASTAL SENSITIVITY

Detailed information on the environmental sensitivity of the coast to oil pollution can be found in the Coastal Sensitivity Atlas of Southern Africa. This includes:

- Robben Island and Boulders Penguin Colonies, which are breeding sites for endangered and threatened species such as penguins, gannets, cormorants and other sea birds;
- A number of estuaries and lagoons which are important for bait organisms, fish, water birds and recreational amenities;
- Marine reserves and sanctuaries;
- Spawning areas for species such as anchovy and sole;
- False Bay is a calving area for the southern right whales, and otters are common along certain parts of the coast;
- Recreational amenities such as popular beaches, tidal pools, surfing and sailing areas;
- Commercial considerations such as shellfish and seaweed collection, rock lobster catches, demersal and linefish landings.

The whole peninsula area from Green Point to Muizenberg falls within the Table Mountain National Park Marine Protected Area (MPA). The objectives of the declaration of this protected area are to:

1) “Protect and conserve marine ecosystems and populations of marine species;
2) Protect the reproductive capacity of commercially important species of fish, including abalone, rock lobster and traditional linefish and to allow their populations to recover;
3) Promote eco-tourism within the Marine Protected Area.”

Included within this MPA are the following restricted zones where no fishing or harvesting of marine resources is permitted:

- Karbonkelberg
- Cape of Good Hope
- Paulsberg
- Castle Rock
- Boulders
- Kalk Bay

The area between the Lourens River and the Eerste River has also been declared as an MPA. All these protected areas are indicated on the map in Section 10.

9.5 PRIORITIES FOR PROTECTION AND CLEAN-UP

The designation as a "Special Area" will create a larger buffer zone where operational releases of oil from tankers should be kept further offshore to protect sensitive resources. Tankers engaged in coastal trade would be required to retain their slops on board for discharge ashore at established Port reception facilities.

In the event of a major oil spill, large stretches of the coastline may be threatened and, ultimately, impacted by oil. The response to such a spill can be divided into two aspects:

a) Protection
b) Clean-up

In both cases, the resources available for the operation are generally limited. Thus, areas meriting priority attention will have been identified ahead of time. A list of the top priorities is given in Section 9.6, while priority ratings for all sites are given in Section 10.

Priorities are established on the grounds of vulnerability, environmental sensitivity and socio-economic importance.

9.6 LISTING OF PRIORITIES

Two of the priorities in the Cape Zone are the bathing beaches and the rock lobster sanctuary. These can only be adequately protected by the dispersal of oil at sea. Should the oil enter the near-shore zone before it can be dispersed, these two priorities will come into conflict, as the use of dispersants in shallow water is likely to have adverse effects on the rock lobster population. In these circumstances therefore, it might be necessary to allow the oil to come ashore.

A similar situation might arise in False Bay, which is a spawning ground for various fish and squid. Squid in particular are highly sensitive, and it might not be possible to use chemical dispersants during spawning periods.

Threatened species of seabirds such as penguins, gannets and cormorants are also a priority in this area.

Priorities in the Cape Zone are identified as follows:

9.6.1 Protection Priorities

1.	Intakes:	Koeberg Power Station
2.	Estuaries:	Milnerton Lagoon
3.	Seabirds:	Robben Island
		Boulders Penguin Colony
		Noordhoek Tidal Lagoon
4.	Harbours:	Port of Cape Town / V&A Waterfront
		Oceana Boat Club
		Granger Bay Harbour
		Kalk Bay Harbour
		Simonstown Harbour
		Royal Cape Yacht Club
		Hout Bay Yacht Club
		Cape Marlin and Tuna Club
		False Bay Yacht Club
		Gordons Bay Harbour, Yacht Club, Aquatic Club and the
		Harbour Island Marina
		Murrays Bay (Robben Island)

9.6.2 Clean-up Priorities

Should the protection measures have failed, then:

1. Seabird rescue and rehabilitation
2. Estuaries
3. Amenity beaches (some of which have “Blue Flag" and tidal pools.

9.7 STRATEGY FOR PROTECTION AND CLEAN-UP

In managing the response operation, the aims are prioritised as follows:

- first, to prevent pollution occurring;
- second, to minimise the extent of any pollution that occurs;
- third, to mitigate the effects of that pollution.

The DEA On-Scene Co-ordinator, in consultation with SAMSA and the JRC, will decide on the actions required to mitigate the extent of pollution. Initially the DEA surveillance aircraft will be requested to investigate the situation. Decisions will be made regarding the following methods of response:

- Assessing and monitoring;
- Dispersant spraying operations according to strict policy guidelines;
- Mechanical recovery operations;
- Cargo transfer operations;
- Protection of coastal resources;
- Shoreline clean-up techniques.

The aim of the operation is to minimise the damage (environmental, ecological, amenity or financial). The decisions will be based on the following considerations:

- the severe limitations on the effectiveness of at sea recovery techniques;
- the distance from shore of the casualty;
- the type of oil spilled;
- weather conditions and currents;
- the time needed to deploy equipment and resources to the scene;
- environmental sensitivities in relation to clean-up methods.

Oceanographic conditions off the South African coast are not generally conducive to containment and recovery of oil at sea. International experience has shown that it is unlikely that more than 20% of spilled oil can be recovered at sea. Booms and skimmers should therefore only be used in sheltered ports and coastal areas, unless particularly calm conditions prevail offshore.

Booms and barriers will be used to protect sensitive coastal features such as estuaries, harbours and marinas. Where insufficient booms are available, barriers can be constructed from other materials such as straw. Where resources allow, DEA will assist with the deployment of booms in estuaries.

Manual clean-up measures are generally preferred for sandy beaches, to minimise the amount of sand removed. Mechanical equipment, such as bulldozers may be used in situations where the oil is very thick.

Seabirds are particularly vulnerable to oil pollution. Some species such as penguins and gannets can be successfully rehabilitated. One of the preferred strategies is to contain clean penguins within their colonies until the oil is cleared from the area, or to remove breeding pairs to prevent them from becoming oiled. This may separate them from their young, and so chicks may need to be collected for captive rearing.

Further discussion regarding the use of dispersants needs to be initiated by DEA with the other stakeholders. There may be a pertinent case for the early use of dispersants to protect seabird populations. On the other hand, dispersant should not be used close to the seawater intake basin of the Koeberg Nuclear Power Station as this will increase the chance of the oil being taken up with the cooling water. This is a strategic decision that should be made ahead of time, and is in line with the DEA dispersant policy. Criteria need to be established for the Cape Zone, which will facilitate a prompt resolution during an incident.

9.8 SITE SPECIFIC INSTRUCTIONS FOR PROTECTION AND CLEAN-UP

Specific instructions for protection and clean-up of the coastal features of this Zone are given in geographical sequence predominantly from west to east in Section 10. It should be noted that the use of oil spill dispersants is NOT PERMITTED for treating oil that has impacted the shoreline (see Addendum B). In terms of the "Policy on the use of oil spill dispersants in South African waters", the use of dispersants can only be undertaken with approval through DEA (see Addendum F). In short, the policy prohibits the use of dispersants in water depths less than 30 metres and within 5 nautical miles of the coast.

Priorities for both protection and clean-up are indicated in Section 10 by means of the words "high", "medium" and "low" priority ratings.

It will be noticed that in certain areas no clean-up actions are recommended. Exposure to heavy surf action in some areas promotes natural cleansing of both sandy beaches and rocky shores. In addition, there are stretches of the coast which are more or less inaccessible, and clean-up will therefore only be attempted in the event of heavy deposits of oil, from where oil may be refloated and move to estuaries or identified amenity beaches. There may be certain times when it will be necessary to clean beaches which have been assigned a medium or low rating, even if they are only lightly oiled; for example, if an event is to be staged there, or if the beach is used for walking dogs etc.

In some instances, clean-up operations could be more damaging than the oil, and in these instances it might be best to "do nothing."

A map of the whole Zone appears at the beginning of Section 10. Each stretch of coastline on the map is marked with a letter of the alphabet and is apportioned to the responsible local authority for clean-up. In certain cases, abutting Responsible Authorities may be required to undertake clean-up measures for the neighbouring Local Authority, even though these areas do not fall under their jurisdiction. This may be the case where small stretches of coastline are bordered by large stretches or where certain Local Authorities do not have sufficient resources to undertake the required tasks. These areas are marked with a (+) sign in the margin of Section 10.

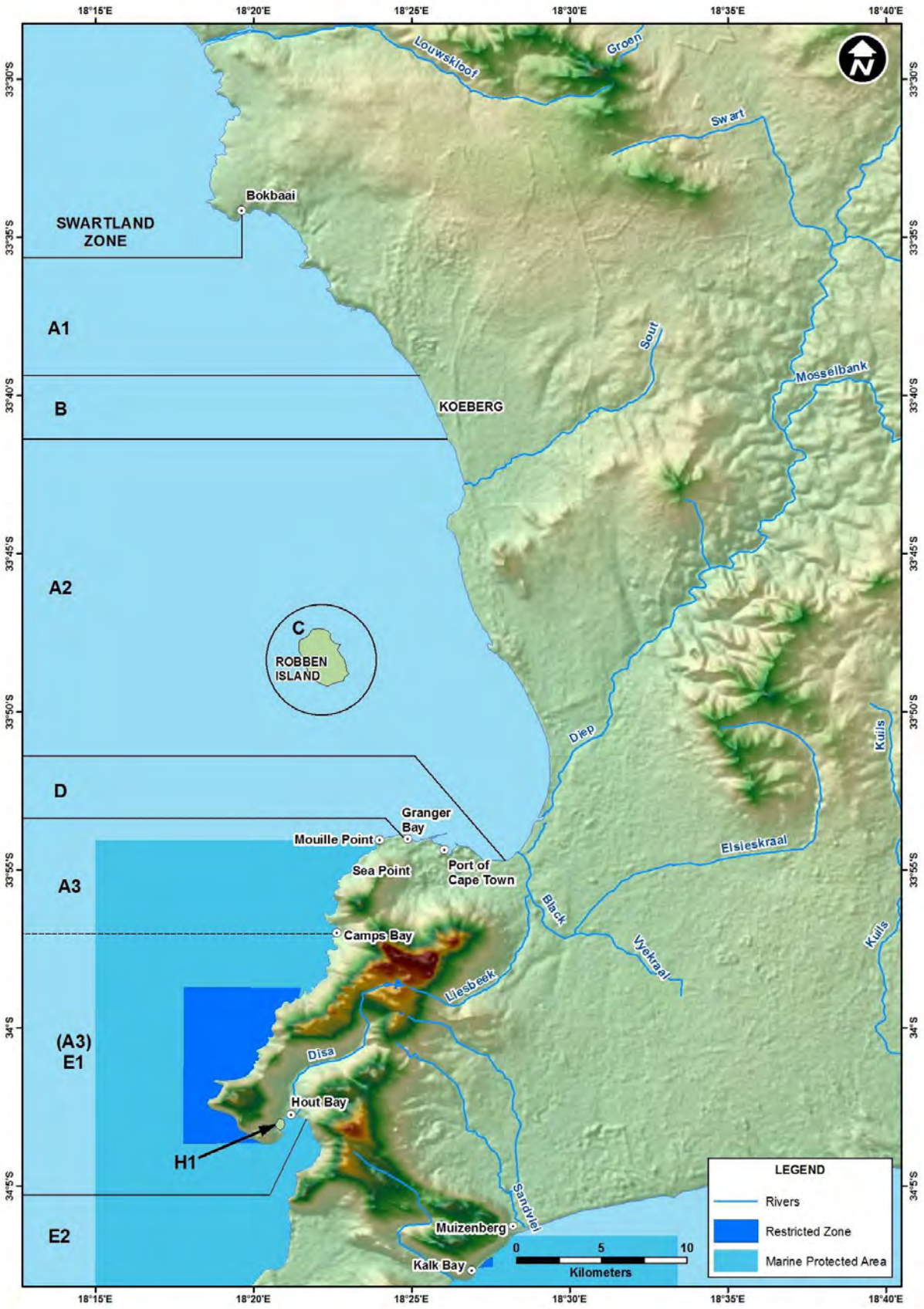
Maps of estuaries, and more detailed instructions referred to under protective action can be found at the end of Section 10. It should be noted that these are the current, recommended procedures and that the linear scales indicated on the estuary maps are approximations only. Should the river mouth conditions have changed, or should the suggested materials not be available, a different approach might have to be adopted.

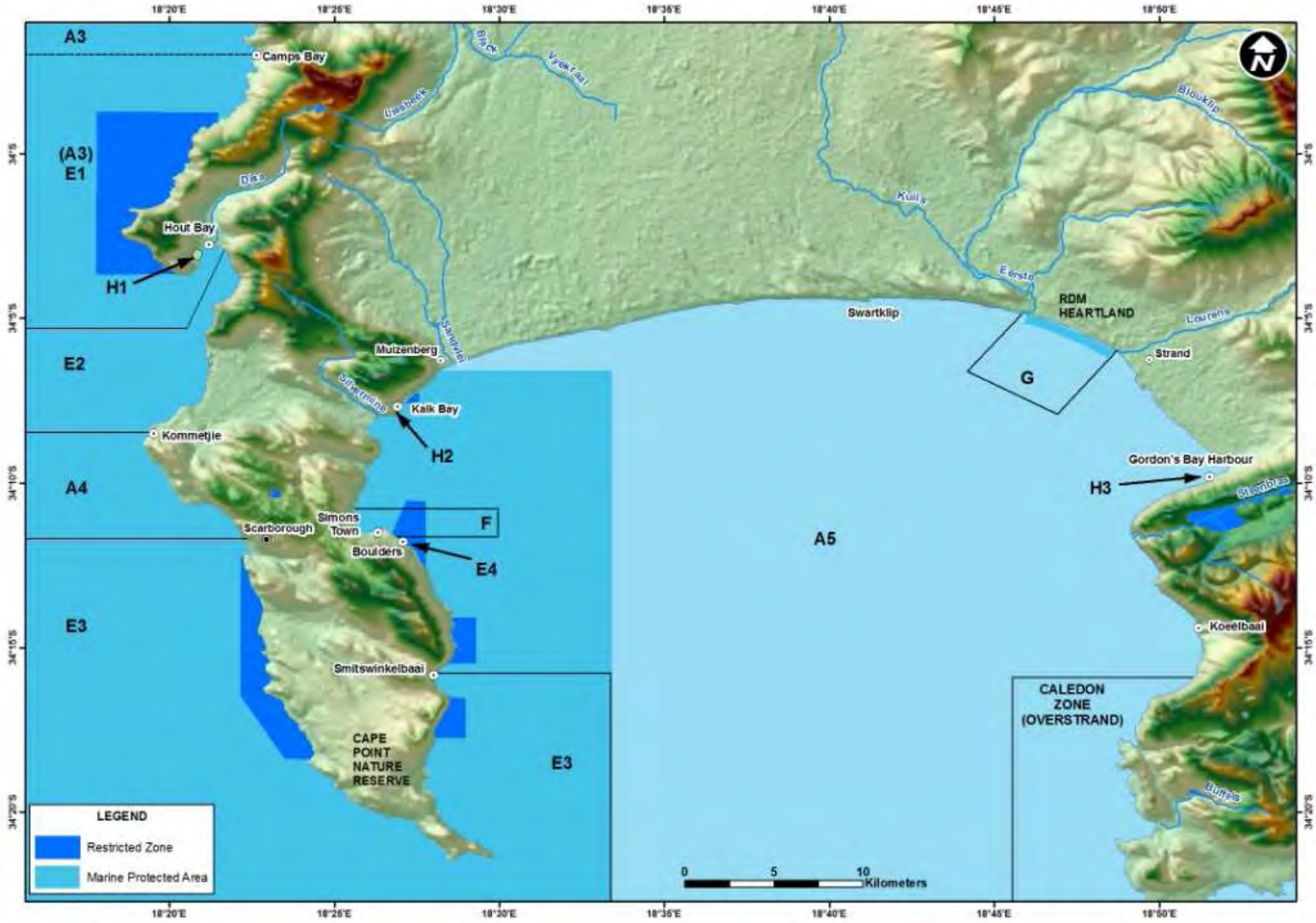
The Catchment, Stormwater and River Management Branch of the City of Cape Town, must be contacted for advice/input in all cases when river mouths/estuaries, within the Cape Zone, are to be closed to prevent movement of oil into these systems. This is to ensure that there will be no un-intended consequences such as a backup of water which could cause over-bank flooding and possible damage to private properties or City infrastructure. Systems that receive treated sewage effluent generally flow fairly well throughout the year, with marked increases in flow during winter. The dynamic nature of the mouths of some of these systems could result in a new outlet point forming, thus essentially circumventing temporary installed barriers such as sand berms or hay bales. Floating booms may be a better option in some cases.

A range of possible alternatives can be found in the document titled "Emergency Barriers from Materials of Opportunity" (EBMO), but it might be necessary to fall back on individual ingenuity and initiative. General details of methods for protection and clean-up can be found in Addendum B.

Section 10 sets out the protection measures that are to be put into immediate effect when requested by the DEA Shore Controller as well as the clean-up measures that are to take place if the coastline is impacted by an oil spill.

10. MAPS AND SITE SPECIFIC RESPONSES


18°15'E
18°20'E
18°25'E
18°30'E
18°35'E
18°40'E
33°30'S
33°35'S
33°40'S
33°45'S
33°50'S
33°55'S
34°S
34°5'S
Louwskloof
Groen
Swart
Bokbaai
SWARTLAND ZONE
A1
B
KOEBERG
Sout
Mosselbank
A2
C
ROBBEN ISLAND
Diep
Kuils
D
Granger Bay
Mouille Point
Sea Point
Port of Cape Town
Elsieskraal
A3
Black
Camps Bay
Vyekraal
Liesbeek
(A3) E1
Disa
Hout Bay
H1
Sandvlei
Muizenberg
E2
Kalk Bay
0
5
10
Kilometers
LEGEND
Rivers
Restricted Zone
Marine Protected Area


18°20'E
18°25'E
18°30'E
18°35'E
18°40'E
18°45'E
18°50'E
34°0'S
34°5'S
34°10'S
34°15'S
34°20'S
A3
Camps Bay
(A3)
E1
Hout Bay
H1
E2
A4
Kommetjie
Muizenberg
Kalk Bay
H2
Scarborough
Simons Town
Boulders
F
E4
E3
Smitswinkelbaai
CAPE POINT NATURE RESERVE
E3
A5
Swartklip
RDM HEARTLAND
G
Strand
Gordon's Bay Harbour
H3
Koeelbaai
CALEDON ZONE (OVERSTRAND)
LEGEND
Restricted Zone
Marine Protected Area
0
5
10
Kilometers
N

10. SITE SPECIFIC RESPONSES

SITE: Responsible Authority Pertinent Detail	PROTECTION Priority Rating	 Action	CLEAN-UP Priority Rating	 Action
A to H DEA: OCEANS AND COAST Rock lobster sanctuary (Melkbosstrand to Die Josie) The whole peninsula area from Green Point to Muizenberg is a Marine Protected Area, with the following restricted (no-take) zones: - Karbonkelberg - Cape of Good Hope - Paulsberg - Castle Rock - Boulders - Kalk Bay **SANParks** manages these MPA's on behalf of DEA. The Helderberg MPA between the Eerste River and Lourens River is managed by the City of Cape Town. Shellfish collection.	High High	Attempts will be made to disperse oil if it is far out at sea, but once inshore, dispersant will not be used as this will result in increased exposure of oil to the rock lobster population. Inform public of hazard with respect to consumption of shellfish.	High	Coastal cleanup to be carried out, taking various environmental sensitivities into account. DEA, SANParks, CapeNature and City of Cape Town environmental advisors to be consulted.
A1: BOKBAAI TO KOEBERG **City of Cape Town Metro** Amenity beach at Silverstroomstrand. Remaining beaches accessible by four-wheel drive vehicles only.			High Medium	Clean amenity beaches all year round. Rocky areas to be cleaned of heavy deposits only. Clean medium to heavy deposits only.

SITE: Responsible Authority Pertinent Detail	PROTECTION Priority Rating	 Action	CLEAN-UP Priority Rating	 Action
B: KOEBERG NUCLEAR POWER STATION **Eskom** Intake basin for cooling water. Beaches on either side of intake basin. Security restricted area along beach which extends 2 km out to sea.	High	Eskom: Koeberg to be alerted immediately. Eskom Oil Spill Contingency Plan for intake basin to come into operation. See Map 3A. Security clearance required.	Medium	Beaches on either side of intake basin to be cleaned of oil at all times to prevent the oil from refloating and entering the intake basin.
A2: KOEBERG TO BLACK RIVER MOUTH **City of Cape Town Metro** Sout River at Melkbos: mouth normally closed but may open after heavy rains. Amenity beaches between Melkbosstrand and at Blouberg, Big Bay and Little Bay and Milnerton. Long sandy beaches between Blouberg and Milnerton, popular walking area. Milnerton Lagoon: mouth usually open. High recreational usage and productive mud flats. Black River: canalized with limited tidal penetration, and polluted.	Medium High Low	If mouth is open, close as in Map 3B. Inform CSRM Branch: CoCT. Mouth to be closed or boomed, as shown in Map 3C. Inform CSRM Branch: CoCT. If resources are available, a floating barrier can be used to prevent oil entering the canal. See Map 3D. Inform CSRM Branch: CoCT.	High High High Low	Should oil enter the lagoon, the DEA Shore Controller must be advised immediately and clean-up should only be undertaken under supervision Beaches to be cleaned all year round. Should oil enter the lagoon, the DEA Shore Controller must be advised immediately and clean-up should only be undertaken under supervision in conjunction with the Cape Town Metro Coastal Co-ordinator. Clean up should be undertaken to prevent oil being refloated.

SITE: Responsible Authority Pertinent Detail	PROTECTION Priority Rating	 Action	CLEAN-UP Priority Rating	 Action
C: ROBBEN ISLAND **Robben Island Museum**		SANCCOB and MCPM must be contacted. Implement Island Bird Contingency Plan (not yet available). Where possible penguins to be contained on Island to prevent them from becoming oiled.		
Penguins and other seabirds	High			
Rocky shoreline with small sandy beaches.			High	Where possible, shoreline to be cleaned of oil at all times, especially on penguin access "highways".
Popular tourist destination with harbour for ferry passenger access.	High	Harbour to be protected using a floating boom or bubble barrier. These are not currently available on the Island and will need to be sourced from DEA. The Harbour should have its own Contingency Plan which would need to be implemented. See Map 3E.	High	Oil to be contained and removed using skimmers or sorbent materials. Jetties to be cleaned using high pressure seawater jets.
D: PORT OF CAPE TOWN and GRANGER BAY **Transnet National Ports Authority**				Contain oil by means of booms and remove using skimmers or sorbent materials. If oil enters yacht basin remove floating oil as quickly as possible.
Table Bay Harbour, including northern coastal stretch to Black River mouth canal. Includes Royal Cape Yacht Club.	High	Implement Port Oil Spill Contingency Plan. Yacht basin entrance to be protected by a bubble barrier. See Map 3F.	High	Rocky area between NE corner of harbour wall and City boundary to be cleaned of medium to heavy deposits of oil by City of Cape Town.
Oceana Boat Club			High	Clean slipway using high pressure seawater jets, and recover released oil.
+V&A Waterfront Development				
Victoria and Alfred Waterfront Basins, with marina development. Popular tourist destination.	High	Liaise with Port of Cape Town and Waterfront Harbour Master regarding protection of basins.	High	Contain oil by means of booms and remove using skimmers or sorbent materials. Harbour walls and jetties to be cleaned using high pressure seawater jets and released oil to be recovered.

SITE: Responsible Authority Pertinent Detail	PROTECTION Priority Rating	 Action	CLEAN-UP Priority Rating	 Action
GRANGER BAY HARBOUR **+Cape Peninsula University of** **+Technology and Water Club** Slipway and Marina development with yacht moorings.	High	Implement Harbour Oil Spill Contingency Plan (not currently available). Prevent oil from entering the harbour by means of floating boom or bubble barrier (not available on site). See Map 3G.	High	Contain oil by means of booms and remove using skimmers or sorbent materials. Harbour walls and jetties to be cleaned using high pressure seawater jets, and released oil to be recovered.
A3: MOUILLE POINT TO HOUT BAY (Excluding TMNP see E1) **City of Cape Town Metro** Amenity beaches at: -Mouille Point beach and tidal pool. -Three Anchor Bay beach and tidal pool. -Rockland's Beach -Milton Road Pool -Broken Baths Beach -Sea Point Pavilion -Sunset Beach and Tidal Pool -Queen's Beach -Saunders Rocks Beach and Tidal Pool			 High High High High High High High High High	 Amenity beaches to be cleaned all year round. Tidal pools to be cleaned under all circumstances using high pressure seawater jets. Amenity beaches to be cleaned all year round. Tidal pools to be cleaned under all circumstances using high pressure seawater jets. Rocky areas to be cleaned of medium to heavy deposits of oil.

SITE: Responsible Authority Pertinent Detail	PROTECTION Priority Rating	 Action	CLEAN-UP Priority Rating	 Action
High amenity beaches and popular tourist areas at: -Clifton: 1st Beach, 2nd Beach, 3rd Beach 4th Beach -Moses Beach -Bachelors Cove -Maidens Cove Tidal Pool -Glen Beach -Camps Bay Beach andTidal Pool -Llandudno -Sandy Bay -Hout Bay			 High High High High High High High High	 Amenity beaches to be cleaned all year round. Tidal pools to be cleaned under all circumstances using high pressure seawater jets, and recovered oil to be contained and removed. Rocky areas to be cleaned of medium to heavy deposits of oil. Amenity beaches to be cleaned all year round. Rocky areas to be cleaned of medium to heavy deposits of oil.
Disa River (Hout Bay), mouth generally closed, but opens during winter months.	High	In the event of high spring tide build barrier at mouth as shown in Map 3H. If open, bulldoze closed. Inform CSRM Branch.	High	Should oil enter the river the DEA Shore Controller must be advised and clean-up should be undertaken under supervision.
E1: CAMPS BAY TO HOUT BAY PART OF TABLE MOUNTAIN NATIONAL PARK **SANParks (and City of Cape Town Metro, see A3)** Rocky coastline with recreational area at Oudekraal. Includes Karbonkelberg Marine Restricted Zone.			 High Medium	 Clean amenity areas all year round. Accessible rocky areas to be cleaned of medium to heavy deposits of oil. Inaccessible rocky areas to be left to natural cleaning.

SITE: Responsible Authority Pertinent Detail	PROTECTION Priority Rating	 Action	CLEAN-UP Priority Rating	 Action
H1: HOUT BAY HARBOUR **DAFF** Fishing boats and yachts. Fish Factories Duikereiland supports seal and seabird colonies.	 High High High	Place bubble barrier or floating boom (not available on site) across mouth of harbour as shown in Map 3I. Implement Harbour Oil Spill Contingency Plan (not yet available). Alert fish factory personnel to stop pumping from intakes both inside and outside the harbour. SANCCOB and DEA: O&C must be contacted.	 High	Contain oil by means of booms and remove using skimmers or sorbent materials.
E2: HOUT BAY TO KOMMETJIE **PART OF TMNP** **SANParks** Amenity beach at Noordhoek. Rocky coastline. Wildevoelvlei opens at southern end of Noordhoek beach. Tidal lagoons at back of Noordhoek beach.	 High	 In the event of high spring tide build barrier as shown in Map 3J. Inform CSRM Branch: CoCT.	 High Medium High	 Amenity beaches to be cleaned all year round. Accessible rocky areas to be cleaned of medium to heavy deposits of oil. Inaccessible rocky areas to be left to natural cleaning. Should oil enter the lagoons the DEA Shore Controller must be advised and clean-up should be times undertaken under supervision.

SITE: Responsible Authority Pertinent Detail	PROTECTION Priority Rating	 Action	CLEAN-UP Priority Rating	 Action
A: KOMMETJIE TO SCARBOROUGH **City of Cape Town Metro** Amenity beaches at: Kommetjie, Witsands and Scarborough. Rocky coastline.			High	Clean amenity beaches all year round. Accessible rocky areas to be cleaned of medium to heavy deposits of oil. Inaccessible rocky areas to be left to natural cleaning.
Rock lobster processing plant at Witsands.	High	Alert plant personnel.		
Shusters River (Scarborough), pristine; lagoon popular recreational area.	High	In the event of high spring tide build barrier at mouth as in Map 3K. Inform CSRM Branch: CoCT.	High	Should oil enter the river the DEA Shore Controller must be advised and clean up should only be undertaken under supervision.
E3: TMNP: SCARBOROUGH TO SMITSWINKEL BAAI **CAPE OF GOOD HOPE SECTION** **SANParks** Includes Cape of Good Hope and Paulsberg Marine Restricted Zones.				
Popular tourist destination.			High	Clean amenity beaches all year round.
Amenity beaches at Olifantsbos and Buffelsbaai. Rocky coastline, inaccessible in places.			Medium	Accessible rocky areas to be cleaned of medium to heavy deposits of oil. Inaccessible rocky areas to be left to natural cleaning.
E4: TMNP: BOULDERS **SANParks** Penguin Colony: popular tourist site. Sandy amenity beach with boulders and rocky areas.	High	Implement Penguin Oil Spill Contingency Plan. Where possible penguins to be contained on land to prevent them from becoming oiled. SANCCOB and MCPM should be notified.	High Medium	Clean amenity beach all year round. Rocky areas to be cleaned of all deposits of oil, to prevent further oiling of penguins.

SITE: Responsible Authority Pertinent Detail	PROTECTION Priority Rating	 Action	CLEAN-UP Priority Rating	 Action
F: SA NAVY, SIMONSTOWN **SANDF** The following areas fall under the jurisdiction of the SA Navy and are to be cleaned by them: Admirals Beach Cole Point Oil Coast Makrielbaai Offshore rocks; between Seaforth Beach and Boulders; between Hiller Rd and Bellevue Rd (Boulders) and between Windmill Beach and Rocklands Point. Naval docks	 High	 Navy to place boom across mouth of dockyard according to their standard operating procedure. (See Map 3L).	 High High High High Medium Medium	 Amenity beaches to be cleaned all year round. Rocky areas to be cleaned of medium to heavy deposits of oil. Navy to contain oil by means of booms and remove oil using skimmers or sorbent material.
H2: KALK BAY HARBOUR **DAFF** Fishing Harbour	 High	 Place bubble barrier or boom (not available on site) across mouth of harbour as shown on Map 3M. Implement Harbour Oil Spill Contingency Plan (not yet available).	 High	 Contain oil by means of booms and remove using skimmers or sorbent material.

SITE: Responsible Authority Pertinent Detail	PROTECTION Priority Rating	 Action	CLEAN-UP Priority Rating	 Action
A5: FALSE BAY COASTLINE: SMITSWINKELBAAI TO MUIZENBERG **City of Cape Town Metro**				
Amenity beaches at:				
-Froggy Pond			High	Clean amenity beaches all year round.
-Boulders			High	
-Seaforth			High	
-Jubilee Beach/Promenade			High	
-Long Beach			High	
-Glencairn			High	
Tidal pools at:				Tidal pools to be cleaned all year round. Remove
-Shelley Pool, Glencairn Pool and Water Edge			High High	oil by means of skimmers and sorbent materials. Clean walls using high pressure seawater jets, and recover released oil.
-Windmill Beach			High	
-Fisherman's Beach			High	Clean amenity beaches all year round.
Elsies River, mouth closed but may overtop at high spring tide.	Medium	Build sand barrier to prevent overtopping. Inform CSRM Branch: CoCT.		
NSRI Slipway			High	Clean slipway using high pressure water jets.
Naval, Cape Marlin and Tuna Club and False Bay Yacht Club anchorage in bay west of Naval docks, Simonstown. See Map 3L.	High	Impossible to protect. Where possible remove boats from water.	High	In the event of major oil spill, the cleaning of boats must be organised through individual clubs in conjunction with the DEA Shore Controller.

SITE: Responsible Authority Pertinent Detail	PROTECTION Priority Rating	 Action	CLEAN-UP Priority Rating	 Action
Amenity beach at: Fish Hoek Rocky coast south of beach. Silvermine River: tidal penetration blocked by weir under road bridge. Flat rocky platforms between Clovelly and Muizenberg. Tidal pools at St. James, Dalebrook, Kalk Bay and Willy's Pool.			High Medium Medium High High	Clean amenity beach all year round. Rocky areas to be cleaned of medium to heavy oil deposits. Lagoon below weir should be cleaned under supervision. Rocky areas to be cleaned of medium to heavy oil deposits. Oily water collecting in pools to be pumped out and separated. Remove oil from tidal pools by means of skimmers and sorbent materials. Clean walls using high pressure seawater jets.
A5: FALSE BAY COASTLINE (cont): MUIZENBERG TO MACASSAR **City of Cape Town Metro** Long sandy amenity beach between Muizenberg and Kapteinsklip, and from Swartklip to RDM (Somchem) security fence. Popular for walking and fishing. Zandvlei mouth: canalised above beach, sensitive estuarine system. Zeekoei mouth: canalised, outfall of Rondevlei, Zeekoevlei and Cape Flats WWTW.	 High Medium	 Mouth to be closed as shown in Map 3N. Inform CSRM Branch: CoCT. Mouth to be closed as shown in Map 3(O). Inform CSRM Branch: CoCT.	 High High High	 Beaches to be cleaned all year round. Should oil enter the river, the DEA Shore Controller must be advised immediately, and clean-up should be undertaken under supervision. Should oil enter the river, the DEA Shore Controller must be advised immediately, and clean-up should be undertaken under supervision.

SITE: Responsible Authority Pertinent Detail	PROTECTION Priority Rating	 Action	CLEAN-UP Priority Rating	 Action
Tidal Pool at Strandfontein.	Medium	Place sandbags on tidal pool wall if it is likely that oil will be washed over wall.	High	Tidal pools to be cleaned all year round. Remove oil by means of skimmers and sorbent materials. Clean walls using high pressure seawater jets.
Mnandi amenity beach.			High	Amenity beach to be cleaned all year round.
Seagull sanctuary at Wolfgat.				
Beach resort at Macassar.			High	Clean amenity beaches all year round, other areas to be cleaned prior to and during holiday season or if there are medium to heavy deposits of oil.
Sandstone rocky cliffs at Swartklip			Medium	Rocky cliffs to be left to natural cleaning.
F: SECURITY AREA **RD Munitions and Heartland Leasing** (previously Somchem and AECI) (Helderberg Marine Protected Area)				
Sandy beach enclosed by security fence. Clearance required prior to entry. Recently designated as a Marine Protected Area managed by the City of Cape Town Metro.			Medium	Clean medium to heavy deposits of oil, under supervision of MPA manager.
Eerste River: mouth opens seasonally	Medium	Mouth to be closed as shown in Map 3P. Inform CSRM Branch: CoCT	Medium	Should oil enter the river, the DEA Shore Controller must be advised and clean-up should be undertaken under supervision.
Lourens River: mouth opens seasonally.	Medium	Mouth to be closed as in Map 3Q. Inform CSRM Branch: CoCT	Medium	Should oil enter the river, the DEA Shore Controller must be advised and clean-up should be undertaken under supervision.

SITE: Responsible Authority Pertinent Detail	PROTECTION Priority Rating	 Action	CLEAN-UP Priority Rating	 Action
A5: FALSE BAY COASTLINE **(cont): STRAND / GORDONS BAY/ KOEELBAAI** **City of Cape Town Metro**				
Amenity beach between Lourens River mouth and Harmoniestrand with rocky outcrops in places. Popular amenity area at Strand.			High	Clean amenity beaches all year round, other areas to be cleaned prior to and during holiday season or if there are medium to heavy deposits of oil. Rocky cliffs to be left to natural cleaning
Harbour Island Marina: managed by Homeowners Association. Slipway managed by City of Cape Town.	High	Place bubble barrier or floating boom (not available on site) across mouth of harbour as shown in Map 3R. Implement Harbour Oil Spill Contingency Plan (not yet available).	High	Contain oil by means of booms and remove using skimmers or sorbent material.
Amenity beaches on either side of Gordons Bay Harbour with rocks in places on south side.			High	Clean amenity beaches all year round. Rocky areas to be cleaned of medium to heavy deposits of oil.
Inaccessible rocky coast between amenity beach and Platbank and Steenbras River Mouth			Low	Inaccessible rocky areas to be left to natural cleaning.
Steenbras River: mouth rocky, tidal, popular fishing area.	High	Mouth to be protected as shown in Map 3T. Inform CSRM Branch: CoCT	High	Should oil enter the river, the DEA Shore Controller should be advised immediately and clean-up should be undertaken under supervision.
Rocky coastline.			Medium	Rocky areas to be left to natural cleaning unless there is a medium to heavy deposit of oil.
Amenity sandy beaches at Boskloofpunt and Koëelbaai. Tidal pool.			High	Amenity beaches and tidal pool to be cleaned all year round.

SITE: Responsible Authority Pertinent Detail	PROTECTION Priority Rating	 Action	CLEAN-UP Priority Rating	 Action
H3: GORDONS BAY HARBOUR **DAFF** Gordons Bay harbour: contains fishing boats, yachts and Naval Academy	High	Harbour to be protected using bubble barrier or floating boom. (Not available on site, need to be sourced from DEA). See Map 3S. Harbour should have an Oil Spill Contingency Plan which would need to be implemented.	High	Contain oil by means of booms and remove using skimmers or sorbent materials.

MAP 3A **KOEBERG POWER STATION**



Cooling water for the Koeberg Nuclear Power Station is provided via the intake basin, and is essential for the safe and efficient operation of the power station. Should oil enter the basin, the power plant would have to be shut down.

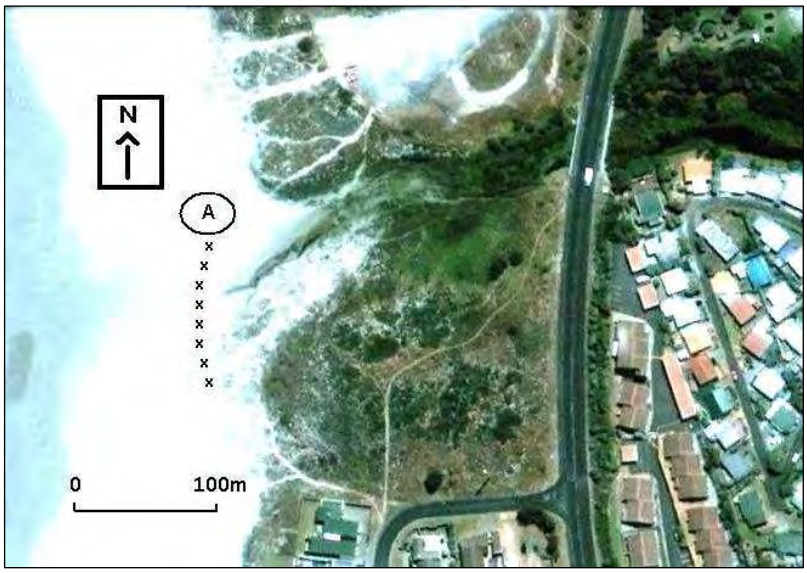
ESKOM will implement their Oil Spill Contingency Plan, which involves the placement of a floating boom as shown in the figure above. In the event of an oil spill, it is essential that the Power Station be alerted immediately of any threats of pollution.

The Koeberg Nuclear Power Station is a high security restricted area which extends along the beach as well as 2 km out to sea.

MAP 3B SOUT RIVER (MELKBOS)

MOUTH CONDITONS

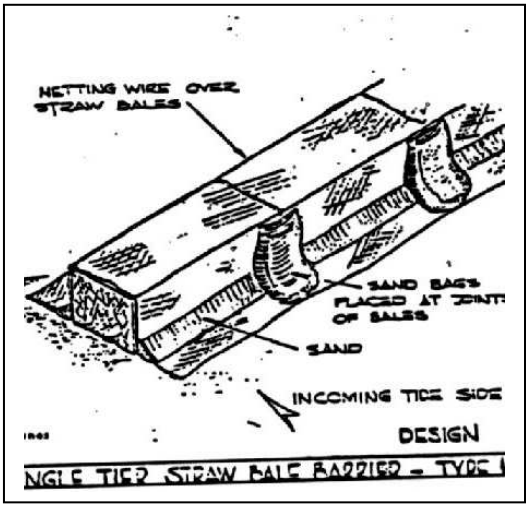
The mouth of this river is usually closed, but could open during heavy winter rains. The Ouskip Caravan Park is located just upstream of the mouth and the road also crosses just above the beach. If the mouth is closed, the height of the sand barrier may have to be raised to prevent overtopping by the sea during high spring tide conditions. In the event of the mouth being open, either of the following procedures will be required.



CONSTRUCTION OF SAND BARRIER

Sand should be moved, by means of a front end loader, into the position marked XXX, until a stable sand barrier has been created. Care should be taken not to disturb the vegetated sand dunes on either side of the river.

CONSTRUCTION OF STRAW BALE BARRIER



Lay straw bales tightly end to end, commencing at the middle of the barrier and working outwards. Starting at one end, unroll 1.8m wide 50mm mesh wire netting along the length of the barrier. If more than one roll of wire netting is required, provide a 1m overlap. Place wire netting around bales as in sketch. Place bags filled with sand on the wire netting, on either side of the barrier where the straw bales abut and as close to the bales as possible. The bags can be of plastic or hessian, and can be completely filled. The sand for filling them must not be obtained from vegetated sand dunes. The barrier should be laid in the position marked XXX. While either barrier is in position, it is to be inspected regularly, with any repairs being effected immediately. Alternatively, a shore sealing flotation boom could be deployed if available.

RESPONSE TIME

It is estimated that a front-end loader will take 3 hours to raise the sand mound by 0,5m. The straw bale barrier is estimated to take 18 man-hours to construct once all the materials are on site.

MAP 3C **DIEP RIVER (MILNERTON LAGOON)**



MOUTH CONDITIONS

The Milnerton Lagoon is tidal and experiences a strong flow at its mouth. It is permanently open to the sea, due to the increased and permanent treated effluent from the Potsdam Waste Water Treatment Works as well as from the storm water drainage infrastructure in Milnerton. The Woodbridge Island residential development is located in the lagoon area.

BOOM DEPLOYMENT

A possible boom site has been identified between the old and the new road bridge at points AB on the map, where the currents, under normal conditions, are weak enough. This will effectively prevent an oil spill from entering the sensitive upper reaches of the lagoon.

The river is approximately 100 meters wide at this point and has a mudflat bank on its eastern side which extends approximately midway across the river. Both sides of the river banks have suitable slopes to seal contained oil using shore booms.

The use of three 25m sea/port booms and two 10m shore booms will be adequate to span this section of the river. Monitor the tidal conditions so that the booms are deployed on a rising tide or when the tide is high enough to float the boom sections across the river. The mudflats are exposed at low tide and it is impossible to pull the booms across if the tidal conditions are too low.

The river may flow strongly at times during the winter season. In this case it is not advisable to deploy booms until the flooding has subsided. The continuous downstream flow will prevent any oil from penetrating the lagoon mouth. Monitor these conditions closely as it may be necessary to deploy the equipment once the flow has subsided. There is adequate space on both sides of the lagoon to set up skimming and storage facilities if required.

MAP 3D **BLACK RIVER**



MOUTH CONDITIONS

This river is canalised and the mouth is usually open as a result of urban stormwater and final effluent from the Athlone WWTW. The river is polluted and protection measures are not a high priority.

PROTECTION MEASURES

If resources are available, it is suggested that a floating barrier be placed across the canal in the vicinity of the road bridge.

MAP 3E **ROBBEN ISLAND HARBOUR**



A floating boom or bubble barrier should be deployed across the entrance to the harbour. These are not currently available on the Island and will need to be sourced from DEA. The Harbour should have its own Contingency Plan which would need to be implemented.

Oil should be contained using booms, and removed using skimmers or sorbent materials. Harbour walls and jetties to be cleaned using high pressure seawater jets, and the released oil to be recovered.

MAP 3F **TABLE BAY HARBOUR**



A Tier 1 oil spill occurring within the Port of Cape Town and approaches will be dealt with in accordance with the TNPA Oil Spill Contingency Plan for Port of Cape Town. The Port Plan lists the actions that are to be taken and the Port has equipment in the form of booms, skimmers etc to initiate clean-up. If the response is beyond the capability of the Port, a Tier 2 or Tier 3 response will be initiated through SAMSA and DEA. TNPA requires that all persons within a port must take all reasonable steps to prevent, minimise, mitigate and combat any oil pollution or damage to the environment.

A series of bubble barriers is permanently in place across the entrances to the various basins. Refer to the TNPA Oil Spill Contingency Plan for the Port of Cape Town.

MAP 3G **GRANGER BAY HARBOUR**



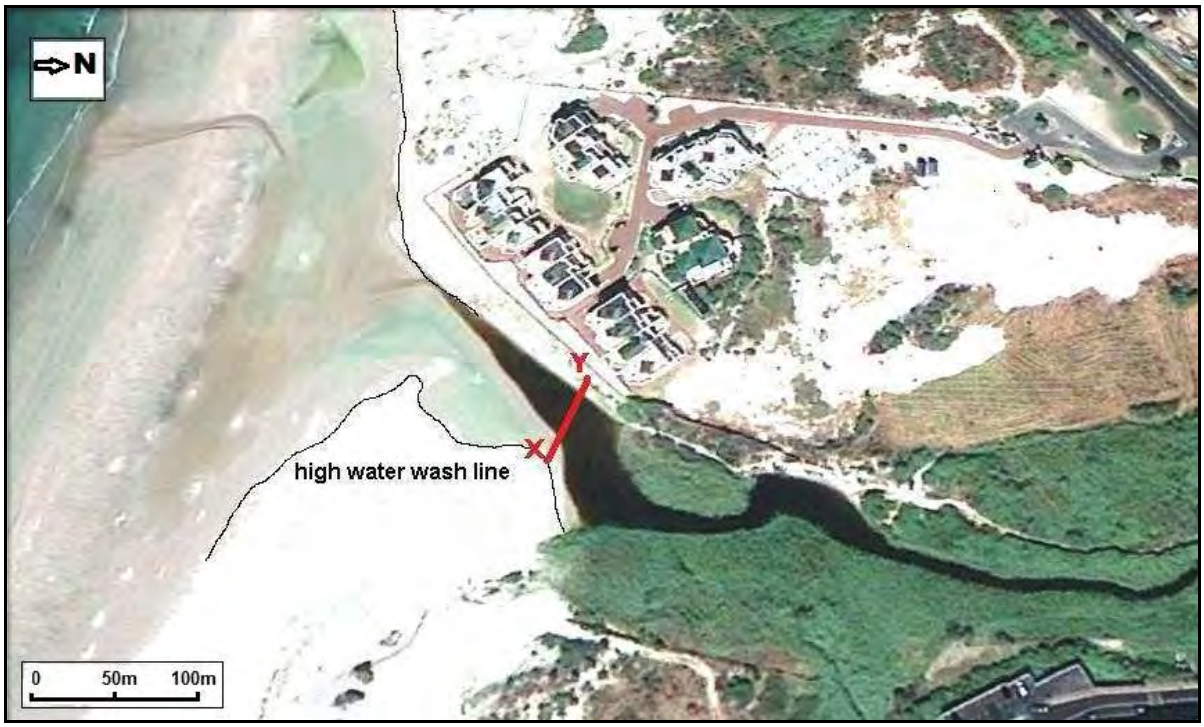
In the event of a threat of oil entering the harbour, a floating boom or bubble barrier is to be installed across the entrance. An air compressor(s) which will feed a perforated submarine air hose, is to be positioned at the end of the western breakwater. This air hose is to be secured in the position marked on the map.

At present, there is no boom or bubble barrier available on site. A boom will need to be sourced from DEA or another service provider.

A joint Oil Spill Contingency Plan for the Granger Bay Harbour should be compiled by the two operators within the Harbour, namely the Cape Peninsula University of Technology (CPUT) and the Marina Water Club.

CPUT has indicated that in the absence of any protection for the harbour, they would protect their basin and slipway with a boom positioned at XY marked on the map.

MAP 3H **DISA RIVER (HOUT BAY)**

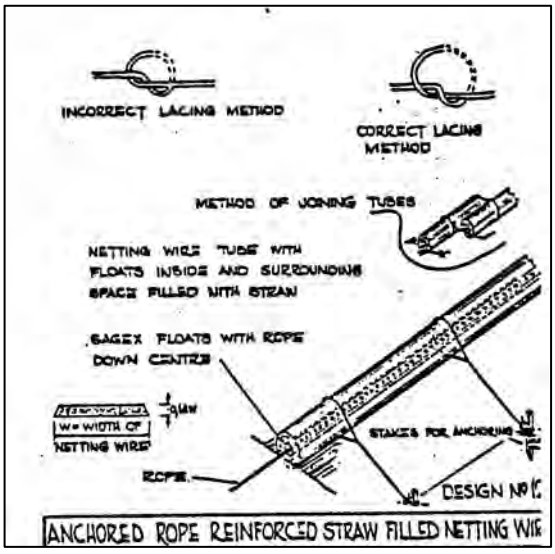


MOUTH CONDITIONS

The mouth of this river is usually open during winter and closed in the summer months, with overwash occurring during high spring tides. If available, a boom can be placed at position XY, or a straw bale barrier can be erected as illustrated below.

ASSEMBLY OF STRAW FILLED NETTING WIRE TUBE BARRIER

Roll out 50m of 1.8m wide 50mm mesh netting wire. Place bales of straw at 1.3m spacing on netting wire. Roll out 60m of 20mm diameter rope and thread purse seine net floats on rope for 40m. Starting at centre of barrier and working outwards, cut first bale of straw open and spread it to cover the full width of netting wire and 1.3m along its length. Similarly cut open a further two bales of straw on either side, and spread straw. Place rope with floatation attached on top of pile of straw. At centre bring edges of netting wire together, ensuring that the floatation is in the centre of the tube and lace with 2mm cordage using the correct lacing method.



A netting needle (tatting shuttle) made from a piece of box wood will make lacing easier. Continue as before and

when ends are reached, lace them closed. If correctly packed, barrier will be about 40m long. The sequence of operations is suggested to limit the amount of straw that may be blown away by the wind, if present.

ERECTION OF BARRIER

Select end anchor points for the barrier and drive in a stake until really firm, on or above the high water overwash line at the location shown by XY in on the map, and make each end of the anchor rope of the barrier fast to these stakes, allowing a small amount of slack (to limit excessive tension). If barrier does not span the distance between the high water overwash lines on each bank, a mound of sand can be shovelled into position to prevent water washing around the ends of the barrier.

The barrier is to be continually inspected and any repairs needed, to be effected immediately.

RESPONSE TIME

With all materials on site the barrier will take 6 man-hours to assemble. Once assembled, the barrier can be deployed within minutes. Actual deployment should be delayed until the last hours. This is recommended as the straw becomes saturated with water in time, thus losing its oil absorption capability.

MAP 3I **HOUT BAY HARBOUR**



In the event of a threat of oil entering the harbour, a bubble barrier is to be installed across the entrance. An air compressor(s), which will feed a perforated submarine air hose, is to be positioned at the end of the northern breakwater, at point C. This air hose is to be secured in the position marked on the map. The harbour is to implement their Oil Spill Contingency Plan, which has yet to be compiled.

At present, there is no bubble barrier available on site. An alternative option is to place a floating boom across the entrance to the harbour. This will need to be sourced from DEA or another service provider.

MAP 3J **NOORDHOEK/WILDEVOELVLEI**



MOUTH CONDITIONS

This system receives moderate daily volumes of final treated effluent from the Wildevoelvlei WWTW, so the mouth is frequently open to the sea. Shallow backshore tidal lagoons occur along the Noordhoek Beach. These are generally inundated during spring tides and winter storms and possibly from groundwater seepage entering the lagoons from the landward end of the beach. Due to their sensitivity, it is important that mitigation measures do not result in the flow from the Wildevoelvlei outlet entering these lagoons.

BARRIER LOCATION

The objective is to build a single, tier, straw bale barrier at the position marked XY to prevent the possibility of oil being washed into the tidal lagoons at the back of the beach.

CONSTRUCTION OF SINGLE TIER STRAW BALE BARRIER

Lay straw bales tightly end to end, approximately along the average spring tide high water line denoted by the XXX's in the sketch. Unroll lengths of 1.8m wide 50mm mesh wire netting, allowing 1m overlap at the start of each new roll. Place wire netting around bales as in sketch (pg 69). Place bags filled with sand on the wire netting on either side of the barrier where the straw bales abut and as close to the bales as possible. These bags should be plastic or hessian and can be filled with sand taken from the sea side of the barrier location. While the barrier is in position it is to be continually inspected and repairs needed, are to be effected immediately.

RESPONSE TIME

The recommended barrier is 3350m in length and is likely to take 400 man-hours to erect, once all materials are on site.

MAP 3K **SHUSTER RIVER (SCARBOROUGH)**



MOUTH CONDTIONS

This is a virtually pristine stream which must be protected from oil spill impacts. It dries out for virtually 6 months of the year (summer), but overwash may take place into the lagoon. The lagoon area is used by beachgoers.

BARRIER LOCATION

The objective is to build a straw bale barrier in position XY, to prevent the possibility of oil being washed into less dynamic sections of the estuary.

CONSTRUCTION OF STRAW BALE BARRIERS

Lay straw bales tightly end to end, commencing at the middle of the barrier and working outwards. Starting at one end, unroll 1.8m wide 50mm mesh wire netting along the length of the barrier. If more than one roll of wire netting is required provide a 1m overlap. Place wire netting around bales as in sketch (pg 69). Place bags filled with sand on the wire netting on either side of the barrier where the straw bales abut and as close to the bales as possible. The bags can be of plastic or hessian, and can be completely filled. The sand for filling them must not be obtained from vegetated sand dunes.

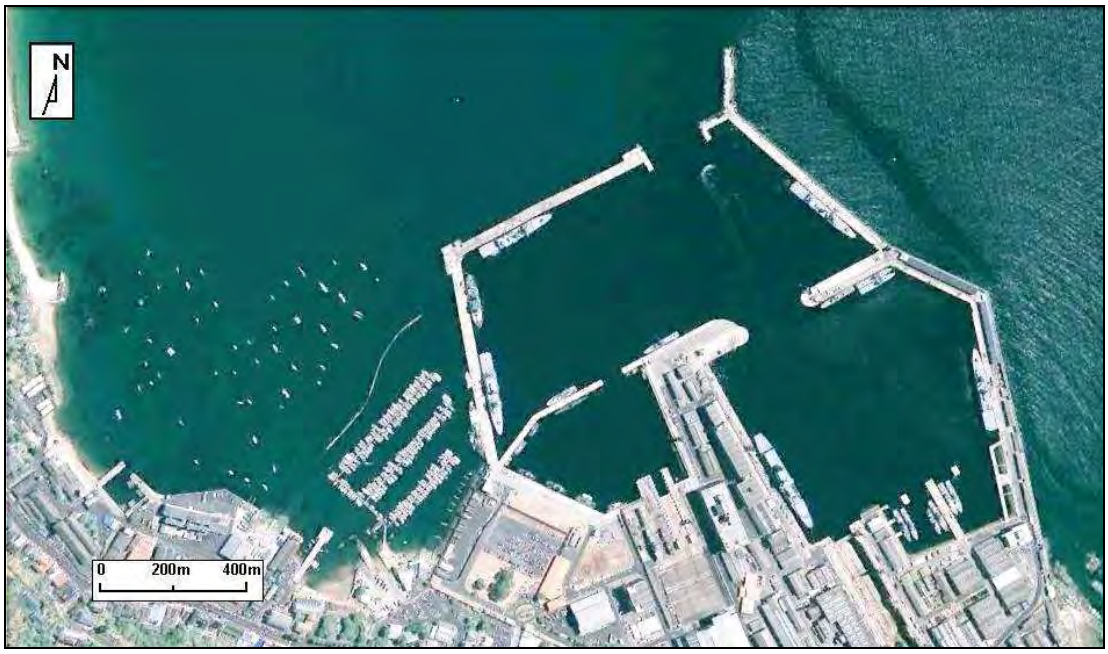
OUTFLOW PIPES

No outflow pipes will be required. Should the river level rise, the excess water can be allowed to escape, preferably around the south-west end of the barrier to prevent erosion of the vegetated sand dune at the north-east end. The barrier is to be continually inspected and any repairs to be effected immediately.

RESPONSE TIME

The recommended barrier is 60m in length and is likely to take 10 man-hours to erect, once all materials are on site.

MAP 3L **SIMONSTOWN NAVAL DOCKS**



In order to prevent large quantities of oil entering the Docks, the South African Navy will deploy their boom across the entrance. Any oil spill occurring within the harbour will be contained and removed using skimmers or sorbent material. These actions will be undertaken according to their standard operating procedures.

The Naval, Cape Marlin and Tuna Club and False Bay Yacht Club anchorage in the bay west of the Naval Docks will be impossible to protect under normal prevailing sea conditions. Where possible, remove boats from water. Under calm conditions, it may be possible to deploy deflection booms.

MAP 3M **KALK BAY HARBOUR**



In the event of a threat of oil entering the harbour, a bubble barrier is to be installed across the entrance. An air compressor(s), which will feed a perforated submarine air hose, is to be positioned at the end of the northern breakwater. This air hose is to be secured in the position marked on the map. The harbour is to implement their Oil Spill Contingency Plan, which has yet to be compiled.

At present, there is no bubble barrier available on site. An alternative option is to place a floating boom across the entrance to the harbour. This will need to be sourced from DEA or another service provider.

MAP 3N **ZANDVLEI CANAL**



MOUTH CONDITIONS

This estuarine system is ecologically sensitive and is also used for recreation purposes. The mouth is manipulated by the City (Roads and Stormwater operational staff under the guidance of the Catchment, Stormwater and River Management Branch) by creating/removing a large sand barrier in front of the mouth. In this way water levels are balanced to ensure saline intrusion into the estuary, to provide adequate depth for recreational users (e.g. sailors) and to prevent flooding of shoreline properties in the Marina da Gama area.

Strong winter flows from three major rivers feeding the estuary necessitate careful management of this mouth. When the mouth is open, spring tides wash strongly into the system, and this could easily carry oil into the estuary. While a berm in front of the mouth would certainly be effective in preventing this pollution, it would require careful management to avoid flooding of the low-lying properties.

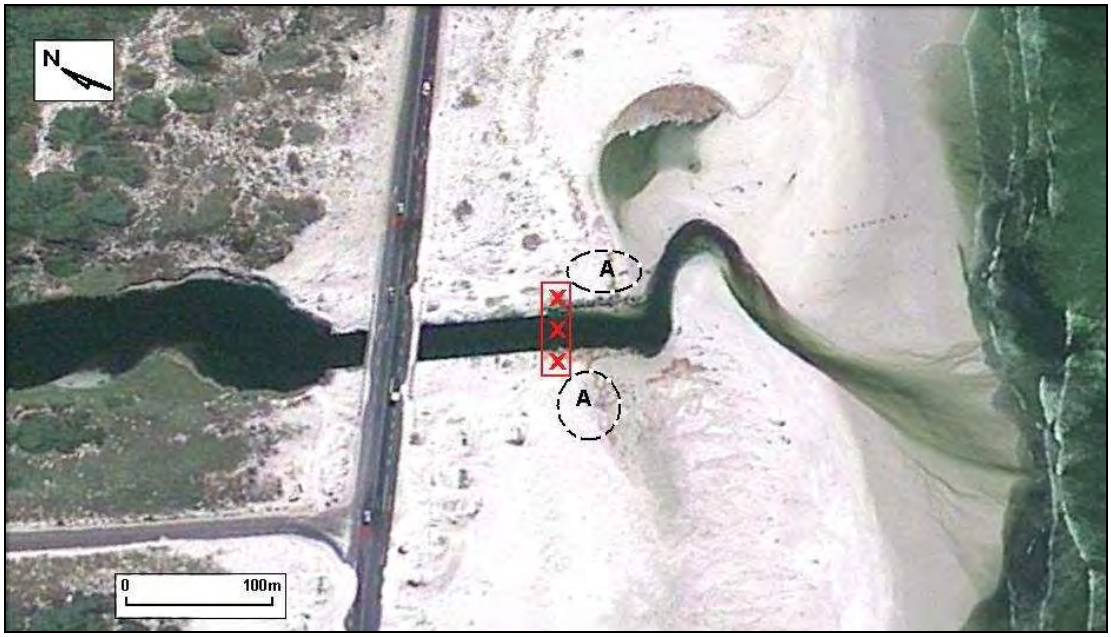
CONSTRUCTION OF SAND BARRIER

Using a front-end loader, move sand from position A into the position marked XXX, until a stable barrier has been created. Care should be taken not to disturb the vegetated sand dune to the east of the mouth. If, during high flow conditions, the water level rises to unacceptable levels in the vlei area, overflow pipes must be positioned in the barrier in order to release some of this water. While the barrier is in position, it is to be inspected regularly, with any repairs being effected immediately. At certain times of the year, there may not be enough sand available, in which case a floating barrier should be deployed.

RESPONSE TIME

It is estimated that a front-end loader will take 2 1/2 hours to raise the sand barrier by 1m.

MAP 3(O) **ZEEKOEIVLEI CANAL**



MOUTH CONDITIONS

The canal mouth is usually open due to large daily volumes of final treated effluent from Cape Flats WWTW. Outlet to the sea has shown considerable westerly migration, and Baden Powell Drive, which is located very close to the outlet, is critical infrastructure that could be impacted. If it is apparent that the tide is likely to penetrate beyond the bridge, the following procedure will be required.

CONSTRUCTION OF SAND BARRIER

Using a front-end loader or bulldozer, move sand from position A into the position marked XXX, until a stable barrier has been created. Care should be taken not to disturb the sand dunes in the surrounding area. It will be necessary to install overflow pipes above the high water mark on the sand barrier in order to maintain the flow from the sewage works. While the barrier is in position, it is to be inspected regularly, with any repairs needed, to be effected immediately.

RESPONSE TIME

It is estimated that a front-end loader will take 3 hours to raise the sand barrier to 1 m.

MAP 3P **EERSTE RIVER**



MOUTH CONDITIONS

This river receives large daily volumes of final treated effluent from Macassar WWTW, and forms an elongated backshore lagoon during the summer months. The outlet to sea has shown considerable westerly migration. Seawater washes over the sandspit into the lagoon during high spring tides. During these periods, a straw bale barrier should be laid where the sandspit is low. The mouth usually breaches the sandspit in a variable position wherever the sandspit is lowest, after the first winter rains, or is sometimes artificially breached by management. During this period a sand barrier should be constructed.

CONSTRUCTION OF STRAW BALE BARRIERS

See page 69 for details on construction of straw bale barrier.

CONSTRUCTION OF SAND BARRIER

Using a front-end loader, sand is to be removed from position A and placed in the river mouth so as to form a stable sand barrier. Care should be taken not to remove sand from the sandspit or surrounding dunes.

RESPONSE TIME

The time required to construct a sand barrier will be dependent on the width and position of the mouth. Six man-hours will be required for each 50 metres of straw bale barrier.

MAP 3Q **LOURENS RIVER**



MOUTH CONDITIONS

The mouth is generally closed during the summer months with the sandbar being breached at its lowest point during winter months. In the event of the mouth being open, the following procedure will be required.

CONSTRUCTION OF SAND BARRIER

Using a front end loader or bulldozer, sand should be moved from position A, into a position across the mouth, until a stable barrier is formed. Care should be taken not to disturb the sand dunes in the area. While the barrier is in position, it is to be inspected regularly with any repairs needed, to be effected immediately. At certain times of the year, there may not be enough sand available, in which case a barrier will need to be constructed using straw bales. Shore sealing booms could also be used if available.

HEARTLAND (AECI) MAIN DRAIN

This drain flows across the beach to the west of the river mouth. During high spring tides, straw bales must be placed on the seaward edge of the road bridge to prevent oil entering the vegetated area above the bridge.

MAP 3R **HARBOUR ISLAND MARINA (Gordon's Bay)**



This Marina is a residential property development managed by the Home Owners Association. There is a slipway within the harbour, which falls under the jurisdiction of the City of Cape Town Metro. There is no Oil Spill Contingency Plan in place for the harbour development, and there are no booms on site.

In order to protect the Marina, it is suggested that a floating barrier be placed across the entrance to the harbour. Booms will have to be sourced from DEA or other service providers. Failing this, individual basins could be protected using floating barriers or sorbent booms.

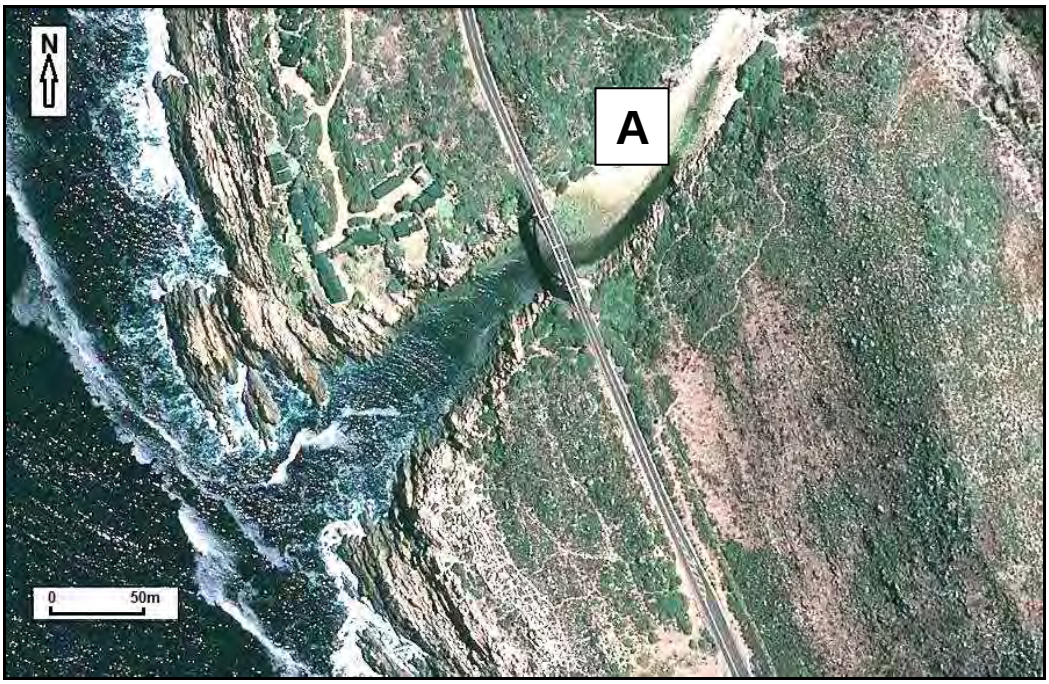
MAP 3S **GORDONS BAY HARBOUR**



In the event of a threat of oil entering the harbour, a bubble barrier is to be installed across the entrance. An air compressor(s), which will feed a perforated submarine air hose, is to be positioned at the end of the eastern breakwater. This air hose is to be secured in the position marked on the map. As the breakwater falls under the jurisdiction of the Naval College, clearance will need to be obtained for this course of action. The harbour is to implement their Oil Spill Contingency Plan, which has yet to be compiled.

At present, there is no bubble barrier available on site. An alternative option is to place a floating boom across the entrance to the harbour. This will need to be sourced from DEA or another service provider.

MAP 3T **STEENBRAS RIVER**



MOUTH CONDITIONS

The mouth is a rocky tidal inlet and is permanently open. Closure of the mouth is not possible. Tidal penetration does not extend beyond point A.

PROTECTION MEASURES

During calm conditions, a floating barrier could be deployed in the vicinity of the road bridge. If this is not possible, the pebble beaches should be protected using straw bale barriers.

11. WASTE MANAGEMENT

During the clean-up process, large amounts of oily waste will be generated. Methods for the collection, transportation and temporary storage of this oil can be found in Addendum C. Decisions regarding the final disposal of this oil will be made by the Department of Environmental Affairs: Pollution and Waste Management, and the DEA Shore Controller.

Waste management will need to take into account various streams of oily water and solid waste. Waste contractors will be required to deal with waste requiring special disposal. Arrangements need to be made ahead of time with contractors, to establish their suitability and capabilities for removing oily waste in an environmentally acceptable manner. Response teams need to be fully briefed on how to deal with different types of oily waste. Specially marked, separate containers/skips for oily waste separation and removal need to be provided.

The only suitable disposal site for significant quantities of oil and oily waste is situated at Vissershok, as the Swartklip site has been closed. The Vissershok site is preferred as it is an old established site, with a capacity for volumes that may normally be encountered. The Swartklip site may be available as a temporary storage and transfer station for oil spills occurring in False Bay. These sites fall under the jurisdiction of the City of Cape Town and any intention of disposal of oil should be directed to the Director: Solid Waste.

Fuel Firing Services is involved in the recycling of liquid waste oil, with a depot at the Port of Cape Town and their plant at Vissershok. Their oil storage tanks may be available for storing collected oil. The ROSE Foundation can assist with the co-ordination of recycling of waste oil. Their contact details are provided at the end of Section 13.

The oil refinery in Milnerton can be approached for disposal of liquid waste oil that is not contaminated with sand or debris. They do however have strict limitations on what type of oils they can accept.

12. EQUIPMENT - MATERIAL – MANPOWER

12.1 DEPARTMENTAL EQUIPMENT

The Department of Environmental Affairs manages the national equipment stocks for the combating of oil pollution. This equipment consists of:

- K9 surveillance aircraft on contract
- inshore patrol vessels fitted with dispersant spraying equipment and breaker boards (managed by DAFF)
- an offshore patrol vessel equipped with dispersant tanks (managed by DAFF)
- Seaguardian and Shoreguardian booms, a Portboom and Riverboom
- Skimmers
- Floating tank and fast tanks
- Inflatable boat
- Drum vacuum unit
- High pressure water washer

This equipment is held at Paarden Island in Cape Town but can be mobilised at short notice.
A full list of equipment is provided in Appendix IV.

12.2 TRANSNET NATIONAL PORTS AUTHORITY EQUIPMENT

The TNPA has oil pollution equipment stocks at all the major ports. This includes booms, skimmers, storage tanks etc. This equipment can be commissioned during emergency situations. The nearest Harbour should be contacted to establish availability of equipment. A full list of this equipment is provided in the National Plan.

12.3 SOUTH AFRICAN PETROLEUM INDUSTRY

The Oil Industry has various booms, skimmers and other equipment stored at various locations around the country. SAPIA should be contacted to establish the availability of this equipment. (See contact details in Section 13.) A full list of the equipment held by SAPIA is provided in the National Plan.

12.4 COMMERCIAL CONTRACTORS

Various contractors such as Smit Amandla Marine, OPCSA, Drizit, ABZorbit, have equipment available at various locations. This equipment can be hired on contract, and skilled staff are available for deployment. The contact numbers for these organisations are provided at the end of Section 13.

12.5 LOCAL AUTHORITY EQUIPMENT AND MANPOWER

The equipment and materials required for beach clean-up operations by local authorities are for the most part not specifically for oil spills.

The following plant and machinery is likely to be required:
Bulldozers
Front-end loaders
Low bed transporters
Excavator and tractor loader backhoes
Self loading trucks / self elevating scrapers
Articulated dump trucks
Tractors 2x4
Tractors 4x4
Platform truck and crane
Tip trucks
Water trucks
Open trucks
LDV's 4x4
LDV's 2x4
Vacuum tankers

Materials and equipment as listed below will also be useful:
Portable Centrifugal pumps
Sludge pumps
Straw bales
Petrol generator and lighting sets
200 litre drums and bins
Wire mesh - diamond
Plastic and hessian bags
PVC sheeting
Spades

In terms of manpower, supervisors, operators and labourers will also be required.

Where requirements for these resources exceed in-house availability, private local contractors can be approached. Local authorities should ensure that they know where these resources can be supplied.

13. TELEPHONE NUMBERS

13.1 PRIORITY NUMBERS

Organisation	Office Tel	Fax	Cell	Email
DEPARTMENT OF ENVIRONMENTAL AFFAIRS: MCPM				
Pollution Officers: Dr Yazeed Petersen (DD) Ms Albertus-Stanley (AD) Pollution Officer Equipment (Paarden Is.): Teboho Ntje	 021 819 2450 021 819 2457 021 510 3957	 021 819 2445 021 819 2445 021 510 3957	 083 530 3127 072 173 6234 078 200 8442	 ypeterson@environment.gov.za feroza@environment.gov.za tntje@environment.gov.za
SAMSA				
SAMSA: WESTERN REGION **Regional Manager:** Capt Dave Colly	 021 421 6170	021 419 0730 086 616 4104	 083 412 8861	 dcolly@samsa.org.za
Cape Town: Capt G Louw (PO) Mr. Barry Jubber (DPO)	021 421 6170	021 419 0730 086 696 9074	083 227 0721 082 6776630	glouw@samsa.org.za bjubber@samsa.org.za
Saldanha Bay: Mr. Martin Slabber	 022 714 1612	022 714 3635 086 693 7084	 082 789 6764	 mslabber@samsa.org.za
Port Nolloth: Mr. Justin Coraizen	027 851 7695	027 851 7699	082 386 2141	jcoraizen@samsa.org.za
Centre of Sea Watch: Maritime Rescue Co-ordination Centre MRCC				
Head: Mr. Karl Otto	021 938 3317	021 938 3319 086 654 4742	082 812 2991	kotto@samsa.org.za
Capt Ravi Naicker	021 938 3310	021 938 3319	082 768 8401	rnaicker@samsa.org.za
Duty Controller: all hours	021 938 3300	021 938 3309		

Organisation	Office Tel	Fax	Cell	Email
SAMSA: Head Office: Head: Centre of Ships. Mr. Sobantu Tilayi Mr. Francis Chilalika (Operations Manager)	012 366 2600	012 366 2601 086 590 9056 086 615 0886	 071 608 6480 082 789 6802	 stilayi@samsa.org.za fchilalika@samsa.org.za
SAMSA Head Office CEO –	 012 366 2600	 012 366 2601		
SAMSA: SOUTHERN REGION **Regional Manager:** Capt N. Campbell	 041 582 2138	041 582 2130 0866 157489	 083 309 6053	 ncampbell@samsa.org.za
Port Elizabeth:Mr B Colenutt (PO) Capt Daron Burgess (DPO)	041 585 0051	041 582 1213 0866 942707	082 445 3167 082 374 7942	bcolenutt@samsa.org.za dburgess@samsa.org.za
East London: Capt P Kroon (PO)	043 722 4120	043 722 2264 0866 158659	082 445 3166	pkroon@samsa.org.za
Mossel Bay: Mr. Dave Manley	044 690 4201	044 691 1206 0866163370	082 477 1813	dmanley@samsa.org.za
SAMSA: EASTERN REGION. **Regional Manager:** Capt. Saroor Ali	 031 307 1501	031 306 4983 0866 153417	 071 686 9593	 sali@samsa.org.za
Durban: Mr. Grant Conway	031 307 1501	031 306 4983 0866 157055	082 449 6350	gconway@samsa.org.za
Richard's Bay: Mr. Thandi Mehlo	035 788 0068	035 788 0067	082 492 4404	tmehlo@samsa.org.za
CITY OF CAPE TOWN: Disaster Operations Centre: Cape Town				
Duty Officer: All hours Alternate: 107 PECC	0800 911 4357 0800 112 4357 107 (from Telkom line) 021 480 7700 (from Cell)	021 597 5025	DisasterOperations.Centre@capetown.gov.za	

13.2 RESPONSIBLE LOCAL AUTHORITIES

Organisation	Office Tel	Fax	Cell	Email
CITY OF CAPE TOWN METRO MUNICIPALITY: 021 400 1111 (switchboard)				
Greg Pillay: Head Disaster Management Secretary	021 597 5012 021 597 5007	021 597 5010	084 711 7723	greg.pillay@capetown.gov.za
Franz Schlaphoff: Disaster Management	021 597 5019	021 597 5010	084 462 2013	franz.schlaphoff@capetown.gov.za
Chris Konings: Disaster Management	021 597 5015	021 597 5010	084 711 7756	Chris.Konings@capetown.gov.za
Koos Retief: Biodiversity Management	021 550 1086	021 550 1003	082 788 6987	koos.retief@capetown.gov.za
Darryl Colenbrander: Coastal Management	021 487 2355	021 487 2255	0823123443	darryl.colenbrander@capetown.gov.za
Barry Wood: Catchment, Stormwater and River Management Branch.	021 400 1204/5	021 400 4554	084 900 0916	barry.wood@capetown.gov.za
Jaco Uys: MPA Manager	021 851 6982	021 851 2148	084 645 8810	Jacobus.Uys@capetown.gov.za
Sakhile Tsotsobe: Sport and Recreation	021 400 4638	086 537 7418	072 626 3669	sakhile.tsotsobe@capetown.gov.za
Claire McKinnon: Manager Solid Waste Eddie Abrahams: Solid Waste	021 400 2822 021 514 3478	021 400 2620 021 514 3491	082 600 6648 084 220 0049	claire.mckinnon@capetown.gov.za EdmundC.Abrahams@capetown.gov.za
KOEBERG NUCLEAR POWER STATION: ESKOM				
Emergency Control (24 hours) Shift Manager: Gary Thomson Martin Saaymans: Emergency Manager	021 550 4100 / 5840 021 950 6111 021 950 6111/6	 021 950 6150 021 950 6150	 083 450 4574 072 148 9958	 Gary.Thomson@eskom.co.za martin.saaymans@eskom.co.za

Organisation	Office Tel	Fax	Cell	Email
TRANSNET NATIONAL PORTS AUTHORITY **Port Control: (all hours)** **021 449 2805**				
Lyndon Metcalf: SHEQ	021 449 2156	021 449 2085	082 405 2811	Lyndon.Metcalf@transnet.net
Henry Kemp: Pollution	021 449 2484	021 449 2085	073 148 1421	Henry.Kemp@transnet.net
Dennis Mqadi: Harbour Master	021 449 5763	021 449 2091	084 444 8758	Dennis.Mqadi@transnet.net
Michael Melato: Pollution	021 449 2152	021 449 2085	082 517 5561	Michael.Melato@transnet.net

V & A WATERFRONT				
Steven Bentley: Harbour Master	021 408 7500	086 679 3142	083 293 4616	sbentley@waterfront.co.za
GRANGER BAY				
Wilfred Prince: CPUT Faried Sylvester: Water Club	021 440 5766 021 425 4256	021 419 8050 086 660 2482	072 138 1034 082 569 0362	princew@cput.ac.za admin@mywaterclub.co.za
ROBBEN ISLAND MUSEUM				
Anthony Thomas: Harbour Master	021 409 5128		083 642 1546	anthonyt@robbenisland.org
S A NAVY Port Control (all hours)	021 787 3728			
WO Haywood (Port Operations)	021 787 3728	021 787 4063	083 523 8597	haywoodGuy@yahoo.com debbie.loubser@sanavy.co.za
DAFF FISHING HARBOURS				
Hout Bay: H. Stevens	021 790 1440	021 790 1792	082 771 8892	HendrikS@daff.gov.za
Kalk Bay: Pat Stacey	021 788 8313	021 788 1038	082 829 3010	PatricS@daff.gov.za
Gordon's Bay: H Stevens	021 856 1482	021 856 5222	082 771 8892	HendrikS@daff.gov.za

Organisation	Office Tel	Fax	Cell	Email
SANPARKS	**All hours**			
Justin Buchmann: Senior Ranger, TMNP	021 780 9100	021 780 9525	086 110 6417	justinbu@sanparks.org
Paul Sieben: Marine Area Manager, TMNP Danielle Bowen: Marine Ranger Bernacia Andreas: Marine Ranger	021 786 5656 021 786 5656 021 786 5656	021 786 4507 021 786 4507 021 786 4507	082 905 4661 082 674 3578 076 541 4117	pauls@sanparks.org danielb@sanparks.org Bernacia@sanparks.org
Boulders Monique Ruthenberg: Simonstown	021 786 2329 021 786 5787	021 786 5786	 All hours	 moniquer@sanparks.org
Amos Lombo: Cape Point	021 780 9100	086 525 2781	All hours	amosl@sanparks.org
Mathabatha Matjila: Cape Point	021 780 9100	086 5252 763	All hours	mathabatham@sanparks.org
Hilton Blumerus: Senior Ranger, Oudekraal	021 422 1601	021 4233 106	083 785 4773	hiltonb@sanparks.org
Jannie du Plessis	021 689 4441	021 689 4461	082 346 7191	jannied@saparks.org
Leighan Mossop: Noordhoek, Kommetjie	021 789 2457	021 789 2455		leighanm@sanparks.org
HEARTLAND LEASING (previously AECI)				
Johan Truter (All hours)	021 852 1111	021 852 1901	083 641 1642	johantr@heartland.co.za
RHEIN-METALL DENEL MUNITIONS (previously Somchem)				
Stephen Mitchell	021 850 2911	021 850 2487	083 676 5434	smitchell@nashuaisp.co.za
HARBOUR ISLAND DEVELOPMENT (Gordons Bay) and GORDON'S BAY BOAT ANGLING CLUB				
Harbour Master: Louis Siewertsen Chairman: Paul Dobson	021 856 1683 021 856 5125	021 856 1683 021 856 5125	082 874 1424 082 451 3064	club@gbbac.co.za paulmarion@telkomsa.net

13.3 RELEVANT GOVERNMENT DEPARTMENTS

Organisation	Office Tel	Fax	Cell	Email
WEATHER FORECAST OFFICE: Cape Town	082 231 1640 or 082 231 1645 all hours			
DEPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES (DAFF) Monitoring, Compliance and Surveillance Unit				
Keith Govender Pollution Combating Vessels	021 402 3079	021 402 3113	084 597 1147	KeithG@daff.gov.za
Fisheries Control Officers (DAFF) Mqondisi Ngadlela (Director)	021 402 3439	021 402 3433	082 379 3429	MqondisiN@daff.gov.za
Hout Bay Kommetjie Kalk Bay Gordon's Bay	021 790 2530 021 783 2295 021 788 8313 021 856 1482	021 790 1792 021 783 5853 021 788 1038 021 856 5222		
Fishing Harbours: Technical Manager Desmond Marinus	021 402 3337	021 402 3690	084 488 8844	DesmondM@daff.gov.za
W. CAPE PROVINCIAL GOVERNMENT				
Jackson Rikhotso (Disaster Management) Lavenia Nichols (Disaster Management) Zain Jumat (DEA&DP: Coastal Environment)	021 937 0806 021 937 0806 021 483 2889	021 931 9031 021 931 9031 021 483 8326	083 277 4221 074 262 5151 079 523 3715	jrikhot@pgwc.gov.za lnichols@pgwc.gov.za zjumat@pgwc.gov.za
CAPE NATURE				
Kas Hamann	021 659 3466		082 572 7205	khamman@capenature.co.za
Fanie Bekker	021 659 3468	021 659 3467	082 553 3476	fbekker@capenature.co.za
Pierre de Villiers (Estuaries)	021 866 8023	021 866 1523 086 529 4983	083 236 2924	estuaries@capenature.co.za
Terence Coller: (Betty's Bay MPA)	028 272 9829	086 605 8517	082 453 0835	terence@capenature.co.za

Johan Visagie : (Dassen Island)			082 745 9421	dassenisland@gmail.com

13.4 SCIENTIFIC ADVISORY PERSONNEL AND I&AP'S

SAPIA: Anton Moldan	021 671 8460	086 668 8054	082 801 6215	anton@sapia.co.za
SEA BIRD and MAMMAL RESCUE				
SANCCOB (Seabirds) Venessa Strauss Nola Parsons	 021 557 6155 021 557 6155	 021 557 8804 021 557 8804	 082 325 4638 084 822 0189	 venessa@sanccob.co.za vet@sanccob.co.za
Dr Rob Crawford: Seabirds, DEA	021 402 3140	021 402 3330	082 578 1533	rcrawford@environment.gov.za
Bruce Dyer: Seabirds, DEA	021 402 3138	021 402 3330	082 953 3153	bdyer@environment.gov.za
Mike Meyer: Marine Mammals DEA	021 402 3173	021 402 3330	082 5787617	mmeyer@environment.gov.za
ROYAL CAPE YACHT CLUB	021 421 1354	021 421 6028		info@rcyc.co.za
FALSE BAY YACHT CLUB	021 786 1703	021 786 3925		admin@fbyc.co.za
HOUT BAY YACHT CLUB	021 790 3110	021 790 2585		hbye@africa.com
GORDONS BAY YACHT CLUB	021 856 3263			

13.5 CONTRACTORS AND SERVICE PROVIDERS

Organisation	Office Tel	Fax	Cell	Email
SMIT AMANDLA MARINE				
Clare Gomes	021 507 5777	021 507 5885	079 699 4406	c.gomes@smit.com
Paul Maclons	021 507 5777	021 507 5885	082 909 2013	p.maclons@smit.com
Dave Murray	021 507 5777	021 507 5885	082 909 9948	d.murray@smit.com
SHELTAM AVIATION:				
Surveillance aircraft				
Peter Roux (Cape Town office)	021 510 3341	021 510 3432	082 800 4560	peterroux@sheltam.com
Peter Woods (Port Elizabeth office)	041 581 4194	041 581 3413	083 452 7007	pwoods@sheltam.com
Donovan Jordaan (Pilot) / Thys du Toit (Pilot)			083 651 4863	sacoastguard@hotmail.co.za
To contact pilots in the air – emergency only				
Phone Air Traffic Control:				
Cape Town	021 937 1116	021 934 0964		
Overberg	028 425 4111	028 425 4068		
George	044 801 8809	044 801 8810		
Port Elizabeth	041 501 5948	041 501 5959		
East London	043 736 6161	043 7366 014		
Durban	032 436 5001	032 436 3811		
ENVIROSERV	0800 192 783			info.ct@enviroserv.co.za
Stephen van Zyl	021 951 8420	021 951 8440	082 447 4447	
DRIZIT	021 425 5187	021 425 3932	0800 202 202 all hours	
OIL RECYCLING				
Fuel Firing Services: Depot Manager	021 557 5301	021 557 0667	083 652 6113	
The ROSE Foundation: Raj Lochan	021 448 7492	021 448 7563	083 378 8556	usedoil@iafrica.com
NORA-SA	086 066 7272	086 652 7384		
OPCSA				
Piet Coetzee	021 912 1600	021 912 1613	082 566 0525	pcoetzee@opcsa.co.za

ADDENDUM A

OIL RECOGNITION

ADDENDUM A

OIL RECOGNITION

Guidelines for the recognition of some of the common types of oil that could impact the shore.

TYPICAL APPEARANCE OF OIL ON SHORE	POSSIBLE CONDITION AND TYPE OF OIL AND PROBABLE SOURCE
A dark brown or nearly black layer of oil up to 10mm thick, stretching from the high water mark to the water's edge and into the sea, accompanied by a strong smell.	Fresh crude oil escaping from a stranded laden tanker within a few kilometers. If very fresh, this oil can present a fire hazard.
A brown or reddish brown carpet of pasty material 5 – 100mm thick, deposited on the shore from the high water mark to the water's edge, turning dark brown or black in the heat of the sun. A malodour will be present.	Weathered and emulsified crude oil (chocolate mousse) that has escaped from a laden tanker that has suffered hull damage either due to collision, hull failure or grounding. Thicker layers will be encountered nearer to the source, and thinner layers further away.
Black pasty material in the form of individual pats not more than 5mm thick, strewn on the beach from the high water mark to the water's edge. The concentration of these pats can vary from nearly touching each other to pea size pellets 100 – 200 mm apart.	Such an appearance could originate from different types of oil or source. In all cases the oil will be weathered and emulsified with sea water. The source could be from a stranded, laden oil tanker many kilometers away or from a stranded ship or tanker in ballast or even tanker washings from a passing tanker in ballast.
Brown staining of the sand particles of white sandy beaches, with a slight malodour of diesel oil.	Light bunker oil (diesel) from a stranded fishing boat or coasting vessel nearby. Although larger vessels usually carry some light bunker oil, it would usually be incorporated with other spilled oil should it be released during an incident.

NOTE: HEAVY BUNKER OIL

Although the colour of Heavy Bunker Oil on the shore will invariably be black, its appearance will vary considerably, depending on the physical properties of the oil (viscosity, pour point) and the ambient temperature of the sea, energy in the breaker zone it passes through and temperature reached by the oil on the shore.

ADDENDUM B

METHODS FOR COASTAL PROTECTION AND CLEAN-UP

ADDENDUM B

METHODS FOR COASTAL PROTECTION AND CLEAN-UP

INTRODUCTION

Past experience has shown that in many instances, clean-up efforts have only contributed to the environmental damage of an oil spill, and that it is often better to leave it to natural clean-up processes. In situations where some clean-up must be attempted, it is important that the methods selected are those which are least damaging to the environment. Decisions over clean-up will depend on the type of oil, the degree of contamination, and the type of habitat affected. These guidelines are general in nature. Where specific instructions in Section 10 differ from these, the specific instructions will take precedence.

ESTUARIES

On the basis of ecological considerations, estuaries are the most sensitive of the various coastal environments. These considerations include:

- estuaries are utilised by numerous birds, both resident and migrant species;
- they serve as nursery and spawning grounds for a number of fish species;
- they are often rich in bait organisms such as worms, prawns, mussels etc.;
- they have aesthetic and amenity value;
- they provide shelter for boats, launch sites etc.

Furthermore, oil entering estuaries tends to be deposited in the sediments - either by stranding on sand/mudflats, or by actually sinking in deeper water – where it has a minimum residence time of 10 years, but may persist for up to 70 years. Clean-up measures, unless adequately controlled, only tend to add to the damage.

Protection

The first step should be to prevent oil from entering the estuary. The methods by which this may be achieved are dependent on the mouth conditions, of which there are three basic types:

i. Rivers terminating in lagoons which are only occasionally open to the sea:

   Even when lagoons are closed, oil may enter with waves overtopping the barrier dune. To prevent overtopping, the height of the barrier dune should be increased by means of straw bales, sand bags, boards, or additional loose sand. This barrier should then be monitored for the duration of the spill.

ii. Estuaries with mouths which open on a seasonal basis:

If closed, treat as above. If open, the mouth should be closed by building a dyke using sandbags, loose sand etc. Details of materials and equipment needed must be assessed for each river individually. If sufficient sand is not available close to the mouths of gently flowing rivers, it may be possible to close them using barriers made of timber or similar materials.

During construction of a dyke, it may be necessary to include outflow pipes, to prevent flooding of land upstream. Pipe diameter, slope and number to be used are dependent on the volume of flow, and various designs are calculated at the time of preparing the contingency plan. The choice of which design to use is made at the time of construction of the dyke.

Once dykes have been constructed they must be continually maintained for the durations of the incident, as they are subject to the erosion processes of the encroaching sea.

In some cases, it may be possible to release water from dams upstream to maintain flow at the river mouth, and thus prevent entry of the oil. Similarly, if the river is in flood the water flow may prevent entry of oil.

iii. Permanently open estuaries

This group includes those which could not be artificially closed. Some protection may be possible by the use of floating booms, in areas of reduced flow (providing such booms are available). The oil can then be contained, or diverted to less sensitive areas. Details on site deployment of booms are assessed individually for each permanently open estuary. In addition, sensitive areas seaward of the deployed boom may be protected using barriers made of materials of opportunity, such as anchored straw bales.

<u>IMPORTANT</u>

Prevention activities should not disturb the environment.

Materials such as sediment and brushwood should not be obtained from within the estuary, or from stable, vegetated dunes.

Dispersants should never be used in an estuary.

Clean-up

All clean-up operations in an estuary should be undertaken using manual labour – not machinery – and must be done under strict supervision of the DEA Shore Controller (See section 8.2). It is virtually impossible to remove all oil from mudflats, saltmarshes and other estuarine environments without causing extensive damage. Therefore, the minimum amount of labour is to be used, and tracks, once established should be adhered to. No heavy machinery should be utilised. Oil entering the estuary is to be contained within booms or straw barriers, or diverted to corners from where it can be collected. Contained oil can be skimmed and transferred to temporary storage on shore. Oil may be removed by flushing the marsh with estuarine water under low pressure, and directing the oil so removed to a collecting pond. Large pockets of oil may be removed by pumping, preferably using hypocycloidal pumps, or vacuum tankers. Temporary storage sites must be carefully selected so as to avoid further damage.

Heavy oiled reed and grass may be cut, and the contaminated stems removed, but only on the advice of the DEA Shore Controller (See Section 8.2).

Oil stranded on sand or mudflats is to be lifted off using flat spades – taking care not to trample oil into the sediment.

Oil that has sunk to the estuary bottom should be removed by diver operated suction pumps.

DO NOT – Attempt clean-up with inadequate supervision.
DO NOT – Spray dispersants.
DO NOT – Use heavy machinery or trample sand and mudflats.
DO NOT – Disturb the sediments in the estuary.

MARINAS AND HARBOURS / INDUSTRIAL INTAKES

With some exceptions, spill damage in these areas will be socio-economic rather than biological.

Protection

Entry of oil should be prevented by the use of floating booms or air barriers (bubble curtains). Boats should be removed from the water where possible. Similar protection should be given to industrial seawater intakes, or, alternatively, the industrial plant should be shut down while the threat persists.

Clean-up

Oil entering the area should be contained, skimmed and removed. Recovered oil should be deposited into containers such as 200 litre drums, and the oil allowed to rise to the surface. For emulsified oil (chocolate mousse), emulsion breakers may be used to facilitate this separation. The clean, underlying water can then be drained off through an oleophilic (oil absorbent) filter.

Slipways should be cleaned using high pressure water jets. Contaminated jetties should be cleaned by hand.

COASTLINE / SHORELINE

The coastline can be divided into 3 types – rocky, sandy and pebble beaches – each having a different degree of sensitivity to oil contamination.

Rocky areas are the least sensitive. Around cliffs, oil is generally prevented from coming ashore by wave reflection, while in other areas the heavy surf action tends to promote natural cleansing.

Sandy beaches have a medium sensitivity. Fine grain beaches especially, have limited oil penetration, and can be relatively easily cleaned.

Pebble beaches are more sensitive than sandy beaches, as oil penetrates them readily. Clean-up is difficult, and can lead to destabilisation of the beach.

Protection

The only way in which oil can be prevented from coming ashore over a long stretch of coastline, is by the use of dispersants when the oil is still at sea. However, more local protective actions may be warranted in particular areas. For example, straw bales or other absorbents may be used to protect pebble beaches, sandy beaches with overwash pools in the backbeach area, or bird nesting areas. These will both limit penetration of oil, and facilitate clean-up.

Clean-up

Rocky Shores:

WHEN TO CLEAN

Clean-up should only be attempted in amenity area and other areas that have been subject to heavy oiling.

HOW TO CLEAN

Partial removal of oil may be achieved by washing down rocks with seawater pumped through pressure hoses. Where oil or oily water has collected in rock pools, it can be pumped or bailed out to temporary storage sites. Any remaining oil that is still somewhat mobile, can be removed by using straw or proprietary brands of sorbents. The straw or sorbents are rubbed or trampled into the oil, and then brushed or lifted off. Such sorbents, even if contaminated with oil, will float on the water surface, and can be lifted off. Skimmers can be used for large pools.

DO NOT – Use dispersants
DO NOT – Wash with fresh water
DO NOT – Sand blast

Sandy Beaches:

WHEN TO CLEAN

Amenity beaches must always be cleaned. Non-amenity beaches should be cleaned only where there is a heavy oiling, or in cases when the oil is likely to be refloated and transported to adjacent areas by longshore currents.

Inaccessible, unutilised beaches should be left to natural cleansing unless otherwise advised, in specific circumstances.

HOW TO CLEAN

Fresh Oil: On beaches with large volumes of fresh liquid oil coming ashore, trenches can be dug just above the high tide mark and lined with plastic sheeting. Oil coming ashore can be "swept" into these trenches using "flat rakes" – pieces of timber 0,5 to 1metre long, 75 to 100mm high and 10mm thick, secured to a broom pole, or transported there in buckets. The oil can then be pumped out and disposed of later. If necessary, emulsion breakers can be used to separate oil/water mixtures before final disposal.

Weathered Oil and Oily Debris: After a spill, oil may continue to wash ashore sporadically over several days. Once the oil has stopped coming ashore, the top contaminated layer of sand, together with any tarballs and oil debris, can be manually removed suing flat spades. It should be piled into heaps, above the high water mark, and then carted away to dump sites. On the wet parts of the beach, the oil can be gathered using flat rakes. During these processes, an absolute minimum of sand should be removed, and care should be taken to avoid churning oil into sand. The general principle is to work from a clean area towards a polluted area.

Removal: Trucks or tankers are obviously essential for the removal of oily waste from collection points on the beach. During this operation, access tracks to polluted beaches should be demarcated by stones or other markers, and drivers should not be permitted to depart from the assigned tracks.

DO NOT – Use conventional rakes.
DO NOT – Use heavy mechanical equipment to clean the beach (only for removal of oil from collection points).
DO NOT – Spray dispersants.

Pebble Beaches:

Pebble beaches are best left to natural cleansing processes if there has been no attempt at protection. Clean-up efforts generally result in forcing the oil deeper into the beach, or if pebbles are removed, in destabilising the beach.

If straw bales or other sorbents have been applied, they should be removed once saturated, or when the oil has stopped coming ashore.

ADDENDUM C

TEMPORARY STORAGE AND TRANSPORT OF OILY WASTE

ADDENDUM C

TEMPORARY STORAGE AND TRANSPORT OF COLLECTED OIL

INTRODUCTION

Oil deposited on the coast will vary in compositions and fluidity, depending on the time it has been exposed to the effects of weathering – sun, wind, waves etc. Fresh liquid oil only reaches the coast if the source is within a kilometer or so of the shore. A more common form is known as "chocolate mousse", which is a water-in-oil emulsion, containing up to 80% water. This is a stable semi-solid, which will cover the beaches in sheets or patches. Another form is "tarballs", somewhat like road tar, and varying in size from that of a pea, to larger than a football. Oily waste can also contain sand, seaweed, plastics, dead birds, and other beach debris.

TRANSPORTATION OF RECOVERED OIL

Any conventional vehicle used for conveying liquids, such as vacuum tankers, sludge gulpers, tank trailers or farm tank trucks, can be used for transporting liquid oil. Improvisation, however, may be necessary, and vehicles such as flat bed lorries carrying open drums, fitted with temporary covers, may have to be used instead. Care should always be taken to ensure that oil does not leak out to the conveying vehicle, spreading the pollution further afield.

Water-in-oil emulsions (chocolate mousse) tend to solidify or become very viscous with time, making removal from tanks very difficult. Deep bodied trucks are therefore best suited to the transportation of emulsions and other oily waste and debris. Oil seepage must be prevented, by lining the trucks with heavy duty plastic sheeting. For emulsions, chemical emulsion breakers may sometimes be used to separate the oil and water prior to transportation, thus lessening the volume that has to be transported.

Front-end loaders are most suitable for the transportation of weathered oil and oily debris, collected from the beaches, to the temporary storage areas, but use of heavy machinery on the beaches must be kept to a minimum.

TEMPORARY STORAGE

As a first stage, emergency storage should be provided in a position of easy access to the beach, but well clear of the tidal area. Relatively cheap and simple storage can be quickly provided by digging pits in the ground and lining them with heavy duty PVC polyethylene or oil resistant rubber sheeting. Long narrow pits are the most practical shape, as they are easy to dig, fill and empty with simple equipment. In situations where the digging of pits is precluded, storage can be provided by constructing retaining walls, using suitable quality soil. This is built up into sloping walls, usually having a flat top, with a wall angle ratio of 3:2 horizontal to vertical. The finished storage can be square or rectangular.

The choice of sites for these temporary storage pits must take the following points into consideration:

- damage to sand dunes should be avoided;
- sand blowing into the pits will reduce storage space and further contaminate oily waste;
- areas adjacent to the pits are likely to become contaminated, so sensitive sites should be avoided;
- sites chosen should be such that after final disposal, they are able to be restored to their original condition.

Liquid oil may be stored temporarily in 200 litre drums, porta pools, or any other convenient receptacle, depending on the quantity of oil present.

Oiled debris and sand may be stacked in heaps on plastic or other impervious material, to prevent drainage of oil into the ground beneath. If plastic bags are used for the collection of oily wastes, care should be taken to ensure that they are not exposed to hot sun for any length of time as the plastic may become brittle and split open.

FINAL DISPOSAL

There are a number of methods available for the final disposal of oil and oily waste. Although the choice of disposal method will be dependent on the circumstances prevailing at the time, a brief description of each method is given below.

Direct Disposal

One method of direct disposal is to transport the recovered oil to possible recipients such as oil refineries, recycling contractors or certain installations that can burn fuel oil. Oil refineries are unlikely to accept recovered oil except for certain crudes and further with a salt content of less that 0,1% and virtually free of solids. Fuel oils with a salt content up to 0,5% and low in solids could possibly be blended into other fuel oil.

The other method of direct disposal listed in the literature is that of dumping as landfill or burial above the high tide mark. This method is not generally acceptable in South Africa. The possible health implications, impact on the environment, possible contamination of water supplies, transportation costs and quantity of oil to be disposed of are to be assessed in relation to the other disposal options available. The contingency plan lists disposal sites and any limiting conditions of these sites.

Stabilisation

Oily sand which does not contain large amounts of other debris can be mixed with quicklime to produce a stabilised material which limits oil leaking from it. As such, it can possibly be disposed of under less stringent conditions, such as low load bearing road foundations and embankments, sports ground construction, land fill etc.

Burning

The direct, uncontrolled in situ burning of oil debris is usually not advised, as complete combustion is not attainable. However, it may be possible to use portable oil burner equipment or portable incinerators if the oil is not unduly contaminated. Purpose built incinerators, reaching high combustion efficiency, are available commercially. These may be an option in areas with limited accessibility.

Extraction

Extraction processes are not oil disposal methods in themselves, but employment of an extraction process might facilitate recovery of the oil in a form that may permit use of another disposal technique. A hot water fluidisation process for cleaning oil contaminated beach sand has been researched, but the effectiveness of the operation is dependent on the range of distribution of sand particle sizes.

If a high pressure water washing technique has been used to remove oil adhering to surfaces, the oily material can be extracted by a conventional oil/water separator.

The oil can in certain circumstances be extracted from water-in-oil emulsions by the use of emulsion breakers.

Biodegradation

Sludge farming is a process whereby the oily material is spread on the ground, fertilised and tilled. The process requires one hectare of land to dispose of 400 tonnes of oil. The choice of land would have to meet health, environmental and other requirements.

Composting oil, by addition to domestic waste tips has been used satisfactorily, provided certain conditions are met. The suitability of domestic waste tips for the disposal of oily waste is to be assessed during contingency planning.

ADDENDUM D

COLLECTION OF OILED SEABIRDS

ADDENDUM D

COLLECTION OF OILED SEABIRDS

1. INTRODUCTION

Seabirds, particularly those which spend a large portion of their time in the water, are vulnerable to contamination by oil. This affects them adversely, either by destroying the waterproofing of the plumage, or by direct toxicity of ingested oil.

The distribution of seabirds around the coast is patchy, being concentrated mainly on the offshore islands. Island breeding colonies are especially susceptible to oil pollution. The major risk areas are St Croix and Bird Islands in Algoa Bay; Dyer, Dassen and the Saldanha Bay Islands; and Bird Island in Lamberts Bay.

In the event of an oiled bird incident, it is the function of Marine Development to oversee the collection, temporary holding and transport of the oiled birds to rehabilitation centres; S.A. National Foundation for the Conservation of Coastal Birds (SANCCOB) in Cape Town, the Centre for the Rehabilitation of Wildlife (CROW) in Durban and possibly the Port Elizabeth Museum. At these centres the oiled birds are washed to remove the oil, rinsed and kept in captivity until the waterproofing of the feathers has been restored. This is a specialised procedure which should only be carried out by skilled personnel, and not attempted by novices in the field. It is stressed that inexperienced persons should not attempt to feed, clean or render medical aid to oiled birds, as this is likely to result in further harm to the birds.

During an oil spill incident, however, oiled birds may arrive on the shoreline, particularly in the vicinity of offshore breeding islands. In such cases, if Marine Development personnel are not immediately available, local authorities may be required to provide temporary holding facilities for the birds. Procedures for the capture, selection and holding of these birds are outlined below.

2. REPORTING

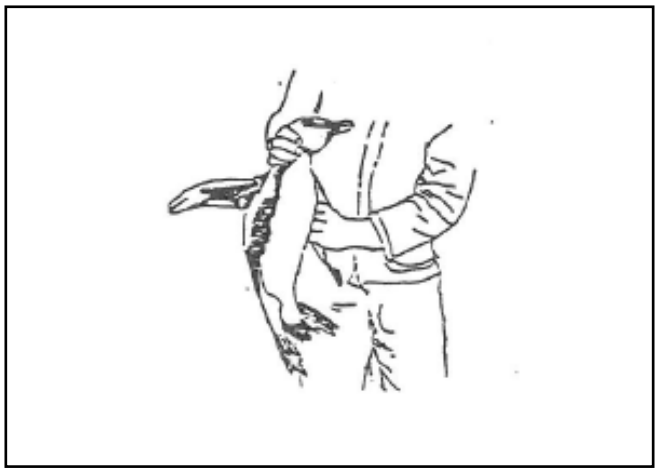
In the event of oiled birds being found on the shoreline, at least one of the persons from the Department of Environmental Affairs listed in Section 13 must be informed immediately.

3. CAPTURE

The aim is to capture and restrain birds with the least disturbance possible. Catchers should move slowly and carefully, avoiding rapid movement if possible. If oiled birds are chased too much, they become exhausted, and their chances of survival decreases.

Catchers should operate in teams of two or three, and should be protected against injury by birds with gloves and glasses. This is essential, as a person afraid of injury is unlikely to handle birds correctly. Catchers should position themselves between the bird and its escape route, usually the sea. If long-handled nets are available, these are most useful.

Catchers should not capture oiled birds if the operation disturbs nesting birds, especially those in the process of nest-building. The same applies to searching for oiled birds. For example, an oiled penguin in a nesting colony should not be caught at all as it will cause losses of eggs and chicks. The losses to gulls and nest desertion will probably far exceed the alternative loss of one oiled bird.



a) Jackass Penguin

Penguins may be caught with long-handled scoop nets, or by hand, suitably protected with gloves. Birds should be approached cautiously until the final lunge with net or hands. Penguins should be held by the base of the neck and base of a flipper, or by the base of both flippers (see Fig. A1.)

Figure A1

b) Cape Gannets

Gannets may be caught with a gannet pole (a long-handled crook) if available, or by a long-handled scoop net, or by hand, suitably protected by gloves. Catchers must be particularly careful of their eyes, as gannets can lunge forwards with their sharp beaks. Gannets should be held firmly around the base of the head, and with the wings pinned under the arm.
(See Fig. A2).

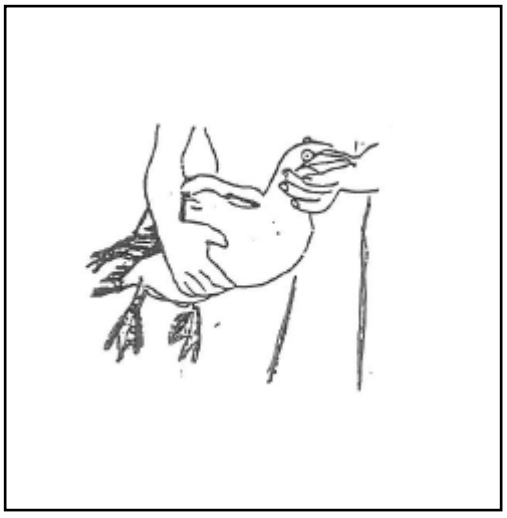
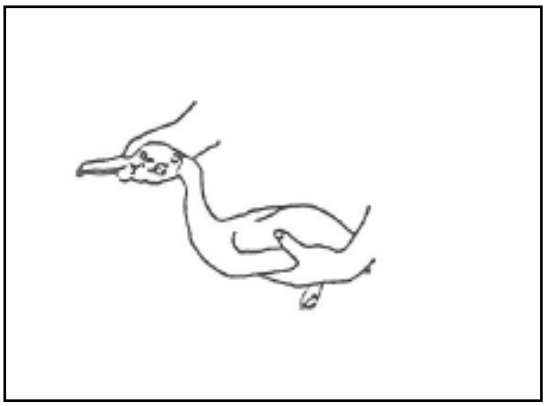


Figure A2

c) Cormorants and other species



Cormorants and other species should be caught with a long-handled scoop net or by hand, suitably protected by gloves. The method of holding birds is shown in Fig. A3.

The beak and wings should be firmly held, without squeezing the bird's body. The smaller the bird, the more vulnerable it is to injury and the less likely it is to survive rehabilitation.

Figure A3

4. SELECTION

Not all oiled birds need to be captured for rehabilitation, as natural weathering will remove the oil in time.

(a) Jackass Penguin

Oiled penguins should be captured and examined. If the oil has penetrated to the down, and has oiled an area of down larger than half the size of a closed fist, it should be kept for cleaning at the rehabilitation centre. Otherwise it should be released.

(b) Cape Gannet

Oil is very obvious on the white plumage. However, gannets need only be captured if the plumage is obviously heavily matted with oil, so that gaps in the surface layer are readily apparent. Unless the oil has penetrated to the down and oiled an area as large as a closed fist, the birds should not be collected. Gannets may show a distinct "high-water" mark of oil across the front and down the sides of the breast. Most of these birds do not require collecting.

(c) Cormorants and other species

These birds can only be captured when severely oiled. If it is possible to catch the bird, it is in need of cleaning.

5. CARE DURING TEMPORARY CAPTIVITY

Birds must be kept until transport is ready to deliver them from the collection point to the rehabilitation centre. Birds should be kept in comfort, with minimal disturbance, and out of sight of people. Ideally they should not be kept for longer than 48 hours from time of collection to the time of arrival at the rehabilitation centre.

Medical care and feeding should not be attempted at this stage. There is little point in attempting to prevent the birds from ingesting oil on their plumage, as they will already have done so. If the oil is toxic, the damage will already have been done.

(a) Jackass Penguin

Penguins should be kept in well-ventilated store-rooms, or enclosures with walls or wire sides. The floor should be cement, or rapidly draining sand. No more than 50 penguins should be kept in a 6m x 6m enclosure. The mesh should be 60mm or less diamond mesh, and the penguins should not be able to burrow underneath. The walls should be at least 1 m high. Protection against sun, wind and rain should be provided. Drinking water must be available. Under hot conditions, birds should be lightly sprayed with water. If birds gape their beaks wide and pant, spraying is essential as the birds are overheating.

(b) Cape Gannet

Follow procedures described for penguins, except that not more than 30 gannets should be confined to a 6 m x 6 m enclosure. The enclosure should be roofed, and if the enclosure is wire, the mesh should be 30mm or less.

(c) Cormorants and other species

Follow procedures described for penguins. Greater numbers of birds can be accommodated than gannets e.g. 50 Cape Cormorants in a 6m x 6m enclosure. Wire enclosures are not suitable unless the mesh is very fine. Enclosures should be roofed.

6. HELPERS

Helpers should be aware of the potential hazards to both their health, and that of the birds.

Helpers should be well protected against injury by birds, as fear of injury is likely to result in mishandling of birds. All cuts and scratches should be washed with soap, hot water and preferably antiseptic after handling birds.

Some avian diseases are potentially hazardous to humans. Birds suspected of disease should be handled with gloves, and isolated to prevent infection of others. Helpers should be immunised against tetanus. Some human diseases are harmful to birds, so helpers should be in good health.

7. TRANSPORT

Transportation of the oiled birds from the holding area to the rehabilitation centre should only be undertaken under the supervision of experienced personnel. It is vital that birds should have adequate ventilation otherwise deaths through overheating and asphyxiation could occur.

ADDENDUM E

OIL SAMPLING PROCEDURES

ADDENDUM E

OIL SAMPLING PROCEDURES

INTRODUCTION

Both in the case of prosecution for contravention of the Prevention and Combating of Pollution at Sea by Oil Act, (Act 6 of 1981) and in the case of the Government claiming recompense for the cost of clean-up of the beaches from an identifiable spill, it will be necessary to relate the offending oil to the cargo or fuel of a particular ship. Since only a relatively fresh sample of oil can be compared with a sample taken from the ship, it is essential that the samples be collected as soon as possible after the spillage. In the case of stranding oil, the Local Authorities are often the first persons to arrive on the scene, and it is therefore recommended that they collect samples of oil immediately.

SOURCES

Oil coming ashore may be deposited on rocks, in rock pools, or on the sand. The best and easiest way to obtain a sample for analysis is from the water surface (probably in a rock pool). Should there be no floating oil, samples must be taken of whatever is available.

- Water: Since oil tends to spread on water, the sample should be skimmed off the surface directly into the container so as to obtain as much oil and as little water as possible.

- Sand: Certain refined petroleum products, fresh light bunker oil and most crude oils tend to sink into a sandy beach. The sample should consist of sand with obvious signs of staining.

- After prolonged weathering at sea, oil tends to form blackish, rounded, almost solid lumps. These "tarballs" can vary in size from less than a pin head to over 300mm in diameter. Those larger than about 10mm can be collected and placed into sample containers.

- Rocks with more viscous oils, the deposited material can be scraped off rocks, concrete or other impervious surfaces, and placed directly into the sample container.

- Debris: Oil adhering to seaweed, small pieces of wood, vegetation or other debris may be collected by placing the complete specimen, comprising oil and support material, into the sample container. In the case of dead birds, a small sample of oil-matted feathers may be removed and placed into the sample container.

It may also be necessary to take samples for insurance purposes, from live birds which are being treated at SANCCOB. The number of samples which will need to be taken will depend on the number of birds being treated and the requirements of the insurers. This could range from between 5% and 20% of the birds. Great care should be taken when collecting oil samples from the feathers of live birds.

NOTE:
Ships and tankers carry various types of oil, both as cargo and as fuel. In the event of serious damage, therefore, several types of oil may be released from a single ship. For this reason, it is recommended that, during sampling of an oiled beach, a careful examination of the beach be made to determine the uniformity of the oil deposit. Should there appear to be two or more types of oil, samples of each type should be retained, and some idea of their extent be recorded as in Section 7.1.1(c).

CONTAINERS

When oil pollution of the beaches is anticipated, it is prudent to ensure that the proper containers for collecting the samples are available. The use of adventitious containers such as tins, bottles, plastic bags etc. picked up off the beach is not acceptable, as they may cause contamination of the sample. Ideally, clean glass jars should be used. Glass jars of about 1 litre capacity - usually used for the preservation of fruit and vegetables - are most suitable.

In most cases, the samples will be required either for prosecution or litigation purposes, and it is, therefore, necessary that, prior to use, the jars be certified clean of hydrocarbon contamination by a qualified chemist (jars can be cleaned by rinsing thoroughly with an organic solvent). Once the sample has been collected, the jars should be sealed - preferably in the presence of someone with authority e.g. a policeman. They should then be packed into a wooden box with suitable packing material (e.g. polystyrene foam), for transit to the laboratory, and the packing box sealed by the person taking the samples.

The correct storage and transport of samples is important. Before dispatch it is advisable to verify that sufficient space has been allowed for any expansion of the sample that might occur. It is also necessary to comply with any safety regulations that apply to the transport of hydrocarbon materials. If possible, air should be excluded from the filled sample containers by displacement with an inert gas (nitrogen or carbon dioxide).

Having obtained the sample, it should be sent to the SAMSA which is responsible for the analysis arrangements.

LABELLING

Clear labeling and identification of samples after collection are essential. All samples that are collected should be clearly identified with a label that is not likely to become readily separated from the sample jar. The label should give the following information:

i. Ownership of sample (e.g. Margate Municipality - Zone X).

ii. Description of sample (e.g. heavy, viscous oil, tarry residue).

iii. Location from which sample was taken (e.g. Durban South Beach, scraped from rocks or collected from water surface etc.).

iv. Date and time of sampling.

v. Date and time of stranding on beach.

vi. Reference to any written or photographic record taken at the time of sampling.

vii. Name, telephone number and address of person taking sample, and those of witnesses.

ANALYSIS

Samples taken for use as evidence in court proceedings to obtain prosecution in terms of the Prevention and Combating of Pollution of the Sea by Oil Act will be analysed immediately. Those for use in litigation may need to be stored for up to two years, in which case they should be refrigerated at not higher than 5^0C.

The South African Maritime Safety Authority will be responsible for the arrangements for analysis.

ADDENDUM F

POLICY ON THE USE OF OIL SPILL DISPERSANTS IN SOUTH AFRICAN WATERS

ADDENDUM F

POLICY ON THE USE OF OIL SPILL DISPERSANTS IN SOUTH AFRICAN WATERS

1. INTRODUCTION

Oil spills may have adverse effects on various marine and coastal resources both natural and socio-economic. The objective of countermeasures is to minimise such effects.

Oil spill dispersants have frequently been used as such a measure during response operations. Their use, however, is controversial, as it has both advantages and disadvantages. Disadvantages include the fact that application of dispersants results in increased concentrations of oil in the water column, and that oil/dispersant mixtures are generally more toxic than the oil itself. Moreover, dispersants are only effective on certain types of oil, and even then only within a limited time span after the spill. It is very important, therefore, that their use is properly controlled; that they are used only when physical containment and removal is not possible, and that their use results in a net environmental benefit.

The objective of the guidelines below is to set out the criteria necessary for making rational decisions on the use /non-use of dispersants. It should be pointed out, however, that in general the decision to use dispersants should only be taken by the governmental authority responsible for the co-ordination of oil spill response i.e. the Department of Environmental Affairs DEA). A list of DEA Pollution Officers to be contacted in this regard can be found in Appendix I.

2. CONDITIONS FOR USE

Oil spill dispersants should only be used when it has been decided by the authorities concerned (the DEA On-Scene Co-ordinator) - in consultation with the scientific advisors - during a spill incident) that such use will minimise the overall environmental impact.

Only oil spill dispersants bearing the SABS mark of approval and which have passed the SFRI approved toxicity/ efficiency tests may be used. The specifications for the SABS mark are contained in SABS 1234-1978 (Amendment No. 1:3 November, 1982). It does not include dispersants and detergents approved by SABS for purposes other than oil spill dispersion. Details of the SFRI tests, and a list of dispersants which have passed the test, can be obtained from the Pollution Officer.

All use of dispersants should be documented (see Appendix II), so that relevant information can be used to improve predictions of effectiveness in field situations.

3. RESTRICTIONS ON USE

In general terms, dispersants should only be used in waters more than 5 nautical miles offshore, and/or with a depth of more than 30 metres. Use within these limits must be approved by a Pollution Officer of DEA, except in circumstances of extreme emergency where dispersant use is specifically recommended (see Section 4), or where approval for dispersant use has been incorporated into the relevant contingency plan. The Pollution Officer must then be informed of such use without delay.

In situations where the use of dispersants is being considered, the following restrictions also apply:

A. Dispersants should **only** be utilised in circumstances where they are likely to prove **effective**.

(i) Type and state of the oil: Dispersants should **not** be used on:

- slicks $\geq$ 0,5 cm in thickness
- slicks that appear as sheen or colour bands
- diesel or light fuel oil heavy fuel oil
- viscous, weathered or emulsified oil oils with pour points at or above ambient temperature
- small offshore spills

Dispersants are most effective on fresh crude oils, but it is good practise to test the effectiveness of the dispersant on the particular oil in the laboratory before application at sea, where this is practical. Should the tests prove favourable, dispersants should **still only** be used when all other requirements are met.

(ii) Weather conditions: Dispersants require a certain amount of mixing energy to be effective, and are therefore not effective in flat calm conditions, unless energy is supplied during application. On the other hand, in turbulent sea conditions the oil will be dispersed naturally. For these purposes, turbulent conditions are considered to be sea states 4, or Beaufort No's 4-5. In winds greater than Beaufort No. 5, dispersant application will be impossible.

(iii) Time limitations: Immediately oil has spilled it begins to change as a result of processes such as evaporation, dissolution, biodegradation, photochemical breakdown etc. As stated above, dispersants are not effective on weathered oil. They should, therefore, only be used if they can be applied preferably within ~two hours, or, at a maximum, 24 hours after the oil's release. These time limitations may be modified either way should careful monitoring of the operation indicate so.

Ideally, oil should be sprayed as near to the source as is possible.

(iv) Application: There are a number of methods for the application of dispersants. Dispersants should not be used unless suitable equipment is available to apply it at the rate recommended by the manufacturers. Generally, the volume of dispersant used should never exceed 20 - 30% of the volume of oil treated.

B. Dispersants should only be utilised where their use will result in a **net environmental benefit.**

They should **not** be used in the following situations:

(i) in areas of low water volume and a limited rate of exchange e.g., bays, estuaries etc.
(ii) near shellfish resources
(iii) in fresh water
(iv) on established fish breeding grounds and in migratory areas
(v) in the vicinity of industrial water intakes
(vi) in areas far offshore where there is little ashore
(vii) on the shoreline.
(viii) where there is a likelihood of the oil coming ashore

4. USE IN EMERGENCIES

At the present time, dispersant use is recommended for use on fresh crude oil when:

i. the slick is approaching islands/rocks supporting large seabird colonies, especially if these colonies include species that are rare or endangered.
ii. the slick, although just beyond the 5 nautical mile offshore limit, is moving rapidly onshore (winds or currents onshore) into
    - an area with ecologically sensitive coastal features e.g. estuaries or bays which it would not be possible to close artificially (e.g. Langebaan).
    - an area with important socio-economic features, which could not be protected from impact, e.g. heavily utilised bathing beaches at the height of the holiday season.

As stipulated above, the DEA Pollution Officers must be informed of any such use of dispersants as soon as possible and by the quickest means available (preferably telephonically).

5. DECISION MAKING

As mentioned above, the decision to use/not use dispersants involves weighing up the advantages and disadvantages. This can be facilitated using the decision tree shown in Figure 1.

APPENDIX 1

DEA Pollution Officers

* Pollution Officers:	Tel:	Fax:	Email	Cell:
Dr Yazeed Petersen (DD)	021 819 2450	021 819 2445	ypeterson@environment.gov.za	083 530 3127
Feroza Albertus-Stanley (AD)	021 819 2457	021 819 2445	feroza@environment.gov.za	072 173 6234

APPENDIX II

SAMPLE FORM for report on the use of dispersants

(a) Details of the spill location
- Data and time of the spill
- Source and type of oil
- Estimated amount, slick area, and thickness
- Appearance of the oil

(b) Environmental conditions
- Air and water temperature
- Wind, waves, currents
- Water depth
- Shoreline under threat

(c) Dispersant applications
- Rationale
- Type of dispersant
- Amount used
- Application and mixing methods
- Application rate
- Date and time commenced and ceased
- Amount of oil treated

(d) Observations

- Visual, photographic, remote sensing, sampling
- Estimated amount of oil left on water surface
- Rate of dispersed oil
- Effects on birds, fish etc.
- Persistence of effects

(e) Were other countermeasures used?
Were they successful?

Reports should be sent to:

Deputy Director: Marine & Coastal Pollution Management, Department of Environmental Affairs, PO Box 52126, V&A Waterfront, Cape Town, 8002

Approved oil spill dispersants (passed SABS and SFRI tests)

Chemserve OSE 750
Chemserve OSE 760
Chemserve OSE 770
Shell 208/84
Shell 209/84
Shell 109/85
Shell 10/85
Shell 11/85
Shell VDC plus
INIPOL IP 80
INIPOL IP 90
Oil Technics Sc-500
Slickgone LT2
Chemrite OSD
Drew Ameroid Marine OSD / LT
Planisol NT4
Veclean 1:20
Veclean 1:40
HSC 8 630
Marinekleen 2
ASC 7

Chapter 13: Large Marine Animal Stranding Policy and Protocol

A. General Policy Principles

1. Introduction

Although a relatively rare occurrence, the City of Cape Town - with over 300km of coastline - does experience strandings of large marine animals. Whilst these events pose challenges to the City, such events also offer important opportunities. Cetacean strandings in particular provide an important opportunity for research and training purposes, as access to biological material is generally limited. In responding to large marine animals strandings, a collective, coordinated and organised response by various authorities and agencies is required for effective:

- Rescue attempts for live animals
- Public control and management
- Volunteer control and management
- Environmental protection
- Enabling research access and accession of biological material
- Carcass removal and disposal

This policy and protocol defines the coordinated response by City line functions to these events, details roles and responsibilities for each line function, organises decision making processes and defines how the City's policy fits within the broader national Stranding Policy.

2. Definition of Stranding Categories

This policy and protocol addresses the following large marine animals:

- Whales
- Dolphins
- Large sharks
- Seals

Within these stranding categories the policy and protocol will address the following categories:

1. Category 1: Live whale, dolphin or whale shark stranding
2. Category 2: Injured or sick seals or seal pups
3. Category 3: Large shark species, live or dead
4. Category 4: Whale, dolphin or shark carcass

3. City Line Functions

This policy and protocol will be binding on the following City line functions:

- Environmental Resource Management Department (ERMD)
- Marine and Environmental Law Enforcement Unit
- 107 Public Emergency Call Centre
- Disaster Risk Management Centre (DRMC)
- Solid Waste Management
- Specialised Technical Services: Fleet and Mechanical Services
- Sport, Recreation and Amenities

- Communications
- City Law Enforcement Agencies, consisting of:
  - Metro Police
  - City Law Enforcement
  - Traffic Services

Integration with National Policy and Framework

The Department of Environmental Affairs' (DEA) Marine and Coastal Management Department is in the process of developing a National Stranding Policy and Framework. The City's policy and protocol will be integrated with the national policy with national standards and approaches as stated in each of the **Stranding Categories** (SECTION B).

4. Partners

This policy and protocol recognises that for each of the stranding categories a number of other organisations, authorities and groups will play vital roles within stranding rescue efforts. These include, but not limited to:

- DEA Oceans and Coasts
- The National Sea Rescue Institute (NSRI)
- Table Mountain National Park (TMNP)
- CapeNature
- Society for the Prevention of Cruelty to Animals (SPCA)
- South African National Defence Force, via Joint Tactical HQ, Western Cape at Silvermine
- South African Police Service (SAPS)
- Various NGOs and NPOs
- Civil Society Groups

The role of these organisations, authorities and groups will be governed by the national policy and framework, but are included within the City's policy and protocol where relevant and appropriate within each stranding category.

5. The Public

This policy and protocol outlines a public education and awareness programme that should be implemented in conjunction with the policy. In addition, this policy and protocol must be widely communicated to citizens of Cape Town as part of that public education and awareness programme.

6. Stranding Policy Principles

The City of Cape Town in developing the stranding protocol does so with the following policy principles:

- Cooperative governance with other authorities to ensure effective, coordinated and organised responses to live stranding events
- Optimise the possibility of successful rescues in live stranding events through a well informed and organised approach
- Providing support services to expert decision makers in the case of live stranding events
- Minimal suffering and trauma to live animals
- .
- An overarching principle of supporting, endorsing and facilitating humane choices.
- Through engagement with the various specialists, including marine biologists, consider euthanasia provided that such action is in the best interest of the animal

- Minimising trauma and stress on the general public
- Environmental considerations of the broader area will be considered within each stranding event
- Effective, efficient and appropriate removal of all carcasses within an environmental framework
- The effective, appropriate and legally compliant disposal of all carcasses

7. Governance

The City of Cape Town will apply the following governance principles in all stranding events to ensure optimum opportunity for successful rescue and/or disposal, while minimising risk of injury to person or persons:

- The City retains the rights to close affected beaches to public access
- City law enforcement agencies will have the authority to prevent public access to the affected area and affected animals and where needed may remove general public and unauthorised individuals from the area
- The City will ensure ongoing communication through the media in this regard
- City law enforcement officials retain the right to arrest individuals who refuse to cooperate within the closed area

B. Protocol for each Stranding Category

1. <u>Category 1: Live whale, dolphin or whale shark stranding</u>

A Category 1 stranding occurs when either a single animal or group of animals are found stranded alive. Category 1 strandings can be further separate into Category 1a and Category 1b, detailed below.

1.1. Primary Call Centre

All live stranding events will be communicated to the Disaster Risk Management (DRM) Centre as the primary call centre. Details of the DRM Centre numbers will be advertised at all beaches as the first point of contact for any marine animal strandings. The DRM Centre will notify the Disaster Operations Centre.

Should a call be received by the 107 Emergency call centre, 107 Emergency call centre staff will notify the Disaster Risk Management Centre and if possible, transfer the call.

The call operator who receives the call must request specific details, including:

- Number and estimated size of animals
- Confirmation on whether the animal (s) are alive or dead
- Accurate location of the animals – description of closest significant landmark

<u>All 107 Emergency call centre and DRM Centre staff will have access to the Whale Stranding Sign</u> as attached to this document.

On notification of a live stranding the following protocol will be put in effect by the DRMC's Disaster Operations Centre (DOC).

1.2. Communication to line functions

On notification of a live stranding, instructions will be given to the caller by the DRM Centre call operator on what actions to take, and which actions to avoid. These instructions will be based on the 10 Key Points as listed in the attached Whale Stranding Sign. Once instructions have been given, the following line functions will be notified immediately and placed on standby as per the relevant official contact list in Annexure A:

- Environmental Resource Management Department (ERMD)
- Marine and Environmental Law Enforcement Unit
- Disaster Risk Management Centre (DRMC), via the DOC
- Solid Waste Management
- Sport, Recreation and Amenities
- Communications

- City Law Enforcement Agencies (LEAs), consisting of:
  - Metro Police
  - City Law Enforcement
  - Traffic Services

1.3. Primary decision

On receiving information of a live stranding DEA Oceans and Coasts will be contacted by the DRMC's Disaster Operations Centre (DOC). Details of the stranding will be communicated to the designated DEA Oceans and Coasts officials, as per Annexure A. Initial information that will be provided to DEA Oceans and Coasts will include:

- Estimated number of animals involved in the stranding
- Type of animal – description including size, weight, colour.
- Exact location of stranding

Based on this information, DEA Oceans and Coasts will determine whether it is a category 1a or 1b stranding. In the case of DEA Oceans and Coasts being contacted before the City Of Cape Town, the designated official(s) at DEA Oceans and Coasts will ensure that the DRMC's Disaster Operations Centre (DOC) is informed, and the above information supplied.

1.4. <u>Category 1a: Single, small animal stranding</u>

A Category 1a stranding occurs when a single, small animal is found stranded alive. Small animals under consideration here include dolphins and juveniles of small whale species. A small/local response team is required.

1.4.1. Response Team

The small local response team will consist of DEA Oceans and Coasts, ERMD and Solid Waste Management officials and local area law enforcement. All other line functions/staff will stand down.

1.4.2. Procedure

On notification of a Category 1a stranding, the DRMC's Disaster Operations Centre (DOC) will instruct local area law enforcement officials to proceed directly to the location, verify the call, and secure the site. On arrival, local law enforcement officials will:

- Communicate directly with members of the small response team
  - Current status
  - Exact location of the animal
  - Whether the animal has been attended to and by whom
  - Access points to the animal

- Administer the recovery position to the animal, (if not yet done), ensure airways are clear and keep the animal wet, in accordance with the Whale Stranding Sign 10 Key Points.
- Prevent unauthorised individuals or the public gaining access to the animal
- Await arrival of the response team

If the rescue attempt is unsuccessful, Solid Waste Management will respond in accordance with **Stranding Category 4.**

1.5. Category 1b: Multiple small animals, single or multiple large animals stranding

A Category 1b stranding occurs when a multiple small animals, a single large animal, or multiple large animals are found stranded alive. Small animals under consideration here include dolphins, whilst large animals include all whale species as well as whale sharks. A full response team is required.

1.5.1. Response Team

The full response team will consist of officials from the following line functions:

- Environmental Resource Management Department (ERMD)
- Marine and Environmental Law Enforcement Unit
- Disaster Risk Management Centre (DRMC)
- Solid Waste Management
- Specialised Technical Services: Fleet and Mechanical Services
- Sport, Recreation and Amenities
- Communications
- City Law Enforcement Agencies, consisting of:
  - Metro Police
  - City Law Enforcement
  - Traffic Services

Designated officials from each line function will proceed directly to the stranding location

On notification of a mass live stranding, the Solid Waste Department must as a priority dispatch front-end loaders and other required plant and equipment to the scene. Solid Waste will where necessary coordinate with Specialised Technical Services: Fleet and Mechanical Services for additional equipment and vehicles

1.5.2. Access Control prior to arrival of response team

On notification of a Category 1b stranding, the DRMC's Disaster Operations Centre (DOC) will dispatch local area Law enforcement, Metro police and Traffic Services officials to the location. On arrival the following shall take place:

- A senior law enforcement official will be take control of the site until the SOCC (Site Operation Command Centre) is established.
- Beach will be closed to the public
- Public will be notified that the beach has been closed to public access
- Entire area to be secured and an enforcement official stationed at all access points, where the geography of the beach allows this
- A clear area around the animals is to be demarcated using emergency tape
- No unauthorised people will be allowed into the demarcated area.
- While waiting for the arrival of the response team, law enforcement officials will ensure that all animals (as far as possible) are placed in the recovery position (informed by the national policy). To achieve this, individual members of the public may be asked to assist (informed by the national policy).

1.5.3. Establishment of a SOCC (Site Operations Command Centre) at the location

- On arrival at the location a central point will be established to form a SOCC
- One senior member from each line function will form part of the SOCC
- Disaster Risk Management will coordinate the SOCC
- The SOCC will take overall command and management of the entire site and the situation
- SOCC members will provide instruction from the SOCC to their officials within their own line functions and responsibilities
- Other organisations may be represented on the SOCC as per the national policy, as required (e.g. NSRI, SA Navy, SAPS).

1.5.4. Responsibilities of the SOCC

City line functions will be responsible for the following areas and actions from the SOCC.

- ERMD officials will:
  - determine environmentally appropriate access points for vehicles and equipment
  - identify environmentally sensitive areas to be kept free of people, vehicles and equipment
  - assist DEA Oceans and Coasts with animal management

- Metro police will coordinate overall security management of the site
- City Law Enforcement will be responsible for crowd management and control.
- Traffic Services will manage roads, parking areas, access points and emergency vehicles
- Disaster Risk Management officials will coordinate the SOCC, equipment, reinforcements, supplies (incl. food) and media, and will supply a media liaison to the SOCC.
- Disaster Risk Management to provide a central SOCC gazebo on the beach. The SOCC to work out of this central space and act as a central coordination point. DRM to source and provide as part of their material provision list.
- Everyone involved in the stranding emergency will wear a vest identifying them as part of the team, and SOCC decision makers will wear separate coloured vests identifying them as such. The DEA Incident Controller must be individually identifiable. Any individual without a vest will be removed from the rescue and cordon area. DRM to source and provide as part of their material provision list
- Solid Waste will provide the required plant and equipment and where necessary will call on Specialised Technical Services for assistance as and when needed
- Solid Waste will coordinate carcass removal as per Stranding Category 4 in the event that the rescue is unsuccessful.

1.5.5. Crowd Management and Control

- The SOCC will nominate a single official to co-ordinate regular communication updates to the public
- Only this official will communicate to the public beyond standard crowd control needs.
- All members of the public will be managed in a cordial and informative manner
- The area around the animals will be strictly controlled and kept free of unauthorised people
- All environmentally sensitive areas will be kept free of the public at all times.
- Unleashed dogs that are found to be in the area will be considered stray and will be impounded

Where volunteers are asked to assist, this will be done so in accordance with the national policy and a City or DEA Oceans and Coasts official will be allocated to each volunteer group.

1.5.6. Traffic Management

- Traffic services will close all roads leading directly to the area
- All roads leading to the area will be kept free of cars to allow heavy equipment and emergency vehicles access
- Only official vehicles, and personal vehicles used by City officials responding in their official capacity, will be allowed access.

- Heavy Vehicle routes: it is important for communication lines to be open with each driver and for traffic control to actively communicate with the drivers to ensure the shortest and quickest travel route followed

1.5.7. Second Holding Area

- On direction by the SOCC, Law Enforcement and Traffic Services are to cordon off a “holding area” that will be free of all public vehicles
- This area may be used where live whales can be cared for until they can all be loaded onto a single or multiple flatbed vehicles and all transported to the release or vessel area in a single convoy.

1.5.8. Emergency Medical Services

Disaster Risk Management will ensure that emergency medical services are on site and on standby in the event of injury

1.5.9. Media Liaison

- A member of the SOCC will be nominated to liaise with the media
- The communication officer will provide regular and informative updates to the media
- A general media request will be made through the Disaster Management Centre to all radio stations requesting people not to go to the site and informing the public of road closures

1.5.10. Volunteer control and management

As per the national policy and coordinated through the SOCC. Public volunteers must be replaced with NSRI or other formal recognised volunteer agencies earlier and as soon as possible to ensure that the rescue area is limited to only those individuals from formal organisations participating in the stranding rescue.

1.5.11. Animal handling

As per the national policy and coordinated through the SOCC

1.5.12. Euthanasia decision

Any decision to euthanize animals will be made:

- In consultation with the SOCC
- If consensus is not reached, the final decision will rest with DEA Oceans and Coasts as per the national policy

Once a decision to euthanize animals has been made:

- Metro police, SAPS and law enforcement will ensure that no members of the public are in the vicinity
- If required, members of the public will be removed
- Euthanasia will be carried out in accordance with the national policy

1.5.13. Carcass Removal

Carcass removal will be carried out in accordance with the protocol as defined in Stranding Category 4.
Where possible, carcasses must be covered on the back of Solid Waste vehicles out of sight from the public and especially young children.

1.5.14. Site rehabilitation

- On completion of successful rescue or carcass removal, the SOCC City members will define site rehabilitation needs
- Site rehabilitation will include the removal of all waste, rehabilitation of impacted dune systems, repair of damaged infrastructure and trampled vegetation
- Site rehabilitation, including the provision finances or staff required to rehabilitate, will be the joint responsibility of ERMD, Disaster Risk Management and Sport, Recreation and Amenities

2. Category 2: Injured or sick seals or seal pups

2.1. Response Team

The response team will consist of (a) local area law enforcement official(s), ERMD Biodiversity Management official(s), and SPCA official(s).

2.2. Procedure

On notification of Category 2 stranding, the DRMC's Disaster Operations Centre (DOC) will:

- Dispatch a local law enforcement officer to the location
- Immediately inform ERMD Biodiversity Management officials (as per Annexure A), who will contact the SPCA and co-ordinate the rescue.
- Animal to be removed to an appropriate collection point, where the SPCA will take over.
- Log and record the information

On arrival at the location, the law enforcement official will:

- Keep the public away from the animal at all times
- Remain on site until members of the ERMD Biodiversity Management branch or SPCA arrive.

3. Category 3: Large shark species, live or dead

Although a very rare occurrence, occasionally live sharks or shark carcasses will be found on the beach. Although sharks cannot live for more than a few minutes out of water, many sharks are formally protected species, and thus DEA Oceans and Coasts will co-ordinate the response.

3.1. Response Team

The response team will consist of local area law enforcement official(s), and DEA Oceans and Coasts official(s).

3.2. Procedure

On notification of a Category 3 stranding, the DRMC's Disaster Operations Centre (DOC) will:

- Dispatch a local area law enforcement officer to the site
- Inform DEA Oceans and Coasts
- Inform the Director of Research: Shark Spotting Programme

On arrival, the law enforcement officer will:

- Keep the public away from the animal at all times
- Remain on site until members of DEA Oceans and Coasts arrive
- The animal and the site will be handed over to DEA Oceans and Coasts on arrival

In the event that DEA Oceans and Coasts does not want the shark carcass for research purposes, DEA Oceans and Coasts will contact Solid Waste Management for removal of the animal to an appropriate disposal site in accordance with Stranding Category 4.

4. Category 4: Whale, dolphin, or shark carcass

A Category 4 stranding occurs when the carcass of any of the above large marine animals is found on the beach.

4.1. Response Team

The response team will consist of (a) the solid waste by-law enforcement unit, local area law enforcement official(s), ERMD official(s), and Solid Waste Management official(s).

4.2. Procedure

On receiving a report of a whale, dolphin, or whale shark carcass the following line functions (as per the contact schedule) will be notified:

- Solid Waste Management
- ERMD
- Local area law enforcement

On notification, officials from ERMD and Solid Waste will proceed directly to the site. Once on site, ERMD and Solid Waste will convene and jointly undertake the following:

- Inform DEA Oceans and Coasts and assess whether they want to collect carcass or any tissue samples etc prior to disposal
- Collectively decide on the most effective method of removal/disposal, considering:
  - Ease of access
  - Environmental impact
  - Site rehabilitation
  - Cost effectiveness
- Determine whether additional law enforcement assistance is needed for area control and traffic control, and if so, contact the DRMC's Disaster Operations Centre (DOC) to coordinate this.
- Carcasses will be disposed of in accordance with existing Solid Waste Management policies
- Seal carcasses will be removed in accordance with existing Solid Waste Management procedures.
- Successful removal and disposal of the animal will only be considered completed once the location has been rehabilitated and returned to its original state.

5. Record Keeping and Policy Monitoring

A record will be kept for all categories of strandings listed in this policy and protocol. All information will be collated, kept as records and maintained as part of the City's Coastal Monitoring Programme. The responsibility for record keeping and policy monitoring will be the City's Coastal Coordinators (Mr Darryl Colenbrander and MrEdward Knott).

For each event the following information will be recorded:

- Date, time and place
- Species, number of animals
- Cause of stranding (where known)
- Did the response by the City comply with this Council and Protocol
- Outcome of event

- Effectiveness of response
- Lessons learned

C. Public Awareness and Communication

1. Introduction

A public awareness and communication initiative should be undertaken – suggested as a joint initiative between the City and DEA Oceans and Coasts. This initiative should:

- Inform the public of the national policy
- Inform the public of the City's policy and protocol

There is also a need to clearly and effectively communicate with the public in the event of a marine mammal stranding in order to ensure the safety and wellbeing of both the public and the animals, as the public is often the first responders. As the response differs based on the type of stranding which has occurred, it is necessary for communication to be based around the appropriate actions to be taken in each of the four scenarios below.

Communication should include the following: designated signage on marine animal strandings and/or additional information added to existing signage; a pamphlet and website giving details on the species which frequently occur on the City's coast, how to determine the appropriate action to take and which actions to avoid, and which agencies to phone.

2. Category 1: Live whale, dolphin and whale shark strandings

Communication should include the following:

- Signage indicating the DRM Centre as the number to phone in the case of a live animal stranding.
- Pamphlet and website detailing what actions are appropriate for the public to take, and a list of actions to avoid, including supportive care that can be offered before first responders arrive, safety precautions, and the importance of not attempting to move or return the animal to the water.

3. Category 2: Injured or sick seals or seal pups

Communication should include the following:

- Pamphlet and website detailing what actions are appropriate for the public to take, and a list of actions to avoid, as well as information on how to determine whether seals are sick and in need of treatment, and when it is normal for seals to be on the beach.

4. Category 3: Large shark species, alive or dead

Communication should include the following:

- Pamphlet and website detailing what actions are appropriate for the public to take, and a list of actions to avoid.

5. Category 4: Whale, dolphin, or shark carcass

Communication should include the following:

- Signage indicating the DRM Centre as the number to phone in the case if a dead animal.
- Pamphlet and website detailing what actions to take in this case, and the need to avoid contact and interference with carcass.

Annexure A

Marine Animal Stranding Contact List

Line Function	Contact Person	Contact details
Environmental Resource Management	Gregg Oelofse	083 940 8143
	Howard Gold	084 630 9153
	Darryl Colenbrander	082 312 3443
Biodiversity Management Branch	Bongani Mnisi	083 591 7791
	Benjamin Lourens	083 650 2010
Sport, Recreation and Amenities	Edward Knott	0847057568
Solid Waste Management	Claire McKinnon	082 600 6648
	Eddie Abrahams	084 220 0049
Marine and Environmental Law Enforcement Unit	Arne Purves	082 940 8937
	Assistant Chief Wentzel	083 592 8883
	Senior Inspector Shaw	083 264 2040
	Inspector Panday	084 668 3888
Disaster Risk Management Centre	Disaster Operations Centre (DOC)	021 597 5000
		080 911 4357
		080 112 4357
Traffic Services	Henry Swift	084 620 5566
	Jan Koen	078 802 7373
Metro Police	Command Centre	021 596 1999
Law Enforcement	Declan Ross	084 622 2515

Marine Animal Stranding Material Provision List: DRM

- Heavy duty loading straps – multiple – Oceans and Coasts
- Animal stretchers - multiple – Oceans and Coasts
- Hand pump water sprayers – multiple (DRM)
- Mattresses – multiple (DRM)
- Rescue team vests – multiple (ERMD)
- SOCC vests (ERMD)
- SOCC Gazebo (DRM)

Annexure B: Marine Mammal Stranding Signage



Chapter 14: Coastal Risk Register

1. Introduction

With a coastline of over 240km with a wide range of infrastructure, both public and private exposed to coastal variables and dynamics, keeping track of and mitigating risk remains challenging. Risk in itself has three primary considerations, namely:

1. Current risk, i.e. infrastructure is currently being damaged, undermined threatened
2. Potential future risk as a result of predicted long term changes such as sea-level rise
3. Risk of a coastal accident or emergency, i.e. ship wreck, whale stranding, or pollution event

This Coastal Risk Register is intended as a means to track, record and ensure remedial action for risk falling into category (1) above, i.e. current risk. Risks resulting from categories (2) and (3) are addressed and dealt with explicitly in other chapters in this MCMP.

2. Problem Identification

As a result of the extent of the coastline combined with the historical lack of clarity with regards departmental responsibility, the current situation results in many coastal risks being unattended over extensive periods of time. The outcome of this lack of action is that the risk often progresses from minor to major due to the lack of immediate response. This has both cost and risk implications for the City as well as results in a coastline that is in a slow process of decline in terms of quality.

The importance of this Risk Register is to:

- Log and track all risks on the coastline from small to large
- Define and assign clear line function responsibility for remedial action
- Clearly articulate the appropriate remedial action
- Clearly articulate if there are any legislative requirements with regards the remedial action proposed
- Ensure that line functions are aware of their responsibilities and make provision for both budget as well as project management by staff members
- Track the completion and resolution of the risk
- Highlight ongoing risk that has not been addressed within a reasonable timeframe at the appropriate City forum/committee

3. Process

In compiling the risk register the following process will be used:

- Where a coastal risk is identified a standard template (see template below) will be completed in full
- Completed templates will be submitted to the relevant responsible line department as per the Coastal Roles and Responsibilities as defined in this MCMP in Chapter 4 for action
- Duplicate copies of the completed template must be submitted for record keeping and logging to the Coastal Monitoring Data Base
- The full set of completed templates will comprise the City's Coastal Risk Register
- The Coastal Risk Register as well as a short report detailing departmental response of lack thereof will be submitted annually to the City's Disaster Risk Management Forum, EMT as well as relevant Sub Councils for consideration and follow up.

4. Risk Identification

The purpose of the Risk Register is to log and track all levels of current coastal risk and as such will include all levels and scales of risk from broken gabion cages, disintegrating boardwalks, collapsing sea walls through to wide-scale coastal erosion at the scale of Table Bay.

Risk Register Template

DATE OF ISSUE:	**PREPARED BY:**
PHOTOGRAPHIC RECORD OF RISK	
RESPONSIBLE DEPARTMENT FOR REMEDIAL ACTION	
RESPONSIBLE PERSON OR DISTRICT MANAGER FOR REMEDIAL ACTION	
RECOMMENDED REMEDIAL ACTION REQUIRED:	

LEVEL OF PRIORITY
LEGISLATIVE REQUIREMENTS/STANDARDS APPLICABLE FOR REMEDIAL ACTION:
RECORD OF COMPLETED REMEDIAL ACTION **DATE COMPLETED**: **REMEDIAL ACTION UNDERTAKEN**: **BY:**

Example of completed template

DATE OF ISSUE: 17/05/2013	**PREPARED BY: Gregg Oelofse**
PHOTOGRAPHIC RECORD OF RISK	

RESPONSIBLE DEPARTMENT FOR REMEDIAL ACTION
RESPONSIBLE PERSON OR DISTRICT MANAGER FOR REMEDIAL ACTION
RECOMMENDED REMEDIAL ACTION REQUIRED:
LEVEL OF PRIORITY
LEGISLATIVE REQUIREMENTS/STANDARDS APPLICABLE FOR REMEDIAL ACTION:
RECORD OF COMPLETED REMEDIAL ACTION **DATE COMPLETED**: **REMEDIAL ACTION UNDERTAKEN**: **BY:**

Chapter 15: Marine Access Points

A. Public Boat Launch Sites

1. Introduction

The City of Cape Town's (City) coastline provides a wide variety of services and opportunities for its citizens. The launching of motorised craft to access the marine environment is a common activity, conducted for varying purposes, ranging from recreational activities, to the permitted harvesting of marine resources. Managed, functional and accessible marine access points are a critical component to the City's coastal economy and the associated social value.

Marine access points are a number of formalised public boat launch sites consisting of slipways which allow craft to enter the water directly off hard infrastructure, or launch sites which allow craft to launch either directly off the beach or via a ramp to the beach and then into the water. National legislation requires that each of these launch sites are permitted.

The launching of motorised vessels, or the launching of non-motorised vessels using a vehicle, outside of these formal access points is illegal.

All launch sites used solely for the purpose of launching official emergency craft and/or for providing beach access for municipal services to undertake maintenance are excluded from these legal requirements.

2. General Principles

- The location of public boat launch sites must promote fair marine accessibility to all communities
- Access to high quality and well managed public boat launch sites is essential;
- Safety of users and adherence to environmental legislation are imperative.

3. Legal and Policy Considerations

3.1. Public Launch Sites in the Coastal Zone Regulations

The Regulations for Public Launch Sites in the Coastal Zone introduces general control measures for the launching of motorised craft into the marine environment. These Regulations are now separate from the Off Road Vehicle Regulations and permitting of the launch sites rests with the Provincial MEC for Environment. In applying for a permit, the City is required to provide an Environmental Management and Operational Plan for each launch site.

3.2. Environmental and Operational Management Plans

A boat launch site Environmental and Operational Management Plan (EOMP) outlines the minimum operational and environmental management requirements for each site.

The EOMP for each boat launch site includes, but is not limited to, the following:

- Legal context
- Institutional arrangements
- Function of EOMP
- Site description

- Site usage with respect to: access, parking, vessel safety requirements, launching and landing control and safety (day and night), toilet facilities and waste water treatment, events and functions, waste management,
- Conflict management
- Noise mitigation
- Communication and compliance
- Safety, emergency preparedness and responses
- Records

In certain cases the City has opted to lease the management of a boat launch site to a boat club. This is particularly relevant at the most active slipways where clubs are able to provide day-to-day management, administration, maintenance and access control. Where lease agreements are in place, these are listed along with the Operational Management Plan.

Regulating the use of Off-road vehicles

The General Policy for off-road vehicles in the coastal zone was published in Government Notice 858, in Government Gazette No.15655, dated 29 April 1994 and introduced general control measures, on a national basis, to protect the coastal environment from damage caused by the use of vehicles in the coastal zone and to ensure the safety of other beach users. The policy makes provision for zoning the coastal zone, for the protection of ecologically sensitive areas, and for various recreational activities, and also allows for a permit system to facilitate the control of vehicles in specifically demarcated areas. According to the General Policy, the use of vehicles in any beach area may be reserved for specific purposes, such as angling or boat launching.

The Control of Vehicles in the Coastal Zone Regulations ("off-road vehicle Regulations") was published under NEMA (Government Notice No. 1399 of 21 December 2001).The rationale behind the ORV regulations serves to protect and conserve South Africa's sensitive coastal ecosystems from the impact of ORVs through their regulation and control. Whilst the ORV regulations provide for a general prohibition on the recreational use of vehicles in the coastal zone, the ORV regulations do make provisions for approving the use of vehicles in the coastal zone under specific circumstances. The ORV regulations also provide measures for the enforcement of these regulations and prescribe penalties in respect of contraventions.

In terms of the ORV Regulations (Regulation 7), the City is required to apply for a license to the provincial authority for those slipways that the City wishes to operationalize and to ensure that every precaution is undertaken to promote safe, environmentally sensitive and socially responsible boat launching from such slipways. As per the ORV Regulations, the City is required to meet the following criteria in applying for a license from the provincial authority:

(i) Payment of a stipulated fee for each boat launch site that the City wishes to license;
(ii) Complies with the requirements of section 24(4) of the National Environmental Management Act relating to the investigation, assesses and communicates to the competent authority the potential impact of the activities associated with the boast launching site;
(iii) Demonstrates that the use of vehicles at the boat launch site will not cause significant harm to the coastal environment; and
(iv) That the City Submits an Environmental and Operational Management Plan to ensure that all appropriate measures are undertaken to ensure that any activity associated with the slipway sensitive to the coastal environment and that such activities do not detract from the social and economic values of slipways in Cape Town.

The National Government is considering legislating marine access points separately from the ORV Regulations. If this is promulgated the City will revise this chapter of its CMP accordingly.

4. Listed Public Launch Sites in the City of Cape Town

LOCATION	COORDINATES	MANAGEMENT	RESTRICTIONS
Fish Hoek (sailing)	34°8'13"S 18°26'2"E	Fish Hoek Sailing Club	No vehicles permitted
Harbour Island	34°9'8"S 18°51'29"E	Gordon's Bay Boat Angling Club	None
Hottentots Holland	34°6'18"S 18°49'1"E	Hottentots Holland Sailing Club	None
Kommetjie	34°8'24"S 18°19'20"E	Kommetjie Boat Club	None
Melkbosstrand	33°43'42"S 18°26'19"E	CCT	None
Miller's Point	34°13'49"S 18°28'26"E	Cape Boat and Ski Club	None
Strand	34°7'4"S 18°49'37"E	CCT	None
Table View	33°48'36"S 18°28'6"E	CCT	None
Three Anchor Bay	33°54'20"S 18°23'52"E	CCT	No vehicles permitted
Witsands	34°10'39"S 18°20'40"E	CCT	None

5. Exclusions

Slipways that are utilised for emergency purposes (specifically the NSRI and Lifesaving) are excluded from legislation and are not available to public use. As such, they are not listed in Table 1.

B. Other marine access points

In addition to slipways the City is exploring alternative means to facilitate and promote access to the marine and coastal environment. These include a current investigation into a beach launching site at Sonwabe as well as promoting access to the coast via public jetties. If these projects are successful the City will investigate the further expansion of these initiatives.

1. Jetties for public use

The City is responsible for the management of three public jetties, the Strand Jetty, the Harmony Park Jetty within the Harmony Park Coastal Resort, and the Simon's Town Jetty. The City either directly manages these facilities, e.g. Strand and Harmony Park Jetties, or enters into management agreements with non-profit organisations, for example the Simon's Town Jetty.

The Strand Jetty, built in 1934, forms part of the Strand Jetty Precinct which provides commercial, recreational and residential opportunities in the Strand area. This Jetty provides a point of embarkation/disembarkation for crew of fishing boats launching at the Strand Boat Launch Site.

The Harmony Park Jetty forms part of the Harmony Park Resort and provides opportunities for recreational use including fishing within the Resort.

The Simon's Town Jetty is administered by the City and forms part of the central tourism, recreation and commercial hub of Simon's Town. This Jetty is used primarily as a recreational asset and is accessible to all. In addition, this jetty provides an operational access point for a number of eco-tourism operators (boat based whale watching, white shark viewing and site-seeing boat tours) and is also used for refuelling. The City developed and prepared an Operational Management Plan (OMP) for this Jetty and engaged Simon's Town Amenities Development Company through a formal agreement to manage and operate the Jetty in terms of the OMP.

JETTY	LOCATION	COORDINATES
Strand	Strand	34º7'6"S 18º49'39"E
Harmony Park	Strand	34º8'21"S 18º50'46"E
Simon's Town	Simon's Town	34º11'32"S 18º26'0"E

Table 2: Jetties in Cape Town

2. Marine Access for MLRA operations

The City's coastline provides access to the marine environment for MLRA rights holders, for the purposes of harvesting and consumptive use of marine resources such as fish and kelp.

The rights holders must be in possession of an Off-Road Vehicles Permit (ORV Permit), which is issued by the Department of Environmental Affairs, in accordance with the Control of Vehicles in the Coastal Area Regulations (ORV Regulations). Where necessary, the City must, in consultation with the rights holders, set conditions to ensure best practise, Duty of Care, and protection of coastal public property, by considering:

- that such marine access does not pose a threat to existing coastal dunes;
- that existing formalised excess points are utilised, before new access points are considered;
- that such marine access is not in conflict with City efforts towards the protection of sensitive and fragile coastal systems; and
- that the safety of other beach users receives priority.

C. New Marine Access Points

Cape Town has a varied coastline exposed to high wind and wave activity with few sheltered bays suitable for marine access points such as boat launch sites and jetties. Opportunities to develop and establish new suitable marine access points are extremely limited. As such, the existing marine access points that are available should be considered vital assets.

As part of the City's Economic and Spatial Development Plan for the coastline, possible and viable new marine access points will be investigated. This investigation will address historical redress, fair spatial distribution and safe and easy accessibility of such marine access points to all City communities.

D. Environmental and Operational Management Plans

The following Environmental and Operational Management Plans are in place, and are available as annexures to this chapter (Annexures B– J). EOMPs are under development for those launch sites that do not currently have plans in place.

1. Fish Hoek (sailing) – Annexure B
2. Hottentots Holland – Annexure C
3. Kommetjie – Annexure D
4. Melkbosstrand – Annexure E
5. Miller's Point – Annexure F
6. Strand – Annexure G
7. Table View – Annexure H
8. Three Anchor Bay – Annexure - I
9. Witsands – Annexure J

E. Roles and Responsibilities

- The Sport, Recreation and Amenities Department:
  - ensuring all marine access points have the relevant EOMPs in place;
  - that these EOMPs are kept up to date and amended when necessary;

    - that the relevant leases for the management of access points are up to date and in place;
    - the repairs and maintenance of marine access points

- The Environmental Resource Management Department will play a supporting role to ensure that environmental considerations are adequately accounted for in the Operational Management Plans, and in future planning for additional marine access points.

- City of Cape Town Marine and Coastal Law Enforcement Unit:
    - will play an active role in the application and enforcement of conditions of use for marine access points; and
    - ensure co-ordination with other relevant law enforcement agencies (national, provincial and municipal) in order to address environmental compliance issues associated with the use of marine access points.

- Western Cape Environmental Affairs and Development Planning:
    - Listing of public boat launch sites. More information can be obtained at: http://www.westerncape.gov.za/service/permits-drive-beach-and-licences-operate-boat-launching-site

- Department of Environmental Affairs: Oceans and Coasts Branch:
    - Issuing of permits for the use of vehicles in the coastal zone.

- Department of Agriculture, Forestry and Fisheries:
    - Issuing of rights and permits in terms of the Marine Living Resources Act.

Annexure A: Location of public boat launch sites and jetties



Annexure B

OPERATIONAL MANAGEMENT PLAN FOR FISH HOEK BEACH

Fish Hoek Sailing Club & Trek Net Fisherman

PREPARED BY:
Peninsula Permits cc.
Envirocentric

FOR:
The City of Cape Town

May 2004

Envirocentric

PENINSULA PERMITS

1. BACKGROUND

1.1 Legal Context

This General Policy for off-road vehicles in the coastal zone was published in Government Notice 858, in Government Gazette No.15655, dated 29 April 1994 and introduced general control measures, on a national basis, to protect the coastal environment from damage caused by the use of vehicles in the coastal zone and to ensure the safety of other beach users. The policy makes provision for zoning the coastal zone, for the protection of ecologically sensitive areas, and for various recreational activities, and also allows for a permit system to facilitate the control of vehicles in specifically demarcated areas. According to the General Policy, the use of vehicles in any beach area may be reserved for specific purposes, such as angling or boat launching.

The Control of Vehicles in the Coastal Zone Regulations ("Beach Regulations") published under NEMA (Government Notice No. 1399 of 21 December 2001) provide for a general prohibition on the recreational use of vehicles in the coastal zone and procedures for approving the use of vehicles in the coastal zone under specific circumstances. They also provide measures for the enforcement of these regulations and prescribe penalties in respect of contraventions.

The Beach Regulations (Regulation 7) require operators of boat launching sites to apply to the relevant authority to grant a license to use vehicles, or allow their use by third parties, to facilitate boat launching.
An application for a licence must:

- Be made in the format stipulated by the relevant authority.
- Be accompanied by payment or proof of payment of the application fee stipulated by the relevant authority.
- Clearly indicate:
  - The boundaries of the proposed boat-launching site and all access roads.
  - The types of vehicles that will be used at the site.
  - Set out fully the reasons why the boat-launching site is required.
  - Include a plan for managing activities at the site in a manner that avoids or minimises damage to the environment.
  - Subject to Regulation 22, be accompanied by evidence that the requirements of Section 24(7) of the Act relating to the investigation, assessment and communication of the potential impact of the activities associated with boat-launching at the site have been complied with.

To comply with these regulations, the City of Cape Town (CoCT) has completed the required application form for the licensing of the Fish Hoek Beach (the area of beach between 34º08'13.6"S; 18º26'02.3"E and 34º08'17.5"S; 18º25'59.2"E). Below please find the proposed Operational Management Plan (OMP) for Fish Hoek Beach.

Based on this generic OMP, the OMP for the Fish Hoek Beach includes a general description of the boat launch site (including slipways, parking, roads, and other service facilities), a general description of the types of uses of the beach and a detailed description of the activities required to minimise and mitigate the environmental impacts of the use of the boat launch site. The OMP will however only describe the minimum operational management requirements for each site and it is anticipated that each site will, over time, exceed these minimum requirements.

1.2 Environmental Management in the City of Cape Town

The City of Cape Town's Integrated Metropolitan Environmental Policy (IMEP) was formally adopted in October 2001. IMEP sets the broad framework and a number of core principles for guiding the City towards a sustainable future. IMEP recognises the economic, social and environmental value of the City's coastal asset, and as such identified the Coast as a priority theme for the development of a detailed implementation strategy. In October 2003, the City formally adopted the Coastal Zone Management Strategy giving effect to the principles of IMEP and setting coastal management practise and standards in place.

1.3 Responsible Authority

All reference to the licensed operator within this OMP refers to the City of Cape Town. The City through a lease agreement, may delegate the authority and responsibility for the management of the boat launch site to any competent club or organisation (see 2.20). The City may furthermore delegate their responsibility and management of the launch site to any user with a valid permit, subject to the user complying to the terms set out in the OMP.

1.4 Function of the OMP

The OMP has been drafted to ensure compliance with the regulations in terms of the national environmental management act, 1998: control of vehicles in the coastal zone, specifically "*7(4)(f) subject to regulation 22, be accompanied by evidence that the requirements of section 24(7) of the act relating to the investigation, assessment and communication of the potential impact of the activities associated with boat-launching at the site have been complied with*". The function of the OMP is thus to ensure that the licensed operator utilises the boat launching site in an environmentally sensitive manner. The OMP explicitly identifies the mitigating actions required to control the impacts of the boat launch site and associated activities on the bio-physical attributes of the site, the surrounding residents and the safety of the users of the site. The OMP further provides a framework to ensure that all activities occurring within the boat launch site comply with the relevant enabling legislation.

1.5 Site description

Fish Hoek Beach (above the high water mark) is owned by the City of Cape Town, and is situated off the Main Road (M4) in Fish Hoek.

The boat launching facilities at Fish Hoek include the following:

- 5 large gravel parking areas (non-demarcated), 2 large paved parking areas and 1 tarred parking area.
- Two entrances leading onto the beach (one utilised by the Fish Hoek Beach Sailing Club (FBSC) and one utilised by Trek Net Fisherman).
- Public toilets.
- Law Enforcement offices.
- A clubhouse for members of the FBSC.
- A large boat yard for storing trailers and hobie cats for members of the FBSC.
- A storage and fish cleaning area for Trek Net Fisherman.
- A raised platform allowing Trek Net Fisherman to see fish from the dunes, without having to walk on the dunes (see map 1).
- A Surf Lifesaving clubhouse, manned by the Fish Hoek Beach Surf Lifesaving Club.

The Fish Hoek Beach Launch Site is owned and managed by the CoCT. Currently no lease agreement exists for this site. Future reference in this OMP to the Fish Hoek Beach Launch Site refers to the all the associated facilities required for boat launching. Map 1 shows the location of the boat launching facilities at the Fish Hoek Beach.

1.6 Site usage

The site is not highly utilised, only being used over the holiday season and weekends in the summer months. Vehicles are rarely used to launch boats; most are pushed to the seashore by hand. Even during large organised events (e.g. sailing events), the usage never exceeds the “carrying capacity” for the parking areas.

The following uses have been recorded at the boat launch site:

- The majority of the launch site users are recreational users (e.g. Kayaks, hobie-cats, surf skis etc).
- The site occasionally used by Trek Net Fisherman.
- Fish Hoek Beach is a very popular holiday destination and is highly utilised during holidays and weekends in the summer months.
- The Fish Hoek Surf Lifesaving Club (FSLC) carries out regular exercise and training programs.

No accurate user counts exist for the site. Members of the FBSC launch with the aid of a vehicle approximately four times a year. The FSLSC launch an estimated 50 times a year (approximately every weekend between November to the end of April, without the use of a vehicle). The users and associated levels of usage are seasonal and weather dependent.

2. OPERATIONAL MANAGEMENT REQUIREMENTS OF BOAT LAUNCH SITES

2.1 Access management

2.1.1 The site is accessed approximately 200m from the Main Road (M4) in Fish Hoek. The layout of the access to, and traffic flows through the parking areas at the site are shown in Map 1. The roads and parking areas must be tarred, adequately marked to meet municipal and provincial road standards and free of potholes.

2.1.2 All access roads, parking areas and slipways are to be properly bollarded or fenced off to ensure that all vehicles remain on the hardened road surface, and only park in designated parking areas. All areas outside the hardened road surfaces are designated no-go areas (see Map 1 for the extent of the hardened road surfaces). No vehicle is permitted in any sensitive areas (e.g. dune areas) on, or abutting, the site. The shortest route to the water will be used. Vehicles will offload/load and return to the parking area immediately.

2.1.3 Vehicles, their trailers and the drivers or boat launch operators using the boat launch sites shall comply with the requirements of the Road Traffic Act and the General Policy on Control of Vehicles in the Coastal Zone (Government Gazette, Notice 858 of 29 April 1994).

2.1.4 Trailers may be brought onto the seashore by a motor vehicle, only for the purposes of launching or retrieving a vessel. Upon launching (or retrieving if appropriate) a vessel, these trailers and vehicles are to be parked in a clearly demarcated parking area, off the beach (shown in Map 1).

2.1.5 The minimum signage requirements to facilitate vehicular and pedestrian flows, and for demarcating parking areas, are attached. Map 2 further indicates the location for the posting of the signage and safety requirements for the site.

2.1.6 A fee is to be charged and a ticket issued to all persons launching from the site. Key provisions of this OMP and code of conduct are to be described on the ticket (or an attached brochure). A chain/boom is to be placed across the access route of the slipway enabling the licensed operator to control access. Users can pay an annual instalment, entitling them to free access to the launch site for a year. On payment of the instalment, the user must be issued with and be made aware of the conditions of the OMP. They will furthermore be issued with a key to the chain/boom at the entrance to enable them to access the launching site. The launching site is kept locked when no boats are at sea to avoid unauthorized entry onto the beach by vehicles. Only persons who are in possession of a valid permit (and key) may access this slipway. The boom is to be closed between sunset and sunrise, unless by special arrangement for night launches.

2.1.7 The limits on the numbers of boats that may launch from each site will be linked to the availability of parking and other service facilities. This limit includes boats in the process of being launched or retrieved.

2.1.8 Due to the nature of the boat launch site (facilities, services, parking, access, bio-physical characteristics), vehicles under 1400cc engine capacity shall not be permitted to launch a boat at the site.

2.1.9 Due to the nature of the boat launch site (facilities, services, parking, access, bio-physical characteristics) boats may only have a single engine, and an engine capacity no greater than a 50 HP. Boats longer than 5 meters shall not be permitted to launch from the site.

2.2 Parking management

2.2.1 All the parking areas/bays for vehicles and vehicle-and-trailers will be properly demarcated and vehicle flows clearly indicated.

2.2.2 Launching and parking areas must be separated. Parked vehicles should not obstruct access to the boat launch site by any user, visitor or resident, nor interfere with reasonable use of that beach by any user, visitor or resident. Map 2 shows vehicular access routes, boat launch site and associated parking.

2.3 Boat Launch area

2.3.1 Every effort shall be made to minimise disturbance to the beach surface during the process of launching and retrieving boats, i.e. only tow vehicles with sufficient capacity may be used - this includes engine capacity, tyre profile, tyre pressure, driver proficiency, etc.

2.3.2 The launch area shall not be used as an access to other parts of the beach.

2.3.3 Kelp washed up onto the launch site may not be completely removed from the area. If kelp builds up directly on the launch site, kelp may be spread out manually, along another adjacent section of the coastline that will not impact on other users. If kelp build-up has reached the extent that mechanical means is necessary, prior authorisation and consent must be obtained from the relevant authorities.

2.4 Launching and beaching control and safety

2.4.1 The licensed operator must be in control of all launches and boat retrievals at all times. During busy periods, the operator must ensure that a dedicated staff member is provided to direct the launches and retrievals.

2.4.2 No alcohol or any other intoxicating substance shall be allowed on the CoCT premises. Any person suspected of being under the influence of alcohol or any other intoxicating substance shall not be permitted access to, or allowed to remain on, the premises. No alcohol may be consumed on site, except within the confines of the Clubhouse as per the approved Liquor Licence.

2.4.3 All SADSA, SAMSA and CoCT safety regulations shall be adhered to at all times. A comprehensive first-aid box capable of handling normal domestic emergencies shall be maintained at the FSLC. Weatherproof lists of relevant emergency contact numbers shall be displayed near the launch site.

2.4.4 Where feasible, designated launch positions at launch sites on beaches shall be clearly demarcated. The areas demarcated for boat launching will be demarcated by adequate signage and positioned as indicated on Map 2.

2.4.5 Boats should not be left unattended on the seashore and beached boats shall be removed from the launch site area within 10 minutes of arrival after beaching. No parking on the beach is permitted.

2.4.6 Boats in the process of landing or being retrieved shall have priority over boats wishing to launch.

2.4.7 A boom or chain gate will to be constructed in front of the slipway, to enable the licensed operator to control access. The licensed operator shall temporarily close the launch site under exceptional circumstances such as extremely inclement weather conditions, damage to the slipway, or any other emergency that will prevent the safe launching or retrieval of boats. If the launch site is to be closed to users, the boom will locked by the operator and a notice posted to notify users of the reason for closure and anticipated time of re-opening.

2.4.8 The launch area will be kept clear of all other users when in use. Signage and beacons will be posted, at the slipways informing other users (e.g. swimmers, kayaks) to remain outside of the demarcated sailing/boating area (see map 3).

2.4.9 The provisions of section 68 of the Merchant Shipping Act No 57 of 1951 and all applicable regulations made under Section 356 of the same act shall be strictly adhered to. No boat will be able to launch from the site unless it is properly marked and registered (or licensed as the case may be) according to the Merchant Shipping Act No 57 of 1951 and it's associated regulations.

2.5 Vessel safety

2.5.1 No boat will be able to launch unless the skipper is in possession of a valid Certificate of Competency issued by the South African Maritime Safety Authority (SAMSA), an Agency recognised by it or a IRB (Inflatable Rubber Duck) skippers Certificate issued by Lifesaving South Africa.

2.5.2 Everyone on the boat in the immediate launch and landing zone must wear life jackets or buoyancy aids.

2.5.3 All boats launching from the site are to carry a functional form of communication. (Note: boats not exceeding the one nautical mile limit are not required to have a radio).

2.6 Jet skis/Personal watercraft (PWC)

2.6.1 No launching of jet skis shall be allowed to take place from these launch sites.

2.7 Night launching and beaching

2.9.1 No night launching may take place from this site, unless in the event of an emergency.

2.8 Managing conflict between different user groups

2.8.1 No other users may use the designated launch areas. Map 3 indicates the extent of the launch area and the other adjacent areas designated for recreational use.

2.8.2 Except during launching and landing, boats under power in the in-shore area are not to approach within 200m of other users (divers, swimmers, surfers, body-boarders, or any other non-powered craft). Provided that the skipper is qualified in surf rescue operations (e.g. rescue operations or patrols) this 200m distance is not compulsory. Rescue rubber ducks that are used within 200m of other users must have a propeller guard fitted.

2.8.3 Boats may not enter an area set aside specifically for bathers or other water sports and vice versa. It is the skipper's responsibility to keep a proper lookout for bathers and divers. Other users are to stay clear of the launch and landing channel (see Map 3). Adequate signage is to be posted; informing other users (e.g. swimmers, kayaks) to remain outside of these demarcated launching/ landing areas (see Map 3).

2.9 Special events and functions

2.9.1 In terms of the Merchant Shipping Act, the relevant authority may grant permission for the total number of allowable launches to be increased during these events.

2.9.2 In order to cater for special events and functions, the licensed operator is to ensure that sufficient staff is available to cater for, and mitigate, the impacts resulting from an increase in users. During such events the licensed operator is to aggressively manage and enforce the conditions of the OMP. The following areas will require intensive management during periods of high usage:

- Control and management of vehicle flows and parking
- Control of alcohol consumption, anti-social activities, littering and vandalism
- Prevention of overnighting at the boat launch site
- Prevention of fish hawking on site
- Control over the cleaning of boats
- Control over the disposal of offal
- Monitoring of, and compliance with, the Marine Living Resources Act
- Preventing conflicts between different user groups
- Compliance with minimum safety standards
- The management of noise pollution

2.10 Toilet facilities and waste water treatment

2.10.1 The existing toilet and ablution facilities associated with the boat launch site are indicated in Map 1. The Licensed operator shall ensure that all toilet facilities used by boat launch site users are properly maintained and in a clean and hygienic condition at all times. During busy periods toilets shall be cleaned and serviced at least twice daily, while during quiet periods toilets shall be cleaned and serviced at least every second day.

2.10.2 Wastewater must be discharged into a recognised drainage system. All wastewater is to be directed into the Municipal Waste Water drains. Where there is no municipal sewer available at the site, an adequately designed and maintained septic tank or any other acceptable wastewater treatment system is to be provided.

2.10.3 No washing of boats will be permitted at the launch sites or in the parking areas.

2.11 Pollution and litter management

2.11.1 All litter and refuse is to be cleaned from the site by the licensed operator at least twice a week. In peak season, and during special events, the cleaning schedule is to take place at least once a day.

2.11.2 Plastic (or any other non-corroding material) refuse bins are to be provided at the site. In peak season, and during special events, the bins are to be emptied daily. Outside peak season, bins are to be cleaned at least twice a week. Refuse bins are to be discreetly placed in areas of high usage (e.g. at the parking areas). The bins will be clearly visible and be a short distance from the users. The bins are to be placed in an area where they can be easily serviced.

2.11.3 Refuelling supplies held at the launch sites will be in sealed containers, which are only opened once in place within the boat.

2.11.4 Spillages of fuel or oil at the launch site are to be avoided. The licensed operator must keep Spill Sorb (or similar product) on site. Should a fuel or oil spill take place, the material containing the spill shall be properly disposed of at an approved facility.

2.11.5 No scaling, cleaning of fish or disposal of bait may take place on the site.

2.11.6 No cleaning of boats bodywork is permitted.

2.12 Noise mitigation

2.12.1 The licensed operator is to ensure that the premises is operated in accordance with the requirements of the Noise Control Regulations PN 627/1998.

2.12.2 Where the licensed operator cannot control rowdy and noisy activity, they are to contact municipal law enforcement officials or the SAPS for assistance.

2.12.3 No dry starting of motors is allowed at the launch site or in the parking area. The licensed operator is responsible for ensuring that management measures are put in place to address reasonable complaints from users, visitors and residents.

2.13 New developments

2.13.1 No listed (in terms of Schedule 1 1(e) of the Regulations under section 21 of the Environmental Conservation Act 73 of 1989) activity may take place within the site, unless approved by the responsible authority after an Environmental Impact Assessment (EIA) has been undertaken. This assessment must meet the requirements of the provincial planning and environmental authorities.

2.14 Helicopters

2.14.1 There are no demarcated helicopter-landing sites.

2.15 Archaeological sites

2.15.1 Any area of archaeological significance found on the site is to be reported immediately by the licensed operator of the launch site to the South African Heritage Resource Agency (SAHRA) (or its nominated representative) and access to the archaeological site should be prevented, pending appropriate investigation and decision.

2.16 Consumptive use of marine resources

2.16.1 All consumptive use of marine resources on the site will be subject to the national regulations (bag limits, closed seasons etc). The licensed operator will inform MCM and Municipal Police Officials of any illegal marine resource use activities occurring on the site. MCM and Municipal Police are to be notified of special events to ensure that enforcement staff are available to monitor the consumptive use of marine resources.

2.16.2 Fish (or any other marine resources) may not be sold/bartered on the site.

2.17 Communication and compliance

2.17.1 The licensed operator shall draw the attention of all users of the site to the key provisions of this OMP by providing an information board near the launch site.

2.17.2 Adequate complementary signage must be provided to inform all users and visitors to the site with regards to the conditions of the OMP. Map 2 shows the minimum signage requirements.

2.17.3 The licensed operator shall be responsible for monitoring compliance with this OMP.

2.17.4 Appropriate records of compliance monitoring and any audit will be maintained and may be used in support of subsequent applications for re-licensing of the site.

2.17.5 Any user of the site who disregards the provisions of this OMP shall be reported, by the licensed operator, to the relevant authority that has the legal jurisdiction to impose penalties. MCM and City Law Enforcement Officers will be contacted to monitor and enforce all marine resource use activities. All social and traffic related activities will be enforced by the City Police, Traffic Officials and/or SAPS.

2.17.6 Disregard for the provisions of this OMP, may result in the relevant authority's withdrawal of the licence.

2.18 Safety, emergency preparedness and responses

2.18.1 The site shall form part of, and conform to, local and regional emergency response plans and procedures (e.g. fire, oil spills).

2.19 Records

2.19.1 Adequate launch records, in the prescribed format, will be maintained by the licensed operator. The minimum information for the boat launch record is to include boat registration, boat name, time of launch, time of landing, number of crew and purpose of trip.

2.19.2 The licensed operator shall keep a detailed register of all accidents and casualties involving boats, craft and/or crew (using the prescribed SAMSA form as required by section 259 of the Merchant Shipping Act No 57 of 1951). This register should then be forwarded to the nearest SAMSA office at the end of each month.

2.20 Operators other than the licensed operator

2.20.1 The licensed operator may delegate the authority for the management of the boat launch site to any competent club or organisation. The licensed operator shall ensure that any club or institution to which operation of the site may be delegated is properly constituted, has the capacity to observe the conditions of this OMP and re-invests income generated from the site to the effective management of that site.

2.20.2 The prescriptions in this OMP shall be incorporated into any lease agreement entered into between the licensed operator and a club or institution to which the management authority is delegated.

2.20.3 The club or organisation will ensure that a suitable Code of Conduct is in place, and that its members comply with the conditions of the Code.

2.20.4 This club or organisation shall ensure that the site is open to all users, on condition that they comply with the legal requirements of the site. The Club or organisation shall ensure that a transparent, equitable and fair process is followed in determining its membership.

3. ACRONYMS USED IN THIS DOCUMENT

CoCT	City of Cape Town
DEA&DP	Department of Environmental Affairs and Development Planning
ECA	Environmental Conservation Act
EIA	Environmental Impact Assessment
FBSC	Fish Hoek Beach Sailing Club
FSLC	Fish Hoek Surf Lifesaving Club
OMP	Operational Management Plan
MCM	Marine and Coastal Management
MLRA	Marine Living Resources Act, Act No. 18 of 1998
NEMA	National Environmental Management Act, Act No. 107 of 1998
PWC	Personal Watercraft
SAHRA	South African Heritage Resources Agency
SAMSA	South African Maritime Safety Authority
SAPS	South African Police Services

4. OVERVIEW OF OTHER LEGISLATION REFERRED TO IN THIS DOCUMENT

Environment Conservation Act (73 of 1989)

The primary objective of the ECA is to provide for the effective protection and controlled utilisation of the environment (Henderson, 1996). The Act makes provision for the declaration of protected natural environments and for the identification of activities that may have a detrimental effect on the environment.

Regulations to control potentially harmful activities on a permit system within demarcated sensitive coastal areas were promulgated in terms of the ECA. The prohibited activities are the disturbance of vegetation, earthworks, dredging and dune stabilisation.

Subsequent to the promulgation of the Act in 1989, a number of key regulations governing EIAs and identified activities that may be detrimental to the environment have also been promulgated. Of importance to proposed developments in the coastal zone are Government Notices R1182, R1183, R1184 and R448 and amendments of May 2002. While beach driving and boat launching are not listed activities in terms of these regulations, proposed developments, such as structures below the high water mark of the sea and certain access infrastructure which may provide for such activities, must undergo environmental impact assessments before environmental authorisation can be granted by DEAT.

The Act was originally passed to provide a basis for environmental conservation in South Africa. Many of its provisions have since been repealed by NEMA. Provision is also made in NEMA for the repeal of sections of Part V and Part VI of the Environmental Conservation Act, which provide for the “Control of Activities which may have a Detrimental Effect on the Environment" and associated EIA regulations. However, these remain in force until they are replaced with new regulations promulgated under NEMA.

National Environmental Management Act (107 of 1998)

NEMA is South Africa’s overarching environmental legislation and has, as its primary objective, to provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state and to provide for matters connected therewith (Government Gazette, 1998).

The Act provides for the right to an environment that is not harmful to the health and well-being of South African citizens; the equitable distribution of natural resources; sustainable development; environmental protection and the formulation of environmental management frameworks (Government Gazette, 1998). These principles and provisions in Chapter 5 (Integrated Environmental Management) govern the way in which environmental management should be practiced. Provision is also made for the issuing of various Regulations in order to carry out the purposes and the provisions of NEMA.

Marine Living Resources Act (18 of 1998)

This MLRA repeals most of the Sea Fishery Act (12 of 1988). Its preamble reads as follows:

"To provide for the conservation of the marine ecosystem, the long-term sustainable utilisation of marine living resources and the orderly access to exploitation, utilisation and protection of certain marine living resources; and for these purposes to provide for the exercise of control over marine living resources in a fair and equitable manner to the benefit of all the citizens of South Africa; and to provide for matters connected therewith."

The Act and Regulations published thereunder provide for the conservation of South Africa's marine ecosystems and the sustainable utilisation of marine living resources. This includes the protection of every species of sea animal, whether vertebrate or invertebrate, including the spawn or larvae of such sea animal, but excluding any seal or sea bird. Fish and marine organisms were protected by means of prohibitions against their catching, disturbance or possession. There is an OMPhasis on the broadening of fair and equitable access to resources, the gradual transformation of fishing methods, the development of fees for utilisation and a favourable business environment in fisheries. The Act provides for a principle of national control and co-ordination and places responsibility for resource-allocation decisions with the Minister: Environmental Affairs and Tourism. The Act makes provision for the granting of commercial, recreational and subsistence fishing rights.

The Minister may establish areas or zones where subsistence fishers may fish and, after consultation, may declare a specified community to be a fishing community, any person to be a subsistence fisher or any fishing or related activity or the exercise of any other right in that area or zone to be prohibited. No subsistence-fishing permit shall be transferable except with the approval of and subject to the conditions determined by the Minister.

Merchant Shipping Act (57 of 1951)

All vessels, of whatever size, that proceed to sea from anywhere in South Africa fall under the Merchant Shipping Act. Small vessels (3 m to < 25 tonnes) are divided into two classes, viz. small vessels used solely for sport and recreation, and all other small vessels, e.g. fishing boats, diving boats and sailing training yachts (i.e. commercial boats).

The Merchant Shipping Act:

- Sets out various categories of vessel, applicable to each class, and their operational limits.
- Makes provision for the inspection of seaworthiness and the competency of skippers.
- Sets out the various safety measures.
- Requires that skippers submit voyage details.

- Makes provision for authorised agencies to exercise or perform powers or duties as required by the Act.

Has certain Regulations namely:

- Government Notice R2799 that applies to ships or small vessels used for sport or recreation.

- Government Notice R1044 that makes provision for vessels of less than 3 m in length. Vessels falling into this category may not proceed to sea further than 500 m from the low water mark. 7

The Act also has relevance with respect to control of marine pollution and to that extent applies to all ships in South African waters.

Road Traffic Act (29 of 1989)

This Act outlines the various requirements and Regulations for vehicles and drivers. In terms of the Act, if a vehicle is able to gain access to, and be driven on, the seashore, this Act and its Regulations are deemed to apply.

There are a number of High Court cases which have established the breadth of application of the definition of a road and, although no cases involving the Admiralty Reserve or that part of the beach between the high and low water marks are known of, the Provincial Road Traffic Inspectorate is certain that the Act applies.

In this, it is important to note that a person does not have to have a right of vehicular access to the beach: right of access by the person is sufficient. The responsible erection of booms, etc., in providing and simultaneously limiting vehicular access to the beach, will thus not affect the applicability of this legislation to what can generally be described as “the beach”.

All vehicles (powered vehicles and trailers) using the beach must be roadworthy and licensed, and be driven by persons who themselves are licensed drivers of that category of vehicle. The body that controls vehicular access to the beach must know that the provisions of this Act apply. This Act has been replaced by the new National Road Traffic Act (93 of 1996). However, the 1996 Act provides that any relevant provision of the 1989 Act will remain in force until such time as the corresponding provision of the 1996 Act has been put into operation.



Parking areas
Fish Hoek SLSC
Look-out Platform
Launching area
Trek Net Fisherman (storage)

Changing rooms
Toilets
Fish Hoek Beach Sailing Club (boat yard)
Fish Hoek Beach Sailing Club House

Map 1 - Launching facilities

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PENINSULA PERMITS

for the City of Cape Town



Information boards
Entry routes
Launch areas
Exit routes
Fish Hoek Beach Sailing Club Boatyard
Parking areas

Map 2 - Entry/Exit Routes & Parking Areas

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for the City of Cape Town



Boating and surfing prohibited

Swimming prohibited

Launch areas

Map 3 - Designated launching/landing & recreational area

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PENINSULA PERMITS

for the City of Cape Town

Annexure C

OPERATIONAL MANAGEMENT PLAN FOR HOTTENTOTS HOLLAND BEACH SAILING CLUB

PREPARED BY:
Peninsula Permits cc.
Envirocentric

FOR:
The City of Cape Town

May 2004

1. BACKGROUND

1.1 Legal Context

This General Policy for off-road vehicles in the coastal zone was published in Government Notice 858, in Government Gazette No.15655, dated 29 April 1994 and introduced general control measures, on a national basis, to protect the coastal environment from damage caused by the use of vehicles in the coastal zone and to ensure the safety of other beach users. The policy makes provision for zoning the coastal zone, for the protection of ecologically sensitive areas, and for various recreational activities, and also allows for a permit system to facilitate the control of vehicles in specifically demarcated areas. According to the General Policy, the use of vehicles in any beach area may be reserved for specific purposes, such as angling or boat launching.

The Control of Vehicles in the Coastal Zone Regulations ("Beach Regulations") published under NEMA (Government Notice No. 1399 of 21 December 2001) provide for a general prohibition on the recreational use of vehicles in the coastal zone and procedures for approving the use of vehicles in the coastal zone under specific circumstances. They also provide measures for the enforcement of these regulations and prescribe penalties in respect of contraventions.

The Beach Regulations (Regulation 7) require operators of boat launching sites to apply to the relevant authority to grant a license to use vehicles, or allow their use by third parties, to facilitate boat launching.
An application for a licence must:

- Be made in the format stipulated by the relevant authority.
- Be accompanied by payment or proof of payment of the application fee stipulated by the relevant authority.
- Clearly indicate:
  - The boundaries of the proposed boat-launching site and all access roads.
  - The types of vehicles that will be used at the site.
  - Set out fully the reasons why the boat-launching site is required.
  - Include a plan for managing activities at the site in a manner that avoids or minimises damage to the environment.
  - Subject to Regulation 22, be accompanied by evidence that the requirements of Section 24(7) of the Act relating to the investigation, assessment and communication of the potential impact of the activities associated with boat-launching at the site have been complied with.

To comply with these regulations, the City of Cape Town (CoCT) has completed the required application form for the licensing of the Hottentots Holland boat launching site. Below please find the proposed Operational Management Plan for the Hottentots Holland boat launch site.

Based on this generic OMP, the OMP for the Hottentots Holland launch site includes a general description of the boat launch site (including slipways, parking, roads, and other service facilities), a general description of the types of uses of the boat launch site and a detailed description of the activities required to minimise and mitigate the environmental impacts of the use of the boat launch site.

The OMP will however only describe the minimum operational management requirements for each site and it is anticipated that each site will, over time, exceed these minimum requirements.

1.2 Environmental Management in the City of Cape Town

The City of Cape Town's Integrated Metropolitan Environmental Policy (IMEP) was formally adopted in October 2001. IMEP sets the broad framework and a number of core principles for guiding the City towards a sustainable future. IMEP recognises the economic, social and environmental value of the City's coastal asset, and as such identified the Coast as a priority theme for the development of a detailed implementation strategy. In October 2003, the City formally adopted the Coastal Zone Management Strategy giving effect to the principles of IMEP and setting coastal management practise and standards in place.

1.3 Responsible Authority

All reference to the licensed operator within this OMP refers to the City of Cape Town. The City through a lease agreement, may delegate the authority and responsibility for the management of the boat launch site to any competent club or organisation (see 2.20).

1.4 Function of the OMP

The OMP has been drafted to ensure compliance with the regulations in terms of the national environmental management act, 1998: control of vehicles in the coastal zone, specifically "*7(4)(f) subject to regulation 22, be accompanied by evidence that the requirements of section 24(7) of the act relating to the investigation, assessment and communication of the potential impact of the activities associated with boat-launching at the site have been complied with*". The function of the OMP is thus to ensure that the licensed operator utilises the boat launching site in an environmentally sensitive manner. The OMP explicitly identifies the mitigating actions required to control the impacts of the boat launch site and associated activities on the bio-physical attributes of the site, the surrounding residents and the safety of the users of the site. The OMP further provides a framework to ensure that all activities occurring within the boat launch site comply with the relevant enabling legislation.

1.5 Site description

The Hottentots Holland boat launch site (above the high water mark) is owned by the City of Cape Town, and is situated off Beach Road in Strand, approximately 2km from the from the Strand Slipway. It is utilised by the Strand Surf Lifesaving Club and Hottentots Holland Beach Sailing Club.

The boat launching facilities at Hottentots Holland Sailing Club include the following:

- A non-demarcated parking area, large enough to allow for approximately 30 vehicles or 15 vehicles-and-trailers.
- Two toilet blocks for recreational users, and clubhouses for both the Hottentots Holland Beach Sailing Club and the Strand Surf Lifesaving Club members.

Map 1 shows the location of the boat launching facilities at the Hottentots Holland Beach Sailing Club (HBSC) and Strand Surf Lifesaving Club. The HBSC currently lease the boat launch site from the CoCT. The leased area (the Hottentots Holland Beach Sailing Club), a portion of the Lourens River Parking Area (Erf 5236), approximately 270m² in extent, is shown in Map 1. Future reference in this OMP to the HBSC refers to the leased area, as well as the associated facilities required for boat launching. In terms of the current lease agreement, the HBSC is responsible for managing the launching facilities and for the ongoing maintenance and development of the facilities.

1.6 Site usage

The site is highly utilised, especially over the holiday season and weekends in the summer months. The usage seldom exceeds the “carrying capacity” for the parking area, even during organised events.

The following uses have been recorded at the boat launch site:

- Currently the launch site users are all recreational users (members of the HBSC) or lifesavers from the Strand Surf Lifesaving Club.
- Rescue and other official users intermittently use the site (NSRI, Metro Rescue, SLSC, etc).
- There are several, small dinghies, hobie cats and wind surfers launching from this site.
- The site is popular for sailing events and races.

No accurate user counts exist for the site. The users and associated levels of usage are seasonal and weather dependent. Approximately once a month a sailing race is organised, with an average of 30 hobie cats launched per event. All events are managed by the HBSC.

2. OPERATIONAL MANAGEMENT REQUIREMENTS OF BOAT LAUNCH SITES

2.1 Access management

2.1.1 The site is a portion of the Lourens River Parking Area, accessed off Beach Road. The internal layout of the access to, and traffic flows through, the parking areas and launch site are shown in Map 1. An access gate or boom shall be constructed to prevent any unauthorised entry. Members of the Strand Surf Lifesaving club shall be issued with keys for the boom or gate, so that they may make use of the launch site for training and emergency purposes. The roads and parking areas must at least be tarred, adequately marked to meet municipal and provincial road standards and free of potholes.

2.1.2 All access roads, parking areas and launch site are to be properly demarcated to ensure that all vehicles remain on the hardened road surface, and only park in designated parking areas. All areas outside the hardened road surfaces are designated no-go areas (see Map 2 for the extent of the hardened road surfaces). No vehicle is permitted in any sensitive areas (e.g. dune areas) on, or abutting, the site. The shortest route to the water will be used. Vehicles will offload/load and return to the parking area immediately.

2.1.3 Vehicles, their trailers and the drivers or boat launch operators using the boat launch site shall comply with the requirements of the Road Traffic Act and the General Policy on Control of Vehicles in the Coastal Zone (Government Gazette, Notice 858 of 29 April 1994).

2.1.4 Trailers may be brought onto the seashore by a motor vehicle only for the purposes of launching or retrieving a vessel. Upon launching (or retrieving if appropriate) a vessel, these trailers and vehicles are to be parked in a clearly demarcated parking area, off the beach (shown in Map 1 & 2).

2.1.5 Only the designated boat launch site may be used to launch vessels. Erosion must be monitored and remedial/rehabilitation action instituted if necessary. Where the remedial/rehabilitation measure constitutes a listed activity in terms of the Environmental Conservation Act, and as directed by the relevant authorities, an Environmental Impact Assessment (EIA) will be implemented for the remedial/rehabilitation action.

2.1.6 The minimum signage requirements to facilitate vehicular and pedestrian flows, and for demarcating parking areas, are shown in Map 1. Map 1 further indicates the location for the posting of the safety requirements for the site.

2.1.7 A fee is to be charged and a ticket issued to all persons launching from the site. Key provisions of this OMP and code of conduct are to be described on the ticket (or an attached brochure). A chain/boom is to be placed across the access route of the slipway enabling the licensed operator to control access. Users can pay an annual instalment, entitling them to free access to the launch site for a year. On payment of the instalment, the user must be issued with and made aware of the conditions of the OMP. They will furthermore be issued with a key to the chain/boom at the entrance to enable them to access the launching site. The launching site is kept locked when no boats are at sea to avoid unauthorized entry onto the beach by vehicles. Only persons who are in possession of a valid permit (and key) may access this launch site.

The boom is to be closed between sunset and sunrise, except in the event of an emergency.

2.1.8 The limits on the numbers of boats that may launch from each site will be linked to the availability of parking and other service facilities. This limit includes boats in the process of being launched or retrieved. The number of vehicles and trailers may increase during an event, if the event co-ordinators have the obtained the permission of the licensed operator to park legally in the residential parking areas.

2.1.9 Due to the nature of the boat launch site (facilities, services, parking, access, bio-physical characteristics), vehicles under 1400cc engine capacity shall not be permitted to launch a boat at the site.

2.1.10 Due to the nature of the boat launch site (facilities, services, parking, access, bio-physical characteristics) boats longer than 3 meters and boat engines greater than 30 HP engine capacity shall not be permitted to launch from the site.

2.2 Parking management

2.2.1 During events, overflow vehicles and trailers may be parked legally in the residential area, provided that they do not interfere with traffic flows any user, visitor or resident.

2.2.2 All the parking areas/bays for vehicle-and-trailers will be properly demarcated and vehicle flows clearly indicated.

2.2.3 Launching and parking areas must be separated. Parked vehicles should not obstruct access to the boat launch site by any user, visitor or resident, nor interfere with reasonable use of that beach by any user, visitor or resident. Map 2 shows vehicular access routes, boat launch site and associated parking.

2.3 Boat Launch area

2.3.1 Every effort shall be made to minimise disturbance to the beach surface during the process of launching and retrieving boats, i.e. only tow vehicles with sufficient capacity may be used - this includes engine capacity, tyre profile, tyre pressure, driver proficiency, etc.

2.3.2 The launch area shall not be used as an access to other parts of the beach.

2.3.3 Kelp washed up onto the launch site may not be completely removed from the area. If kelp builds up directly on the launch site, it may be spread out manually along another adjacent section of the coastline that will not impact on other users. If kelp build up has reached the extent that mechanical means is necessary, prior authorisation and consent must be granted from the relevant authorities.

2.4 Launching and beaching control and safety

2.4.1 The licensed operator must be in control of all launches and boat retrievals at all times. During busy periods, the operator must ensure that a dedicated staff member is provided to direct the launches and retrievals.

2.4.2 No alcohol or any other intoxicating substance shall be allowed on the CoCT premises. Any person suspected of being under the influence of alcohol or any other intoxicating substance shall not be permitted access to, or allowed to remain at the site.

2.4.3 All SADSA, SAMSA and CoCT safety regulations shall be adhered to at all times. A comprehensive first-aid box capable of handling normal domestic emergencies shall be maintained on site. Weatherproof lists of relevant emergency contact numbers shall be displayed near the launch site.

2.4.4 Where feasible, designated launch positions at launch sites on beaches shall be clearly demarcated. The area demarcated for boat launching will be demarcated by adequate signage and positioned as indicated on Map 3.

2.4.5 Boats should not be left unattended on the seashore and beached boat shall be removed from the launch site area within 10 minutes of arrival after beaching. No parking on the beach is permitted.

2.4.6 Boats in the process of landing or being retrieved shall have priority over boats wishing to launch.

2.4.7 The licensed operator shall temporarily close the launch site under exceptional circumstances such as extremely inclement weather conditions, damage to the slipway, or any other emergency that will prevent the safe launching or retrieval of boats. If the launch site is to be closed to users, the boom will locked by the operator and a notice posted to notify users of the reason for closure and anticipated time of re-opening.

2.4.8 The launch area will be kept clear of all other users when in use. Signage will be posted, at the slipways informing other users (e.g. swimmers, kayaks) to remain outside of the demarcated launching/ landing areas.

2.4.9 The provisions of section 68 of the Merchant Shipping Act No 57 of 1951 and all applicable regulations made under Section 356 of the same act shall be strictly adhered to. No boat will be able to launch from the site unless it is properly marked and registered (or licensed as the case may be) according to the Merchant Shipping Act No 57 of 1951 and it's associated regulations.

2.4.10 Launching and beaching may only take place between the legally determined sunrise and sunset. These times will be clearly displayed on the notice board at the entrance to the slipway.

2.5 Vessel safety

2.5.1 No boat will be able to launch unless the skipper is in possession of a valid Certificate of Competency issued by the South African Maritime Safety Authority (SAMSA), an Agency recognised by it or a IRB (Inflatable Rubber Duck) skippers Certificate issued by Lifesaving South Africa.

2.5.2 Everyone on the boat in the immediate launch and landing zone must wear life jackets or buoyancy aids.

2.5.3 All boats launching from the site are to carry a functional form of communication. (Note: boats not exceeding the one nautical mile limit are not required to have a radio).

2.6 Jet skis/Personal watercraft (PWC)

2.6.1 No launching of Jet skis shall take place from this launch site.

2.7 Night launching and beaching

2.9.1 No night launching shall take place from this site, except in the event of an emergency.

2.8 Managing conflict between different user groups

2.8.1 No other users may use the designated launch areas during periods of high usage. Map 3 indicates the extent of the launch area and the other adjacent areas designated for recreational use.

2.8.2 Except during launching and landing, boats under power in the in-shore area are not to approach within 200m of other users (anglers, divers, swimmers, surfers, body-boarders, or any other non-powered craft). Provided that the skipper is qualified in surf rescue operations (e.g. rescue operations or patrols) this 200m

distance is not compulsory. Rescue rubber ducks that are used within 200m of other users must have a propeller guard fitted.

2.8.3 Boats may not enter an area set aside specifically for bathers or other water sports and vice versa. It is the skipper's responsibility to keep a proper lookout for bathers and divers. Other users are to stay clear of the launch and landing channel during periods of high usage (see Map 3). Adequate signage is to be posted, informing other users (e.g. swimmers, kayaks) to remain outside of these demarcated launching/ landing areas (see Map 3).

2.9 Special events and functions

2.9.1 A range of competitive sailing events is held at the boat launch site. In terms of the Merchant Shipping Act, the relevant authority may grant permission for the total number of allowable launches to be increased during these events.

2.9.2 In order to cater for special events and functions, the licensed operator is to ensure that sufficient staff is available to cater for, and mitigate, the impacts resulting from an increase in users. During such events the licensed operator is to aggressively manage and enforce the conditions of the OMP. The following areas will require intensive management during periods of high usage:

- Control and management of vehicle flows and parking
- Control of alcohol consumption, anti-social activities, littering and vandalism
- Prevention of overnighting at the boat launch site
- Prevention of fish hawking on site
- Control over the cleaning of boats
- Control over the disposal of offal
- Monitoring of, and compliance with, the Marine Living Resources Act
- Preventing conflicts between different user groups
- Compliance with minimum safety standards
- The management of noise pollution

2.10 Toilet facilities and waste water treatment

2.10.1 The existing toilet and ablution facilities associated with the boat launch site are indicated in Map 1. The Licensed operator shall ensure that all toilet facilities used by boat launch site users are properly maintained and in a clean and hygienic condition at all times. During busy periods toilets shall be cleaned and serviced at least twice daily, while during quiet periods toilets shall be cleaned and serviced at least every second day.

2.10.2 No washing of boats will be permitted at the launch site or in the parking area.

2.11 Pollution and litter management

2.11.1 All litter and refuse is to be cleaned from the site by the licensed operator at least twice a week. In peak season, and during special events, the cleaning schedule is to take place at least once a day.

2.11.2 Plastic (or any other non-corroding material) refuse bins are to be provided at the site. In peak season, and during special events, the bins are to be emptied daily. Outside peak season, bins are to be cleaned at least twice a week. Refuse bins are to be discreetly placed in areas of high usage (e.g. at the parking areas). The bins will be clearly visible and be a short distance from the users. The bins are to be placed in an area where they can be easily serviced.

2.11.3 Refuelling supplies held at the launch sites will be in sealed containers, which are only opened once in place within the boat.

2.11.4 Spillages of fuel or oil at the launch site are to be avoided. The licensed operator must keep Spill Sorb (or similar product) on site. Should a fuel or oil spill take place, the material containing the spill shall be properly disposed of at an approved facility.

2.11.5 No cleaning of boats bodywork is permitted at the launch site or in the parking area.

2.12 Noise mitigation

2.12.1 The licensed operator is to ensure that the premises is operated in accordance with the requirements of the Noise Control Regulations PN 627/1998.

2.12.2 Where the licensed operator cannot control rowdy and noisy activity, they are to contact municipal law enforcement officials or the SAPS for assistance.

2.12.3 Motors are to be started and warmed up in such a way as not to cause undue nuisance to other beach users, visitors and residents. The licensed operator is responsible for ensuring that management measures are put in place to address reasonable complaints from users, visitors and residents.

2.13 New developments

2.13.1 No listed (in terms of Schedule 1 1(e) of the Regulations under section 21 of the Environmental Conservation Act 73 of 1989) activity may take place within the site, unless approved by the responsible authority after an Environmental Impact Assessment (EIA) has been undertaken. This assessment must meet the requirements of the provincial planning and environmental authorities.

2.14 Helicopters

2.14.1 There are no demarcated helicopter-landing sites.

2.15 Archaeological sites

2.15.1 Any area of archaeological significance found on the site is to be reported immediately by the licensed operator of the launch site to the South African Heritage Resource Agency (SAHRA) (or its nominated representative) and access to the archaeological site should be prevented, pending appropriate investigation and decision.

2.16 Consumptive use of marine resources

2.16.1 All consumptive use of marine resources on the site will be subject to the national regulations (bag limits, closed seasons etc). The licensed operator will inform MCM and City officials of any illegal marine resource use activities occurring on the site.

2.16.2 Fish (or any other marine resources) may not be sold/bartered on the site.

2.17 Communication and compliance

2.17.1 The licensed operator shall draw the attention of all users of the site to the key provisions of this OMP by providing an information board near the launch site.

2.17.2 Adequate complementary signage must be provided to inform all users and visitors to the site with regards to the conditions of the OMP.

2.17.3 The licensed operator shall be responsible for monitoring compliance with this OMP.

2.17.4 Appropriate records of compliance monitoring and any audit will be maintained and may be used in support of subsequent applications for re-licensing of the site.

2.17.5 Any user of the site who disregards the provisions of this OMP shall be reported, by the licensed operator, to the relevant authority that has the legal jurisdiction to impose penalties. MCM and City Law Enforcement Officers will be contacted to monitor and enforce all marine resource use activities. All social and traffic related activities will be enforced by the City Police, Traffic Officials and/or SAPS.

2.17.6 Disregard for the provisions of this OMP, may result in the relevant authority's withdrawal of the licence.

2.18 Safety, emergency preparedness and responses

2.18.1 The site shall form part of, and conform to, local and regional emergency response plans and procedures (e.g. fire, oil spills).

2.18.2 Emergency procedures will take precedence over all activities at the launch site.

2.19 Records

2.19.1 Adequate launch records, in the prescribed format, will be maintained by the licensed operator. The minimum information for the boat launch record is to include boat registration, boat name, time of launch, time of landing, number of crew and purpose of trip.

2.19.2 The licensed operator shall keep a detailed register of all accidents and casualties involving boats, craft and/or crew (using the prescribed SAMSA form as required by section 259 of the Merchant Shipping Act No 57 of 1951). This register should then be forwarded to the nearest SAMSA office at the end of each month.

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4. OVERVIEW OF OTHER LEGISLATION REFERRED TO IN THIS DOCUMENT

Environment Conservation Act (73 of 1989)

The primary objective of the ECA is to provide for the effective protection and controlled utilisation of the environment (Henderson, 1996). The Act makes provision for the declaration of protected natural environments and for the identification of activities that may have a detrimental effect on the environment.

Regulations to control potentially harmful activities on a permit system within demarcated sensitive coastal areas were promulgated in terms of the ECA. The prohibited activities are the disturbance of vegetation, earthworks, dredging and dune stabilisation.

Subsequent to the promulgation of the Act in 1989, a number of key regulations governing EIAs and identified activities that may be detrimental to the environment have also been promulgated. Of importance to proposed developments in the coastal zone are Government Notices R1182, R1183, R1184 and R448 and amendments of May 2002. While beach driving and boat launching are not listed activities in terms of these regulations, proposed developments, such as structures below the high water mark of the sea and certain access infrastructure which may provide for such activities, must undergo environmental impact assessments before environmental authorisation can be granted by DEAT.

The Act was originally passed to provide a basis for environmental conservation in South Africa. Many of its provisions have since been repealed by NEMA. Provision is also made in NEMA for the repeal of sections of Part V and Part VI of the Environmental Conservation Act, which provide for the “Control of Activities which may have a Detrimental Effect on the Environment" and associated EIA regulations. However, these remain in force until they are replaced with new regulations promulgated under NEMA.

National Environmental Management Act (107 of 1998)

NEMA is South Africa’s overarching environmental legislation and has, as its primary objective, to provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state and to provide for matters connected therewith (Government Gazette, 1998).

The Act provides for the right to an environment that is not harmful to the health and well-being of South African citizens; the equitable distribution of natural resources; sustainable development; environmental protection and the formulation of environmental management frameworks (Government Gazette, 1998). These principles and provisions in Chapter 5 (Integrated Environmental Management) govern the way in which environmental management should be practiced. Provision is also made for the issuing of various Regulations in order to carry out the purposes and the provisions of NEMA.

Marine Living Resources Act (18 of 1998)

This MLRA repeals most of the Sea Fishery Act (12 of 1988). Its preamble reads as follows:

"To provide for the conservation of the marine ecosystem, the long-term sustainable utilisation of marine living resources and the orderly access to exploitation, utilisation and protection of certain marine living resources; and for these purposes to provide for the exercise of control over marine living resources in a fair and equitable manner to the benefit of all the citizens of South Africa; and to provide for matters connected therewith."

The Act and Regulations published thereunder provide for the conservation of South Africa's marine ecosystems and the sustainable utilisation of marine living resources. This includes the protection of every species of sea animal, whether vertebrate or invertebrate, including the spawn or larvae of such sea animal, but excluding any seal or sea bird. Fish and marine organisms were protected by means of prohibitions against their catching, disturbance or possession. There is an OMPhasis on the broadening of fair and equitable access to resources, the gradual transformation of fishing methods, the development of fees for utilisation and a favourable business environment in fisheries. The Act provides for a principle of national control and co-ordination and places responsibility for resource-allocation decisions with the Minister: Environmental Affairs and Tourism. The Act makes provision for the granting of commercial, recreational and subsistence fishing rights.

The Minister may establish areas or zones where subsistence fishers may fish and, after consultation, may declare a specified community to be a fishing community, any person to be a subsistence fisher or any fishing or related activity or the exercise of any other right in that area or zone to be prohibited. No subsistence-fishing permit shall be transferable except with the approval of and subject to the conditions determined by the Minister.

Merchant Shipping Act (57 of 1951)

All vessels, of whatever size, that proceed to sea from anywhere in South Africa fall under the Merchant Shipping Act. Small vessels (3 m to < 25 tonnes) are divided into two classes, viz. small vessels used solely for sport and recreation, and all other small vessels, e.g. fishing boats, diving boats and sailing training yachts (i.e. commercial boats).

The Merchant Shipping Act:

- Sets out various categories of vessel, applicable to each class, and their operational limits.
- Makes provision for the inspection of seaworthiness and the competency of skippers.
- Sets out the various safety measures.
- Requires that skippers submit voyage details.

- Makes provision for authorised agencies to exercise or perform powers or duties as required by the Act.

Has certain Regulations namely:

- Government Notice R2799 that applies to ships or small vessels used for sport or recreation.

- Government Notice R1044 that makes provision for vessels of less than 3 m in length. Vessels falling into this category may not proceed to sea further than 500 m from the low water mark. 7

The Act also has relevance with respect to control of marine pollution and to that extent applies to all ships in South African waters.

Road Traffic Act (29 of 1989)

This Act outlines the various requirements and Regulations for vehicles and drivers. In terms of the Act, if a vehicle is able to gain access to, and be driven on, the seashore, this Act and its Regulations are deemed to apply.

There are a number of High Court cases which have established the breadth of application of the definition of a road and, although no cases involving the Admiralty Reserve or that part of the beach between the high and low water marks are known of, the Provincial Road Traffic Inspectorate is certain that the Act applies.

In this, it is important to note that a person does not have to have a right of vehicular access to the beach: right of access by the person is sufficient. The responsible erection of booms, etc., in providing and simultaneously limiting vehicular access to the beach, will thus not affect the applicability of this legislation to what can generally be described as “the beach”.

All vehicles (powered vehicles and trailers) using the beach must be roadworthy and licensed, and be driven by persons who themselves are licensed drivers of that category of vehicle. The body that controls vehicular access to the beach must know that the provisions of this Act apply. This Act has been replaced by the new National Road Traffic Act (93 of 1996). However, the 1996 Act provides that any relevant provision of the 1989 Act will remain in force until such time as the corresponding provision of the 1996 Act has been put into operation.



Toilets
Parking area
Strand Surf Lifesaving Club
Information board
Hottentots Holland Beach Sailing Club

Map 1 - Launching facilities & positioning of information boards

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Exit routes
Entry routes
Parking area

Map 2 - Entry/Exit Routes & Parking Area

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Launching/Landing channel

Launching/Beaching Area

Map 3 - Designated launching/landing & recreational areas

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for the City of Cape Town

Annexure D

OPERATIONAL MANAGEMENT PLAN FOR THE KOMMETJIE SLIPWAY

PREPARED BY:
Peninsula Permits cc.
Envirocentric

FOR:
The City of Cape Town

MAY 2004

Envirocentric

PENINSULA PERMITS

1. BACKGROUND

1.1 Legal Context

This General Policy for off-road vehicles in the coastal zone was published in Government Notice 858, in Government Gazette No.15655, dated 29 April 1994 and introduced general control measures, on a national basis, to protect the coastal environment from damage caused by the use of vehicles in the coastal zone and to ensure the safety of other beach users. The policy makes provision for zoning the coastal zone, for the protection of ecologically sensitive areas, and for various recreational activities, and also allows for a permit system to facilitate the control of vehicles in specifically demarcated areas. According to the General Policy, the use of vehicles in any beach area may be reserved for specific purposes, such as angling or boat-launching.

The Control of Vehicles in the Coastal Zone Regulations ("Beach Regulations") published under NEMA (Government Notice No. 1399 of 21 December 2001) provide for a general prohibition on the recreational use of vehicles in the coastal zone and procedures for approving the use of vehicles in the coastal zone under specific circumstances. They also provide measures for the enforcement of these regulations and prescribe penalties in respect of contraventions.

The Beach Regulations (Regulation 7) require operators of boat launching sites to apply to the relevant authority to grant a license to use vehicles, or allow their use by third parties, to facilitate boat launching.
An application for a licence must:

- Be made in the format stipulated by the relevant authority.
- Be accompanied by payment or proof of payment of the application fee stipulated by the relevant authority.
- Clearly indicate:
  - The boundaries of the proposed boat-launching site and all access roads.
  - The types of vehicles that will be used at the site.
  - Set out fully the reasons why the boat-launching site is required.
  - Include a plan for managing activities at the site in a manner that avoids or minimises damage to the environment.
  - Subject to Regulation 22, be accompanied by evidence that the requirements of Section 24(7) of the Act relating to the investigation, assessment and communication of the potential impact of the activities associated with boat-launching at the site have been complied with.

To comply with these regulations, the City of Cape Town (CoCT) has completed the required application form for the licensing of the Kommetjie slipway. Below please find the proposed Operational Management Plan for the Kommetjie slipway.

Based on this generic OMP, the OMP for the Kommetjie Boat Launch Site includes a general description of the boat launch site (including slipways, parking, roads, and other service facilities), a general description of the types of uses of the boat launch site and a detailed description of the activities required to minimise and mitigate the environmental impacts of the use of the boat launch site.

The OMP will however only describe the minimum operational management requirements for each site and it is anticipated that each site will, over time, exceed these minimum requirements.

1.2 Environmental Management in the City of Cape Town

The City of Cape Town's Integrated Metropolitan Environmental Policy (IMEP) was formally adopted in October 2001. IMEP sets the broad framework and a number of core principles for guiding the City towards a sustainable future. IMEP recognises the economic, social and environmental value of the City's coastal asset, and as such identified the Coast as a priority theme for the development of a detailed implementation strategy. In October 2003, the City formally adopted the Coastal Zone Management Strategy giving effect to the principles of IMEP and setting coastal management practise and standards in place.

1.3 Responsible Authority

All reference to the **licensed operator** within this OMP refers to the City of Cape Town. The City, through a lease agreement, may delegate the authority and responsibility for the management of the boat launch site to any competent club or organisation (see 2.20).

1.4 Function of the OMP

The OMP has been drafted to ensure compliance with the Regulations in terms of the National Environmental Management Act, 1998: Control of Vehicles in the Coastal Zone, specifically "*7(4)(f) subject to regulation 22, be accompanied by evidence that the requirements of section 24(7) of the act relating to the investigation, assessment and communication of the potential impact of the activities associated with boat-launching at the site have been complied with*". The function of the OMP is thus to ensure that the licensed operator utilises the boat launching site in an environmentally sensitive manner. The OMP explicitly identifies the mitigating actions required to control the impacts of the boat launch site and associated activities on the bio-physical attributes of the site, the surrounding residents and the safety of the users of the site. The OMP further provides a framework to ensure that all activities occurring within the boat launch site comply with the relevant enabling legislation.

1.5 Site description

The Kommetjie Boat Launch Site is owned by the City of Cape Town, situated off Beach Road, Kommetjie.

The boat launching facilities at Kommetjie include the following:

- A gate keeper's hut (wooden wendy house 1,8m x 2,3m) providing controlled access, with the access and exit point which are chained off.
- A large beach launching and landing/beaching area, where several boats can launch or land parallel to one another.
- A 42-bay parking area, all of which are demarcated and large enough to incorporate vehicles and their trailers (except long vehicles and trailers).
- Temporary ± 5-bay queuing area, for boats waiting to launch.

Map 1 shows the location of the boat launching facilities at Kommetjie. The Kommetjie Boat Club (KBC) currently lease the boat launch site from the CoCT. The leased area, a portion of Cape Farm 948, approximately 705m² in extent, is shown in Map 1. Future reference in this OMP to the Kommetjie Boat Launch Site refers to the leased area, as well as the associated facilities required for boat launching. In terms of the current lease agreement, the KBC is responsible for managing the launching of all boats from the launching areas, for ensuring the facility is open to public use and for the ongoing maintenance and development of the facilities.

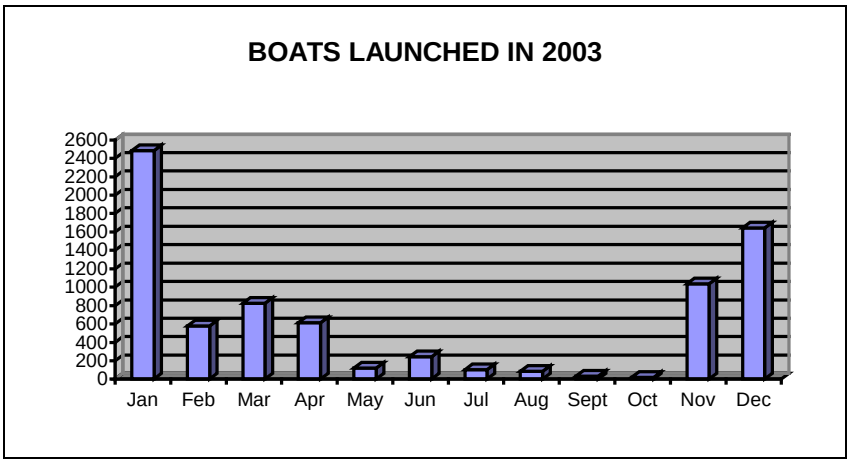
1.6 Site usage

As the boat launch site is one of the safest launching facilities on the western coast of the Peninsula, to which the public has unrestricted access, it has assumed a significant role for many users.

The following uses have been recorded at the boat launch site:

- Approximately 80% of the slipway users are recreational fishermen. The intensity of the crayfishing season and snoek runs results in temporary management chaos. This applies in particular to the crayfish season (dates subject to change); crayfishing is currently permitted on weekends and public holidays from 08:00 to 16:00. During these periods, up to 125 boats and their crews launch from the slipway on these days.
- Recreational, commercial and charter divers occasionally utilise the site.
- Rescue, research and other official users intermittently use the site (NSRI, Metro Rescue, SAPS water wing, Marine and Coastal Management, etc.).
- There are a few jet skis that occasionally launch from the site.

Accurate user counts exist for the site, with an average of 6000 launches per annum. The users and associated levels of usage are seasonal and weather dependent, see table below for the representation of usage in 2003.



2. OPERATIONAL MANAGEMENT REQUIREMENTS OF BOAT LAUNCH SITES

2.1 Access management

2.1.1 The Kommetjie launch site is accessed by travelling westwards on Kommetjie Road (M65), turning off onto Beach Road. Access to the launch site is gained directly off Beach Road. The layout of the access to the parking area and launch site is shown in Map 2. The roads and parking areas must be adequately tarred and marked to meet municipal and provincial road standards and free of potholes.

2.1.2 All access roads, parking areas and slipways are to be properly bollarded or fenced off to ensure that all vehicles remain on the hardened road surface and only park in designated parking areas. All areas outside the hardened road surfaces are designated no-go areas (see Map 2 for the extent of the hardened road surfaces at the site).

2.1.3 Vehicles, their trailers and the drivers or operators using the boat launch site shall comply with the requirements of the Road Traffic Act and the General Policy on Control of Vehicles in the Coastal Zone (Government Gazette, Notice 858 of 29 April 1994).

2.1.4 Trailers may be brought onto the seashore by a motor vehicle only for the purposes of launching or retrieving a vessel. Upon launching (or retrieving if appropriate) a boat, these trailers and vehicles are to be parked in a clearly demarcated parking area, off the beach (shown in Map 2).

2.1.5 Only the designated launch area may be used to launch boats. Erosion of the launch area must be monitored and remedial/rehabilitation action instituted if necessary. Where the remedial/rehabilitation measure constitutes a listed activity in terms of the Environmental Conservation Act, and as directed by the relevant authorities, an Environmental Impact Assessment (EIA) will be implemented for the remedial/rehabilitation action.

2.1.6 The minimum signage requirements to facilitate vehicular and pedestrian flows, and for demarcating parking areas, are shown in Map 3. Map 3 further indicates the location for the posting of the safety requirements for the site.

2.1.7 A fee is to be charged and a ticket issued to all persons launching from the site. Key provisions of this OMP and code of conduct are to be described on the ticket (or an attached brochure). The Boat Club members pay an annual instalment, and are entitled to free access for a year. On payment of the instalment the members must be made aware of the conditions of the OMP and the Code of Conduct. Club members will be issued with keys to the chain/boom at the entrance to enable them to access the launching site. Should these members launch they have to inform the duty controller on their return.

2.1.8 The launching site is to be kept locked when no boats are at sea to avoid unauthorized entry onto the beach by vehicles. The duty controller officer is contactable via cellphone, with the number clearly displayed on the control hut. The duty control officer is to remain on site until all boats return.

2.1.9 A strict limit of 75 vehicles-and-trailers may use the site at any one time. This limit includes boats in the process of being launched or retrieved and vehicles-and-trailers parked in the designated parking areas.

2.1.10 Due to the nature of the boat launch site (facilities, services, parking, access, bio-physical characteristics), vehicles under 1600cc engine capacity shall not be permitted to launch a boat at the site.

2.1.11 Due to the nature of the boat launch site (facilities, services, parking, access, bio-physical characteristics) boats longer than 5.5 meters and outboards/inboards engines with a total capacity greater than 200 HP shall not be permitted to launch from the site.

2.1.12 Pedestrians traversing through sensitive dunes and bird nesting areas, adjacent to the site, will be managed to minimise environmental impacts. Access routes through such areas will be clearly defined, supported by appropriate signage, and highly sensitive areas may be closed to pedestrian and/or vehicular traffic.

2.2 Parking management

2.2.1 An upper limit of 42 vehicles-and-trailers will be allowed in the designated parking area. During peak periods, such as crayfish season, 33 overflow vehicles-and-trailers may park within the residential area. It should be noted that this designated parking area is also a public parking area and other users must also be accommodated.

2.2.2 All the parking areas/bays for vehicles-and-trailers will be properly demarcated and vehicle flows clearly indicated.

2.2.3 Launching and parking areas must be separated. Parked vehicles should not obstruct access to the boat launch site by any user, visitor or resident, nor interfere with reasonable use of that beach by any user, visitor or resident. No-Parking zones will be clearly demarcated in front of the entry and exit ramps.

In order to accommodate large vehicles and trailers, the traffic island between the parking area and Beach Road should be removed and replaced with a narrow barrier. The walkway/pavement on the Bird Island side of the parking area should be extended to further accommodate longer vehicles and trailers.

2.3 Boat Launch area

2.3.1 Every effort shall be made to minimise disturbance to the beach surface during the process of launching and retrieving boats, i.e. only tow vehicles with sufficient capacity may be used - this includes engine capacity, tyre profile, tyre pressure, driver proficiency, etc.

2.3.2 The launch area shall not be used as an access to other parts of the beach.

2.3.3 Kelp washed up onto the launch site may not be completely removed from the area. If kelp builds up directly on the launch site, entry or egress routes, kelp may be spread out manually, along another adjacent section of the coastline that will not impact on other users. If after a storm kelp build up has reached the extent that mechanical means (e.g. 4x4 and trailer) is necessary, prior authorisation and consent must be obtained from the relevant authorities.

2.4 Launching and beaching control and safety

2.4.1 The licensed operator must be in control of all launches and boat retrievals at all times. During busy periods the operator must ensure that a dedicated staff member is provided to direct the launches and retrievals.

2.4.2 No alcohol or any other intoxicating substance shall be allowed at the launch site. Any person suspected of being under the influence of alcohol or any other intoxicating substance shall not be permitted access to, or allowed to remain on, at the launch site.

2.4.3 All club, SADSA, SAMSA and CoCT safety regulations shall be adhered to at all times. A comprehensive first-aid box capable of handling normal domestic emergencies shall be maintained on site. Weatherproof lists of relevant emergency contact numbers shall be displayed on the outside of the Gate-keeper’s hut.

2.4.4 Launching and beaching may only take place between the legally determined sunrise and sunset. These times will be clearly displayed on the notice board at the entrance to the slipway.

2.4.5 The area demarcated for boat launching will be directed by adequate signage and positioned as indicated on Map 4.

2.4.6 Boats and vehicles may not be left unattended on the beach. Boats shall be retrieved from the beach within 10 minutes of arrival. No parking on the beach or access roads to the beach is permitted.

2.4.7 At the discretion of the Duty Control Officer, boats in the process of landing/beaching shall have priority over boats wishing to launch.

2.4.8 The licensed operator shall temporarily close the launch site under exceptional circumstances such as extremely inclement weather conditions, damage to the launching area, or any other emergency that will prevent the safe launching or retrieval of boats from the beach.

2.4.9 If the launch site is to be closed to users, the chain-gate will be locked by the licensed operator and a notice posted to notify users of the reason for closure and anticipated time of re-opening.

2.4.10 The safety of all users in the landing/launching channel is under the control of the Duty Control Officer. Signage will be posted at the slipway informing other users (e.g. swimmers) to remain outside of the demarcated launching/landing areas.

2.4.11 The licensed operator shall ensure that only persons who are suitably licensed (e.g. relevant code driving license) shall operate vehicles for launching or retrieval on the site.

2.4.12 The provisions of section 68 of the Merchant Shipping Act No 57 of 1951 and all applicable regulations made under Section 356 of the same act shall be strictly adhered to. No boat will be able to launch from the site unless it is properly marked and registered (or licensed as the case may be) according to the Merchant Shipping Act No 57 of 1951 and it's associated regulations.

2.5 Vessel safety

2.5.1 No boat will be able to launch unless the skipper is in possession of a valid Certificate of Competency issued by the South African Maritime Safety Authority (SAMSA), an Agency recognised by it or a IRB (Inflatable Rubber Duck) skippers Certificate issued by Lifesaving South Africa.

2.5.2 All boats launching from the site are to carry a functional form of communication. (i.e. in the case of an emergency the boat can make contact with emergency services and can be contacted by emergency services).

2.6.1 Jet skis/Personal watercraft (PWC)

2.6.2 Jet ski wave riding may only take place in areas designated for such activity by the licensed operator of the launch site.

2.6.3 No jet ski shall be navigated across the front of any bather or bathers in the designated recreational areas.

2.7 Night launching and beaching

2.7.1 No night launches are allowed from this site, unless in the event of an emergency.

2.8 Managing conflict between different user groups

2.8.1 No bathers may swim in the designated launch areas. Map 4 indicates the extent of the launch area and the other adjacent areas designated for recreational use. All users in the launching/landing channel are under the direction of the Duty Control Officer.

2.8.2 Except during launching and landing, boats and jet skis under power in the in-shore area are not to approach within 200m of other users (anglers, divers, swimmers, surfers, body-boarders, or any other non-powered craft). Provided that the skipper is qualified in surf rescue operations (e.g. rescue operations or patrols) this 200m distance is not compulsory. Rescue rubber ducks that are used within 200m of other users must have a propeller guard fitted.

2.8.3 Boats may not enter an area set aside specifically for bathers or other water sports and vice versa. It is the skipper's responsibility to keep a proper lookout for bathers and divers. Other users are to stay clear of the launch and landing channel (see Map 4). Adequate signage is to be posted, informing other users (e.g. swimmers, divers, kayaks) to remain outside of these demarcated launching/ landing areas (see Map 4).

2.9 Special events and functions

2.7.2 In order to cater for special events and functions, the licensed operator or the boat club is to ensure that sufficient staff are available to cater for, and mitigate, the impacts resulting from an increase in users.

During the period of high usage, the licensed operator is to aggressively manage and enforce the conditions of the OMP. The following areas will require intensive management during periods of high usage:

- Control and management of vehicle flows and parking.
- Control of alcohol consumption, anti-social activities, littering and vandalism.
- Prevention of overnighting at the boat launch site.
- Prevention of fish hawking on site.
- Ensuring control over the cleaning of boats.
- Ensuring control over the disposal of offal.
- Monitoring of, and compliance with, the Marine Living Resources Act.
- Prevention of conflicts between different user groups.
- Ensuring compliance with minimum safety standards.
- Provision of temporary toilets.

2.10 Toilet facilities and waste water treatment

2.10.1 The existing toilet and ablution facilities, associated with the boat launch site are indicated in Map 1. The licensed operator shall ensure that all toilet facilities used by persons launching boats from the site are properly maintained and in a clean and hygienic condition at all times.

During busy periods, these toilets shall be cleaned and serviced at least twice daily, while during quiet periods toilets shall be cleaned and serviced at least every second day. Two additional chemical toilets shall be provided on site during periods of high usage (weekends, school holidays, and other public holidays during the crayfish season). These temporary toilets are to be placed alongside the gate keepers hut when in use. Toilets are to be secured in a removable frame to ensure that they are not blown over by the wind, knocked over or vandalised. Signage will be erected to encourage more users to use the existing municipal toilets.

2.10.2 No washing of boats will be permitted on the slipways, parking area or at the Municipal toilets.

2.11 Pollution and litter management

2.11.1 All litter and refuse at the launch site and surrounding areas utilised by the launch users, is to be cleaned up by the licensed operator on a daily basis.

2.11.2 Seven plastic (or any other non-corroding material) refuse bins are to be provided at the site. In peak season, and during special events and snoek runs, the bins are to be emptied daily. Outside peak season, bins are to be cleaned at least twice a week. Refuse bins are to be discreetly placed in areas of high usage (e.g. at the parking areas). The bins will be clearly visible and be a short distance from the users. The bins are to be placed in an area where they can be easily serviced (See map 4 for the positioning of the bins).

2.11.3 Bins provided at the site and are to be “baboon-proofed”.

2.11.4 Refuelling supplies held at the launch sites will be in sealed containers, which are only to be opened once in place within the boat.

2.11.5 Spillages of fuel or oil at the launch site are to be avoided. The licensed operator must keep Spill Sorb (or similar product) on site. Should a fuel or oil spill take place, the material containing the spill shall be properly disposed of at an approved facility.

2.11.6 No scaling, cleaning of fish or disposal of bait may take place on the site.

2.11.7 No cleaning of boats bodywork is permitted on site.

2.11.8 Disposal of fish waste/bait within 500m of the backline of breakers not permitted.

2.12 Noise mitigation

2.12.1 The licensed operator is to ensure that the premises is operated in accordance with the requirements of the Noise Control Regulations PN 627/1998.

2.12.2 Where the licensed operator cannot control rowdy and noisy activity, they are to contact municipal law enforcement officials or the SAPS for assistance.

2.12.3 No dry-starting of engines is allowed at the launch site. Any users not complying with these regulations shall not be permitted to launch. The licensed operator is responsible for ensuring that management measures are put in place to address noise complaints from users, visitors and residents.

2.13 New developments

2.13.1 No listed (in terms of Schedule 1 1(e) of the Regulations under section 21 of the Environmental Conservation Act 73 of 1989) activity may take place within the site, unless approved by the responsible authority after an Environmental Impact Assessment (EIA) has been undertaken. This assessment must meet the requirements of the provincial planning and environmental authorities.

2.13.2 If there is a need to remove or clear rocks and sand from the channel, then Schedule 1 1(e) of the Regulations under section 21 of the Environmental Conservation Act 73 of 1989 is applicable (i.e. an Environmental Impact Assessment will have to be undertaken).

2.13.3 The general maintenance and upgrading of the boat launch site should not compromise the environmental integrity of the area. The upgrading of the area should furthermore harmonize with the Kommetjie Village theme and not negatively impact on the aesthetic value of the location.

2.14 Helicopters

2.14.1 There are no demarcated helicopter-landing sites at the site.

2.15 Archaeological sites

2.15.1 Any area of archaeological significance found on the site is to be reported immediately by the licensed operator of the launch site to the South African Heritage Resource Agency (SAHRA) (or its nominated representative) and access to the archaeological site should be prevented, pending appropriate investigation and decision.

2.16 Consumptive use of marine resources

2.16.1 All consumptive use of marine resources on the site will be subject to the national regulations (bag limits, closed seasons etc). The licensed operator will inform MCM and SANParks officials of any illegal marine resource use activities occurring on the site.

2.16.2 The licensed operator shall facilitate access to the site to MCM, Municipal Police and SANParks to monitor and enforce regulations relating to the consumptive use of marine resources.

2.16.3 Fish and crayfish (or any other marine resources) may not be sold/bartered on the site.

2.17 Communication and compliance

2.17.1 The licensed operator shall draw the attention of all users of the site to the key provisions of this OMP by providing an information board at the launch site. This communication may also take the form of a pamphlet provided to each user, detailing the specific requirements of the OMP.

2.17.2 Adequate complementary signage must be provided to inform all users and visitors to the site with regards to the conditions of the OMP. Map 3 shows the minimum signage requirements.

The licensed operator shall be responsible for monitoring compliance with this OMP. An additional person to the Duty Control Officer will be employed to enforce user compliance to the OMP over weekends, school holidays and other public holidays during the crayfish season. This person will have access to a phone and all the relevant contact numbers of organisations that can enforce the conditions of the OMP. The function of this attendant will, amongst others, be to manage parking arrangements within the parking area, control traffic flows, control littering, control noise and other anti-social behaviour, encourage people to utilise the municipal toilet and to clean litter from both the site and adjacent parking bays within the residential area.

2.17.3 Appropriate records of compliance monitoring and any audit will be maintained and may be used in support of subsequent applications for re-licensing of the site.

2.17.4 Any user of the site who disregards the provisions of this OMP shall be reported, by the licensed operator, to the relevant authority that has the legal jurisdiction to impose penalties. MCM and SANParks officials will be contacted to monitor and enforce all marine resource use activities. All social and traffic related activities will be enforced by the City Police, Traffic Officials and/or SAPS. The licensed operator may contract a security service to provide 24-hour site surveillance where required.

2.17.5 Disregard for the provisions of this OMP, may result in the relevant authority's withdrawal of the licence.

2.18 Safety, emergency preparedness and responses

2.18.1 The site shall form part of, and conform to, local and regional emergency response plans and procedures (e.g. fire, oil spills).

2.18.2 Emergency procedures will take precedence over all activities at the launch site.

2.19 Records

2.19.1 Adequate launch records, in the prescribed format, will be maintained by the licensed operator. The minimum information for the boat launch record is to include boat registration, boat name, time of launch, time of landing, number of crew and purpose of trip.

2.19.2 The licensed operator shall keep a detailed register of all accidents and casualties involving boats, craft and/or crew (using the prescribed SAMSA form as required by section 259 of the Merchant Shipping Act No 57 of 1951). This register should then be forwarded to the nearest SAMSA office at the end of each month.

2.20 Operators other than the licensed operator

2.20.1 The licensed operator may delegate the authority for the management of the boat launch site to any competent club or organisation. The licensed operator shall ensure that any club or institution to which operation of the site may be delegated is properly constituted, has the capacity to observe the conditions of this OMP and re-invests income generated from the site to the effective management of that site.

2.20.2 The prescriptions in this OMP shall be incorporated into any lease agreement entered into between the licensed operator and a club or institution to which the management authority is delegated.

2.20.3 The club or organisation will ensure that a suitable Code of Conduct is in place, and that its members comply with the conditions of the Code.

2.20.4 This club or organisation shall ensure that the site is open to all users, on condition that they comply with the legal requirements of the site. The Club or organisation shall ensure that a transparent, equitable and fair process is followed in determining its membership.

3. ACRONYMS USED IN THIS DOCUMENT

KBC	Kommetjie Boat Club
CoCT	City of Cape Town
DEA&DP	Department of Environmental Affairs and Development Planning
ECA	Environmental Conservation Act
EIA	Environmental Impact Assessment
OMP	Operational Management Plan
MCM	Marine and Coastal Management
MLRA	Marine Living Resources Act, Act No. 18 of 1998
NEMA	National Environmental Management Act, Act No. 107 of 1998
PWC	Personal Watercraft
SAHRA	South African Heritage Resources Agency
SAMSA	South African Maritime Safety Authority
SANParks	South African National Parks
SAPS	South African Police Services

4. OVERVIEW OF OTHER LEGISLATION REFERRED TO IN THIS DOCUMENT

Environment Conservation Act (73 of 1989)

The primary objective of the ECA is to provide for the effective protection and controlled utilisation of the environment (Henderson, 1996). The Act makes provision for the declaration of protected natural environments and for the identification of activities that may have a detrimental effect on the environment.

Regulations to control potentially harmful activities on a permit system within demarcated sensitive coastal areas were promulgated in terms of the ECA. The prohibited activities are the disturbance of vegetation, earthworks, dredging and dune stabilisation.

Subsequent to the promulgation of the Act in 1989, a number of key regulations governing EIAs and identified activities that may be detrimental to the environment have also been promulgated. Of importance to proposed developments in the coastal zone are Government Notices R1182, R1183, R1184 and R448 and amendments of May 2002. While beach driving and boat launching are not listed activities in terms of these regulations, proposed developments, such as structures below the high water mark of the sea and certain access infrastructure which may provide for such activities, must undergo environmental impact assessments before environmental authorisation can be granted by DEAT.

The Act was originally passed to provide a basis for environmental conservation in South Africa. Many of its provisions have since been repealed by NEMA. Provision is also made in NEMA for the repeal of sections of Part V and Part VI of the Environmental Conservation Act, which provide for the “Control of Activities which may have a Detrimental Effect on the Environment" and associated EIA regulations. However, these remain in force until they are replaced with new regulations promulgated under NEMA.

National Environmental Management Act (107 of 1998)

NEMA is South Africa’s overarching environmental legislation and has, as its primary objective, to provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state and to provide for matters connected therewith (Government Gazette, 1998).

The Act provides for the right to an environment that is not harmful to the health and well-being of South African citizens; the equitable distribution of natural resources; sustainable development; environmental protection and the formulation of environmental management frameworks (Government Gazette, 1998). These principles and provisions in Chapter 5 (Integrated Environmental Management) govern the way in which environmental management should be practiced. Provision is also made for the issuing of various Regulations in order to carry out the purposes and the provisions of NEMA.

Marine Living Resources Act (18 of 1998)

This MLRA repeals most of the Sea Fishery Act (12 of 1988). Its preamble reads as follows:

"To provide for the conservation of the marine ecosystem, the long-term sustainable utilisation of marine living resources and the orderly access to exploitation, utilisation and protection of certain marine living resources; and for these purposes to provide for the exercise of control over marine living resources in a fair and equitable manner to the benefit of all the citizens of South Africa; and to provide for matters connected therewith."

The Act and Regulations published thereunder provide for the conservation of South Africa's marine ecosystems and the sustainable utilisation of marine living resources. This includes the protection of every species of sea animal, whether vertebrate or invertebrate, including the spawn or larvae of such sea animal, but excluding any seal or sea bird. Fish and marine organisms were protected by means of prohibitions against their catching, disturbance or possession. There is an OMPhasis on the broadening of fair and equitable access to resources, the gradual transformation of fishing methods, the development of fees for utilisation and a favourable business environment in fisheries. The Act provides for a principle of national control and co-ordination and places responsibility for resource-allocation decisions with the Minister: Environmental Affairs and Tourism. The Act makes provision for the granting of commercial, recreational and subsistence fishing rights.

The Minister may establish areas or zones where subsistence fishers may fish and, after consultation, may declare a specified community to be a fishing community, any person to be a subsistence fisher or any fishing or related activity or the exercise of any other right in that area or zone to be prohibited. No subsistence fishing permit shall be transferable except with the approval of and subject to the conditions determined by the Minister.

Merchant Shipping Act (57 of 1951)

All vessels, of whatever size, that proceed to sea from anywhere in South Africa fall under the Merchant Shipping Act. Small vessels (3 m to < 25 tonnes) are divided into two classes, viz. small vessels used solely for sport and recreation, and all other small vessels, e.g. fishing boats, diving boats and sailing training yachts (i.e. commercial boats).

The Merchant Shipping Act:

- Sets out various categories of vessel, applicable to each class, and their operational limits.
- Makes provision for the inspection of seaworthiness and the competency of skippers.
- Sets out the various safety measures.
- Requires that skippers submit voyage details.

- Makes provision for authorised agencies to exercise or perform powers or duties as required by the Act.

Has certain Regulations namely:

- Government Notice R2799 that applies to ships or small vessels used for sport or recreation.

- Government Notice R1044 that makes provision for vessels of less than 3 m in length. Vessels falling into this category may not proceed to sea further than 500 m from the low water mark. 7

The Act also has relevance with respect to control of marine pollution and to that extent applies to all ships in South African waters.

Road Traffic Act (29 of 1989)

This Act outlines the various requirements and Regulations for vehicles and drivers. In terms of the Act, if a vehicle is able to gain access to, and be driven on, the seashore, this Act and its Regulations are deemed to apply.

There are a number of High Court cases which have established the breadth of application of the definition of a road and, although no cases involving the Admiralty Reserve or that part of the beach between the high and low water marks are known of, the Provincial Road Traffic Inspectorate is certain that the Act applies.

In this, it is important to note that a person does not have to have a right of vehicular access to the beach: right of access by the person is sufficient. The responsible erection of booms, etc., in providing and simultaneously limiting vehicular access to the beach, will thus not affect the applicability of this legislation to what can generally be described as “the beach”.

All vehicles (powered vehicles and trailers) using the beach must be roadworthy and licensed, and be driven by persons who themselves are licensed drivers of that category of vehicle. The body that controls vehicular access to the beach must know that the provisions of this Act apply. This Act has been replaced by the new National Road Traffic Act (93 of 1996). However, the 1996 Act provides that any relevant provision of the 1989 Act will remain in force until such time as the corresponding provision of the 1996 Act has been put into operation.



Launch area
Leased area
Ablution facilities

Map 1 - Launching facilities

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for the City of Cape Town



Entry routes
Exit routes
Exit
Egress
Parking area
Queing area

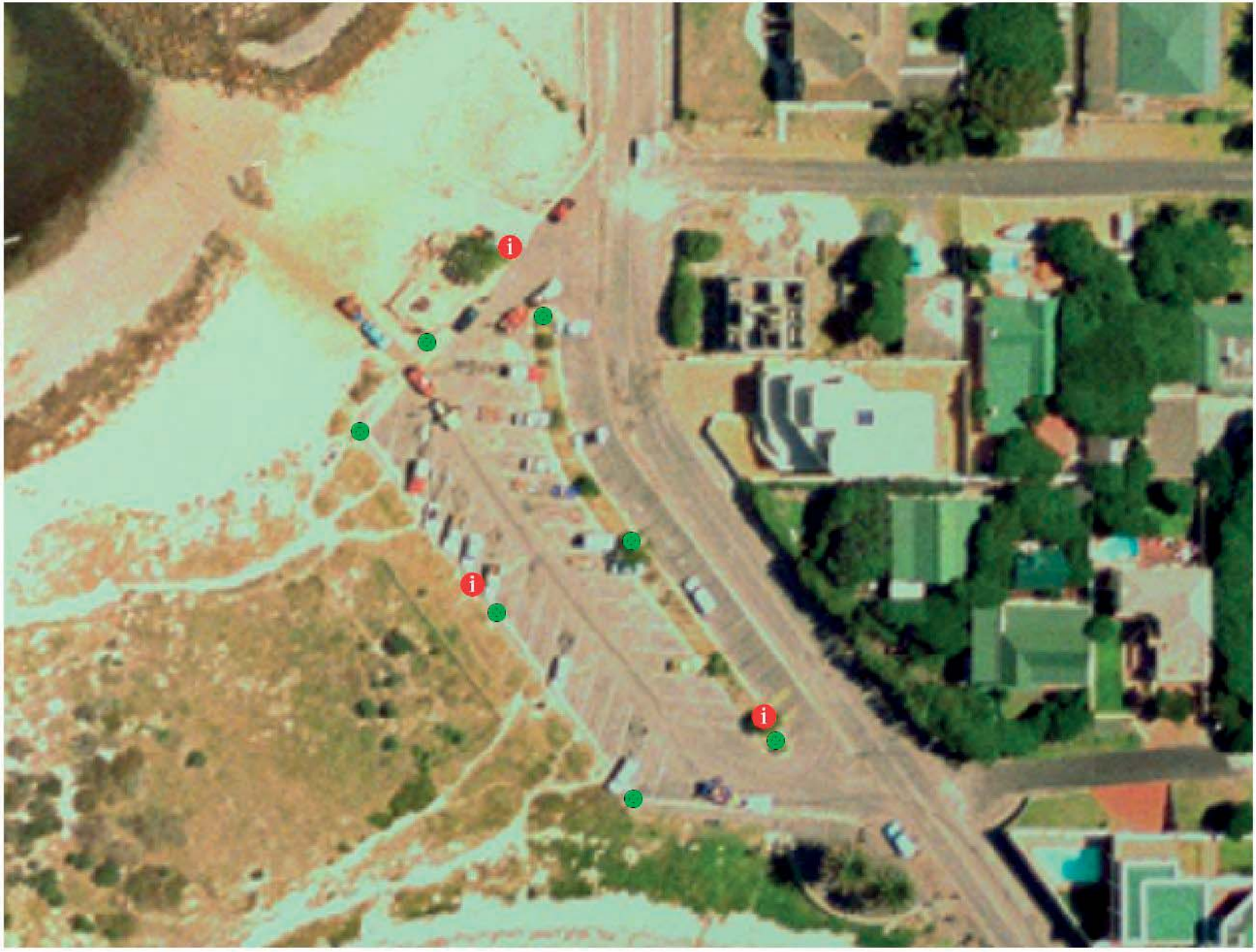
Map 2 - Entry/Exit Routes and Parking Areas

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Proposed placement of Information Boards

Proposed placement of Baboon-proof bins

Map 3 - Proposed positioning of Baboon-proof bins and Information boards

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Launching/Landing channel

Launch/Landing area

Map 4 - Launching/landing area & channel

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for the City of Cape Town

Annexure E

OPERATIONAL MANAGEMENT PLAN FOR MELKBOS SLIPWAY

PREPARED BY:
Peninsula Permits cc.
Envirocentric

FOR:
The City of Cape Town

May 2004

1. BACKGROUND

1.1 Legal Context

This General Policy for off-road vehicles in the coastal zone was published in Government Notice 858, in Government Gazette No.15655, dated 29 April 1994 and introduced general control measures, on a national basis, to protect the coastal environment from damage caused by the use of vehicles in the coastal zone and to ensure the safety of other beach users. The policy makes provision for zoning the coastal zone, for the protection of ecologically sensitive areas, and for various recreational activities, and also allows for a permit system to facilitate the control of vehicles in specifically demarcated areas. According to the General Policy, the use of vehicles in any beach area may be reserved for specific purposes, such as angling or boat launching.

The Control of Vehicles in the Coastal Zone Regulations ("Beach Regulations") published under NEMA (Government Notice No. 1399 of 21 December 2001) provide for a general prohibition on the recreational use of vehicles in the coastal zone and procedures for approving the use of vehicles in the coastal zone under specific circumstances. They also provide measures for the enforcement of these regulations and prescribe penalties in respect of contraventions.

The Beach Regulations (Regulation 7) require operators of boat launching sites to apply to the relevant authority to grant a license to use vehicles, or allow their use by third parties, to facilitate boat launching.
An application for a licence must:

- Be made in the format stipulated by the relevant authority.
- Be accompanied by payment or proof of payment of the application fee stipulated by the relevant authority.
- Clearly indicate:
  - The boundaries of the proposed boat-launching site and all access roads.
  - The types of vehicles that will be used at the site.
  - Set out fully the reasons why the boat-launching site is required.
  - Include a plan for managing activities at the site in a manner that avoids or minimises damage to the environment.
  - Subject to Regulation 22, be accompanied by evidence that the requirements of Section 24(7) of the Act relating to the investigation, assessment and communication of the potential impact of the activities associated with boat-launching at the site have been complied with.

To comply with these regulations, the City of Cape Town (CoCT) has completed the required application form for the licensing of the Melkbos Boat Launching Site. Below please find the proposed Operational Management Plan for the Melkbos Boat Launching Site.

Based on this generic OMP, the OMP for the Melkbos Boat Launch Site includes a general description of the boat launch site (including slipways, parking, roads, and other service facilities), a general description of the types of uses of the boat launch site and a detailed description of the activities required to minimise and mitigate the environmental impacts of the use of the boat launch site. The OMP will however only describe the minimum operational management requirements for each site and it is anticipated that each site will, over time, exceed these minimum requirements.

1.2 Environmental Management in the City of Cape Town

The City of Cape Town's Integrated Metropolitan Environmental Policy (IMEP) was formally adopted in October 2001. IMEP sets the broad framework and a number of core principles for guiding the City towards a sustainable future. IMEP recognises the economic, social and environmental value of the City's coastal asset, and as such identified the Coast as a priority theme for the development of a detailed implementation strategy. In October 2003, the City formally adopted the Coastal Zone Management Strategy giving effect to the principles of IMEP and setting coastal management practise and standards in place.

1.3 Responsible Authority

All reference to the licensed operator within this OMP refers to the City of Cape Town. The City through a lease agreement, may delegate the authority and responsibility for the management of the boat launch site to any competent club or organisation (see 2.20).

1.4 Function of the OMP

The function of the OMP is to ensure that the licensed operator utilises the boat launching site in an environmentally approved manner. It is to ensure that all activities comply with the relevant legislation. The activities taking place at the site with regards to launching a boat must take place with minimal disturbance to the surrounding residents, users and visitors.

A further function of the OMP is to ensure compliance with the regulations in terms of the National Environmental Management Act, 1998: Control of Vehicles in the Coastal Zone, specifically "*7(4)(f) subject to regulation 22, be accompanied by evidence that the requirements of section 24(7) of the Act relating to the investigation, assessment and communication of the potential impact of the activities associated with boat-launching at the site have been complied with*".

1.5 Site description

The Melkbos boat launching site (above the high water mark) is owned by the City of Cape Town, and is situated off Beach Road in Melkbos, approximately 30km from Cape Town.

The boat launching facilities at Melkbos include the following:

- A large tarred vehicle and vehicle-and-trailer parking area.
- A concrete ramp leading onto the beach.
- A municipal toilet facility.

The Melkbos Boat Launching Site is owned and managed by the CoCT. Currently no lease agreement exists for this site. Future reference in this OMP to the Melkbos Boat Launching Site refers to all the associated facilities required for boat launching. Map 1 shows the location of the boat launching facilities at the Melkbos Boat Launch Site.

1.6 Site usage

The site is highly utilised, especially over the holiday season and weekends in the summer months. The usage often exceeds the “carrying capacity” for the parking area, especially during organised events.

The following uses have been recorded at the boat launch site:

- Currently between 80-85% of the slipway users are for recreational purposes (rubber ducks and jet skis).
- Rescue, research and other official users intermittently use the site (NSRI, Metro Rescue, SAPS water wing, Marine and Coastal Management, Municipal Law Enforcement, SLSC, etc.).
- There are several kayaks, catamarans, hobie cats and wind surfers making use of this site or areas adjacent to the launching site.
- The site is popular for events ranging from rubber ducks/semi rigids, sailing and jet-ski events and races.

No accurate user counts exist for the site. The users and associated levels of usage are seasonal and weather dependent.

2. OPERATIONAL MANAGEMENT REQUIREMENTS OF BOAT LAUNCH SITES

2.1 Access management

2.1.1 The site is accessed approximately 400m from Otto du Plessis Drive (M14) off Beach Road. The internal layout of the access to, and traffic flows through, the parking areas and slipways at the site is shown in Map 2. The roads and parking areas must be tarred, adequately marked to meet municipal and provincial road standards and free of potholes.

2.1.2 All access roads, parking areas and slipways are to be properly bollarded or fenced to ensure that all vehicles remain on the hardened road surface, and only park in designated parking areas. All areas outside the hardened road surfaces are designated no-go areas (see Map 2 for the extent of the hardened road surfaces and grassed area at the site). No vehicle is permitted in any sensitive area (e.g. dune areas) on, or abutting the site. The shortest route to the water will be used. Vehicles will offload/load and return to the parking area immediately.

2.1.3 Vehicles, their trailers and the drivers or boat launch operators using the boat launch site shall comply with the requirements of the Road Traffic Act and the General Policy on Control of Vehicles in the Coastal Zone (Government Gazette, Notice 858 of 29 April 1994).

2.1.4 Trailers may be brought onto the seashore by a motor vehicle, only for the purposes of launching or retrieving a vessel. Upon launching (or retrieving if appropriate) a vessel, these trailers and vehicles are to be parked in a clearly demarcated parking area, off the beach (see Map 2).

2.1.5 Only the designated boat launch ramp may be used to access the beach and launch vessels. Erosion and undercutting of the access ramp must be monitored and remedial/rehabilitation action instituted if necessary. Where the remedial/rehabilitation measure constitutes a listed activity in terms of the Environmental Conservation Act, and as directed by the relevant authorities, an Environmental Impact Assessment (EIA) will be implemented for the remedial/rehabilitation action.

2.1.6 The minimum signage requirements to facilitate vehicular and pedestrian flows, and for demarcating parking areas, are shown in Map 1. Map 1 further indicates the location for the posting of the safety requirements for the site.

2.1.7 A fee is to be charged and a ticket issued to all persons launching from the site. Key provisions of this OMP and code of conduct are to be described on the ticket (or an attached brochure). A boom is to be placed across the access route of the slipway enabling the licensed operator to control access. Users can pay an annual instalment, entitling them to free access to the launch site for a year.

On payment of the instalment, the user must be made aware of the conditions of the OMP and issued with a key to the chain/boom at the entrance to enable them to access the launching site. The launching site is kept locked when no boats are at sea to avoid unauthorized entry onto the beach by vehicles. Only persons who are in possession of a valid permit (and key) may access this slipway. The boom is to be closed between sunset and sunrise, unless in the event of an emergency.

2.1.8 The limits on the numbers of boats that may launch from each site will be linked to the availability of parking and other service facilities. This limit includes boats in the process of being launched or retrieved. All vehicles and trailers must be parked legally on the hardened road surface and not hinder traffic flows.

2.1.9 Due to the nature of the boat launch site (facilities, services, parking, access, bio-physical characteristics), unsuitable vehicles shall not be permitted to launch a boat at the site.

2.1.10 Due to the nature of the boat launch site (facilities, services, parking, access, bio-physical characteristics) boats with a solid hull longer than 6m, inflatable boats longer than 7.5m and boat engines with greater that 200 HP engine capacity shall not be permitted to launch from the site.

2.2 Parking management

2.2.1 During peak periods, overflow trailers shall, by agreement of the management authority of the recreational area, be accommodated on the public grassed area (see map 2).

2.2.2 All the parking areas/bays for vehicle-and-trailers will be properly demarcated and vehicle flows clearly indicated.

2.2.3 Launching and parking areas must be separated. Parked vehicles should not obstruct access to the boat launch site by any user, visitor or resident, nor interfere with reasonable use of that beach by any user, visitor or resident. Map 2 shows vehicular access routes, boat launch site and associated parking.

2.3 Boat Launch area

2.3.1 Where boat launches use the beach area, every effort shall be made to minimise disturbance to the beach surface during the process of launching and retrieving boats, i.e. only tow vehicles with sufficient capacity may be used - this includes engine capacity, tyre profile, tyre pressure, driver proficiency, etc.

2.3.2 The launch area shall not be used as an access to other parts of the beach.

2.3.3 Kelp washed up onto the launch site may not be completely removed from the area. If kelp builds up directly on the launch site, kelp may be spread out manually, along another adjacent section of the coastline that will not impact on other users.

If kelp build up has reached the extent that mechanical means is necessary, prior authorisation and consent must be granted from the relevant authorities.

2.4 Launching and beaching control and safety

2.4.1 The licensed operator must be in control of all launches and boat retrievals at all times. During busy periods, the operator must ensure that a dedicated staff member is provided to direct the launches and retrievals.

2.4.2 No alcohol or any other intoxicating substance shall be allowed on the CoCT premises. Any person suspected of being under the influence of alcohol or any other intoxicating substance shall not be permitted access to, or allowed to remain on, the premises.

2.4.3 All SADSA, SAMSA and CoCT safety regulations shall be adhered to at all times. A comprehensive first-aid box capable of handling normal domestic emergencies shall be maintained on site. Weatherproof lists of relevant emergency contact numbers shall be displayed near the launch site and at the public phone box.

2.4.4 Designated launch positions at the launch site on the beach shall be clearly demarcated. The area demarcated for boat launching will be demarcated by adequate signage and positioned as indicated on Map 1.

2.4.5 Boats may only remain beached at the designated beaching area. All boats are to be retrieved and removed from the seashore before sunset. Map 2 shows the position were boats may be beached. Boats should not be left unattended on the seashore. No parking of vehicles on the beach is permitted.

2.4.6 Boats in the process of landing or being retrieved shall have priority over boats wishing to launch.

2.4.7 A boom or chain gate will to be constructed in front of the slipway, to enable the licensed operator to control access. The licensed operator shall temporarily close the launch site under exceptional circumstances such as extremely inclement weather conditions, damage to the slipway, or any other emergency that will prevent the safe launching or retrieval of boats. If the launch site is to be closed to users, the boom will locked by the operator and a notice posted to notify users of the reason for closure and anticipated time of re-opening.

2.4.8 The launch area will be kept clear of all other users when in use. Buoys will be provided to demarcate the launching and landing areas. Signage will be posted, at the slipways informing other users (e.g. swimmers, kayaks) to remain inside their demarcated use areas and outside of the demarcated launching/landing area.

2.4.9 The provisions of section 68 of the Merchant Shipping Act No 57 of 1951 and all applicable regulations made under Section 356 of the same act shall be strictly adhered to.

No boat will be able to launch from the site unless it is properly marked and registered (or licensed as the case may be) according to the Merchant Shipping Act No 57 of 1951 and it's associated regulations.

2.5 Vessel safety

2.5.1 No boat will be able to launch unless the skipper is in possession of a valid Certificate of Competency issued by the South African Maritime Safety Authority (SAMSA), an Agency recognised by it or a IRB (Inflatable Rubber Duck) skippers Certificate issued by Lifesaving South Africa.

2.5.2 Everyone on the boat in the immediate launch and landing zone must wear life jackets or buoyancy aids.

2.5.3 Boats launching from the site are to carry a functional form of communication. (Note: boats not exceeding the one nautical mile limit are not required to have a radio).

2.6 Jet skis/Personal watercraft (PWC)

2.6.1 Jet ski wave riding may only take place in areas designated for such activity by the licensed operator of the launch site.

2.6.2 No jet ski may be navigated in a dangerous manner or be driven at excessively high speeds within the surf zone of the launching area. No jet ski shall be navigated across the front of any bather or bathers in the designated recreational areas.

2.7 Night launching and beaching

2.9.1 Use of the launch site for night operations is to be strictly controlled by the licensed operator. Relevant safety and statutory requirements as stipulated by SADSA and SAMSA, must be met and enforced by the licensed operator. The licensed operator is to provide controlled access for night boat launches and landings.

2.8 Managing conflict between different user groups

2.8.1 No other users may use the designated launch areas. Map 4 indicates the extent of the launch area and the other adjacent areas designated for recreational use.

2.8.2 Except during launching and landing, boats under power in the in-shore area are not to approach within 200 m of other users (anglers, divers, swimmers, surfers, body-boarders, jet skis or any other non-powered craft).

2.8.3 Boats may not enter an area set aside specifically for bathers or other water sports and vice versa. It is the skipper's responsibility to keep a proper lookout for bathers and divers.

Other users are to stay clear of the launch and landing channel (see Map 3). Adequate signage is to be posted, informing other users (e.g. swimmers, kayaks) to remain outside of these demarcated launching/ landing areas (see Map 3).

2.9 Special events, functions and "fish runs"

2.9.1 A range of competitive events is held at the boat launch site. These include Rubber duck/semi-rigid, sailing and jet ski competitions. In terms of the Merchant Shipping Act, the relevant authority may grant permission for the total number of allowable launches to be increased during these events. The number of trailers may increase during an event, if the event co-ordinators have permission from the licensed operator to park trailers on the designated parking and overflow areas (see Map 2).

2.9.2 In order to cater for special events and functions, the licensed operator is to ensure that sufficient staff are available to cater for, and mitigate, the impacts resulting from an increase in users. During such events the licensed operator is to ensure that the provisions of the OMP are complied with – and the following additional actions/control measures take place:

- Control and management of vehicle flows and parking
- Control of alcohol consumption, anti-social activities, littering and vandalism
- Prevention of fish hawking on site
- Control over the cleaning of boats
- Control over the disposal of offal
- Monitoring of, and compliance with, the Marine Living Resources Act
- Preventing conflicts between different user groups
- Compliance with minimum safety standards
- Provision of temporary toilets

2.10 Toilet facilities and waste water treatment

2.10.1 The existing toilet and ablution facilities associated with the boat launch site are indicated in Map 1. The licensed operator shall ensure that all toilet facilities used by boat launch site users are properly maintained and in a clean and hygienic condition at all times. During busy periods toilets shall be cleaned and serviced at least twice daily, while during quiet periods toilets shall be cleaned and serviced at least every second day.

2.10.2 No washing of boats will be permitted on the site.

2.11 Pollution and litter management

2.11.1 All litter and refuse is to be cleaned from the site by the licensed operator at least twice a week. In peak season, and during special events, the cleaning schedule is to take place at least once a day.

2.11.2 Plastic (or any other non-corroding material) refuse bins are to be provided at the site. In peak season, and during special events, the bins are to be emptied daily. Outside peak season, bins are to be cleaned at least twice a week. Refuse bins are to be discreetly placed in areas of high usage (e.g. at the parking areas). The bins will be clearly visible and be a short distance from the users. The bins are to be placed in an area where they can be easily serviced.

2.11.3 Refuelling supplies will be in sealed containers, which are only to be opened within the boat.

2.11.4 Spillages of fuel or oil at the launch site are to be avoided. The licensed operator must keep Spill Sorb (or similar product) on site. Should a fuel or oil spill take place, the material containing the spill shall be properly disposed of at an approved facility.

2.11.5 No scaling, cleaning of fish or disposal of bait may take place on the site.

2.11.6 No cleaning of boats bodywork is permitted.

2.12 Noise mitigation

2.12.1 The licensed operator is to ensure that the premises is operated in accordance with the requirements of the Noise Control Regulations PN 627/1998.

2.12.2 Where the licensed operator cannot control rowdy and noisy activity, they are to contact municipal law enforcement officials or the SAPS for assistance.

2.12.3 No dry starting of motors may take place within the parking and residential area. Motors may only be started and warmed up on the beach, in such a way as not to cause undue nuisance to other beach users, visitors and residents. The licensed operator is responsible for ensuring that management measures are put in place to address reasonable complaints from users, visitors and residents.

2.13 New developments

2.13.1 No listed (in terms of Schedule 1 1(e) of the Regulations under section 21 of the Environmental Conservation Act 73 of 1989) activity may take place within the site, unless approved by the responsible authority after an Environmental Impact Assessment (EIA) has been undertaken. This assessment must meet the requirements of the provincial planning and environmental authorities.

2.14 Helicopters

2.14.1 There are no demarcated helicopter-landing sites, but the site is made available for emergency rescue and evacuation operations.

2.15 Archaeological sites

2.15.1 Any area of archaeological significance found on the site is to be reported immediately by the licensed operator of the launch site to the South African Heritage Resource Agency (SAHRA) (or its nominated representative) and access to the archaeological site should be prevented, pending appropriate investigation and decision.

2.16 Consumptive use of marine resources

2.16.1 All consumptive use of marine resources on the site will be subject to the national regulations (bag limits, closed seasons etc). The licensed operator will inform MCM, Municipal Police and SAPS officials of any illegal marine resource activities occurring on the site. MCM, Municipal Police and SAPS are to be notified of special events to ensure that enforcement staff are available to monitor the consumptive use of marine resources.

2.16.2 Fish (or any other marine resources) may not be sold/bartered on the site.

2.17 Communication and compliance

2.17.1 The licensed operator shall draw the attention of all users of the site to the key provisions of this OMP by providing an information board near the launch site.

2.17.2 Adequate complementary signage must be provided to inform all users and visitors to the site with regards to the conditions of the OMP. Map 3 shows the minimum signage requirements.

2.17.3 The licensed operator shall be responsible for monitoring compliance with this OMP.

2.17.4 Appropriate records of compliance monitoring and any audit will be maintained and may be used in support of subsequent applications for re-licensing of the site.

2.17.5 Any user of the site who disregards the provisions of this OMP shall be reported, by the licensed operator, to the relevant authority that has the legal jurisdiction to impose penalties. MCM and City Law Enforcement Officers will be contacted to monitor and enforce all marine resource use activities. All social and traffic related activities will be enforced by the City Police and/or SAPS.

2.17.6 Disregard for the provisions of this OMP, may result in the relevant authority's withdrawal of the licence.

2.18 Safety, emergency preparedness and responses

2.18.1 The site shall form part of, and conform to, local and regional emergency response plans and procedures (e.g. fire, oil spills).

2.19 Records

2.19.1 Adequate launch records, in the prescribed format, will be maintained by the licensed operator. The minimum information for the boat launch record is to include boat registration, boat name, time of launch, time of landing, number of crew and purpose of trip.

2.19.2 The licensed operator shall keep a detailed register of all accidents and casualties involving boats, craft and/or crew (using the prescribed SAMSA form as required by section 259 of the Merchant Shipping Act No 57 of 1951). This register should then be forwarded to the nearest SAMSA office at the end of each month.

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2.20.1 The licensed operator may delegate the authority for the management of the boat launch site to any competent club or organisation. The licensed operator shall ensure that any club or institution to which operation of the site may be delegated is properly constituted, has the capacity to observe the conditions of this OMP and re-invests income generated from the site to the effective management of that site.

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MCM	Marine and Coastal Management
MLRA	Marine Living Resources Act, Act No. 18 of 1998
NEMA	National Environmental Management Act, Act No. 107 of 1998
PWC	Personal Watercraft
SAHRA	South African Heritage Resources Agency
SAMSA	South African Maritime Safety Authority
SAPS	South African Police Services

4. OVERVIEW OF OTHER LEGISLATION REFERRED TO IN THIS DOCUMENT

Environment Conservation Act (73 of 1989)

The primary objective of the ECA is to provide for the effective protection and controlled utilisation of the environment (Henderson, 1996). The Act makes provision for the declaration of protected natural environments and for the identification of activities that may have a detrimental effect on the environment.

Regulations to control potentially harmful activities on a permit system within demarcated sensitive coastal areas were promulgated in terms of the ECA. The prohibited activities are the disturbance of vegetation, earthworks, dredging and dune stabilisation.

Subsequent to the promulgation of the Act in 1989, a number of key regulations governing EIAs and identified activities that may be detrimental to the environment have also been promulgated. Of importance to proposed developments in the coastal zone are Government Notices R1182, R1183, R1184 and R448 and amendments of May 2002. While beach driving and boat launching are not listed activities in terms of these regulations, proposed developments, such as structures below the high water mark of the sea and certain access infrastructure which may provide for such activities, must undergo environmental impact assessments before environmental authorisation can be granted by DEAT.

The Act was originally passed to provide a basis for environmental conservation in South Africa. Many of its provisions have since been repealed by NEMA. Provision is also made in NEMA for the repeal of sections of Part V and Part VI of the Environmental Conservation Act, which provide for the “Control of Activities which may have a Detrimental Effect on the Environment" and associated EIA regulations. However, these remain in force until they are replaced with new regulations promulgated under NEMA.

National Environmental Management Act (107 of 1998)

NEMA is South Africa’s overarching environmental legislation and has, as its primary objective, to provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state and to provide for matters connected therewith (Government Gazette, 1998).

The Act provides for the right to an environment that is not harmful to the health and well-being of South African citizens; the equitable distribution of natural resources; sustainable development; environmental protection and the formulation of environmental management frameworks (Government Gazette, 1998). These principles and provisions in Chapter 5 (Integrated Environmental Management) govern the way in which environmental management should be practiced. Provision is also made for the issuing of various Regulations in order to carry out the purposes and the provisions of NEMA.

Marine Living Resources Act (18 of 1998)

This MLRA repeals most of the Sea Fishery Act (12 of 1988). Its preamble reads as follows:

"To provide for the conservation of the marine ecosystem, the long-term sustainable utilisation of marine living resources and the orderly access to exploitation, utilisation and protection of certain marine living resources; and for these purposes to provide for the exercise of control over marine living resources in a fair and equitable manner to the benefit of all the citizens of South Africa; and to provide for matters connected therewith."

The Act and Regulations published thereunder provide for the conservation of South Africa's marine ecosystems and the sustainable utilisation of marine living resources. This includes the protection of every species of sea animal, whether vertebrate or invertebrate, including the spawn or larvae of such sea animal, but excluding any seal or sea bird. Fish and marine organisms were protected by means of prohibitions against their catching, disturbance or possession. There is an OMPhasis on the broadening of fair and equitable access to resources, the gradual transformation of fishing methods, the development of fees for utilisation and a favourable business environment in fisheries. The Act provides for a principle of national control and co-ordination and places responsibility for resource-allocation decisions with the Minister: Environmental Affairs and Tourism. The Act makes provision for the granting of commercial, recreational and subsistence fishing rights.

The Minister may establish areas or zones where subsistence fishers may fish and, after consultation, may declare a specified community to be a fishing community, any person to be a subsistence fisher or any fishing or related activity or the exercise of any other right in that area or zone to be prohibited. No subsistence-fishing permit shall be transferable except with the approval of and subject to the conditions determined by the Minister.

Merchant Shipping Act (57 of 1951)

All vessels, of whatever size, that proceed to sea from anywhere in South Africa fall under the Merchant Shipping Act. Small vessels (3 m to < 25 tonnes) are divided into two classes, viz. small vessels used solely for sport and recreation, and all other small vessels, e.g. fishing boats, diving boats and sailing training yachts (i.e. commercial boats).

The Merchant Shipping Act:

- Sets out various categories of vessel, applicable to each class, and their operational limits.
- Makes provision for the inspection of seaworthiness and the competency of skippers.
- Sets out the various safety measures.
- Requires that skippers submit voyage details.

- Makes provision for authorised agencies to exercise or perform powers or duties as required by the Act.

Has certain Regulations namely:

- Government Notice R2799 that applies to ships or small vessels used for sport or recreation.

- Government Notice R1044 that makes provision for vessels of less than 3 m in length. Vessels falling into this category may not proceed to sea further than 500 m from the low water mark. 7

The Act also has relevance with respect to control of marine pollution and to that extent applies to all ships in South African waters.

Road Traffic Act (29 of 1989)

This Act outlines the various requirements and Regulations for vehicles and drivers. In terms of the Act, if a vehicle is able to gain access to, and be driven on, the seashore, this Act and its Regulations are deemed to apply.

There are a number of High Court cases which have established the breadth of application of the definition of a road and, although no cases involving the Admiralty Reserve or that part of the beach between the high and low water marks are known of, the Provincial Road Traffic Inspectorate is certain that the Act applies.

In this, it is important to note that a person does not have to have a right of vehicular access to the beach: right of access by the person is sufficient. The responsible erection of booms, etc., in providing and simultaneously limiting vehicular access to the beach, will thus not affect the applicability of this legislation to what can generally be described as “the beach”.

All vehicles (powered vehicles and trailers) using the beach must be roadworthy and licensed, and be driven by persons who themselves are licensed drivers of that category of vehicle. The body that controls vehicular access to the beach must know that the provisions of this Act apply. This Act has been replaced by the new National Road Traffic Act (93 of 1996). However, the 1996 Act provides that any relevant provision of the 1989 Act will remain in force until such time as the corresponding provision of the 1996 Act has been put into operation.



Concrete slipway
Ablutions
Beaching area
Launch site
Information boards
Parking area

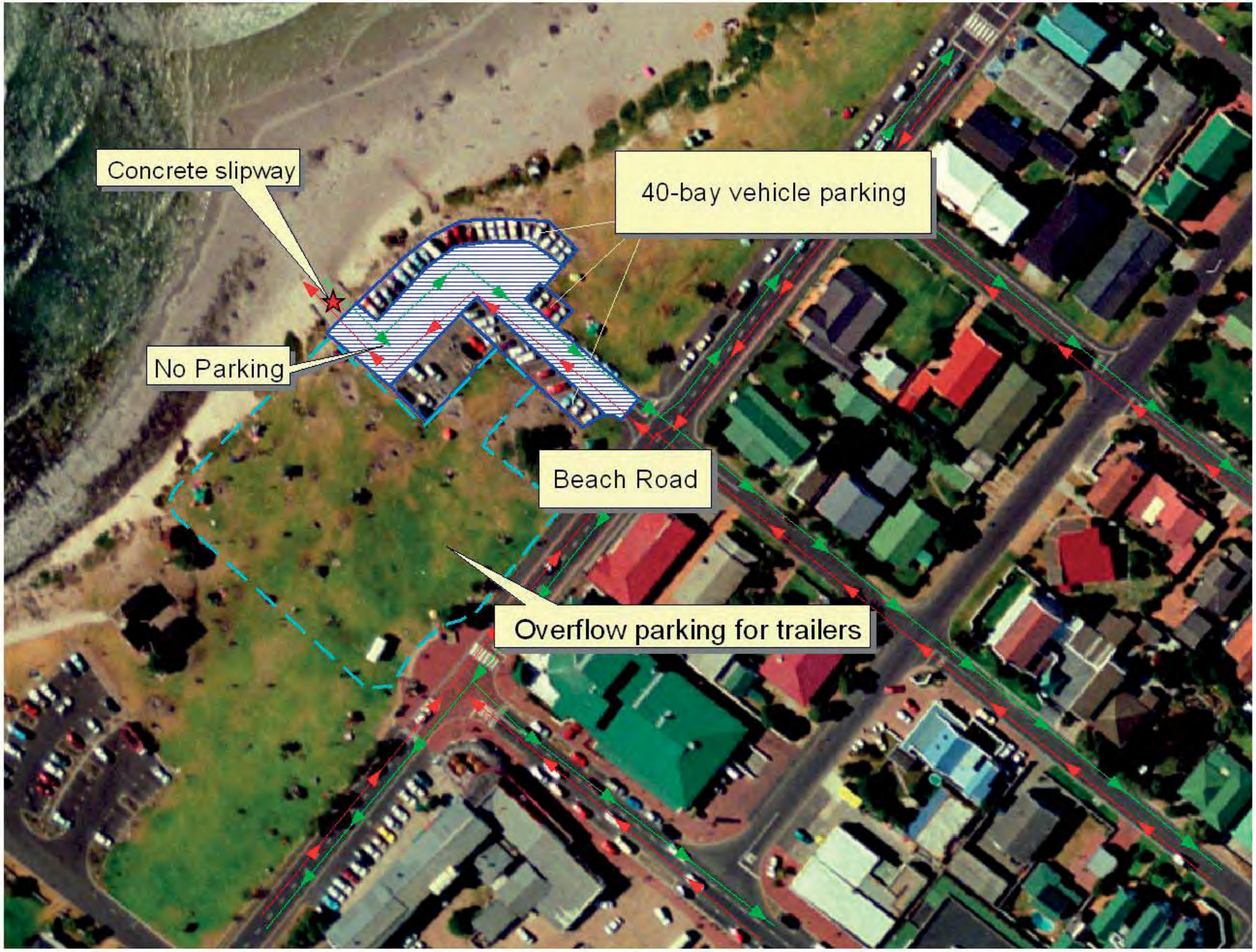
Map 1 - Launching facilities

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for the City of Cape Town



Concrete slipway
Overflow parking for trailers
Exit routes
Entry routes
Parking area
No parking area

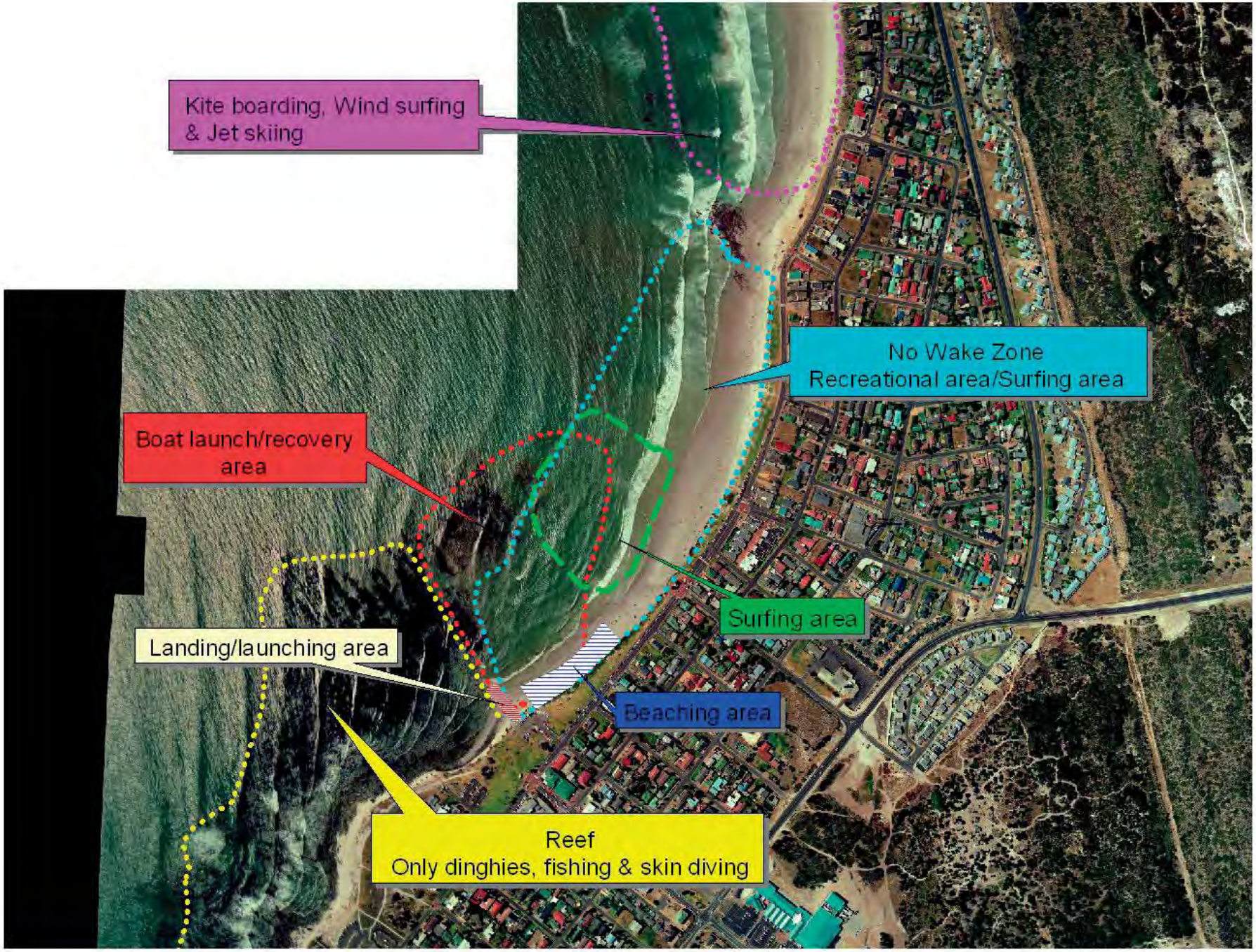
Map 2 - Entry/Exit Routes & Parking Areas

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No swimmimg area
Surfing area
Landing area
Launching area
Beaching area
Reef
No wake zone

Map 3 - Designated launching/landing and recreational areas

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Prepared by
PENINSULA PERMITS
for the City of Cape Town

Annexure F

OPERATIONAL MANAGEMENT PLAN FOR MILLER'S POINT

Northern and Southern Slipways

PREPARED BY:
Peninsula Permits cc.
Envirocentric

FOR:
The City of Cape Town

May 2004

Envirocentric

PENINSULA PERMITS

1. BACKGROUND

1.1 Legal Context

This General Policy for off-road vehicles in the coastal zone was published in Government Notice 858, in Government Gazette No.15655, dated 29 April 1994 and introduced general control measures, on a national basis, to protect the coastal environment from damage caused by the use of vehicles in the coastal zone and to ensure the safety of other beach users. The policy makes provision for zoning the coastal zone, for the protection of ecologically sensitive areas, and for various recreational activities, and also allows for a permit system to facilitate the control of vehicles in specifically demarcated areas. According to the General Policy, the use of vehicles in any beach area may be reserved for specific purposes, such as angling or boat launching.

The Control of Vehicles in the Coastal Zone Regulations ("Beach Regulations") published under NEMA (Government Notice No. 1399 of 21 December 2001) provide for a general prohibition on the recreational use of vehicles in the coastal zone and procedures for approving the use of vehicles in the coastal zone under specific circumstances. They also provide measures for the enforcement of these regulations and prescribe penalties in respect of contraventions.

The Beach Regulations (Regulation 7) require the licensed operator of boat launching sites to apply to the relevant authority to grant a license to use vehicles, or allow their use by third parties, to facilitate boat launching.
An application for a licence must:

- Be made in the format stipulated by the relevant authority.
- Be accompanied by payment or proof of payment of the application fee stipulated by the relevant authority.
- Clearly indicate:
  - The boundaries of the proposed boat-launching site and all access roads.
  - The types of vehicles that will be used at the site.
  - Set out fully the reasons why the boat-launching site is required.
  - Include a plan for managing activities at the site in a manner that avoids or minimises damage to the environment.
  - Subject to Regulation 22, be accompanied by evidence that the requirements of Section 24(7) of the Act relating to the investigation, assessment and communication of the potential impact of the activities associated with boat-launching at the site have been complied with.

To comply, in part, with these regulations, the City of Cape Town (CoCT) has drafted a generic Operational Management Plan (OMP) to mitigate the environmental impacts of the boat launch sites within the Municipal Area of Cape Town.

Based on this generic OMP, the OMP for the Miller's Point boat launch site includes a general description of the boat launch site (including slipways, parking, roads, and other service facilities), a general description of the types of uses of the boat launch site and a detailed description of the activities required to minimise and mitigate the environmental impacts of the use of the boat launch site. The OMP will however only describe the minimum operational management requirements for each site and it is anticipated that each site will, over time, exceed these minimum requirements.

1.2 Environmental Management in the City of Cape Town

The City of Cape Town's Integrated Metropolitan Environmental Policy (IMEP) was formally adopted in October 2001. IMEP sets the broad framework and a number of core principles for guiding the City towards a sustainable future. IMEP recognises the economic, social and environmental value of the City's coastal asset, and as such identified the Coast as a priority theme for the development of a detailed implementation strategy. In October 2003, the City formally adopted the Coastal Zone Management Strategy giving effect to the principles of IMEP and setting coastal management practise and standards in place.

1.3 Responsible Authority

All reference to the licensed operator within this OMP refers to the City of Cape Town. The City through a lease agreement, may delegate the authority and responsibility for the management of the boat launch site to any competent club or organisation (see 2.20).

1.4 Function of the OMP

The OMP has been drafted to ensure compliance with the regulations in terms of the national environmental management act, 1998: control of vehicles in the coastal zone, specifically "*7(4)(f) subject to regulation 22, be accompanied by evidence that the requirements of section 24(7) of the act relating to the investigation, assessment and communication of the potential impact of the activities associated with boat-launching at the site have been complied with*". The function of the OMP is thus to ensure that the licensed operator utilises the boat launching site in an environmentally sensitive manner. The OMP explicitly identifies the mitigating actions required to control the impacts of the boat launch site and associated activities on the bio-physical attributes of the site, the surrounding residents and the safety of the users of the site. The OMP further provides a framework to ensure that all activities occurring within the boat launch site comply with the relevant enabling legislation.

1.5 Site description

The Miller's Point Recreational Area (MPRA) is a 14ha site owned by the City of Cape Town, situated some 2km south of Simon's Town. The MPRA, extends along a 1,5km coastal strip and currently incorporates a restaurant, holiday accommodation, a recreation amenity and boat launching facilities, administered by the Cape Boat and Ski-Boat Club (CBSC).

The boat launching facilities on the southern portion of the MPRA include the following:

- A clubhouse with a 37-bay vehicle-and-boat parking area with an electronically controlled access point.
- A slipway into Rumbly Bay (the "southern slipway").
- A slipway and breakwater on the northern edge of a large spoil mound (the "northern slipway") with an associated 56-bay vehicle-and-boat parking area.

Map 1 shows the location of the boat launching facilities at the Miller's Point boat launch site. The CBSC currently lease the boat launch site from the CoCT. The leased area is approximately 17,640m^2 in extent and is shown in Map 1. Future reference in this OMP to the Miller's Point Boat Launch Site refers to this leased area, unless otherwise indicated in the OMP.

In terms of the lease agreement, the CBSC is responsible for managing the launching of all boats from the launching areas, for ensuring the facility is open to public use and for the ongoing maintenance and development of the facilities.

1.6 Site usage

As the boat launch site is the only launching facility on the eastern shore of False Bay to which the public has ease off access, playing an important role in allowing access by communities to the coastal asset. The majority of boat launches (95%) take place from the northern slipway.

The following uses have been recorded at the boat launch site:

- Currently between 80-85% of the slipway users are commercial fishermen. The intensity of commercial fishing activities during the seasonal fish runs result in temporary management difficulties. This applies in particular to the snoek runs in July /August and sometimes in September/October. During these periods, up to 100 boats and their crews launch from the slipway every day.
- The CBSC is well utilised by the recreational fishing community, and recreational anglers (both club and non-club) account for a significant proportion of users of the site.
- Recreational, commercial and charter diving is an increasingly popular usage at the site.
- Rescue, research and other official users intermittently use the site (NSRI, Metro Rescue, SAPS water wing, Marine and Coastal Management, SA Museum, SA Navy, etc.). The facility is used to co-ordinate search and rescue operations in the area.
- Kayaks, small dinghies and wind surfers launch at the southern slipway.
- The site is popular for events ranging from angling competitions (inter-club, inter-provincial, national, international) to kayak and pentathlon races.

No accurate user counts exist for the site. The users and associated levels of usage are seasonal and weather dependent. Some months can see 300 boats launched and others only 10.

2. OPERATIONAL MANAGEMENT REQUIREMENTS FOR THE MILLER'S POINT BOAT LAUNCH SITE

2.1 Access management

2.1.1 The site is accessed off the M4 approximately 2km south of Simon's Town. The internal layout of the access to, and traffic flows through, the parking areas and slipways at the site is shown in Map 2. The roads and parking areas must be tarred, adequately marked to meet municipal and provincial road standards and free of potholes. An investigation of the feasibility of upgrading an existing unused gravel road outside the current lease area to establish a ring road to, and from, the northern slipway must be initiated.

2.1.2 All access roads, parking areas and slipways are to be properly bollarded or fenced off to ensure that all vehicles remain on the hardened road surface, and only park in designated parking areas. Except for the grassed area surrounding the clubhouse, all areas outside the hardened road surfaces are designated no-go areas (see Map 2 for the extent of the hardened road surfaces and grassed area at the site).

2.1.3 Vehicles, their trailers and the drivers or operators using the boat launch site shall comply with the requirements of the Road Traffic Act and the General Policy on Control of Vehicles in the Coastal Zone (Government Gazette, Notice 858 of 29 April 1994).

2.1.4 Trailers may be brought onto the northern and southern slipways by a motor vehicle or tractor only for the purposes of launching or retrieving a boat. Upon launching (or retrieving) a boat, these trailers and vehicles are to be parked in the clearly demarcated parking areas shown in Map 2.

2.1.5 Only the designated northern and southern slipway may be used to launch boats. Erosion and undercutting of these slipways must be monitored and remedial/rehabilitation action instituted if necessary. Where the remedial/rehabilitation measure constitutes a listed activity in terms of the Environmental Conservation Act, and as directed by the relevant authorities, an Environmental Impact Assessment (EIA) will be implemented for the remedial/rehabilitation action.

2.1.6 The minimum signage requirements to facilitate vehicular and pedestrian flows, and for demarcating parking areas, are attached. Map 3 further indicates the location for the posting of the safety requirements for the site.

2.1.7 A fee is to be charged for the use of the slipways, with CBSC members are entitled to a 50% discount. Key provisions of this OMP are, within the space constraints, to be described on the ticket.

The CBSC members may have exclusive use of the parking area adjacent to the Clubhouse (see Map 1). It is a secure parking area with CCTV and an electronic controlled gate. The public parking area is accessed via a manually operated boom controlled from a kiosk. The licensed operator is to ensure that a staff member is available during daylight hours to collect launch fees and provide a basic security presence. The licensed operator may provide a contracted security service and/or CCTV between sunset and sunrise to sustain a basic security presence and gate control after hours. The boom and electronic gates are to be closed between sunset and sunrise, unless by special arrangement of the licensed operator for night launches at which time the licensed operator will have a staff member present.

2.1.8 A strict limit of 103 vehicle-and-trailers may use the site at any one time, with the exception of high use days when, in agreement with the management authority, 50% of the municipal parking area may be utilised (**in accordance with** 2.9.2). This limit includes boats in the process of being launched or retrieved and vehicles-and-trailers parked in the designated parking and overflow areas.

2.1.9 Due to the nature of the boat launch site (facilities, services, parking, access, bio-physical characteristics), vehicles under 1300cc engine capacity shall not be permitted to launch a boat at the site.

2.1.10 Due to the nature of the boat launch site (facilities, services, parking, access, bio-physical characteristics) boats longer than 12 meters and boat engines with greater that 500 HP engine capacity shall not be permitted to launch from the site.

2.2 Parking management

2.2.1 A limit of 56 vehicle-and-trailers will be allowed in the designated northern parking area, 37 in the southern parking area and 10 on the grass in front of the Clubhouse. During peak periods, such as snoek runs, overflow vehicles-and-trailers shall, by agreement of the management authority of the recreational area, be accommodated in the public and southern parking areas up to a maximum of 50% of the parking capacity of that parking area. The allowance for overflow vehicles-and-trailers to make use of the municipal parking area is subject to 2.2.2. (i.e. vehicles-and-trailers may only park in bays demarcated for that purpose).

2.2.2 All the parking areas/bays for vehicle-and-trailers will be properly demarcated and vehicle flows clearly indicated.

2.3 Boat Launch area

2.3.1 The boat launch area shall not be used as an access to other parts of the beach or to the surrounding recreational area.

2.3.2 Where required, the methods for cleaning slipways are restricted to:
- Manual brushing of the surface.
- Mechanical brushing of the surface.
- The application of environmentally friendly chemicals under the control of the Environmental Management Department of the CoCT.

2.4 Launching and beaching control and safety

2.4.1 The licensed operator must be in control of all launches and boat retrievals at all times. During busy periods at the northern slipway, the operator must ensure that a dedicated staff member is provided to direct the launches and retrievals. The northern slipway will be clearly demarcated to enable two boats to be launched or retrieved parallel to each other. No alcohol may be consumed on site, except within the confines of the Clubhouse as per the approved Liquor Licence.

2.4.2 All club, SADSA, SAMSA and CoCT safety regulations shall be adhered to at all times. A comprehensive first-aid box capable of handling normal domestic emergencies shall be maintained on site. Weatherproof lists of relevant emergency contact numbers shall be displayed on the outside of the clubhouse, on the control booth at the north parking area and at the public phone box alongside the facility entrance on the Main Road to the south.

2.4.3 Boats and vehicles may not be left unattended on the slipways and boats shall be retrieved from the launch site area within 10 minutes of arrival at the slipway. No parking on the slipway or access roads to the slipway is allowed.

2.4.4 Boats in the process of landing or being retrieved shall have priority over boats wishing to launch.

2.4.5 The licensed operator shall temporarily close the launch site under exceptional circumstances such as extremely inclement weather conditions, damage to the slipway, or any other emergency that will prevent the safe launching or retrieval of boats from either slipway. If the launch site is to be closed to users, the boom will be locked by the licensed operator and a notice posted to notify users of the reason for closure and anticipated time of re-opening.

2.4.6 The launch area will be kept clear of all other users when in use. Buoys will be provided to demarcate the launching and landing areas. Signage will be posted, at the slipways informing other users (e.g. swimmers, kayaks) to remain outside of the demarcated launching / landing areas.

2.4.7 The licensed operator shall ensure that only persons who are suitably licensed (e.g. relevant code driving license) shall operate vehicles for launching or retrieval on the site.

2.4.8 The provisions of section 68 of the Merchant Shipping Act No 57 of 1951 and all applicable regulations made under Section 356 of the same act shall be strictly adhered to.

No boat will be able to launch from the site unless it is properly marked and registered (or licensed as the case may be) according to the Merchant Shipping Act No 57 of 1951 and its associated regulations.

2.5 Vessel safety

2.5.1 No boat will be able to launch unless the skipper is in possession of a valid Certificate of Competency issued by the South African Maritime Safety Authority (SAMSA), an Agency recognised by it or a IRB (Inflatable Rubber Duck) skippers Certificate issued by Lifesaving South Africa.

2.5.2 All boats launching from the site are to carry a functional form of communication, (i.e. in the case of an emergency the boat can make contact with emergency services and can be contacted by emergency services).

2.6 Jet skis/Personal watercraft (PWC)

2.6.1 Jet ski wave riding may only take place in areas designated for such activity by the licensed operator of the launch site.

2.6.2 No jet ski may be navigated in a dangerous manner or be driven at excessively high speeds within the surf zone of the launching area. No jet ski shall be navigated across the front of any bather or bathers in the designated recreational areas.

2.7 Night launching and landing

2.7.1 Use of the launch site for night operations is to be strictly controlled by the licensed operator. Relevant safety and statutory requirements as stipulated by SADSA and SAMSA, must be met and enforced by the licensed operator. The licensed operator is to provide controlled access for night boat launches and landings.

2.8 Managing conflict between different user groups

2.8.1 No other users may use the designated launch areas. Map 4 indicates the extent of the launch area and the other adjacent areas designated for recreational use.

2.8.2 During launching and landing, boats and jet skis under power in the in-shore area are not to approach within 200m of other users (anglers, divers, swimmers, surfers, body-boarders, or any other non-powered craft). Provided that the skipper is qualified in surf rescue operations (e.g. rescue operations or patrols) this 200m distance is not compulsory. Rescue rubber ducks that are used within 200m of other users must have a propeller guard fitted.

2.8.3 Boats may not enter an area set aside specifically for bathers or other water sports and vice versa. It is the skipper's responsibility to keep a proper lookout for bathers and divers. Other users are to stay clear of the launch and landing channel (see Map 4).

Adequate signage is to be posted, informing other users (e.g. swimmers, kayaks) to remain outside of these demarcated launching/ landing areas (see Map 4).

2.9 Special events, functions and "fish runs"

2.9.1 A range of competitive events are held at the boat launch site. These include competitions such as:

- Club competitions: Offshore/Inshore
- Inter-club: Western Province Offshore Competitions
- Inter-club: Western Province Inshore Competitions
- Inter-Provincial Competitions
- SA National Championship
- International Championships

In terms of the Merchant Shipping Act, the relevant authority may grant permission for the total number of allowable launches to be increased during these events.

2.9.2 In order to cater for special events and functions, the licensed operator or the boat club is to ensure that sufficient staff are available to cater for, and mitigate, the impacts resulting from an increase in users.

During the period of the snoek runs – generally in July/August and sometimes in September/October – the licensed operator is to aggressively manage and enforce the conditions of the OMP. The following areas will require intensive management during periods of high usage:

- Control and management of vehicle flows and parking.
- Control of alcohol consumption, anti-social activities, littering and vandalism.
- Prevention of overnighting at the boat launch site.
- Prevention of fish hawking on site.
- Ensuring control over the cleaning of boats.
- Ensuring control over the disposal of offal.
- Monitoring of, and compliance with, the Marine Living Resources Act.
- Prevention of conflicts between different user groups.
- Ensuring compliance with minimum safety standards.
- Provision of temporary toilets.

2.10 Toilet facilities and waste water treatment

2.10.1 The existing toilet and ablution facilities associated with the boat launch site are indicated in Map 1. These toilet facilities are to be included in any lease agreement for the management of the boat launch site (see 2.20.2). The Licensed operator shall ensure that all toilet facilities used by boat launch site users are properly maintained and in a clean and hygienic condition at all times. During busy periods toilets shall be cleaned and serviced at least twice daily, while during quiet periods toilets shall be cleaned and serviced at least every second day. Additional chemical toilets must be provided on site during the snoek runs. Where toilets cannot be properly maintained or serviced (e.g. low water pressure, poor sewerage management, vandalism, etc.), these are to be shut and sealed and chemical toilets provided by the licensed operator.

2.10.2 Wastewater must be discharged into a recognised drainage system. All wastewater is to be directed into the Municipal Waste Water drains. Where there is no municipal sewer available at the site, an adequately designed and maintained septic tank or any other acceptable wastewater treatment system is to be provided. No washing of boats will be permitted on the slipways.

2.11 Pollution and litter management

2.11.1 All litter and refuse is to be cleaned from the site by the licensed operator at least twice a week. In peak season, and during special events and snoek runs, the cleaning schedule is to take place at least once a day.

2.11.2 Plastic (or any other non-corroding material) refuse bins are to be provided at the site. In peak season, and during special events and snoek runs, the bins are to be emptied daily. Outside peak season, bins are to be cleaned at least twice a week. Refuse bins are to be discreetly placed in areas of high usage (e.g. at the parking areas). The bins will be clearly visible and be a short distance from the users. The bins are to be placed in an area where they can be easily serviced.

2.11.3 Dustbins at the site are to be "baboon-proofed".

2.11.4 Refuelling supplies held at the launch sites will be in sealed containers, which are only to be opened once in place within the boat. During organised competitions a fuelling tanker and/or bowser may be used with the relevant approvals from the local authority (e.g. Fire Chief).

2.11.5 Spillages of fuel or oil at the launch site are to be avoided. The licensed operator must keep Spill Sorb (or similar product) on site. Should a fuel or oil spill take place, the material containing the spill shall be properly disposed of at an approved facility.

2.11.6 No scaling, cleaning of fish or disposal of bait may take place on the site.

2.11.7 No cleaning of boats bodywork is permitted.

2.12 Noise mitigation

2.12.1 The licensed operator is to ensure that the premises is operated in accordance with the requirements of the Noise Control Regulations PN 627/1998.

2.12.2 Where the licensed operator cannot control rowdy and noisy activity, they are to contact municipal law enforcement officials or the SAPS for assistance.

2.12.3 Motors are to be started and warmed up in such a way as not to cause undue nuisance to other beach users, visitors and residents. The licensed operator is responsible for ensuring that management measures are put in place to address reasonable complaints from users, visitors and residents.

2.13 New developments

2.13.1 No listed (in terms of Schedule 1 1(e) of the Regulations under section 21 of the Environmental Conservation Act 73 of 1989) activity may take place within the site, unless approved by the responsible authority after an Environmental Impact Assessment (EIA) has been undertaken. This assessment must meet the requirements of the provincial planning and environmental authorities and may only take place with permission of the landowner.

2.14 Helicopters

2.14.1 There is one demarcated helicopter-landing site that is only available for emergency rescue and evacuation operations. Helicopter landing will only be permitted at the specified landing zone (see Map 1). As this is the only landing zone at the Millers Point Area currently under the supervision of the CBSC, other users must obtain permission first, except in rescue operations.

2.15 Archaeological sites

2.15.1 Any area of archaeological significance found on the site is to be reported immediately by the licensed operator of the launch site to the South African Heritage Resource Agency (SAHRA) (or its nominated representative) and access to the archaeological site should be prevented, pending appropriate investigation and decision.

2.16 Consumptive use of marine resources

2.16.1 All consumptive use of marine resources on the site will be subject to the national regulations (bag limits, closed seasons etc). The licensed operator will inform MCM and SANParks officials of any illegal marine resource use activities occurring on the site.

MCM, Municipal Police and SANParks are to be notified of special events and snoek runs to ensure that enforcement staff are available to monitor the consumptive use of marine resources.

2.16.2 Fish (or any other marine resources) may not be sold/bartered on the site.

2.17 Communication and compliance

2.17.1 The licensed operator shall draw the attention of all users of the site to the key provisions of this OMP by providing an information board at each slipway.

2.17.2 Adequate complementary signage must be provided to inform all users and visitors to the site with regards to the conditions of the OMP. Map 3 shows the minimum signage requirements.

2.17.3 The licensed operator shall be responsible for monitoring compliance with this OMP.

2.17.4 Appropriate records of compliance monitoring and any audit will be maintained and may be used in support of subsequent applications for re-licensing of the site.

2.17.5 Any user of the site who disregards the provisions of this OMP shall be reported, by the licensed operator, to the relevant authority that has the legal jurisdiction to impose penalties. MCM and SANParks officials will be contacted to monitor and enforce all marine resource use activities. All social and traffic related activities will be enforced by the City Police, Traffic Officials and/or SAPS. The licensed operator will contract a security service to provide 24-hour site surveillance where required.

2.17.6 Disregard for the provisions of this OMP, may result in the relevant authority's withdrawal of the licence.

2.18 Safety, emergency preparedness and responses

2.18.1 The site shall form part of, and conform to, local and regional emergency response plans and procedures (e.g. fire, oil spills).

2.18.2 Emergency procedures will take precedence over all activities at the launch site.

2.19 Records

2.19.1 Adequate launch records, in the prescribed format, will be maintained by the licensed operator. The minimum information for the boat launch record is to include boat registration, boat name, time of launch, time of landing, number of crew and purpose of trip.

2.19.2 The licensed operator shall keep a detailed register of all accidents and casualties involving boats, craft and/or crew (using the prescribed SAMSA form as required by section 259 of the Merchant Shipping Act No 57 of 1951). This register should then be forwarded to the nearest SAMSA office at the end of each month.

2.20 Operators other than the licensed operator

2.20.1 The licensed operator may delegate the authority for the management of the boat launch site to any competent club or organisation. The licensed operator shall ensure that any club or institution to which operation of the site may be delegated is properly constituted, has the capacity to observe the conditions of this OMP and re-invests income generated from the site to the effective management of that site.

2.20.2 The prescriptions in this OMP shall be incorporated into any lease agreement entered into between the licensed operator and a club or institution to which the management authority is delegated.

2.20.3 The club or organisation will ensure that a suitable Code of Conduct is in place, and that its members comply with the conditions of the Code.

2.20.4 This club or organisation shall ensure that the site is open to all users, on condition that they comply with the legal requirements of the site. The Club or organisation shall ensure that a transparent, equitable and fair process is followed in determining its membership.

3. ACRONYMS USED IN THIS DOCUMENT

CBSC	Cape Boat & Ski-Boat Club
CoCT	City of Cape Town
DEA&DP	Department of Environmental Affairs and Development Planning
ECA	Environmental Conservation Act
EIA	Environmental Impact Assessment
OMP	Operational Management Plan
MCM	Marine and Coastal Management
MLRA	Marine Living Resources Act, Act No. 18 of 1998
MPRA	Miller's Point Recreation Area
NEMA	National Environmental Management Act, Act No. 107 of 1998
PWC	Personal Watercraft
SAHRA	South African Heritage Resources Agency
SADSAA	South African Deep Sea Angling Association
SAMSA	South African Maritime Safety Authority
SANParks	South African National Parks
SAPS	South African Police Services
TMNP	Table Mountain National Park

4. OVERVIEW OF LEGISLATION REFERRED TO IN THIS DOCUMENT

Environment Conservation Act (73 of 1989)

The primary objective of the ECA is to provide for the effective protection and controlled utilisation of the environment (Henderson, 1996). The Act makes provision for the declaration of protected natural environments and for the identification of activities that may have a detrimental effect on the environment.

Regulations to control potentially harmful activities on a permit system within demarcated sensitive coastal areas were promulgated in terms of the ECA. The prohibited activities are the disturbance of vegetation, earthworks, dredging and dune stabilisation.

Subsequent to the promulgation of the Act in 1989, a number of key regulations governing EIAs and identified activities that may be detrimental to the environment have also been promulgated. Of importance to proposed developments in the coastal zone are Government Notices R1182, R1183, R1184 and R448 and amendments of May 2002. While beach driving and boat launching are not listed activities in terms of these regulations, proposed developments, such as structures below the high water mark of the sea and certain access infrastructure which may provide for such activities, must undergo environmental impact assessments before environmental authorisation can be granted by DEAT.

The Act was originally passed to provide a basis for environmental conservation in South Africa. Many of its provisions have since been repealed by NEMA. Provision is also made in NEMA for the repeal of sections of Part V and Part VI of the Environmental Conservation Act, which provide for the "Control of Activities which may have a Detrimental Effect on the Environment" and associated EIA regulations. However, these remain in force until they are replaced with new regulations promulgated under NEMA.

National Environmental Management Act (107 of 1998)

NEMA is South Africa's overarching environmental legislation and has, as its primary objective, to provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state and to provide for matters connected therewith (Government Gazette, 1998).

The Act provides for the right to an environment that is not harmful to the health and well-being of South African citizens; the equitable distribution of natural resources; sustainable development; environmental protection and the formulation of environmental management frameworks (Government Gazette, 1998). These principles and provisions in Chapter 5 (Integrated Environmental Management) govern the way in which environmental management should be practiced. Provision is also made for the issuing of various Regulations in order to carry out the purposes and the provisions of NEMA.

Marine Living Resources Act (18 of 1998)

This MLRA repeals most of the Sea Fishery Act (12 of 1988). Its preamble reads as follows:

"To provide for the conservation of the marine ecosystem, the long-term sustainable utilisation of marine living resources and the orderly access to exploitation, utilisation and protection of certain marine living resources; and for these purposes to provide for the exercise of control over marine living resources in a fair and equitable manner to the benefit of all the citizens of South Africa; and to provide for matters connected therewith."

The Act and Regulations published thereunder provide for the conservation of South Africa's marine ecosystems and the sustainable utilisation of marine living resources. This includes the protection of every species of sea animal, whether vertebrate or invertebrate, including the spawn or larvae of such sea animal, but excluding any seal or sea bird. Fish and marine organisms were protected by means of prohibitions against their catching, disturbance or possession. There is an OMPhasis on the broadening of fair and equitable access to resources, the gradual transformation of fishing methods, the development of fees for utilisation and a favourable business environment in fisheries. The Act provides for a principle of national control and co-ordination and places responsibility for resource-allocation decisions with the Minister: Environmental Affairs and Tourism. The Act makes provision for the granting of commercial, recreational and subsistence fishing rights.

The Minister may establish areas or zones where subsistence fishers may fish and, after consultation, may declare a specified community to be a fishing community, any person to be a subsistence fisher or any fishing or related activity or the exercise of any other right in that area or zone to be prohibited. No subsistence-fishing permits shall be transferable except with the approval of and subject to the conditions determined by the Minister.

Merchant Shipping Act (57 of 1951)

All vessels, of whatever size, that proceed to sea from anywhere in South Africa fall under the Merchant Shipping Act. Small vessels (3 m to < 25 tonnes) are divided into two classes, viz. small vessels used solely for sport and recreation, and all other small vessels, e.g. fishing boats, diving boats and sailing training yachts (i.e. commercial boats).

The Merchant Shipping Act:

- Sets out various categories of vessel, applicable to each class, and their operational limits.
- Makes provision for the inspection of seaworthiness and the competency of skippers.
- Sets out the various safety measures.
- Requires that skippers submit voyage details.

- Makes provision for authorised agencies to exercise or perform powers or duties as required by the Act.

Has certain Regulations namely:

- Government Notice R2799 that applies to ships or small vessels used for sport or recreation.

- Government Notice R1044 that makes provision for vessels of less than 3 m in length. Vessels falling into this category may not proceed to sea further than 500 m from the low water mark. 7

The Act also has relevance with respect to control of marine pollution and to that extent applies to all ships in South African waters.

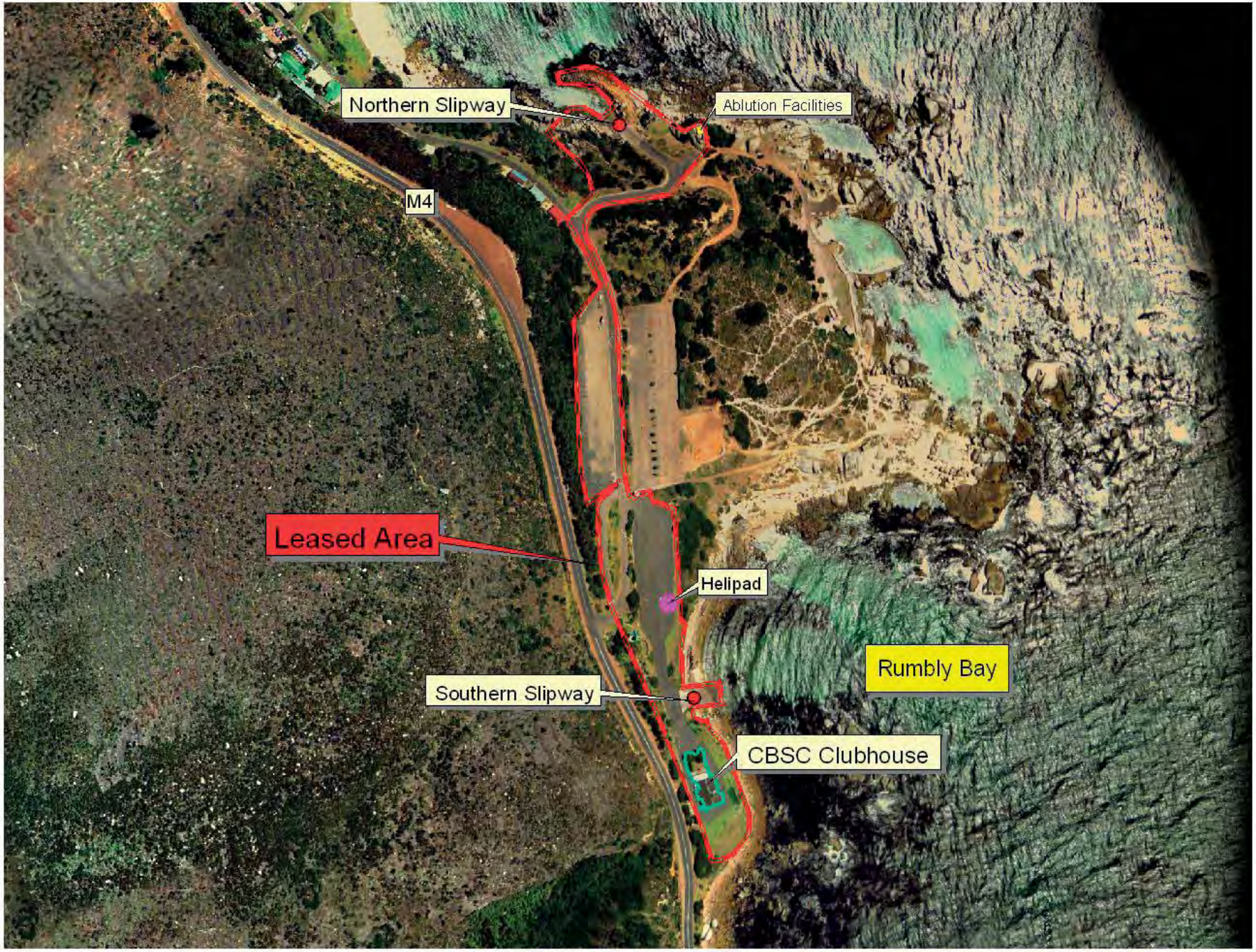
Road Traffic Act (29 of 1989)

This Act outlines the various requirements and Regulations for vehicles and drivers. In terms of the Act, if a vehicle is able to gain access to, and be driven on, the seashore, this Act and its Regulations are deemed to apply.

There are a number of High Court cases which have established the breadth of application of the definition of a road and, although no cases involving the Admiralty Reserve or that part of the beach between the high and low water marks are known of, the Provincial Road Traffic Inspectorate is certain that the Act applies.

In this, it is important to note that a person does not have to have a right of vehicular access to the beach: right of access by the person is sufficient. The responsible erection of booms, etc., in providing and simultaneously limiting vehicular access to the beach, will thus not affect the applicability of this legislation to what can generally be described as "the beach".

All vehicles (powered vehicles and trailers) using the beach must be roadworthy and licensed, and be driven by persons who themselves are licensed drivers of that category of vehicle. The body that controls vehicular access to the beach must know that the provisions of this Act apply. This Act has been replaced by the new National Road Traffic Act (93 of 1996). However, the 1996 Act provides that any relevant provision of the 1989 Act will remain in force until such time as the corresponding provision of the 1996 Act has been put into operation.



CBSC Clubhouse
Ablution Facilities
Leased Area
Helipad

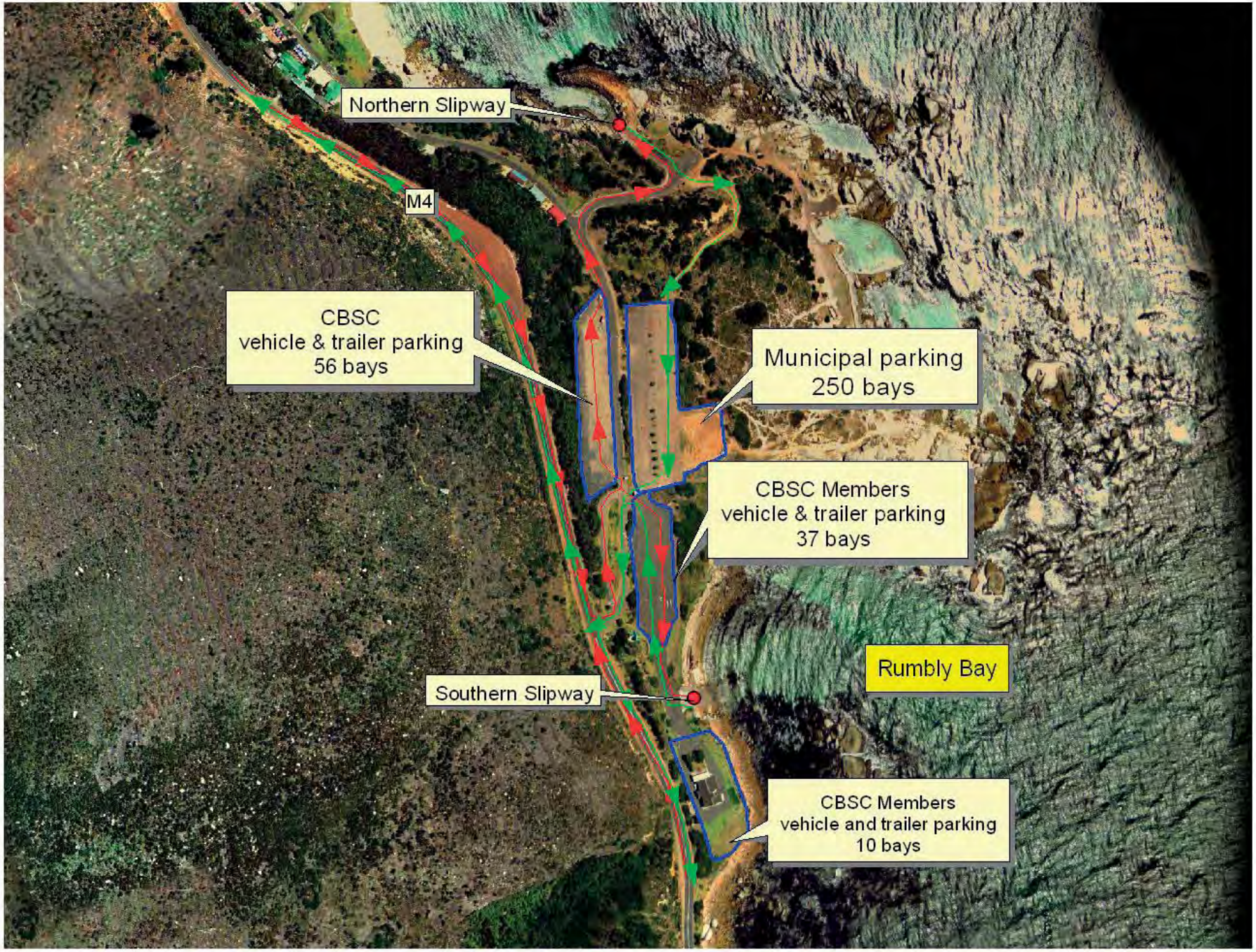
Map 1 - Launching facilities

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Exit Routes

Entry Routes

Parking Facilities

Map 2 - Entry/Exit Routes & Parking Areas

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Information Boards

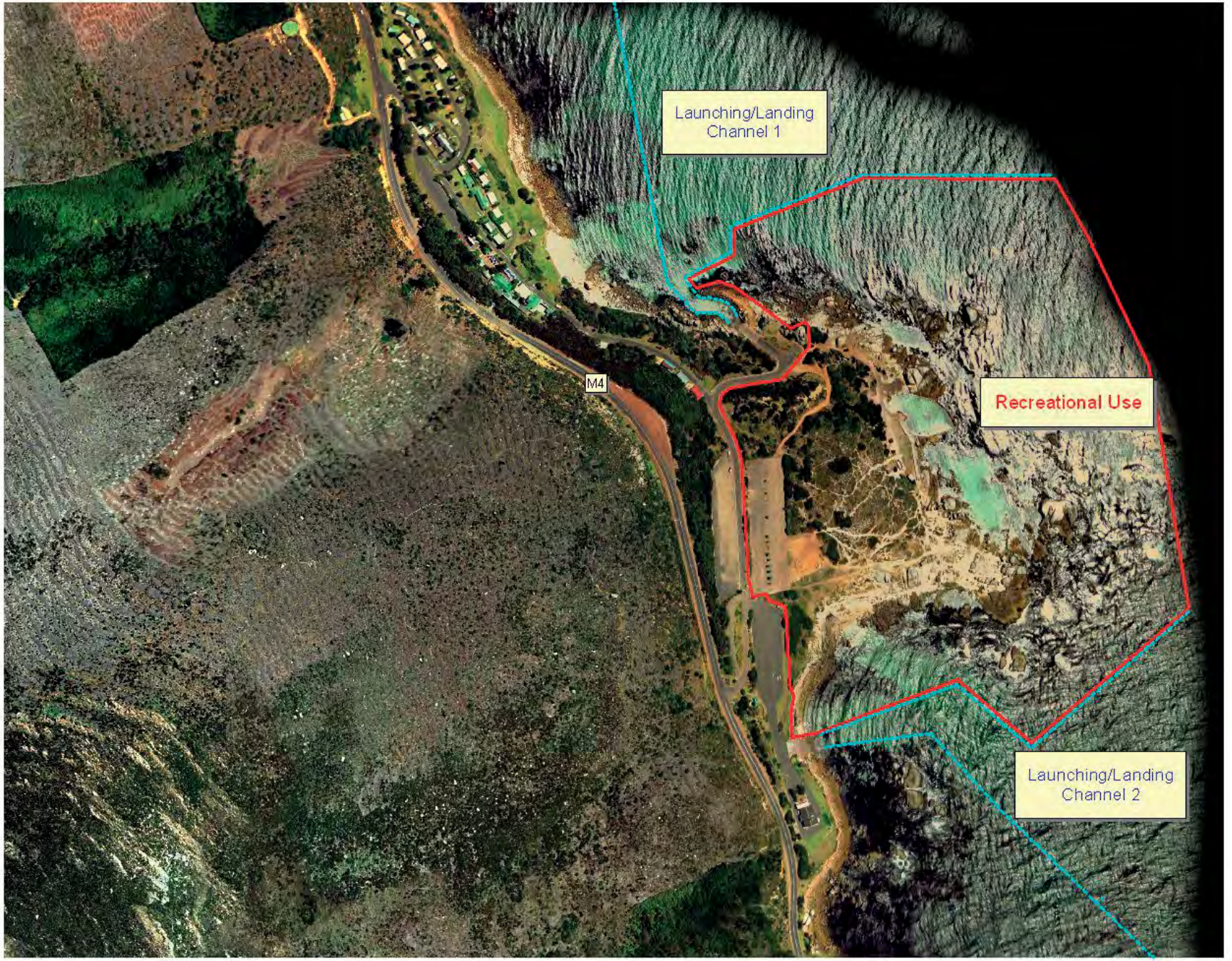
Map 3 - Positioning of Information Boards

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Launching/Landing Channels

Recreational Area

Map 4 - Designated Launching/Landing and Recreational Use Areas

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for the City of Cape Town

Annexure G

OPERATIONAL MANAGEMENT PLAN FOR THE STRAND SLIPWAY

PREPARED BY:
Peninsula Permits cc.
Envirocentric

FOR:
The City of Cape Town

May 2004

Envirocentric

PENINSULA PERMITS

1. BACKGROUND

1.1 Legal Context

This General Policy for off-road vehicles in the coastal zone was published in Government Notice 858, in Government Gazette No.15655, dated 29 April 1994 and introduced general control measures, on a national basis, to protect the coastal environment from damage caused by the use of vehicles in the coastal zone and to ensure the safety of other beach users. The policy makes provision for zoning the coastal zone, for the protection of ecologically sensitive areas, and for various recreational activities, and also allows for a permit system to facilitate the control of vehicles in specifically demarcated areas. According to the General Policy, the use of vehicles in any beach area may be reserved for specific purposes, such as angling or boat launching.

The Control of Vehicles in the Coastal Zone Regulations ("Beach Regulations") published under NEMA (Government Notice No. 1399 of 21 December 2001) provide for a general prohibition on the recreational use of vehicles in the coastal zone and procedures for approving the use of vehicles in the coastal zone under specific circumstances. They also provide measures for the enforcement of these regulations and prescribe penalties in respect of contraventions.

The Beach Regulations (Regulation 7) require operators of boat launching sites to apply to the relevant authority to grant a license to use vehicles, or allow their use by third parties, to facilitate boat launching.
An application for a licence must:

- Be made in the format stipulated by the relevant authority.
- Be accompanied by payment or proof of payment of the application fee stipulated by the relevant authority.
- Clearly indicate:
  - The boundaries of the proposed boat-launching site and all access roads.
  - The types of vehicles that will be used at the site.
  - Set out fully the reasons why the boat-launching site is required.
  - Include a plan for managing activities at the site in a manner that avoids or minimises damage to the environment.
  - Subject to Regulation 22, be accompanied by evidence that the requirements of Section 24(7) of the Act relating to the investigation, assessment and communication of the potential impact of the activities associated with boat-launching at the site have been complied with.

To comply with these regulations, the City of Cape Town (CoCT) has completed the required application form for the licensing of the Strand boat launch site. Below please find the proposed Operational Management Plan for the Strand boat launch site.

Based on this generic OMP, the OMP for the Strand boat launch site includes a general description of the boat launch site (including slipways, parking, roads, and other service facilities), a general description of the types of uses of the boat launch site and a detailed description of the activities required to minimise and mitigate the environmental impacts of the use of the boat launch site.

The OMP will however only describe the minimum operational management requirements for each site and it is anticipated that each site will, over time, exceed these minimum requirements.

1.2 Environmental Management in the City of Cape Town

The City of Cape Town's Integrated Metropolitan Environmental Policy (IMEP) was formally adopted in October 2001. IMEP sets the broad framework and a number of core principles for guiding the City towards a sustainable future. IMEP recognises the economic, social and environmental value of the City's coastal asset, and as such identified the Coast as a priority theme for the development of a detailed implementation strategy. In October 2003, the City formally adopted the Coastal Zone Management Strategy giving effect to the principles of IMEP and setting coastal management practise and standards in place.

1.3 Responsible Authority

All reference to the **licensed operator** within this OMP refers to the City of Cape Town. The City, through a lease agreement, may delegate the authority and responsibility for the management of the boat launch site to any competent club or organisation (see 2.20).

1.4 Function of the OMP

The OMP has been drafted to ensure compliance with the regulations in terms of the national environmental management act, 1998: control of vehicles in the coastal zone, specifically "*7(4)(f) subject to regulation 22, be accompanied by evidence that the requirements of section 24(7) of the act relating to the investigation, assessment and communication of the potential impact of the activities associated with boat-launching at the site have been complied with*". The function of the OMP is thus to ensure that the licensed operator utilises the boat launching site in an environmentally sensitive manner. The OMP explicitly identifies the mitigating actions required to control the impacts of the boat launch site and associated activities on the bio-physical attributes of the site, the surrounding residents and the safety of the users of the site. The OMP further provides a framework to ensure that all activities occurring within the boat launch site comply with the relevant enabling legislation.

1.5 Site description

The Strand boat launching site (above the high water mark) is owned by the City of Cape Town, and is situated off Beach Road in Strand.

The boat launching facilities at Strand include the following:

- A 244-bay public vehicle area.
- A 10-bay vehicle-and-trailer parking area.
- A concrete slipway leading into the water.
- Toilet block for recreational users.
- A designated and constructed fish cleaning facility.

The Strand boat launch site is owned and managed by the CoCT. Currently no lease agreement exists for this site. Future reference in this OMP to the Strand boat launch site refers to the all the associated facilities required for boat launching. Map 1 shows the location of the boat launching facilities at the Strand boat launch site.

1.6 Site usage

The site is highly utilised, especially over the holiday season and weekends in the summer months. The usage often exceeds the “carrying capacity” for the parking area, especially during organised events and fish runs.

The following uses have been recorded at the boat launch site:

- Currently the majority of users at the site are recreational and commercial fisherman.
- Rescue, research and other official users intermittently use the site (NSRI, Metro Rescue etc).

An annual permit obtained from the municipality allows permit holders free access to most of the launch sites in the Strand area. No accurate user counts exist for the site. The users and associated levels of usage are seasonal and weather dependent. It is estimated that up to 3650 boats may launch from this site per annum, with an average of 20 boats being launched per day.

2. OPERATIONAL MANAGEMENT REQUIREMENTS OF BOAT LAUNCH SITES

2.1 Access management

2.1.1 The site is accessed off Beach Road, Strand. The internal layout of the access to, and traffic flows through, the parking areas and slipways at the site is shown in Map 1. The roads and parking areas must be tarred, adequately marked to meet municipal and provincial road standards and free of potholes.

2.1.2 All access roads, parking areas and slipways are to be properly bollarded or fenced to ensure that all vehicles remain on the hardened road surface, and only park in designated parking areas. All areas outside the hardened road surfaces are designated no-go areas (see Map 1 for the extent of the hardened road surfaces). No vehicle is permitted in any sensitive areas (e.g. dune areas) on, or abutting, the site. The shortest route to the water will be used. Vehicles will offload/load and return to the parking area immediately.

2.1.3 Vehicles, their trailers and the drivers or boat launch operators using the boat launch site shall comply with the requirements of the Road Traffic Act and the General Policy on Control of Vehicles in the Coastal Zone (Government Gazette, Notice 858 of 29 April 1994).

2.1.4 Trailers may be brought onto the seashore by a motor vehicle only for the purposes of launching or retrieving a vessel. Upon launching (or retrieving if appropriate) a vessel, these trailers and vehicles are to be parked in a clearly demarcated parking area, off the beach (shown in Map 1).

2.1.5 Only the designated boat launch ramp may be used to launch vessels. Erosion and undercutting of this slipway must be monitored and remedial/rehabilitation action instituted if necessary. Where the remedial/rehabilitation measure constitutes a listed activity in terms of the Environmental Conservation Act, and as directed by the relevant authorities, an Environmental Impact Assessment (EIA) will be implemented for the remedial/rehabilitation action.

2.1.6 The minimum signage requirements to facilitate vehicular and pedestrian flows, and for demarcating parking areas, are shown in Map 1. Map 2 further indicates the location for the posting of the safety requirements for the site.

2.1.7 A fee is to be charged and a ticket issued to all persons launching from the site. Key provisions of this OMP and code of conduct are to be described on the ticket (or an attached brochure). A chain/boom is to be placed across the access route of the slipway enabling the licensed operator to control access. Users can pay an annual instalment, entitling them to free access to the launch site for a year. On payment of the instalment, the user must be made aware of the conditions of the OMP and issued with a key to the chain/boom at the entrance to enable them to access the launching site.

The launching site is kept locked when no boats are at sea to avoid unauthorized entry onto the beach by vehicles. Only persons who are in possession of a valid permit (and key) may access this slipway. The boom is to be closed between sunset and sunrise, unless by special arrangement for night launches.

2.1.8 The limits on the numbers of boats that may launch from each site will be linked to the availability of parking and other service facilities. A strict limit of 244 vehicles and 20 vehicle-and-trailers may use the site at any one time. This limit includes boats in the process of being launched or retrieved (see Map 1).

2.1.9 Due to the nature of the boat launch site (facilities, services, parking, access, bio-physical characteristics), vehicles under 1600cc engine capacity shall not be permitted to launch a boat at the site.

2.1.10 Due to the nature of the boat launch site (facilities, services, parking, access, bio-physical characteristics) boats longer than 5.5 meters and boat engines with greater that 200 HP engine capacity shall not be permitted to launch from the site.

2.2 Parking management

2.2.1 A limit of 244 vehicles and 20 vehicle-and-trailers will be allowed in the designated parking area.

2.2.2 All the parking areas/bays for vehicle-and-trailers will be properly demarcated and vehicle flows clearly indicated.

2.2.3 Launching and parking areas must be separated. Parked vehicles should not obstruct access to the boat launch site by any user, visitor or resident, nor interfere with reasonable use of that beach by any user, visitor or resident. Map 1 shows vehicular access routes, boat launch site and associated parking.

2.3 Boat Launch area

2.3.1 The launch area shall not be used as an access to other parts of the beach with a vehicle.

2.3.2 Kelp washed up onto the launch site may not be completely removed from the area. If kelp builds up directly on the launch site kelp may be spread out manually, along another adjacent section of the coastline that will not impact on other users.

2.3.3 Where required, the methods for cleaning slipways are restricted to:
- Manual brushing of the surface
- Mechanical brushing of the surface

2.4 Launching and beaching control and safety

2.4.1 The licensed operator must be in control of all launches and boat retrievals at all times. During busy periods, the operator must ensure that a dedicated staff member is provided to direct the launches and retrievals.

2.4.2 No alcohol or any other intoxicating substance shall be allowed on the CoCT premises. Any person suspected of being under the influence of alcohol or any other intoxicating substance shall not be permitted access to, or allowed to remain on, the premises.

2.4.3 All SADSA, SAMSA and CoCT safety regulations shall be adhered to at all times. A comprehensive first-aid box capable of handling normal domestic emergencies shall be maintained on site. Weatherproof lists of relevant emergency contact numbers shall be displayed near the launch site.

2.4.4 The area demarcated for boat launching will be demarcated by adequate signage and positioned as indicated on Map 2.

2.4.5 Boats and vehicles may not be left unattended on the slipways and boats shall be retrieved from the launch site area within 10 minutes of arrival at the slipway. No parking on the slipway or access roads to the slipway is allowed.

2.4.6 Boats in the process of landing or being retrieved shall have priority over boats wishing to launch.

2.4.7 A boom or chain gate will to be constructed in front of the slipway, to enable the licensed operator to control access. The licensed operator shall temporarily close the launch site under exceptional circumstances such as extremely inclement weather conditions, damage to the slipway, or any other emergency that will prevent the safe launching or retrieval of boats. If the launch site is to be closed to users, the boom will locked by the operator and a notice posted to notify users of the reason for closure and anticipated time of re-opening.

2.4.8 The launch area will be kept clear of all other users when in use. Buoys will be provided to demarcate the launching and landing areas. Signage will be posted, at the slipways informing other users (e.g. swimmers, kayaks) to remain outside of the demarcated launching/ landing areas.

2.4.9 The provisions of section 68 of the Merchant Shipping Act No 57 of 1951 and all applicable regulations made under Section 356 of the same act shall be strictly adhered to. No boat will be able to launch from the site unless it is properly marked and registered (or licensed as the case may be) according to the Merchant Shipping Act No 57 of 1951 and it’s associated regulations.

2.5 Vessel safety

2.5.1 No boat will be able to launch unless the skipper is in possession of a valid Certificate of Competency issued by the South African Maritime Safety Authority (SAMSA), an Agency recognised by it or a IRB (Inflatable Rubber Duck) skippers Certificate issued by Lifesaving South Africa.

2.5.2 All boats launching from the site are to carry a functional form of communication. (i.e. in the case of an emergency the boat can make contact with emergency services and can be contacted by emergency services).

2.6 Jet skis/Personal watercraft (PWC)

2.6.1 No launching of Jet skis may take place from this site.

2.7 Night launching and beaching

2.9.1 Use of the launch site for night operations is to be strictly controlled by the licensed operator. Relevant safety and statutory requirements as stipulated by SADSA and SAMSA, must be met and enforced by the licensed operator. The licensed operator is to provide controlled access for night boat launches and landings.

2.8 Managing conflict between different user groups

2.8.1 No other users may use the designated launch areas. Map 2 indicates the extent of the launch area and the other adjacent areas designated for recreational use.

2.8.2 Except during launching and landing, boats and jet skis under power in the in-shore area are not to approach within 200m of other users (anglers, divers, swimmers, surfers, body-boarders, or any other non-powered craft). Provided that the skipper is qualified in surf rescue operations (e.g. rescue operations or patrols) this 200m distance is not compulsory. Rescue rubber ducks that are used within 200m of other users must have a propeller guard fitted.

2.8.3 Boats may not enter an area set aside specifically for bathers or other water sports and vice versa. It is the skipper's responsibility to keep a proper lookout for bathers and divers. Other users are to stay clear of the launch and landing channel (see Map 2). Adequate signage is to be posted, informing other users (e.g. swimmers, kayaks) to remain outside of these demarcated launching/ landing areas (see Map 2).

2.9 Special events, functions and "fish runs"

2.9.1 A range of competitive events are held at the boat launch site. These include Rubber duck/semi-rigid, sailing and jet ski competitions. In terms of the Merchant Shipping Act, the relevant authority may grant permission for the total number of allowable launches to be increased during these events.

2.9.2 In order to cater for special events and functions, the licensed operator is to ensure that sufficient staff is available to cater for, and mitigate, the impacts resulting from an increase in users. During such events the licensed operator is to aggressively manage and enforce the conditions of the OMP.

The following areas will require intensive management during periods of high usage:

- Control and management of vehicle flows and parking
- Control of alcohol consumption, anti-social activities, littering and vandalism
- Prevention of fish hawking on site
- Ensuring control over the cleaning of boats
- Ensuring control over the disposal of offal
- Monitoring of, and compliance with, the Marine Living Resources Act
- Prevention of conflicts between different user groups
- Ensuring compliance with minimum safety standards
- Provision of temporary toilets

2.10 Toilet facilities and waste water treatment

2.10.1 The existing toilet and ablution facilities associated with the boat launch site are indicated in Map 1. The Licensed operator shall ensure that all toilet facilities used by boat launch site users are properly maintained and in a clean and hygienic condition at all times. During busy periods toilets shall be cleaned and serviced at least twice daily, while during quiet periods toilets shall be cleaned and serviced at least every second day.

2.10.2 No washing of boats will be permitted on the slipways.

2.11 Pollution and litter management

2.11.1 All litter and refuse is to be cleaned from the site by the licensed operator at least twice a week. In peak season, and during special events, the cleaning schedule is to take place at least once a day.

2.11.2 Plastic (or any other non-corroding material) refuse bins are to be provided at the site. In peak season, and during special events, the bins are to be emptied daily.

Outside peak season, bins are to be cleaned at least twice a week. Refuse bins are to be discreetly placed in areas of high usage (e.g. at the parking areas). The bins will be clearly visible and be a short distance from the users. The bins are to be placed in an area where they can be easily serviced.

2.11.3 Refuelling supplies will be in sealed containers, which are only opened once in place within the boat.

2.11.4 Spillages of fuel or oil at the launch site are to be avoided. The licensed operator must keep Spill Sorb (or similar product) on site. Should a fuel or oil spill take place, the material containing the spill shall be properly disposed of at an approved facility.

2.11.5 Scaling, cleaning of fish or disposal of bait may only take place at the designated fish cleaning area.

2.11.6 No cleaning of boats bodywork is permitted.

2.12 Noise mitigation

2.12.1 The licensed operator is to ensure that the premises is operated in accordance with the requirements of the Noise Control Regulations PN 627/1998.

2.12.2 Where the licensed operator cannot control rowdy and noisy activity, they are to contact municipal law enforcement officials or the SAPS for assistance.

2.12.3 Motors are to be started and warmed up in such a way as not to cause undue nuisance to other beach users, visitors and residents. The licensed operator is responsible for ensuring that management measures are put in place to address reasonable complaints from users, visitors and residents.

2.13 New developments

2.13.1 No listed (in terms of Schedule 1 1(e) of the Regulations under section 21 of the Environmental Conservation Act 73 of 1989) activity may take place within the site, unless approved by the responsible authority after an Environmental Impact Assessment (EIA) has been undertaken. This assessment must meet the requirements of the provincial planning and environmental authorities.

2.14 Helicopters

2.14.1 There are no demarcated helicopter-landing sites.

2.15 Archaeological sites

2.15.1 Any area of archaeological significance found on the site is to be reported immediately by the licensed operator of the launch site to the South African Heritage Resource Agency (SAHRA) (or its nominated representative) and access to the archaeological site should be prevented, pending appropriate investigation and decision.

2.16 Consumptive use of marine resources

2.16.1 All consumptive use of marine resources on the site will be subject to the national regulations (bag limits, closed seasons etc). The licensed operator will inform MCM and City officials of any illegal marine resource use activities occurring on the site. MCM and Municipal Police are to be notified of special events to ensure that enforcement staff are available to monitor the consumptive use of marine resources.

2.17 Communication and compliance

2.17.1 The licensed operator shall draw the attention of all users of the site to the key provisions of this OMP by providing an information board the slipway.

2.17.2 Adequate complementary signage must be provided to inform all users and visitors to the site with regards to the conditions of the OMP.

2.17.3 The licensed operator shall be responsible for monitoring compliance with this OMP.

2.17.4 Appropriate records of compliance monitoring and any audit will be maintained and may be used in support of subsequent applications for re-licensing of the site.

2.17.5 Any user of the site who disregards the provisions of this OMP shall be reported, by the licensed operator, to the relevant authority that has the legal jurisdiction to impose penalties. MCM and City Law Enforcement Officers will be contacted to monitor and enforce all marine resource use activities. All social and traffic related activities will be enforced by the City Police, Traffic Officials and/or SAPS.

2.17.6 Disregard for the provisions of this OMP, may result in the relevant authority's withdrawal of the licence.

2.18 Safety, emergency preparedness and responses

2.18.1 The site shall form part of, and conform to, local and regional emergency response plans and procedures (e.g. fire, oil spills).

2.18.2 Emergency procedures will take precedence over all activities at the launch site.

2.19 Records

2.19.1 Adequate launch records, in the prescribed format, will be maintained by the licensed operator. The minimum information for the boat launch record is to include boat registration, boat name, time of launch, time of landing, number of crew and purpose of trip.

2.19.2 The licensed operator shall keep a detailed register of all accidents and casualties involving boats, craft and/or crew (using the prescribed SAMSA form as required by section 259 of the Merchant Shipping Act No 57 of 1951). This register should then be forwarded to the nearest SAMSA office at the end of each month.

2.20 Operators other than the licensed operator

2.20.1 The licensed operator may delegate the authority for the management of the boat launch site to any competent club or organisation. The licensed operator shall ensure that any club or institution to which operation of the site may be delegated is properly constituted, has the capacity to observe the conditions of this OMP and re-invests income generated from the site to the effective management of that site.

2.20.2 The prescriptions in this OMP shall be incorporated into any lease agreement entered into between the licensed operator and a club or institution to which the management authority is delegated.

2.20.3 The club or organisation will ensure that a suitable Code of Conduct is in place, and that its members comply with the conditions of the Code.

2.20.4 This club or organisation shall ensure that the site is open to all users, on condition that they comply with the legal requirements of the site. The Club or organisation shall ensure that a transparent, equitable and fair process is followed in determining its membership.

3. ACRONYMS USED IN THIS DOCUMENT

CoCT	City of Cape Town
DEA&DP	Department of Environmental Affairs and Development Planning
ECA	Environmental Conservation Act
EIA	Environmental Impact Assessment
OMP	Operational Management Plan
MCM	Marine and Coastal Management
MLRA	Marine Living Resources Act, Act No. 18 of 1998
NEMA	National Environmental Management Act, Act No. 107 of 1998
PWC	Personal Watercraft
SAHRA	South African Heritage Resources Agency
SAMSA	South African Maritime Safety Authority
SAPS	South African Police Services

4. OVERVIEW OF OTHER LEGISLATION REFERRED TO IN THIS DOCUMENT

Environment Conservation Act (73 of 1989)

The primary objective of the ECA is to provide for the effective protection and controlled utilisation of the environment (Henderson, 1996). The Act makes provision for the declaration of protected natural environments and for the identification of activities that may have a detrimental effect on the environment.

Regulations to control potentially harmful activities on a permit system within demarcated sensitive coastal areas were promulgated in terms of the ECA. The prohibited activities are the disturbance of vegetation, earthworks, dredging and dune stabilisation.

Subsequent to the promulgation of the Act in 1989, a number of key regulations governing EIAs and identified activities that may be detrimental to the environment have also been promulgated. Of importance to proposed developments in the coastal zone are Government Notices R1182, R1183, R1184 and R448 and amendments of May 2002. While beach driving and boat launching are not listed activities in terms of these regulations, proposed developments, such as structures below the high water mark of the sea and certain access infrastructure which may provide for such activities, must undergo environmental impact assessments before environmental authorisation can be granted by DEAT.

The Act was originally passed to provide a basis for environmental conservation in South Africa. Many of its provisions have since been repealed by NEMA. Provision is also made in NEMA for the repeal of sections of Part V and Part VI of the Environmental Conservation Act, which provide for the “Control of Activities which may have a Detrimental Effect on the Environment" and associated EIA regulations. However, these remain in force until they are replaced with new regulations promulgated under NEMA.

National Environmental Management Act (107 of 1998)

NEMA is South Africa’s overarching environmental legislation and has, as its primary objective, to provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state and to provide for matters connected therewith (Government Gazette, 1998).

The Act provides for the right to an environment that is not harmful to the health and well-being of South African citizens; the equitable distribution of natural resources; sustainable development; environmental protection and the formulation of environmental management frameworks (Government Gazette, 1998). These principles and provisions in Chapter 5 (Integrated Environmental Management) govern the way in which environmental management should be practiced. Provision is also made for the issuing of various Regulations in order to carry out the purposes and the provisions of NEMA.

Marine Living Resources Act (18 of 1998)

This MLRA repeals most of the Sea Fishery Act (12 of 1988). Its preamble reads as follows:

"To provide for the conservation of the marine ecosystem, the long-term sustainable utilisation of marine living resources and the orderly access to exploitation, utilisation and protection of certain marine living resources; and for these purposes to provide for the exercise of control over marine living resources in a fair and equitable manner to the benefit of all the citizens of South Africa; and to provide for matters connected therewith."

The Act and Regulations published thereunder provide for the conservation of South Africa's marine ecosystems and the sustainable utilisation of marine living resources. This includes the protection of every species of sea animal, whether vertebrate or invertebrate, including the spawn or larvae of such sea animal, but excluding any seal or sea bird. Fish and marine organisms were protected by means of prohibitions against their catching, disturbance or possession. There is an OMPhasis on the broadening of fair and equitable access to resources, the gradual transformation of fishing methods, the development of fees for utilisation and a favourable business environment in fisheries. The Act provides for a principle of national control and co-ordination and places responsibility for resource-allocation decisions with the Minister: Environmental Affairs and Tourism. The Act makes provision for the granting of commercial, recreational and subsistence fishing rights.

The Minister may establish areas or zones where subsistence fishers may fish and, after consultation, may declare a specified community to be a fishing community, any person to be a subsistence fisher or any fishing or related activity or the exercise of any other right in that area or zone to be prohibited. No subsistence-fishing permit shall be transferable except with the approval of and subject to the conditions determined by the Minister.

Merchant Shipping Act (57 of 1951)

All vessels, of whatever size, that proceed to sea from anywhere in South Africa fall under the Merchant Shipping Act. Small vessels (3 m to < 25 tonnes) are divided into two classes, viz. small vessels used solely for sport and recreation, and all other small vessels, e.g. fishing boats, diving boats and sailing training yachts (i.e. commercial boats).

The Merchant Shipping Act:

- Sets out various categories of vessel, applicable to each class, and their operational limits.
- Makes provision for the inspection of seaworthiness and the competency of skippers.
- Sets out the various safety measures.
- Requires that skippers submit voyage details.

- Makes provision for authorised agencies to exercise or perform powers or duties as required by the Act.

Has certain Regulations namely:

- Government Notice R2799 that applies to ships or small vessels used for sport or recreation.

- Government Notice R1044 that makes provision for vessels of less than 3 m in length. Vessels falling into this category may not proceed to sea further than 500 m from the low water mark. 7

The Act also has relevance with respect to control of marine pollution and to that extent applies to all ships in South African waters.

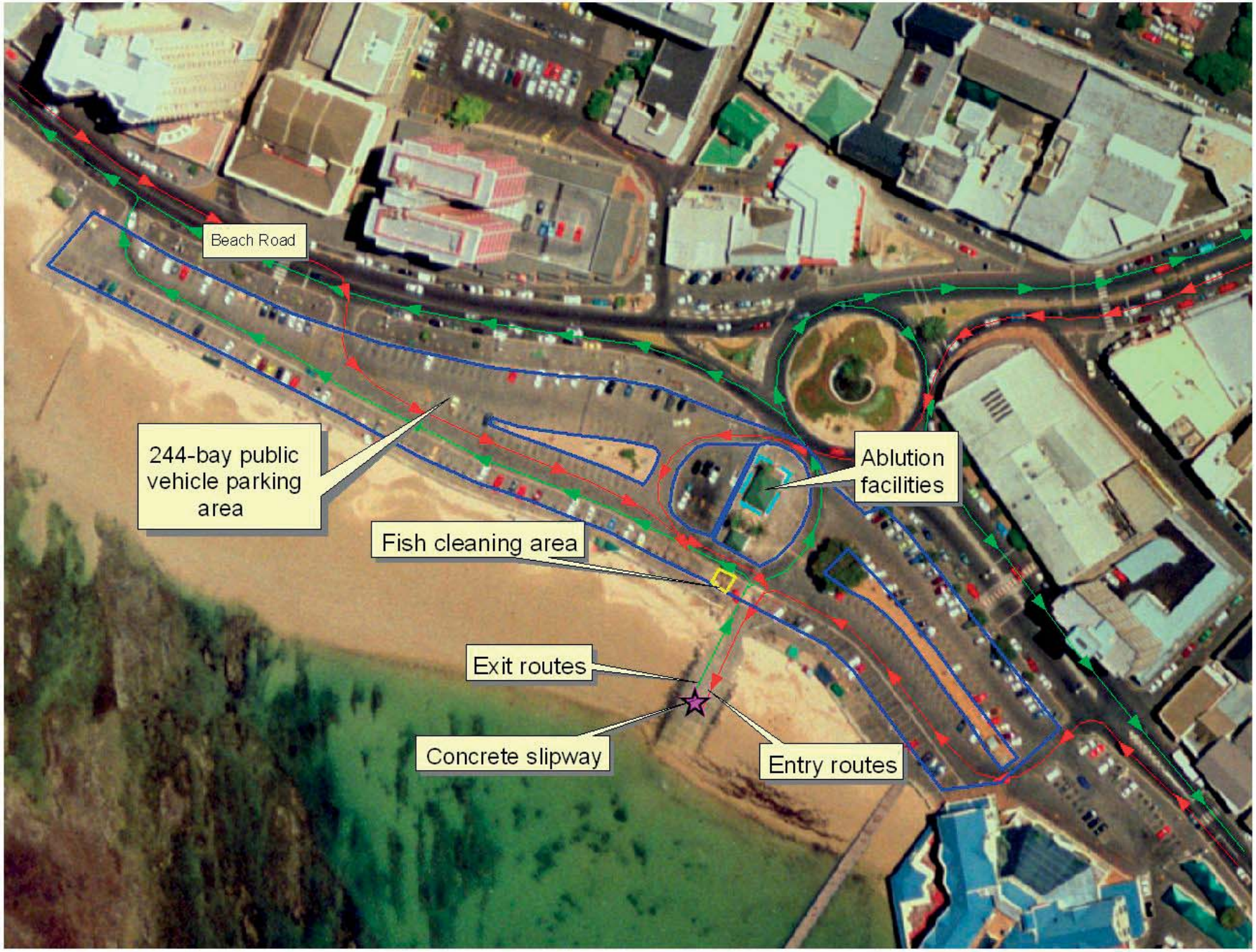
Road Traffic Act (29 of 1989)

This Act outlines the various requirements and Regulations for vehicles and drivers. In terms of the Act, if a vehicle is able to gain access to, and be driven on, the seashore, this Act and its Regulations are deemed to apply.

There are a number of High Court cases which have established the breadth of application of the definition of a road and, although no cases involving the Admiralty Reserve or that part of the beach between the high and low water marks are known of, the Provincial Road Traffic Inspectorate is certain that the Act applies.

In this, it is important to note that a person does not have to have a right of vehicular access to the beach: right of access by the person is sufficient. The responsible erection of booms, etc., in providing and simultaneously limiting vehicular access to the beach, will thus not affect the applicability of this legislation to what can generally be described as “the beach”.

All vehicles (powered vehicles and trailers) using the beach must be roadworthy and licensed, and be driven by persons who themselves are licensed drivers of that category of vehicle. The body that controls vehicular access to the beach must know that the provisions of this Act apply. This Act has been replaced by the new National Road Traffic Act (93 of 1996). However, the 1996 Act provides that any relevant provision of the 1989 Act will remain in force until such time as the corresponding provision of the 1996 Act has been put into operation.



Concrete slipway
Entry route
Exit route

Parking area
Fish cleaning area
Ablution facilities

Map 1 - Launching, Access & Parking Facilities

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Prepared by
PENINSULA PERMITS
for the City of Cape Town



Information boards
Recreational use area
Launch/Landing channel

Map 2 - Designated 'Use Areas' & positioning of information boards

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Prepared by

PENINSULA PERMITS

for the City of Cape Town

Annexure H

OPERATIONAL MANAGEMENT PLAN FOR TABLE VIEW

(Opposite Doodles)

PREPARED BY:
Peninsula Permits cc.
Envirocentric

FOR:
The City of Cape Town

May 2004

Envirocentric

PENINSULA PERMITS

1. BACKGROUND

This General Policy for off-road vehicles in the coastal zone was published in Government Notice 858, in Government Gazette No.15655, dated 29 April 1994 and introduced general control measures, on a national basis, to protect the coastal environment from damage caused by the use of vehicles in the coastal zone and to ensure the safety of other beach users. The policy makes provision for zoning the coastal zone, for the protection of ecologically sensitive areas, and for various recreational activities, and also allows for a permit system to facilitate the control of vehicles in specifically demarcated areas. According to the General Policy, the use of vehicles in any beach area may be reserved for specific purposes, such as angling or boat-launching.

The Control of Vehicles in the Coastal Zone Regulations ("Beach Regulations") published under NEMA (Government Notice No. 1399 of 21 December 2001) provide for a general prohibition on the recreational use of vehicles in the coastal zone and procedures for approving the use of vehicles in the coastal zone under specific circumstances. They also provide measures for the enforcement of these regulations and prescribe penalties in respect of contraventions.

The Beach Regulations (Regulation 7) require operators of boat launching sites to apply to the relevant authority to grant a license to use vehicles, or allow their use by third parties, to facilitate boat launching.
An application for a licence must:

- Be made in the format stipulated by the relevant authority.
- Be accompanied by payment or proof of payment of the application fee stipulated by the relevant authority.
- Clearly indicate:
  - The boundaries of the proposed boat-launching site and all access roads.
  - The types of vehicles that will be used at the site.
  - Set out fully the reasons why the boat-launching site is required.
  - Include a plan for managing activities at the site in a manner that avoids or minimises damage to the environment.
  - Subject to Regulation 22, be accompanied by evidence that the requirements of Section 24(7) of the Act relating to the investigation, assessment and communication of the potential impact of the activities associated with boat-launching at the site have been complied with.

To comply with these regulations, the City of Cape Town (CoCT) has completed the required application form for the licensing of the Table View launch site. Below please find the proposed Operational Management Plan for Table View.

Based on this generic OMP, the OMP for the Table View Launch Site includes a general description of the launch site (including slipways, parking, roads, and other service facilities), a general description of the types of uses of the launch site and a detailed description of the activities required to minimise and mitigate the environmental impacts of the use of the boat launch site. The OMP will however only describe the minimum operational management requirements for each site and it is anticipated that each site will, over time, exceed these minimum requirements.

1.2 Environmental Management in the City of Cape Town

The City of Cape Town's Integrated Metropolitan Environmental Policy (IMEP) was formally adopted in October 2001. IMEP sets the broad framework and a number of core principles for guiding the City towards a sustainable future. IMEP recognises the economic, social and environmental value of the City's coastal asset, and as such identified the Coast as a priority theme for the development of a detailed implementation strategy. In October 2003, the City formally adopted the Coastal Zone Management Strategy giving effect to the principles of IMEP and setting coastal management practise and standards in place.

1.3 Responsible Authority

All reference to the licensed operator within this OMP refers to the City of Cape Town. The City through a lease agreement, may delegate the authority and responsibility for the management of the boat launch site to any competent club or organisation (see 2.20).

1.4 Function of the OMP

The OMP has been drafted to ensure compliance with the regulations in terms of the national environmental management act, 1998: control of vehicles in the coastal zone, specifically "*7(4)(f) subject to regulation 22, be accompanied by evidence that the requirements of section 24(7) of the act relating to the investigation, assessment and communication of the potential impact of the activities associated with boat-launching at the site have been complied with*". The function of the OMP is thus to ensure that the licensed operator utilises the boat launching site in an environmentally sensitive manner. The OMP explicitly identifies the mitigating actions required to control the impacts of the boat launch site and associated activities on the bio-physical attributes of the site, the surrounding residents and the safety of the users of the site. The OMP further provides a framework to ensure that all activities occurring within the boat launch site comply with the relevant enabling legislation.

1.5 Site description

The Table View launch area is a site owned by the City of Cape Town, situated off Marine Drive (M14), Table View.

The boat launching facilities at Table View include the following:

- A tarred ramp.
- A 30-bay vehicle parking area.

The Table View slipway is owned and managed by the CoCT. Currently no lease agreement exists for this site. Future reference in this OMP to the Table View slipway refers to the all the associated facilities required for boat launching. Map 1 shows the location of the boat launching facilities at Table View Launch Site.

1.6 Site usage

The site is highly utilised, especially over the holiday season and weekends in the summer months. The usage often exceeds the “carrying capacity” for the parking area, especially during organised events.

The following uses have been recorded at the boat launch site:

- Currently between 95% of the slipway users are for recreational purposes (rubber ducks and jet skis)
- Rescue, research and other official users intermittently use the site (NSRI, Metro Rescue, SLSC, etc.).
- The site is popular for rubber ducks/semi-rigids and jet-ski events and races.

Currently there is no controlled access and no accurate user counts exist for the site. It is estimated that approximately 520 jet skis and boats are launched from this site per annum. The users and associated levels of usage are seasonal and weather dependent.

2. OPERATIONAL MANAGEMENT REQUIREMENTS OF BOAT LAUNCH SITES

2.1 Access management

2.1.1 The site is accessed off Marine Drive (M14), Table View. The internal layout of the access to, and traffic flows through, the parking areas and slipways at the site is shown in Map 2. The roads and parking areas must be tarred, adequately marked to meet municipal and provincial road standards and free of potholes.

2.1.2 All access roads, parking areas and slipways are to be properly bollarded or fenced to ensure that all vehicles remain on the hardened road surface, and only park in designated parking areas. All areas outside the hardened road surfaces are designated no-go areas (see Map 2 for the extent of the hardened road surfaces at the site). No vehicle is permitted in any sensitive areas (e.g. dune areas) on, or abutting, the site. The shortest route to the water will be used. Vehicles will offload/load and return to the parking area immediately.

2.1.3 Vehicles, their trailers and the drivers or operators using the boat launch site shall comply with the requirements of the Road Traffic Act and the General Policy on Control of Vehicles in the Coastal Zone (Government Gazette, Notice 858 of 29 April 1994).

2.1.4 Trailers may be brought onto the seashore by a motor vehicle only for the purposes of launching or retrieving a vessel. Upon launching (or retrieving if appropriate) a vessel, these trailers and vehicles are to be parked in a clearly demarcated parking area, off the beach (shown in Map 1 and 2).

2.1.5 Only the designated launch area may be used to launch a boat or jet ski. Erosion of the launch area must be monitored and remedial/rehabilitation action instituted if necessary. Where the remedial/rehabilitation measure constitutes a listed activity in terms of the Environmental Conservation Act, and as directed by the relevant authorities, an Environmental Impact Assessment (EIA) will be implemented for the remedial/rehabilitation action.

2.1.6 The minimum signage requirements to facilitate vehicular and pedestrian flows, and for demarcating parking areas, are shown in Map 3. Map 3 further indicates the location for the posting of the safety requirements for the site.

2.1.7 A fee is to be charged and a ticket issued to all persons launching from the site, with the exception of Blouberg Surf Lifesaving Club (BSLC), NSRI and Law Enforcement. Key provisions of this OMP and code of conduct are to be described on the ticket (or an attached brochure). A chain/boom is to be placed across the access route of the slipway enabling the licensed operator to control access. Users can pay an annual instalment, entitling them to free access to the launch site for a year. On payment of the instalment, the user must be made aware of the conditions of the OMP and issued with a key to the chain/boom at the entrance to enable them to access the launching site. The launching site is kept locked when no boats are at sea to avoid unauthorized entry onto the beach by vehicles. The BSLC, NSRI and Law Enforcement will be provided with a key. Only persons who are in possession of a valid permit (and key) may access this launch site.

The boom is to be closed to all users between sunset and sunrise, except in the event of an emergency.

2.1.8 The limits on the numbers of boats that may launch from each site will be linked to the availability of parking and other service facilities. A strict limit of 30 vehicles may use the site at any one time. This limit includes boats in the process of being launched or retrieved.

2.1.9 Due to the nature of the boat launch site (facilities, services, parking, access, bio-physical characteristics), unsuitable vehicles not be permitted to launch a boat or jet ski at this site.

2.1.10 Due to the nature of the boat launch site (facilities, services, parking, access, bio-physical characteristics) boats longer than 5.5 meters and boat engines with a combined engine capacity greater than 200 HP shall not be permitted to launch from the site.

2.1.11 Pedestrians may only access the beach along pathways and boardwalks and may not traverse the dunes, vegetation, and bird nesting areas on and adjacent to the site. Access routes through such areas will be clearly defined, supported by appropriate signage, and highly sensitive areas may be closed to pedestrian and/or vehicular traffic.

2.2 Parking management

2.2.1 During peak periods or events a limit of 30 vehicle-and-trailers will be accommodated in the designated parking area. Vehicles-and-trailers shall, by agreement of the management authority of the recreational area, be accommodated in the public parking areas.

2.2.2 All the parking areas/bays for vehicles-and-trailers will be properly demarcated and vehicle flows clearly indicated.

2.2.3 Launching and parking areas must be separated. Parked vehicles should not obstruct access to the boat launch site by any user, visitor or resident, nor interfere with reasonable use of that beach by any user, visitor or resident. Map 2 shows vehicular access routes, boat launch site and associated parking.

2.3 Boat Launch area

2.3.1 Where boat launches use the beach area, every effort shall be made to minimise disturbance to the beach surface during the process of launching and retrieving boats, i.e. only tow vehicles with sufficient capacity may be used - this includes engine capacity, tyre profile, tyre pressure, driver proficiency, etc.

2.3.2 The launch area shall not be used as an access to other parts of the beach for boats and vehicles.

2.3.3 Kelp washed up onto the launch site may not be completely removed from the area. If kelp builds up directly on the launch area, the kelp may be spread out manually, along another adjacent section of the coastline that will not impact on other users. If kelp build up has reached the extent that mechanical means is necessary, prior authorisation and consent must be granted from the relevant authorities (i.e. City of Cape Town, Community Facilities Dept/Environmental Management Dept).

2.4 Launching and beaching control and safety

2.4.1 The licensed operator must be in control of all launches and boat retrievals at all times. During busy periods, the operator must ensure that a dedicated staff member is provided to direct the launches and retrievals.

2.4.2 No alcohol or any other intoxicating substance shall be allowed on the CoCT premises. Any person suspected of being under the influence of alcohol or any other intoxicating substance shall not be permitted access to, or allowed to remain on, the premises.

2.4.3 All SADSA, SAMSA and CoCT safety regulations shall be adhered to at all times. A comprehensive first-aid box capable of handling normal domestic emergencies shall be maintained on site. Weatherproof lists of relevant emergency contact numbers shall be displayed near the launch site.

2.4.4 Where feasible, designated launch positions at launch sites on beaches shall be clearly demarcated. The area demarcated for boat launching will be demarcated by adequate signage and positioned as indicated on Map 4.

2.4.5 Boats/Jet skis should not be left unattended on the seashore and beached boats/ jet skis shall not remain on the seashore in such a way that it hinders the launching and landings activities of the launch site. All boats and jet skis shall be retrieved by sunset. No parking on the beach is permitted.

2.4.6 Boats in the process of landing or being retrieved shall have priority over boats wishing to launch.

2.4.7 A boom or chain gate will to be constructed in front of the slipway, on the parking area side of the slipway, in line with the bollards/fencing. This will enable the licensed operator to control access. The licensed operator shall temporarily close the launch site under exceptional circumstances such as extremely inclement weather conditions, damage to the slipway, or any other emergency that will prevent the safe launching or retrieval of boats. If the launch site is to be closed to users, the boom will locked by the operator and a notice posted to notify users of the reason for closure and anticipated time of re-opening.

2.4.8 The launch area will be kept clear of all other users when in use. Signage will be posted, at the slipways informing other users (e.g. swimmers, kayaks) to remain outside of the demarcated launching/ landing areas.

2.4.9 The provisions of section 68 of the Merchant Shipping Act No 57 of 1951 and all applicable regulations made under Section 356 of the same act shall be strictly adhered to. No boat will be able to launch from the site unless it is properly marked and registered (or licensed as the case may be) according to the Merchant Shipping Act No 57 of 1951 and it's associated regulations.

2.5 Vessel safety

2.5.1 No boat will be able to launch unless the skipper is in possession of a valid Certificate of Competency issued by the South African Maritime Safety Authority (SAMSA), an Agency recognised by it or a IRB (Inflatable Rubber Duck) skippers Certificate issued by Lifesaving South Africa. (Note: boats not exceeding 3m in size are exempt from this regulation).

2.5.2 Everyone on the boat in the immediate launch and landing zone must wear life jackets or buoyancy aids.

2.5.3 All boats launching from the site are to carry a functional form of communication. (Note: boats not exceeding the one nautical mile limit are not required to have a radio but must at least have flares onboard).

2.6 Jet skis/Personal water craft (PWC)

2.6.1 Jet ski wave riding may only take place in areas designated for such activity by the licensed operator of the launch site.

2.6.2 No jet ski may be navigated in a dangerous manner or be driven at excessively high speeds within the surf zone of the launching area. No jet ski shall be navigated across the front of, or between any bather in the designated recreational areas.

2.7 Night launching and beaching

2.9.1 No night launching may take place from this site, except in the event of an emergency.

2.8 Managing conflict between different user groups

2.8.1 No other users may use the designated launch areas. Map 4 indicates the extent of the launch area and the other adjacent areas designated for recreational use.

2.8.2 Except during launching and landing, boats and jet skis under power in the in-shore area are not to approach within 200m of other users (anglers, divers, swimmers, surfers, body-boarders, or any other non-powered craft). Provided that the skipper is qualified in surf rescue operations (e.g. rescue operations or patrols) this 200m distance is not compulsory. Rescue rubber ducks that are used within 200m of other users must have a propeller guard fitted.

2.8.3 Boats may not enter an area set aside specifically for bathers or other water sports and vice versa. It is the skipper's responsibility to keep a proper lookout for bathers and divers. Other users are to stay clear of the launch and landing channel (see Map 4). Adequate signage is to be posted, informing other users (e.g. swimmers, kayaks) to remain outside of these demarcated launching/ landing areas (see Map 1 and 4).

2.9 Special events and functions

2.9.1 Prior permission for any special event or function must be obtained from CoCT first.

2.9.2 A range of competitive events may be held at the boat launch site. These include Rubber duck/semi-rigid and jet ski competitions. In terms of the Merchant Shipping Act, the relevant authority may grant permission for the total number of allowable launches to be increased during these events (subject to 2.1.8).

2.9.3 In order to cater for special events and functions, the licensed operator is to ensure that sufficient staff are available to cater for, and mitigate, the impacts resulting from an increase in users. During such events the licensed operator is to ensure that the provisions of the OMP are complied with – and the following additional actions/control measures take place:

- Control and management of vehicle flows and parking
- Control of alcohol consumption, anti-social activities, littering and vandalism
- Prevention of fish hawking on site
- Control over the cleaning of boats
- Control over the disposal of offal
- Monitoring of, and compliance with, the Marine Living Resources Act
- Preventing conflicts between different user groups
- Compliance with minimum safety standards

2.10 Toilet facilities and waste water treatment

2.10.1 Currently there are no existing ablution facilities associated with the Blaauwberg Slipway. Additional chemical toilets must be provided on site during an event or functions.

2.10.2 No washing of boats or jet skis will be permitted at the launch site or in the parking area.

2.11 Pollution and litter management

2.11.1 All litter and refuse is to be cleaned from the site by the licensed operator at least twice a week. In peak season, and during special events, the cleaning schedule is to take place at least once a day.

2.11.2 Plastic (or any other non-corroding material) refuse bins are to be provided at the site. In peak season, and during special events, the bins are to be emptied daily. Outside peak season, bins are to be cleaned at least twice a week. Refuse bins are to be discreetly placed in areas of high usage (e.g. at the parking areas). The bins will be clearly visible and be a short distance from the users. The bins are to be placed in an area where they can be easily serviced.

2.11.3 Refuelling supplies held at the launch sites will be in sealed containers, which are only opened once in place within the boat.

2.11.4 Spillages of fuel or oil at the launch site are to be avoided. The licensed operator must keep Spill Sorb (or similar product) on site. Should a fuel or oil spill take place, the material containing the spill shall be properly disposed of at an approved facility.

2.11.5 No cleaning of boats bodywork is permitted.

2.12 Noise mitigation

2.12.1 The licensed operator is to ensure that the launch site is operated in accordance with the requirements of the Noise Control Regulations PN 627/1998.

2.12.2 Where the licensed operator cannot control rowdy and noisy activity, they are to contact municipal law enforcement officials or the SAPS for assistance.

2.12.3 No dry starting of motors may take place within the parking and residential area. Motors may only be started and warmed up on the beach, in such a way as not to cause undue nuisance to other beach users, visitors and residents. The licensed operator is responsible for ensuring that management measures are put in place to address reasonable complaints from users, visitors and residents.

2.13 New developments

2.13.1 No listed (in terms of Schedule 1 1(e) of the Regulations under section 21 of the Environmental Conservation Act 73 of 1989) activity may take place within the site, unless approved by the responsible authority after an Environmental Impact Assessment (EIA) has been undertaken. This assessment must meet the requirements of the provincial planning and environmental authorities.

2.14 Helicopters

2.14.1 There are no demarcated helicopter-landing sites at the launch site.

2.15 Archaeological sites

2.15.1 Any area of archaeological significance found on the site is to be reported immediately by the licensed operator of the launch site to the South African Heritage Resource Agency (SAHRA) (or its nominated representative) and access to the archaeological site should be prevented, pending appropriate investigation and decision.

2.16 Consumptive use of marine resources

2.16.1 All consumptive use of marine resources on the site will be subject to the national regulations (bag limits, closed seasons etc). The licensed operator will inform MCM officials of any illegal marine resource use activities occurring on the site. MCM, City Police and Law Enforcement are to be notified of special events and snoek runs to ensure that enforcement staff are available to monitor the consumptive use of marine resources.

2.16.2 Fish (or any other marine resources) may not be sold/bartered on the site.

2.17 Communication and compliance

2.17.1 The licensed operator shall draw the attention of all users of the site to the key provisions of this OMP by providing an information board the slipway.

2.17.2 Adequate complementary signage must be provided to inform all users and visitors to the site with regards to the conditions of the OMP. Map 3 shows the minimum signage requirements.

2.17.3 The licensed operator shall be responsible for monitoring compliance with this OMP.

2.17.4 Appropriate records of compliance monitoring and any audit will be maintained and may be used in support of subsequent applications for re-licensing of the site.

2.17.5 Any user of the site who disregards the provisions of this OMP shall be reported, by the licensed operator, to the relevant authority that has the legal jurisdiction to impose penalties. MCM and City Law Enforcement Officers will be contacted to monitor and enforce all marine resource use activities. All social and traffic related activities will be enforced by the City Police, Traffic Officials and/or SAPS.

2.17.6 Disregard for the provisions of this OMP, may result in the relevant authority's withdrawal of the licence.

2.18 Safety, emergency preparedness and responses

2.18.1 The site shall form part of, and conform to, local and regional emergency response plans and procedures (e.g. fire, oil spills).

2.18.2 Emergency procedures will take precedence over all activities at the launch site.

2.19 Records

2.19.1 Adequate launch records, in the prescribed format, will be maintained by the licensed operator. The minimum information for the boat launch record is to include boat registration, boat name, time of launch, time of landing, number of crew and purpose of trip.

2.19.2 The licensed operator or nominated club shall keep a detailed register of all accidents and casualties involving boats, craft and/or crew (using the prescribed SAMSA form as required by section 259 of the Merchant Shipping Act No 57 of 1951). This register should then be forwarded to the nearest SAMSA office at the end of each month.

2.20 Operators other than the licensed operator

2.20.1 The licensed operator shall ensure that any club to which operation of the site may be delegated is properly constituted, has the capacity to observe the conditions of this OMP and re-invests income generated from the site to the effective management of that site.

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Regulations to control potentially harmful activities on a permit system within demarcated sensitive coastal areas were promulgated in terms of the ECA. The prohibited activities are the disturbance of vegetation, earthworks, dredging and dune stabilisation.

Subsequent to the promulgation of the Act in 1989, a number of key regulations governing EIAs and identified activities that may be detrimental to the environment have also been promulgated. Of importance to proposed developments in the coastal zone are Government Notices R1182, R1183, R1184 and R448 and amendments of May 2002. While beach driving and boat launching are not listed activities in terms of these regulations, proposed developments, such as structures below the high water mark of the sea and certain access infrastructure which may provide for such activities, must undergo environmental impact assessments before environmental authorisation can be granted by DEAT.

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This MLRA repeals most of the Sea Fishery Act (12 of 1988). Its preamble reads as follows:

"To provide for the conservation of the marine ecosystem, the long-term sustainable utilisation of marine living resources and the orderly access to exploitation, utilisation and protection of certain marine living resources; and for these purposes to provide for the exercise of control over marine living resources in a fair and equitable manner to the benefit of all the citizens of South Africa; and to provide for matters connected therewith."

The Act and Regulations published thereunder provide for the conservation of South Africa's marine ecosystems and the sustainable utilisation of marine living resources. This includes the protection of every species of sea animal, whether vertebrate or invertebrate, including the spawn or larvae of such sea animal, but excluding any seal or sea bird. Fish and marine organisms were protected by means of prohibitions against their catching, disturbance or possession. There is an OMPhasis on the broadening of fair and equitable access to resources, the gradual transformation of fishing methods, the development of fees for utilisation and a favourable business environment in fisheries. The Act provides for a principle of national control and co-ordination and places responsibility for resource-allocation decisions with the Minister: Environmental Affairs and Tourism. The Act makes provision for the granting of commercial, recreational and subsistence fishing rights.

The Minister may establish areas or zones where subsistence fishers may fish and, after consultation, may declare a specified community to be a fishing community, any person to be a subsistence fisher or any fishing or related activity or the exercise of any other right in that area or zone to be prohibited. No subsistence fishing permit shall be transferable except with the approval of and subject to the conditions determined by the Minister.

Merchant Shipping Act (57 of 1951)

All vessels, of whatever size, that proceed to sea from anywhere in South Africa fall under the Merchant Shipping Act. Small vessels (3 m to < 25 tonnes) are divided into two classes, viz. small vessels used solely for sport and recreation, and all other small vessels, e.g. fishing boats, diving boats and sailing training yachts (i.e. commercial boats).

The Merchant Shipping Act:

- Sets out various categories of vessel, applicable to each class, and their operational limits.
- Makes provision for the inspection of seaworthiness and the competency of skippers.
- Sets out the various safety measures.
- Requires that skippers submit voyage details.

- Makes provision for authorised agencies to exercise or perform powers or duties as required by the Act.

Has certain Regulations namely:

- Government Notice R2799 that applies to ships or small vessels used for sport or recreation.

- Government Notice R1044 that makes provision for vessels of less than 3 m in length. Vessels falling into this category may not proceed to sea further than 500 m from the low water mark. 7

The Act also has relevance with respect to control of marine pollution and to that extent applies to all ships in South African waters.

Road Traffic Act (29 of 1989)

This Act outlines the various requirements and Regulations for vehicles and drivers. In terms of the Act, if a vehicle is able to gain access to, and be driven on, the seashore, this Act and its Regulations are deemed to apply.

There are a number of High Court cases which have established the breadth of application of the definition of a road and, although no cases involving the Admiralty Reserve or that part of the beach between the high and low water marks are known of, the Provincial Road Traffic Inspectorate is certain that the Act applies.

In this, it is important to note that a person does not have to have a right of vehicular access to the beach: right of access by the person is sufficient. The responsible erection of booms, etc., in providing and simultaneously limiting vehicular access to the beach, will thus not affect the applicability of this legislation to what can generally be described as “the beach”.

All vehicles (powered vehicles and trailers) using the beach must be roadworthy and licensed, and be driven by persons who themselves are licensed drivers of that category of vehicle. The body that controls vehicular access to the beach must know that the provisions of this Act apply. This Act has been replaced by the new National Road Traffic Act (93 of 1996). However, the 1996 Act provides that any relevant provision of the 1989 Act will remain in force until such time as the corresponding provision of the 1996 Act has been put into operation.



Tarred slipway
Parking area
Launching/Landing area

Map 1 - Launching facilities

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PENINSULA PERMITS
for the City of Cape Town



Tarred Slipway
Exit route
Entry route
Parking area

Map 2 - Entry/Exit Routes & Parking Area

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Information Board

Map 3 - Placement of Information Boards

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Slipway
Designated jetski
& power boating area
Launching/Beaching area

Map 4 - Designated use areas

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for the City of Cape Town

Annexure I

OPERATIONAL MANAGEMENT PLAN FOR THREE ANCHOR BAY

PREPARED BY:
Peninsula Permits cc.
Envirocentric

FOR:
The City of Cape Town

May 2004

Envirocentric

PENINSULA PERMITS

1. BACKGROUND

This General Policy for off-road vehicles in the coastal zone was published in Government Notice 858, in Government Gazette No.15655, dated 29 April 1994 and introduced general control measures, on a national basis, to protect the coastal environment from damage caused by the use of vehicles in the coastal zone and to ensure the safety of other beach users. The policy makes provision for zoning the coastal zone, for the protection of ecologically sensitive areas, and for various recreational activities, and also allows for a permit system to facilitate the control of vehicles in specifically demarcated areas. According to the General Policy, the use of vehicles in any beach area may be reserved for specific purposes, such as angling or boat-launching.

The Control of Vehicles in the Coastal Zone Regulations ("Beach Regulations") published under NEMA (Government Notice No. 1399 of 21 December 2001) provide for a general prohibition on the recreational use of vehicles in the coastal zone and procedures for approving the use of vehicles in the coastal zone under specific circumstances. They also provide measures for the enforcement of these regulations and prescribe penalties in respect of contraventions.

The Beach Regulations (Regulation 7) require operators of boat launching sites to apply to the relevant authority to grant a license to use vehicles, or allow their use by third parties, to facilitate boat launching.
An application for a licence must:

- Be made in the format stipulated by the relevant authority.
- Be accompanied by payment or proof of payment of the application fee stipulated by the relevant authority.
- Clearly indicate:
  - The boundaries of the proposed boat-launching site and all access roads.
  - The types of vehicles that will be used at the site.
  - Set out fully the reasons why the boat-launching site is required.
  - Include a plan for managing activities at the site in a manner that avoids or minimises damage to the environment.
  - Subject to Regulation 22, be accompanied by evidence that the requirements of Section 24(7) of the Act relating to the investigation, assessment and communication of the potential impact of the activities associated with boat-launching at the site have been complied with.

To comply with these regulations, the City of Cape Town (CoCT) has completed the required application form for the licensing of the Three Anchor Bay launch site. Below please find the proposed Operational Management Plan for the Three Anchor Bay launch site.

Based on this generic OMP, the OMP for the Three Anchor Bay includes a general description of the boat launch site (including slipways, parking, roads, and other service facilities), a general description of the types of uses of the boat launch site and a detailed description of the activities required to minimise and mitigate the environmental impacts of the use of the boat launch site. The OMP will however only describe the minimum operational management requirements for each site and it is anticipated that each site will, over time, exceed these minimum requirements.

1.2 Environmental Management in the City of Cape Town

The City of Cape Town's Integrated Metropolitan Environmental Policy (IMEP) was formally adopted in October 2001. IMEP sets the broad framework and a number of core principles for guiding the City towards a sustainable future. IMEP recognises the economic, social and environmental value of the City's coastal asset, and as such identified the Coast as a priority theme for the development of a detailed implementation strategy. In October 2003, the City formally adopted the Coastal Zone Management Strategy giving effect to the principles of IMEP and setting coastal management practise and standards in place.

1.3 Responsible Authority

All reference to the licensed operator within this OMP refers to the City of Cape Town. The City through a lease agreement, may delegate the authority and responsibility for the management of the boat launch site to any competent club or organisation (see 2.20).

1.4 Function of the OMP

The OMP has been drafted to ensure compliance with the regulations in terms of the national environmental management act, 1998: control of vehicles in the coastal zone, specifically "*7(4)(f) subject to regulation 22, be accompanied by evidence that the requirements of section 24(7) of the act relating to the investigation, assessment and communication of the potential impact of the activities associated with boat-launching at the site have been complied with*". The function of the OMP is thus to ensure that the licensed operator utilises the boat launching site in an environmentally sensitive manner. The OMP explicitly identifies the mitigating actions required to control the impacts of the boat launch site and associated activities on the bio-physical attributes of the site, the surrounding residents and the safety of the users of the site. The OMP further provides a framework to ensure that all activities occurring within the boat launch site comply with the relevant enabling legislation.

1.5 Site description

Three Anchor Bay is owned by the City of Cape Town, situated off Beach Road (M6), Sea Point.

The boat launching facilities at Three Anchor Bay include the following:

- 5 storage garages.
- Public toilets.
- A large concrete slipway, entering into Three Anchor Bay.
- A 73-bay demarcated vehicle-parking area.

Map 1 shows the location of the boat launching facilities at the Three Anchor Bay. Currently the CoCT is responsible for managing the launching of all boats from the launching site, for ensuring the facility is open to public use and for the ongoing maintenance and development of the facilities.

1.6 Site usage

As the boat launch site is one of the few launching facilities on the western coast of the Peninsula, to which the public has unrestricted access, it has assumed a significant role for many users.

The following uses have been recorded at the boat launch site:

- Currently the majority of users are recreational users (e.g. kayaking, paddle skiing and recreational boating). The intensity of users increases during weekends and holidays.
- Recreational, commercial and charter divers occasionally utilise the site.
- There are a growing number of kayak and canoe racing events.
- Occasionally filming takes place on site.

No accurate user accounts exist for the site, but it is estimated that approximately 1080 boats launch per annum, with an average of 2 to 3 boats launched per day. The users and associated levels of usage are seasonal and weather dependent.

2. OPERATIONAL MANAGEMENT REQUIREMENTS OF BOAT LAUNCH SITES

2.1 Access management

2.1.1 Access to the site is gained off Beach Road (M6), Three Anchor Bay. The layout of the access to the parking area and launch site is shown in Map 1. The roads and parking areas must be tarred, adequately marked to meet municipal and provincial road standards and free of potholes. The flow of vehicles wishing to launch a boat, will follow a clockwise one-way system. It must make allowance for all movements between parking areas.

2.1.2 Vehicles may only park in the designated parking areas (see Map 1).

2.1.3 Vehicles, their trailers and the drivers or operators using the boat launch site shall comply with the requirements of the Road Traffic Act and the General Policy on Control of Vehicles in the Coastal Zone (Government Gazette, Notice 858 of 29 April 1994).

2.1.4 Trailers may be brought onto the seashore by a motor vehicle only for the purposes of launching or retrieving a vessel. Upon launching (or retrieving if appropriate) a vessel, these trailers and vehicles are to be parked in a clearly demarcated parking area (shown in Map 1).

2.1.5 Only the designated launch area may be used to launch boats. Erosion of the launch area must be monitored and remedial/rehabilitation action instituted if necessary. Where the remedial/rehabilitation measure constitutes a listed activity in terms of the Environmental Conservation Act, and as directed by the relevant authorities, an Environmental Impact Assessment (EIA) will be implemented for the remedial/rehabilitation action.

2.1.6 The minimum signage requirements to facilitate vehicular and pedestrian flows, and for demarcating parking areas, are shown in Map 2. Map 2 further indicates the location for the posting of the safety requirements for the site.

2.1.7 A fee is to be charged for the use of the slipways. Key provisions of this OMP are, within the space constraints, to be described on the ticket. A boom is to be placed across the access route at the slipway. Only persons who are in possession of a valid permit (and key) may access this slipway.

The boom is to be closed between sunset and sunrise, unless by special arrangement for night launches.

2.1.8 The limits on the numbers of boats that may launch from the site will be linked to the availability of parking and other service facilities. A strict limit of 36 vehicles-and-trailers may use the site at any one time. This allows for 50% of the parking area to utilised for vehicle-and-trailer parking.

This limit includes boats in the process of being launched or retrieved and vehicles-and-trailers parked in the designated parking areas.

2.1.9 Due to the nature of the boat launch site (facilities, services, parking, access, bio-physical characteristics), vehicles under 1600cc engine capacity shall not be permitted to launch a boat at the site.

2.1.10 Due to the nature of the boat launch site (facilities, services, parking, access, bio-physical characteristics) boats longer than 5.5 meters and boat engines with greater than a combined 200 HP engine capacity, shall not be permitted to launch from the site.

2.2 Parking management

2.2.1 A limit of 36 vehicles-and-trailers will be allowed in the designated parking area at the launch site.

2.2.2 All the parking areas/bays for vehicles-and-trailers will be properly demarcated and vehicle flows clearly indicated.

2.2.3 Launching and parking areas must be separated. Parked vehicles should not obstruct access to the boat launch site by any user, visitor or resident, nor interfere with reasonable use of that beach by any user, visitor or resident.

2.3 Boat Launch area

2.3.1 Kelp washed up onto the launch site may be removed from the area.

2.3.2 The methods for cleaning the slipway include*:*

- Manual brushing of the surface
- Mechanical brushing of the surface

2.4 Launching and beaching control and safety

2.4.1 The boat launch operator must be in control of all launches and boat retrievals at all times. During busy periods the operator must ensure that a dedicated staff member is provided to direct the launches and retrievals.

2.4.2 No alcohol or any other intoxicating substance shall be allowed on the CoCT premises. Any person suspected of being under the influence of alcohol or any other intoxicating substance shall not be permitted access to, or allowed to remain on, the premises.

2.4.3 All SADSA, SAMSA and CoCT safety regulations shall be adhered to at all times. A comprehensive first-aid box capable of handling normal domestic emergencies shall be maintained on site. Weatherproof lists of relevant emergency contact numbers shall be displayed near the launch site.

2.4.4 Boats and vehicles may not be left unattended on the beach and boats shall be retrieved from the beach within 10 minutes of arrival. No parking on the or access roads to the beach is permitted.

2.4.5 Boats in the process of landing or being retrieved shall have priority over boats wishing to launch.

2.4.6 The boat launch operator shall temporarily close the launch site under exceptional circumstances such as extremely inclement weather conditions, damage to the launching area, or any other emergency that will prevent the safe launching or retrieval of boats from the beach. If the launch site is to be closed to users, the boom will be locked by the boat launch operator and a notice posted to notify users of the reason for closure and anticipated time of re-opening.

2.4.7 The launch area will be kept clear of all other users when in use. Signage will be posted, at the slipway informing other users (e.g. swimmers, kayaks) to remain outside of the demarcated launching/landing areas.

2.4.8 The boat launch operator shall ensure that only persons who are suitably licensed (e.g. relevant code driving license) shall operate vehicles for launching or retrieval on the site.

2.4.9 The provisions of section 68 of the Merchant Shipping Act No 57 of 1951 and all applicable regulations made under Section 356 of the same act shall be strictly adhered to. No boat will be able to launch from the site unless it is properly marked and registered (or licensed as the case may be) according to the Merchant Shipping Act No 57 of 1951 and it's associated regulations.

2.5 Vessel safety

2.5.1 No boat will be able to launch unless the skipper is in possession of a valid Certificate of Competency issued by the South African Maritime Safety Authority (SAMSA), an Agency recognised by it or a IRB (Inflatable Rubber Duck) skippers Certificate issued by Lifesaving South Africa.

2.5.2 Everyone on the boat in the immediate launch and landing zone must wear life jackets or buoyancy aids.

2.5.3 All boats launching from the site are to carry a functional form of communication. (i.e. in the case of an emergency the boat can make contact with emergency services and can be contacted by emergency services). Boats not exceeding the one nautical mile limit are not required to have a radio.

2.6 Jet skis/Personal watercraft (PWC)

2.6.1 Jet ski wave riding may only take place in areas designated for such activity by the boat launch operator of the launch site.

2.6.2 No jet ski may be navigated in a dangerous manner or be driven at excessively high speeds within the surf zone of the launching area. No jet ski shall be navigated across the front of any bather or bathers in the designated recreational areas.

2.7 Night launching and beaching

2.7.1 Use of the launch site for night operations is to be strictly controlled by the boat launch operator. Relevant safety and statutory requirements as stipulated by SADSA and SAMSA, must be met and enforced by the boat launch operator. The boat launch operator is to provide controlled access for night boat launches and landings.

2.8 Managing conflict between different user groups

2.8.1 No other users may use the designated launch areas. Map 2 indicates the extent of the launch area and the other adjacent areas designated for recreational use.

2.8.2 Except during launching and landing, boats and jet skis under power in the in-shore area are not to approach within 200m of other users (anglers, divers, swimmers, surfers, body-boarders, or any other non-powered craft). Provided that the skipper is qualified in surf rescue operations (e.g. rescue operations or patrols) this 200m distance is not compulsory. Rescue rubber ducks that are used within 200m of other users must have a propeller guard fitted.

2.8.3 Boats may not enter an area set aside specifically for bathers or other water sports and vice versa. It is the skipper's responsibility to keep a proper lookout for bathers and divers. Other users are to stay clear of the launch and landing channel (see Map 2). Adequate signage is to be posted, informing other users (e.g. swimmers, kayaks) to remain outside of these demarcated launching/ landing areas (see Map 2).

2.9 Special events, functions and “fish runs”

2.9.1 In terms of the Merchant Shipping Act, the relevant authority may grant permission for the total number of allowable launches to be increased during exceptional cases (e.g. fishing competitions), but should do so with discretion and within the resource limits available.

2.9.2 In order to cater for special events and functions, the boat launch operator is to ensure that sufficient staff are available to cater for, and mitigate, the impacts resulting from an increase in users.

During special events the boat launch operator is to develop and implement a temporary management plan that *inter alia* provides for:

- Control and management of vehicle flows and parking
- Control of alcohol consumption, anti-social activities, littering and vandalism
- Prevention of fish hawking on site

- Control over the cleaning of boats
- Control over the disposal of offal
- Monitoring of, and compliance with, the Marine Living Resources Act
- Preventing conflicts between different user groups
- Compliance with minimum safety standards
- Provision of temporary toilets

2.10 Toilet facilities and waste water treatment

2.10.1 The existing toilet and ablution facilities, associated with the boat launch site are placed under the parking area, indicated in Map 1. The Boat launch operator shall ensure that all toilet facilities used by persons launching boats from the site are properly maintained and in a clean and hygienic condition at all times. During busy periods toilets shall be cleaned and serviced at least twice daily, while during quiet periods toilets shall be cleaned and serviced at least every second day.

2.10.2 No washing of boats will be permitted on the slipway.

2.11 Pollution and litter management

2.11.1 All litter and refuse is to be cleaned from the site by the boat launch operator at least twice a week. In peak season, and during special events the cleaning schedule is to take place at least once a day.

2.11.2 Plastic (or any other non-corroding material) refuse bins are to be provided at the site. In peak season and during special events, the bins are to be emptied daily. Outside peak season, bins are to be cleaned at least twice a week. Refuse bins are to be discreetly placed in areas of high usage. The bins will be clearly visible and be a short distance from the users. The bins are to be placed in an area where they can be easily serviced.

2.11.3 Refuelling supplies held at the launch sites will be in sealed containers, which are only to be opened once in place within the boat.

2.11.4 Spillages of fuel or oil at the launch site are to be avoided. The boat launch operator must keep Spill Sorb (or similar product) on site. Should a fuel or oil spill take place, the material containing the spill shall be properly disposed of at an approved facility.

2.11.5 No scaling, cleaning of fish or disposal of bait may take place on the site.

2.11.6 No cleaning of boats bodywork is permitted.

2.12 Noise mitigation

2.12.1 The licensed operator is to ensure that the premises is operated in accordance with the requirements of the Noise Control Regulations PN 627/1998.

2.12.2 Where the boat launch operator cannot control rowdy and noisy activity, they are to contact municipal law enforcement officials or the SAPS for assistance.

2.12.3 No dry-starting of engines is allowed at the launch site. Any users not complying with these regulations shall not be permitted to launch. The licensed operator is responsible for ensuring that management measures are put in place to address reasonable noise complaints from users, visitors and residents.

2.13 New developments

2.13.1 No listed (in terms of Schedule 1 1(e) of the Regulations under section 21 of the Environmental Conservation Act 73 of 1989) activity may take place within the site, unless approved by the responsible authority after an Environmental Impact Assessment (EIA) has been undertaken. This assessment must meet the requirements of the provincial planning and environmental authorities.

2.14 Helicopters

2.14.1 There are no demarcated helicopter-landing sites.

2.15 Archaeological sites

2.15.1 Any area of archaeological significance found on the site is to be reported immediately by the boat launch operator of the launch site to the South African Heritage Resource Agency (SAHRA) (or its nominated representative) and access to the archaeological site should be prevented, pending appropriate investigation and decision.

2.16 Consumptive use of marine resources

2.16.1 All consumptive use of marine resources on the site will be subject to the national regulations (bag limits, closed seasons etc). The boat launch operator will inform MCM and City Law Enforcement Officials of any illegal marine resource use activities occurring on the site. MCM and Municipal Police are to be notified of special events and snoek runs to ensure that enforcement staff are available to monitor the consumptive use of marine resources.

2.16.2 Fish (or any other marine resources) may not be sold/bartered on the site.

2.17 Communication and compliance

2.17.1 The boat launch operator shall draw the attention of all users of the site to the key provisions of this OMP by providing an information board at each slipway.

2.17.2 Adequate complementary signage must be provided to inform all users and visitors to the site with regards to the conditions of the OMP. Map 2 shows the minimum signage requirements.

2.17.3 The boat launch operator shall be responsible for monitoring compliance with this OMP.

2.17.4 Appropriate records of compliance monitoring and any audit will be maintained and may be used in support of subsequent applications for re-licensing of the site.

2.17.5 Any user of the site who disregards the provisions of this OMP shall be reported, by the boat launch operator, to the relevant authority that has the legal jurisdiction to impose penalties. MCM and CoCT Officials will be contacted to monitor and enforce all marine resource use activities. All social and traffic related activities will be enforced by the City Police, Traffic Officials and/or SAPS.

2.17.6 Disregard for the provisions of this OMP, may result in the relevant authority's withdrawal of the licence.

2.18 Safety, emergency preparedness and responses

2.18.1 The site shall form part of, and conform to, local and regional emergency response plans and procedures (e.g. fire, oil spills).

2.18.2 Emergency procedures will take precedence over all activities at the launch site.

2.19 Records

2.19.1 Adequate launch records, in the prescribed format, will be maintained by the boat launch operator. The minimum information for the boat launch record is to include boat registration, boat name, time of launch, time of landing, number of crew and purpose of trip.

2.19.2 The boat launch operator shall keep a detailed register of all accidents and casualties involving boats, craft and/or crew (using the prescribed SAMSA form as required by section 259 of the Merchant Shipping Act No 57 of 1951). This register should then be forwarded to the nearest SAMSA office at the end of each month.

2.20 Operators other than the licensed operator

2.20.1 The licensed operator may delegate the authority for the management of the boat launch site to any competent club or organisation. The licensed operator shall ensure that any club or institution to which operation of the site may be delegated is properly constituted, has the capacity to observe the conditions of this OMP and re-invests income generated from the site to the effective management of that site.

2.20.2 The prescriptions in this OMP shall be incorporated into any lease agreement entered into between the licensed operator and a club or institution to which the management authority is delegated.

2.20.3 The club or organisation will ensure that a suitable Code of Conduct is in place, and that its members comply with the conditions of the Code.

2.20.4 This club or organisation shall ensure that the site is open to all users, on condition that they comply with the legal requirements of the site. The Club or organisation shall ensure that a transparent, equitable and fair process is followed in determining its membership.

3. ACRONYMS USED IN THIS DOCUMENT

CoCT	City of Cape Town
DEA&DP	Department of Environmental Affairs and Development Planning
ECA	Environmental Conservation Act
EIA	Environmental Impact Assessment
OMP	Operational Management Plan
MCM	Marine and Coastal Management
MLRA	Marine Living Resources Act, Act No. 18 of 1998
NEMA	National Environmental Management Act, Act No. 107 of 1998
PWC	Personal Watercraft
SAHRA	South African Heritage Resources Agency
SAMSA	South African Maritime Safety Authority
SAPS	South African Police Services

4. OVERVIEW OF OTHER LEGISLATION REFERRED TO IN THIS DOCUMENT

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The Minister may establish areas or zones where subsistence fishers may fish and, after consultation, may declare a specified community to be a fishing community, any person to be a subsistence fisher or any fishing or related activity or the exercise of any other right in that area or zone to be prohibited. No subsistence fishing permit shall be transferable except with the approval of and subject to the conditions determined by the Minister.

Merchant Shipping Act (57 of 1951)

All vessels, of whatever size, that proceed to sea from anywhere in South Africa fall under the Merchant Shipping Act. Small vessels (3 m to < 25 tonnes) are divided into two classes, viz. small vessels used solely for sport and recreation, and all other small vessels, e.g. fishing boats, diving boats and sailing training yachts (i.e. commercial boats).

The Merchant Shipping Act:

- Sets out various categories of vessel, applicable to each class, and their operational limits.
- Makes provision for the inspection of seaworthiness and the competency of skippers.
- Sets out the various safety measures.
- Requires that skippers submit voyage details.

- Makes provision for authorised agencies to exercise or perform powers or duties as required by the Act.

Has certain Regulations namely:

- Government Notice R2799 that applies to ships or small vessels used for sport or recreation.

- Government Notice R1044 that makes provision for vessels of less than 3 m in length. Vessels falling into this category may not proceed to sea further than 500 m from the low water mark. 7

The Act also has relevance with respect to control of marine pollution and to that extent applies to all ships in South African waters.

Road Traffic Act (29 of 1989)

This Act outlines the various requirements and Regulations for vehicles and drivers. In terms of the Act, if a vehicle is able to gain access to, and be driven on, the seashore, this Act and its Regulations are deemed to apply.

There are a number of High Court cases which have established the breadth of application of the definition of a road and, although no cases involving the Admiralty Reserve or that part of the beach between the high and low water marks are known of, the Provincial Road Traffic Inspectorate is certain that the Act applies.

In this, it is important to note that a person does not have to have a right of vehicular access to the beach: right of access by the person is sufficient. The responsible erection of booms, etc., in providing and simultaneously limiting vehicular access to the beach, will thus not affect the applicability of this legislation to what can generally be described as “the beach”.

All vehicles (powered vehicles and trailers) using the beach must be roadworthy and licensed, and be driven by persons who themselves are licensed drivers of that category of vehicle. The body that controls vehicular access to the beach must know that the provisions of this Act apply. This Act has been replaced by the new National Road Traffic Act (93 of 1996). However, the 1996 Act provides that any relevant provision of the 1989 Act will remain in force until such time as the corresponding provision of the 1996 Act has been put into operation.

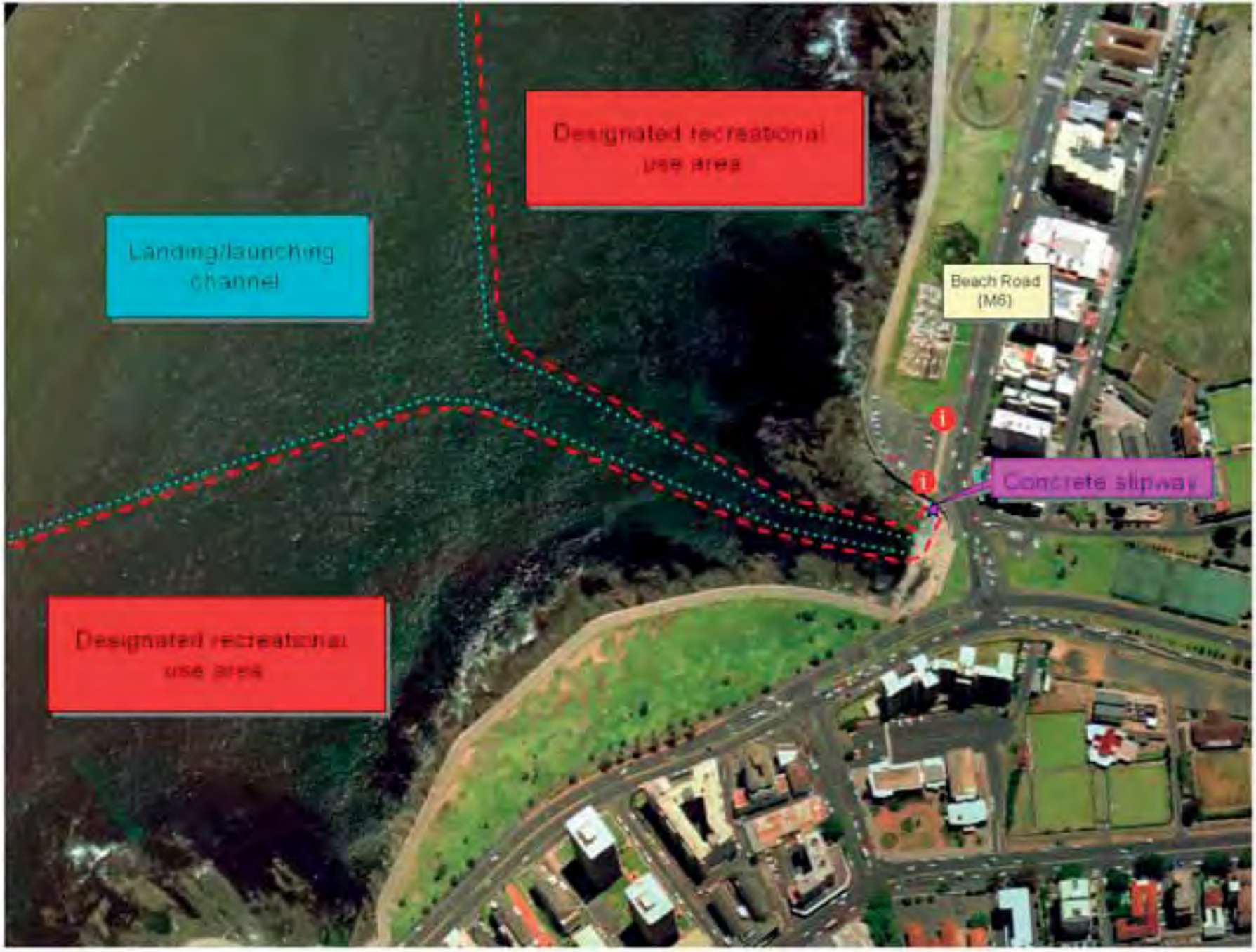


Parking area
Concrete slipway
Entry routes
Exit routes

Map 1 - Access, Launching & Parking Facilities

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PENINSULA PERMITS
for the City of Cape Town



Recreational areas
Concrete slipway
Launching/landing channel
Information boards

Map 2 - Designated 'Use Areas' & positioning of information boards

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Prepared by

PENINSULA PERMITS

for the City of Cape Town

Annexure J

OPERATIONAL MANAGEMENT PLAN FOR WITSANDS SLIPWAY

PREPARED BY:
Peninsula Permits cc.
Envirocentric

FOR:
The City of Cape Town

MAY 2004

Envirocentric

PENINSULA PERMITS

1. BACKGROUND

1.1 Legal Context

This General Policy for off-road vehicles in the coastal zone was published in Government Notice 858, in Government Gazette No.15655, dated 29 April 1994 and introduced general control measures, on a national basis, to protect the coastal environment from damage caused by the use of vehicles in the coastal zone and to ensure the safety of other beach users. The policy makes provision for zoning the coastal zone, for the protection of ecologically sensitive areas, and for various recreational activities, and also allows for a permit system to facilitate the control of vehicles in specifically demarcated areas. According to the General Policy, the use of vehicles in any beach area may be reserved for specific purposes, such as angling or boat-launching.

The Control of Vehicles in the Coastal Zone Regulations ("Beach Regulations") published under NEMA (Government Notice No. 1399 of 21 December 2001) provide for a general prohibition on the recreational use of vehicles in the coastal zone and procedures for approving the use of vehicles in the coastal zone under specific circumstances. They also provide measures for the enforcement of these regulations and prescribe penalties in respect of contraventions.

The Beach Regulations (Regulation 7) require operators of boat launching sites to apply to the relevant authority to grant a license to use vehicles, or allow their use by third parties, to facilitate boat launching.
An application for a licence must:

- Be made in the format stipulated by the relevant authority.
- Be accompanied by payment or proof of payment of the application fee stipulated by the relevant authority.
- Clearly indicate:
  - The boundaries of the proposed boat-launching site and all access roads.
  - The types of vehicles that will be used at the site.
  - Set out fully the reasons why the boat-launching site is required.
  - Include a plan for managing activities at the site in a manner that avoids or minimises damage to the environment.
  - Subject to Regulation 22, be accompanied by evidence that the requirements of Section 24(7) of the Act relating to the investigation, assessment and communication of the potential impact of the activities associated with boat-launching at the site have been complied with.

To comply with these regulations, the City of Cape Town (CoCT) has completed the required application form for the licensing of the Witsand launching site. Below please find the proposed Operational Management Plan for the Witsand launching site.

Based on this generic OMP, the OMP for the Witsand Boat Launch Site includes a general description of the boat launch site (including slipways, parking, roads, and other service facilities), a general description of the types of uses of the boat launch site and a detailed description of the activities required to minimise and mitigate the environmental impacts of the use of the boat launch site. The OMP will however only describe the minimum operational management requirements for each site and it is anticipated that each site will, over time, exceed these minimum requirements.

1.2 Environmental Management in the City of Cape Town

The City of Cape Town's Integrated Metropolitan Environmental Policy (IMEP) was formally adopted in October 2001. IMEP sets the broad framework and a number of core principles for guiding the City towards a sustainable future. IMEP recognises the economic, social and environmental value of the City's coastal asset, and as such identified the Coast as a priority theme for the development of a detailed implementation strategy. In October 2003, the City formally adopted the Coastal Zone Management Strategy giving effect to the principles of IMEP and setting coastal management practise and standards in place.

1.3 Responsible Authority

All reference to the licensed operator within this OMP refers to the City of Cape Town. The City through a lease agreement, may delegate the authority and responsibility for the management of the boat launch site to any competent club or organisation (see 2.20).

1.4 Function of the OMP

The OMP has been drafted to ensure compliance with the regulations in terms of the national environmental management act, 1998: control of vehicles in the coastal zone, specifically "*7(4)(f) subject to regulation 22, be accompanied by evidence that the requirements of section 24(7) of the act relating to the investigation, assessment and communication of the potential impact of the activities associated with boat-launching at the site have been complied with*". The function of the OMP is thus to ensure that the licensed operator utilises the boat launching site in an environmentally sensitive manner. The OMP explicitly identifies the mitigating actions required to control the impacts of the boat launch site and associated activities on the bio-physical attributes of the site, the surrounding residents and the safety of the users of the site. The OMP further provides a framework to ensure that all activities occurring within the boat launch site comply with the relevant enabling legislation.

1.5 Site description

The Witsand Boat Launch Site is owned by the City of Cape Town, situated 600m from Lighthouse Road, which is approximately 1.7km from the Main Road (M65), Soetwater.

The boat launching facilities at Witsand include the following:

- 5 condemned storage garages.
- One operational storage garage.

- A concrete slipway/slab.
- A tarred non-demarcated parking area (large enough to accommodate 50 vehicles-and-trailers).

Map 1 shows the location of the boat launching facilities at the Witsand. The Witsand Boat Launch Site falls within Soetwater (CF 978), but currently no lease agreement exists. The CoCT is responsible for managing the launching of all boats from the launching areas, for ensuring the facility is open to public use and for the ongoing maintenance and development of the facilities.

1.6 Site usage

As the boat launch site is one of the most accessible launching facilities on the western coast of the Peninsula, to which the public has free and unrestricted access, it has assumed a significant role for many users. This site is approximately 4km from Ocean View and 5km from Kommetjie. The peak usage is during the commercial season (i.e. November to June).

The following uses have been recorded at the boat launch site:

- Most of the users of the slipway are recreational and commercial fishermen.
- Rescue personal intermittently use the site (NSRI, Metro Rescue etc).

Accurate user counts do not exist for the site. The users and associated levels of usage are seasonal and weather dependent. It is estimated that up to 8400 launches may take place per annum. There have been records of up to 40 boats being launched per day between November to April, and again during the snoek season between June and July, weather permitting.

2. OPERATIONAL MANAGEMENT REQUIREMENTS OF BOAT LAUNCH SITES

2.1 Access management

2.1.1 The site is accessed off Lighthouse Road, 1.7km from the Main Road (M65) and some 4km south of Ocean View. The layout of the access to the parking area and launch site is shown in Map 2. The roads and parking areas must be tarred, adequately marked to meet municipal and provincial road standards and free of potholes.

2.1.2 All access roads, parking areas and slipways are to be properly bollarded or fenced to ensure that all vehicles remain on the hardened road surface, and only park in designated parking areas. All areas outside the hardened road surfaces are designated no-go areas (see Map 2 for the extent of the hardened road surfaces at the site).

2.1.3 Vehicles, their trailers and the drivers or operators using the boat launch site shall comply with the requirements of the Road Traffic Act and the General Policy on Control of Vehicles in the Coastal Zone (Government Gazette, Notice 858 of 29 April 1994).

2.1.4 Trailers may be brought onto the seashore by a motor vehicle only for the purposes of launching or retrieving a vessel. Upon launching (or retrieving if appropriate) a vessel, these trailers and vehicles are to be parked in a clearly demarcated parking area (shown in Map 2).

2.1.5 Only the designated launch area may be used to launch boats. Erosion of the launch area must be monitored and remedial/rehabilitation action instituted if necessary. Where the remedial/rehabilitation measure constitutes a listed activity in terms of the Environmental Conservation Act, and as directed by the relevant authorities, an Environmental Impact Assessment (EIA) will be implemented for the remedial/rehabilitation action.

2.1.6 The minimum signage requirements to facilitate vehicular and pedestrian flows, and for demarcating parking areas, are shown in Map 3. Map 3 further indicates the location for the posting of the safety requirements for the site.

2.1.7 A fee is to be charged and a permit issued to all persons launching from the site. Key provisions of this OMP and code of conduct are to be described on the permit (or an attached brochure). A chain/boom is to be placed across the access route of the slipway enabling the licensed operator to control access. Users can pay an annual instalment, entitling them to free access to the launch site for a year. On payment of the instalment, the user must be issued with and be made aware of the conditions of the OMP. They will furthermore be issued with a key to the chain/boom at the entrance to enable them to access the launching site.

The launching site is to be kept locked when no boats are at sea to avoid unauthorized entry. Only persons who are in possession of a valid permit (and key) may make use of this slipway. The boom is to be closed between sunset and sunrise, unless by special arrangement for night launches.

2.1.8 A strict limit of 50 vehicles-and-trailers may use the site at any one time. This limit includes boats in the process of being launched or retrieved and vehicles-and-trailers parked in the designated parking area.

2.1.9 Due to the nature of the boat launch site (facilities, services, parking, access, bio-physical characteristics), vehicles under 1400cc engine capacity shall not be permitted to launch a boat at the site.

2.1.10 Due to the nature of the boat launch site (facilities, services, parking, access, bio-physical characteristics) boats longer than 6 meters and boat engines with a combined engine capacity greater that 300 HP engine capacity shall not be permitted to launch from the site.

2.1.11 Pedestrians traversing through sensitive dunes and bird nesting areas, adjacent to the site, will be managed to minimise environmental impacts. Access routes through such areas will be clearly defined, supported by appropriate signage.

2.2 Parking management

2.2.1 A limit of 20 vehicles-and-trailers will be allowed in the designated parking area. During peak periods (November to June), 30 overflow vehicles-and-trailers may park legally along the access roads, provided that they do not hinder or obstruct traffic flows.

2.2.2 The parking area for vehicles and vehicles-and-trailers will be properly demarcated and vehicle flows clearly indicated.

2.2.3 Launching and parking areas must be separated. Parked vehicles should not obstruct access to the boat launch site by any user or visitor, nor interfere with reasonable use of that beach by any user or visitor.

2.3 Boat Launch area

2.3.1 The launch area shall not be used as an access to other parts of the beach by vehicles and trailers.

2.3.2 Kelp washed up onto the launch site may not be completely removed from the area. If kelp builds up directly on the launch site, kelp may be spread out manually, along another adjacent section of the coastline that will not impact on other users. If kelp build up has reached the extent that mechanical means is necessary, prior authorisation and consent must be obtained from the relevant authorities.

2.4 Launching and beaching control and safety

2.4.1 The licensed operator must be in control of all launches and boat retrievals at all times.

2.4.2 Users of the launch site must be made aware of the 5 condemned storage garages, supported by appropriate signage.

2.4.3 No alcohol or any other intoxicating substance shall be allowed on the CoCT premises. Any person suspected of being under the influence of alcohol or any other intoxicating substance shall not be permitted access to, or allowed to remain on, the premises.

2.4.4 All club, SADSA, SAMSA and CoCT safety regulations shall be adhered to at all times. A comprehensive first-aid box capable of handling normal domestic emergencies shall be maintained at the Soetwater ticket office. Weatherproof lists of relevant emergency contact numbers shall be displayed near the launch site.

2.4.5 Where feasible, designated launch positions at launch sites on beaches shall be clearly demarcated. The area demarcated for boat launching will be demarcated by adequate signage and positioned as indicated on Map 3.

2.4.6 Boats and vehicles may not be left unattended and shall be retrieved from the landing site.

2.4.7 Boats in the process of landing or being retrieved shall have priority over boats wishing to launch.

2.4.8 The CoCT shall temporarily close the launch site (in consultation with the fisherman and NSRI) under exceptional circumstances such as extremely inclement weather conditions, damage to the launching area, or any other emergency that will prevent the safe launching or retrieval of boats from the beach. If the launch site is to be closed to users, the chain-gate/boom will be locked by the licensed operator and a notice posted to notify users of the reason for closure and anticipated time of re-opening.

2.4.9 The launch area will be kept clear of all other users when in use. Signage will be posted, at the slipway informing other users (e.g. surfers, kayaks) to remain outside of the demarcated launching/landing areas.

2.4.10 The licensed operator shall ensure that only persons who are suitably licensed (e.g. relevant code driving license) shall operate vehicles for launching or retrieval on the site.

2.4.11 The provisions of section 68 of the Merchant Shipping Act No 57 of 1951 and all applicable regulations made under Section 356 of the same act shall be strictly adhered to. No boat will be able to launch from the site unless it is properly marked and registered (or licensed as the case may be) according to the Merchant Shipping Act No 57 of 1951 and it's associated regulations.

2.5 Vessel safety

2.5.1 No boat will be able to launch unless the skipper is in possession of a valid Certificate of Competency issued by the South African Maritime Safety Authority (SAMSA), an Agency recognised by it or a IRB (Inflatable Rubber Duck) skippers Certificate issued by Lifesaving South Africa.

2.5.2 Everyone on the boat in the immediate launch and landing zone must wear life jackets or buoyancy aids.

2.5.3 All boats launching from the site are to carry a functional form of communication. (i.e. in the case of an emergency the boat can make contact with emergency services and can be contacted by emergency services).

2.6 Jet skis/Personal watercraft (PWC)

2.6.1 Jet ski wave riding may only take place in areas designated for such activity by the licensed operator of the launch site.

2.6.2 No jet ski may be navigated in a dangerous manner or be driven at excessively high speeds within the surf zone of the launching area. No jet ski shall be navigated across the front of any bather or bathers in the designated recreational areas.

2.7 Night launching and beaching

2.7.1 Use of the launch site for night operations is to be strictly controlled by the boat launch operator. Relevant safety and statutory requirements as stipulated by SADSA and SAMSA, must be met and enforced by the boat launch operator. The boat launch operator is to provide controlled access for night boat launches and landings.

2.8 Managing conflict between different user groups

2.8.1 No other users may use the designated launch areas. Map 3 indicates the extent of the launch area and the other adjacent areas designated for recreational use.

2.8.2 During launching and landing, boats and jet skis under power in the in-shore area are not to approach within 200m of other users (anglers, divers, swimmers, surfers, body-boarders, or any other non-powered craft). Provided that the skipper is qualified in surf rescue operations (e.g. rescue operations or patrols) this 200m distance is not compulsory. Rescue rubber ducks that are used within 200m of other users must have a propeller guard fitted.

2.8.3 Boats may not enter an area set aside specifically for bathers or other water sports and vice versa. It is the skipper's responsibility to keep a proper lookout for bathers and divers.

Other users are to stay clear of the launch and landing channel (see Map 3). Adequate signage is to be posted, informing other users (e.g. swimmers, kayaks) to remain outside of these demarcated launching/ landing areas (see Map 3).

2.9 Special events and peak periods (November to June)

2.9.1 In terms of the Merchant Shipping Act, the relevant authority may grant permission for the total number of allowable launches to be increased during exceptional cases (e.g. fish runs), but should do so with discretion and within the resource limits available.

2.9.2 In order to cater for special events and fish runs, the licensed operator is to ensure that sufficient staff are available to cater for, and mitigate, the impacts resulting from an increase in users.

During the commercial season (November to June), the licensed operator is to aggressively manage and enforce the conditions of the OMP. The following areas will require intensive management during periods of high usage:

- Control and management of vehicle flows and parking
- Control of alcohol consumption, anti-social activities, littering and vandalism
- Prevention of overnighting at the boat launch site
- Prevention of fish hawking on site
- Ensuring control over the cleaning of boats
- Ensuring control over the disposal of offal
- Monitoring of, and compliance with, the Marine Living Resources Act
- Prevention of conflicts between different user groups
- Ensuring compliance with minimum safety standards
- Provision of temporary toilets

2.10 Toilet facilities and waste water treatment

2.10.1 Additional chemical toilets must be provided by the licensed operator and placed as indicated in Map 1 and 2. The Licensed operator shall ensure that all toilet facilities used by persons launching boats from the site are properly maintained and in a clean and hygienic condition at all times. During busy periods (November to June), toilets shall be cleaned and serviced at least twice daily, while during quiet periods toilets shall be cleaned and serviced at least every second day.

2.10.2 Wastewater must be discharged into a recognised drainage system. All wastewater is to be directed into the Municipal Waste Water drains. Where there is no municipal sewer available at the site, an adequately designed and maintained septic tank or any other acceptable wastewater treatment system is to be provided.

2.10.3 No washing of boats will be permitted at the launch site or in the parking area.

2.11 Pollution and litter management

2.11.1 All litter and refuse is to be cleaned from the site by the licensed operator at least twice a week. In peak season (November to June), and during special events, the cleaning schedule is to take place at least once a day.

2.11.2 Plastic (or any other non-corroding material) refuse bins are to be provided at the site. In peak season, and during special events and crayfish season, the bins are to be emptied daily. Outside peak season, bins are to be cleaned at least twice a week. Refuse bins are to be discreetly placed in areas of high usage (e.g. at the parking area). The bins will be clearly visible and be a short distance from the users. The bins are to be placed in an area where they can be easily serviced.

2.11.3 Dustbins at the site are to be “baboon-proofed”.

2.11.4 Refuelling supplies held at the launch sites will be in sealed containers, which are only to be opened once in place within the boat.

2.11.5 Spillages of fuel or oil at the launch site are to be avoided. The licensed operator will keep Spill Sorb (or similar product) at the Soetwater ticket office. Should a fuel or oil spill take place, the material containing the spill shall be properly disposed of at an approved facility.

2.11.6 No scaling, cleaning of fish or disposal of bait may take place on the site.

2.11.7 No cleaning of boats bodywork is permitted at the launch site or in the parking area.

2.12 Noise mitigation

2.12.1 The licensed operator is to ensure that the premises is operated in accordance with the requirements of the Noise Control Regulations PN 627/1998.

2.12.2 Where the licensed operator cannot control rowdy and noisy activity, they are to contact municipal law enforcement officials or the SAPS for assistance.

2.12.3 Motors are to be started and warmed up in such a way as not to cause undue nuisance to other beach users, visitors and residents. The licensed operator is responsible for ensuring that management measures are put in place to address reasonable complaints from users, visitors and residents.

2.13 New developments

2.13.1 No listed (in terms of Schedule 1 1(e) of the Regulations under section 21 of the Environmental Conservation Act 73 of 1989) activity may take place within the site, unless approved by the responsible authority after an Environmental Impact Assessment (EIA) has been undertaken.

This assessment must meet the requirements of the provincial planning and environmental authorities and may only take place with permission of the landowner.

2.13.2 If there is a need to remove or clear rocks and sand from the launching/landing channel, then Schedule 1 1(e) of the Regulations under section 21 of the Environmental Conservation Act 73 of 1989 is applicable (i.e. an Environmental Impact Assessment will have to be undertaken).

2.14 Helicopters

2.14.1 There are no demarcated helicopter-landing sites.

2.15 Archaeological sites

2.15.1 Any area of archaeological significance found on the site is to be reported immediately by the licensed operator of the launch site to the South African Heritage Resource Agency (SAHRA) (or its nominated representative) and access to the archaeological site should be prevented, pending appropriate investigation and decision.

2.16 Consumptive use of marine resources

2.16.1 All consumptive use of marine resources on the site will be subject to the national regulations (bag limits, closed seasons etc). The licensed operator will inform MCM and SANParks officials of any illegal marine resource use activities occurring on the site. MCM, Municipal Police and SANParks are to be notified of special events to ensure that enforcement staff are available to monitor the consumptive use of marine resources.

2.16.2 Fish (or any other marine resources) may not be sold/bartered on the site.

2.17 Communication and compliance

2.17.1 The licensed operator shall draw the attention of all users of the site to the key provisions of this OMP by providing an information board at each slipway.

2.17.2 Adequate complementary signage must be provided to inform all users and visitors to the site with regards to the conditions of the OMP. Map 3 shows the minimum signage requirements.

2.17.3 The licensed operator shall be responsible for monitoring compliance with this OMP.

2.17.4 Appropriate records of compliance monitoring and any audit will be maintained and may be used in support of subsequent applications for re-licensing of the site.

2.17.5 Any user of the site who disregards the provisions of this OMP shall be reported, by the licensed operator, to the relevant authority that has the legal jurisdiction to impose penalties. MCM, CoCT and SANParks officials will be contacted to monitor and enforce all marine resource use activities. All social and traffic related activities will be enforced by the City Police, Traffic Officials and/or SAPS.

2.17.6 Disregard for the provisions of this OMP, may result in the relevant authority's withdrawal of the licence.

2.18 Safety, emergency preparedness and responses

2.18.1 The site shall form part of, and conform to, local and regional emergency response plans and procedures (e.g. fire, oil spills).

2.18.2 Emergency procedures will take precedence over all activities at the launch site.

2.19 Records

2.19.1 Adequate launch records, in the prescribed format, will be maintained by the licensed operator. The minimum information for the boat launch record is to include boat registration, boat name, time of launch, time of landing, number of crew and purpose of trip.

2.19.2 The licensed operator shall keep a detailed register of all accidents and casualties involving boats, craft and/or crew (using the prescribed SAMSA form as required by section 259 of the Merchant Shipping Act No 57 of 1951). This register should then be forwarded to the nearest SAMSA office at the end of each month.

2.20 Operators other than the licensed operator

2.20.1 The licensed operator may delegate the authority for the management of the boat launch site to any competent club or organisation. The licensed operator shall ensure that any club or institution to which operation of the site may be delegated is properly constituted, has the capacity to observe the conditions of this OMP and re-invests income generated from the site to the effective management of that site.

2.20.2 The prescriptions in this OMP shall be incorporated into any lease agreement entered into between the licensed operator and a club or institution to which the management authority is delegated.

2.20.3 The club or organisation will ensure that a suitable Code of Conduct is in place, and that its members comply with the conditions of the Code.

2.20.4 This club or organisation shall ensure that the site is open to all users, on condition that they comply with the legal requirements of the site. The Club or organisation shall ensure that a transparent, equitable and fair process is followed in determining its membership.

3. ACRONYMS USED IN THIS DOCUMENT

CoCT	City of Cape Town
DEA&DP	Department of Environmental Affairs and Development Planning
ECA	Environmental Conservation Act
EIA	Environmental Impact Assessment
OMP	Operational Management Plan
MCM	Marine and Coastal Management
MLRA	Marine Living Resources Act, Act No. 18 of 1998
NEMA	National Environmental Management Act, Act No. 107 of 1998
PWC	Personal Watercraft
SAHRA	South African Heritage Resources Agency
SAMSA	South African Maritime Safety Authority
SANParks	South African National Parks
SAPS	South African Police Services

4. OVERVIEW OF OTHER LEGISLATION REFERRED TO IN THIS DOCUMENT

Environment Conservation Act (73 of 1989)

The primary objective of the ECA is to provide for the effective protection and controlled utilisation of the environment (Henderson, 1996). The Act makes provision for the declaration of protected natural environments and for the identification of activities that may have a detrimental effect on the environment.

Regulations to control potentially harmful activities on a permit system within demarcated sensitive coastal areas were promulgated in terms of the ECA. The prohibited activities are the disturbance of vegetation, earthworks, dredging and dune stabilisation.

Subsequent to the promulgation of the Act in 1989, a number of key regulations governing EIAs and identified activities that may be detrimental to the environment have also been promulgated. Of importance to proposed developments in the coastal zone are Government Notices R1182, R1183, R1184 and R448 and amendments of May 2002. While beach driving and boat launching are not listed activities in terms of these regulations, proposed developments, such as structures below the high water mark of the sea and certain access infrastructure which may provide for such activities, must undergo environmental impact assessments before environmental authorisation can be granted by DEAT.

The Act was originally passed to provide a basis for environmental conservation in South Africa. Many of its provisions have since been repealed by NEMA. Provision is also made in NEMA for the repeal of sections of Part V and Part VI of the Environmental Conservation Act, which provide for the “Control of Activities which may have a Detrimental Effect on the Environment" and associated EIA regulations. However, these remain in force until they are replaced with new regulations promulgated under NEMA.

National Environmental Management Act (107 of 1998)

NEMA is South Africa’s overarching environmental legislation and has, as its primary objective, to provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state and to provide for matters connected therewith (Government Gazette, 1998).

The Act provides for the right to an environment that is not harmful to the health and well-being of South African citizens; the equitable distribution of natural resources; sustainable development; environmental protection and the formulation of environmental management frameworks (Government Gazette, 1998). These principles and provisions in Chapter 5 (Integrated Environmental Management) govern the way in which environmental management should be practiced. Provision is also made for the issuing of various Regulations in order to carry out the purposes and the provisions of NEMA.

Marine Living Resources Act (18 of 1998)

This MLRA repeals most of the Sea Fishery Act (12 of 1988). Its preamble reads as follows:

"To provide for the conservation of the marine ecosystem, the long-term sustainable utilisation of marine living resources and the orderly access to exploitation, utilisation and protection of certain marine living resources; and for these purposes to provide for the exercise of control over marine living resources in a fair and equitable manner to the benefit of all the citizens of South Africa; and to provide for matters connected therewith."

The Act and Regulations published thereunder provide for the conservation of South Africa's marine ecosystems and the sustainable utilisation of marine living resources. This includes the protection of every species of sea animal, whether vertebrate or invertebrate, including the spawn or larvae of such sea animal, but excluding any seal or sea bird. Fish and marine organisms were protected by means of prohibitions against their catching, disturbance or possession. There is an OMPhasis on the broadening of fair and equitable access to resources, the gradual transformation of fishing methods, the development of fees for utilisation and a favourable business environment in fisheries. The Act provides for a principle of national control and co-ordination and places responsibility for resource-allocation decisions with the Minister: Environmental Affairs and Tourism. The Act makes provision for the granting of commercial, recreational and subsistence fishing rights.

The Minister may establish areas or zones where subsistence fishers may fish and, after consultation, may declare a specified community to be a fishing community, any person to be a subsistence fisher or any fishing or related activity or the exercise of any other right in that area or zone to be prohibited. No subsistence fishing permit shall be transferable except with the approval of and subject to the conditions determined by the Minister.

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Has certain Regulations namely:

- Government Notice R2799 that applies to ships or small vessels used for sport or recreation.

- Government Notice R1044 that makes provision for vessels of less than 3 m in length. Vessels falling into this category may not proceed to sea further than 500 m from the low water mark. 7

The Act also has relevance with respect to control of marine pollution and to that extent applies to all ships in South African waters.

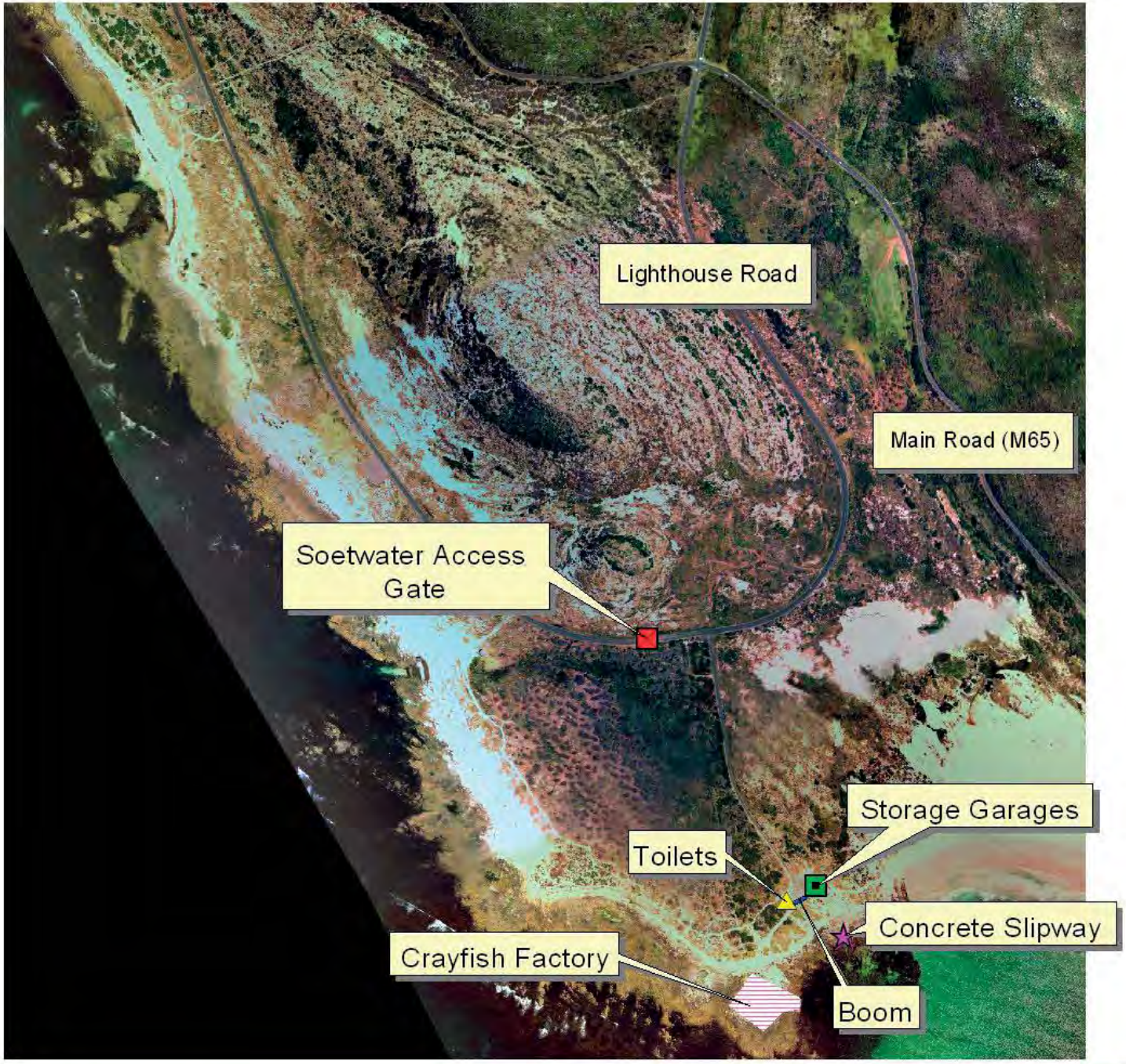
Road Traffic Act (29 of 1989)

This Act outlines the various requirements and Regulations for vehicles and drivers. In terms of the Act, if a vehicle is able to gain access to, and be driven on, the seashore, this Act and its Regulations are deemed to apply.

There are a number of High Court cases which have established the breadth of application of the definition of a road and, although no cases involving the Admiralty Reserve or that part of the beach between the high and low water marks are known of, the Provincial Road Traffic Inspectorate is certain that the Act applies.

In this, it is important to note that a person does not have to have a right of vehicular access to the beach: right of access by the person is sufficient. The responsible erection of booms, etc., in providing and simultaneously limiting vehicular access to the beach, will thus not affect the applicability of this legislation to what can generally be described as “the beach”.

All vehicles (powered vehicles and trailers) using the beach must be roadworthy and licensed, and be driven by persons who themselves are licensed drivers of that category of vehicle. The body that controls vehicular access to the beach must know that the provisions of this Act apply. This Act has been replaced by the new National Road Traffic Act (93 of 1996). However, the 1996 Act provides that any relevant provision of the 1989 Act will remain in force until such time as the corresponding provision of the 1996 Act has been put into operation.



Crayfish factory
Concrete slipway
Ablution facilities
Garages
Gates

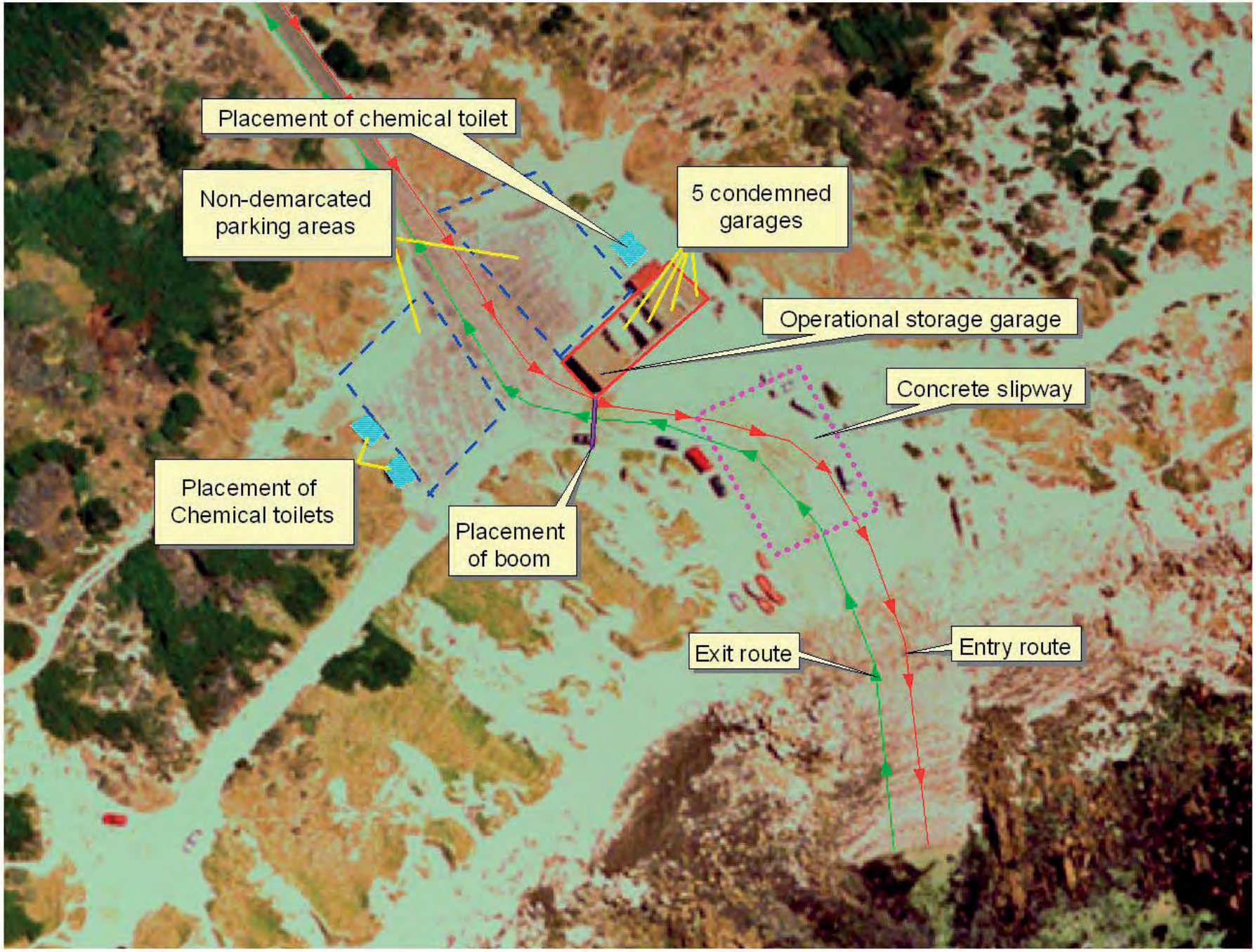
Map 1 - Location of boat launching facilities at Witsand

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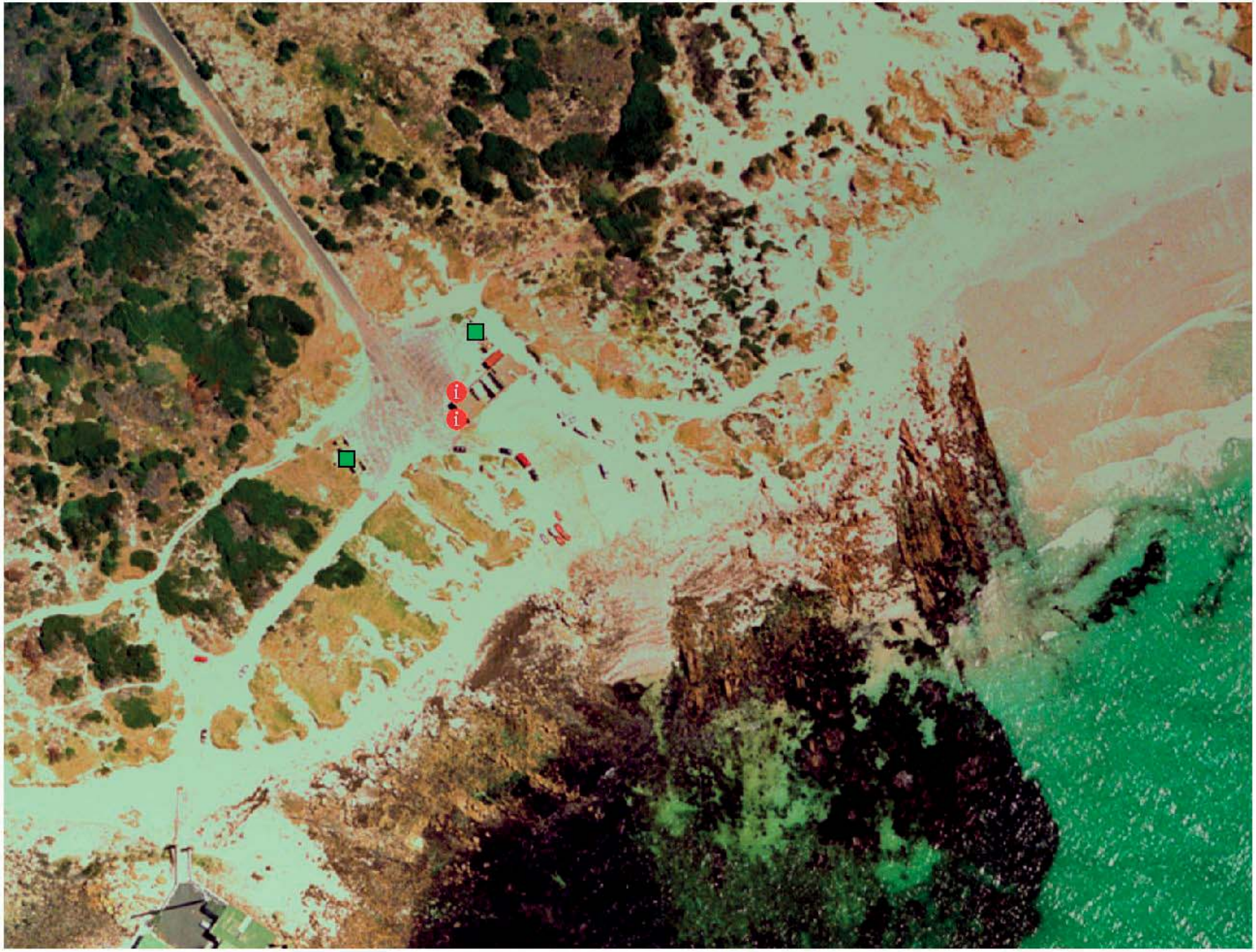
Entry route
Toilets
Parking area
Concrete slipway

Boom.shp
Garages
Exit route

Map 2 - Launching facilities & Entry/Exit Routes

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Dustbins

Information

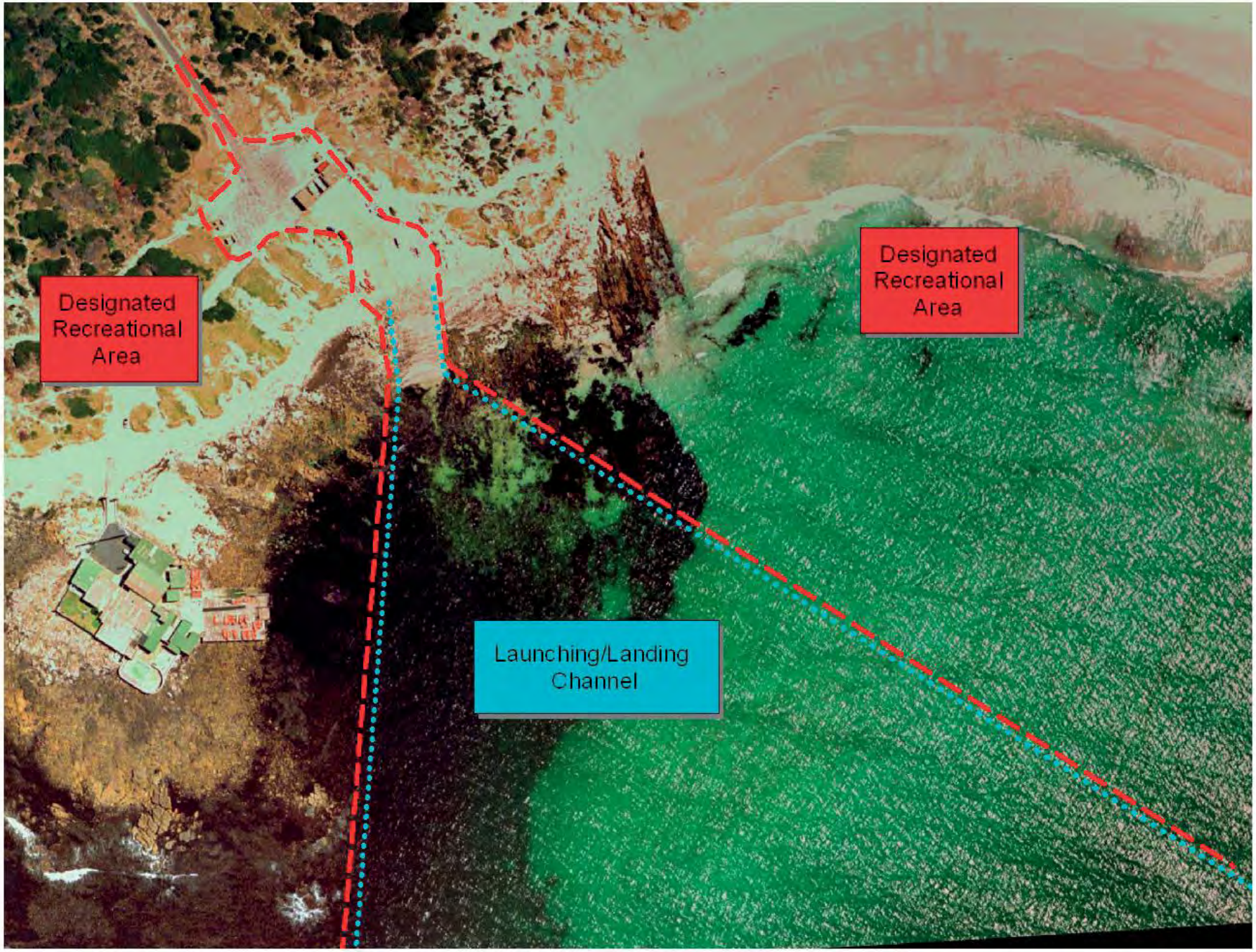
Map 3 - Positioning of information boards and dustbins

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Recreational area.
Launching channel

Map 4 - Designated 'Use Areas'

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Chapter 16: Coastal Recreational Use Zones

1. Introduction

With over 240km of highly varied coastline as part of an urban area with a population exceeding 3.5 million people, coastal recreation is one of the most important social assets that the coast holds for Cape Town. Cape Town's coastline is highly varied with in-excess of 48 sandy beaches, interspersed with rocky shoreline, calm protected bays, wide sandy beaches and varied swell and wind conditions. This in conjunction with an ever increasing variety and popularity of new water sports places Cape Town as a global centre of coastal recreation. The wide diversity and quality of coastal recreation on Cape Town's coastline is one of the core drivers of the tourism sector and Cape Town's desirability as coastal city for international and national visitors. The number, types and diversity of coastal recreation has grown substantially over the last 15 years and includes amongst others:

- Surfing and body boarding
- Stand Up Paddle Boarding
- Kite Surfing
- Kayaking and Surfskiing
- General swimming
- Beach activities (sunbathing, volley ball, Frisbee, ball sports)
- Recreational fishing
- Sand Yachting
- Scuba diving
- Lifesaving training and competitions
- Jetskiing
- Motorised Watercraft
- Sailing (all forms)
- Windsurfing
- Spear fishing
- Open water swimming

2. Issue

With the increasing number of recreational users as well as forms of recreation, safety considerations for the general public visiting the coastline is at the core of use zone considerations. In addition the potential for conflict between user groups is growing as a result of the increasing forms of recreation competing for the same coastal space.

3. General Principles

a) The coastline is a common space belonging to all. Regulation and control of recreation types should only be done when necessary where public safety, nuisance or conflict are factors
b) Access to the coastline for recreation must remain unrestricted and free wherever possible and practical
c) A common principle of a shared space, consideration and care must be entrenched in all user groups
d) Coastal recreation in all its forms should be encouraged

e) Fair and reasonable space (use zones) must be provided for those activities that may present safety concerns to the general public, or are considered possible nuisance factors
f) The “common good” should be the defining factor if and when choices are to be made
g) Coastal recreation is strictly at the users own risk

4. Use Zones: Restrictions and Regulations

4.1. Surfing and bodyboarding

Unrestricted access across the coastline but not permitted in the following areas:

- Formal Blue Flag Beaches
- In any area designated as a defined swimming area for safety reasons by lifesaving flags during official lifesaving operations or by City officials
- Between the Law Enforcement Hut and Jaeggers Walk at Fish Hoek Beach

4.2. Stand Up Paddle Boarding

Unrestricted access across the coastline but not permitted in the following areas:

- Formal Blue Flag Beaches
- In any area designated as a defined swimming area for safety reasons by lifesaving flags or by City officials
- Between the Law Enforcement Hut and Jaeggers Walk at Fish Hoek Beach

4.3. Kite Surfing and windsurfing

Unrestricted access across the coastline but not permitted in the following areas:

- All Blue Flag Beaches
- Silwerstroomstrand Resort within 200m of shorebreak
- Melkbos main beach (see aerial photograph) within 500m of shorebreak
- Big Bay main beach within 200m of shorebreak
- Small Bay beach
- Clifton beaches 1- 4
- Glen Beach
- Camps Bay Beach within 200m of shorebreak
- Llandudno Beach
- Seaforth beach
- Between the Law Enforcement Hut and Jaeggers Walk at Fish Hoek Beach
- Between Muizenberg Corner and Zandvlei Mouth
- Strandfontein Pavilion
- Mnandi
- Blue Waters Resort
- Monwabisi Resort

- East of the lifesaving club on Strand Beach
- Gordon's Bay Beach
- Bikini Beach

4.4. Kayaking and Surfskiing

Unrestricted launch and land access across the coastline but not permitted in the following areas:

- All Blue Flag Beaches
- Between the Law Enforcement Hut and Jaeggers Walk at Fish Hoek Beach
- At Seaforth beach in accordance with the demarcated area
- In any area designated as a defined swimming area for safety reasons by lifesaving flags

4.5. General Swimming

Unrestricted access across the coastline except:

- Where health warnings are posted due to pollution events
- Closure of areas by official lifesaving demarcation on dangerous areas due to strong currents or wave action
- Where swimming threatens or interferes with protected species

4.6. General Beach Activities

Includes all ball games, Frisbee etc.

- Unrestricted access with due consideration for others
- Beach Managers may restrict activities at certain beaches as the need arises

4.7. Recreational Fishing

Unrestricted access for recreational fishing with associated valid permit except:

- At any recognised beach recreational nodal point including:
    - Silwerstroomstrand
    - Melkbos
    - Big Bay
    - Small Bay
    - Tableview beach front
    - Milnerton beach front
    - Sea Point Promenade
    - Clifton (1-4)
    - Glen Beach
    - Camps Bay
    - Llandudno
    - Hout Bay beach
    - Long Beach Kommetjie
    - Glencairn beach
    - Fish Hoek Beach

- St James beach
- Muizenberg Corner
- Strandfontein Pavilion
- Mnandi
- Blue Waters
- Monwabisi
- Strand beach front
- Gordon's Bay Beach
- Bikini Beach
- "The Caves" Kogel Bay

4.8. Sand Yachting

Sand Yachting is only permitted in the following demarcated areas (Annexure A):

- Zonwabe and Cemetery Beach
- Duynefontein

4.9. Scuba Diving

Unrestricted across the coastline with the following conditions:

- Boat based scuba diving must make use of a registered and licensed slipway or launch site

4.10. Lifesaving training and competitions

Unrestricted across the coastline with the following conditions:

- When using paddle boards, surfing restrictions listed in (1) above apply
- Any official or organised competition must apply for a permit from the City's Events Office in accordance with the Events Policy

4.11. Jetskiing

No jetski may come within 300m of the shoreline across the coastline unless in the following demarcated areas (Annexure B):

- Gordon's Bay
- Strand
- Tableview
- Melkbos
- Zonwabe inshore area
- Blaauwberg inshore area

Jetskis are prohibited from the Table Mountain National Park Marine Protected Area (Mouille Point to Muizenberg Corner) under the National Parks Act

4.12. Motorised Watercraft

The following conditions apply:

- Motorised watercraft may only launch from registered and licensed slipways and launch sites.
- No motorised watercraft may come within 200m of the coastline at any point along the coastline
- No motorised watercraft may land on the coastline unless at a registered and licensed slipway or launch site
- These conditions do not apply to emergency situations, lifesaving watercraft, NSRI watercraft, law enforcement watercraft, Naval watercraft or watercraft undertaking sanctioned public services

4.13. Sailing (all forms)

Unrestricted access with the following conditions:

- No launching or landing permitted at designated swimming areas
- No launching or landing where surfers or other water users are in the surf zone

4.14. Spear Fishing

Not permitted at, or within 500m of any defined recreational beach

4.15. Open Water Swimming

Unrestricted access across the coastline except:

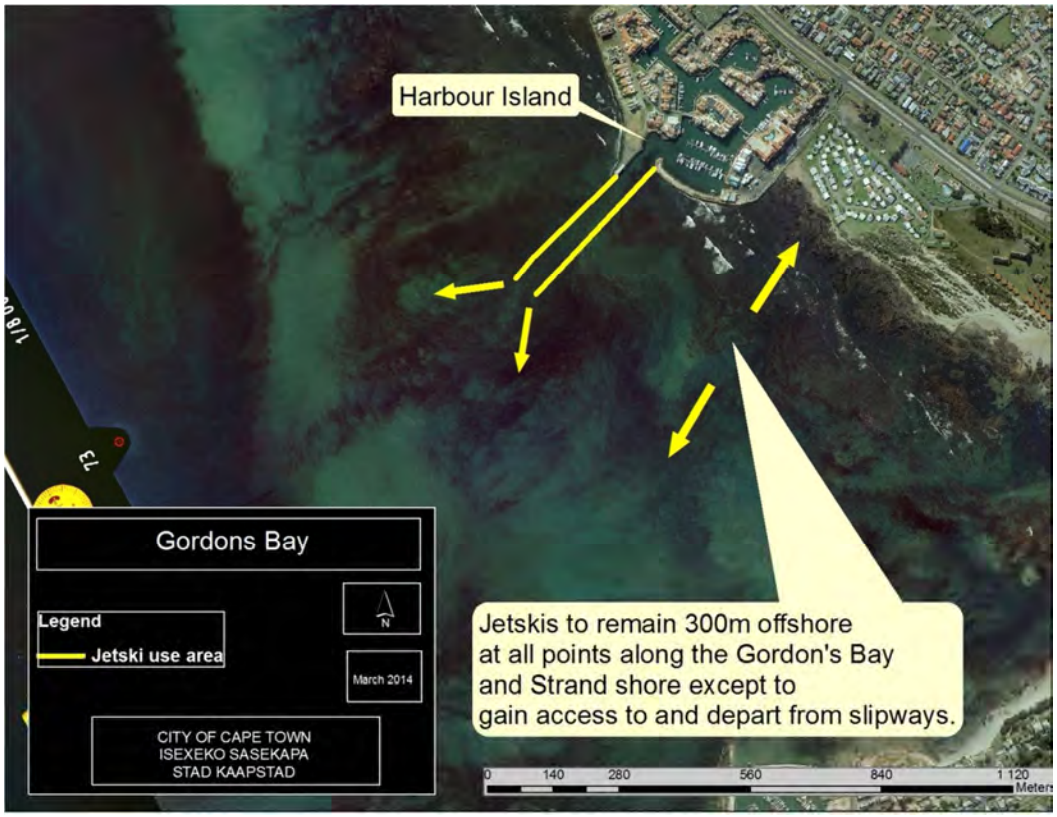
- Where health warnings are posted due to pollution events
- Closure of areas by official lifesaving demarcation at dangerous areas due to strong currents or wave action

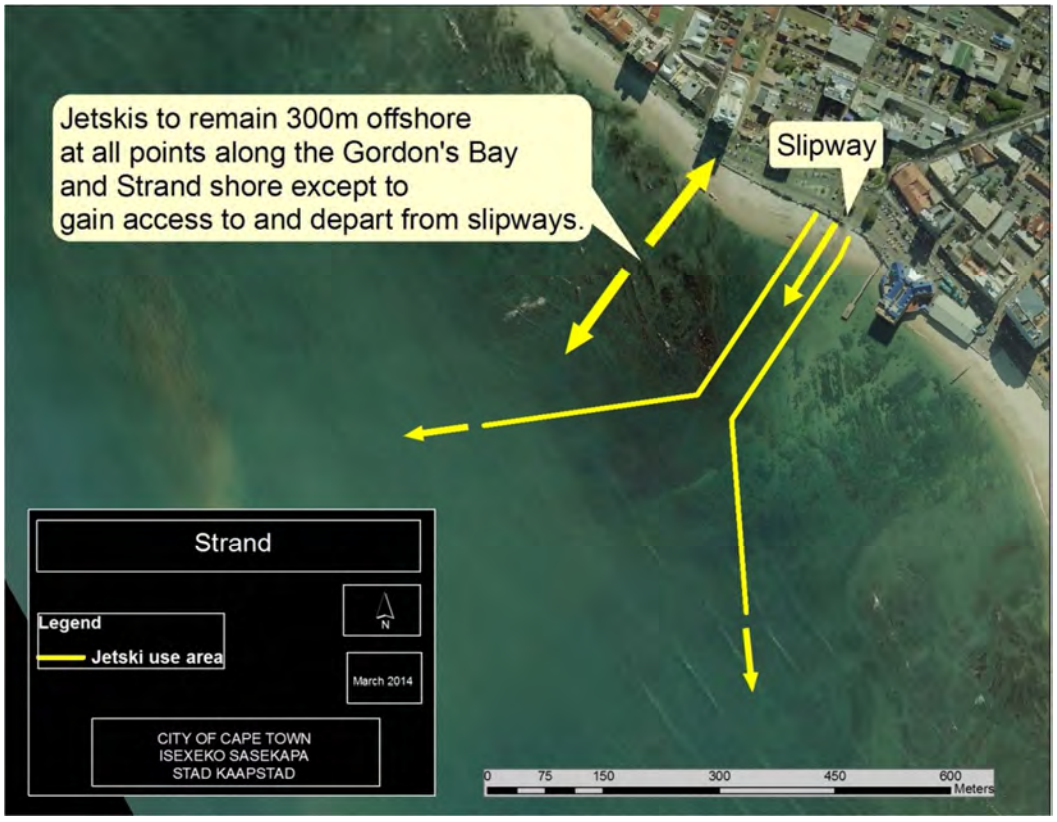
Annexure A: Sand yachting demarcated areas





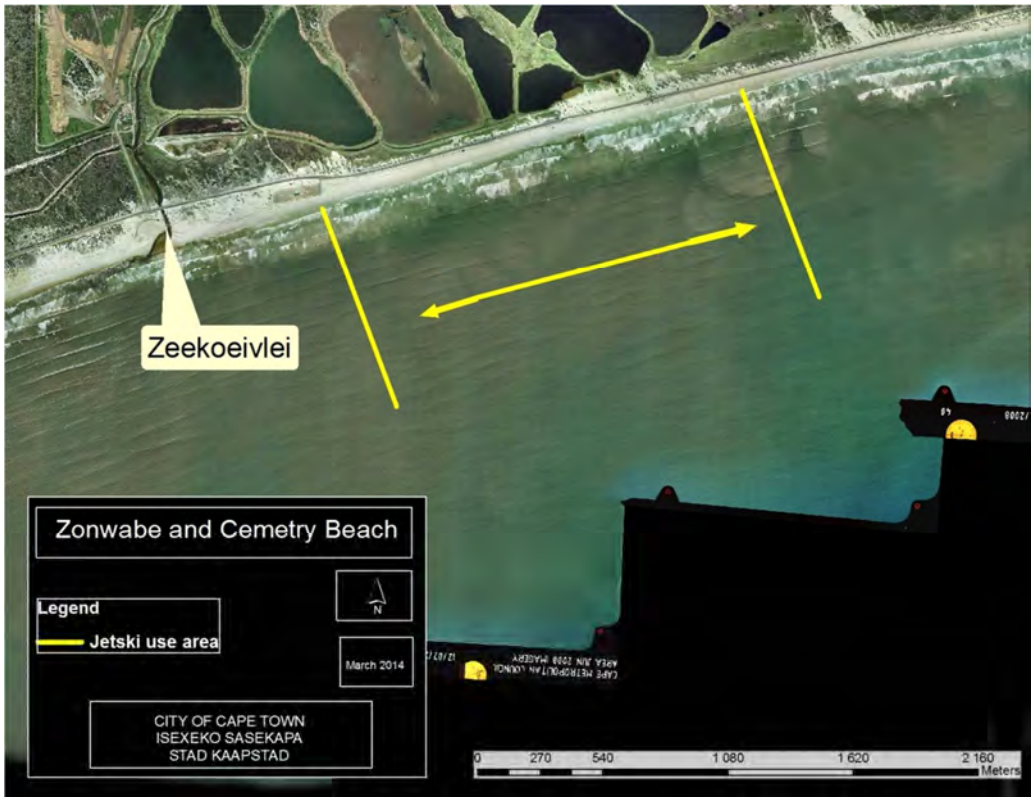
Annexure B: Jetski demarcated areas






Slipway
Jetskis to remain 300m offshore except gaining access to and departing slipways
Table View
Legend
Jetski use area
N
March 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 90 180 360 540 720
Meters


Jetskis to remain 300m offshore except gaining access to and departing slipways
Slipway
Melkbos
Legend
Jetski use area
N
March 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 120 240 480 720 960
Meters


Zeekoeivlei
Zonwabe and Cemetry Beach
Legend
Jetski use area
N
March 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 270 540 1 080 1 620 2 160
Meters


Eerstesteen
Big Bay
Blaauwberg
Legend
Jetski use area
N
March 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 200 400 800 1 200 1 600
Meters

Chapter 17: Shark Safety

1. Introduction

White sharks (*Carcharodon carcharias*) occur naturally along Cape Town's coastline and aggregate seasonally at select coastal sites, some of which are human recreational areas. This overlap and the predatory nature of white sharks, results in some sharks biting humans. The global number of white shark attacks has increased gradually, as it has in Cape waters and this increase is largely attributed to increasing human use of the ocean for recreation, as well as improved reporting.

False Bay, in particular has been identified as a critical feeding habitat for large, maturing white sharks, which are present year-round. . Research has shown that white sharks aggregate around Seal Island from autumn until spring (March/April to September/October) which corresponds with the time the seal pups spend prolonged periods in the water, learning to catch their own prey. The pups are weaned by August/September, and then disperse and become increasingly difficult to catch, after which the sharks leave the vicinity of the island and move closer inshore, often swimming parallel to the coastline where they predate on seasonally abundant summer gamefish and smaller sharks. It is therefore in the spring and summer months (October–March) that sharks are most likely to be seen off beaches in False Bay.

Records indicate that over the last six years, the highest number of interactions between white sharks and recreational beach users has occurred between mid-August and the end of March. This seasonal presence inshore is not a recent phenomenon, nor is it unique to False Bay. Similar behaviour has also been recorded in Gansbaai, Mossel Bay and abroad in California, Mexico and Australia.

2. General Principles

The City of Cape Town adopts the following general principles as part of its shark safety approach

2.1. Risk Reduction: The City recognises that it is not possible to completely eliminate the risk of human-shark encounters; accordingly, a risk reduction approach has been adopted. This approach focuses on providing an early warning system that alerts beach users to the presence, or potential presence, of sharks in the vicinity, and allows beach users to make informed choices about their water use.

2.2. Shark Conservation: The City of Cape Town is committed to the conservation of shark species found along its coastline as part of the City's coastal biodiversity approach. Accordingly, the City has committed to only using shark safety measures that will not have a negative impact on marine life or marine ecosystems, including sharks.

2.3. Research: Research into shark movement and behaviour along Cape Town's coastline forms a fundamental part of risk reduction activities. By gaining a greater understanding of shark behaviour, the City is able to implement more targeted programmes.

3. Shark Spotting programme

3.1. History

The Shark Spotting Programme was initiated in 2004 in response to an increase in shark sightings close to popular beaches, as well as a series of high profile shark attacks. The programme was started by members of the water using community in Muizenberg and Fish Hoek and remains a community driven program.

Subsequently, in 2005, the City of Cape Town assisted in the formalisation of the Shark Spotters as a registered Non-Profit Organisation. In 2006 the City entered into a Memorandum of Agreement with the Shark Spotting Programme providing annual funding, establishing a formal relationship and formalising the Shark Spotters as Cape Town's primary shark safety measure. A number of other organisations, including corporate sponsors, contribute to the programme on an annual basis. The Save Our Seas Foundation provides annual funding to the programme and its research needs.

3.2. Methodology

The Shark Spotting programme aims to balance the needs of both people and white shark conservation by pro-actively reducing the opportunity for interaction and conflict between recreational water users and sharks. The programme has attracted international and local attention because of the novel way it seeks to find a non-lethal solution to potential conflicts between sharks and people.

Shark spotters are positioned at strategic points along the Cape Peninsula, primarily along the False Bay coastline. A spotter is positioned on the mountain with polarised sunglasses and binoculars. This spotter is in radio contact with another spotter on the beach. If a shark is seen, the beach spotter sounds a siren and raises a white flag with a black shark. When the siren sounds, the water users are directed to leave the water and only return when the appropriate 'all clear' signal is given. Shark spotters use colour-coded flags to communicate with the public regarding shark conditions on the day.

Since the programme began in 2004 more than 1600 shark sightings have been recorded at spotter beaches, with over 60% of these sightings resulting in temporary beach closures. The program has therefore been successful in reducing the spatial overlap between people and sharks, and the assumption is that reducing spatial overlap will reduce the probability of a shark attack.

In addition to improving beach safety through shark warnings, the Shark Spotting programme also provides emergency assistance in the event of a shark incident. It also provides employment opportunities and skills development for its staff that are recruited from previously disadvantaged communities.

3.3. Research

Shark Spotters conducts applied research focused on inshore white shark presence and behavioural ecology in Cape Town to inform public safety policy, management strategies and education and awareness. Shark Spotters drives an adaptive management approach to human-shark conflict which is responsive to conflict and proactive in using research and best practices.

Key objectives of the research are to:

1. describe spatial and temporal movements of sharks in Cape waters;
2. determine the influence of environmental variables on movement and behaviour;
3. determine the influence of prey availability and distribution on movement and behaviour;
4. identify population trends; and
5. actively engage with, and test where possible, shark safety technology and developments.

Shark attack information is collated and all local incidents are responded to in order to collect factual and objective information. Fact-based information is used to lead a communication strategy that aims to provide objective and informed information to the public and media around shark-human conflict issues.

The Shark Spotting programme involves close partnerships with the NSRI and SA Lifesaving and has distributed several shark attack kits to Cape Town beaches, trained spotters in emergency first aid and provides regular reports on shark presence to a range of organisations.

3.4. Management

Shark Spotters is a registered Non-Profit Organisation, Public Benefit Organisation and has Section 18A registration. The core management team consists of a Project Manager, Field Manager and Research Manager. Their work is overseen by a management committee from the City of Cape Town Environmental Resource Management Department and the steering committee of the Non-Profit Organisation. The steering committee comprises representatives from the local communities that the Shark Spotting program serves, including the founding members of the organisation.

3.5. Locations and operating times

Shark spotters are operational at the following coastal locations:

Permanent Beaches (365 days a year):
- Muizenberg: 8am – 6pm
- St James/Kalk Bay: 8am – 6pm
- Fish Hoek: 8am – 6pm (7am – 6.45pm in summer)
- The Hoek, Noordhoek: 8am – 6pm
- Caves, Kogel Bay - 8am to 6pm

Temporary Beaches (Oct – April: Weekends, Public Holidays and School Holidays)
- Clovelly: 10am – 5pm
- Glencairn: 8am – 6pm
- Monwabisi: 8am to 6pm

4. Protocol for Shark Spotters flag system

4.1. SUMMARY

- No flag = no spotter on duty
- White Flag (with a solid black shark) = shark in vicinity of water users (siren sounded) or after serious incident when beach is closed.
- Red Flag (with solid white shark) = 1 hours after a sighting or if a shark is spotted but not near water users or if there is an increased risk of shark activity.
- Black Flag (with shark outline) = poor spotting conditions in area where majority of water users are. No shark seen.
- Green Flag (with shark outline) = good spotting conditions in area where majority of water users are. No shark seen

4.2. FLAG SYSTEM PROTOCOL

If there are no flags flying associated with the Shark Spotting Programme it means that there are no shark spotters on duty. At Shark Spotter beaches the mountain spotter (lookout) will upon the start of his / her shift first asses the spotting conditions before raising any flags. The spotter will take into account the glare, cloud cover, water clarity; swell and wind chop (all which affect the ability to detect sharks). Once the spotter has assessed his / her ability to spot for sharks they will request the spotter on the beach to raise the appropriate flag.

GREEN FLAG

The green flag signifies good spotting conditions. This will be raised when the spotters can see clearly in the area where the majority of water users are. Please note that if for example, it is low tide and the water is clear for the first 50 metres, but there are 60 surfers at approx. 100m where the water is milky or patchy, this will not qualify for a green flag.

BLACK FLAG

The black flag signifies poor spotting conditions. This flag will be raised by the spotters if they are not able to clearly see what is happening in the area used by the majority ofwater users. Factors affecting water visibility include: glare, cloud cover, water clarity; swell and wind chop. Please note that glare plays a significant role in reducing the spotters' ability to see clearly, particularly in early morning and late afternoon.

WHITE FLAG AND SIREN

The white flag (with a solid black shark) along with the sounding of a siren will be raised when a shark is seen in the vicinity of water users and is assessed to pose a potential threat to water users. The spotter will take into account the shark's distance from the water users, its swimming speed and direction of travel. The shark siren will also be sounded at this time.

The white flag will remain raised for as long as the spotter has a visual of the shark in the area, whether this is a few minutes or a few hours.

Once the shark has left the area used by water users the white flag will remain raised for a short time while the spotter scans the area to ensure another shark has not entered and that the original shark does not return to the area.

Once the spotter is satisfied that the shark no longer poses a threat and there are no other visible potential dangers, the white flag will be removed and the red flag will be raised.

The white flag will also be raised after a serious incident such as a shark attack, when the beach is closed.

RED FLAG

The red flag is used as a warning that a shark has recently been seen, that there is higher than usual shark activity or that there are known conditions for high shark activity.

The red flag will be flown every time after a shark has been seen, for one hour. Provided no other sighting is recorded during that time, after one hour the red flag will be taken down and either the green or black flag will be raised depending upon spotting conditions. If a second shark is seen within the hour following the first sighting, the red flag will remain flying for a further hour from the time the second shark left the area.

If a shark is spotted that is far from the area used by water users, and poses no potential threat to water users, instead of clearing the beach and putting up the white flag, the spotters will raise the red flag for one hour, but not clear the beach.

The shark sightings are monitored daily and trends and patterns can be identified. This allows for the early detection of sudden increases in shark activity. In the event that more than five shark sightings are made at a specific beach on one day, the red flag will be flown as a warning to water users that there is increased shark activity in the area. If shark activity at adjacent beaches is even higher than five shark sightings and the sharks are observed in hunting behavioural modes i.e. chasing schools of fish or seals, then the red flag will be strongly considered for adjacent beaches, especially if there is poor visibility. It's important to remember that this is a dynamic system and therefore each situation will be assessed in conjunction with managers, scientists and local authorities with the public's safety as the top priority.

Furthermore, the red flag will be flown when the conditions are conducive to increased shark activity, such as (but not limited to) cetacean strandings which are proven to attract sharks to the area, the presence of large schools of migratory fish e.g. yellowtail or white steenbras which attract large sharks.

5. Shark Exclusion Net

The City is currently in the process of piloting a shark exclusion net at Fish Hoek beach. If deemed successful, the use of an exclusion net at Fish Hoek beach could become a permanent safety measure. It should be clearly noted that the deployment of an exclusion net at Fish Hoek Beach would at no time replace the existing Shark Spotting Programme.

The exclusion net is 350 m long, made out of HDPE twine and has a small mesh (45 x 45 mm), hung on the flag (i.e. square as opposed to a "diamond" profile, to reduce the risk of entanglement of marine animals such as whales, dolphins, sharks etc. It forms a complete barrier from the seafloor to the surface, and encloses an area of ~0.023 km^2. Unlike traditional shark barriers, which are permanently fixed in position, the Fish Hoek exclusion net is deployed and retrieved daily to further minimise the risk of entanglement of marine animals and reduce any potential negative physical impacts on the environment. This means that the Fish Hoek exclusion net is globally unique.

The deployment of the exclusion net is dependent on:

- The weather and sea conditions being suitable
- The presence of whales and dolphins in the bay
- Trek fishing activities

A research permit was granted by DAFF and DEA in February 2013 for the trial operation of the exclusion net. The City of Cape Town, in conjunction with the Shark Spotters, was able to start trials towards the end of March 2013. These trials have been largely successful, and have been a critical learning experience for the City of Cape Town and the Shark Spotters. The research permit expires at the end of April 2014.

In mid-2014, the City will be entering into a review process to determine whether or not exclusion nets will be adopted as permanent shark safety measures in Cape Town. This determination will be made by the Department of Agriculture, Forestry and Fisheries, and Department of Environmental Affairs.

5.1. Exclusion Net Operating protocols

The following exclusion net operating protocols are in place:

1) Prior to deployment each morning the spotters will confirm with the trek net fisherman whether yellow tail are in the bay or have been sighted in close proximity to the bay.

2) When yellow tail are in the bay or in close proximity to the bay, the net will NOT be deployed so as to minimise impacts on fishing success
3) If the net has already been deployed and yellow tail move into the bay, the net will remain in position and not be removed
4) Any presence of whales or dolphins in the bay or in close proximity to the bay will delay the deployment of the net until such time as the animals have moved off on their own will
5) If whales or dolphins move into the bay after deployment, the net will remain in place. In this situation the rubber duck will be launched and will gently herd the animals away from the net
6) In the event of an entanglement, the Whale Disentanglement Network will be notified and they will assume full control and authority of the rescue and disentanglement

6. Beach Closures

The City will close beaches and swimming to the public under the following circumstances. Where a beach is closed the White Shark Flag will be flown:

- In the event of a shark attack, the beach and surrounding beaches will be closed until such time as the City deems it safe to reopen beaches
- In the event of whale strandings or the presence of a whale carcass.
- In any circumstance where the shark risk is considered high

The City will issue a general shark caution and warning:

- High presence of white sharks on the inshore
- The Red Flag will be flown as a caution to all users

7. Shark Attack Emergency Response

In the event of a shark attack the following emergency response will take place:

- City's Disaster Risk Management to notify and alert:
    - Environmental Resource Management (ERMD)
    - Safety and Security
    - Sport, Recreation and Amenities
- NSRI, Western Province Lifesaving and Shark Spotters to coordinate rescue/retrieval of the victim and medical response
- The beach where the attack occurred as well as surrounding beaches as determined by ERMD to be closed to the public. Law Enforcement to ensure and assist
- City to release press statement informing the public and indicating beach closures
- ERMD to lead the completion of a detailed Shark Attack Report compiled after collection of all relevant data and information
- Shark Attack report to be released by the City (once approved) for public information
- Shark Attack form for the international database to be completed by the Shark Spotting Programme
- Beaches re-opened once immediate risk has passed

8. Communication

General public awareness and information is key to:

- Reducing shark attack risk

- Ensuring a reasonable and objective public response to shark issues
- Empowering individuals to make informed decisions for themselves
- Reducing risk behaviour

In this regard the City and the Shark Spotters will communicate on an ongoing basis on all shark related issues in the following way:

1) Shark Smart Sign Boards at all beaches (Annexure A)
2) High Risk Shark Sign Boards (Annexure B)
3) Shark Spotting Information Boards (Annexure C)
4) Public press releases when required to issue a general shark caution
5) An annual press release in August to remind beach goers of the inshore movement of white sharks during the summer period
6) Daily updates on shark spotting via Twitter and Facebook through the Shark Spotting Programme – https://www.facebook.com/SharkSpotters and @SharkSpotters
7) Daily notification by Twitter and Facebook indicating when the exclusion net has been deployed

9. Roles and Responsibilities

The City of Cape Town's Environmental Resource Management Department manages and directs the City's shark safety programmes. The City of Cape Town is additionally responsible for providing primary funding for the Shark Spotting programme.

Annexure A

BE SHARK SMART

INFORMATION

- Great White Sharks naturally occur in these waters all year round
- Great White Sharks are predators, and are dangerous animals
- Encounters with sharks are rare, but please remain alert
- Great White Sharks are known to use the inshore area
- Great White Sharks are an important part of the natural marine environment

INLIGTING

- Witdoodhaaie kom regdeur die jaar natuurlik in hierdie water voor
- Witdoodhaaie is roofvisse en dus gevaarlik
- Haaivoorvalle is skaars maar wees asseblief versigtig
- Witdoodhaaie kom van tyd tot tyd naby die kus voor
- Witdoodhaaie vorm 'n belangrike deel van die natuurlike see-omgewing

INGCACISO

- Kukho ooKrebe abaKhulu abaMhlophe kule ndawo unyaka wonke
- OoKrebe abaKhulu abaMhlophe ngawona marhamncwa aqwengayo yaye zizilwanyana eziyingozi
- Anqabile amathuba okudibana nooKrebe kodwa ncedani nihlale nilumkile
- OoKrebe abaKhulu abaMhlophe bayaziwa ngokuthanda ukudada kwindawo ekufuphi nonxweme
- OoKrebe abaKhulu abaMhlophe bayinxalenye ebalulekileyo kwimeko-bume esingqongileyo yendalo yaselwandle



SAFETY TIPS

DO

- Swim, surf, surfski, or kayak in groups
- Swim close to shore / in waist deep water
- Consider using a personal shark shield for surfing or kayaking

VEILIGHEIDSWENKE

MOETS

- Swem, branderplankry, branderski of kajakroei in groepe
- Swem naby aan die kus of in middellyf-diep water
- Oorweeg dit om 'n persoonlike haaiskild te gebruik wanneer jy kajakroei of branderplankry

INGCEBISO ZOKHUSELEKO

OMA UKWENZE

- Dadani, nityibilize ngamaplanga, okanye ngekayak ningamaqela
- Dadelani kufuphi nonxweme / emanzini ama esinqeni
- Kungaluncedo ukusebenzisa ikhakha lokuzikhusela kookrebe xa nisiya kutyibiliza ngamaplanga emanzini okanye ngekayak

DO NOT

- Swim at night or if bleeding
- Swim, surf, surfski or kayak where birds, dolphins or seals are feeding, or where people are fishing

MOENIE

- Moenie saans swem of wanneer jy bloei nie
- Moenie swem, branderplankry, branderski of kajakroei indien voëls, dolfyne of robbe daar naby vreet of mense daar naby visvang nie

OMA UNGAKWENZI

- Ukudada ebusuku okanye xa usopha
- Ukudada, ukutyibiliza ngamaplanga, ukudlala emanzini okanye ngekayak kufuphi nendawo ekutya kuyo iintaka, amahlengesi okanye iintini zolwandle, okanye kufuphi nendawo ekulotywayo kuyo

EMERGENCY NUMBERS / NOODNOMMERS / IINOMBOLO ZEXESHA LIKAXAKEKA

107 021 480-7700 / 080 911-4357 021 449-3500

THIS CITY WORKS FOR YOU

Annexure B


SHARK WARNING
HAAIWAARSKUWING / ISILUMKISO SOOKREBE
HIGH RISK AREA
HOËRISIKOGEBIED / INDAWO YOKUDADA EYINGOZI
SWIM AT OWN RISK
SWEM OP EIE RISIKO / UDADA NGOBAKHO UBUTYALA
EMERGENCY NUMBERS
NOODNOMMERS / IINOMBOLO ZEXESHA LIKAXAKEKA
107 021 480-7700 / 080 911-4357 021 449-3500
THIS CITY WORKS FOR YOU

Annexure C


SHARK SPOTTING PROGRAMME
HAAIKYKPROGRAM / INKQUBO YOKUJONGWA KOOKREBE
The Shark Spotting Programme is an early warning initiative provided as a service to communities. Although effective, shark spotting can never guarantee your safety 100%. Sharks spotters are not responsible for your safety.
As 'n vroeëwaarskuwingsinisiatief lewer die haaikykprogram 'n diens aan gemeenskappe. Hoewel doeltreffend, kan haaikyk nooit jou veiligheid 100% waarborg nie. Haaikykers is nie vir u veiligheid verantwoordelik nie.
INkqubo yokulongwa kooKrebe liphulo lokulumkisa abantu kwangexesha nebonelelwa njengenkonzo eluntwini. Nangona isebenza, ukujongwa kookrebe akunakho ukuqinisekisa ukuba ukhuseleko ngokuqubeleleyo (100%). Amagosa ajonga ookrebe awanaxanduva lokhuseleko lwakho.
FLAG WARNING SYSTEM
VLAGWAARSKUWINGSTELSEL / INKQUBO YOKULUMKISA NGEEFLEGI
GREEN FLAG
• Spotting conditions good
• Haaikyktoestande goed
• Iimeko ezilungele ukujonga ookrebe
BLACK FLAG
• Spotting conditions poor
• Haaikyktoestande swak
• Iimeko ezingakulungelanga ukujonga ookrebe
RED FLAG
• High shark alert
• Ernstige haaiwaarskuwing
• ISilumkiso sooKrebe abaNinzi
WHITE FLAG
• A shark has been spotted - siren will sound. Leave the water immediately
• 'n Haai is gesien – sirene sal loei. Verlaat die water onmiddellik
• Kubonwe ukrebe – kuza kukhaliswa ixilongo lokulumkisa. Phumani ngokukhawuleza emanzini
USE OF OCEAN AT OWN RISK
GEBRUIK DIE OSEAAN OP EIE RISIKO
ULWANDLE ULUSEBENZISA NGOBAKHO UBUTYALA
EMERGENCY NUMBERS / NOODNOMMERS / IINOMBOLO ZEXESHA LIKAXAKEKA
107 021 480-7700 / 080 911-4357 021 449-3500
DUTY INFORMATION
DIENSINLIGTING / IINKCUKACHA ZOKUSEBENZA KOLU LWANDLE
SHIFT TIMES / SKOFTYE / AMAXESHA OMSEBENZI
SPOTTING CONDITIONS/ HAAIKYKTOESTANDE / IMIQATHANGO YOKUBONA OOKREBE
WATER TEMPERATURE / WATERTEMPERATUUR / IQONDO LOBUSHUSHU BAMANZI
LAST SHARK SIGHTING / LAASTE HAAI WAARGENEEM / UKREBE WOKUGQIBELA UBONWE NGOWE
save our seas shark centre
SHARK SPOTTERS
SAFETY CONSERVATION EDUCATION RESEARCH
THIS CITY WORKS FOR YOU
FOR FURTHER INFORMATION CALL 078 174 4244 OR VISIT WWW.SHARKSPOTTERS.ORG.ZA

Chapter 18: Blue Flag strategy

1. Introduction

The Blue Flag is a leading voluntary international eco-certification programme, owned and managed by the Danish-based Foundation for Environmental Education (FEE). The Blue Flag is awarded to municipalities for beaches and marinas which meet strict criteria addressing water quality, environmental education and information, environmental management and safety.

1.1. History

The concept of the Blue Flag was developed in France in 1985, where coastal municipalities were awarded the Blue Flag after meeting certain sewage treatment and bathing water quality criteria. In 1987 FEE proposed the concept of the Blue Flag to the European Commission, leading to the launching of the Blue Flag programme as one of the community activities. Gradually the programme was adopted in a number of countries outside Europe, including Morocco, Tunisia, New Zealand, Brazil, Canada and the Caribbean. In 2001 South Africa became the first county outside Europe to be awarded the Blue Flag.

1.2. Blue Flag in the City of Cape Town

In South Africa, the Blue Flag programme is managed by the Wildlife and Environment Society of South Africa (WESSA). The implementation of the Blue Flag beach programme is carried out by participating local authorities and marina managers along the coast of South Africa.

The City of Cape Town's (City) inaugural participation in the Blue Flag programme was in 2003, with three beaches, namely Bikini, Mnandi, and Clifton 4th, awarded Blue Flag pilot status and subsequently achieving full status in 2004. Since then, the City's Blue Flag programme has grown steadily and by 2013 eight City beaches and two marinas were participating in the Blue Flag programme, namely Bikini beach, Camps Bay beach, Clifton 4th beach, Llandudno beach, Mnandi beach, Muizenberg beach, Silwerstroom Strand, Strandfontein, False Bay Yacht Club and the Granger Bay Water Club (Annexure 1)

2. Vision and Aims

To position the City as a leading coastal destination through the provision of world-class recreational beach amenities, by:

- Ensuring close alignment with the vision and criteria of the international Blue Flag programme;
- Ensuring strict compliance with Blue Flag criteria as established by FEE and as enforced by WESSA;
- Expressing the City's commitment to the Blue Flag through:
    - Promoting and facilitating community involvement and benefit;
    - Using Environmental Education as a key means towards achieving and retaining Blue Flag status.
    - Providing a safe and healthy environment;
    - Ensuring the protection of the natural coastal environment;
    - Promoting the City's coastline and its beaches as a major tourist attraction; and
    - Promoting the City's coastline as an important contributor to its economic prosperity.

3. Blue Flag Season

The City's Blue Flag season falls within the main summer holiday period – the Blue Flag season starts on 1 December and ends on 31 March each year.

WESSA requires that the duration of a Blue Flag season for a municipality or beach exceeds one month. This being said, the City may deviate from its four month schedule where it deems necessary, based on availability of capacity and resources, beach user trends, climate and season considerations. As such, Llandudno has a two month season (1 December to 31 January) , while Silwerstroom has a one month season (1 to 31 December).

4. Features of a Blue Flag beach

In order to offer beach users a complete and satisfactory experience, the City strives to ensure the provision of key facilities and services, including, but not limited to those indicated here. These facilities and services ensure the implementation of and compliance with the Blue Flag Criteria, as administered and enforced by WESSA.

4.1. Facilities and equipment

- First aid equipment and facilities;
- Visible appropriate signage, including the Blue Flag Information Board, displaying a beach map, water quality results, rules and regulations and contact details for information and emergencies;
- Blue Flag and WESSA flags;
- Appropriate lifesaving flags;
- Special parking for emergency vehicles;
- Parking for people with disabilities;
- Wheelchair ramps (where possible – at least one beach in the municipality must provide a wheelchair ramp);
- Well-managed ablution facilities, to include a baby-changing station and soap and paper towel dispensers;
- Appropriate and safe, well-managed ablution facilities for people with disabilities;
- Information centre;
- Lifeguard facility;
- Law Enforcement office; and
- Beach Manager's office.

4.2. Services

- Water Quality: Weekly bathing water quality monitoring (according to set Blue Flag Criteria) and on-site display of up-to-date water quality results on the Blue Flag Information Board.
- Security: Deployment of security guards or law enforcement officers.
- Safety: Deployment of qualified and well-trained (according to Lifesaving South Africa's standards) lifeguards. If deployment of lifeguards is not possible, then the provision of on-site lifesaving response kits is acceptable.
- Beach Wheelchairs: Provided at beaches with the appropriate and necessary infrastructure in accordance with the City's Operational Manual for the Use of Beach Wheelchairs.
- Environmental Management and Environmental Education

Blue Flag has recently been extended to marina's. The City has recently added Harbour Island as a Blue Flag Marina (See Annexure 2 for detail on the Blue Flag Marina checklist)

5. Roles and Responsibilities

5.1. Cooperative Governance

The City's Blue Flag programme is led by the Sport, Recreation and Amenities Department (SRA). In order to ensure compliance with Blue Flag criteria and requirements, SRA enlists the services of other City line functions, through the signing of Service Level Agreements with such line functions. In addition to City line functions, SRA facilitates the provision of lifesaving services through collaboration and partnership with Lifesaving Western Province.

5.2. Specific Services

5.2.1. Sport, Recreation and Amenities Department

- Lead City's participation in Blue Flag, including compilation and submission of Blue Flag application forms, introduction of new beaches to the Blue Flag programme, convening of Blue Flag Committee meetings;
- Coordinate and ensure all necessary services are provided by relevant line functions;
- Provide the necessary facilities and signage;
- Serve as the central point of communication with respect to City Blue Flag matters;
- Ensure and facilitate the provision of lifeguards;
- Where law enforcement is not available, deploy private security guards;
- Provide the necessary beach management staff, including seasonal staff.
- Pollution abatement and incident management at Blue Flag beaches

5.2.2. Solid Waste Management

- Ensure a high-standard waste management programme according to a set waste removal schedule;
- Provide a waste-removal schedule to beach managers, outlining the following:
    - waste removal from beach and parking areas;
    - removal of beach-cast kelp;
    - that the following shifts are adhered to: 7h00 – 15h30; 12h00 – 20h00
- Removal of dead animals.
- Ensure a high standard of waste removal within the local contributing catchment

5.2.3. Scientific Services

- Collection and testing of water samples;
- Interpretation of data;
- Making water quality results available to beach managers;
- Maintenance of water quality datasets;
- Provide annual training for beach management officials.

5.2.4. Law Enforcement

- Maintaining a visible presence during Blue Flag hours, 10h00 – 18h00;
- Ensuring officers report for duty during the set Blue Flag season and hours;

- Ensure that all officers are appropriately identifiable and are equipped with the necessary tools and equipment.

5.2.5 Environmental Resource Management

- Designing an environmental education and information programme for the City's Blue Flag beaches and marinas each year;
- Compiling a budget and ensuring the resourcing of the budget;
- Ensuring programmes are rolled out in accordance with Blue Flag requirements;
- Promoting, participating in and/or advising on ongoing public awareness campaigns with respect to Blue Flag and responsible beach amenities utilisation.

5.2.6. Lifesaving Western Province

- Ensuring the provision of well-trained, certified lifeguards to Blue Flag beaches, in accordance with Blue Flag requirements;
- Facilitating and ensuring lifeguards are equipped with all the necessary lifesaving equipment;
- Ensuring lifeguards are present on Blue Flag beaches, during Blue Flag season, from 10h00 until 18h00;
- Upon request, presenting lessons on safe and responsible beach use, during environmental education and information programmes.

5.2.7. Tourism Department

- Provide co-funding and support for the running of the Blue Flag EE programmes on the eight beaches each season.

6. Beach Selection Process

The City must aspire to manage all its public recreational beaches to standards espoused by Blue Flag. It is acknowledged that, due to limited resources, all recreational beaches cannot participate in Blue Flag. Where the City considers introducing a new beach to the Blue Flag programme, a process based on a set of guidelines must be followed (refer to Annexure 3 for details on Blue Flag Beach checlist)

6.1. Guidelines for selection of a new beach

6.1.1. Spatial distribution

a) The City must strive to accomplish an even spatial distribution of Blue Flag beaches along its coastline;
b) The spatial distribution of Blue Flag beaches must promote the equitable accessibility to all its communities; and
c) The spatial distribution of Blue Flag beaches must be seen to enhance the economic integrity of the area in question.

6.1.2. Water quality

a) The Blue Flag programme lists water quality as the overriding criterion for the selection of a candidate;
b) ii) The City's routine coastal water quality monitoring programme must be used as a guideline when selecting a candidate beach; and

c) iii) The geographical location of the beach must take into account logistical feasibility for the practicable, viable and sustainable collection and delivery of water samples for water quality testing.

6.1.3. Strategic Planning

a) To grow the Blue Flag programme, a steady, cautious and systematic approach must be followed;
b) ii) Before selecting a candidate beach, the City must be satisfied with the management of the beaches already participating in the Blue Flag programme; and
c) iii) After five years, the City must assess its performance with respect to the management of Blue Flag beaches.

7. Operational performance monitoring

7.1. Minimum Standards

In addition to complying with the Blue Flag Criteria, in order to ensure a successful Blue Flag programme, during each Blue Flag season, the City must strive towards maintaining the following minimum standards:

- Zero forced lowering of the Blue Flag by WESSA;
- Zero permanent withdrawal of the Blue Flag status by WESSA;
- Zero public misconduct incidences, especially alcohol-related incidences;
- Zero drowning incidences during Blue Flag hours – 10h00 to 18h00;
- Maintain a Level 1 cleanliness standard; and
- Provide at least five environmental education and information programmes per Blue Flag beach.

7.2. Control Measures

In order to meet the above-mentioned minimum standards, the City must implement the following control measures:

- Convene a Blue Flag pre- season meeting with all participating line functions and services;
- Conduct a Blue Flag pre- season inspection, in accordance with the Blue Flag Checklist (Annexure 3);
- Convene monthly Blue Flag Committee meetings during the Blue Flag season – that is, 1 December to 31 March;
- Conduct surveys to gauge the public's opinion of and attitudes towards the City's Blue Flag programme; and
- Conduct research on economic viability, opportunities and benefits for each beach, once every five years.

Annexure 1: Blue Flag Beaches and Marinas 2013/14



ANNEXURE 2

BLUE FLAG MARINA CRITERIA AND EXPLANATORY NOTES 2014

INTRODUCTION

The Blue Flag Programme for marinas and beaches is run by the non-governmental, non-profit organisation FEE (Foundation for Environmental Education). The Blue Flag programme was started in France in 1985. It has been operating in Europe since 1987 and in areas outside of Europe since 2001, when South Africa joined. Today, Blue Flag has become a truly global programme with an ever-increasing number of countries participating in the programme.

The Blue Flag programme promotes sustainable development in freshwater and marine areas. It challenges local authorities and beach operators to achieve high standards in water quality, environmental management, environmental education and safety. Over the years, the Blue Flag programme has become a highly respected and recognised eco-label working to bring together the tourism and environmental sectors at local, regional and national levels.

The explanatory notes given in this document make up the common and shared understanding of the Blue Flag marina criteria and the requirements for the implementation thereof. The explanatory notes provide details on the measurement and management of compliance with the Blue Flag criteria for marinas.

The criteria are categorised as either imperative or guideline. Most criteria are imperative, which means that the marina must comply with them in order to be awarded Blue Flag accreditation. If they are guideline criteria, it is preferable that they are complied with, but not mandatory. For some criteria, there are slight variations in different regions of the world.

It must be emphasized that the Blue Flag marina criteria in this document are the minimum requirement. A national programme can choose to have stricter criteria to what is outlined here.

These marina criteria and explanatory notes are to be used by all Blue Flag applicant marinas to understand the requirements that must be met before the marina can receive Blue Flag accreditation. For guidance purposes, this document should also prove valuable for the management of marinas already accredited with Blue Flag status.

The marina criteria and explanatory notes also serve as a guide for the National, Regional and International Blue Flag Juries when making decisions about a Blue Flag marina candidate.

If a marina that has Blue Flag accreditation does not comply with the Blue Flag criteria, the flag may be permanently or temporarily withdrawn from the marina. There are several degrees of non-compliance:

1. A **minor** non-compliance is where there is a problem with only one criterion of minor consequence to the health and safety of the marina user or to the environment. When minor compliance occurs and can be immediately rectified, the flag is not withdrawn and the non-compliance is only registered in the control visit report. If however, a minor compliance cannot be fixed immediately, the marina is given 10 days in which to comply fully with all criteria. The flag is withdrawn until all problems are rectified and it is noted on the Blue Flag homepage.
2. **Multiple non-compliances** relates to non-compliance of two to three criteria but of minor consequence to the health and safety of the marina user or to the environment. When multiple non-compliances occur, the marina is given 10 days in which to comply fully with all criteria, the flag is withdrawn until all the problems are rectified and the homepage is updated accordingly.
3. **Major** non-compliance is where the marina does not comply with one or several criteria, the result of which can have consequence to the health and safety of the marina user or to the environment, as well as the general perception of the marina and therefore the

Programme. When met with major non-compliance, the flag is withdrawn immediately and for the rest of the season. The site is registered as 'withdrawn' on the Blue Flag homepage, and the marina information board should clearly indicate that Blue Flag status has been withdrawn.

In all cases of non-compliance, the National Operator must immediately inform the local authority/marina operator about the observed areas of non-compliance. Information about the reason for a withdrawal of the flag must be posted clearly at the marina. The local authority/marina operator must inform the National Operator of re-compliance with the criteria and present the appropriate documentation needed. The flag can then be raised at the marina again. The National Operator should also consider a follow-up control visit to check that the marina does comply. In the event that the local authority/marina operator does not ensure and document re-compliance with the criteria within 10 days, the National Operator must ensure that the Blue Flag is withdrawn for the rest of the season at the marina.

In the event that conditions on the marina change and the flag has to be temporarily withdrawn, e.g. when climatic events cause damage to the marina or an emergency arises, the marina management must inform the National Operator that the flag has been temporarily withdrawn. and the international website must be changed accordingly.

Apart from updating the Blue Flag homepage of the status of the marina, the National Operator must inform the International Coordination about the non-compliance. If the non-compliance is noted at by an international controller, the National Operator has to give feedback to the International Coordination within 30 days.

The applicant for Blue Flag accreditation is the authority charged with responsibility for the marina. This may be a local municipality, private hotel, national park, or private marina operator. A marina may be eligible for Blue Flag accreditation if it is a designated bathing area and it has the necessary facilities and services to comply with the Blue Flag criteria.

FEE, and the National Operator in a country, reserves the right to refuse or withdraw Blue Flag accreditation from any marina where the local authority/marina operator is responsible for violations of national environmental regulations or otherwise acts in discord with the objectives and spirit of the Blue Flag programme. Blue Flag marinas are subject to announced and/or unannounced control visits by FEE International.

DEFINITION OF A BLUE FLAG MARINA

A Blue Flag marina must be a marina with pontoons or piers for pleasure boats. It can be part of a larger harbour with other activities, if the Blue Flag marina is clearly separated from other harbour activities. The marina can be located in marine or inland waters. The marina must have the necessary facilities to comply with the Blue Flag criteria. The marina must appoint a person to be responsible for communications on all matters relating to the Blue Flag programme. The marina must be accessible for unannounced inspection by FEE.

ENVIRONMENTAL EDUCATION AND INFORMATION

1. Information relating to local eco-systems and environmental phenomena must be available to marina users

The aim of this criterion is to ensure that the marina users and boaters are well informed and educated about the eco-systems and sensitivity of the surrounding environment, and that they are motivated to learn about and experience this environment in a responsible way.

The information about the coastal zone eco-system and nearby sensitive, natural areas and marine areas (including Marine Protected Areas) must be publicly displayed on the information board at the marina. Nearby sensitive areas are defined as areas within walking distance from the marina (a few kilometres) and nearby sensitive, natural marine areas are defined as coastal or inland areas easily reached by boat (within the distance frequently sailed by the users of the marina). The information should include both the information about the sensitive area and, in cases where it is possible to visit the sensitive area, a code of conduct for activities within the area should be included. Details must also be provided about sensitive marine areas to avoid when sailing or mooring.

It is particularly important for applicants with marinas located in natural settings to pay close attention to this criterion. If there are no particularly sensitive areas nearby, information about the general surrounding eco-systems should be posted.

Other general environmental information about the surrounding environment could also be appropriate and could demonstrate the environmental commitment of the marina.

Some sites at/near the Blue Flag marina may be very sensitive and require special management. In these cases, the marina operator is strongly encouraged to consult an appropriate conservation organisation for advice on how to manage these sites. Where areas require special management, at the time of application, the applicant must provide confirmation that this consultation has taken place and that a management plan will be implemented.

In exceptional cases, the sensitivity of certain natural areas may precludes them from being included in the information posted at the marina, due to the fact that such information could increase the number of visitors to the area and possibly endanger wildlife or impact on habitats.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

2. A code of conduct that reflects appropriate laws governing the use of the marina and surrounding areas must be displayed at the marina (i).

A code of environmental conduct should cover the following issues:

- Use of the reception facilities for hazardous waste / oil waste, etc.
- Use of the garbage containers / litter bins / waste recycling facilities
- Respect for sensitive protected natural areas
- Avoidance of sensitive protected areas where sailing is prohibited
- Use of the boat-repairing and washing areas according to the prescriptions
- Prohibition of emptying litterbins, toilet tank waste, etc. into the marina, sea or along the coast
- Use of the toilet tank waste facilities

The code of conduct must be posted on the information board. In addition, the code of conduct can be distributed to boatowners (leaflet form) when possible, and could also be available on the marina website.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

3. Information about the Blue Flag marina programme and/or the Blue Flag marina criteria and other FEE eco-label must be displayed in the marina

Information about the Blue Flag programme must be displayed on the information board. The correct Blue Flag logo must be used, in accordance with the FEE branding guidelines. The essence of each of the four categories of Blue Flag criteria must be explained. It is strongly recommended that the entire list of criteria is available at the marina for interested visitors. Furthermore, contact details of the international Blue Flag Coordination, the national Blue Flag operator and the local person responsible for the marina must be displayed. Visitors should be encouraged to contact the relevant authority if they come across any non-compliance with the Blue Flag marina criteria.

Blue Flag beaches and marinas must promote the Green Key programme as another eco-label FEE programme with a message such as: “Along with the Blue Flag, the Foundation for Environmental Education also develops another eco-label for accommodations: Green Key. Find more information at: www.green-key.org.”

The information posted on the information board should also include the duration of the Blue Flag season and on what basis a marina can receive Blue Flag accreditation.

The following information about the Blue Flag programme could be useful when preparing the information to be posted at the information board:

The Blue Flag programme:
This marina has been awarded a Blue Flag. The Blue Flag is an environmental award given to marinas making a special effort to implement sound management with respect to the local environment and nature, and providing users with information on environmental issues. To attain the Blue Flag, the marina has to comply with a number of criteria concerning environmental information and education, environmental management, safety and service facilities, and water quality.

The Blue Flag is awarded by the Foundation for Environmental Education (FEE), a non-governmental environmental organisation and is represented by national organisations in each of the participating countries in Europe, the Caribbean, New Zealand and South Africa. Along with the Blue Flag, FEE also develops another eco-label for accommodations: Green Key. Find more information at: www.green-key.org

- The Blue Flag is an environmental award for beaches and marinas
- The Blue Flag is concerned with four main areas:
    1) Environmental education and information
    2) Environmental management
    3) Safety and service facilities
    4) Water quality
- The Blue Flag is only awarded for one season at a time and the award is only valid as long as the criteria are fulfilled. When this is not the case, the persons responsible at local level must remove the Blue Flag
- The national FEE organisation conducts control visits to the Blue Flag sites during the season.

You can help the programme by also taking action to protect the environment:
- Follow instructions of the code of conduct at the marina

- Use environmentally-friendly products for paints, detergents, chemicals etc.
- Report any pollution or other violations of environmental regulations to the authorities
- Save water, electricity and fuel
- Encourage other sailors to take care of the environment

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

4. The marina is responsible for offering at least three environmental education activities to the users and staff of the marina

Environmental education activities promote the aims of the Blue Flag programme by:

- Increasing the awareness of, and care for, the aquatic environment by recreational users and inhabitants of the marina and adjacent areas.
- Providing training in environmental matters and best practice methods to marina personnel, suppliers to the marina and other tourist services operating in the area of the marina
- Encouraging the participation of local stakeholders in local ecosystem management
- Promoting sustainable recreation and tourism in the area
- Promoting sharing of ideas and efforts between the Blue Flag programme and other FEE programmes (YRE, LEAF, Eco-Schools and Green Key).

The planned activities for the coming season must be included in the application form, as well as information about the environmental education activities carried out during the previous Blue Flag season (if applicable).

There must be at least three different activities offered by the marina and carried out within the Blue Flag season. The activities should focus on the environment, environmental issues, Blue Flag issues or sustainability issues.

The education activities should be effective and relevant. It is recommended that the marina management should re-evaluate the activities implemented in previous seasons and work towards constantly improving them.

If specific environmental areas (including Marine Protected Areas) exist near a Blue Flag marina (e.g. mangroves, sea grass beds), it is strongly recommended that 1 or 2 environmental activities deal with these sensitive, natural areas.

Types of Activities
There must be a mix of different types of educational activities carried out by the marina. The different types of activities can be divided into five categories:

Activities for Passive Participation: This could include exhibitions, demonstrations, films, presentations, slide shows, conferences, debates, presentations by international experts, etc.

Activities for Active Participation: This includes guided tours, educational games, theatre/plays, cleaning days, photography or drawing competitions, nature reconstruction projects, recycling projects, green technology projects, community coastal monitoring programmes, etc.

Training Activities: This could be training for boaters or marina staff, people in charge of children groups, contractors, specific national training programmes, etc.

Publishing and Media: The production of leaflets, stickers, interpretive signs, postcards, school and municipal newsletters, books, T-shirts, bags, posters, radio broadcasts, etc.

Blue Flag Environmental Information Centre: This is a place where specific information about Blue Flag and environmental education issues can be provided. Such a centre or place should offer both activities and exhibitions and provide environmental and nature information in order to

qualify as an environmental interpretation or education centre. Information about its location and activities is provided at the marina or in nearby tourist information offices.

Target groups
The activities should be addressed to a wide range of different target groups. These target groups could be visitors, boaters, workers, locals, other tourism employees, fishermen, local industries, etc.

The types, amounts and target groups of activities should match the situation. For example, in a major tourist destination, more than one activity per season should be available to the general public.

Connection with existing programmes
It is recommended that the marina work with other groups, NGO's, with local Blue Flag beaches or with participants of other FEE programmes, with experts and universities to help set up and implement the activities.

Information about activities
Information about the publicly accessible activities must be made available at the marina and preferably also in tourism newspapers or magazines or posted in tourism offices. The published information should include: what kind of activities, when and where are they going to take place, who they are for, etc.

Not Acceptable
Activities that are not acceptable for meeting this criterion are activities that:
- are done to meet other Blue Flag criteria such as the general cleaning of the marina, waste management, recycling, etc.
- focus only on tourism without a specific focus on sustainable tourism
- are otherwise done by the marina as part of the standard management of health, safety, or tourism.

Examples
Examples of good educational activities can be found downloaded from the Blue Flag international website (www.blueflag.org).

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

5. The individual Blue Flag for boat owners is offered through the marina

The management at the marina must offer the Individual Blue Flag for Boat Owners at the marina office. The individual Blue Flag is a small flag offered (given or purchased) to boat owners who commit themselves to an environmental code of conduct. Both national and foreign boat owners are eligible for the Individual Blue Flag.

The exact content of the environmental code of conduct varies from country to country, but they should, at least, contain the following:
- I will not throw garbage into the sea or along the coast
- I will not release waste water into the sea, in coastal waters or sensitive areas
- I am using a holding tank for the collection of toilet waste on board
- I will not release poisonous or toxic waste (oil, paint, used batteries, cleaning agents, etc.) into the sea. I will safely dispose of these wastes in containers provided in the marina/harbour.
- I will promote and use recycling facilities (glass, paper, etc.)
- I will use the most environmentally-friendly products (paints, anti-foulings, paint remover, detergents, chemicals etc.) available
- I will instantly report pollution or other violations of environmental regulations to the authorities
- I will not use illegal fishing practices and I will respect periods when fishing is prohibited

- I will protect animals and plants in the sea, including not disturbing breeding birds, seals or other marine mammals
- I will respect sensitive and natural protected areas
- I will avoid anchoring in sensitive areas
- I will avoid disturbing fishery or fishing gear
- I will be respectful and considerate to other people and the environment
- I will not buy or use objects made from protected/endangered species or from archaeological underwater findings
- I will encourage other sailors to take care of the environment

The code of conduct should require the name, signature and address of the boat owner and must also contain the name and address of the national office or the International Coordination. If the boat owner hands in the Code of Conduct to the marina management, they should send it to the national operator who will then send the flag to the boat owner. Alternatively, the boat owner can send it directly to either the national or International Coordination. All boat owners flying the Blue Flag will have their name and addresses registered at the national operator.

The marina must offer the environmental code of conduct at the marina office, clubhouse or shop. If there is no national version of the environmental code of conduct available, the international version should be presented. In addition, information about the Individual Blue Flag for Boat Owners must be displayed on the information board.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

ENVIRONMENTAL MANAGEMENT

6. A marina management committee should be established to be in charge of instituting environmental management systems and conducting regular environmental audits of the marina facility

The marina management committee should consist of all the relevant stakeholders at the local level. Relevant stakeholders could include representatives from: the local authority, local tourism, sailing organizations, Marine Protected Area representant, educational representative, local environmental NGO, etc.

The marina management committee should cooperate with the marina manager to institute the environmental management system and to conduct regular environmental audits of the marina. The committee is furthermore jointly charged with ensuring compliance with other environmental management criteria.

IMPERATIVE CRITERION	GUIDELINE CRITERION
	All regions

7. The marina must have an environmental policy and an environmental plan. The plan should include references to water management, waste and energy consumption, health and safety issues, and the use of environmentally-friendly products wherever possible

This criterion encourages the marina to investigate the environmental loads entering the marina, to plan and perform the improvements of the environmental conditions at the marina, and finally, to document these improvements. The criterion therefore, not only aims to encourage marinas to get an overview of the environmental situation – but also to focus on the action that needs to be taken. Planning and improving the environmental conditions at the marina can - at the same time - have a positive effect on the economy of the marina.

The marinas participating in the Blue Flag programme are very different in size and capacity. *See Appendix A for two suggestions on how to comply with this criterion*

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

8. Sensitive area management.

Some sites at/near the Blue Flag marina may be very sensitive and require special management. In these cases, the marina operator is strongly encouraged to consult an appropriate conservation organisation or expert for advice on how to manage these sites. Where areas require special management, at the time of application, the applicant must provide confirmation that this consultation has taken place and that a management plan will be implemented.

In or near a Marine Protected Area, it is necessary to consult with the MPA management in order to ensure compatible ecosystem conservation and biodiversity goals.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

9. Adequate and properly identified, segregated containers must be in place for the storage of hazardous wastes. The wastes have to be handled by a licensed contractor and disposed of at a licensed facility for hazardous wastes

The facilities for hazardous waste must provide segregated, properly identified containers for the collection of all relevant hazardous waste (e.g. paints, solvents, boat scraping, antifouling agents, batteries, waste oil, flares, etc.) in segregated containers that are properly identified. It is obligatory to have segregated facilities for at least three (3) different types of hazardous waste.

The facilities for receiving hazardous waste must be functional. In locating and choosing storage facilities, consideration should be given to aesthetics as well.
The capacity of the containers, the number of users of the marina and how frequently the containers are emptied, determine the number of containers placed in the marina.

The facilities for receiving hazardous waste must be clean and environmentally-safe, i.e. the containers must be suitable to contain the hazardous waste and the floor on which the containers stand must be concrete, a metal tray or of another solid material. The waste must be prevented from leaking, ignition, exploding, etc. They should be separated from other facilities and must not pose a danger to children. Wherever possible, the facilities should not be located close to the water. In the event of an accidental spillage, the area around the containers must be cleaned up immediately and rehabilitated as a matter of priority. The oil reception facilities should preferably include mobile oil reception facilities.

Licensed disposal facilities means facilities approved by authorities on the basis of environmental requirements. To ensure the correct collection, sorting, storage and disposal of the waste, the marina must comply with national/international waste management plans/standards (in Europe according to the EU Directive 2000/59/EC of 27 November 2000). The duty of the marina receiving Blue Flag accreditation is to ensure that the waste is properly disposed of. Licensed carriers must transport the hazardous waste to the licensed facility.

In the case of small and/or remote marinas (less than 150 berths) who find it impossible to deal with hazardous waste due to an inability to responsibly dispose of the waste, it is permissible to negotiate with another marina in the vicinity of their marina that has the facilities to recover and dispose of hazardous waste. If this neighbouring marina can deal with the hazardous waste of the small and remote marina, then it can accept the hazardous waste from the boating clients of the small and remote marina. However, this must be stipulated on the marina information board as well as in the marina's information package to all visiting boaters.
A written agreement needs to be signed between the two marinas, however it remains the responsibility of the Blue Flag marina to ensure that the waste is properly managed.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

10. Adequate and well-managed litterbins and/or garbage containers must be place. The wastes are handled by a licensed contractor and disposed of at a licensed facility

All the land areas of the marina itself should appear clean with regularly emptied litter bins / garbage containers. Also restaurants, shops, green areas, etc. in the marina must be kept clean.

Litterbins and/or garbage containers should be functional and attactive. Consideration should be given to aesthetics as well as functionality. If possible, it is also recommended that litterbins should be made of environmentally-friendly products.

An adequate number of litterbins/garbage containers should be present, depending on the number of users of the marina, the capacity of the litterbins/garbage containers and how frequently they are emptied.

Licensed disposal facilities means facilities approved by authorities on the basis of environmental requirements. The duty of the marina receiving Blue Flag accreditation is to make sure that its waste is properly disposed of. Licensed carriers must transport the waste to the licensed facility.

To ensure the correct collection, sorting, storage and disposal of the hazardous waste, the marina must comply with national/international waste management plans/standards (in Europe according to the EU Directive 2000/59/EC of 27 November 2000).

The marina must ensure a cleaning of the area as often as needed (could be every day). In the case of severe pollution coming from outside, such pollution must immediately be removed according to the procedures in the emergency plan (criterion 18). In very severe cases, it can be necessary to withdraw the Blue Flag temporarily explaining the reasons for the withdrawal on the information board.

At the same time, it is important in the code of environmental conduct (criterion no. 2) to educate the marina users not to throw garbage, empty toilet tanks etc. into the marina or the sea.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

11. The marina must have facilities for receiving recyclable waste materials, such as bottles, cans, paper, plastic, organic material, etc.

In the marina, emphasis should be placed on waste minimisation. Waste should be separated to the largest possible extent into different categories and recycled.

Separation could include glass, cans, paper, plastic, organic material, etc. The marina must have facilities for receiving at least three different kinds of recyclable waste materials. To facilitate use, the containers must be well labelled, and if appropriate, in different languages.

Information about how to separate the recyclable waste should be provided at the location of the recycling facility or at the information board.

The marina receiving Blue Flag accreditation has the duty to ensure that its recyclable waste is properly recycled. Licensed carriers must transport the waste to the recycling facility.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

12. Bilge water pumping facilities should be available at the marina

The bilge water pumping facilities should be able to separate the oily bilge water or water extraction from oily residues.

The bilge water pumping facilities can be provided within the marina or in very close proximity to the marina. The facilities must be easily accessible for all potential users.

In the case of a small and/or remote marina (less than 150 berths), the possibility of sharing this facility with a neighbouring marina is permitted. In this case, the information must be very clear on the information board as well as to all clients of the marina. A written agreement needs to be signed between the two marinas, however it remains the responsibility of the Blue Flag marina to ensure that the bilge pumping facilities are properly managed.

IMPERATIVE CRITERION	GUIDELINE CRITERION
	All regions

13. Toilet tank waste reception facilities must be present in the marina

The toilet tank waste reception facilities may consist of a permanent toilet pumping station, a mobile toilet pumping facility or a sludge pumping van.

The toilet pumping facilities can be located within the marina or in very close proximity to the marina. The facilities must be easily accessible to boat owners.

The permanent toilet pumping facilities must be centrally located in the marina, easily accessible for all boats (including those boats requiring more space and depth).

The toilet tank waste reception facilities must comply with the national legislation.

In the case of a small and/or remote marina (less than 150 berths), the possibility of sharing this facility with a neighbouring marina is permitted. Additionally, a small and/or remote marina can also offer the services of a contractor to take care of this. In both cases, the information must be very clear on the information board as well as to all clients of the marina. A written agreement needs to be signed between the two marinas, or the Blue Flag marina and the contractor, however it remains the responsibility of the Blue Flag marina to ensure that the toilet tank reception facilities are properly managed.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

14. All buildings and equipment must be properly maintained and be in compliance with national legislation. The marina must be well integrated into the surrounding natural and built environment

The marina (including all the buildings and equipment) must be well maintained and must comply with national and international legislation. The marina must have all the necessary permits to act as a marina.

If a new marina with more than 500 berths is to be constructed or an existing marina is to be extended by more than 250 berths, an Environmental Impact Assessment must be conducted.

Other buildings/facilities at the marina (including shops, restaurants, cranes, playgrounds etc.) must be clean, safe, properly maintained and in compliance with the legislation. No unauthorised pollution from buildings/facilities must enter the marina land, water or surroundings.

It is strongly recommended that the marina uses environmentally-friendly equipment and products in the buildings whenever possible. Green areas at the marina should also be properly maintained in an environmentally-friendly way (without the use of pesticides, etc.).

Consideration should be given to the general appearance of the marina. It must be well integrated within the surrounding natural and built environment, should give consideration to design standards and meet environmental and aesthetic requirements. It is not the intention that all Blue Flag marinas become identical; marinas should be encouraged to maintain their individual characteristics.

The Blue Flag must not fly during substantial building extensions and/or rebuilding at the marina.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

15. Adequate, clean and well sign-posted sanitary facilities, including washing facilities must be in place and provide drinking water. Sewage disposal is controlled and directed to a licensed sewage treatment

The sanitary facilities must be in good condition, clean and well kept. The sanitary facility buildings must also be well maintained and in general accordance with national building legislation (see also criterion no. 12).

The sanitary facilities should include toilets, washbasins and showers. There should also be drinking water available. Other facilities could include washing machines.

The number of sanitary facilities available in the marina must be adequate for the number of marina visitors in the peak season. The marina management should discourage boat owners from using the boat toilet facilities during their stay in the marina.

The sanitary facilities must be easy accessible and located not too far away from any point in the marina (in general less than 200 metres from any boat at any berth). The location of the sanitary facilities must be easy to locate (using signs or on the map of the marina).

The sanitary facilities must be linked to a licensed sewage treatment system, and the system must be in compliance with the EU Urban Waste Water Directive. If the marina is very small and/or very remote, the National Jury can, in special cases, approve another safe way of disposing of the generated wastewater from the marina.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

16. If the marina has boat repairing and washing areas, no pollution must enter the sewage system, marina land and water or the natural surroundings

A marina with boat repairing and washing areas must comply with all standards and regulations in national and international legislation.

The boat repairing and washing must take place in a specifically designated area at the marina.

There must ~~in~~ be collection filters (or equivalent systems) from boat repairing and washing areas to prevent hazardous substances from entering the sewage system and the marina land/water. The collection filters must be regularly emptied and the waste in the filters should be treated as hazardous waste.

Larger repairing activities (e.g. grinding, polishing or sandblasting which cause dust pollution) should take place under cover or indoors under controlled conditions. Collected waste must be handled as hazardous waste.

Serious noise pollution from boat repairing and washing must be avoided.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

17. Sustainable transportation should be promoted

The marina should encourage the use of sustainable transportation to and from the marina.

If there are more than two kilometres to the nearest urban settlement, there should preferably be public transportation between the marina and urban settlement.

Sustainable transportation can also be promoted through the availability of bicycles for rent and the presence of pedestrian pathways.

Since this criterion is in accordance with Local Agenda 21 activities, the marina is encouraged to collaborate, or work with, local authorities and/or local Agenda 21 groups regarding compliance with this criterion.

IMPERATIVE CRITERION	GUIDELINE CRITERION
	All regions

18. Parking/driving is not permitted in the marina, unless in specific designated areas

In general, parking and driving cars inside the marina should be avoided. The use of cars should, wherever possible, be replaced with sustainable transportation (public transportation, bicycles, etc.) – see criterion no. 16.

If parking and driving within the marina cannot be avoided, driving and parking must only take place in areas designated for this purpose. It is very important in the planning of these areas, to consider the safety and free passage of people walking in the marina.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

SAFETY AND SERVICES

19. Adequate and well signposted lifesaving, first-aid equipment and fire-fighting equipment must be present. Equipment must be approved by national authorities

When addressing good safety practices in marinas, it is valuable to distinguish between the different role-players and the different types of action to be taken:

- The Users (sailors) versus the Marina Management and Staff
- Prevention measures versus Rescue/Emergency measures

Accident prevention is paramount for safety. To help prevent accidents, the marina management and staff should ensure that the marina facilities are properly maintained, that national legislation is followed, and that staff and users are well informed and/or trained about safety issues. It is also recommended that an assessment of the marina be undertaken to study safety issues, e.g. the placement of boats in relation to the possible spread of fires, etc.

If an accident does occur, the marina should have the necessary technical means or equipment to deal with it.

Lifesaving equipment

The following general guidelines should be followed when considering water safety in a marina:

- A person who falls in the water should be able to get out of the water
- A person must be able to help or rescue a distressed person in the water without risking his or her own life.

The required lifesaving equipment in the marina must (at least) include the presence of lifebuoys and ladders. Other types of lifesaving equipment could include boat-hooks, rescue

boats, rescue stations, etc. at/near the marina. The lifesaving equipment must be approved by the national lifesaving body or comply with national or international standards. The equipment must be available in adequate numbers, easy to identify (well signposted) and easily accessible from all over the marina (not more than 200 meters from any point). The placement of equipment must be in compliance with national legislation. It must be available 24 hours a day throughout the Blue Flag season and the location of lifesaving equipment must be indicated on the marina map.

A guideline recommendation is for a ladder and public lifesaving equipment to be placed (at least) every 25-50 meters from any water-front point in the marina. Equipment should be available on each pier. The equipment should furthermore be painted for visibility (red, orange and with reflectors).

Fire-fighting equipment

The fire-fighting equipment in the marina must (at least) include the presence of fire extinguishers, but could also include water hoses, fire carpets, etc. The fire-fighting equipment must be approved by the national fire fighting association/organisation/authority or comply with national or international standards.

The equipment must be available in adequate numbers, easy to identify (well signposted) and easily accessible from all over the marina (not more than 200 meters from any point). The placement of equipment must also be in compliance with national legislation. It must be available 24 hours a day throughout the Blue Flag season. The location of fire-fighting equipment must be indicated on the marina map.

Fire extinguishers must also be present at fuelling stations, near hazardous waste storage facilities and at locations where high temperature work is being done.

A guideline recommendation is to have handheld fire extinguishers placed every 25-50 meters and with at least one per pier. On piers longer than 100 meters, there should be a fixed water supply (fire hydrant) at the beginning of the pier. When deciding on the size and type of extinguishers and their placement, consideration should be given to the size of the boats and the distance of the marina from an emergency fire department or fire brigade.

First Aid

First-aid equipment must be present at the marina and can be located in the marina office or at other facilities (shops, restaurants, etc.). The first-aid equipment does not necessarily need to be available 24 hours a day, but must be available at reasonable times (e.g. the opening hours of the marina office). The content of a first-aid equipment box must comply with national legislation or meet the standards set by a national or international lifesaving association. In exceptional cases, the first-aid equipment can be located in a place very near to the marina (less than 200 metres away). The contents of the first-aid box must be regularly checked and items must be replaced if necessary. The availability and location of the first-aid equipment must be very clearly signposted on the information board and on the marina map.

Other

It is recommended that the entrance/exit to the marina be clearly marked with signs for sailors.

It is recommended that the marina be well lit at night.

For dry docks and storage areas, it is recommended that the boats be placed so that emergency vehicles can move between the rows, and fire fighting equipment should be placed throughout the area. Local fire experts should be contacted for advice.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

20. Emergency plans in case of pollution, fire or other accidents must be produced

If an accident or emergency does occur, the marina should have the necessary organisational means or emergency plans in place to deal with it.

The marina must have an emergency plan available that states what to do in case of pollution, fire or other possible accidents affecting the safety of the marina (e.g. safety at fuelling stations, near cranes, etc.). The staff at the marina must be informed about the emergency plan.

The emergency plan for the marina can be specific for the marina, but can also be part of a larger harbour, municipal or regional emergency plan. Relevant authorities (local authorities, fire-fighting brigade, Red Cross, etc) must approve the emergency plan.

The emergency plan should at least include the following:

- Identification of the people to contact in case of an accident
- Involvement of administration services and people necessary to intervene
- Procedures for the protection or evacuation of people at or near the marina
- Procedure of public warning and information.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

21. Safety precautions and information must be posted at the marina

Accident prevention is paramount for safety. In most cases, accidents that occur could have been prevented by the people involved. Thus, safety information and education for the marina users is very important.

General information about safety precautions must be posted at an easily accessible site at the marina, and on the information board. The safety precautions should include (at least) the following:

- Information about the correct storage of hazardous and flammable waste
- Directions for filling gasoline/petrol tanks at the fuelling station
- Signs for safety hazards (e.g. unprotected piers)
- Prohibition of open fire or fireworks at the marina (unless there is a designated area or permission from the marina)
- Directions for the safe use of electrical outlets at the marina
- No swimming in the marina
- Information about the location of eventual public telephone, lifesaving, fire-fighting and first-aid equipment
- Information about how to use the above-mentioned equipment
- Details on how to warn other people about an unsafe situation
- Information about who to contact for further information about safety at the marina
- Information about relevant emergency telephone numbers (police, fire department, ambulance, marina manager)

Other information could include:

- Guidance that children should wear lifejackets in the marina
- Information about first-aid and lifesaving courses
- Guidance about the consumption of alcohol at the marina
- Information about how to prevent fire on individual boats

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

22. Electricity and water is available at the berths, installations must be approved according to national legislation

Electricity and water must be available for the boats. The facilities must be available no more than 25 metres from the berths (except for boats not using electricity). There must be clear information about the conditions for using electricity and water and preferably also accompanied by information about energy and water saving.

All installations must be safe and approved by national and/or international legislation.

Public light must be available at marinas especially for safety reasons.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

23. Facilities for disabled people should be in place

The facilities for disabled people in a marina should (at least) include:
- Access for disabled people to and around ~~in~~ the marina (including the piers)
- Special car parking facilities for disabled people
- Access to sanitary facilities for disabled people

Other facilities for disabled people in a marina could be:
- Boating facilities for disabled people
- Access to marina offices, shops and restaurants in the marina
- Access to marina activities

All access and facilities for disabled people must comply with all national and international regulations/standards. Toilets should be designed for wheelchair and other disabled users.

IMPERATIVE CRITERION	GUIDELINE CRITERION
	All regions

24. A Map indicating the location of the different facilities must be posted at the marina

A map of the marina area indicating all the required and other facilities must be posted on the information board.

The following facilities must be indicated on the map:
- Reception facilities for hazardous waste and oil waste
- Garbage containers
- Facilities for recyclable waste
- Toilet tank pumping/reception facilities (if present)
- Bilge water pumping/reception facilities (if present)
- Lifesaving equipment
- Fire-fighting equipment
- First-aid equipment
- Public telephone (if applicable)
- Sanitary facilities (toilets, showers, washing facilities, drinking facilities, etc.)
- Fuelling station (if present)
- Boat repairing and washing areas (if present)
- Marina office / club house
- Facilities for disabled people (if present)
- Designated parking areas (if present)
- Boat places reserved for guest boats (if present)
- Nearby public transportation (if very close to the marina)
- You are Here indicators
- Direction signs, e.g. North

Other facilities (like shops, restaurants, etc.) can also be indicated on the map.

The different facilities should preferably be indicated on the map as easily understood pictograms.

The cartographic co-ordinates of the marina should be located in a clearly visible place.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

WATER QUALITY

25. The water in the marina must be visually clean without any evidence of pollution, e.g. oil, litter, sewage or other evidence of pollution

In order for the marina to comply with high environmental standards, it is very important that the marina and marina water are visually clean. The marina water should not contain oil spots, litter (bottles, cans, plastic, etc.), sewage or other noticeable signs of pollution. What about un-natural odours or smells coming from the water?

Natural occurrences like decaying of algae, spawning of mussels, etc. might give the appearance of pollution in the water without this actually being the case. In such cases, information about the natural occurrences should be provided at the information board.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

APPENDIX A: Tools for establishing environmental plans [Criterion 7]

The marinas participating in the Blue Flag programme are very different in size and capacity. The compliance with criterion 7 can therefore take place in two ways: either a) through the planning and performance/implementation as requested in an "environmental logbook" system, or b) through implementing a proper environmental management system.

a) "Environmental logbook" system

In the "environmental logbook" system, the environmental goals for a Blue Flag marina are listed. The marina management can choose the most relevant and important goals for the marina, but does not need to restrict itself to these. It is recommended that these goals are discussed with the national operator. What is essential is continual improvement. The marina is therefore required to set new and higher goals each year, though the marina can choose to work with goals relating to previously set goals.

In the application form for the coming season the marina must provide information about the goals that the marina intends to fulfil. In the same application form, the marina should also report on goals achieved in the previous season by sending a status copy of the environmental logbook. The marina can change a goal during the season, but there should be a good reason for this and it needs to be noted in the environmental logbook. The marina is strongly advised to contact the national operator before changing a goal. In exceptional cases, if the marina has not fulfilled a goal and they can give a reasonable explanation for it, the National Jury might choose to give a dispensation. There is no stipulation that the marina has to fulfil the goal during the Blue Flag season; often it is preferable to carry out improvements ahead of the season.

Here are some suggestions from FEE for relevant goals:

GOAL	DESCRIPTION	FURTHER INFORMATION
1	**Electricity**	
1a	Replace energy consuming light bulbs	Put in place energy-saving bulbs
1b	Management of lighting in marina	Put in place automatic light switches.
1c	Change old equipment and installations	Refrigerator, freezer, washing machine, etc.
1d	Sunlight collector Collection of solar energy.	Heating the water
1e	Limit on electricity on the jetty to 4 ampere	Visitors cannot then use el-heaters
1f	General investigation of the electric insulation at the marina	

2	**Water**	
2a	Install water saving equipment, e.g. showers,	
2b	Install water saving taps	
2c	Replace toilets, shower, taps, etc	Toilets with less flush water and/or toilets with two types of flush (3 / 6 litres)
2d	Inspection of the installation	Waste pipe, water pipe, etc.
2e	Push buttons on taps and showers	
2f	Information about water saving	
2g	Install an environmental facility for receiving toilet waste	

3	**Buy and use of environmentally-friendly products**	
3a	Buy environmentally-friendly paint	
3b	Buy environmentally-friendly soap for cleaning and washing	

4	**Waste**	
4a	Production of “recycling bags”	For boat owners taking short trips and returning to the marina, the marina can offer garbage bags to collect their waste while at sea.
4b	Litter management and disposal	Separation of organic waste (for compost) and inorganic/toxic waste. Establish additional containers for sorting household waste
4c	Establish compost bins	

The environmental logbook looks like this:

Environmental logbook of a Blue Flag Marina

Name of Marina:	Park Marina
Name of responsible person:	Brian Jones
Year:	2004

Activity	Date	Goal	Description	Persons involved	Documentation
Goal	15-01-04	1a	Changing to energy saving bulbs everywhere in the marina.	Brian Jones Peter Smith	
Goal	15-01-04	2a	Change to water saving showers.	Brian Jones Peter Smith	
Action	15-05-04	1a	The bulbs in the office, toilet and in the club were changed. The bulbs outside will be changed during the season.	Brian Jones	Copy of bills and photos.
Action	30-05-04	2a	The showers were changed and at the same time we changed to water saving taps (2b).	Brian Jones	Copy of bills and photos.
Action	25-06-04	1a	The bulbs outside were changed.	Brian Jones	Copy of bills and photos.

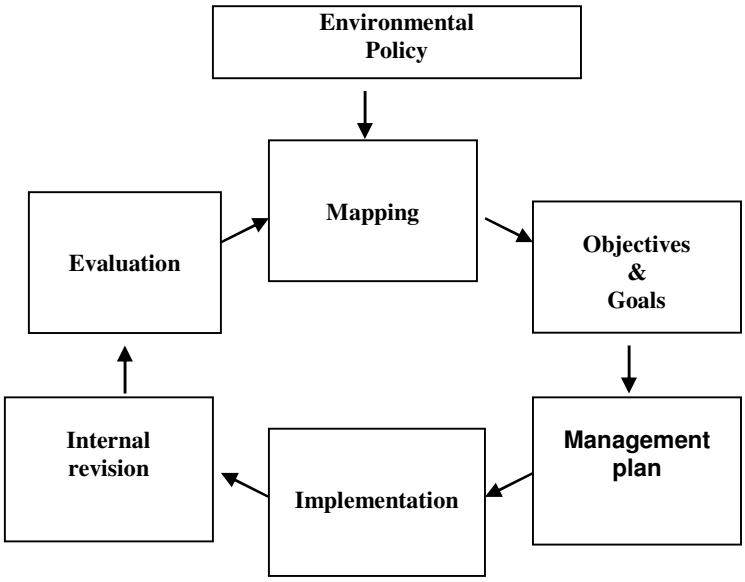
Goals obtained	01-12-04	1a 2a	Obtained Obtained		

Further remarks
We expect to see savings on the water consumption in 2004.

b) Environmental management system

If a marina chooses to ensure the compliance through an environmental management system, it can either be certified through the official systems (ISO 14001 or EMAS certification system), or the marina can choose a parallel environmental management system as described here. It is always possible, and advisable, to contact the national operator for more information about environmental management systems.

The environmental management system is a process that can be repeated. The circle looks as follows:



The Environmental Policy deals with how the marina can reduce the environmental loads from its activities and should be a good example of how to inspire the users and other stakeholders to make an active effort in protecting the environment. The marina must itself prioritise the work and goals in correspondence with activities and wishes. There are, however, some recommended areas (water, waste and energy consumption, health and safety issues, and the use of environmentally sound products) which should be addressed.

Mapping is an important starting point for the further planning and evaluation of the environmental work. The actual environmental load of the marina must be known. It can be beneficial or useful to distinguish between the environmental loads from the marina and from the boats (including guest boats) entering the marina.

In the evaluation of the environmental loads, it is important to be systematic and transparent to be able to easily recognise the achievements from previous years. The number of environmental factors at the marina is limited and most users can point out the most important factors. The following steps can be used in the overview mapping process:

- Develop an overview of the marina and its immediate surroundings, and imagine an invisible border around the marina
- Try to determine the environmental loads (in the form of energy, water, materials, waste, etc) entering the designated area of the marina.
- Make a physical examination of the marina where all observed environmental conditions are noted (Which environmental loads are present? Where can the influences be observed? What is the reason for the influences?)

With a well-documented overview of the environmental conditions at the marina, the individual conditions can be dealt with. It is important to identify the most important environmental loads of the marina and determine a reasonable level of detail. It can be a good idea to use pre-defined schemes in the evaluation of the marina to ensure that all relevant issues are included, to be systematic and to see the changes/improvements over the years. It can be useful to have two different schemes, one for the marina (basic running of the marina) and one for the users (sailors).

When the management plan is produced for the first time, wherever possible, the most important environmental improvements over the past years should be included (energy saving

or water saving arrangements, etc.). The information about these improvements can give an indication for new areas of improvements.

Objectives and goals: When information about the environmental loads has been ascertained, it is time to consider the handling of the loads and to determine objectives for each of the environmental conditions. In other words, decisions need to be taken about whether to change the observed conditions. This should be followed by decisions regarding the objective, goals for the acceptable discharge, waste handling, energy consumption, etc. When deciding on objectives and goals it is important to take into account the overall environmental policy of the marina.

The management plan: With the environmental policy and the objectives in place, it is time to decide on the areas (with definite priorities) for the coming year. Efforts must be prioritised, because it is often not possible to start on all areas at the same time. During this process, the importance as well as the level of impacts involved and the size of the environmental loads must be taken into consideration. In prioritising, the following issues must be considered:

- Effect (What is the effect to be expected from the effort?)
- Economy (What does it cost? Which savings can be expected? Are there external ways of financing the implementation?)
- Environmental awareness (What effects do the efforts have?)
- Occupational health (Are there advantages for the occupational health?)

Having decided what to do, it is now time to decide how to do it (specification) within a certain timeframe. It can be helpful to draw up a formal scheme of work.

The implementation of the management plan can require a change in behaviour of the users and the management of the marina, a change in the code of conduct and the production of new instructions. It is important to inform everybody about the management plan and what is required of everyone.

The revision/audit is a means of checking whether the management plans have been fulfilled. An internal revision/audit should therefore involve:

- Check that objectives are achieved
- Check whether the expected effects are obtained
- Investigate the reason and extent of any discrepancies
- Note any unforeseen effects
- Write down observations in the internal revision/audit

The evaluation should be published once a year as a tool in the environmental management process, but also in order to promote the improvements externally. The evaluation could contain the following:

- Description of the main environmental loads
- Prior environmental improvements (first year: previously taken initiatives, second year: follow-up to the management plan)
- Environmental policy and objectives
- Environmental management plan

Continuing the process: After having been through the process the first year, the effect can be evaluated and the process starts again (at a higher level than the previous year). The most important environmental loads are again determined. The management plan must be reviewed and the observed effects compared with the expected effects. The environmental policy should also be evaluated in order to consider if changes are needed. Then the objectives and the management plan for the next year are decided. The work can include issues as yet unresolved from the previous year.

ANNEXURE 3

BLUE FLAG BEACH CRITERIA AND EXPLANATORY NOTES 2014



INTRODUCTION

The Blue Flag programme for beaches and marinas is run by the international, non-governmental, non-profit organisation FEE (the Foundation for Environmental Education). The Blue Flag programme was started in France in 1985. It has been operating in Europe since 1987 and in areas outside of Europe since 2001, when South Africa joined. Today, Blue Flag has become a truly global programme with an ever-increasing number of countries participating in the programme.

The Blue Flag programme promotes sustainable development in freshwater and marine areas. It challenges local authorities and beach operators to achieve high standards in the four categories of: water quality, environmental management, environmental education and safety. Over the years, the Blue Flag has become a highly respected and recognised eco-label working to bring together the tourism and environmental sectors at local, regional and national levels.

The explanatory notes given in this document make up the common and shared understanding of the Blue Flag beach criteria and the requirements for the implementation thereof. The explanatory notes provide details on the measurement and management of compliance with the Blue Flag beach criteria.

The criteria are categorised as either imperative or guideline. Most beach criteria are imperative, i.e. the beach must comply with them in order to be awarded Blue Flag accreditation. If they are guideline criteria, it is preferable that they are complied with, but not mandatory.

It must be emphasised that the Blue Flag beach international criteria in this document are the minimum criteria. A national operator can choose to have stricter criteria to what is outlined here.

These beach criteria and explanatory notes are to be used by all Blue Flag applicants in order to understand the requirements that must be met before a beach can receive Blue Flag accreditation. For guidance purposes, this document should also prove valuable for the management of those beaches already accredited with Blue Flag status. The beach criteria and explanatory notes also serve as a guide for the National, Regional and International Blue Flag Juries when making decisions about a Blue Flag beach candidate.

During the Blue Flag season the flag must fly at the beach. The flag is both a symbol of the programme being run at the beach but also an indication of compliance. The flag may either be flown 24 hours a day during the Blue Flag season, or only during the hours when the beach meets all the Blue Flag criteria. In the case of the former, there must be adequate signage indicating the time when services (eg life-saving), and facilities (eg toilets) are in operation.

If a beach that has Blue Flag accreditation does not comply with the Blue Flag criteria, the flag may be permanently or temporarily withdrawn from the beach. There are several degrees of non-compliance:

1. A **minor** non-compliance is where there is a problem with only one criterion of minor consequence to the health and safety of the beach user or to the environment. When minor compliance occurs and can be immediately rectified, the flag is not withdrawn and

the non-compliance is only registered in the control visit report. If however, a minor compliance cannot be fixed immediately, the beach is given 10 days in which to comply fully with all criteria. The flag is withdrawn until all problems are rectified and it is noted on the Blue Flag homepage.

2. **Multiple non-compliances** relates to non-compliance of two to three criteria but of minor consequence to the health and safety of the beach user or to the environment. When multiple non-compliances occur, the beach is given 10 days in which to comply fully with all criteria, the flag is withdrawn until all the problems are rectified and the homepage is updated accordingly.
3. **Major** non-compliance is where the beach does not comply with one or several criteria, the result of which can have consequence to the health and safety of the beach user or to the environment, as well as the general perception of the beach and therefore the Programme. When met with major non-compliance, the flag is withdrawn immediately and for the rest of the season. The site is registered as 'withdrawn' on the Blue Flag homepage, and the beach information board should clearly indicate that Blue Flag status has been withdrawn.

In all cases of non-compliance, the National Operator must immediately inform the local authority/beach operator about the observed areas of non-compliance. Information about the reason for a withdrawal of the flag must be posted clearly at the beach. The local authority/beach operator must inform the National Operator of re-compliance with the criteria and present the appropriate documentation needed. The flag can then be raised at the beach again. The National Operator should also consider a follow-up control visit to check that the beach does comply. In the event that the local authority/beach operator does not ensure and document re-compliance with the criteria within 10 days, the National Operator must ensure that the Blue Flag is withdrawn for the rest of the season at the beach.

In the event that conditions on the beach change and the flag has to be temporarily withdrawn, e.g. when climatic events cause damage to the beach or an emergency arises, the beach management must inform the National Operator that the flag has been temporarily withdrawn and the international website must be changed accordingly.

Apart from updating the Blue Flag homepage of the status of the beach, the National Operator must inform the International Coordination about the non-compliance. If the non-compliance is noted by an international controller, the National Operator has to give feedback to the International Coordination within 30 days.

The applicant for Blue Flag accreditation is the authority charged with responsibility for the beach. This may be a local municipality, private hotel, national park, or private beach operator. A beach may be eligible for Blue Flag accreditation if it is a designated bathing area and it has the necessary facilities and services to comply with the Blue Flag criteria.

A beach must be accessible in order to be eligible for Blue Flag accreditation. It is preferable that beach users be granted free access to a Blue Flag beach, i.e. to use the beach and its facilities without paying a fee. Blue Flag, however, recognises that at some beaches, e.g. private beaches, members of the public are charged a small, reasonable fee to access the beach. Other payments may be levied for services in the area, e.g. for parking or hiring of equipment.

FEE, and the National Operator in a country, reserves the right to refuse or withdraw Blue Flag accreditation from any beach where the local authority/beach operator is responsible for violations of national environmental regulations or otherwise acts in discord with the objectives and spirit of the Blue Flag programme. Blue Flag beaches are subject to announced and/or

unannounced control visits by FEE International.

In the event of a first-time applicant, the applicant local authority/beach operator must provide evidence in the application that the beach complied with the imperative water quality criterion for Blue Flag in the season (or year) prior to application for full status. Applications will only be considered from beaches where a minimum of 20 samples have been taken in the previous season(s).

ENVIRONMENTAL EDUCATION AND INFORMATION

Each beach must have at least one Blue Flag information board in place containing all the information as required by the criteria listed below. For long beaches it is recommended to install more than one Blue Flag information board (approximately one every 500 metres). All Blue Flag information boards must follow national standards with respect to information, content and design. These Blue Flag information boards must be in place at all Blue Flag beaches.

Criterion 1. Information about the Blue Flag programme and other FEE eco-label must be displayed.

Information about the Blue Flag programme must be displayed on the Blue Flag information board. The correct Blue Flag logo must be used, in accordance with the FEE branding guidelines. The essence of each of the four categories of the Blue Flag criteria must be explained in this information. The length of the Blue Flag season must also be included.

The information could furthermore be posted at other locations, e.g. at major access points, lifeguard stations, other beach facilities, or in parking areas. Tourist information offices should also have information about the Blue Flag programme.

Contact details for the local, national and international Blue Flag representatives should be posted as well.

In areas of international tourism, it is recommended that the information be provided in relevant languages.

In the event that the flag is temporarily withdrawn, information must be posted at the beach informing the public as to the reasons why the flag was withdrawn.

Blue Flag beaches and marinas must promote the Green Key programme as another eco-label FEE programme with a message such as: “Along with the Blue Flag, the Foundation for Environmental Education also develops another eco-label for accommodations: Green Key. Find more information at: www.green-key.org”

Appendix B provides an example of how the Blue Flag information can be presented.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 2. Environmental education activities must be offered and promoted to beach users.

Environmental education activities promote the aims of the Blue Flag programme by:

- increasing the awareness of, and care for, the local environment by recreational users and residents.
- training personnel and tourist service providers in environmental matters and best practice methods.
- encouraging the participation of local stakeholders in environmental management within the area.
- promoting sustainable recreation and tourism in the area.
- promoting the sharing of ideas and efforts between the Blue Flag programme and other FEE programmes (YRE, LEAF, Eco-Schools and Green Key).

The planned environmental education activities for the coming season must be included in the application documents, as well as a report on activities carried out during the previous Blue Flag season (if applicable).
There must be at least five different activities offered in the municipality or community - preferably during the Blue Flag season. The activities should focus on the environment, environmental issues, Blue Flag issues or sustainability issues. At least some of the activities should be carried out at the beach and have a direct focus on the beach environment.

The education activities should be effective and relevant, and each year, the local authority should re-evaluate the activities that were implemented and work towards constantly improving them.

Where the planned environmental education activities are of interest to, and involve, the general public or beach users these activities must be promoted in good time to inform the public about these opportunities. Such activities could also be promoted on the Blue Flag information board, in other areas in the beach area, in local centres, in newspapers and other media.

The environmental education activities must be clearly disseminated to the public. Preferably, the activities should be posted on the common information board. However, dissemination could be an updatable list posted at the kiosk or clubhouse, an SMS service or other means of communication. Whatever the platform for dissemination is, it has to be stated on the information board where to find out more about the activities.

Local authorities/beach operators are encouraged to implement and/or support sustainable development projects in which public participation is a key element, e.g. Local Agenda 21 initiatives.

If specific sensitive natural areas (including Marine Protected Areas) exist near a Blue Flag beach (e.g. mangroves or sea grass beds), it is strongly recommended that some of the education activities address these sensitive natural areas.

Examples of good educational activities can be downloaded from the internal pages of the Blue Flag international website (www.blueflag.org).

Appendix C provides further background on the environmental education activities.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 3. Information about bathing water quality must be displayed.

Bathing water quality information must be displayed on the Blue Flag information board. It is recommended that a table or figure with easily identifiable symbols that correspond to the results be used. The information should also clearly explain how the water quality results relate to the imperative criteria for water quality, with specific reference to sampling frequency and the conditions under which Blue Flag status can be withdrawn.

The authority in charge of providing the bathing water quality results must do so shortly after the analysis so that the data can be updated regularly. It is the responsibility of the local authority to ensure that the beach operator/beach management posts the information no later than one month after the sampling date. The complete and detailed data must be made available by the local authority to anybody upon request.

Appendix D provides an example of how this information could be presented.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 4. Information relating to local eco-systems and environmental phenomena must be displayed.

The aim of this criterion is to ensure that beach users are well informed and educated about relevant environmental phenomena (including valuable cultural sites/communities), local ecosystems and any sensitive areas in the surrounding environment so that they are encouraged to learn about and experience the environment in a responsible way.

Where appropriate, information about coastal zone ecosystems, wetland areas, unique habitats or any sensitive natural areas must be displayed at or close to the Blue Flag beach. The information should include details about the natural area and a code of conduct for visitors to the area. If the full information is not available on the Blue Flag information board, there should at least be a short notice on the board informing the public about the nearby sensitive area and where they can find further information.

Relevant environmental information could furthermore be displayed at tourist sites, at the natural areas, or in tourist information offices. The information can be published in tourist brochures, local newspapers or pamphlets created specifically for this purpose. In areas that are visited by a high number of tourists, it is recommended that the information be presented in more than one way, as listed above, and it should be presented in relevant languages.

In the case of sensitive underwater environments, specific information about these areas must be provided for divers and snorkelers.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 5. A map of the beach indicating different facilities must be displayed.

A map showing the boundaries of the Blue Flag beach area and the location of key facilities and services must be posted on the Blue Flag information board. The map should be of good quality, easy to read and properly orientated.

Pictograms should preferably be used.

The required map elements (where applicable) should show the location of:

- "You are here" pointers
- lifeguards or lifesaving equipment
- the area patrolled (for beaches with lifeguards)
- first aid equipment
- telephones
- toilets (including toilets for disabled people)
- drinking water
- car and bicycle parking areas
- authorised camping sites at/near the beach
- recycling facilities
- location of water sampling point(s)
- access points and access for disabled persons
- zoning (swimming, surfing, sailing, boating, etc.) where applicable

- nearby public transport
- footpaths
- demarcation of Blue Flag area
- location of other information boards
- rivers and inflows
- local landmarks (where applicable)
- storm water outlets
- nearby natural sensitive areas, etc.
- direction (North)
- scale bar

For guidelines on the design and suitability of maps of Blue Flag beaches, visit www.blueflag.org.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 6. A code of conduct that reflects appropriate laws governing the use of the beach and surrounding areas must be displayed.

The code of conduct should address the activities of beach users and their conduct on the beach. The beach code of conduct must be displayed on the Blue Flag information board. The information could furthermore be posted at other locations, e.g. at all major entrance points, near to the issue concerned (i.e. a No Diving sign on a pier) or as information at the relevant sites. Internationally recognised symbols, e.g. pictograms should be used wherever possible.

The code of conduct should include rules about the presence of domestic animals, zoning, litter management, the use of vehicles, camping, fires, etc.

Laws governing beach usage and management should be available to the public at the office of the local authority/beach operator.

The period when the lifesaving equipment and/or lifeguards, and first aid are available must be clearly marked on the Blue Flag information boards and at the lifeguard station. An explanation of the emergency flag system in use must also be provided.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

WATER QUALITY

The Blue Flag programme requires that beaches achieve excellent bathing water quality. The bathing water quality standards have been based on the most appropriate international and national standards and legislation.

Blue Flag is an international eco-label and it therefore has one minimum global standard for water quality. The standards described here for bathing water quality for beaches must be adopted unless stricter national standards are already in existence, e.g. testing for total coliform bacteria. In that case, the beach must comply with the more demanding national standards for bathing water quality.

Criterion 7. The beach must fully comply with the water quality sampling and frequency requirements.

A Blue Flag beach must have at least one sampling site and this must be located where the

concentration of bathers is highest. In addition, where there are potential sources of pollution, e.g. near streams, rivers or other inlets, storm water outlets, etc. additional samples must be taken at these sites to provide evidence that such inflows do not affect bathing water quality.

Samples for microbiological and physical–chemical parameters must be taken.

Similarly, in the case of inland waters where the water is supplemented by outside sources during dry periods, the water quality of the outside source must meet the Blue Flag bathing water quality standards.

Samples should be taken 30 cm below the water surface except for the mineral oil samples that should be taken at surface level.

How often a sample must be taken?

There must be no more than 30 days between samples during the Blue Flag season. The Blue Flag programme does not accept applications from beaches, irrespective of the length of the Blue Flag season, where less than five samples have been taken. I.e. a minimum of five samples must be taken evenly spread out during the season. The first sample must be taken within 30 days before the official starting date of the Blue Flag season.

When sample results raise concern of a possible increase in levels of pollution, it is recommended to temporarily increase the sampling frequency in order to track any possible pollution incident.

In the event of short-term pollution, one additional sample is to be taken to confirm that the incident has ended. This sample is not part of the set of bathing water quality data. If necessary to replace a discarded sample, an additional sample is to be taken seven days after the end of the short-term pollution. Discounting of samples because of short-term pollution during the last assessment period is allowed for maximum 15% of the total number of samples provided for in the monitoring calendar established for that period, or one sample per bathing season, whichever is the greater.

When calculating 15% of the total number of samples provided for that period, the result must be rounded up or down.
The rule is:
Anything lower or equal to ,49 should be rounded down (for example: a result of 2,49 gives a possibility of discounting 2 samples).
Anything higher or equal to ,50 should be rounded up (for example: a result of 2,50 gives a possibility of discounting 3 samples).

Both the original and the re-samples have to be sent as a dispensation case to the International Jury for the evaluation (*see Appendix A on dispensation cases*).

In case of an oil spill, abnormal weather or other extreme factors which can have a serious adverse effect on the quality of the bathing water, the beach manager must temporarily take down the flag and clearly state the reason on the information board. It is recommended that the wording of this information is along the lines: "This beach has recently experienced abnormal weather. Swimming is not recommended at this time due to the possibility of pollution."

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 8. The beach must fully comply with the standards and requirements for water quality analysis.

An independent person, officially authorised and trained for the task, must collect the samples.

An independent laboratory must carry out the analysis of the bathing water samples. The laboratory must be nationally or internationally accredited to carry out microbiological and physical-chemical analyses.

In the event that the sampler or the laboratory is not independent, at the time of application a dispensation must be requested and details provided as to why this is required, e.g. in some cases beaches are substantial distances away from the services necessary to meet this requirement.

Methods of analysis:
In the interest of increased quality and comparability of the bathing water quality data used for the evaluation of candidates for the Blue Flag, FEE finds that methods of analysis that ensure a certain trueness, reproducibility, repeatability and comparability between methods should be used. FEE follows European (CEN) or International (ISO) standards in its recommendations regarding parameters and acceptable methods of analysis.

Water quality results must be given to the National Operator as soon as they are made available but not later than one month after the sample has been taken.

A sampling calendar must be established prior to the start of the bathing season. Sampling must take place no later than four days after the date specified in the sampling calendar unless there are exceptional circumstances preventing this. In such a case, the National Jury must submit the beach as a dispensation case to the International Jury (*see Appendix A for more information on dispensation cases*).

Sampling history:
The water quality results for the previous four seasons must accompany all applications. In order to be eligible for the Blue Flag, the beach must show - through these reports - that the bathing water quality standards were met in the previous seasons.

For new countries or new beaches, results from a minimum of 20 samples taken within the proposed Blue Flag season must be available for Blue Flag accreditation to be considered. The sampling history may be taken in one Blue Flag season in order to be able to apply the following year. The applicant beach may also choose to take fewer samples and wait to apply when 20 samples have been collected (for example taking 10 samples in year 1, 10 more in year 2 and applying in year 3). Remember that a minimum of 5 samples has to be taken per Blue Flag season.

The water quality information of the current season must be posted on the Blue Flag information board, in accordance with Criterion 3. *See Appendix D for a recommendation for presenting water quality information on Blue Flag beaches.*

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 9. No industrial, waste-water or sewage-related discharges should affect the beach area.

A bathing water profile must be compiled for every Blue Flag beach. A bathing water profile includes identification of potential sources of pollution, a description of the physical, geographical and hydrological characteristics of the bathing water, as well as assessment of the potential for cyanobacteria and algae formation.
It is recommended that there should not be any discharge of industrial, urban wastewater or sewage-related discharges into the Blue Flag area or immediate buffer zone/surrounding area. In the event that there are discharge points in the area of the beach, these must be documented at the time of application.

Where identified, combined sewage overflow discharges or other urban/industrial waste water discharges are within, or immediately adjacent to, the proposed award area, information to warn the public that there is an intermittent discharge which could, in the short term, impact the bathing water quality must be provided.

The collection, treatment and discharge of urban wastewater in the community must meet national/ international standards and comply with national/international legislation. For the countries in EU, there are requirements for the treatment and effluent quality given in the EU Urban Waste Water Treatment Directive (91/271/EEC). A number of new EU countries have been granted dispensation from the EU Directive. Regardless of national/ international standards and legislation, this waste-water or any discharges must not negatively affect the environment or compromise the water quality standards of a Blue Flag beach.

Regarding industrial pollution, notification must be given about industrial facilities and plants in the vicinity of the beaches stating their likely influence on the environment. Moreover, the appropriate authorities must confirm in writing that the area is being monitored to ascertain the environmental impacts of nearby industrial facilities and confirm that the facilities do not pose a public health risk or environmental hazard.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 10. The beach must comply with the Blue Flag requirements for the microbiological parameter Escherichia coli (faecal coli bacteria) and intestinal enterococci (streptococci)

The microbiological parameters to be monitored are given below:

Parameter	Coastal and transitional waters Limit values	Inland waters Limit values
Escherichia coli (Faecal Colibacteria)	250 cfu/100 ml	500 cfu/100 ml
Intestinal Enterococci (streptococci)	100 cfu/100 ml	200 cfu/100 ml

- cfu = colony forming units (of bacteria)

Accepted percentile:
For the evaluation of an applicant beach the Blue Flag programme requires 95th percentile compliance of the above limit values. This is in accordance with the EU Bathing Water Directive 2006 as well as the recommendation of the World Health Organisation. The percentile has to be calculated for each parameter and also met for each parameter. For example, if the 95th percentile is below the limit values for Escherichia coli but not for Intestinal Enterococci then the beach cannot be awarded with the Blue Flag.
Details on how to calculate the 95th percentile can be found in Appendix F. A calculation spreadsheet, however, is available on the internal pages of the Blue Flag homepage. All bathing water sample results should be entered into the spreadsheet and the percentiles will be calculated automatically. This sheet should be sent to the International Coordination with the application.

For EU countries implementing the Blue Flag it is imperative that an applicant beach is classified as being 'Excellent'.

As stated previously, discounting of a sample may be considered in case of extreme (weather) conditions. Should this be necessary, applicant beaches must be sent in as dispensation cases. *See Appendix A for further details on dispensation cases.*

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 11. The beach must comply with the Blue Flag requirements for the following physical parameters.

Water quality can also be affected by physical and chemical parameters such as oil and floatables:

- There must be no oil film visible on the surface of the water and no odour detected. On land the beach must be monitored for oil and emergency plans should include the required action to take in case of such pollution.
- There has to be an absence of floatables such as tarry residues, wood, plastic articles, bottles, containers, glass or any other substance.

Immediate action should be taken if abnormal changes are detected. This includes abnormal changes in the colour, transparency and turbidity of the water. Should physical and chemical pollution be detected repeatedly, the Blue Flag must be taken down for the remainder of the season and the beach will not be eligible for the Blue Flag the following year, unless the applicant fulfils the conditions for applying as a dispensation case.
Other tests can be conducted, such as the pH value of the water (its value ranges from 6 to 9 in most bathing waters).

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

ENVIRONMENTAL MANAGEMENT

Criterion 12. The local authority/beach operator should establish a beach management committee.

The beach management committee should be charged with ensuring compliance with all environmental management criteria, including Marine Protected Areas requirements if appropriate. The committee should consist of all relevant stakeholders at the local level. Relevant stakeholders could be a local authority representative, hotel manager, beach manager, lifeguard, educational representative, local NGO, and other stakeholders such as community representatives, special user groups, Marine Protected Area representative, etc.

The beach management committee should co-operate with and support the local authority/beach operator and could institute environmental management systems and conduct environmental audits of the beach and its facilities.

Where appropriate, a beach management committee may operate over a number of Blue Flag beaches within a local authority or an area/region, i.e. there is no need for a separate beach management committee for each individual Blue Flag beach.

IMPERATIVE CRITERION	GUIDELINE CRITERION
	All regions

Criterion 13. The local authority/beach operator must comply with all regulations affecting the location and operation of the beach.

Regulations pertaining to issues relating to coastal zone planning, environmental management, waste-water legislation, environmental legislation, and others must be met for the beach to receive and maintain Blue Flag status. The applicant must assure that the facilities and activities under its responsibility comply with these guidelines and/or regulations. The management of the beach location, facilities, beach operation and immediate surrounding area must comply with official development plans and planning regulations. The legislation may include regulations for land-use planning, sewage/industrial waste effluent discharge, environmental health regulations, conservation plans, operations licenses and permits, etc.

The location of facilities and use of the beach area and its vicinity must be subject to planning guidelines.
This includes environmental impact assessments. At the time of application for Blue Flag status, the applicant authority must provide written evidence from the planning department that all buildings on the beach meet local building regulations.

Existing beach facilities, construction and other use of the beach and its vicinity must be in compliance with laws regulating the use of the coastal zone or freshwater areas, including environmental conservation regulations. The back beach area including dunes, paths, and parking areas must be properly maintained according to coastal zone management principles.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 14. Sensitive area management.

Some sites at/near the Blue Flag beach may be very sensitive and require special management. In these cases, the beach operator is strongly encouraged to consult an appropriate conservation organisation or expert for advice on how to manage these sites. Where areas require special management, at the time of application, the applicant must provide confirmation that this consultation has taken place and that a management plan will be implemented.

However, the sensitivity of certain areas may prevent them from being part of a Blue Flag beach or from having information posted at the beach directing people to the area. An increased number of visitors could endanger wildlife and/or habitats, e.g. using land space for the construction of facilities, parking, paths, etc. As a general rule, Blue Flag accreditation is only given to sites that can demonstrate management of visitors and recreational use that prevents long-term irreversible damage to the local natural environment.

If a Blue Flag beach is in or near a Marine Protected Area, it is necessary to consult with the MPA management in order to ensure compatible ecosystem conservation and biodiversity goals.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 15. The beach must be clean.

The beach and surrounding areas including paths, parking areas and access paths to the beach must be clean and maintained at all times. Litter should not be allowed to accumulate causing these areas to become unsightly or hazardous.

The beach must comply with national guidelines or legislation concerning litter and waste management. Beach cleaning may be mechanical or manual, depending on the size, appearance, and sensitivity of the beach and its surroundings. In high use areas, where possible, occasional mechanical sieving and deep cleaning of the sand should be done to remove small particles such as cigarette butts, etc.

During storm water flows, the outlets and surrounding areas must be kept clean.

When cleaning the beach, this must be done with consideration for local flora and fauna, e.g. where turtles may have buried eggs in the sand. The use of insecticides or chemicals for cleaning the sand or surrounding environment is not allowed. The cleaning of Marine Protected Areas as well as sensitive areas (sand dunes, etc.), must be done in accordance with the laws and advice from the relevant authority.

For information about the management of algal waste and seaweed, refer to criterion 15.

To determine the cleanliness level of the beach, it is recommended that a Beach Litter Measuring system, or similar system, be used. (*See Appendix G for further details*).

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 16. Algae vegetation or natural debris should be left on the beach.

Algal vegetation is generally accepted as referring to seaweed. Seaweed and other vegetation/natural debris are natural components of both freshwater and marine ecosystems. These ecosystems must be considered as living and natural environments and not only as a recreational asset to be kept tidy. Thus, the management of seaweed or other vegetation/natural detritus on the shore should be sensitive to both visitor needs and biodiversity. Natural disposal by tides and waves at the beach is accepted, as long as it does not present a nuisance.

Vegetation should not be allowed to accumulate to the point where it becomes a hazard. Only if it is absolutely necessary should vegetation be removed, and then consideration should be given to disposing of it in an environmentally-friendly way, e.g. through composting or for fertilizer use. Wherever possible, environmental specialists should be consulted regarding the management of algal vegetation on the beach.

In some areas seaweed is dried on the beach for later use as fertilizer or dune stabiliser. While this good practice should not be discouraged it is also necessary to ensure that it does not create a nuisance for beach users.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 17. Waste disposal bins/containers must be available at the beach in adequate numbers and they must be regularly maintained.

Waste disposal bins or litter-bins (preferably with covers) should be of a suitable design and appearance as well as functionality. It is recommended that bins made of environmentally friendly products are used, e.g. bins made of recycled composite plastics or wood.

There should be an adequate number of bins on the beach and they should all be regularly maintained, well secured, and spaced appropriately. Individual bin capacity, the number of users on the beach and how frequently the bins are emptied determine the number and minimum space between bins placed on the beach. During the peak tourist season, the spacing between bins and the frequency at which they are emptied should be increased as necessary.

In summary, when choosing and locating bins, the following factors should be considered:

- Bin capacity
- Environmentally friendly products
- Type and source of litter
- Volume of pedestrian traffic
- Servicing methods and intervals (including peak times)
- Local environment, e.g. winds, high tides, scavenging seagulls
- Accessibility, e.g. height, surface

The collected waste should only be disposed of in licensed facilities that are approved by authorities on the basis of environmental requirements. The duty of the community receiving the Blue Flag is to make sure that the waste is properly disposed.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 18. Facilities for the separation of recyclable waste materials should be available at the beach.

In the event that the community has a local recycling facility then containers must be made available at the beach for these materials, e.g. glass, cans, plastic, paper, etc. The receptacles should be properly designed and managed for the type of waste received, should be emptied regularly, and be well placed for accessibility.

The recycling facilities should accommodate the collection and separation of as many different types of materials as possible.

On application, the local authority/beach operator must indicate whether the local authority has facilities for the recycling of waste. In the event that no such facilities exist, the applicant must apply for a dispensation from this criterion.

Blue Flag encourages all local authorities/beach operators to promote recycling and waste separation at the beach, even if the community does not have a local recycling facility.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 19. An adequate number of toilet or restroom facilities must be provided.

The number of toilets/restrooms available at the beach must reflect the average number of beach visitors during the peak season, the length of the beach and the number and location of major access points.

The toilet or restroom facilities must be easy to locate through signage and through information on the map on the Blue Flag information board.

The presence of showers (on the beach or in the buildings), changing rooms and nappy changing facilities are furthermore encouraged. Restrooms/toilets may also be located in nearby shops, restaurants, cafeterias or other establishments open to the general public. There should also be facilities provided for disabled visitors (see criterion 32).

Toilet or restrooms facilities must be equipped with washbasins, soap and clean towels (paper or cloth) or a hand-dryer.

Access to the toilet/restroom facilities must be safe.

Consideration should also be given to the design and maintenance of these facilities. They should be
well-integrated within the built and natural environment and they must be regularly maintained so as to present a well-maintained appearance and to prevent vandalism of buildings.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 20. The toilet or restroom facilities must be kept clean.

The toilet/restroom facilities must be kept clean at all times. The frequency of checking and cleaning the facilities must reflect the intensity of use. Beaches with a high number of daily visitors must have their facilities checked and cleaned every day or several times a day. The use of environmentally friendly cleaning materials, soap and towels is recommended.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 21. The toilet or restroom facilities must have controlled sewage disposal.

Sewage or effluent from the toilets must not enter the ground or the water untreated. In villages, communities, or in a municipality with sewage treatment facilities, the toilet facilities must be connected to the municipal sewer.

For facilities located outside of areas serviced by the municipal sewage system and/or remotely located beaches, individual treatment and regularly emptied holding tanks that prevent untreated sewage, effluent or seepage from entering the ground or the water - and which do not adversely affect the environment - are acceptable.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 22. On the beach there will be no unauthorised camping or driving and no dumping.

Unauthorised camping, driving and dumping must be prohibited on the beach. There must be information about these restrictions displayed at the beach (as part of the code of conduct, Criterion 6).

Vehicles (except for those used for the purpose of cleaning and safety, e.g. for moving lifeguard equipment, or emergency vehicles) should not be allowed on Blue Flag beaches. For cases, however, where vehicles cannot be entirely prohibited, it must be adequately justified and they must be properly managed. Areas for driving and parking as well as car-free zones must be designated and whenever the situation requires it, police or traffic guards must control the beach. If vehicles are allowed they should be prohibited from entering the high water zone at any time. The majority of the beach should be designated entirely vehicle-free.

Where there are no physical barriers preventing access to the beach by vehicles and where there are problems with unauthorised vehicles, camping or dumping, bylaws should be put in place to prohibit these activities. Information about these by-laws should be displayed. The use of the beach or its nearby areas as dumps for litter and other waste is not accepted.

In the case of special events that involve the use of vehicles on the beach a special management plan must be drawn up and applied to prevent damage to the ecosystem, as well as risks to beach users. *See Appendix H for guidelines on events on Blue Flag beaches.*

Parking for emergency vehicles must be provided in close proximity to the beach.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 23. Access to the beach by dogs and other domestic animals must be strictly controlled.

On Blue Flag beaches, dogs and pets are permitted in the parking areas, on walkways and promenades in the back beach area only - if permitted by the beach authorities as well as local and national legislation. Animals in these areas must be controlled. It is recommended that a Dog-Free Zone be created to prevent dogs and other animals from entering the main beach and swimming area - this excludes guides dogs for the visually impaired.

If the beach is patrolled by mounted police measures must be taken to ensure that no faecal matter contaminates the beach.

Wherever possible stray animals should be managed and systems should be in place to remove stray animals from the beach. Measures should also be put in place to prevent access to the beach by stray animals. In the event that stray animals are able to access the beach and cannot be controlled, it is recommended that the beach operator/local authority erect signs informing the public as to this fact. It is also recommended that information be displayed informing the public what to do should stray animals be seen on the beach.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 24. All buildings and beach equipment must be properly maintained

Consideration should be given to the appearance of buildings and structures at the beach. They should be well integrated within the natural and built environment, should adhere to design standards and meet environmental and aesthetic requirements.
Equipment on the beach includes facilities or services not discussed in any other criteria, e.g. playgrounds and piers. Equipment must be regularly maintained and checked in order to ensure that it is safe to use. Consideration should be given to: the cleanliness of equipment, its condition, the environmental effects of paint and other materials used for maintaining the equipment/buildings and any potential risk associated with its deterioration and malfunction. Wherever possible, environmentally friendly products should be used.

To prevent access by the public, all construction work or hazardous structures must be fenced off. In the event that construction takes place during the Blue Flag season, all Blue Flag criteria must be met during the period of the construction. Also, the construction activities should not impact on beach users.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 25. Marine and freshwater sensitive habitats (such as Coral reefs or sea grass beds) in the vicinity of the beach must be monitored.

If there is a sensitive habitat (such as coral reef or sea grass beds) located within 500 metres from any part of a Blue Flag beach, a monitoring programme must be established to monitor the health of the habitat (coral reef or sea grass beds) at least once a season.

An expert organisation or relevant authority must be consulted regarding the monitoring and management of this sensitive area.

The “Reef Check” Coral Reef Monitoring Programme could be used. *See Appendix H for further details of the Reef Check monitoring system.*

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions where applicable.	

Criterion 26. A sustainable means of transportation should be promoted in the beach area.

This criterion refers to all actions that

- encourage public and collective transport.
- encourage bicycling, bike renting and facilities for bike parking.
- support plans to organise traffic and reduce the peak traffic periods.
- develop pedestrian access.

The Blue Flag programme encourages the promotion of alternative means of transportation, e.g. beach shuttles, bicycle rental or free bicycles. Such initiatives should be given particular attention in communities with high traffic densities in the beach area or where the beach is located in a sensitive area.
It is recommended that the local authority/beach operator implements a traffic management plan to reduce traffic volumes and the impact of traffic on land use and air pollution in the Blue Flag and surrounding areas.
It is also recommended that information about the availability of sustainable transportation be made available on the Blue Flag information board.

IMPERATIVE CRITERION	GUIDELINE CRITERION
	All regions

SAFETY AND SERVICES

Criterion 27. Appropriate public safety control measures must be implemented.

The beach operator must ensure that safety measures comply with the national legislation regarding beach safety.

Moreover, it is strongly recommended that the beach operator undertakes a safety risk assessment for each designated bathing area. This safety risk assessment is to be carried out by the appropriate national authorities or where applicable by a Full Member organisation of the International Life Saving Federation (ILS), see appendix I.
The public safety control measures as recommended by the safety risk assessment should be implemented in priority based on available resources.

Irrespective of the above, a Blue Flag beach with a high number of visitors must be guarded/patrolled by an adequate number of lifeguards placed at appropriate intervals as recommended in the risk assessment and according to the beach characteristics and use. The number of lifeguards must increase according to peak usage, and a minimum of two every 200m is recommended for those beaches which have not undertaken a risk assessment.
Lifeguards must have appropriate national or international qualifications. Certificates must be checked prior to employment and must be made available to the National Operator upon request.
Lifeguards should only be employed for life-guarding and not in combination with duties such as water sports, rentals and services, cleaning or other duties.

Lifeguards must be easily recognisable. It is therefore recommended that lifeguards wear the

internationally recognised red/yellow uniform. Lifeguards must be provided with appropriate lifesaving equipment.

Bathing areas patrolled by lifeguards should be clearly marked out. The area should be defined on the map, on the information board and/or physically on the beach with markers or flags. The International Lifesaving Federation (ILS) recommends that flags and signs should be in accordance with ISO 20712. Additionally, Blue Flag international pictograms should be used.

On beaches, with low hazard risks and with few[1] users public rescue equipment can replace lifeguards, unless the national legislation or the safety risk assessment states otherwise.

Public rescue equipment could include: life buoys, hooks, lifejackets, life rafts, etc. The equipment must be regularly inspected and must fulfil national/international guidelines.

Where public rescue equipment is provided, it should be clearly positioned, visible and located at regular intervals allowing it to be reached quickly from any point on the beach. On beaches without lifeguards, maximum intervals of 100 metres between the equipment are recommended for those beaches which have not undertaken a risk assessment. Public rescue equipment must be accompanied by instructions for use and what to do in the event of a rescue. It is recommended that the location of equipment is identified by an emergency marker. The location of the lifesaving equipment/lifeguard tower must be indicated on the beach map of the Blue Flag information boards.
The period when the public rescue equipment and/or lifeguards, and first aid are available must be clearly marked on the Blue Flag information boards and at the lifeguard station. An explanation of the beach safety flag system in use must be provided.

The lifesaving equipment must include access to an emergency phone, unless the risk assessment states otherwise. The equipment should be regularly inspected and must fulfil national/international guidelines.

The beach operator must provide safety instructions which must be posted on the information board and other appropriate place(s) on the beach.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 28. First aid equipment must be available on the beach.

The first aid may be available by means of a) a lifeguard on site, and/or b) an attended first aid station with trained personnel, and/or c) equipment located in a shop or other beach facilities at the beach, and/or d) directly available to the public on the beach. It is strongly recommended that busy beaches and family beaches have first-aid stations with staff in attendance. First-aid personnel must have appropriate qualifications.

First aid stations should have the following equipment a) adequate first aid stock (basic first aid supplies such as bandages, gloves, disinfectant, plasters, etc.) b) cold water and preferably hot water c) first aid bed d) oxygen cylinder and mask e) immobilizing trauma board (e.g. immobilizing blocks or spider harness) f) other equipment (shark attack pack), etc.

First-aid stations or the location of first-aid equipment must be clearly sign-posted for easy

[1] Few = Over a period of 4 weeks in the high season there are on average less than 50 beach users per day

location by beach visitors (including on the map on the Blue Flag information board). See Criterion 5. In addition, the time in which first aid is available must be clearly informed.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 29. Emergency plans to cope with pollution risks must be in place.

The emergency plan should cover a clearly identified procedure, facilitating efficiency in the case of an emergency. An emergency could result from oil spills, hazardous/toxic waste spills entering the beach from the sea, discharge of storm water, hurricanes, algal blooms that could be dangerous, etc. An emergency in this context would be defined as an event which leads to a large scale impact on the beach or bathing water.

In order to quickly address pollution at the local level in co-ordination with local authorities, the following
should be included. The:

- identification of people to contact in case of pollution.
- involvement of all administration services and people necessary to intervene.
- procedure for the protection or evacuation of people if necessary.
- procedure of public warning and information.
- withdrawal of the Blue Flag.

The emergency plan must specify who should be contacted in the case of a pollution incident. A responsible local person must be designated for this position. It must also specify who does what in the case of an emergency, including pollution incidents.

The emergency plan must furthermore prove the compliance with other national legislation in the area, e.g. a national oil spill contingency plan.

As long as the hazard persists, the public should be informed of the pollution or potential danger by posting information at the beach, at all access points, in the media, tourist offices or other relevant means of communication. If the hazard is in the form of large scale polluted water then the public must be informed that bathing is not safe and the beach should be closed to swimming. If there is any infringement of Blue Flag criteria, and to ensure the integrity of the Blue Flag, the flag must be temporarily withdrawn and information posted on the Blue Flag information board or at the beach.
Emergency phone numbers for the police, first aid, and relevant emergency numbers along with the contact details for emergency services, in the event of an oil or toxic chemical spill must be posted at the beach preferably on the Blue Flag information board.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 30. There must be management of different users and uses of the beach so as to prevent conflicts and accidents.

Beaches that support multiple activities must have management plans to prevent accidents and conflicts. This must include zoning for swimmers, surfers, wind surfers and motor craft. At the same time, recreational use of the beach must be managed without negatively impacting the natural environment, the biodiversity of the beach and with consideration for aesthetic issues.

Swimmers should be protected from all sea craft (motor, sail or pedal). Where necessary, zoning through the use of buoys, beacon or signs should be in place. The same should be done for surfing areas. Distinctions should be made between motor craft, paddle or sail craft. The use of these various activities must be separated.

Powerboats and powered craft should operate at least 100-200 metres away from the swimming area. The exact distance is to be determined by the local regulatory agency. Furthermore, patrons who operate powered craft should be provided with guidelines for the use of their craft and the location of different zones.

The relevant authority, for example lifeguards, must enforce the zoning of the different recreational areas in the water. Different activities on the beach must also be clearly marked and zoned.

Consideration should also be given to potential noise impacts from some activities (motorised activities, stereos and kites).

If special events are to be held on the beach then these should be located outside of the main swimming areas. In the case that special activity events prevent the beach from upholding the Blue Flag criteria, then the flag must be withdrawn for the duration of the event. When such an event takes place, users of the beach should be notified through public warnings at the beach and preferably in the local media prior to the event. *See Appendix I for guidelines for events on Blue Flag beaches.*

The beach itself must be managed in accordance with an environmental plan that protects sensitive species and habitats at the beach. This can be achieved through zoning or other preventative actions. In some cases, it may be necessary to restrict, disperse or otherwise manage certain activities. Beaches with sensitive dune habitats must be managed in such a way to protect these sensitive habitats, e.g. protective fences. Recreational activities must be managed to prevent environmental degradation, e.g. coastal erosion or damage to vegetation as well as to prevent birds and other wildlife, e.g. breeding turtles, from being disturbed.

Some particularly sensitive sites may require careful planning and management. In such cases, evidence must be provided to show that recognised local conservation organisations or groups have been approached and that a management plan has been drawn up.

Besides the use of physical separation of the different users, zoning should be clearly indicated on the map
on the Blue Flag information board and information could also be given at access and entry points (see Criterion 5).

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 31. There must be safety measures in place to protect users of the beach.

The public must have access to Blue Flag beaches without being a client of a certain hotel or beach club. Access to the beach should preferably be free, although at some beaches public access is provided through charging a small and reasonable fee.

Access to the beach must be safe. Beaches that are physically challenging must have facilities for safe access, e.g. secured steps with handrails. Similarly, there should be designated

pedestrian crossings on busy roads in the vicinity of the beach.

Beach promenades and steps onto the beach must be complete and in good condition. The car park surface must be in good order. Parking places reserved for the use of disabled persons must be available and must be clearly marked. See Criterion 21 for information related to parking on the beach. Other access paths must also be safe, with regulations for cars and bicycles. Bicycle paths should be encouraged whenever relevant.

Where promenade edges are higher than 2 metres above the beach, warning signs and/or a barrier must be in place to prevent accidents. This is especially important where the beach surface is rocky. Consult criteria 32 regarding access for people with physical disabilities.

Visitors to the beach should be safe while on the beach. Information about safety must be readily available. The times of availability of lifesaving services and first aid must be clearly marked on the Blue Flag information boards or at the lifeguard station. In addition, an explanation of the emergency flag system, if in use, must be provided.

If needed, adequate security must be available at the beach in the form of trained and qualified guards responsible for patrolling. The guards must wear easily identified uniforms and should be able to present their licence as trained security personnel on request.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

Criterion 32. A supply of drinking water should be available at the beach

There should be a potable water source at the beach, e.g. from a fountain, pipe, tap, etc. This source can be in the restroom/toilet block or on the beachfront but it must be protected from contamination by animals.

IMPERATIVE CRITERION	GUIDELINE CRITERION
	All regions

Criterion 33. At least one Blue Flag beach in each municipality must have access and facilities provided for the physically disabled.

It is strongly recommended that all Blue Flag beaches have facilities that allow access by the physically disabled granting them access to the beach, surrounding buildings, and the restroom facilities. It is a Blue Flag requirement that at least one beach in every municipality must provide these facilities. It is a Blue Flag recommendation that at this beach, if possible, there is access to the water.

Access to the beach should be facilitated by access ramps adapted to users with various disabilities. It is recommended that the ramp design and material fit the natural environment and wherever possible, environmentally friendly materials should be used, i.e. recycled composite plastics.

Facilities should be designed for wheelchair and other disabled users and should comply with the ISO Standard Code for Access. The beach must comply with national regulations regarding access and facilities for people with disabilities. In addition, parking areas should have reserved spaces for disabled parking. In the event that access ramps cannot be provided due to the topography, e.g. at steep cliffs, the local authority must apply for a dispensation for this criterion.

If none of the Blue Flag beaches in a local authority can provide access and facilities for the disabled, a request for a dispensation from this criterion must be documented in the application.

IMPERATIVE CRITERION	GUIDELINE CRITERION
All regions	

APPENDIX A: Dispensation cases

All imperative criteria have to be complied with in order to obtain the Blue Flag. In the event of discussions arising out of the National Jury processes and if an applicant has failed to fulfil the imperative criteria, the National Jury could forward a beach to the International Jury as a dispensation case. In the case of an application requiring a dispensation, the National Jury must forward the case to the International Jury with the necessary background documentation and an explanation as to what imperative criteria have not been fulfilled and giving reasons as to why a dispensation is requested.

Dispensation cases may arise when a beach has exceeded the required limit values because of a known, documented incident during the bathing season. Dispensation cases argued on the basis of incidents considered unusual but not atypical of the site are not considered.

The most frequent request for dispensation is caused by exceptional/extreme weather conditions impacting on compliance with the water quality criteria. A National Jury can in such cases give a dispensation to omit a sample if the national authority's controlling bathing water quality regulation has officially approved such a dispensation. Furthermore, an official statement from national weather authorities stating that the weather was exceptional must accompany the request for dispensation.
For EU-member countries: if the request for dispensation of omission of a sample has been approved by the European Commission, and written proof of the European Commissions' approval is provided to the International Coordination, then the case is not considered as a dispensation case.

If an incident of high levels of pollution can be attributed by way of documentary evidence to other issues, such as an accident or another unavoidable incident, it is also possible to forward to the National Jury such a candidate as a dispensation case. The documentation must show that the problem has been rectified and that the pollution was undoubtedly linked to the incident in question.

A beach can apply for dispensation when:

- facilities are under construction at the time of the application but will be finished by the start of the season.

- owing to extreme weather conditions, the imperative criteria on the beach not being met, e.g. signage or walkways, access to the beach has been damaged, etc. However, these must be in place by the start of the season.

- a beach is not accessible by the physically disabled yet it is the only beach in a local authority to run the Blue Flag programme. The beach must present a plan for how and when the beach can fulfil the criterion as a central part of the dispensation application.

- the location of the beach is such that the distance from services renders it unable to meet an imperative criterion, e.g. an accredited laboratory.

APPENDIX B: Information about the Blue Flag programme must be displayed.
[Criterion 1]

THE BLUE FLAG PROGRAMME
This beach has been given Blue Flag accreditation. The Blue Flag is an environmental award, given to communities that make a special effort to manage their coastal/inland water environment and beaches with respect for the local environment and nature. To attain the Blue Flag, the community and its beach operators have to fulfil a number of criteria covering water quality, environmental information and education, safety, service and facilities.

This effort by the local community ensures that you and your family can expect to visit clean and safe environments at selected bathing sites. And it makes sure that the local community maintains a basis for sound development.

Facts about the Blue Flag:
The Blue Flag is awarded by the Foundation for Environmental Education (FEE), a non-governmental environmental organisation and is represented by such national organisations in each of the participating countries.

The Blue Flag is an environmental award for beaches and marinas. Only local authorities or private beach operators can apply for a Blue Flag for beaches. The criteria for Blue Flag beaches cover four main areas: a) Water quality, b) Environmental information and education, c) Environmental management, and d) Safety and services.

The criteria of the Programme are developed over time, so that participating communities have to keep working on solving relevant environmental problems to get the Blue Flag. Blue Flag accreditation is only given for one season at a time and the award is only valid as long as the criteria are fulfilled. When this is not the case, the responsible persons at the local level are obligated to take the Blue Flag down.
The national FEE organisation checks the Blue Flag sites during the season.

You can help the Programme by also taking actions to protect the environment:
Use the litter-bins on the beach - and recycle waste if possible
Use public transport, walk or rent a bike to get to the beach
Obey the beach code of conduct
Enjoy the nature of the beach and its surroundings, and treat it with respect
Choose a holiday destination that cares for its environment - and an environmentally friendly hotel too, if possible. Along with the Blue Flag, the Foundation for Environmental Education also develops another eco-label for accommodations: Green Key. Find more information at: www.green-key.org

Local, National and International Blue Flag responsible parties:
Name and address of the local responsible person, national Blue Flag operator and the International Co-ordination must be posted.

Text to accompany the names and addresses could be the following: “These are the names and addresses of the local, national and international Blue Flag contacts. It will assist the programme, if you could report on how these beaches comply with the Blue Flag standards. In this way you can help ensure that the Blue Flag standard continues to be met.”

APPENDIX C: Guidelines for Environmental Education Activities. [Criterion 2]

Types of Activities

There must be a mixture of different types of environmental educational activities for different user groups, Some activities must be carried out at the beach and have a direct focus on the beach or coastal environment. The different types of activities can be divided into five categories:

Activities for Passive Participation: This could include exhibitions, films, presentations, slide shows,
conferences, debates, presentations by international experts, etc.

Activities for Active Participation: This includes guided tours, educational games, theatre/plays, cleaning
days, coast observation days for marine beaches, diving/snorkeling orientation sessions, beach inspections, photography or drawing contests, nature reconstruction projects, green technology projects, “Adopt a Beach” programmes, community coastal monitoring programmes, etc.

Training Activities: This could be training for teachers, beach or marina staff, people in charge of children groups, lifeguards, cleaners, law enforcement officers, specific national training programmes, etc.

Publishing and Media: The production of leaflets, stickers, interpretive signs, postcards, school and
municipal newsletters, books, T-shirts, bags, posters, radio broadcasts, etc.

Blue Flag Environmental Information Centre: It is strongly recommended that Blue Flag beaches provide an
Environmental Information Centre (station, kiosk), where specific information about Blue Flag and environmental education issues can be given. Such a centre or place must offer both activities and exhibitions and provide environmental and nature information in order to qualify as an environmental interpretation or education centre. Information about its location and activities must be provided at the beach or in nearby tourist information offices. The centre should be open to and have activities and information for the general public, not only local school children.

Target groups

The activities should target a wide range of different groups. It is important that the local authority, together with other operators in the area, organise a programme to educate and raise awareness within the many different interest groups that influence the use of the local environment. These interest groups could be visitors, locals, tourism employees, fishermen, local industries, etc.
The types, amounts and target groups of activities should match the situation. For example, in a major tourist destination, more than one activity per season should be available to the general public.

Connection with existing programmes

The activities can be part of already existing environmental education programmes, held either on-site or in the local community (Local Agenda 21 activities, Eco-Schools activities, etc). It is also recommended that the local authority work together with local NGOs in setting up educational activities.

Information about Activities
Information about the publicly accessible activities must be made available at the beach and preferably also in tourism newspapers or magazines or posted in tourism offices. The published information should include: what kind of activities, when and where are they going to take place, who they are for, etc.

Not Acceptable
Activities that are not acceptable for meeting this criterion are:
Activities that are done to meet other Blue Flag criteria such as the general cleaning of the beach, waste management, recycling, and posted environmental information otherwise required on the information board (i.e. information on surrounding sensitive environments), etc.
Activities focusing only on tourism without a specific focus on sustainable tourism
Activities otherwise done by the local authority as part of the standard management of health, safety,
transportation or tourism

APPENDIX D: Recommendations for presenting water quality information on Blue Flag beaches. Example of a coastal water beach:
[Criterion 3]

Beach:_____ **Local authority:_____**
Contact person:_____ **Telephone no:_____**

Date											
Escherichiacoli / Faecal coliform											
☺ < 250cfu/100ml											
😐 >250cfu/100 ml											
Intestinal Enterococci / Faecal streptococci											
☺ <100/100 ml											
😐 >100/100 ml											

Blue Flag and bathing water quality	**What do the results mean?**	
This beach has met the Blue Flag water quality standards. The bathing water is continuously monitored for the different types of bacteria shown in the tables. The bathing water is tested at least every 30 days. In the table you can see when the water has been analysed and how many bacteria were found. A small number of bacteria tell you that the water is very clean - a high number of bacteria tell you that the water may be polluted and could contain bacteria from sewage.	**Faecal coliform / E.coli**	**Faecal streptococci / Intestinal enterococci**
	☺ Below 250 *Excellent bathing water*	☺ Below 100
	😐 Above 250 *Is allowed a few times during the season*	😐 Above 100

APPENDIX E: the 95th percentile

The 95th percentile is a calculation method used to obtain the average amount of pollution. In terms of Bathing Water sampling results, the value shows the results that are less than or equal to the limit values 95% of the time. The standards refer to values that would be exceeded less than 5% of the time.

The 95th percentile is derived through the following calculation (based on the explanation in the EU Bathing Water Directive 2006):

1. Take the log10 value of all bacterial enumerations in the data sequence to be evaluated. Zero values cannot be used and should be replaced by a value of 1 (or the minimum value allowed)
2. Calculate the mean of the log10 values (μ)
3. Calculate the standard deviation of the log10 values (σ)
4. The upper 95 percentile is derived from the following equation: antilog (μ + 1,65 σ)
5. The resulting value must be within the limit values as stated above

A calculating spreadsheet is available on the Blue Flag homepage under the Internal Pages as per January 2010.

APPENDIX F: Beach Litter Measuring System – a method of mapping the status of litter on a beach [Criterion 15]

In order to determine the cleanliness on the beach, the Beach Litter Measuring System could be used by
the beach manager or the national coordinator when doing beach monitoring visits.

The system differentiates between bulky litter (>10cm) and fine litter (<10 cm). It takes a closer look at the
amount of litter in defined representative areas on the beach. According to the amount of litter, beaches are
classified into different cleanliness levels (A+ to D). The method combines taking pictures and making
counts.

At a Blue Flag Beach, the cleanliness level should be A+ or A.

Step by step guidance how to define your beach's cleanliness level:

Bulky Litter

1. Define an area of 100m2 (10m x 10m) for your bulky litter count and photo (Choose the dirtiest 100m2 that you can find on the beach)
2. Count the units of bulky litter (>10cm) within the area
3. Take a picture of the area (to keep as proof)
4. Determine the cleanliness level with help of the beach litter indicator (see below)

Fine Litter

1. Define an area of 1m2 for your fine litter count and photo (choose the dirtiest area within the 100m2)
2. Count units of fine litter (<10cm) within the area
3. Take a picture of the area (to keep as proof)
4. Determine the cleanliness level with help of the beach litter indicator (see below)

Beach Litter Indicator

Number of litter units per area	Cleanliness level
0	A+ Very Clean
1-3	A Clean
4-10	B Moderately Clean
11-25	C Dirty
> 25	D Very Dirty

General
1. Keep a record of your measurements (date, time, location, circumstances, weather conditions, cleanliness level(s) bulky litter, cleanliness level(s) fine litter, other comments)
2. Repeat these steps at different locations along the beach if possible
3. Repeat the measurement at different times during a season and different times of the day if possible

It is important to keep in mind that starting to use this system might require a bit of time in the beginning.
Once you get some exercise or training, it will be a quick, easy and helpful tool.
For a more detailed version of the beach litter indicator, a description of the system, a training CD or for
taking part in a training session, please visit the Blue Flag website or contact the Blue Flag Coordination.

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1 The Beach Litter Measuring System was developed by the Keep Holland Tidy Foundation and the Royal
Dutch Touring Club.

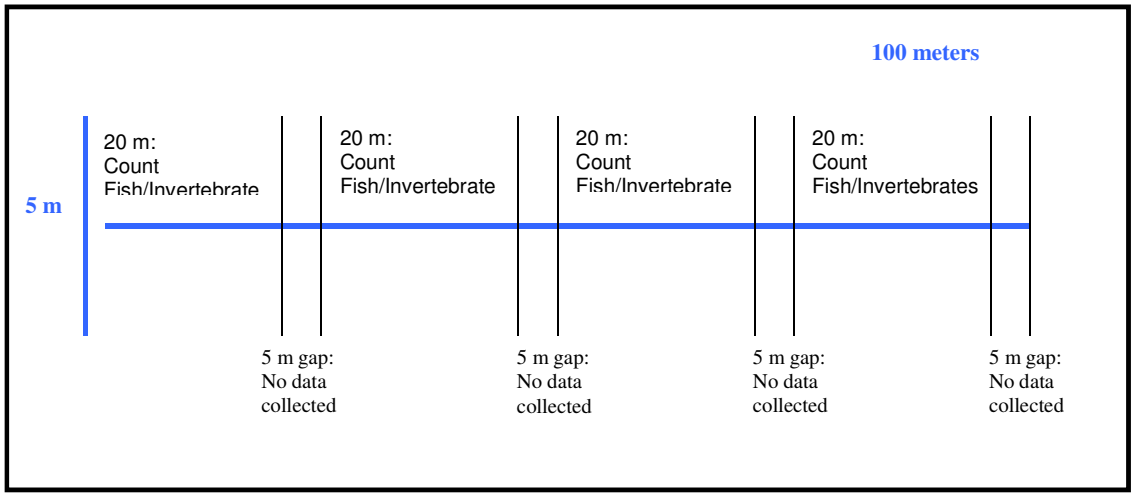
APPENDIX G: Reef Check system for coral reef monitoring [Criterion 25]

Below is a very brief description of the content of the "Reef Check" monitoring programme. For full information about the "Reef Check" system and information about national/international support, please consult http://www.reefcheck.org.

"Reef Check" is designed for use by volunteer non-scientist snorkelers or scuba divers. A local "Reef Check" team should be established with a scientist and a group of snorkelers and divers trained to carry out the analyses. The team members must be skilled at identifying the indicator organisms and substrate categories. It is strongly recommended that the team attend a "Reef Check" training session. If there are already "Reef Check" teams established at the national or local level, these teams can be approached for support.

In order to carry out the monitoring, the following equipment is necessary: a copy of the instruction manual,
indicator organism ID cards/books, GPS, transect lines, underwater paper and water proof pencils/markers,
buoys, plumb line and safety gear.

If possible, the monitoring should take place at two depths: shallow water (2-6 metre depth) and mid-reef (6 - 12 metre depth). Reefs in many areas are however not suitable for monitoring at more than one depth.
A 100 metre transect should be established (preferably parallel to the shore). The transect must be divided
into 4 x 20 metre observation areas divided by 4 x 5 metre gaps. For re-survey, it is important to document or permanently mark the transect start/end points.



The "Reef Check" coral reef monitoring program consists of four types of data collection methods:
1) Site description (environmental conditions and ratings of human impacts) 2) Fish counts
3) Invertebrate counts 4) Substrate type measurements

The site description includes information about: location (overall and exact location), survey time, nearby
population, weather conditions, rating of human impacts on the coral reef and the possible protection of the
coral reef. The substrate survey includes the record of the substrate at points with 0.5 meter intervals along the 4m x 20m transect. The substrate must be classified in one of the following

categories: hard coral, soft coral, recently killed coral, nutrient indicator algae, sponge, rock, rubble, sand, silt/clay or other substrate. In the "Reef Check" manual there is more information about how to conduct the substrate survey and classify the substrate.
The level of coral bleaching, presence of coral disease, presence of litter and coral damage must be noted.

Each region has different indicator fish and invertebrate species that should be counted along the 4m x 20m transect. In the "Reef Check" website and manual, there is more information about the fish and invertebrate species to include in the counting and information about how to conduct the counts. Finally, it is recommended to supplement the survey with photo and/or video documentation.

APPENDIX H: Guidelines for events on Blue Flag beaches [Criterion 30]

Should events be planned for Blue Flag beaches, it is recommended that the local authority/beach operator attempt to find a win-win situation in both hosting the event and maintaining Blue Flag status. Events on Blue Flag beaches are not incompatible with the management of the Blue Flag programme. However, the event should not compromise Blue Flag standards. The Blue Flag should not be dropped simply because an event is planned on the beach.

The decision to allow events to take place on beaches is ultimately the decision of the local authority/beach operator managing that facility and would, as such, be guided by local by-laws and other legislation. Should the local authority be concerned as to potential impacts on Blue Flag standards, early contact and discussion with the National Operator is recommended. It is reiterated that it is the responsibility of the local authority to ensure that Blue Flag standards are met.

If necessary, additional resources, e.g. cleaning staff, portable toilets, etc should be brought in to ensure that the standards do not drop.

Wherever possible, the Blue Flag area should be zoned (this to include the use of buoys – where appropriate – in the water) so that a designated Blue Flag swimming area is still retained and the beach can still fly the flag. It is not recommended that the whole beach be designated to the event.

Wherever possible, every attempt should be made to ensure that all the Blue Flag standards are still met on the beach during the event.

In terms of the criteria of Blue Flag, compliance with all environmental and building legislation also applies to any events and/or the construction of facilities on the beach. This includes the possibility of undertaking Environmental Impact Assessments or producing environmental reports on the impact of the event on the natural surroundings. In this case, permission from the relevant environmental authorities in the region would be necessary.

The public must be given advance warning of any events planned for Blue Flag beaches. This could be in the form of posters or other information at the beach, through announcements in the local media, or on local authority/beach operator websites if appropriate. A notice indicating details of the event, duration of the event, where more information can be obtained, where complaints can be made, etc. must be posted at the beach.

In the event of an activity that takes place on the beach after hours, i.e. for those beaches that withdraw the flag at the end of the day when criterion are no longer being met, the beach operator/local authority must ensure that the beach and the facilities be cleaned and returned to order, before the flag is due to be raised the next morning, even if this means the cleansing teams must work through the night to ensure that the beach is clean once the flag goes up. So, if the flag is normally raised at 08h00 in the morning, the facilities must meet Blue Flag standards by 08h00 in the morning.

It is recommended that the local authority/beach operator consider a fee to be levied on the organisers of events hosted on Blue Flag beaches and that this income be used to make improvements to the beach or within the local area.

Appendix I – Guidance on ILS Safety Risk Assessment for Beaches [Criterion 27]

INTRODUCTION

The International Lifesaving Federation (ILS) is the world authority in the global effort to prevent drowning and works with national life saving organisations to improve drowning prevention, water safety, water rescue, lifesaving, lifeguarding and lifesaving sport. FEE and ILS have therefore entered a Memorandum of Understanding where FEE recognises ILS as being the world authority in the global effort to prevent drowning.

FEE encourages national organisations and local authorities to work with ILS national organisations when possible.

ILS will undertake risk assessments all over the world and take care that the information boards according to ISO 20712 are placed at as many beaches as possible. When this is not possible, an independent risk assessment may be conducted. Below are guidelines produced by ILS.

BACKGROUND

Risk management can be defined as a logical and systematic approach of identifying, analysing, assessing, treating, monitoring and communicating risks associated with any activity or process. In its *Guidelines for safe recreational water environments (Vol.1)* the World Health Organization states: 'Assessment of hazard and risk inform the development of policies for controlling and managing risks to health and well-being in water recreation. … The assessment of a beach or water should take into account several key considerations including:

- the presence and nature of natural or artificial hazards
- the severity of the hazard as related to health outcomes
- the availability and applicability of remedial actions
- the frequency and density of use
- the level of development.

PRINCIPLES

The purpose of hazard and risk assessment is to assess the probability that certain events will take place and assess the potential adverse impact these events may have on people, property or the environment or other adverse outcomes.

ILS sees the implementation of risk assessments for all aquatic locations as a key element of the strategies to reduce injury and loss of life or other adverse impact in the aquatic environment.

A generic framework and the main elements of the risk management process identified are:

- Communication and consultation
- Establish the context
- Risk identification
- Risk analysis
- Risk evaluation
- Development of a risk control measures plan
- Monitor and review

This framework is consistent with the international standard ISO 31000 – Risk Management – Guidelines on principles and implementation of risk management.

The basic rationale for conducting a risk assessment is:

1. Identify the hazards of a particular location and assess the risks of possible human interation with the hazard.
2. Provide the basis for a risk management plan
3. Improve safety and reduce the risk of death or injury at the location

4. Ensure the best use of resources and encourage effective management and cost effective operations
5. Reduce the potential for litigation stemming from accident and management practices
6. Provide guidance for the development of policy, procedure and practices.

A **hazard** is a source of potential harm or a situation with a potential to cause a loss.

A **risk** is used to describe the probability that a given exposure to a hazard will lead to an adverse outcome.

The job of accurately analysing the potential personal risk to the public at a coastal and beach location is complex. The determination and evaluation of potential risks is made more complicated in coastal regions due to the continually changing nature of the environment. Coastal regions are dynamic environments where the presence and level of a potential danger varies with numerous factors such as time, water conditions, weather and human interaction.
In order to effectively assess hazards and their associated risks, the assessor must understand all the contributing factors that go together to create the danger, for example the beach topography, the prevailing weather and wave climates, and the number of people who use the beach and their chosen activity.

Consideration is required to treat (control) and manage the risks to ensure visitors can enjoy the safest aquatic recreation possible. Solutions may include any one or combination of the following "hierarchy of controls".

1. Removal of risk; hazards, people or both, where possible (Elimination).
2. Remove access to the location at which the hazard may present a risk (Isolation).
3. Share the risk with another party or parties through for example contracts, partnerships or insurance (Transfer).
4. Install a barrier such as a fence or vegetation (Engineering control).
5. Management (Administrative) controls that may include:
    a. Community education programmes to raise awareness of potential hazards.
    b. International standard signage to ISP 20712 will enable visitors to make informed decisions on whether they wish to proceed into an area or undertake a particular activity.
    c. Supervision through the deployment of appropriately trained personnel such as lifeguards.
    d. Implementation of appropriate emergency management systems.
    e. Use and appropriate siting of public rescue equipment such as life buoys/rings.
    f. Zoning, such as use of marker buoys and flags to define areas in which non-compatible activities should be conducted such as power boats, swimming and sailing
6. Retain and management of the risk (Residual risk).

REFERENCES

International Life Saving Federation (ILS), 2007, ILS Beach Risk Assessment Policy
International Life Saving Federation of Europe (ILSE), 2007, ILSE Risk Assessment Guidelines
International Life Saving Federation of Europe (ILSE), 2010, ILSE Designated Bathing Area Risk Assessment Report
International Standards Organisation (ISO), 2008, ISO 20712 Water Safety Signs and Beach Safety Flags (Parts 1, 2 & 3).
Royal National Lifeboat Institution (RNLI), 2007*, A guide to coastal public rescue equipment*
World Health Organisation (WHO), 2003, *Guidelines for safe recreational waters Volume 1 - Coastal and fresh waters*

Chapter 19: Trek Net Fishing Protocol

1. Introduction

Treknetting (also known as Beach-seine netting) has been practised off Cape Town's beaches for three and half centuries and forms part of our coastal heritage as well as a source of income generation and employment for permitted operators.

Fishing-rights for treknetting are administered by the Department of Agriculture Forestry and Fisheries (DAFF) and permits are issued to right-holders based on DAFF application and evaluation criteria. Treknet right-holders with a permit have a legal right to treknet.

The City of Cape Town has no role to play in the determination or allocation on treknet rights.

2. Problem Identification

Treknetting takes place on recreational beaches of the City, including Fish Hoek, Muizenberg Corner, Strandfontein, Mackerel Bay and Big Bay beaches. At times this permitted and legal activity creates conflict with recreational users as well as poses some safety risks to water users. As a result, the City in discussions with DAFF and the treknet rights holders developed a Treknetting Protocol for high intensity recreational beach areas to:

- Remove conflict between the treknetters and beach users
- Ensure safety of the public during a trek
- Optimise the success and efficacy of the trek

3. Treknet Protocol for High-intensity Recreational Beaches

Prior to launching vessels or nets the treknet rights holder must, in addition to informing DAFF Fishery Control Officers as per their permits:

- Inform the on-duty Shark Spotter at Muizenberg Corner
- Inform the on-duty Shark Spotter at Fish Hoek Beach
- Inform the lifesaving club and beach management

3.1. Muizenberg Corner and Big Bay Protocols

1. On being notified by the treknetters that they are about to undertake a trek, the Shark Spotting Programme at Muizenberg Corner is to sound the siren and close the beach and actively clear the water of all water users. At Big Bay Beach the lifesaving club or beach management is to close the beach and clear the water of all water users.

2. Once the beach has been cleared of water users, the trek may commence. Where necessary City Law Enforcement may be called to assist in keeping the beach closed to the public through the duration of the trek.

3. Once the net is landed on the beach, the beach may be reopened to the general water users at the discretion of the on-duty Shark Spotters or Beach Manager once all safety aspects have been assessed

3.2. Fish Hoek Beach Protocol

1. Fish Hoek Beach is not a recognised surfing beach and as such the safety protocols vary due to the fact that the majority of water users are close to the shore line.

2. On being notified by the treknetters that they are about to launch their boat, the on-duty Shark Spotters will:
   a. Inform the lifesaving club that the treknetters have launched and may deploy their net
   b. Sound the siren and close the beach only once the net has been deployed from trek netting boat if there are water-users in the bay
   c. If no water users are in the bay at the time of the trek, the red caution shark flag will be raised but no siren sounded
   d. The lifesaving club and law enforcement will assist the Shark Spotters in clearing the beach of water-users
   e. Once the net is landed on the beach, the beach may be reopened to the general water users at the discretion of the on-duty Shark Spotters or Beach Manager once all safety aspects have been assessed
   f. During the Shark Exclusion Net Trial, if the net is deployed and in the water, the net will remain in-place throughout the trek as part of the trial period evaluation to assess its impact on treknetting success

4. General

1. Use of vehicles on the beach by permitted rights holders is regulated under the Off-road Vehicle Regulations. However, no vehicle associated with the treknet operation may travel at speeds higher than 15km/h while on a City beach. DAFF Beach-seine permit conditions require that the netfish registration N number is displayed on the designated vehicles. A maximum of two vehicles per right-holder is allowed on the beach.

2. This protocol is not prescribed for trekking along the Strandfontein coastline outside of the Strandfontein Pavilion Coastal Node, at Macassar Beach or Mackerel Beach as these are not considered high intensity recreation nodes.

3. At no time may a treknet operator at any point along the entire City's coastline:
   a. Deploy their net in such a way that it encircles any water users
   b. Deploy their net at a high intensity recreation beach prior to the beach being closed
   c. Deploy their net or equipment without notifying parties as described in this protocol
   d. Provide (including sell, barter or donate) any fish caught in the trek to any City officials

4. At no time and under no circumstances may a member of the public approach, interfere with or hinder a permitted trek net operator, their equipment, net or targeted school of fish

Chapter 2: City Of Cape Town Integrated Coastal Management Policy

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Definitions

accretion:	Gradual accumulation of sediment
aeolian transportation:	Carried by wind
biodiversity:	Biological wealth of a specified geographic region: including the different marine, aquatic and terrestrial ecosystems, communities of organisms within these, and their component species, number and genetic variation.
City:	The City of Cape Town established in terms of section 12 of the Local Government: Municipal Structures Act of 1998 by Provincial Notice No. 479 of 2000.
city:	Cape Town
climate adaptation:	Adjustment in natural or human systems in response to actual or expected climate stimuli or their effects, which moderates harm or exploits beneficial opportunities.
climate change:	A significant and lasting change in the statistical distribution of weather patterns over periods ranging from decades to millions of years. It may be a change in average weather conditions or the distribution of events around that average (e.g. more or fewer extreme weather events). Climate change may be limited to a specific region or may occur across the whole Earth.
coast:	The inshore marine environment up to 500 metres seaward of the High Water Mark, the interface between the marine and terrestrial environments and the land directly exposed to coastal processes, tidal influence and storm surges.
Coastal Conservancy:	coastal space, under the administration of the City, that is characteristically unique, representative of the diversity of the City's coastline, represents unique coastal habitat, dynamics and processes, and or heritage and social value that is irreplaceable and of long term value to society as a whole and for future generations
Coastal Protection Zone:	The Coastal Protection Zone contemplated in section 17 of the Integrated Coastal Management Act 2009.
Coastal Edge:	Area around the coast demarcated in Cape Town's Spatial Development Framework as the seaward extent of the City's development footprint, primarily to protect coastal resources and avoid risks pertaining to flood-prone areas.
coastal zone:	The area seaward of the Coastal Protection Zone boundary, the seashore, coastal waters and the exclusive economic zone and includes any aspect of the environment on, in, under and above such area.
Council:	City of Cape Town Metropolitan Municipality, established in terms of the Local Government: Municipal Structures Act 1998, read with the Province of the Western Cape: Provincial Gazette 558 dated 22 September 2000.

CTSDF: The Cape Town Spatial Development Framework as approved in terms of the Municipal Systems Act 32 of 2000 (section 34) as well as the Land Use Planning Ordinance 15 of 1985 (section 4(6)).

development: Any process initiated by a person to change the use, physical nature or appearance of that place, and includes—

(a) the construction, erection, alteration, demolition or removal of a structure or building;
(b) a process to rezone or subdivide land;
(c) changes to the existing or natural topography of the coastal zone; and
(d) the destruction or removal of indigenous or protected vegetation

development footprint: The outer extent of urban development

disaster risk management: The continuous and integrated multi-sectoral, multi-disciplinary process of planning and implementation of measures aimed at – (a) preventing or reducing the risk of disasters; (b) mitigating the severity or consequences of disasters, (c) emergency preparedness, (d) a rapid and effective response to disasters, and (e) post-disaster recovery and rehabilitation.

disaster risk reduction: The systematic development and application of policies, strategies and practices to minimize vulnerabilities and disaster risks throughout a society to prevent and limit negative impacts of hazards, within the broad context of sustainable development. In South Africa, disaster risk reduction is an integral and important part of disaster management.

dynamic coastal processes: All natural processes continually reshaping the shoreline and near shore seabed and includes —

(a) aeolian movement of sand;
(b) migrating dune systems;
(c) wave action;
(d) coastal storms;
(e) currents;
(f) tidal action;
(g) river flows;
(h) erosion; and
(i) accretion

ecosystem: A dynamic system of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

EGS: Ecosystem goods and services: The resources and functions that accrue from the natural environment.

Exclusive Economic Zone: The Exclusive Economic Zone of the Republic referred to in section of the Maritime Zones Act 1994.

heritage sites: Material remains resulting from human activity older than 100 years. This includes wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, territorial

	waters or in the maritime cultural zone where such wrecks are older than 60 years. Archaeological sites also includes any feature, structure or artefact associated with military history older than 75 years and includes the sites on which they are found.
High Water Mark:	The High Water Mark as defined in section 1 of the Integrated Coastal Management Act 2009.
infrastructure:	Any temporary or permanent structure made by humans
littoral active zone:	Any land forming part of, or adjacent to, the seashore that is – (a) unstable and dynamic as a result of natural processes; and (b) characterised by dunes, beaches, sand bars and other landforms composed of unconsolidated land, pebbles or other such material which is either unvegetated or only partially vegetated.
Overlay Zone:	a more detailed zoning scheme mechanism that is applied in addition to the base zone of a property.
Public Open Space:	Land zoned as open space, located in urban areas and accessible to the general public.
risk:	The measure of potential harm from a hazard or threat. Risk is usually associated with the human inability to cope with a particular situation. In terms of disaster risk management it can be defined as the probability of harmful consequences, or expected losses death, injury, damage to property and the environment, jobs, disruption of economic activity or social systems. Hazards will affect communities differently in terms of ability and resources with which to cope. Poorer communities will be more at risk than others.
vulnerability:	The degree to which people, property, the environment or social and economic activity - in short, all elements-at-risk - are susceptible to injury, loss of life, damage, disruption, exploitation or incapacitation by all hazards.
Zoning Scheme:	Determines the zoning categories and land uses permitted within each category.

1. Introduction and overview

1.1. The coast as an asset

The City of Cape Town Municipality (the "City") has an extensive coastline of 307km which is an important economic, social and environmental asset. Characterised by a highly sensitive, complex and dynamic coastal environment, the city's coastline provides the communities and visitors to Cape Town with a multitude of social and economic benefits and opportunities as well as essential Ecosystem Goods and Services (EGS). Our coastline is an important asset for the City's economy, it is where our communities pursue recreational activities and where they interact. It draws our visitors, protects our city, property and infrastructure from storm surges, receives our waste, supports our unique and diverse fauna and flora and contributes to the livelihoods through the provision of food. It is central to our history and diverse identities and shapes Cape Town's unique sense of place. These goods and services provided by the shoreline are key contributors to the city's economy, desirability and global recognition as one of the world's most beautiful and popular cities.

Central to this value is that the City's coast is, and must remain, a common asset belonging and accessible to all. Further, this value of the coast is determined by both its quality and functionality. As such it is imperative that the City implement a policy that not only optimises the value of the coast and protects it as a common asset for all but one that also creates a framework for the effective governance, decision-making and management of our coastline in the best interests of our city and its communities.

1.2. Problem statement

The integrity and value of Cape Town's coastline is dependent upon the interaction of numerous biophysical processes. Wave action causes erosion of sediment which long-shore winds and currents deposit along the coast, forming beaches and dunes. Storms are drivers of rapid coastal change, often leading to abrupt erosion events and inundation of coastal areas. These important biophysical processes are highly sensitive to change. This is particularly relevant along Cape Town's high energy coastline which is exposed to large weather systems and coastal storms.

Historic planning decisions made without the guidance of a City-wide integrated coastal management framework has resulted in the interference with dynamic coastal processes, degraded coastal environments and which now forms a source of risk to human settlements located in these spaces. The resultant degradation or loss of ecosystem function compromises the ability of these systems to absorb the impacts of further coastal erosion and storm surge, thus exacerbating risk. These problems are likely to worsen given the expected impacts of global climate change, which include sea level rise and an increase in the frequency and intensity of coastal storms.

Risk may be physical, social or financial and can be transferred to coastal stakeholders over periods of time and over space. The degradation of natural coastal processes negatively impacts the social and economic value of the coast. As the coast is a common asset, coastal risk and loss is shared between the authorities and the general public and individuals.

The decision-making processes behind coastal development are therefore crucial for either creating a risk-prone, degraded coast or a high quality, resilient one.

2. Policy and management

An effective policy environment is central to good governance, long term planning and optimising sustainable opportunities and growth. This Integrated Coastal Management policy is therefore central to reducing risk, both to the City and its communities, and is core to retaining and enhancing the many current and future economic, social and environmental opportunities of our unique coastline into the future. The principles determined in the Integrated Coastal Management policy also compliment and support the principles defined in the National Integrated Coastal Management Act, to which the City is legislatively bound by.

The local authority responsibilities of economic and social development, urban planning and land use management as well as the Integrated Coastal Management Act's requirement for a Municipal Coastal Management Programme, requires the City of Cape Town to incorporate an integrated coastal management framework into its existing planning and management processes. Integration with these processes will require that the ICM policy is integrated with and driven through the City's Transversal Management System. The Integrated Coastal Management policy compliments and cross pollinates the City's Transversal Management System through defining clear roles and responsibilities across multiple line departments at both an operational and strategic level.

3. Regulatory context

The following legislation, strategies and council policies are relevant to the Integrated Coastal Management Policy:

- Economic Growth Strategy
- Cape Town Integrated Metropolitan Environmental Policy (IMEP)
- Cape Town Spatial Development Framework 2012
- Cape Town Zoning Scheme 2012
- City of Cape Town's Shipping Incident Disaster Management Plan
- Disaster Management Act (57 of 2002)
- Environment Conservation Act (73 of 1989)
- Floodplain and River Corridor Management Policy (2009)
- Land Use Planning Act (once promulgated)
- Land Use Planning Ordinance (15 of 1985)
- Local Government: Municipal Structures Act (117 of 1998)
- Local Government: Municipal Systems Act (32 of 2000)
- National Biodiversity Act (Act 10 of 2004)
- National Building Standards and Building Regulations Act (103 of 1977)
- National Environmental Management Act (107 of 1998) (NEMA)
- National Heritage Resources Act (25 of 1999)
- National Environmental Management: Integrated Coastal Management Act (24 of 2008) (ICMA)
    - Informed by the NEMA principles. These include maintaining and rehabilitating the "diversity, health and productivity of coastal ecosystems" and following a "risk averse and precautionary approach" to coastal management and planning "under conditions of uncertainty".
    - Sections 48-50 deal with municipal coastal management programmes and by-laws.
    - Section 62 deals with the implementation of land use legislation in the coastal protection zone.
- National Water Act (36 of 1998)
- Sea Shore Act (21 of 1935)

- Ship Stranding Protocol
- South Africa's Oil Spill Contingency Plan
- Spatial Planning and Land Use Management Bill (once promulgated)
- The Constitution of the Republic of South Africa: Sections 151(3), 152(1)(d) and156(5).

4. Strategic intent and desired outcomes

The City envisions a coastline of the highest standard, where coastal ecosystems and our rich natural environment is protected as a sensitive, complex and dynamic space important for our future prosperity. . The coast will be managed as core city infrastructure, valued and protected as an asset for current and future generations. The strategic focus areas of the City are enshrined in the City's Integrated Development Plan (IDP) and are categorised into five pillars. The city's coastal environment has the potential to support all five pillars:

- **The Opportunity City**: by having due care for sustainability implications, this policy supports economic and social development opportunities.

- **The Well-Run City**: through this policy, the City will be accountable to its citizens for its coastal decisions.

- **The Safe City**: the reduction in coastal risk created through the enabling mechanisms of this policy provides a safer city for all.

- **The Caring City**: this policy strives towards taking care of Cape Town's people, especially those most in need of assistance, by retaining and improving the state of their coastal environment.

- **The Inclusive City**: this policy entrenches the rights of access to and enjoyment of the coast for all people and will manage the coast in the best interests of all communities.

5. Coastal policy principles

In working towards the strategic intent of this policy, the following coastal policy principles inform the City of Cape Town's coastal custodianship and will be applied in relation to all City coastal decision-making:

- The coastal environment is a shared asset held in trust for the common good of all. Equitable and ease of public access to coastal areas and associated opportunities for the entire coastline is central to this value. The right of each individual to enjoy the coastline in the way of their choice without impacting on other users' enjoyment must be protected;
- The coast is a shared and common asset vested in the interests of the citizens of South Africa. City decisions relating to coast that have an impact on coastal communities will be facilitated by broad based stakeholder engagement and public consultation processes;
- Economic and social development opportunities must be optimised to the benefit, and in the interest, of all residents, with on-going active investment in and management of the Cape Town coastline by the City;
- Development of coastal economic and social opportunities must be undertaken in a manner that does not reduce, harm or degrade our coastal environment or its ability to cope with climate risks in the future. The diversity and healthy functioning of natural coastal ecosystems and processes must be protected, restored and enhanced for their intrinsic as well as their economic, social and environmental values;

- The coastal environment has been inhabited by humans for millennia. Natural heritage resources that represent this history offer unique values that are central to our sense of identity and must be held in trust for future generations;
- Strategic, proactive, consistent and risk-averse coastal decision-making will be made in the best interests of the broader community of Cape Town, including the implementation of proactive and progressive measures now to reduce coastal risk from climate change, sea level rise and storm surge events. This decision making process will include public participation, and
- All individuals must be accountable and responsible for their actions and must have due care to avoid creating negative impacts on our coastal environment. Our coastline must be an environment free of crime and where legal rights for sustainable resource consumption are protected while illegal resource consumption is acted against.

6. Policy directive details

6.1. Common Asset

The coastline is a common asset, a shared space and unique natural and cultural environment which belongs to all South Africans.

In this regard the City will:

- Protect the right of all people to access the coastline;
- Manage the coastline at all times in the best interests of all and not to the sole benefit or interest of individuals or groups;
- In all decisions relating to the development of the coast, careful consideration will be given to protecting and preserving unique heritage sites, consistent with the City's policies and national law;
- Ensure that future development is appropriately set back from the coastline consistent with the City's Spatial Development Framework.

6.2. Access

Development along the coast can result in valuable spaces which should serve as central points of economic, social, cultural, spiritual, educational and recreational experience instead becoming informally privatised space, limited to a few.

Conversely, uncontrolled or informal access to the coast is one of the primary contributors to dune erosion and disturbances of sensitive ecosystems, ultimately compounding risk from coastal processes.

A core principle to the City must be equitable access to the coast while ensuring that this access is regulated, organised and controlled in a manner that does not detract from or negatively impact on the coastal environment while also ensuring ease of access for all.

In this regard the City will:

- Formally designate Public Coastal Access Land at appropriate locations along the length of the City's coastline in accordance with the ICMA;
- Ensure lateral coastal public access by acting against encroachment of private property into coastal public open space;
- Where sea defence mechanisms are required, apply an integrated approach to ensure that where possible access to, and the amenity value of the coast is retained and promoted, and

- Ensure that formalised public access points are appropriately distributed along the length of the coastline to facilitate public access for all residents.

6.3. Optimise Economic and Social Opportunities

The coastline underpins much of Cape Town's economy and holds significant potential to contribute further economic growth and social development opportunities in Cape Town. However, the economic and social value of the coastline must be finely managed as poor decision making, poor management, prioritising short terms gains, over-development or inappropriate development can substantially diminish current economic and social value while removing or reducing the potential for any future economic and social opportunities.

In this regard the City will:

- Prioritise long term economic planning and gain over short term gain to avoid the generation of risk to the City and its residents;
- Address the inequalities of the past through promoting appropriate coastal nodal development as detailed in the City's Spatial Development Framework to connect communities to the coastline;
- Assess economic and social development opportunities on the coast in a holistic manner that understands the coastline as a complex system that has diverse opportunities and constraints determined by factors outside of our control;
- Optimise and invest the immense potential of Integrated Coastal Management to create long term sustainable employment opportunities across a range of sectors including coastal management, ecotourism, coastal risk reduction and coastal rehabilitation;
- Invest in appropriate infrastructure that supports a wide range of economic and social development activities and opportunities;
- Rectification of historically made inappropriate planning decisions through appropriate regulations, strategies and building codes , and
- Identify and facilitate development of nodal growth points with the intent to optimise the socio-economic benefits of accessing coastal resources.

6.4. Coastal Recreation

Coastal recreation takes many forms and is one of the largest social activities in Cape Town. Coastal recreation underpins a range of economic activities in Cape Town and provides significant social development value.

In this regard the City will:

- Promote and support coastal recreation by maintaining, investing in and developing infrastructure and services that facilitate appropriate coastal recreation opportunities;
- Manage the coast as a shared environment that supports a wide range of recreational activities;
- Where necessary to reduce conflict, congestion, improve safety or reduce environmental social or heritage impact, determine appropriate and defined use zones for various forms of coastal recreation where necessary;
- Where a form of coastal recreation is negatively impacting on the economy, social values and quality of the environment, ban that form of recreation in its entirety or from various locations, and
- Regulate and enforce any recreation activities that require permits from any sphere of government.

6.5. Natural Coastal Processes, Fauna and Flora

Cape Town has a uniquely rich marine and coastal environment with significant diversity in fauna and flora. These natural systems, besides their intrinsic value, form the foundation from which socio-economic systems benefit and community livelihoods are built while playing an essential role in mitigating and reducing risk to the City, its infrastructure as well as private property.

In order to reduce coastal risk, especially given the future impacts of climate change on sea level rise and increased frequency and intensity of coastal storm surges, it is imperative that we maintain a healthy functioning coastline. By maintaining the integrity of the coastline, the economic, social and value of the coast will be optimised.

In this regard the City will:

- Ensure that future coastal development is guided to protect coastal processes and systems;
- Develop and implement a Coastal Overlay Zone as part of the City's Integrated Zoning Scheme to provide an appropriate land use management framework to protect our coastal systems and to manage areas at risk from coastal hazards both along built and un-built stretches of coastline;
- Invest in the on-going rehabilitation of degraded dune systems, beaches, estuaries, coastal corridors, rocky shores and coastal wetland systems;
- Implement Estuary Management Plans that recognise and manage the vital contribution of estuaries to supporting the health of coastal ecosystems, water quality maintenance, the provision of marine species nurseries and the provision of protection against coastal erosion and storm surge damage;
- Play an active role in any activity or process regulated by other spheres of government that have an impact on the City's coastline. This may include the issuing of permits for seine netting, proclamation of Marine Protected Areas etc.
- Designate highly valuable and sensitive natural coastal spaces or coastal heritage sites as Coastal Conservancy land as part of the Coastal Overlay Zone, and
- Undertake coastal waste management in accordance with a Beach Cleaning Operational Protocol that recognises the importance of retaining functional ecological systems while meeting the social and economic needs of high recreation nodal points.

6.6. Heritage, Identity and Sense of Place

Cape Town's coastline has a varied and rich history, spanning several millennia. It is integral to our history, our heritage, sense of place and unique identity. In addition our coastal landscapes underpin our scenic routes and global desirability and recognition.

In this regard the City will:

- Consider all new coastal developments with regards their potential impact on this unique and irreplaceable landscape;
- Take into account architecture, colour, form and position when considering coastal development applications;
- Ensure all signage design and location does not overtly detract from the coastal landscape;
- Ensure that any future coastal defences for the protection of private and public properties and City infrastructure are strategically managed by the City in the interests of Cape Town and its residents.

6.7. Risk Management and Mitigation

Determining the most appropriate and sustainable course of action for addressing coastal erosion and storm surges requires sensitive navigation through the multiple and often conflicting interests of the various stakeholders, including private developers, property owners, government officials (across all three spheres), beach users, civil society and environmental pressure groups.

As the coast changes and options are considered in response to the cross-cutting pressures caused by these changes, which are also expected to be exacerbated by climate change, the City will apply a multi-disciplinary approach in resolving, and adapting to such challenges. Natural systems such as wind, wave action, long shore sand transport, erosion and accretion, and storm action are powerful systems that must inform and guide coastal development and ancillary opportunities. A key principle within this context is that decisions taken to protect any property from coastal dynamic processes must be made in the interest of the broader community and after broad-scale engagement with interested and affected parties.

In this regard the City will:

- Apply a consistent, cautious and ,risk averse approach in responding to the pressures caused by coastal erosion and storm surges;
- Favour soft engineering approaches over hard engineering solutions where possible;
- Require all new coastal developments and changes to existing developments to incorporate mitigation of and/or adaptation to coastal climate change impacts as part of their approval process;
- Ensure that coastal defences to protect private property from the threat of coastal erosion is compliant with the relevant legislation;
- Not approve coastal defence structures if the risk of shoreline erosion for adjacent areas is influenced;
- Retain the option of managed retreat over defence;
- Require that coastal defences be proven to reduce risk prior to being approved;
- Favour coastal defences which are reversible, flexible, do not negatively impact on sense of place or aesthetics, and have other positive knock-on effects, and
- Undertake a broadly consultative process with the public when deciding on sea-defence interventions.

6.8. Coastal Land Alienation and Acquisition

Where coastal land is unsuitable for development, either due to zoning or for environmental reasons, state ownership of coastal land will be consolidated. This includes acquisition by the City of land falling within its jurisdiction. Refer to the City of Cape Town's Coastal Land Alienation and Acquisition Policy.

6.9. Coastal Safety and Security

Illegal activity along the coast impacts negatively on the marine and coastal environment, the interests of residents, local livelihood opportunities, ecotourism potential and the safety of individuals.

Although the City's jurisdiction is determined by the high-water mark, the City recognises that economic, recreational, environmental as well as illegal activities operate across these jurisdictional boundaries.

In this regard the City will:

- Actively seek to work with all relevant spheres of government and law enforcement agencies by promoting an inter-agency marine and coastal law enforcement approach;

- Protect and support the legal marine and coastal resource consumption activities while actively targeting all illegal resource consumption;
- Develop its own marine and coastal law enforcement capacity and resources;
- Consolidate City Regulations and By-laws to facilitate effective coastal law enforcement;
- Increase visible coastal law enforcement and policing, and
- Ensure appropriate informative regulatory signage is located across the coastline.

7. Indemnities and Risk

The City recognises that its coastal value is in part determined by the quality of the immediate coastal environment which includes private property. As such, the City is committed to leading open and transparent processes that will seek to find the most appropriate, effective, just and measured solutions to those parts of its coastline where coastal change has resulted in risk to the coastline, public amenity, public infrastructure and/or adjoining private property. In this regard the City will be guided by the Integrated Coastal Management Act in conjunction with the City's own commitment to a quality, safe and resilient coastal environment.

8. Implementation programme: City's Integrated Coastal Management Framework

To give effect to the policy principles, a set of implementation regulations, mechanisms and tools, which together constitute the City's Integrated Coastal Management Framework, will be developed to protect and manage Cape Town's coast in-line with these policy objectives. The overview of the City's Integrated Coastal Management Framework is depicted in the flow diagram below.

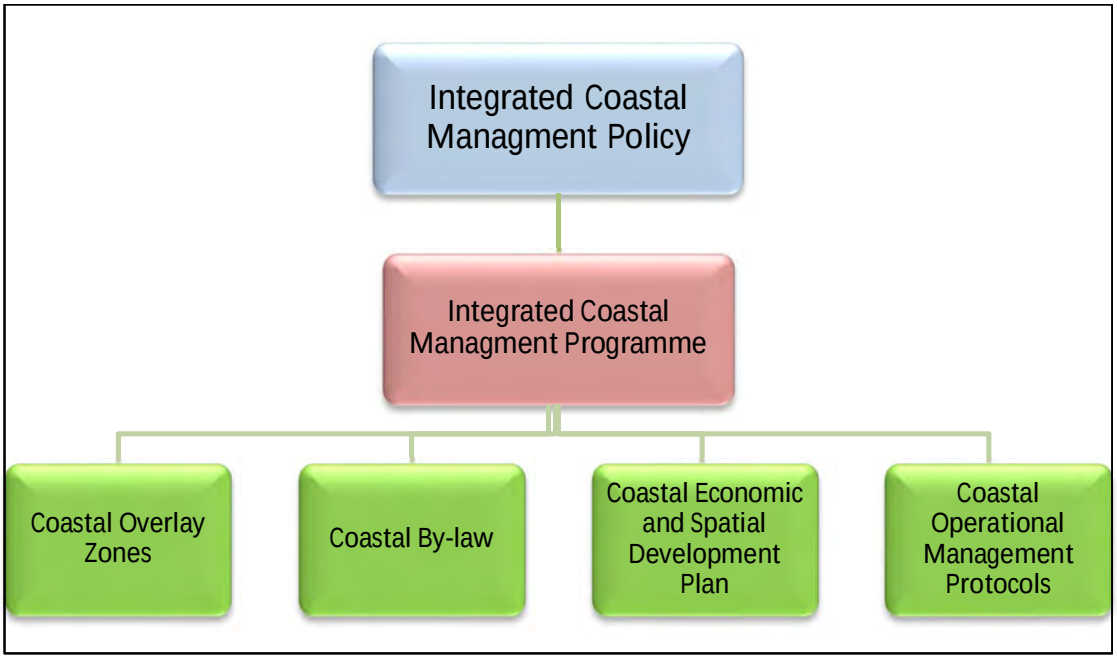


Figure 1: Integrated Coastal Management Framework for the City of Cape Town

8.1. Coastal Area

In order for the City's integrated coastal management framework to be effective, the spaces which it seeks to manage should be defined in a holistic way, taking into consideration the multitude of factors which impact on or are impacted by the dynamic interface between land and sea masses.

Recognising that social, economic and ecosystem processes take place across the High Water Mark, and given the need to ensure integrated management as well as proactive planning, the City intends to make an application, as allowed by the ICMA, for its area of responsibility to extend 500 metres seaward of the High Water Mark.

This application, if successful, will increase the effectiveness of the Policy as well as the implementation framework. Based on this understanding, the applicability of the City's By-law may extend up to 500 metres seaward of the High Water Mark.

8.2. Coastal Overlay Zones

Coastal Overlay Zones will be developed as a component of the City's Integrated Zoning Scheme. Overlay zones provide a mechanism which allows for the provision of more specific development rules to achieve the purpose of a particular City policy. Forming part of the zoning scheme regulations (development management), an overlay zone provides a more detailed zoning mechanism that is applied in addition to the base zone of a property and is considered the most appropriate mechanism to manage and regulate land use and building development. The introduction of overlay zones is not an inevitable consequence of local area planning initiatives as identified through District Site Development Plan. Rather their introduction and development is a consequence of the critical need identified in the Cape Town Spatial Development Framework (CT:SDF) for targeted and specific development rules in addition to the underlying general base zone of land in the coastal area. In the case of property or infrastructure at risk from coastal hazards, additional development rules in the overlay zone may be applied. Thus, the overlay zone will be used as a tool to be employed on an exceptional basis, where it is critical and strategic that land use and building development are managed not only to achieve a shared vision for Cape Town in terms of the CT:SDF, but also as a means to reduce the City's risk profile.

The Coastal Overlay Zones will therefore fulfil the vision of this Integrated Coastal Management Policy, elevating its policy statements to land use regulations to reduce the City's risk profile, build resilience and promote sustainable coastal development..

The overlays will consist of a general overlay, covering the entire coast, to which a general set of regulations will apply, and local area overlays, in which more specific provisions will apply to particular areas.

8.3. Coastal By-law

The City will develop and implement a Coastal Bylaw in 2014. A bylaw is the specific regulatory means for the City to regulate activities. The City is committed to ensuring that all activities carried out on the coast are conducted in a manner that is responsible, in the interests of public safety, and that such activities in no way detract from the amenity value of the coast or the natural coastal environment.

The by-law will assist in enhancing, protecting and optimising social and recreational opportunities by providing regulations that ensure socially and environmentally responsible activities along the coast.

8.4. Integrated Coastal Management Programme

The City will develop and implement an Integrated Coastal Management Programme (ICMP) in 2014, as required by the ICMA. This ICMP will be a comprehensive management and action plan detailing the City's day-to-day management approach for all aspects of the coastal environment over which it has jurisdiction, set the consistent standards and operating protocols for a range of coastal aspects and ensure compliance to national legislation.

8.5. Coastal Economic and Spatial Development Plan

The City is currently in the process of developing a strategic plan that examines the coast as a single, connected space and identifies appropriate public coastal development in order to optimise social and economic opportunities, including those linked to the private sector.

The plan will prioritise opportunity development and give effect to the objectives of the City's broader Economic Growth Strategy and Social Development Strategy. The plan will among other considerations, address coastal resort development, public access, marine access points, coastal public transport and consolidation of ecotourism and other commercial and industrial marine and coastal activities. This long-term planning is especially important in the context of expected climate change impacts, including sea level rise and increased frequency and intensity of storm surges.

Chapter 20: Dune Management

1. Introduction

Cape Town's coast line consists of a mix of rocky shores, interspersed with pocket beaches and long sandy shores. The coastal system is primarily a wind driven system affected by seasonal sand deposition and erosion, and alternating seasonally dominant winds from the south-east and north-west. These dynamics are further affected by high energy winter coastal storms and associated swells.

Historically, prior to urban development, Cape Town's coastline consisted of extensive mobile coastal sand dune systems operating over extensive spatial scales. However as a result of urban development over centuries but particularly within the last 80 years, the historical expansive sand dune systems have been severely compromised and transformed.

2. Importance of Sand Dunes

All remaining sand dunes in Cape Town, including those that are functional and healthy as well as those that are cut-off and in a poor and often destabilised state, are of critical importance to the City's coastline as:

- Functional sand dunes provide the most effective and efficient buffers against storm surge events along sandy coastlines and as such, must be considered as critical green municipal infrastructure that protects coastal property and infrastructure from storm surge events
- Functional and healthy sand dunes provide the best means of regulating and controlling wind-blown sand which, when uncontrolled, creates substantial burden and damage to City infrastructure
- Functional and healthy sand dunes are a habitat for biodiversity
- Functional sand dunes regulate localised environmental and weather conditions

The appropriate and on-going management of remaining dune systems along Cape Town's coastline is of critical importance. This area of coastal management has historically been neglected and under resourced often to the cost of the City and its ratepayers. **Dune management in the City must become a priority activity that is well resourced as an on-going management imperative.**

3. Problem Identification

Fewer and fewer coastal dune systems along Cape Town's coastline remain functional without any need for active management intervention. As the urban development footprint has expanded over the last few decades, most dune systems have become cut-off, damaged and are no longer naturally functional and consequently require on-going intervention. At the core of the issue is the fact that the marine and climatic component of the coastal dynamic system remains functional and dynamic irrespective of the development footprint. As a result sand is still naturally deposited on our beaches, and seasonal wind patterns still move that sand in a manner that historically created the dunes. However, with the development and built infrastructure, these naturally functioning systems are now operating within an altered environment often leading to:

- Excessive sand build-up altering the normal expected profile of fore-dunes
- Excessive build-up of sand against or on hard infrastructure such as buildings and roads
- Inappropriate dune and coastal beach profiles that exacerbate erosion of the dunes
- Inability of natural dune vegetation to become established
- Loss of dunes, particularly frontal hummock dunes

- The loss of sand transport corridors with the result being more permanent dunes where these did not previously exist

These challenges are further exacerbated by:

- Multiple informal access points across the dunes which creates blow-outs and erosion points
- Uncontrolled and unregulated sand removal and manipulation by City line departments
- Illegal small scale sand mining in areas
- Little to no active management of remaining dune belts

4. Dune Management Principles

The following overarching principles will be applied in the City's dune management approach:

- Where systems remain relatively functional, regulate and avoid human interference and protect the dunes from any and all destructive activities to optimise natural self-functioning systems
- Recognise that where systems have been altered to the extent that natural functioning is no longer practical or realistic, implement specific dune management interventions to manage the remaining system in an optimal way as part of an altered system
- Utilisation of exotic species such as Marram Grass as well as the mechanical shaping of dunes as a necessary component to managing dunes in an altered system
- Where dune systems are currently stabilised as a result of established alien plant species, leave those non-natural systems in place until such time that a slow but managed replacement of aliens by indigenous plants occurs through a structured process
- Mechanical removal of excess sand build-up will be applied as needed in managing altered systems.

5. Dune Management Plans

In Chapter 2, the City has defined Coastal Roles and Responsibilities for all aspects of coastal management. The development and implementation of appropriate long-term dune management plans will occur in alignment and as per those defined Roles and Responsibilities in the following way:

5.1. Beach Recreational Nodal Points

At all Beach Recreational Nodal Points where dune management plans are required, the development and implementation as well as long-term on-going management will take place in the following ways:

- Dune Management Plans to be developed by the Environmental Resource Management Department
- Dune Management Plans will be implemented in accordance with those plans by the Sport, Recreation and Amenities Department
- On-going management in the long term resides with the Sport, Recreation and Amenities Department in accordance with Management Plans
- Budget allocation will be provided in accordance with the listed responsibilities above

5.2. Natural Coastal Areas

In all areas defined as Natural Coastal Areas where dune management plans are required, the development and implementation as well as long-term on-going management will take place in the following ways:

- Dune Management Plans to be developed by the Environmental Resource Management Department
- Dune Management Plans will be implemented in accordance with those plans by the Environmental Resource Management Department
- On-going management in the long term resides with the Environmental Resource Management Department
- Budget allocation will be provided in accordance with the listed responsibilities above

6. Defined Areas Requiring Dune Management: Beach Recreational Nodes

Area	Dune Status and Priority	Dune Management Plan Status	Risks	Date to be compiled by
Duynefontein to Melkbosstrand	Impacted by local residents encroachment into dunes, numerous informal access points, but relatively stable	No plan exists	Medium risk of slow deterioration, encroachments must be resolved	December 2014
Big Bay Beach Front	Dunes irrigated and vegetated, stable, requires onging management	Plan in place and attached to this chapter	None at this time	N/A
Table View Beach Front	Irrigation system faulty, blow outs and sand cover shifting, storm water outlets undermining dunes	Historical plan in place, requires updating and review	Pockets of erosion, loss of vegetation and wind blown sand onto infrastructure	June 2014
Cape Town Harbour to West Beach	High risk area, especially in the southern end, exacerbated by erosion of the Bay, installation of illegal defence structures, high priority for integrated intervention	No plan exists	Extremely high risk of ongoing illegal activity as well as high risk to private property as well as risk to quality of coastal environment.	December 2014 due to the fact that it is a substantial piece of work that will require integration across many property owners as well as government agencies
Hout Bay Beach	Massive sand build up, complete collapse of dune systems as functional, high priority	Plan has been developed and implementation began in August 2013. Plan attached to this chapter	Significant risks remain if plan not implemented	EIA for full implementation must be completed by April 2014
Glencairn Beach	Dune system failure placing railway line at risk. High priority intervention area	Detailed study commissioned in January 2013. Study completion will inform way forward	Significant risk to transport corridor as well as coastal quality	Proposed plan expected December 2013
Fish Hoek Beach	Highly cut off dune cordon, managed informally, regular blow-outs and risk of undercutting by Silvermine River Mouth	Formal management plan needed	Low risk, but quality of coastline deteriorating	April 2014
Sunrise Beach	Highly mobile sand system, minimal intervention recommended, small pockets of stabilisation will be beneficial, formalisation of access points would be	No plan exists	Low risk	December 2014

	beneficial.			
Strandfontein Pavilion	Mobile sand threatens infrastructure, limited stabilisation at key points recommended, formalisation of access points recommended. Key risk area along Fishermans Lane where sea wall collapsing, substantial intervention needed	No Plan exists	Priority as a core recreational node and Fisherman Lane seawall collapse poses significant public safety risk and poor quality coastal environment	February 2014
Blue Waters to Mnandi	Dune systems relatively high quality, minimal intervention required, formalisation of access points would be beneficial	No Plan exists	Low priority as minimal risk and well managed as Blue Flag Beach area	December 2014
Monwabisi	Highly wind driven system, massive implications for infrastructure, substantial plan required as part of an overall Resort Development Plan	No Plan exists	High priority due to level of risk as well as a key recreational point	April 2014
Strand beach front western end	Dunes covered in alien invasive species. Noted area for criminal activity. Recommended that alien invasive species be left in-situ until long term sustainable plan developed	No Plan exists	Risk of criminal activity best resolved through management interventions.	December 2014

7. Defined Areas Requiring Dune Management: Natural Coastal Areas

Area	Dune Status and Priority	Dune Management Plan Status	Risks	Date to be compiled by
Blaauwberg Nature Reserve	High quality dunes	Implemented	Trampling	Completed
Dolphin Beach	Dune build up encroaching on private property, requires long term plan	No plan exists	Ongoing encroachment onto private property	February 2014
Kommetjie Beach	Dunes cordon variable in quality but overall functional and self-regulating	Detailed plan developed in 2002. Action required is the formalisation of access points	Unregulated public access across dunes	Access point control plan to be developed and implemented by June 2014

Witsands Beach	Highly mobile dune field actively managed to ensure integrity of historic landfill site	Implemented in 2005	Only if current management strategies cease	Ongoing

8. Compliance Monitoring

This will be done through reporting via the Coastal Risk Register

Chapter 21: Helderberg Marine Protected Area Management Plan

SECTION A: BACKGROUND INFORMATION

1. Introduction

The Helderberg MPA is situated on the north-eastern side of False Bay in the Western Cape, and falls within the jurisdiction of the City of Cape Town (CCT). It falls within the warm temperate Agulhas bioregion, and is a productive, biologically diverse area. Sandy beaches with mobile dune systems dominate the coastline in the area, while offshore habitats comprise rocky reefs, kelp beds, sandy soft-sediment, and pelagic environments. The health of the ecosystems within the Helderberg MPA varies greatly, with those in the poorest state being associated with estuaries where water abstraction, pollution and encroachment by development are extensive.

1.1 Purpose and Scope of the Management Plan

The purpose of this document is to describe the Helderberg MPA, its goals and objectives, methods for achieving these, and methods for measuring the success of the MPA. It aims to protect and conserve the values of the MPA whilst simultaneously allowing for reasonable access to and utilisation of the MPA by various user groups. It is a living, public document and as such is subject to periodic review.

1.2 Development of the Management Plan

The Management Plan for the Helderberg MPA has been compiled by the City of Cape Town (CCT). It draws on international experience of MPA management, as well as the relevant guideline published by the International Union for the Conservation of Nature (IUCN), and national legal and institutional requirements. An annual review of the management plan will be undertaken for the first three years, after which it should be reviewed every five years.

1.3 Management Framework

The management of marine living resources in South Africa is a national responsibility. In terms of the Marine Living Resources Act, the delegated authority to manage MPAs is the Minister of Environmental Affairs, through the Marine and Coastal Management branch. The Helderberg MPA abuts two erven (erf 789 and 790) which fall under the custodianship of Cape Nature. These erven are leased to Cape Nature by Heartland Properties and RDM Denel and which form part of the Cities biodiversity network.

1.4 Structure of the Plan

This management plan outlines the framework for the management of the Helderberg MPA to assist its stakeholders in achieving the site's conservation and user-principle objectives. The plan is broken down into distinct sections with an introduction followed by a section on the background of the MPA. Subsequent sections provide guidance on site management and can be described

as the “living” part of the document. The term “living” illustrates the expectation that this part of the management plan will evolve and change over time to suit the needs of the MPA and its stakeholders. This part includes the specific objectives set for the Helderberg MPA by MCM and CCT. It also provides guidance on governance, as well as management actions such as monitoring, compliance, education and awareness-raising, all of which will be critical to the success of the MPA.

1.5 Goals and Objectives of the Helderberg MPA

Marine Living Resources Act - Main Objectives

1. For the protection of fauna and flora or a particular species of fauna or flora and the physical features on which they depend;
2. To facilitate fishery management by protecting spawning stock, allowing stock recovery, enhancing stock abundance in adjacent areas, and providing pristine communities for research or;
3. To diminish any conflict that may arise from competing uses in that area.

The management agency, CCT, have developed a set of goals specifically related to the Helderberg MPA, which are based on the three main objectives of the MLRA. These include:

Biophysical Goals

1. To protect the marine and estuarine ecosystems that are representative of the Agulhas bioregion and to maintain biodiversity and ecological functioning in these ecosystems;
2. To protect depleted, endangered and endemic species and populations and to protect habitats which are important for the survival and revival of these species and populations;
3. To contribute towards the long-term viability of marine fisheries

Socioeconomic Goals

a) To promote non-consumptive, ecotourism opportunities;
b) To provide opportunities for marine ecological research and monitoring of environmental effects of human activities on marine ecosystems;
c) To facilitate the interpretation of marine ecosystems for the promotion of conservation among scholars and tourists;

Governance Goals

1. To reduce conflicts between competing users in the MPA and surrounding areas;
2. To ensure that appropriate and effective legal structures are developed for protecting the biodiversity of the MPA and the activities that benefit from it;
3. To fulfil South Africa’s international commitment to marine protection in terms of international protocols and conventions;

The development of related management actions further supports the MLRA objectives by identifying the activities which will be undertaken by CCT to reach the biophysical, socioeconomic and governance goals and ensures the effectiveness of the MPA. These management actions are discussed in Section B onwards.

2 Description of the Area

2.1 Site Location

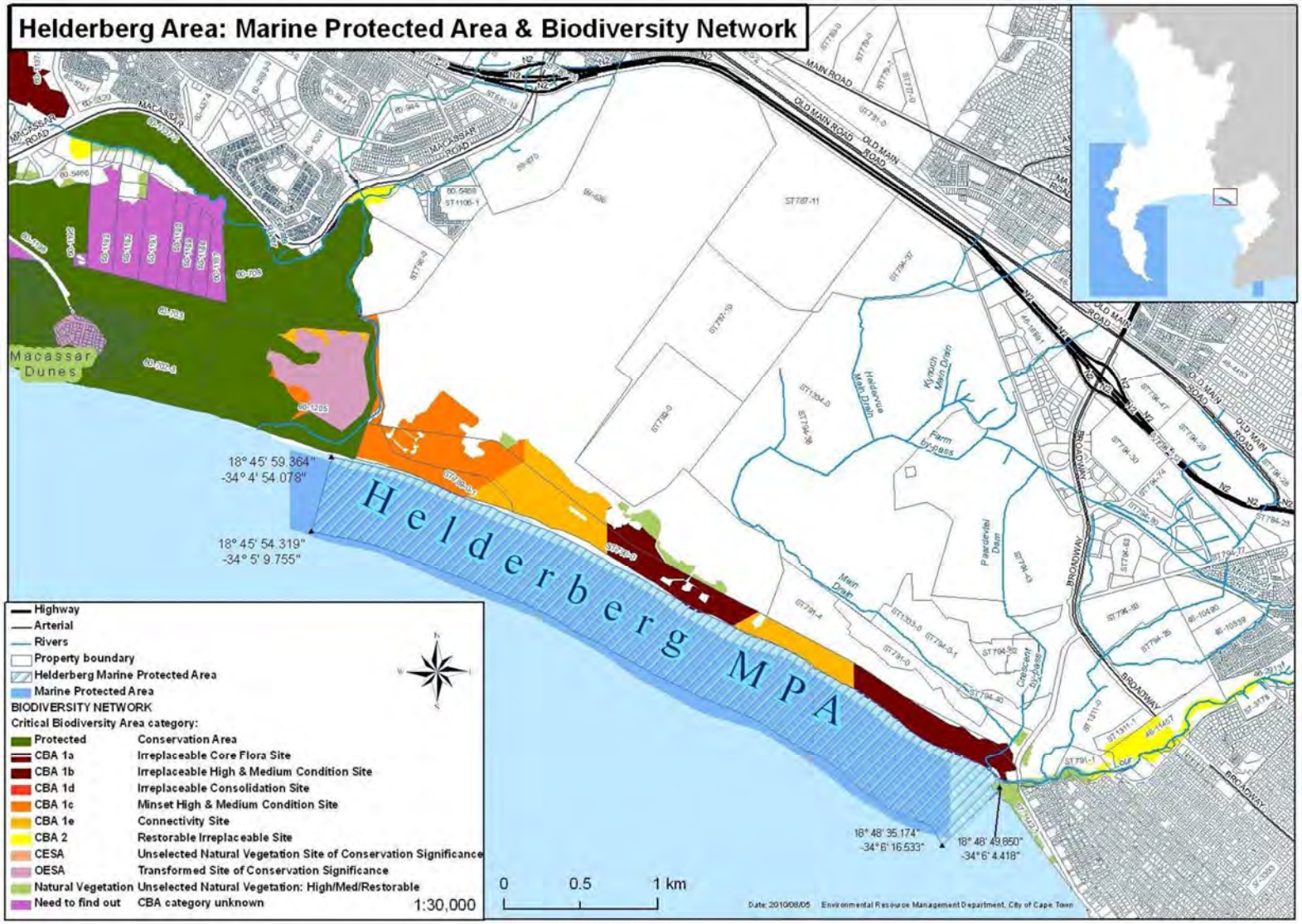


Figure 1: Helderberg MPA

2.2 Geography and Habitat

The east side of False Bay has extensive areas of fine quartzite sand bottom, and there are also occasional deposits of very fine, low-density silt which is easily disturbed and returned to suspension. This silt generally deposits over the sand and depressions in the reef during relatively long periods of calm seas. There are small areas of shell, gravel and mud near Gordon's Bay between the rocky shoreline reef and the sand bottom. The late-Precambrian age Malmesbury group is the oldest rock formation in the area, consisting of alternating layers of dark grey fine-grained greywacke, sandstone and slate, seen along the rocky Sea Point and Bloubergstrand shorelines, and from the Strand to Gordon's Bay. These sediments were originally deposited on an ancient continental slope by sub-marine slumping and turbidity currents. The sequence was subsequently metamorphosed by heat and pressure, and folded tightly in a NW direction so that the rock layers are now almost vertical. These rocks were, in most places, scoured by wave action during past periods of higher sea level. During winter, prevailing north-west and south-west winds bring rain associated with sub-Antarctic cold fronts. Although microclimates significantly affect local rainfall, in general the lower slopes receive approximately 800 mm p.a. The region suffers from summer drought. Temperatures are moderate and range from -5°C minimum in winter and 35°C maximum in summer. The annual average minimum and maximum temperatures are 11°C and 24°C respectively.

The shore of the MPA comprises 4km of sandy beach, as well as some low profile sandstone reefs which fall within the boundary (500m seaward of the high water mark) of the MPA. The beach within the Helderberg MPA is the least disturbed part of the northern shore of False Bay and harbours the last relic population of the giant isopod *Tylos granulatus* south of Yzerfontein.

The main habitats that can be found in the Helderberg MPA are:

a) Sandy beaches

Helderberg's ecosystems include the three zones typical of sandy beaches: the surf zone, the beach, including the intertidal and backshore zones, and the sand dunes. Sandy beaches are characteristically dynamic habitats, wave action being the predominant driver of change, which makes these habitats a unique home to a number of hardy and well adapted species.

The dunes in the area are considered a part of a mobile dune system in which sand is transported both in the littoral zone and long-shore, where it is trapped by coastal vegetation, resulting in the development of fore-dunes. Development within this mobile system has resulted in huge long-term costs, as developments have been inundated with windblown sand.

Threats to the sandy beach at Helderberg:

- Development in the active littoral zone, resulting in the inundation of buildings by sand.
- Artificial dune stabilisation and removal of fore-dunes for development, which deplete the available supply of sand needed for beach functioning.
- Although the Helderberg beach is kept clean, pollution in the form of plastic and oil spills remains a permanent threat if left unchecked.

- No specific research regarding invertebrates has been completed for the Helderberg MPA, which makes clear recommendations and the identifying of specific threats difficult.

b) River mouths

Historically, the Eerste River estuary was a small, temporarily open system with the mouth state predominantly determined by river flows. Under these conditions sea water intrusions created estuarine conditions in the water body that extended 0.9-2.5km in the summer months when the mouth was closed. During this period the estuary was a prime angling spot with up to 23 species of fish recorded. Estuary conditions began to deteriorate from as early as the 1940s due to water abstraction, effluent discharges from wineries and increased turbidity due to poor land use. Chemical pollution from a defence factory also entered the estuary around the time of the Second World War. Conditions in the estuary have not improved in recent years: flow has increased dramatically, with treated effluent entering the estuary or its source rivers from six waste water treatment plants. This increased flow has resulted in the mouth being permanently open (were it to close, breaching would be necessary to prevent flooding of the Macassar wastewater treatment works which are situated on the estuary floodplain). The flow changes largely preclude saltwater penetration which, combined with high pollutant levels, have lead to the loss of most estuarine biota. The estuarine sediments have become anoxic and industrial effluent (particularly heavy metals) entering the sea via the estuary is detrimental to the near-shore marine environment.

The Lourens River estuary enters False Bay on the western outskirts of Strand. It is a small, temporarily open system that forms a saline lagoon during the summer months. Over the period 1948-1978, pollution from the Strand sewage works, AECI, Somchem and Triomph chemical factories and the Gants food factory as well as buildings and excavations impacted negatively on the estuary. The Lourens River has also been altered by channelization and flood-control engineering works, water extraction and alien vegetation encroachment. The closure of the wastewater treatment works (1978) and the AECI chemical factory (1990) in addition to improved management of the Lourens River has improved the ecological condition of the Lourens estuary in recent years, and in 1997 the entire river was declared a Protected Natural Environment. Due to many years of limited public access to the estuary, it functions as a protected roosting site for many seabirds, such as gulls, terns and cormorants, and also constitutes an important estuarine nursery area for marine fish species.

c) Sub-tidal Reefs

There are sub-tidal reefs present offshore of the 5 kilometre stretch of beach known as The Strand. These reefs are known to be home to fish species such as Roman (*Chrysoblephus laticeps)*, Red Stumpnose (*Chrysoblephus gibbiceps)*, Galjoen (*Dichistius capensis)* and Red Steenbras (*Petrus rupestris)*.

2.3 Key Marine fauna found in the Helderberg MPA

The Helderberg MPA is subjected to frequent summer upwelling events, during which water temperatures may drop to 11° C in summer. Although this area is considered part of the warm temperate Agulhas bioregion, it forms a transition between the warm and cool temperate regions. The habitat includes predominantly sandy beaches and low profile sandstone reefs.

Meiofauna are by far the most abundant of the fauna found on sandy beaches, as their small size allows them to live between sand grains. Typical meiofauna include nematodes, copepods and ostracods. Meiofauna play an important role in breaking down organic matter that is then colonised by bacteria. They are also commonly used to monitor pollution on sandy beaches owing to their sensitivity to pollution and other forms of disturbance.

Life in the intertidal zone includes sand mussels, Mole and Ghost crabs, Plough snails, sandhoppers and the presence of Kelp gulls, African Black Oystercatchers, White-fronted Plovers and Sanderlings. Offshore, zooplankton including small shrimps and prawns, as well as a variety of fish, are found.

Before the proclamation of the area as an MPA, linefishing from boats targeted geelbek (*Atractoscion aequidens)*, carpenter (*Argyrozona argyrozona)*, roman (*Chrysoblephus laticeps)*, dageraad (*Chrysoblephus gibbiceps)*, seventy four (*Polysteganus undulosus)*, snoek (*Thysites atun)*, hottentot (*Pachymetopon blochii)*, silver kob (*Argyrosomus inodorus*), yellowtail (*Seriola lalandii)*, and chub mackerel (*Scomber japonicus)* between 1897 and 1906. The catch rates of these- except hottentot, snoek and yellowtail- decreased substantially (between 70 and 100% declines) by 1987, indicating a massive loss of predators on the reef and in the pelagic zone. Those species that increased were either small and less valuable (hottentot), or nomadic (snoek and yellowtail). The decline in chub mackerel may represent an environmental shift. The present (2009) state of fish stocks in the MPA is uncertain owing to the lack of a monitoring programme. Catches in the region, however, are depressed.

Overfishing was not limited to offshore species. There is considerable evidence of a decline in surfzone fish, including galjoen (*Dichistius capensis)*, silver kob, blacktail (*Diplodus sargus),* and white steenbras (*Lithognathus lithognathus)*. In the case of the latter, environmental degradation of the relevant nursing grounds (estuaries) is likely to have contributed significantly to the decline. The catch rates recorded in the present period are a mere fraction of earlier records, a situation that is mirrored throughout the region. Coastal fish have not been protected in the present MPA, which has prevented a recovery. Other MPAs which have stopped shore angling have seen recoveries in coastal fish.

Present-day fishing still targets these species, but shore angling has expanded to include a number of elasmobranch species which are targeted by sport anglers. These include the spotted sevengill shark (*Notorynchus cepedianus)*, smoothhound shark (*Mustelus mustelus)* and the spotted gulley shark (*Triakis megalopterus)*. Sharks caught by anglers are generally returned to the water, but one can expect some mortality with these catch-and-release fisheries.

The African Black Oystercatcher (*Haematopus moquini)* was listed as near threatened in 2006. It feeds predominantly on inter-tidal mollusks and nests on the ground in the coastal zone, where disturbance by humans and domesticated animals has threatened this species. The area is also an important nesting ground for migrating common and sandwich terns, which spend four months of each year within the Helderberg MPA.

2.4 Human Settlements

The suburb of Strand, with a population of 116 000, is situated on the shores of False Bay at the foot of the Hottentots Holland Mountains, approximately 40 minutes' drive from Cape Town. It consists of two bays, Melkbaai and Mostertsbaai, and forms part of the Helderberg Basin, along with Somerset West and Gordon's Bay. Its main attraction is "the strand" - 5 kilometres of white sandy beach. Beach Road runs along the Strand coastline for several kilometres, allowing easy access to the coastline at a number of places. The inland side of the road is lined with restaurants, shops and residential complexes.

2.5 History and Archaeological sites

Strand was founded in 1714, at which time it served purely as a fishing area to coloured and Malay fishers who settled in the area. In the 1830s, its popularity as a holiday destination began to increase, and the small village was named Van Ryneveldsdorp after a man who built his holiday home there. As its popularity grew, the name was changed to Somerset West Strand, becoming known over time as 'Strand'. The area now known as the Helderberg MPA first belonged to De Beers Consolidated Mines, owned at the time by Cecil John Rhodes. It was granted to the company in 1900 for the purpose of building a factory to supply De Beers mines with dynamite.

The land known as Vergelegen is regarded a historical landmark, and has been excavated for evidence of slave-life in the Cape during the eighteenth century. The property was acquired illegally at the end of the seventeenth century by Governor Willem Adriaan van der Stel, who used slaves of the Dutch East India Company to build his estate. When this abuse of power came to the attention of the Dutch East India Company in the Netherlands, van der Stel lost his position as governor, and the Company ordered the destruction of Vergelegen as a warning to future governors. Archaeologists believe that this destruction was never completed, and that the original Vergelegen foundations still remain beneath the current building.

Hendon Park, Gordon's Bay, contains one of the last remnants of shell middens along the False Bay Coast. Gordon's Bay midden is situated on the remnant of what was the highest of a series of dunes which until the 1920s was covered in dense vegetation. The remains of a possible fish trap is visible at low tide. The shell midden was formed as a result of two occupation episodes, which are separated from eachother by a sterile layer of windblown sand. The shellfish remains and fish bones contained within the midden provide a good indication of species of marine animals which were present in the past. These can be used, not only to recreate the diet of the indigenous people who lived here, but also to recreate the environmental conditions and health of the marine environment at the time of the accumulation of the midden.

Boundaries and zoning

The entire Helderberg MPA is classified as a “no-take” zone. The boundaries of the Helderberg MPA are indicated in figure 1 above:

4. Regulations

Section 43, subsection 2, of the MLRA states that-

“(2) No person shall in any marine protected area, without permission in terms of subsection (3):

a) fish or attempt to fish;
b) take or destroy any fauna and flora other than fish;
c) dredge, extract sand or gravel, discharge or deposit waste or any other polluting matter, or in any way disturb, alter or destroy the natural environment;
d) construct or erect any building or other structure on or over any land or water within such a marine protected area; or
e) carry on any activity which may adversely impact on the ecosystems of that area.”

SECTION B: MANAGEMENT OF THE MPA, ITS USER GROUPS AND KEY SPECIES FOUND THEREIN

1. Strategic Plan

The CCT Strategic Plan should be read in conjunction with this Management Plan. The Strategic Plan sets out key actions, roles and responsibilities of the CCT and MCM. The key performance areas described in this Management Plan are considered critical for management interventions in order to ensure that the Helderberg MPA meets its objectives. It should be noted that the Helderberg MPA as it currently exists is not proclaimed in such a manner that can ensure its objectives. A key performance area will therefore be to support a new set of regulations and a new zoning plan for the MPA.

2. Key Performance Areas

2.1 Overview

Many living marine resources have been depleted over the last century, including many line-fish species and abalone. Steps need to be taken to allow such populations to recover sufficiently to enable them to provide rich yields into the future. The Helderberg MPA must seek to address this as far as possible. Furthermore, whilst all South Africans can expect access to marine resources, such access must be controlled in a fair manner to ensure that no person or group compromises the opportunities of any other, whether present or future generation. The termination of illegal harvesting (poaching) in this respect is a priority.

The Helderberg MPA must be managed in such a manner as to maximise opportunities for tourism, whilst minimising the impact thereof on marine and coastal resources.

Furthermore, it must be recognised that the future of our natural coastal assets rests with the South African people. It is therefore essential to educate people about the wealth of resources in the coastal area, and raise their awareness about the human activities that threaten them. From an early age, people need to be taught to respect the environment upon which they depend.

2.2 Management of Key species within the Helderberg MPA

Species of interest	Reason	Conservation action
African Black Oyster catcher	Near threatened, red data listed	No MPA specific regulation. Nesting sites may require protection from dogs, pedestrians.
Bank cormorant	Red data listing	Nesting site at Stony Point protected from visitors and mammalian predators. Purse-seining not allowed in MPA

Cape Cormorant	Endangered	Nesting sites at Stony Point protected from visitors and mammalian predators. Purse seine not allowed in the MPA
Reef fish: roman, red stumpnose, galjoen, red steenbras	Heavily depleted	MPA excludes fishing
White steenbras	Heavily depleted (Threatened, according to IUCN listing)	MPA excludes fishing
Silver kob	Heavily depleted	MPA excludes fishing
Belman	Heavily depleted	MPA excludes fishing
Abalone	Heavily depleted, CITES listed	Fishery has been closed, diving banned in MPA, regular monitoring
Rock lobster	Keystone predator	Protected in MPA
Sea urchin (Parechinus)	Shelters juvenile abalone	No action required – not harvested

2.3 Demarcation of Boundaries and Signage of the Helderberg MPA

- The Naval Hydrographic Office located in Simon's Town must be notified of the boundaries and zones pertaining to the Helderberg MPA to include the required information in the updated SAN Charts.
- The boundaries will be demarcated using beacons with sector lights attached to them. These will be placed on the shore boundaries so that they are clearly visible both from the land and- within reason- the sea. As far as possible an additional beacon should be placed on the shore immediately above the high water mark at each boundary in such a manner that when they are directly behind one another, the line formed will coincide with the boundary in question.
- As far as possible, all landward access points to the MPA will be signposted in English Afrikaans and Xhosa and will clearly indicate the MPA's boundaries, its coastal and offshore extent, activities permitted/not permitted in the area, a map, and a contact telephone number for reporting of incidents.
- All signage will comply with both DEAT and CCT policy guidelines as far as possible.

2.4 Management of Fishing Activities

There are various types of MPA which offer varying degrees of protection to marine living resources, and which therefore determine how fishing activities taking place within them should be managed. The Helderberg MPA is a no-take zone, which means that no fishing whatsoever (commercial, recreational or small-scale) is permitted. Marine living resources may only be extracted from the area for scientific purposes, and only with a permit.

a) Commercial

- All commercial fishing is prohibited within the Helderberg MPA
- All fishing gear on vessels that are in, or enter the MPA for the purposes of passage, must be stowed

b) Recreational Fishing

- All recreational fishing from a boat is prohibited in the MPA
- All fishing gear on vessels that are in, or enter the MPA for the purposes of passage, must be stowed
- Collection of bait or any invertebrate species is prohibited throughout the MPA
- Additional zoning may be implemented to mange different user groups in order to avoid conflict and to protect environmental integrity.
- No fishing is allowed between the mouth of the Eerste River and the mouth of the Lourens River in False Bay, extending 500m seawards from the high-water mark.
- Compliance with regulations will be encouraged through education and awareness programmes

c) Spearfishing

- All spearfishing is prohibited within the Helderberg MPA
- All spearfishing gear on vessels that are in, or enter the MPA for the purposes of passage, must be stowed

d) Invertebrate and Bait Collection

- All invertebrate and bait collection is prohibited within the Helderberg MPA

e) Aquarium Collection

- Collection of any marine species for the purposes of aquarium usage may only take place under the authority of a valid permit issued under section 13 of the MLRA
- Where such collection does take place, a valid permit must be presented to the Fisheries Control, or other Authorised Officer, at his/her request
- The permit should specify the species as well as the amounts permitted for extraction

f) Fishing Charter Programmes

- No Fishing Charter boats are allowed within the MPA

g) Extractive use in the MPA

- The only exception for the extraction of marine living resources in the MPA would be granted for the purpose of scientific research, in terms of section 81 of the MLRA, which states that:

    1) If in the opinion of the Minister there are sound reasons for doing so, he or she may, subject to the conditions that he or she may determine, in writing exempt any person or group of persons or organs of state from a provision of this act.

- These applications are subject to stringent assessment and permits are only issued when appropriate

2.5 Boat Launch Site Management

Currently, there is no boat launching site within the Helderberg MPA. In case of future provision of launching sites or jetties, two sets of legislation are applicable:

- The Regulations for the Control of Vehicles in the Coastal Zone (Government Notice 1399 of 2001 amended in GN No.1426 of 2004) in terms of the National Environmental Management Act 1998
- Regulate all activities within the 100m Coastal Protection Zone in accordance with the Integrated Coastal Management Act 24 of 2008 (Chapter 2, Part 2).
- Regulate activities within 100m of high water mark in accordance with NEMA EIA Regulations, 2013

The following should also be taken into account in the event a boat launch site is considered for the MPA:

- Compliance with all relevant legislation
- Preference should be given to a beach launch site as op[posed to the installation of hard infrastructure i.e. a physical slipway
- Consideration of necessary studies
- Sites must be clearly signposted
- Sites are to be controlled and managed by the CCT

2.6 Anchoring within the Helderberg MPA

At present, all users may anchor within the MPA. This activity should be monitored to ascertain the potential impacts thereof and, if impacts are noted, appropriate management actions must be considered for implementation.

2.7 User and Vessel Safety Requirements

- The category of vessels applicable to the Helderberg MPA and discussed herein include categories B to E (category A is not valid within the scope of this Management Plan)
- Category B refers to vessels operating more than 15 but not more than 40 nautical miles from shore (this category will only be applicable from the Helderberg Harbour and will be managed by MCM. Catch records and launch site registers will however be recorded and monitored for the Helderberg MPA purposes
- Category C refers to vessels operating more than 5 but not more than 15 nautical miles from shore

- Category D refers to vessels operating more than 1 but not more than 5 nautical miles from shore
- Category E refers to vessels operating not more than 1 nautical mile from shore
- Most of the requirements are clearly discussed in documentation compiled by the South African Maritime Safety Authority (SAMSA) and the following documentation is attached as appendices under Appendix 7:
  - Merchant Shipping (National Small Vessel Safety) Regulations, 2007, as amended
  - Marine Notice No. 22 of 2008
  - Small vessel safety pamphlets
  - Safety requirements for Categories B, C, D, and E vessels for preparation of safety surveys

- Any queries relating to user and vessel safety should be sent to the SAMSA e-mail address: info@samsa.org.za
- SAMSA requirements must be managed within the context of the Helderberg MPA and Control Officers will need to regularly monitor vessels to ensure these requirements are met. This activity should be built into weekly patrols
- Safety equipment required for small boats includes:
  - Sufficient fuel for the intended voyage (+25% extra)
  - A life jacket for each person
  - Distress flares (stored in a waterproof container)
  - For signaling: a mirror, a waterproof torch, spare batteries, a spare bulb and a sound device
  - Compass
  - Bailing device
  - Paddles or oars
  - Grab-line
  - Anchors and ropes
  - Knife
  - Survival blanket for each person
  - Identification sheet of highly visible material – for identification from the air
  - First aid kit (including bandages, plaster, antiseptic ointment, seasickness pills, sunburn lotion)
  - Fresh water
  - Tool kit suitable for the boat
  - Air-bellows for inflatable boats
  - Radio (in larger boats)
- CCT staff managing the Helderberg MPA should undergo St. Johns first aid course

2.8 Other Tourist Activities

a) Existing Tourist Activities

At present the MPA is open to all types of tourist activities, which may occur without a permit. The following tourist activities are known to occur in the MPA:

- Various land based tourist activities that involve the MPA, including watching marine mammals and birds that frequent the MPA
- Surfing and Kite-surfing

- Swimming and bathing
- Traditional and cultural uses (for baptism and sea-water extraction/drinking)
- Day hikers on the coastal zone
- Activities associated with vessels such as speed and power boating

The management of tourist activities will include determining and mitigating the potential impacts on the values of the MPA as well as avoiding user conflict. Management actions include:

- Monitoring the different user groups to determine when and where conflicts arise
- Determine the reason for the conflict
- Intervene immediately where appropriate or submit the conflict for discussion at the next Helderberg Marine Working Group meeting for resolution
- Identify well-elevated points above high-use and environmentally sensitive areas for the purpose of fixed point photography. Time intervals between photographs should be determined (recommended interval is no more than six months) during and post high season. Records of these photographs are to be kept and problematic changes such as erosion must be discussed, and solutions sought, at Helderberg Marine Working Group meetings.
- Monitoring of the MPA will be integrated with the City's Coastal Monitoring Programme

Other activities

- In accordance with Municipal by-laws, no dogs are permitted within the coastal zone of the Helderberg MPA due to the potential impact on birds. Appropriate signage informing the public of this must be available at landward coastal zone entry points. Actions 5.3.2 (a) and 5.3.2 (b).
- The lighting of fires in the MPA may only take place at designated places where the appropriate facilities occur.

b) Potential Tourism Activities

There is potential within the Helderberg MPA for several other tourist activities. Opportunities to encourage and support such activities, for the socio-economic benefit of the community and to increase the financial sustainability of the Helderberg MPA, should be considered. Potential activities include:

- Scenic tours
- Marine animal watching
- Non-motorised water sports

Where tourist activities are visibly impacting on the integrity of the Helderberg MPA, the carrying capacity of the MPA for such activities must be determined and, if necessary, the number of operators, times, days and locations of activities must be limited. If necessary, zones will be created for resource protection or to separate user groups. This strategy is essential to ensure that natural resources are protected, user conflicts are reduced, and safety for all user groups is ensured.

c) Public Events

- Public events taking place within the Helderberg MPA which could potentially have a negative impact on the environment should be discussed by the Helderberg Marine Working Group to determine the conditions under which the event must occur.

- Monitoring of the proposed site for the event should include the taking of a photograph of the site from an elevated point prior to the event, during setting up of the event (where appropriate) or during the event itself (to determine visitor numbers and distribution within the site under discussion), as well as after the event to determine changes in the environment.
- Where negative impacts are determined, appropriate action must be either immediately taken, or discussed at the following Helderberg Marine Working Group meeting and the solution implemented where appropriate.
- In the case of annual events, the Helderberg Marine Working Group must take into account any negative impacts which an event had before deciding if it should proceed the following year.

2.9 Emergency Events

- The occurrence of floods is often associated with flotsam, which poses a danger to users within the Helderberg MPA.
- The Management Authority, where possible with the assistance of volunteers, must traverse the Helderberg MPA as soon as possible after the flooding has occurred to identify any dangerous flotsam or environmental degradation.
- Dangerous flotsam identified should be removed if possible. Alternatively, warnings should be posted informing users of the Helderberg MPA of the nature and location of the danger.
- A portion of the Helderberg MPA budget should be allocated to the costs associated with such communication of warnings.

2.10 Appropriate Boating and Sailing Organisations and Clubs

- Interaction with such associations and organisations may be required to ensure improved awareness and/or compliance of certain members into the future.
- Partnerships with these organisations/associations is encouraged
- The Association names and headquarters details are available for such interaction below:
  - South African Sailing: P.O. Box 519, Paarden Eiland, 7420. Tel: 021-5110929 Fax: 021-511 0965. E-mail: mail@sailing.org.za
  - South African Jetsport Boating Association: Tel: 011-425 3499
  - South African Inflatable Boat Association: Tel: 012-914 7737. E-mail: hanliflack@worldonline.co.za
  - South African Power Boat Association: Tel: 011-425 3499. E-mail: powerboat@mweb.co.za
  - South African Water Ski Federation: P.O. Box 7896, Centurion, 0046. Tel: 011-634 0430. Fax: 011-634 0500

SECTION C: MANAGEMENT OF INFRASTRUCTURE AND EQUIPMENT

1. Equipment required for the management of the Helderberg MPA

CURRENT EQUIPMENT			
Item	Unit	Priority	Partnership/funder
Honda XR 250 Tornado Motorcycle	1	High	City of Cape Town
Binoculars	1	High	City of Cape Town
Trunking Radio	1	High	City of Cape Town
Laptop	1	High	City of Cape Town

REQUIRED EQUIPMENT			
Item	Unit	Priority	Partnership/funder
4x4 pickup	1	High	City of Cape Town
Nets	1 x 50m	High	City of Cape Town
Measuring equipment (rulers, measuring tape/ measure board)		High	City of Cape Town
Underwater Temperature Recorder (UTR)	1	High	City of Cape Town
Weather station	1	High	City of Cape Town
Fish tag kit from Ori		High	City of Cape Town
Small 3.2m Semi-rigid boat and small 15hp motor. (This is for monitoring purposes.)	1	High	City of Cape Town
Fishing equipment (rods, reels, line, hooks, sinkers and bait)		High	City of Cape Town
Jet ski (Law enforcement)	1	Medium	City of Cape Town
Scuba diving equipment		Medium	City of Cape Town
Cell Phone	1	High	City of Cape Town

2. Machinery safety and marking requirements in terms of SAMSA

- Fire extinguishers must be serviced annually by an approved fire appliance servicing agent
- All equipment belonging to a vessel must be permanently marked with the vessel's name or approved marking
- The trailer bearing a vessel must be marked in a conspicuous position with the vessel's name or approved marking, and with the management authority's name and telephone number

3. Use of Equipment

a) Capacity Requirements

- All staff to be handling management equipment must obtain the correct training and experience necessary
- A skipper's licence must be obtained by the Helderberg MPA Manager
- Boat crew should undertake the necessary health and safety training for launching and marine vessel use. All staff must undergo a first aid course, including CPR, and must be proficient in the use of the first aid kit

b) Equipment register

- A register must be available for each piece of equipment so that when required for use, the staff member utilising the equipment can sign it out and back in.
- The register should include a table with the item in question, a column for the name of the staff member utilising the equipment, date and time it was taken for use, date and time it was returned and a column for comments where the staff member must state the condition of the piece of equipment upon its return. This should preferably be done in the presence of another staff member such as a supervisor to ensure that the comments are correct.
- In the case of motorised transport (the vehicle or boat), the register must include kilometres travelled, estimated fuel used and odometer reading (in the case of the vehicle). The supervisor should check the motorised transport register frequently to determine service requirements of the equipment as per the manufacturer's servicing requirements (e.g. new diesel vehicle requires a service between every 10 000-20 000kms).
- Fine books should be ordered in advance so that there is always stock available.

c) Equipment Maintenance and Insurance

- All equipment must be maintained in accordance with its manufacturer's servicing requirements
- Tyres of motorised and trailer transport should be checked for legal standards at each service or annually (at minimum for new tyres and at least quarterly for older tyres)
- A budget must be made available for costs associated with maintenance of equipment (amount determined by costs of servicing etc)
- An insurance budget should be provided and all equipment insured
- Maintenance to the outboard engine must take place before it is used if it has been standing for some time:
    - Put in a fresh water tank. Do not use the flushing device as the engine will not reach running temperature and the thermostat will not open.
    - Remove the air filters; run the engine until it warms up. Check the water is flowing strongly. Remove the fuel line without switching off.
    - Spray 'storage seal' into the carburettors until the engine runs out of the fuel in the carburettors and stops. Ensure each one received a good quantity. Switch off the ignition.
    - Make sure the carburettors have no fuel left. Undo the drain screws to allow drainage.
    - Replace air filters and fuel line etc and tighten.
    - Spray the engine with a mixture of paraffin and light machine oil. Assemble the spray cover. Wash the outer surface of the engine with fresh water.
    - Grease all linkages with marine grease, including the steering linkages.
    - Remove the propeller, check and clean, and grease the splines.
- After use of the vessel and engine:

- Rinse the vessel, trailer and engine with fresh water. Take care to not pollute the surrounding environment.
- Let freshwater circulate inside the engine until the engine is well flushed.

4. Maintenance of Infrastructure

- Signage should be checked on each patrol for wear and tear, as well as for graffiti or other damage
- A budget line must be created to restore, replace or upgrade signage as and when required

SECTION D: COMPLIANCE

1. Background

Poaching in the MPA happens mostly in the areas around the Eerste and Lourens Estuaries. It takes place in the form of illegal bait collection, cast netting, illegal fishing and gill netting. The main targeted species are Sand prawn (*Callianassa kraussi*), Blood worm (*Arenicola loveni*), Kob (*Argyrosomus spp*.), White Steenbras (*Lithognathus lithognathus*), Garric (Lichia amia) and Southern Mullet (*Liza richardsonii*).

2. Objectives

The compliance objective for the Helderberg Marine Protected Area is to achieve resource protection through compliance with the declaration as an MPA and the related Regulations, and other applicable laws. The Compliance Plan is intended to contribute towards resource protection, facilitate fishery management, and reduce user conflict arising from competing uses in the MPA. It is intended to complement other elements of the Management Plan and lead to an increased level of success. High-profile, visible enforcement will require proper funding, supervision, staffing, and equipment.

3. Compliance Methodologies

Compliance can be achieved through a range of methods and is best achieved through the use of many tools and methods, including:

- Through community involvement and education
- Traditional enforcement operations, including patrols, apprehension of offenders, confiscation of equipment and convictions for offences
- Signage used to advise the community of the MPA and which activities may or may not occur in the area
- Field rangers encountering members of the public to advise the public of the regulations pertaining to the MPA before an offence is committed
- Distribution of materials such as the DEAT brochure “Recreational Fishing Information Brochure December 2008” (and later editions)
- Planned poaching syndicates and commercial enterprises knowingly commit offences for financial gain. When these culprits are apprehended (if at all possible and with good evidence), admission of guilt fines should not be accepted and rather charges laid

4. Community Involvement

- CCT to encourage user groups and all members of the public to report offences of MPA regulations through an incident reporting system.
- CCT to encourage honourary ranger involvement.

5. Voluntary Compliance Through Education

The Awareness Plan (Section F) includes elements designed to help the public understand the conservation significance of marine protected areas and why it is important to comply with the MPA regulations. This promotes voluntary compliance by the public through education and awareness programmes. This section should therefore be read in conjunction with Section F.

6. Enforcement Operations

a) Patrol Schedules

- At present there is only 1 MPA manager and one part-time field ranger. This could impact directly on the capacity to enforce regulations
- Co-ordination of volunteers and enforcement officers is necessary to maximise the efficiency of each support group
- Enforcement/compliance priorities must be determined for each week
- Compliance requires vessel patrols, diver patrols, inspections at the launch site and shore patrols as far as possible; however, within the current constraints, vessel and vehicle patrols will predominantly be required
- Patrols must be conducted with logbooks daily with night patrols taking place as needed
- Random patrols should be implemented
- Mountain stake-outs should be conducted if and when necessary
- Patrols conducted on foot must include the beaches
- Vehicle patrols must be conducted on town and management roads to cover larger areas quickly (motorcycle or quad bike and 4x4 vehicle)
- Regular vessel patrols must be conducted. The MCM vessels, “Victoria Mxenge”, “Ruth First” and “Lilian Ngoyi” conduct roving patrols along the coastline and these can be accessed for compliance in certain situations.
- Establish working relationships with the police and MCM Inspectorate
- Weekends, public and school holidays are heavy utilisation periods and extra patrols should be conducted
- All aspects of the MLRA and Helderberg MPA regulations are to be enforced during patrols
- A short report (which will provide necessary information for the compiling of the Quarterly reports) should be completed after patrols which must include information such as:
    - Number of persons encountered and interacted with, and in what manner
    - Number of persons contravening the law and actions taken
    - Distance, duration and route travelled
    - Any changes or impacts relative to environmental degradation noted and at what location (preferably GPS reading to be taken at site of degradation)
    - Whether any materials/brochures were distributed, if so which ones, how many, and to what type of visitor (i.e. tourist, fisher, etc)
- Arrange prosecutor’s day (once every two years) to inform the public of procedures, laws, consequences.
- Establish a reliable procedure to establish position at sea, from a boat (GPS) and from the shore (triangulation with sighting compass and GPS).
- Disseminate regulatory information on site and in shops
- General approach: high profile, preventative enforcement

b) Other Enforcement Operations:

- On occasion, it may be necessary to carry out “high impact operations” to ensure high law enforcement visibility and presence
- Additional staff from the nearest CCT office and local police should be utilised during such operations

c) Database of Offenses and Offenders:

- In order to maintain efficient compliance it will be a necessity to develop and maintain a photographic database of the commercial and recreational fishing boats so as to try and assist with identification of vessels fishing illegally within the MPA.
- A database of all illegal activities and suspicious vessels/vehicles/persons must be kept up to date at all times and reviewed on a quarterly basis.
- An electronic database must be maintained by CCT to ensure easy access to compliance information (e.g. repeat offenders) and for easy forwarding to the necessary partners.
- A photo-ID of suspects and offenders must be kept.
- For successful enforcement to take place it is imperative to liaise and work with other law enforcement agencies and the judicial system. Prosecutors should also be informed about the MPA.
- Regular training exercises and meetings should be held with all parties.

d) Compliance and Legal Proceedings

- In serious cases, confiscation of equipment and poached marine organisms, and possibly arrest, will take place. In most cases, confiscated organisms should be returned to the intertidal zone after being photographed or registered and counted at the relevant South African Police Services station.
- All admission of guilt fines and court appearance cases must be registered at the Strand Police station
- Legal proceedings as per the MLRA must be adhered to, in order to ensure positive convictions and fines
- GPS positioning and photographs of the site, offender and exploited resource
- Accurate reports/dockets must be compiled with all evidence well marked, recorded and stored as appropriate
- Dockets must be submitted to the court with evidence
- Court proceedings follow
- If positive conviction: ensure that the fine relates to the MLRA and that such income returns to the Marine Living Resources Fund as stipulated in the Act

SECTION E: CAPACITY

1. Staff

In June 2009, the City and DEA entered into a management agreement for the Helderberg MPA. This agreement provides for the following:

- Annual financial payment from DEA to the City to cover the costs associated with managing the Helderberg MPA
- The development of an agreed annual operating budget for the MPA
- The development of an agreed MPA Management Plan
- The appointment by the City of an MPA Manager

This agreement remains in place and is renewable annually by agreement by both parties. On completion of the agreement the City appointed Mr Jaco Uys, a member of the Helderberg District Biodiversity Branch as the MPA Manager as part of his broader function within the Helderberg District biodiversity and conservation objectives. The City has successfully managed the Helderberg MPA within the framework of the agreement since 29th June 2009 and continues in that management role.

2. Skill Requirements

- An MPA Manager must have at least a degree in Nature Conservation or Oceanography and additional qualifications in MPA management would be advisable. A certificate in MPA Management should be achieved within the first year in order to manage the MPA and staff effectively.
- Additional staff required to patrol/manage the MPA and conduct monitoring programmes are Field Rangers who have passed a recognised Field Ranger course (THETA-approved National Certificate in Natural Resource Guardianship). Field Rangers must also undertake environmental education and capacity building skills as they would run environmental education programmes during quiet periods. MPA Field Rangers must have at least a Grade 12 pass with a Code 08 vehicle licence or a Code 02 motorbike licence.
- Peace Officers Certification, Fisheries Inspectorate and first aid are vital for all staff members.
- It is highly advised that all Staff must be qualified in further specialist courses such as Personnel Management Courses (pending budget allocations and prioritisation through management), but also including:
    - Marine & MPA Legislation
    - Skippers license and boat maintenance
    - Visitor control and compliance
    - Marine Education
    - Investigating Crime Scenes and Docket Handling
    - Court Procedures
    - Commercial Diving Ticket
- Staff must attend various workshops and short courses as required for the station.

- Staff, both permanent and voluntary, must be suitably trained to execute their functions in terms of awareness-raising and education. They would require a complete knowledge of the Helderberg MPA environment and management issues.
- Records should be kept of all courses attended.
- Personnel should be given opportunities to practice new skills attained.
- Personnel should be monitored in terms of improved efficiency following the course.
- A budget line must be made available for capacity building in order to achieve the requirements listed above.

3. Equipment Requirements

- This is discussed in detail under Section C.

SECTION F: AWARENESS

1. Background

The City of Cape Town and DEAT Marine and Coastal Management recognise that their proficiency as managers of South Africa's marine resources depends on their ability to inspire public support and participation through awareness. The focus of this awareness plan is to promote an understanding of the importance of healthy ocean ecosystems, the importance of MPAs and the role that the community can play in their care.

Marine protected area management is emerging as a national priority due to undesirable impacts on marine ecosystems. An important management tool to protect marine resources will be to implement an awareness programme that improves understanding of the Helderberg MPA within its surrounding communities and amongst visitors.

2. Objectives

- Protection of the marine biodiversity of the Helderberg MPA and the surrounding areas through achieving market and public awareness of the Helderberg MPA and the values, services and products it provides.
- Provide information on the benefits/importance of the Helderberg MPA to all user groups and visitors through a range of communication strategies.

3. Awareness Methodologies

- Appropriate signage at key predetermined sites that are highly visible and relevant to the user group in question
- Compilation and distribution of information and compliance pamphlets
- Implementation of school programmes
- Radio broadcasting, newspaper and local magazine articles, presentation at events when requested
- Positive interaction with the surrounding boat clubs
- Participation in and driving of local and national events such as Marine Week activities, beach clean ups, diving events to promote the area, fish watch activities etc
- Interpretation and dissemination of Helderberg MPA research outputs for use by the non-research community
- Compilation of appropriate "Codes of Conduct" for the different user groups as required

4. Programme Activities

All staff will be utilised for formal awareness programmes with local children and adults throughout the year, with the exception of the December-January school holidays. Ongoing environmental awareness must be conducted in conjunction with patrols.

a) School Programmes:

To be carried out on the coast or at schools and include:

- Poster competitions; “touch pools”; beach clean-ups and competitions; poster designing; informative video footage
- Children 10 years and older: snorkelling in tidal pools (include safety module)
- Adopt-a-beach programme can be implemented

b) General Visitors addressing all user groups:

- Interpretive boards for tourists (e.g. whale information boards, pamphlets, booklets, flyers
- Promote marine conservation through local, national and international media (internet, newspapers, magazines, TV)
- Interpret and disseminate Helderberg MPA research for information and use by the non-research community
- Promote alternative non-consumptive activities within the Helderberg MPA with different user groups

c) Specific User Groups “Codes of Conduct”

- Guidelines and Codes of Conduct should be developed in consultation with each specific user group, allowing for use in a manner that does not harm the environment
- Periodic evaluations should be undertaken to monitor the effectiveness of these Codes of Conduct
- Changes should be recommended when necessary.

d) Volunteers

- Develop/enhance the Helderberg MPA volunteer training programme
- Prioritise working with previously disadvantaged communities to encourage and support volunteer opportunities
- Develop formal and informal education-based volunteer programmes
- Introduce community-based volunteer research and monitoring programmes such as Fish in Reserves and Oceanographic Research Institute’s (ORI) catch-cards
- Develop recognition and benefits for volunteers (letter of reference, community recognition through media, clothing)

5. Addressing conflict between user groups within the MPA.

Appropriate signage and information on resources must be developed in partnership with the different user groups, in order to reduce user conflicts and ensure protection of the marine environment (e.g. demarcate areas for certain activities).

SECTION G: SCIENTIFIC RESEARCH AND MONITORING

1. Background And Overview

Monitoring the environment and human activities in and around MPAs should be pursued for two reasons. The first is to provide reliable data for the assessment of the effectiveness of the MPA. Monitoring activities undertaken for this purpose will be designed around the specific objectives of the MPA. Typically, indicators are selected to represent key processes or resources. Successful indicators are easily measured.

The second reason is to provide baseline information against which other potentially impacted areas can be assessed, and which can be used to measure long-term changes in the environment. In South Africa, where there are a number of MPAs spread along the coast, the duplication of such monitoring activities can serve as an excellent network to detect shifts that may be associated with climate change and range changes of critical species.

MPA monitoring should be part of the process of adaptive management. Monitoring in isolation is somewhat pointless. It needs to be included in negative feedback process. The results of monitoring need to be evaluated against pre-determined criteria or thresholds. Thresholds are designed to represent boundaries of acceptable variation. When indicators attain or cross threshold values, a set of actions aimed at addressing impacts, or mitigating unavoidable changes, should be triggered. Importantly, the thresholds and the actions need to be established *a priori*, along with the monitoring programme.

Whereas this structure should pertain also to environmental monitoring, the purpose of such monitoring transcends the MPA. In general the results of environmental monitoring are fed into national structures (e.g. working groups convened by SANBI or MCM), and the selection of appropriate thresholds and actions are beyond the scope of this plan. Environmental monitoring in MPAs should adopt indicators that are used at these higher levels. This management plan lists such indicators.

There are some general principles of monitoring in MPAs that should be considered. Experience in South Africa suggests that monitoring in MPAs is seldom maintained for long enough to be useful, and generally monitoring programmes do not out-live the tenure of the official or researcher who instigated the programme. This is a common failing. One of the purposes of listing monitoring programmes in this plan is to ensure their continuity and consistency with respect to methods. It should also be noted that some monitoring programmes are by their nature unsustainable. This relates mostly to costs. It is clear now, for example, that marine science was heavily funded in the 1980's and 1990's, and that research undertaken in the field was not sustained in the early 2000's. The situation may be rectifying itself, and the danger exists that over-investment in monitoring might mean that some programmes cannot be sustained when funding declines again. The termination of monitoring programmes is wasteful. The purpose of this section should be to develop sustainable and useful monitoring. Other factors that influence sustainability include changing ethics (not all methods used now may be acceptable in future), changing technology (new technology may force changes in methods), shifting priorities (what is deemed an important indicator now, may be deemed irrelevant in future), and changes in legislation (for example, changes in diving regulations make it difficult to repeat work done two decades ago).

Another crucial challenge for monitoring programmes is the capture and storage of data. Many monitoring programmes in the past were effectively wasted because of a failure to ensure that the data was recorded or published in a form that was available for evaluation and comparison by later researchers. The advances in information technology is partly the reason for this failure, as the media of recording has changed several times in the last three decades and is likely to continue to change. Fortunately the South African Environmental Observation Network (SAEON) has been established to address this problem, and it is likely that this agency will be the repository or co-repository for much of the data generated by monitoring in the MPA.

Each monitoring project is described in this section (subsections 4 and 5). Those marked with an asterisk would be needed for an expanded MPA but are probably not warranted by the existing designation which covers a relatively small area. The various MPA monitoring projects are described under six sub-headings, the purposes of which are described here.

Indicator: The variable that has been chosen for monitoring is described and explained. Its usefulness as an indicator needs to be understood by MPA staff, but it also needs to be endorsed by those agencies that intend to use the indicator in revising management strategies. The way in which this indicator is to be used will be described where appropriate.

Method: The method used to measure the indicator is described and referenced. Statistical rigour and continuity with other similar projects, past projects and internationally accepted procedures are key considerations, but cost is often the most important determinant.
Frequency: The frequency of monitoring is usually a trade-off between manpower costs and statistical power. Infrequent measurements of ecological and social indicators generally provide data sets in which signals are swamped by noise. This description also includes considerations related to randomness and stratification of sampling- details which could easily limit the power of the data sets.

Responsibility: The lead agent relates to factors such as whether the monitoring is required for the evaluation of the MPA or for broader objectives, whether the MPA staff are trained or equipped to undertake the work, and whether there may be a conflict of duties. Responsibility also carries implications for funding sources, access to data and ownership of data.

Threshold values: Where appropriate and possible threshold values are listed. In most cases, these values will be determined in advance by consensus.

Possible actions: This section lists the possible actions that could be taken should thresholds be reached. Actions should be refined once agreement has been reached among managers and within co-management structures and representatives of affected parties, as appropriate.

Data storage: Describes who will store the data, where it will be stored, who will have rights of access to it and the form in which it will be stored.

2. Objectives

- To provide information for management decisions and strategies

- To maintain current understanding of the state of the values of the MPA, and to identify threats at an early stage
- To facilitate scientific research and understanding of the physical, biological and socio-economic systems of the Helderberg MPA

3. Scientific Research

- Researchers wishing to conduct scientific research in the Helderberg MPA are issued exemptions under Section 81 of the MLRA which are issued by MCM.
- CapeNature also requires a research agreement (MoU) with the researcher and a Register of Research Projects
- All applications to undertake scientific research are assessed according to a set of criteria
- CapeNature maintains a database on research programs
- Researchers' credibility should be discussed under the guidance of MCM

The following must be considered when research applications are assessed:

- The permit-holder must submit a report after each field visit
- The permit-holder must submit annual reports and final reports to CapeNature and MCM at the completion of their scientific research programs
- The permit-holder must ensure that all equipment deployed in the MPA is marked with the permit holder's name and their permit number
- The permit-holder must ensure that all equipment is removed at the end of the study and prior to the expiry of the Scientific Research Permit
- The permit-holder must inform the General Manager of their arrival date one month in advance
- The permit-holder must not use rotenone, poisons, or chemicals to catch fish in the MPA
- The permit-holder must ensure that where footage/photographs are collected, CCT has free access to these
- The permit-holder must note that any footage/photographs collected may only be used for financial gain with written permission from MCM/CCT

4. Physical environment

a) Sea Temperature

- **Indicator**: Sea temperature. Temperature of coastal waters is one of the variables most likely to respond to climate change, either through direct heat transfer or from changes in frequency and intensity of upwelling. Temperature in turn sets the physiological limits of many species. Limits are usually set not by average temperature but by minima or maxima, which implies that continuous recording (by implication remote, unmanned) is preferred to manual discrete measurement.
- **Method:** A continuous Underwater Temperature Recorder (UTR) will be installed on the outer wall of the harbour. The calibration of the instrument will be checked every six months, at the end of a series and at the start of a new one.

- **Frequency:** Recovery and downloading should be planned for every six months. A second UTR may need to be held in reserve for replacement, which will reduce the effort required for changing instruments.
- **Responsibility**: The MPA manager will need to coordinate instrument retrieval, change and download. If necessary, divers may need to be contracted to assist.
- **Threshold values:** The indicator will be summarised as an average with maxima and minima. Long-term trends in temperature will also be useful. Data will be analysed by oceanographers.
- **Possible actions:** MPA staff will be unlikely to be able to address the causes of temperature changes, but it will certainly be useful when examining changes in biotic communities.
- **Data storage:** SAEON coastal node, Grahamstown and MCM-EUC. Data will be stored in electronic format. Temperature will be indexed hourly. Data will be available upon request to SAEON.

b) Weather*

- **Indicators**: Air temperature, wind speed and direction. Basic weather patterns influence local coastal conditions, such as sea temperature and stratification. Measurements need to be continuous, and consistent with elsewhere.
- **Method**: An automatic, dial-up weather station will be installed (exact location still to be determined).
- **Frequency:** Continuous recording. Monthly data downloading.
- **Responsibility:** MPA manager / MCM.
- **Threshold values:** The indicators will be summarised as an average with maxima and minima. Long-term temperature trends and the duration of upwelling-inducing winds will be useful statistics. Data will be analysed by oceanographers (MCM).
- **Possible actions:** MPA staff will not be able to address the causes of changes in weather. The information will need to be disseminated to researchers, as well as coastal managers at municipal, provincial and national levels.
- **Data storage:** SAEON coastal node and Grahamstown. Data will be stored in electronic format. Temperature will be indexed hourly. Data will be available upon request to SAEON and MCM.

5. Biophysical Environment

a) Inter-tidal communities

- **Indicators**: Species community structure, keystone species abundance and alien species abundance. Changes in inter-tidal communities may reflect climate change, exploitation, a catastrophic pollution event or the effects of an alien invader. Multi-variant analysis can be used to determine the present community structure, which can serve as a standard. Specific target species include giant periwinkle, red-bait and siffie. Indicators of community change include space-occupies such as barnacles, mussels and limpets. Abundances of these should be monitored.
- **Method**: A 0.5 m^2 quadrant should be used to quantify species abundance at alternate 0.5 m spacing along a randomly selected transect on the rocky shore at selected sites (e.g. Stony Point, Die Been), from the low shore to the high shore. Sessile species (mussels, algae) can be evaluated as percentage cover. Mobile species (e.g. limpets) will need to be counted. All organisms larger than 5 mm will need to be included in counts. The percentage of sand on the shore should be included as % cover.

- **Frequency**: Every full-moon, spring-low tide.
- **Responsibility**: MPA manager.
- **Threshold**: Species abundance thresholds can be obtained from prior records, and published findings. Mostly, community data will serve as benchmarks, which could be useful in identifying the effects of catastrophic pollution such as oil-spills.
- **Possible actions:** Identify causes of significant impacts. If harvesting is the cause, investigate further possible restriction, or evaluate effectiveness of compliance.
- **Data storage:** The MPA manager should store this information. Copies may be lodged with SAEON.

b) Surf-zone fish community*

- **Indicator:** Catch per unit effort and size structure of selected species. The catch per unit effort is an indication of fish abundance. The size structure is an indication of mortality rate. Targeted species that should be monitored include, galjoen, silver kob, white steenbras, belman, blacktail, spotted gulley shark and spotted sevengill shark.
- **Method**: Fishery-independent survey. Anglers will be used to catch and release fish from the shore, using standardised methods. Volunteer anglers can be sourced through the Western Province Shore Angling Association. All fish will be measured and recorded. Fishing will take place under the leadership of an MPA official and under permit from MCM. Fishing will take place inside and outside the restricted areas.
- **Frequency:** Surveys should be done on one day of each month.
- **Responsibility**: MPA manager. The job could also involve university or technikon students.
- **Threshold values:** The restricted area will enjoy the maximum possible protection from harvesting, and the results of a survey here will serve as a benchmark for other areas. Threshold values will need to be determined at a national level (Linefish Working Group), as problems with resident species in restricted areas can only point to general recruitment failures. Data analyses should be facilitated through the Linefish Working Group.
- **Possible actions:** Further restrictions on fishing effort (by way of bag limitation, seasonal closure, area closure, permit reduction).
- **Data storage:** National Marine Linefish System and SAEON.

c) Subtidal reef fish

- **Indicator:** Linefish density per species. The density of linefish species (threatened, keystone and top predator) will provide an indication of the health of the temperate reefs in the offshore restricted area. Key species will include roman, silver kob, dageraad, and hottentot. Migratory and nomadic species such as geelbek, yellowtail and snoek will be less useful indicators.
- **Methods**: Baited traps will be deployed from a small boat. This method has undergone preliminary tests by MCM, but requires further testing. It promises to give a reliable and repeatable indication of fish density, eliminating problems associated with fishing skill (controlled angling), poor visibility and diver influence (underwater visual census).
- **Frequency:** Unknown**.** The programme should begin with a minimum of ten deployments per season.
- **Responsibility**: MPA manager and SAEON

- **Threshold values**: Unknown, due to the exploratory nature of the method. Threshold values will probably be cast in terms of relative trends.
- **Possible actions:** Further restrictions on fishing effort (by way of bag limitation, seasonal closure, permit reduction). The restricted area already enjoys the maximum degree of protection.
- **Data storage**: SAEON

d) Abalone

- **Indicator**: Abalone density and size structure.
- **Methods**: Divers swim along fixed transects and count and measure all abalone. This is known at MCM as the Fishery Independent Abalone Survey (FIAS).
- **Frequency**: Annual survey done along several fixed transects.
- **Responsibility**: MCM and the Abalone Working Group.
- **Threshold values**: Data is analysed by size-structured production models. Trends are used to set regulations. Currently the entire fishery is closed. The data will mostly be used in the first period to detect a possible recovery, the strength of recruitment pulses, and the possibility of further poaching.
- **Possible actions**: The maximum restriction is already implemented. Further action will involve better enforcement. A recovery might indicate possible opening of the resource outside of MPAs.

e) West Coast Rock Lobster

- **Indicator:** West Coast Rock Lobster density and size structure.
- **Methods:** Trap surveys are used as a standardised capture method. The number of lobster per trap is used to compute a relative catch per unit effort index. Each lobster is measured and returned. Surveys will conform to MCM standards.
- **Frequency:** Annual surveys done on pre-selected reefs.
- **Responsibility:** MCM or Reserve Manager.
- **Threshold values:** Long term trends in size structure and density will be compared to previous years and adjacent areas. The stock is managed nationally in a series of zones. The values obtained at the Betty's Bay MPA will influence the management east of Cape Hangklip. The threshold values are interpreted in terms of an age-structure model used by MCM.
- **Possible actions:** The maximum restriction is already implemented. Deliberate culling of rock lobster, if deemed to be an impediment for abalone recruitment, is not advised.

f) Seabirds

- **Indicators:** Number of breeding pairs
- **Method:** Counting.
- **Frequency:** Bi-annual.
- **Responsibility:** MCM.
- **Threshold value:** Three years of successive decline.
- **Possible action:** Conduct research into causes. Additional predator control if necessary.

- **Data storage:** MCM (Dr R. Crawford)

h) Cetaceans

- **Indicators**: Number of individual sightings, and mother-calf pairs (Southern Right whale).
- **Methods**: Aerial counts.
- **Frequency**: Unknown.
- **Responsibility:** South African Museum, University of Pretoria.
- **Threshold values:** Rates of change will be used for management action, which will most likely involve regulation of boating activity and boat-based whale-watching.
- **Possible action:** Regulation of boating activity and boat-based whale-watching.
- **Data storage:** South African Museum, University of Pretoria.

6. The process of review

The process of review needs to be made clear, with threshold values established in advance if possible. In this draft document thresholds are not always available, as they need to be discussed and accepted by managers and other parties. Generally, people's acceptance of thresholds is determined more by the intended actions than by the ecological considerations.

It is advised that MPA managers establish working groups, or use existing working groups, to review the results of monitoring projects. The composition of such groups and frequency of meetings need to be established for each monitoring project.

The following Guidebooks offer managers a process and methodology to evaluate the effectiveness of their MPA for the purposes of adaptive management:

a) Pomeroy, Robert S., Parks, John E. and Watson, Lani M. (2004) How is your MPA doing? A Guidebook of Natural and Social Indicators for Evaluating MPA Management Effectiveness, IUCN, Gland, Switzerland & Cambridge, U.K.

b) Wells, Sue and Mangubhai, Sangeeta. (2004) Assessing Management Effectiveness of Marine Protected Areas: A Workbook for the Western Indian Ocean. IUCN Eastern African Regional Programme, Nairobi, Kenya

SECTION H: FUNDING, RESPONBILITIES, AUDITING AND CONCLUSION

1. Funding and Responsibility

The CCT is the delegated authority to ensure the effective management of the Helderberg MPA. CCT has entered into an agreement with MCM to implement the management activities described herein.

The Management Agency, through the MPA Manager, must ensure that the activities prescribed in the Sections dealing with management of the MPA (sections B-G) are carried out and that competent individuals and/or organisations are contracted to undertake the tasks where appropriate or that the staff component is adequately increased and capacitated. The annual Management Plan and Environmental Audit (described in the next section) will determine if the management activities are being carried out adequately, and if adjustments to the Management Plan need to be made.

The delegated authority, contracted management agency, and where possible or appropriate other relevant parties, should allocate funding for activities as necessary.

A budget to fund the implementation of the Helderberg MPA Management Plan must be compiled and approved before the start of each financial year, in collaboration with the delegated authority and the contracted management agency, which in this case is the MPA Manager and his/her staff.

The contractual agreement between MCM and the Management Authority, CCT, requires that the MPA Manager compile and submit a quarterly report to MCM. The contractual agreement with clear deliverables and the annual work plan must be read in conjunction with this management plan.

In addition, the MPA Manager and CCT are encouraged to raise additional funding, but should keep MCM informed in order to avoid allegations of “double dipping” where the same item is requested/funded from different sources.

2. AUDITING OF MANAGEMENT ACTIVITIES AND EFFECTIVENESS

a) Objectives:

Auditing of the Management Plan should not be confused with monitoring of the MPA in accordance with Section G. The purpose of implementing an audit is to ascertain the relevance and effectiveness of the activities recommended within the framework of this Management Plan, in order to ensure that the environment is being maintained in a satisfactory condition. This is done by:

- ensuring that the accepted Management Plan is adhered to
- ensuring that utilization of resources is within acceptable and determined limits and that conflict resolutions are facilitated
- determining if the condition of the environment is deteriorating or improving under current management regimes by measuring certain parameters and monitoring the changes over time

b) Implementation:

- A programme for annual environmental auditing must be designed and agreed upon with MCM, led by CCT.
- There are a number of current MPA audit tools designed to determine the health and effectiveness of MPAs and develop management strategies accordingly. However, the effectiveness and/or relevance of this document to meeting the principles and objectives of the Helderberg MPA need to be audited and amended as required.
- It is recommended that audit sheets be drawn up to accurately evaluate the effectiveness of this document.
- It is recommended that an independent organisation/agency/individual carry out the audit. The CAPE utilizes simple systems such as the METT system which is supported.
- The audit must be undertaken in intervals as agreed upon between the delegated authority and the contracted management agency, but the recommended interval is every year for the first 3 years and every 5 years thereafter.
- Amendments to improve the document should be made and incorporated where necessary.
- Some guideline/example parameters to consider in the audit include:

    - **Marine and terrestrial vegetation**
        i) Changes in species diversity, composition and abundance
        ii) Degree and rates of change in invasion of alien plant species
        iii) Unnecessary destruction of vegetation
        iv) Rate of success of rehabilitation of areas previously disturbed

    - **Marine resources**
        i) Size and abundance of key species
        ii) Fecundity of large predatory fish as an indicator of a healthy functioning ecosystem

    - **Lourens and Eerste river water quality**
        i) Changes in flow rate
        ii) Changes in chemical composition
        iii) Pollution and pollutants

    - **General**
        i) Condition of vehicles, equipment and signage
        ii) User group awareness of the Helderberg MPA and conduct relative to signage
        iii) Number of fines issued and whether or not these are lessening over time
        iv) Number and rate of successful convictions
        v) Rate and reduction of conflicts between users

3. CONCLUSION: AMENDMENTS AND UPDATING OF THE HELDERBERG MPA MANAGEMENT PLAN

The Helderberg MPA Management Plan must be seen as a dynamic working document and should be revised every 5 years. It is, however, important that changes to the Management Plan and the reasons therefore be documented in order to reflect the history and development of the plan.

Chapter 22: Coastal Conservancies

1. Introduction

The City's coastline is a highly varied and diverse space within which distinct localised unique characteristics occur. These unique localised coastal characteristics include coastal habitat and ecosystems, coastal dynamics, landscapes and vistas, social heritage, and historical and archaeological sites. These important coastal spaces may vary from large areas to distinct small sites along the City's coastline. Urban development over the last ten decades has altered and transformed a large proportion of the City's coastline placing an increased relevance and importance on the remaining unique coastal spaces.

Broad conservation planning in the City to determine and define habitat and spaces requiring formal protection as nature reserves or protected areas used a methodology primarily focussed on species targets. Although highly relevant as a methodology for the diverse and unique Cape Floristic Kingdom, this methodology did and does not identify coastal habitat that is unique and of importance for a host of reasons unrelated to botanical species richness.

The unique coastal spaces as described in this chapter conform less to the ideals of nature reserves and more to the ideals of spaces that function well within the urban environment as multi-use spaces, accessible to a wide range of people and activities, minimal regulation but which need an added layer of landuse protection and recognition to ensure that they remain unchanged in the long term as assets to the broad public and reflective of the City's unique and diverse coastline.

To achieve this, the City has identified and defined a number of coastal spaces as Coastal Conservancies. Coastal Conservancy will be a formal and recognised category of coastal land protected by regulations in the Coastal Overlay Zone as part of the City's Zoning Scheme. Chapter 6 of this CMP details the Overlay Zone as well as the future development of specific and detailed overlay categories.

This Chapter defines the principles of Coastal Conservancies, identifies coastal land parcels that will be determined and allocated as formal Coastal Conservancies and provides a broad overview for each on the specific guiding principles in terms of management.

2. Coastal Conservancy: Definition and Principles

The City of Cape Town defines Coastal Conservancy as:

"A coastal space, under the administration of the City, that is characteristically unique, representative of the diversity of the City's coastline, represents unique coastal habitat, dynamics and processes, and or heritage and social value that is irreplaceable and of long term value to society as a whole and for future generations"

The following principles are applicable to all areas defined as Coastal Conservancy:

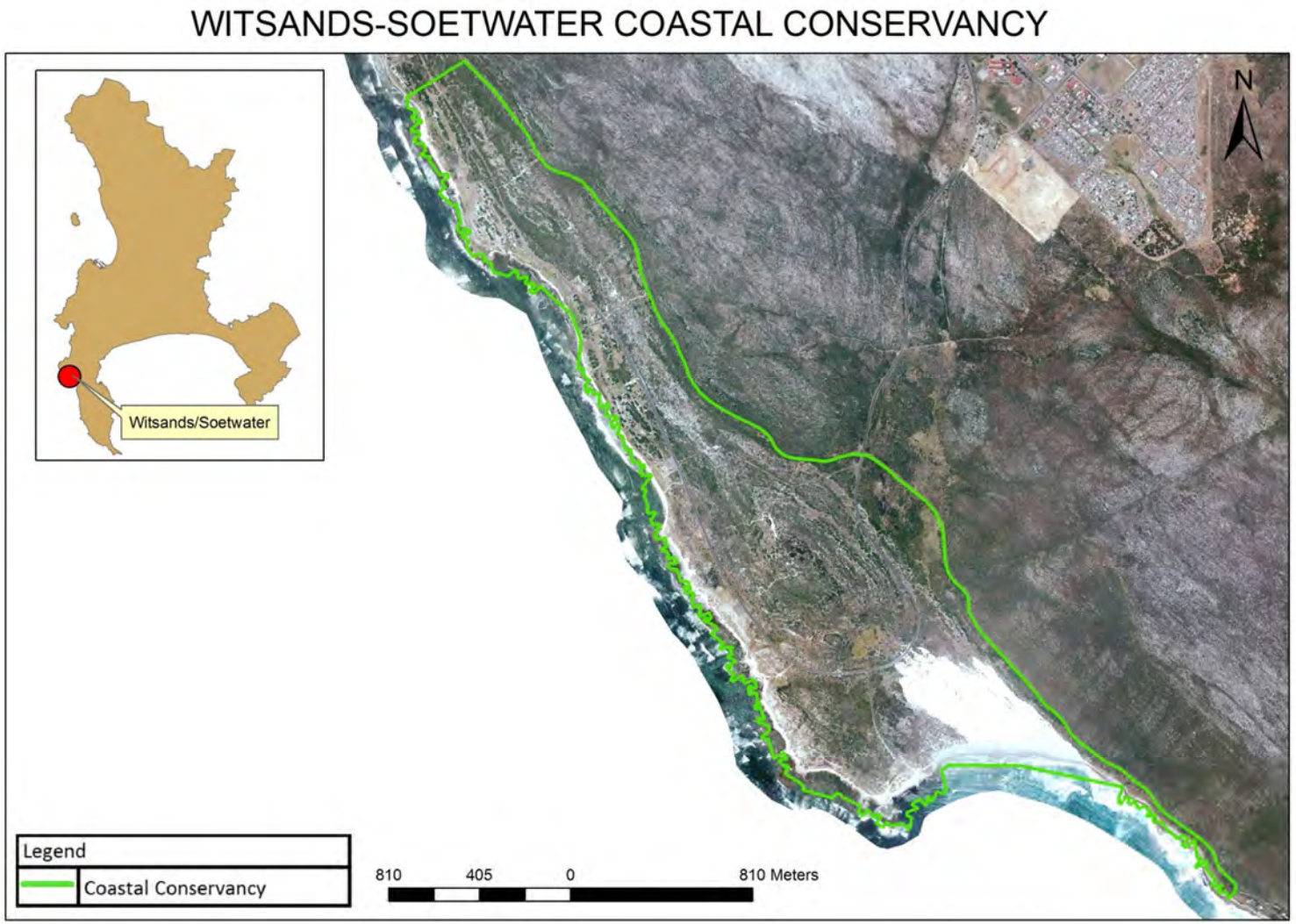
- Retained as natural coastal space while accommodating a wide range of appropriate activities and amenities to ensure public access and use
- Unfenced and unrestricted public access unless formal Coastal Resorts form part of the Coastal Conservancy
- Minimal natural system management intervention other than prescribed maintenance to ensure natural processes are minimally affected
- Archaeological and heritage sites to be mapped, protected and managed
- Social heritage to be documented and reflected within the conservancy

- Landscapes and vistas to be protected as core asset of the conservancy
- Amenity and resort development footprints to be planned and conceived within a broader context of natural coastline and limited to already altered and transformed spaces within the conservancy
- Appropriate infrastructure to be developed to support core activities relevant to each Coastal Conservancy
- Appropriate infrastructure to be developed to facilitate optimum public access

3. Coastal Conservancies

3.1. Witsands-Soetwater Coastal Conservancy

a) Boundary demarcation



b) Justification

The Witsands-Soetwater area has been determined as a Coastal Conservancy for the following reasons:

- Last remaining substantial “coastal shelf” that has been minimally altered by development
- Represents a highly seasonal broad coastal wetland and drainage area
- High levels of indigenous coastal fauna and flora
- Significant habitat for African red Billed Oyster Catcher
- Heritage history of vacation camping from previously disadvantaged communities under Apartheid legislation
- Archaeologically sensitive due to a number of coastal archaeological sites
- Unique back of beach seasonal ponding on Witsands Beach
- High value scenic drive vista’s and landscapes
- Long history of a centre for over-night environmental education targeting disadvantaged learners
- Historic beach landfill site requiring ongoing specific management and vulnerable to disturbance
- Highly mobile wind driven dune systems on Witsands beach
- Coastal Resort and overnight facilities available to the full spectrum of income groups
- Marine access point, particularly important to subsistence fishers
- Natural corridor between TMNP and marine environment as well as the TMNP MPA

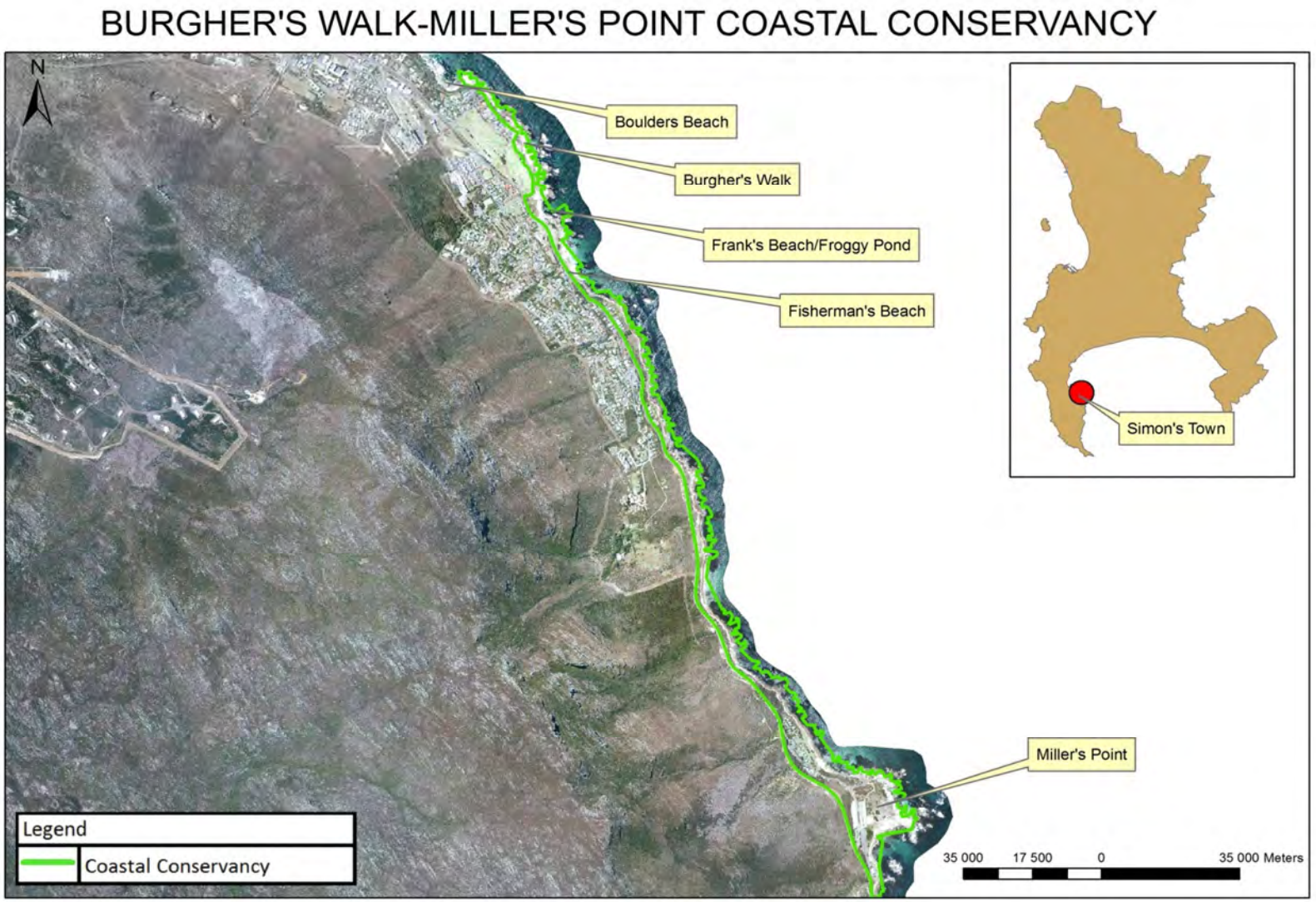
c) Permitted Activities and Uses

The Witsands-Soetwater Coastal Conservancy supports the following uses and activities:

- General Coastal Resort Activities including:
    - Day visitors and associated activities
    - Overnight visitors
    - Peak season holiday accommodation and camping
    - Conference facilities
- Environmental Education Centre – day and overnight
- Regulated and permitted kelp harvesting
- All general non-motorised coastal recreation activities
- Boat launching at designated launch site
- Coastal walking trail

3.2. Simon’s Town: Burghers Walk to Millers Point Coastal Conservancy

a) Boundary Demarcation



b) Justification

Burgers Walk to Millers Point has been determined as a Coastal Conservancy for the following reasons:

- High importance as habitat for the threated African Penguin
- High value coastal walking trail
- Unique granite coastline
- High levels of indigenous coastal fauna and flora
- High value scenic drive vista's and landscapes
- Coastal Resort and overnight facilities available to the full spectrum of income groups at Millers Point
- Marine access point, particularly important to subsistence fishers
- Archaeologically sensitive due to a number of coastal archaeological sites

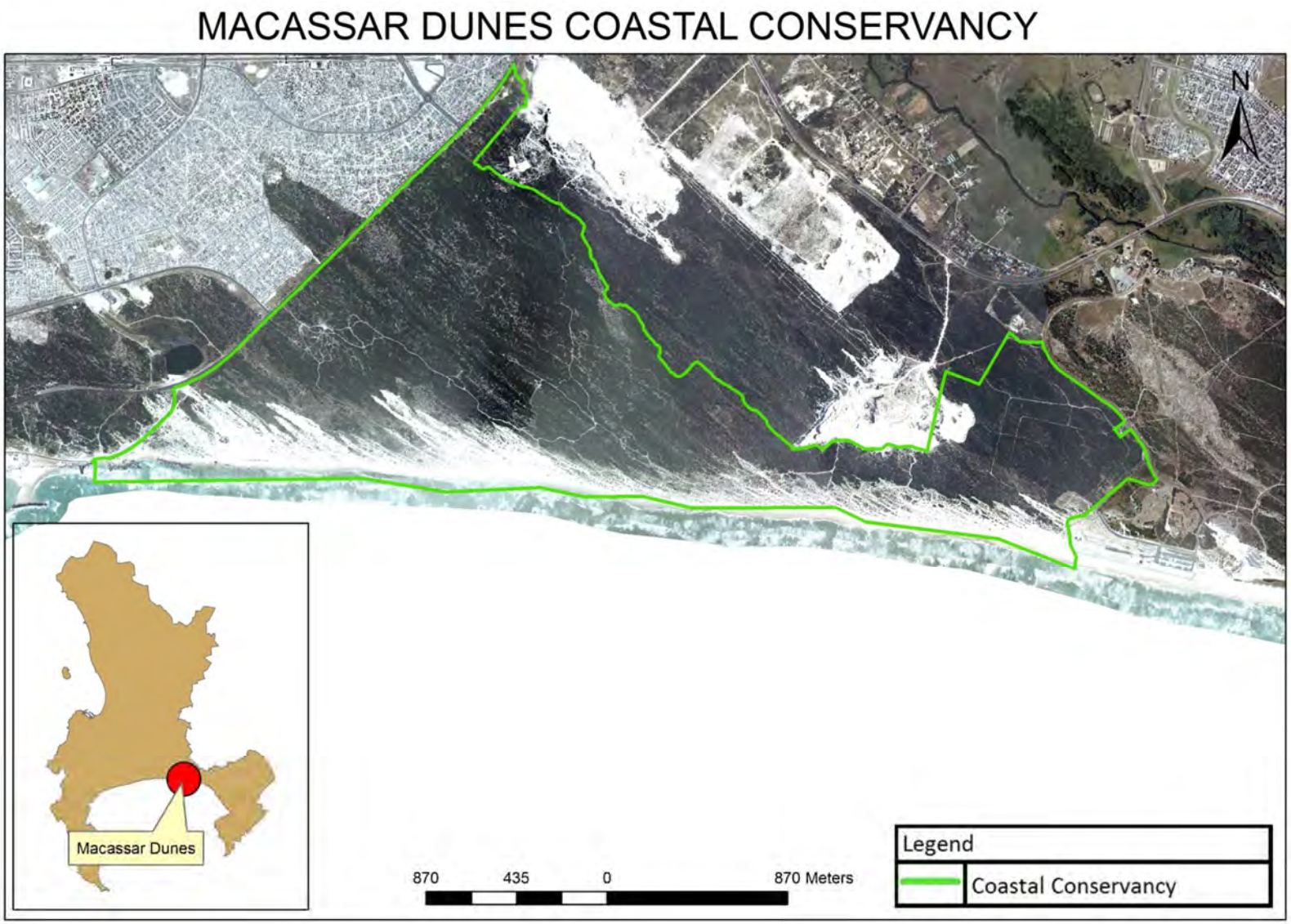
c) Permitted Activities and Uses

The Millers Point Coastal Conservancy supports the following uses and activities:

- All general non-motorised coastal recreation activities
- Controlled dog walking as sign posted
- General Coastal Resort Activities including:
  - Day visitors and associated activities
  - Overnight visitors
  - Peak season holiday accommodation and camping
  - Conference facilities
- Boat launching at designated launch site

3.3 Macassar Dunes

a) Boundary Demarcation



b) Justification

The Macassar Dunes have been determined as a Coastal Conservancy for the following reasons:

- High levels of indigenous coastal fauna and flora
- Highly mobile wind-blown sand dune systems
- One of the few remaining “sand sinks” in Cape Town
- Highly sensitive coastal dynamics prone to destabilisation by any form of development
- Has a moderate palaeontological sensitivity

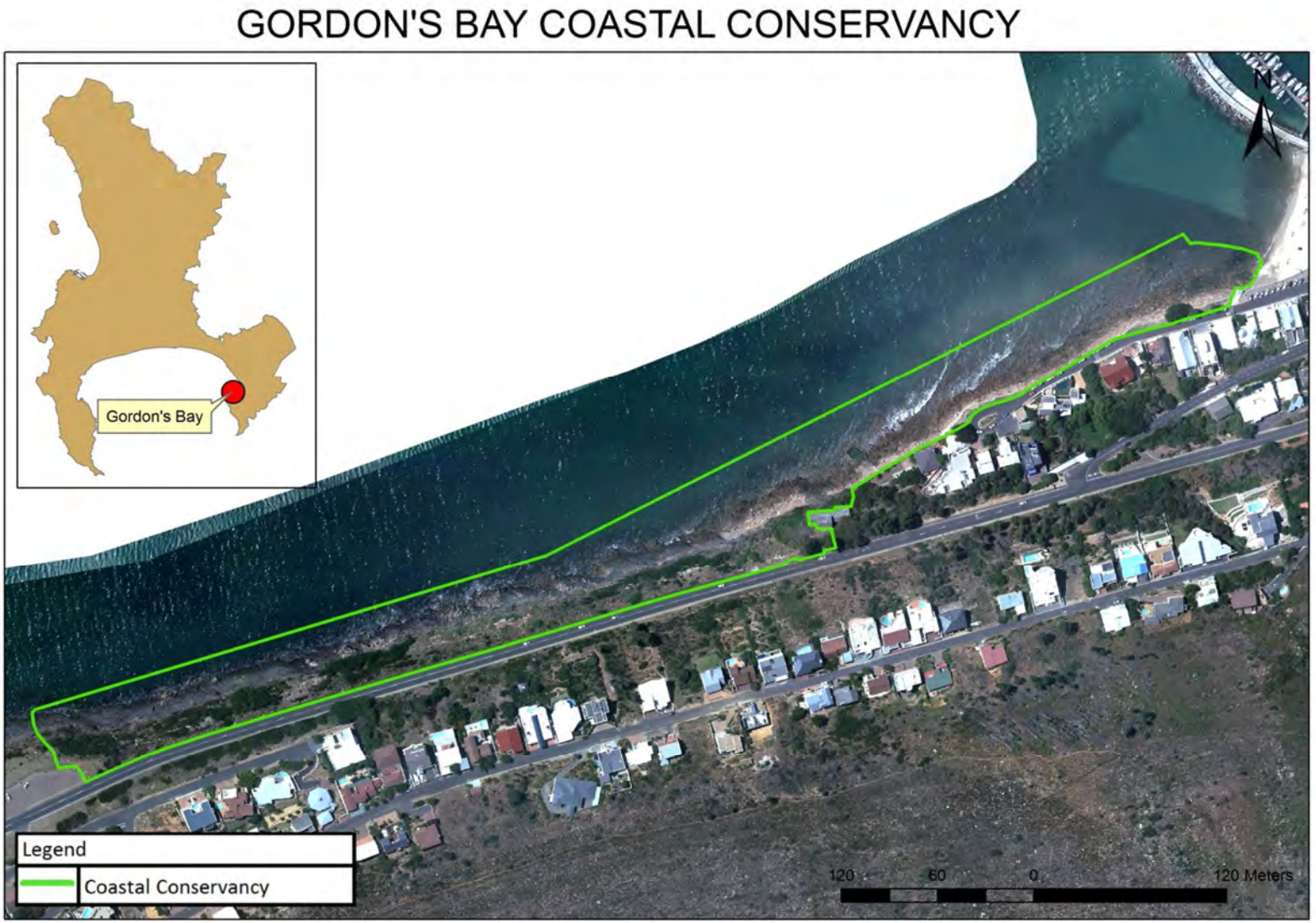
c) Permitted Activities and Uses

The Macassar Dunes Coastal Conservancy supports the following uses and activities:

- All general non-motorised coastal recreation activities

3.4 Gordons Bay Milkwood Forest Walk

a) Boundary Demarcation



b) Justification

Gordons Bay Milkwood Forest Walk has been determined as a Coastal Conservancy for the following reasons:

- Unique coastal walkway through coastal milkwood forest
- High scenic value
- Long term heritage value
- Last remaining remnant of coastal dune as well as significant coastal archaeological site

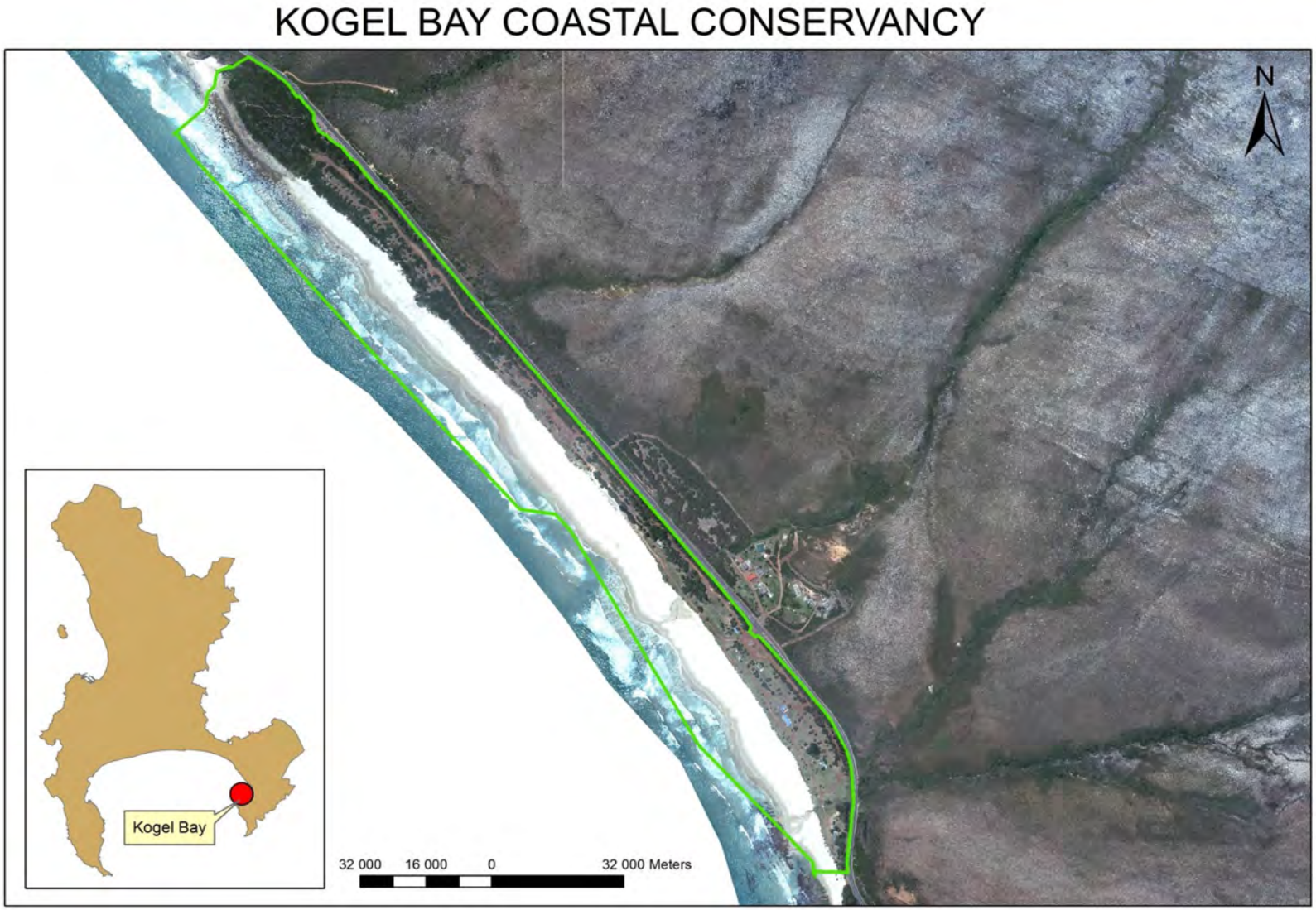
c) Permitted Activities and Uses

The Gordons Bay Milkwood Forest Walk Coastal Conservancy supports the following uses and activities:

- All general non-motorised coastal recreation activities

3.5 Kogel Bay Coastal Conservancy

a) Boundary Demarcation



b) Justification

Kogel Bay has been determined as a Coastal Conservancy for the following reasons:

- High levels of indigenous coastal fauna and flora
- Coastal link in the Kogelberg Biosphere Reserve
- High value scenic drive vista's and landscapes
- Coastal Resort and overnight facilities available to the full spectrum of income groups

c) Permitted Activities and Uses

The Kogel Bay Coastal Conservancy supports the following uses and activities:

- General Coastal Resort Activities including:
    - Day visitors and associated activities
    - Overnight visitors
    - Peak season holiday accommodation and camping
    - Conference facilities
- All general non-motorised coastal recreation activities

CHAPTER 23: ESTUARY MANAGEMENT PLANS

1: Introduction

According to the National Water Act (No. 36 of 1998), an estuary is defined as:

"*a partially or fully enclosed water body that is open to the sea permanently or periodically, and within which the seawater can be diluted, to an extent that is measurable, with freshwater drained from land.*"

In general, estuaries are considered to be highly productive systems which provide a range of ecosystem goods and services. Their high productivity and scenic beauty, however, means that they are vulnerable to development pressure. Those estuaries which occur around intensively developed areas in the Cape Floristic Region are seen to be in very poor condition. This is a result of reductions in freshwater quantity and water quality, changing mouth dynamics, habitat alteration, sedimentation, pollution and recreational disturbance. These issues have been compounded by the historical lack of effective estuarine management, largely due to the fact that estuary management did not fit within the mandate of any specific government department. However this has now been addressed through the inclusion of relevant provisions in the Integrated Coastal Management Act (No. 24 of 2008).

2: Legislation

The National Environmental Management: Integrated Coastal Management Act (No. 24 of 2008) stipulates that all estuaries in South Africa must be managed in a coordinated and efficient manner, in accordance with a National Estuarine Management Protocol.

Section 33(2) of the ICM Act empowers the Minister responsible for Environmental Affairs with the concurrence of the Minister responsible for Water Affairs to publish a Protocol that will provide guidance for the management of estuaries through the development and implementation of individual estuarine management plans.

3: Requirements of Estuary Management Plans

The National Estuarine Management Protocol requires that all EMPS contain the following information:

- An executive summary that highlights the key information that will influence management decisions within the estuary.
- A geographical description and map of the estuary, clearly identifying the boundaries of the system.
- The local vision and objectives of the estuary.
- A list of management objectives for a variety of stipulated activities.
- Details of the intended spatial zonation of the estuary which specifies the activities that may or may not take place in certain sections of the estuary.

- A detailed and integrated monitoring plan with a list of performance indicators.
- Details of the institutional capacity and arrangements required for managing different elements of the EMP.

4. Responsible authorities

4.1 Development of EMPs

The National Estuarine Management Protocol stipulates that, where an estuary falls within the boundary of a single local municipality, it is the responsibility of the municipality to develop an EMP in consultation with the relevant government departments providing that the estuary does not fall within a protected area.

4.2 Stakeholders

Estuaries require integrated and cross-sectoral management as they include stakeholders that are involved in various different disciplines such as land use planning, management of freshwater and marine resources. Various stakeholders are involved with the planning, management and implementation of EMPs in conjunction with the City, specifically:

- Department of Environmental Affairs (DEA)
- Department of Agriculture, Forestry and Fisheries (DAFF)
- Western Cape Department of Environmental Affairs and Development Planning (DEADP)
- CapeNature
- C.A.P.E (Cape Action for People and the Environment)

5. City of Cape Town's EMPs

The City of Cape Town has drafted EMPs for eight estuaries. These include:

- Diep River Estuary
- Zandvlei Estuary
- Eerste River Estuary
- Hout Bay Estuary
- Lourens River Estuary
- Silvermine River Estuary
- Sir Lowry's Pass Estuary
- Zeekoevlei Estuary

EMPs have not been developed by the City for those estuaries that fall within the boundaries of Table Mountain National Park. These estuaries are managed by Table Mountain National Park in accordance with park management plans.

C.A.P.E. Estuaries Programme

Estuary Management Plan
for the
Diep Estuary



JANUARY 2011

Prepared by
Coastal & Environmental Consulting

Acknowledgements

The original edition of this plan was completed under the auspices of Peak Practice. The proposals made therein were based on a series of discussions and workshops involving numerous individuals and organizations from relevant government agencies, to research institutions, non-governmental organizations and representatives of the local resident's associations. The proposals in this second edition of the plan have similarly involved many stakeholders through bilateral discussions and participation in the meetings of the EMP Forum (Rietvlei Management Working Group).

The active and enthusiastic participation in the process augurs well for the successful implementation of this plan and the rehabilitation of the estuary and we would like to express our appreciation to everyone who has contributed.

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The Coastal & Environmental Consulting Team

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1. INTRODUCTION

The management of estuaries in South Africa

The term estuary refers to the body of water which forms the interface between a river and the sea into which it flows. Estuaries may be permanently or periodically open to the sea. When open, they are characterized by fluctuations in water levels related to the tides, and by salinities which are measurably higher than freshwater as a result of seawater intrusion.

Estuaries are generally highly productive ecosystems, and provide a range of goods and services ranging from nursery areas for juvenile fish, to stopovers for migrant birds, and recreational opportunities for local inhabitants. Their productivity, combined with their natural beauty and the shelter they provide also means that they are highly sensitive and vulnerable to development, with many towns and cities, ports and harbours being deliberately located in and around them. As a result, many estuaries have been seriously degraded.

South Africa has approximately 260 estuaries, of which 62 are located within the Cape Floristic Region. Despite the fact that their value – particularly from a biodiversity perspective – has long been recognized, there has been a lack of effective management, largely due to the fact that they did not fit clearly within the mandate of any one government Department. This was highlighted during the recent development of a National Biodiversity Strategy and Action Plan, and has been addressed through the inclusion of relevant provisions in the National Environmental Management: Integrated Coastal Management Act, 2008. Amongst other things, the Integrated Coastal Management Act introduces a requirement for Estuary Management Plans.

In parallel with the development of the legislation, the C.A.P.E. Estuaries Programme has provided funding for the development of Estuary Management Plans for a number of priority estuaries in the Cape Floristic Region, including the Diep.

The management of the Diep Estuary

The Diep River has its origins in the Riebeek Kasteel Mountains north-east of Malmesbury, and flows for about 65 kilometres south-west towards Cape Town, before entering the sea at Milnerton, some 5 kms north of the Port of Cape Town. It has one major tributary – the Mosselbank – which drains the northern slopes of the Durbanville Hills. Other tributaries include the Swart, Groen, Klein, and Riebeeck, with the Klapmuts being a tributary of the Mosselbank. The total size of the catchment is 1,495 km2 or 154,347 ha.

Before entering the sea, the Diep River flows through the Rietvlei wetland and the Milnerton Lagoon, which together cover an area of approximately 900 hectares. These two features together have generally been considered to comprise the “estuary”. More specifically, for purposes of the Estuary Management Plan, the estuary is defined as the area from the estuary mouth, to the Blaauwberg Bridge at

the upper end of Rietvlei, with the lateral boundaries being the 5 metre mean sea level contour. These boundaries, as well as the 1:100 year floodline are shown in Figure 1. below.

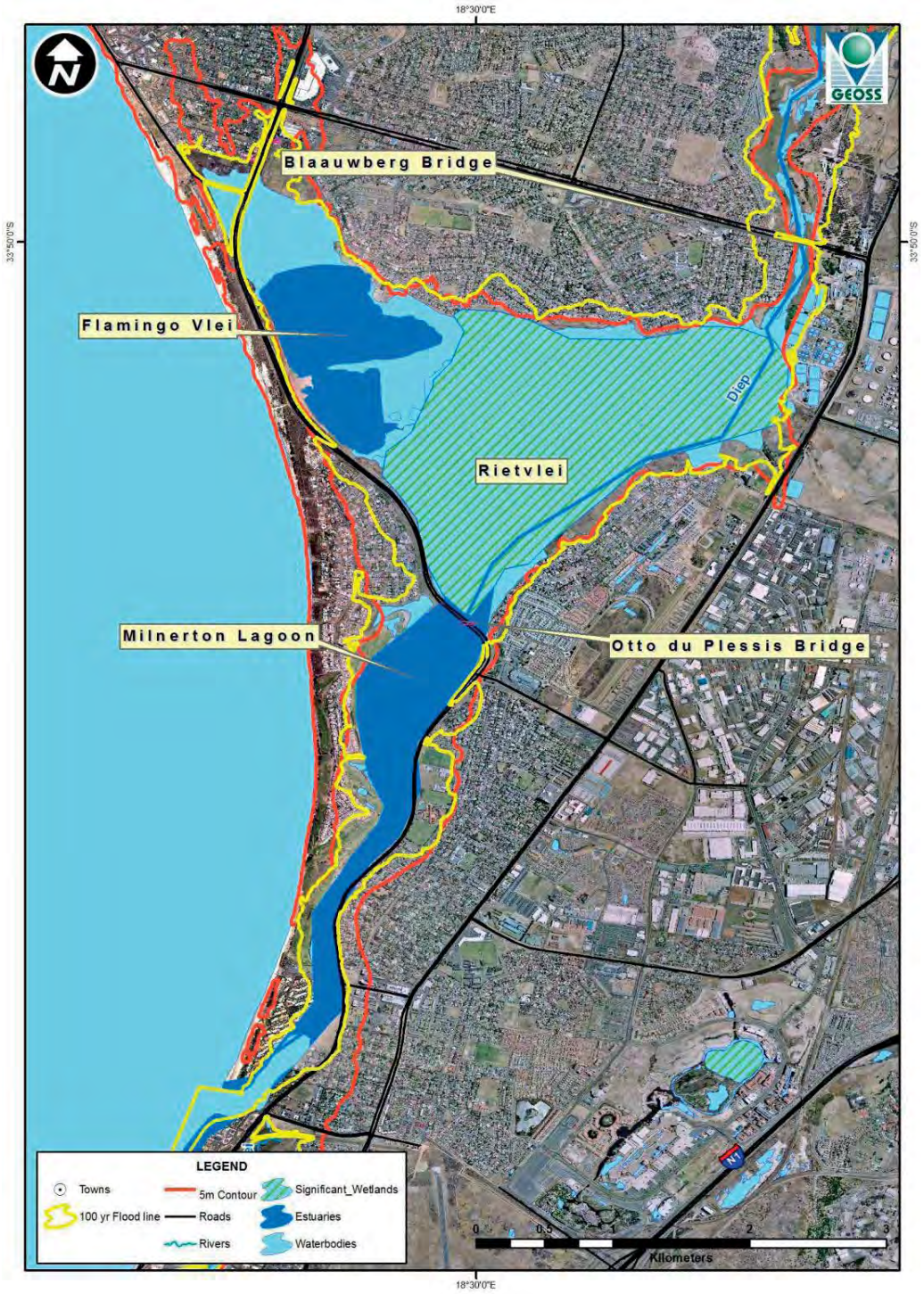


Figure 1: The Diep Estuary comprising Rietvlei and the Milnerton Lagoon.

The catchment of the Diep River has a relatively flat topography, making it suitable for both agriculture and urban development. This, together with its proximity to Cape Town has meant that it has become highly developed, with agricultural activities going back to van Riebeeck's time, and the establishment of an outpost by the Dutch East India Company. Urbanisation around the estuary began in earnest following the founding of Milnerton Estates Limited in 1897, and has continued to gain momentum, with the area to the north of Rietvlei today being the fastest growing in Cape Town. The Diep River, and particularly its lower reaches, has therefore been significantly modified over the past few centuries.

Rietvlei is considered as the most important area for waterbirds in the region and is recognized as an Important Bird Area by Birdlife International. Official recognition of its importance to biodiversity by the South African government was first afforded in 1984, when a Nature Reserve was established. This was followed by its declaration as a Protected Natural Environment in 1989, and the establishment of the Rietvlei Wetland Reserve in 1993. The first formal Management Plan for the reserve was developed in 1994, and this served to guide management activities until the publication of the first edition of this plan in 2008.

Despite these initiatives, development has continued to encroach into the margins of the estuary, the hydrodynamics of the system has been altered, water quality has seriously deteriorated, and the area has been invaded by a number of alien and indigenous species. A fish kill in December, 2006 highlighted these problems, and led to the inclusion of the Diep Estuary in the C.A.P.E. Estuaries Programme.

1.3 The Diep Estuary Management Plan and Action Plan

As per the requirements of the C.A.P.E. Estuaries Programme, the original edition of this management plan was developed in two phases: i) a Situation Assessment; and ii) the Estuary Management Plan (EMP) and Action Plan. The latter was developed through a consultative process including public meetings, the development of a Vision and Strategic Objectives, and the establishment of Technical Working Groups comprising experts and public representatives.

This updated version of the EMP and Action Plan was produced in consultation with the EMP Forum and should be read in conjunction with the Situation Assessment. It takes into account the progress that has been made in implementation of the Action Plan over the past two years, and now covers the period 2011 – 2015.

2. VISION AND STRATEGIC OBJECTIVES

The Vision for the C.A.P.E. Estuaries Programme as a whole is: "***Our estuaries are beautiful, rich in plants and animals, they attract visitors, sustain our livelihoods and uplift our spirits."***

In this context, the following more specific Vision and Strategic Objectives for the Diep Estuary were adopted at a public meeting in September, 2008.

Vision: The Diep River, Rietvlei and Milnerton Lagoon are natural assets, beautiful and rich in biodiversity, and a part of our heritage. They should be restored, enhanced and protected for sustainable use and appreciation by current and future generations.

Management Objectives

Overall Objective**: "***To manage the Diep River, Rietvlei, the Milnerton Lagoon and their environs in a manner that is sustainable, and compatible with the conservation of an ecosystem of international significance for biological diversity".*

Key management objectives:

- *To develop a mechanism to manage the hydrodynamics of the system in a manner which simulates as far as possible the natural condition and which:*
  - alleviates the dust problem
  - protects property against flooding
  - reduces siltation
  - optimises flows from and through the various components of the system
  - establishes optimum conditions at the estuary mouth.

- *To prevent, reduce or minimise pollution from all sources so as to be able to restore the water quality to a standard suitable for supporting natural resources and human recreation.*

- *To ensure that any relevant future planning and development decisions acknowledge the socio-economic value and conservation significance of the estuary.*

- *To promote and manage recreation, education and eco-tourism in the estuary in a manner compatible with its conservation status.*

- *To create conditions suitable for the restoration and ongoing protection of the Diep Estuary ecosystem and its biodiversity, including:*
  - creating an appropriate buffer between the estuary and the surrounding urban areas;
  - controlling and removing key invasive alien species;
  - improving water quality;
  - promoting sustainable use of natural resources.

3. OPERATIONAL OBJECTIVES

3.1 Long-term objectives:

3.1.1 Rietvlei should function optimally as a wetland with the pans undergoing seasonal cycles, and the lagoon should have appropriate tidal flows and salinity levels.

3.1.2 Water quantity and quality should meet Resource Quality Objectives to be developed through a reserve determination, with water quality standards being based on the guidelines for recreation and freshwater and marine ecosystems as appropriate.

3.1.3 Biological communities should be restored to as close to natural species composition and structure as possible.

3.1.4 There should be an appropriate balance between conservation and sustainable use of the system.

3.1.5 The system should comply with South Africa's obligations under relevant international agreements such as the Ramsar Convention, the Convention on Migratory Species (Bonn Convention) and the associated Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA).

3.2 Objectives for Action Plan: 2011 - 2015

This management plan includes an Action Plan for the period 2011 – 2015 (see section 7). Since a number of the long-term objectives will not necessarily be achievable within this period, more detailed specific objectives which are intended to be met by 2015, if not before, are set out below.

3.2.1 Land-use and Infrastructure Development

For purposes of this plan, the Diep Estuary is defined as including the river from the mouth to the Blaauwberg Bridge, with the lateral boundaries being the 5 meter countour above sea level. While the majority of this falls within the Rietvlei Nature Reserve, there are, unfortunately some areas within the 5m contour which have already been developed. On the other hand, there are still some undeveloped portions of land – many of which are currently considered as Public Open Space – lying between the Reserve boundaries and the 5 m contour. These, as well as the Dolphin Beach ponds and a stretch of coastline between Dolphin Beach and Sunset Beach, should be formally included into the Reserve to ensure the best possible protection for the estuary in future. See Fig. 2 below.

Furthermore, subject to discussions with the City's Roads Planning Department, it is proposed to incorporate all City-owned land between Blaauberg Bridge and the railway bridge into the reserve, with a view to establishing a corridor between the Blaauberg Conservation Area and Rietvlei/Milnerton Lagoon.

In addition:

- The wetland should be delineated using the guidelines developed for South African wetlands;
- There should be no further developments within the boundaries of the reserve or the estuary [apart from approved conservation-related structures].
- Facilities within the reserve must be designed to promote conservation objectives, including effective management of the reserve, education, awareness-raising and non-consumptive uses.
- There must be secure boundary conditions around the entire reserve, and where appropriate, between different zones within the reserve.
- Stringent environmental conditions should be included in approvals for rezoning and future development in areas nearby the reserve and with potential to impact on the estuary (eg. on water quality).



Fig. 2. Proposed new boundaries for the Rietvlei Nature Reserve (excluding area upstream of Blaauberg Bidge).

*3.2.2 **Water Quantity and Quality***

Over the years, there have been significant changes to the volumes and quality of water and associated sediments flowing into the Diep Estuary. In combination with physical developments (such as roads and bridges) these changes mean that the system will never function as a completely natural system again and, at present is seriously degraded. At the same time, the estuary remains highly valuable from both a conservation and socio-economic perspective. The primary objective is therefore to develop a management regime which will restore the flows to, from and within the system and the water quality to the extent possible, with a view to maintaining and enhancing its current value.

Water Quantity and Circulation

At present there is insufficient information available to set specific objectives in relation to the management of water quantity. The initial objective must therefore be to obtain a better understanding of the water requirements, hydrodynamics and other aspects of the system. Nevertheless, in the interim, there are a number of more general objectives which can be used as a guide to begin the process of rehabilitation over the next few years.

These interim objectives include:

Salinity

As a consequence of the various changes to the system, the estuary is currently fresh-water dominated. A salinity regime more typical of an estuarine system, with tidal effects and saline penetration up to at least the Otto du Plessis Bridge needs to be re-established. From a biological perspective, the salinity regime should be such that it facilitates the rehabilitation of estuarine communities - such as *Callianassa* - in those areas which they previously occupied.

Mouth conditions

Historically the mouth closed periodically during the summer months of low-rainfall years. More recently, the discharge of sewage effluent into the system has maintained flows at levels which have precluded the closing of the mouth with a variety of consequences (including the drop in salinity). Optimum conditions should therefore be re-established at the estuary mouth. In the longer term, this would imply the mouth closing in late summer at least in some years, and then opening again after a few months. It is noted that in the short-term – until water quality conditions have been improved – it is probably preferable that that the mouth does not close, or that it closes for very short periods only.

Water levels

The water levels in the vlei should be managed such that they fluctuate on a seasonal basis, thereby allowing the pans to maintain the ecological characteristics which make them attractive to wading birds. At the same time, the period during which they are allowed to dry out completely should be limited to the shortest time

possible with a view to alleviating the dust problem. (It is noted that there will need to be expert consultations, and possibly even a study, to determine this).

Water levels should not be allowed under normal conditions to rise to a point where residential areas are under immediate threat of flooding - noting that some areas have already been constructed within areas already prone to flooding (see Fig. 3 below). Residents of such areas must be made aware of this threat, and a Disaster Management Plan should be put in place for such eventualities. It is further noted that the extent of areas under threat of flooding may increase as a consequence of climate change.

Sedimentation

At present there is a lack of understanding of the rates and patterns of sedimentation in the system, and the impacts thereof on channel depth, drying of seasonal pans, circulation, mouth conditions etc. The initial objective should therefore be to generate the required information and, if necessary, sediment inputs and deposits should then be managed so as to limit impacts on the system.

Circulation

Flows of water and stratification within the system are not clearly understood. Relevant data needs to be generated so that flows can be optimised so as to, for example, reduce the potential for development of anoxic conditions.



Fig.3 Floodprone areas around the Diep Estuary (based on the 1:100 -year floodline).

Water quality

The long term objective should be for the water quality to meet Resource Quality Objectives to be developed in terms of the National Water Act (1998) specifically for the Diep Estuary and covering i) the freshwater inflow from the river; and ii) the estuary itself. These will be based on socio-economic requirements and existing guidelines for freshwater or marine ecosystems and/or full contact recreation as appropriate. Interim targets for parameters of particular concern are outlined below. These will be reviewed halfway through the 5-year period of the Action Plan.

Supplementary objectives are:

- that the number of accidental discharges of wastewater per year (i.e. sewage overflows from sewerage bockages and sewage pump stations) should be reduced through monitoring, maintenance and appropriate capital investment;
- to obtain a better understanding of the relative contributions of the different sources of pollution, in particular the stormwater drains.

Bacteriological targets

- The Resource Quality Objectives for bacteriological parameters should be based on those for full contact recreation (especially given the high prevalence of HIV in the country, and the consequential lowered immune system of a substantial proportion of the population). The most important of these is *E.coli*, with others being Faecal coliforms and *Enterococc*i as follows:
  - *E. coli* – which are more specific to warm-bodied animals and show a high correlation with swimming-related gastric illness - with a target range of 0 – 130 counts (based on the DWAF South African Water Quality Guidelines: Recreational Use (2nd Edition, 1996)). To meet the target, the range should not be exceeded by the geometric mean of fortnightly samples over a three-month period.
  - Faecal coliforms (including *E.coli*) – which are used as an indicator of general faecal contamination - for which the target range should be between 0 – 100 counts per 100 ml (based on the 1995 South African Water Quality Guidelines for Coastal Marine Waters). To meet this target, 80% of samples taken from the water body should fall within this range (i.e. less than 100 counts); and 95% of samples should be below 2,000 counts.
  - *Enterococci* – there are currently no guidelines for South Africa, but guidance is obtainable from the Blue Flag Programme and/or World Health Organisation recommendations.
- The bacteriological standards should be met in the northern section of Flamingo Vlei (which is zoned for recreational use) within 3 years (i.e. by the end of 2011).
- There should be an improvement in the bacteriological quality of the water in the Milnerton Lagoon (also zoned for recreational use) over the next 3 years (to end of 2013) as follows: At present, only around 10% of the faecal coliform samples are < 100 counts/ 100 ml, while about 60% of the samples are < 2,000 counts/ 100ml. By 2013, 95% of the samples should be < 2,000 counts/100ml; and 50% of the samples should be < 100 counts/ 100ml.

Nutrient targets

Target values need to be established for the Diep Estuary as part of the reserve determination process, and once there is greater clarity on the discrepancy between target and current actual values, a time-frame can be developed for the achievement of the target values. In the interim, the following targets are proposed:

- The current guideline on dissolved inorganic nutrients for marine aquatic ecosystems is: "Waters should not contain concentrations of dissolved nutrients that are capable of causing excessive or nuisance growth of algae or other aquatic plants or reducing oxygen concentrations below the target range.."(see below).
- The Coastal Water Quality Guidelines provide a more specific guideline for Total Ammonia-N – namely 600 *u*g/l - while the freshwater guideline for unionized ammonia (NH_3) is < 7 *u*g/l (DWAF, 1996). More recent guidelines developed through the Reserve Determination methodology suggest that values of 0.015 – 0.058 mg/l (or 15 – 58 ug/l) are good.[1] It is therefore proposed that this be adopted as the target range for the Diep Estuary.
- The DWAF Water Quality Guidelines: Aquatic Ecosystems provide a guideline for inorganic nitrogen (NH_3 + NH_4 + NO_2 + NO_3) which states that i) concentrations should not deviate by more than 15% from that of the local water body; ii) the trophic status of the water body should not be increased; and iii) that the amplitude and frequency of natural cycles should not be changed. The Guidelines also state that concentrations below 0.5 mg/l are indicative of oligotrophic conditions, 0.5 – 2.5 mg/l mesotrophic, and 2.5 – 10 mg/l, eutrophic. However, according to Taljaard (pers. comm..) although only limited data is available for estuaries in South Africa, concentrations of 1 – 2 mg/l were sufficient to stimulate dense macrophyte growth in the Sundays River. Moreover, recent guidelines developed through the Reserve Determination methodology equate values of 0.25 – 1 mg/l with good conditions, and it is proposed that this be adopted as the target range for the Diep Estuary.
- Phosphorus occurs in a number of forms, of which Soluble Reactive Phosphate (SRP) or orthophosphate is immediately available to aquatic biota. The recent guidelines developed through the Reserve Determination methodology suggest that values of between 0.005 – 0.025 mg/l (or 5 – 25 ug/l) indicate good conditions, and it is proposed that these be adopted as the target value for the Diep Estuary.

Dissolved oxygen

The current guideline on dissolved oxygen for marine aquatic ecosystems is: "For the east coast, the dissolved oxygen level should not fall below 10% of the established natural variation. For the south and east coasts the dissolved oxygen should not fall below 5 mg/l 99% of the time, and below 6 mg/l 95% of the time." The recent guidelines developed through the Reserve Determination methodology suggest that

[1] Information on the guidelines from the Reserve Determination process provided by Candice Haskins.

values of between 6 – 8 mg/l are good, and it is proposed that these be used as the general target range for the Diep Estuary.

For the north and south lakes (Flamingo Vlei), which reach a depth of around 10 metres in places, and where there is likely to be stratification in the water body, it is recommended that a target of 6 mg/l to a depth of 2 metres for 100% of the time be adopted.

Salinity

Target values for salinity also need to be determined for critical species. For example, *Callianassa* requires a salinity of at least 17 ppt to breed successfully. Soil salinities, together with inundation, are also important for macrophyte growth. *Sarcocornia perennis*, for example, has been found to grow best in water-saturated soil at salinities between 0 and 15 ppt (Adams and Bate, 1994).

Biological criteria

In general, the water quality should be sufficient to support all biological communities. More specifically, it should allow for:

- The re-establishment of primary producers (such as *Zostera*) and benthic invertebrates such as *Callianassa* in the lagoon;
- Improved water quality and the recovery of the benthos (which are a food source for fish) should also see the juveniles of species such as the White steenbras and Cape stumpnose re-entering the estuary.
- In the south lake, water quality should be sufficient to support *Galaxius zebratus.*

At the same time [2]:

- Chlorophyll *a* levels (which are a measure of phytoplankton growth/eutrophication) should not create nuisance conditions or produce surface scums. Mean annual concentrations should be < 15 ug/l (DWAF Water Quality Guidelines).
- Cyanobacteria (toxic blue-green algae) should be at levels < 6 blue-green units[3] (DWAF WQ Guidelines), and < 10 ug/l of cyanobacterial toxins (microcystin toxin) (WHO recreational guidelines).

3.2.3 ***Sediment quality***

A number of previous reports have referred to erosion in the catchment and siltation in the lagoon and other parts of the system. More recently there have also been reports of significant accumulations of organic material on or near the bottom. Apart from possible impacts on circulation, mouth conditions etc, sediments tend to be a

[2] Candice Haskins and Robert Siebritz – pers. comm..
[3] This refers to the number of blue-green units (colonies and filaments) counted in a two-minute scan of 0.5 mR of water at x 200 magnification.

sink for contaminants with consequential impacts on bottom-dwelling organisms. It is therefore also important to quantify and manage sediment quality.

The following objectives are proposed for sediment quality:

- Sediment quality objectives should be developed and implemented. These should be based on current international practice (see guidelines developed under BCLME), and should include bacteriological parameters.
- The sediments should be restored as far as possible to their original condition (eg. particle size distribution, organic content etc).
- Bacteriological loads in the sediments should not pose a threat to human health.
- From a biological perspective, the sediment quality in the lagoon should be sufficient to allow the re-establishment of benthic invertebrates such as *Callianassa.*

In the interim, the following guidelines are proposed for trace metals (based on the DEA guidelines)[4]:

Trace Metal	Target (mg/kg dry weight)
Arsenic	< 30
Cadmium	< 1.5
Chromium	< 50
Copper	< 50
Lead	< 100
Mercury	< 0.5
Nickel	< 50
Zinc	< 150
Combined levels of Cd & Hg	< 1.0
Combined levels of As, Cr, Cu, Pb, Ni & Zn	< 50

3.2.4 *Conservation and sustainable use*

Conservation and rehabilitation

Although there were some relatively thorough studies of the biodiversity of the estuary some years back, there are a number of taxonomic groups for which there is fairly limited information. Moreover, there has not been regular monitoring of the biodiversity. Nevertheless, a comparison of some of the reports completed over the years – in particular those on the vegetation – suggests that there have been significant changes to the biodiversity. These are probably a consequence of changes to the habitat, a deterioration in water quality, and the introduction of a variety of invasive species. General objectives therefore are that a more complete understanding of the biota of the estuary needs to be obtained, and that biological

[4] The values given are those which trigger precautionary measures when dumping dredged materials. Updated guidelines are in the process of development.

communities should be restored to as close to original species composition and structure as possible, noting that this may not always i) be possible to determine (given that the system has been compromised over a period of > 300 years); and ii) be practical in the current urban context.

More specific objectives include:

- The restoration of Strandveld in relevant parts of the reserve.
- The stabilization of the shorelines of the central pans and the north lake.
- Restoration of primary producers, benthic invertebrates (*Callianassa* communities) and fish in the lagoon.
- The development and implementation of an invasive species management plan for the reserve covering the eradication of alien species where possible, and where this is not possible, their control. The plan should also include provisions for the control of invasive indigenous species as appropriate.

Human use of the estuary/ reserve

The Diep Estuary is important from both conservation and socio-economic perspectives, the latter primarily due its aesthetic value and the recreational opportunities it affords in an area close to the City centre. Management initiatives must take account of both aspects, with objectives being:

- An appropriate balance between conservation and sustainable use of the system.
- Use of the estuary and adjacent terrestrial areas within the reserve for non-consumptive purposes such as recreation should not further compromise the biological integrity of the system, and should be limited to specific zones.

Resource exploitation

Consumptive use of resources within the estuary is relatively limited. Nevertheless, the exploitation of natural resources that does occur – for example, fishing and bait collection – should be limited to specific zones and seasons to ensure that such exploitation is sustainable.

Education and awareness-raising

Public awareness is essential for the effective implementation of environmental programmes, and the Rietvlei Education Centre offers an ideal opportunity to build awareness of a variety of environmental issues, in particular, the role of wetlands and estuaries. Existing programmes should be expanded and facilities upgraded.

4 ZONATION IN THE RIETVLEI WETLANDS RESERVE

Rietvlei was first designated as a Nature Area in 1984, later becoming a Protected Natural Environment under the Environment Conservation Act (1989) and then the NEM: Protected Areas Act (2003). This was largely on the strength of its regional importance as a habitat for waterbirds ranking in the top ten of South Africa's largest estuaries. It is listed as an Important Bird Area by Birdlife International, and consideration has been given to applying for Ramsar status for the area with the wetland being of international importance for at least four bird species.

At the same time:

- Development of the surrounding areas has continued to encroach into areas which fall within the 100-year floodline of the estuary; and
- historical records show that parts of the estuary have been utilized for recreational purposes for over a century, and today there is a well-established aquatic club on the north lake, as well as a canoeing club on the lagoon. Its establishment as a Nature Reserve, and the construction of an Education Centre and related facilities, has also encouraged walking, bird-watching, picnicking etc. In addition, there is limited bait collection and fishing.

The objectives of this management plan therefore include:

- the prevention of any further inappropriate development/land-use within the reserve; and
- the achievement of an appropriate balance between conservation and sustainable use of the Nature Reserve and estuary.

An important tool in achieving these objectives is zonation. This term can be applied to the designation of particular areas or zones for specific developmental or land-use purposes or to the delineation of different zones for specific visitor uses. Both of these approaches have been applied to the reserve/estuary and are discussed further below.

4.1 City of Cape Town Guidelines

The City of Cape Town has recently developed Guidelines for Land Use Zoning for Nature Reserves and Conservation Areas.[5] These guidelines make provision for the following land-use zones and associated conservation objectives:

- Primary Conservation: Natural areas should be kept intact in order to protect habitat required to meet biodiversity targets for various vegetation types and to provide undisturbed habitat for a range of species. Where possible degraded areas should be rehabilitated.

- Conservation: Natural areas should be kept intact in order to protect habitat required to meet biodiversity targets for various vegetation types and to provide

[5] The name of the current Table is actually Guidelines for Visitor Use Zoning, but according to Arne Purves this should be corrected.

undisturbed habitat for a range of species. Where possible degraded areas should be rehabilitated.

- Low Intensity Leisure: Although some areas will be impacted by a range of activities and limited infrastructure, most areas should be kept largely intact and ecological processes should remain functioning. Where possible degraded areas should be rehabilitated.

- High Intensity Use: The activities and infrastructure in these areas should be managed to minimize impacts on biodiversity and visitor experience in other zones. Where feasible, non-crucial infrastructure should over time be removed from the reserve and the sites rehabilitated.

- Utility Zones: The activities and infrastructure in these areas should be managed to minimize impacts on biodiversity and visitor experience in other zones. Where feasible, non-crucial infrastructure should over time be removed from the reserve and the sites rehabilitated.

Based on these, the City has proposed the following zones for the Rietvlei Wetlands Reserve:

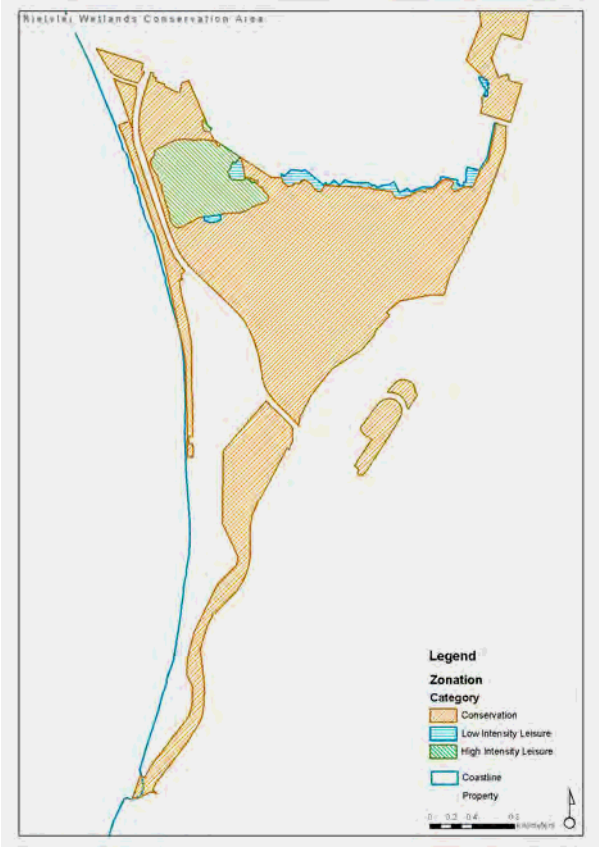


Fig. 4: Developmental/land-use zones in the Rietvlei Wetlands Nature Reserve

As can be seen from the map, the majority of the area of the reserve is designated for conservation. High intensity use is restricted to the northern part of Flamingo Vlei where there are facilities which support boating, educational and other recreational activities.

4.2 Visitor Use Zones in the Rietvlei Wetlands Reserve

The City guidelines make recommendations on the type of activities, frequency of use, group size, sophistication and type of facilities, user movement/transport and roads and footpaths which are considered appropriate to each category. The specific details however, may vary from one reserve to the next, and the activities allowed in the various different parts of the Rietvlei Wetlands Reserve are outlined below and in Fig. 5.

*4.2.1 **Closed areas or sanctuaries***

These are areas where no human disturbance is permitted, and includes the southern part of Flamingo Vlei and the seasonal pans, both of which are important as sanctuaries for birds. This area comprises 357.94 ha or 44% of the total area of the estuary.

*4.2.2 **Low intensity Use***

In these areas only low impact activities such as bird-watching and walking are allowed. They include the entire upper lagoon, as well as a number of strips bordering the sanctuary thus providing some sort of buffer between parts of the sanctuary and developed areas. This covers 128.69 ha, or 15.9 % of the total area.

*4.2.3 **Medium Intensity Use Areas***

Within the reserve, there are 3 different types of low intensity use areas, based on the characteristics of the area and/or use:

a) The terrestrial areas along the eastern bank of north lake, and the western bank of the river just below Blaauberg Bridge. Activities in these areas include picnicking, bird-watching, walking and fishing.
b) The lower lagoon (below the wooden bridge), where canoeing, bait collection and swimming are allowed – the latter only when water quality permits.
c) The area within the Sanctuary just to the east of Otto du Plessis Drive (and adjacent to Sunset Beach) which is used for model aircraft flying. It is noted that this zone is temporary, and will be discontinued in 2014 when the permit expires, at which time this will be incorporated into the sanctuary area.

Together these make up 30.97 ha or 3.8% of the total.

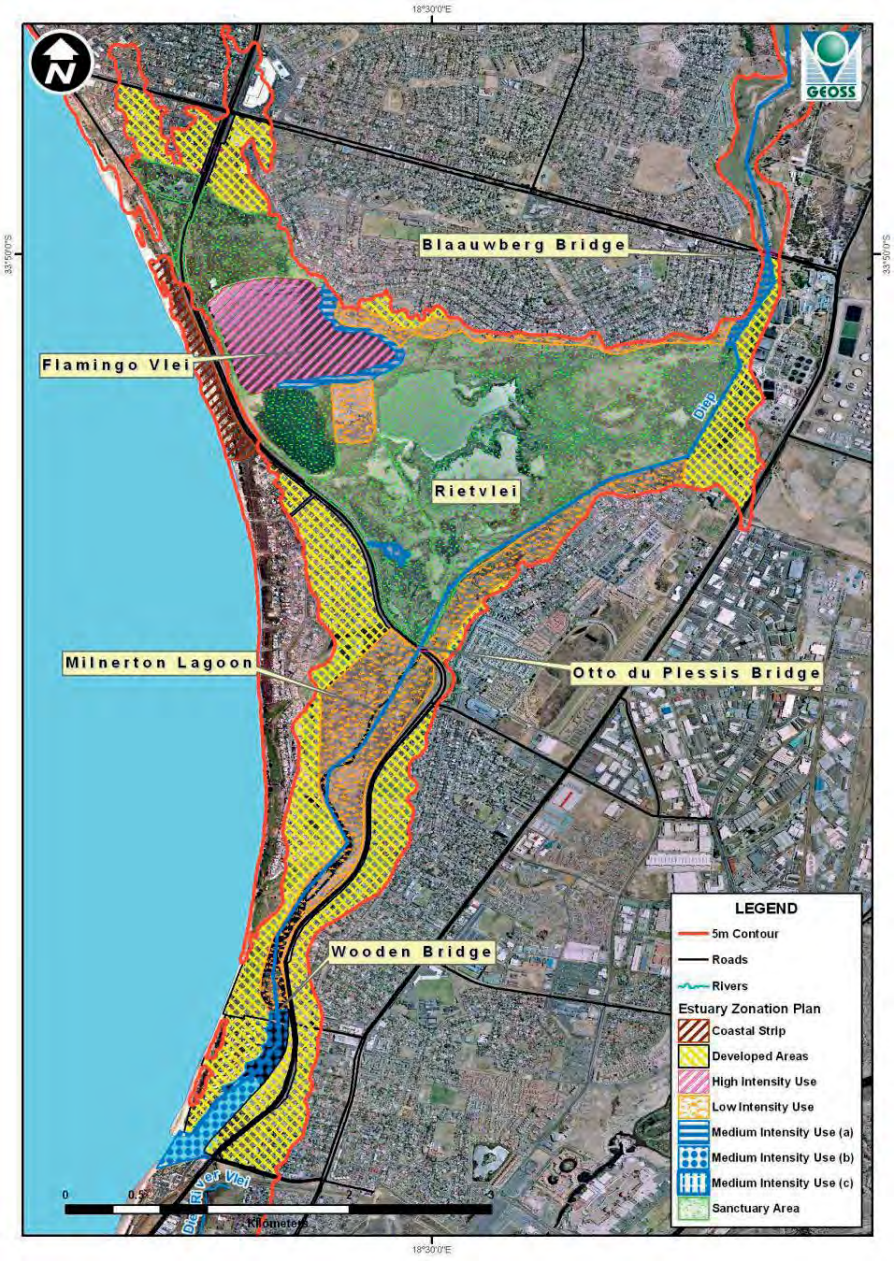


Fig. 5. Visitor Use Plan for the Diep Estuary.

4.2.4 High Intensity Use areas

High intensity use is limited to the north lake of Flamingo Vlei, where power-boating, water-skiing, and sailing are allowed. Limited fishing is also allowed on specifically designated open days. The lake covers 54.51 ha, or 6.73 of the total area.

5 MANAGEMENT STRATEGIES

5.1 Management of water quantity and quality

The prevailing national strategy for managing the water quantity and quality requirements of aquatic ecosystems is through the determination of Reserves and Resource Quality Objectives. These are provided for in the National Water Act (Act 36 of 1998) and the National Water Resource Strategy, and are intended to be implemented through Catchment Management Strategies and Agencies. However, neither the Reserve, nor Resource Quality Objectives have as yet been determined for the Diep River or Estuary. Nor has a Catchment Management Strategy been developed.

National policies on pollution and waste management are also pertinent to water quality. The policies of both DEA and DWA are intended to promote the precautionary approach and a hierarchy of management steps starting from pollution prevention and minimisation. Moreover, the operational policy for the disposal of wastewater derived from land (adopted by DWAF in 2004) espouses a Receiving Water Quality Objectives Approach rather than one based on effluent standards. The policy further states that:

i) the disposal of wastewater into sensitive areas (such as estuaries) will not be considered, except in exceptional circumstances;
ii) wastewater discharges that were existing on 31 May, 2004 (when the policy was adopted) should be re-evaluated during a 5-yearly licence-review process;
iii) revisions can also be motivated on the grounds of negative impact on the environment and non-compliance with licence conditions.

These policies have not yet been applied to the management of water quality in the Diep Estuary. In fact, despite the serious deterioration of water quality in the system, the Western Cape Department of Environmental Affairs and Development Planning (DEA & DP) on the 3rd August, 2010 issued a Record of Decision giving their approval for the further expansion of the Potsdam Wastewater Treatment Works without placing any specific restrictions on disposal of the effluent. While disposal of the effluent would be regulated by a permit from DWA , this raises an urgent need to investigate alternative options for such disposal (other than discharge into the estuary).

5.1.1 Water quantity

There is general consensus that given the history of changes to and around the Diep Estuary caused by historical and ongoing urbanization, the system will never be able to function naturally and there is therefore a need for management interventions to ensure that there is an appropriate balance between runoff from the catchment, inflow from other sources, drainage from the system, and evaporation. There is also general agreement that increasing the salinity in the system – which is now freshwater dominated as a consequence of the changes - could have a number of benefits, and that this must be taken into account in developing a management regime. At the same time, the information available on the system is insufficient to develop a comprehensive and effective water quantity management strategy. There

is therefore an urgent need for a number of studies to, amongst other things, properly quantify the inputs and losses to and from the system, and to determine the ecological reserve for the estuary.

Information requirements

Of the studies proposed, only the topographic survey and development of a Digital Elevation Model (DEM) have been completed, with the following still being required:

i) A study of the hydrology of the estuary needs to be undertaken in order to get a clear understanding of the water balance in the system, including any seasonal variations therein. This will require an accurate determination of all flows into (from the river, groundwater, stormwater and effluent) and out of the system. The data will be obtained from:
   - Existing DWA flow stations;
   - Planned and completed studies on stormwater which include an assessment of flows;
   - A determination of the groundwater contribution to the river base flow;
   - Water level and salinity recorders in the lagoon (at the Woodbridge Island Bridge), to supplement the existing ones in Rietvlei and at the Otto du Plessis Bridge.

   All recorders must be properly maintained, and data downloaded on a regular basis. Once complete, the study should be able to recommend an optimal water balance.

ii) A study of the geohydrology of the estuary is required to determine groundwater flow directions, groundwater gradients, groundwater depths and seasonal fluctuation, as well as groundwater quality variation. The groundwater underpins the surface hydrology dynamics and plays a crucial role in the management of the desiccation of the central pans in summer. The geohydrological study will require the installation of at least 8 piezometers throughout the study area. The piezometers should be equipped with water level and water quality data loggers which then need to be read at regular intervals. The piezometer water level data will also provide valuable input into assisting with the understanding of surface water dynamics. (At certain times of the year the piezometers may well be flooded).

iii) A study of the patterns of stratification in the deep water lakes needs to be undertaken so as to have a better understanding of their contribution to the development of anoxic conditions.

iv) A study of the quantity and quality of sediments and the rate of sedimentation needs to be undertaken (including core sampling of sediments) with a view to determining their impact on drainage patterns and the dust problem, as well as on the environmental health of the system. Sediments act as a sink for pollutants which can be re-released into the water column under certain conditions.

v) GIS based mapping of all historical aerial photos to measure possible changes in the extent and duration of the drying of the seasonal pans.

vi) A study on the ecology of the central pans – and especially those species which are the main food sources of the wading birds – to determine

optimal seasonal cycles from an ecological perspective. In particular, the requirements of the Palearctic waders must be taken into account.

vii) Ultimately, a comprehensive reserve determination in terms of Chapter 3, Parts 2 and 3 of the National Water Act (1998) needs to be undertaken, noting that some of the above studies will contribute to this process.

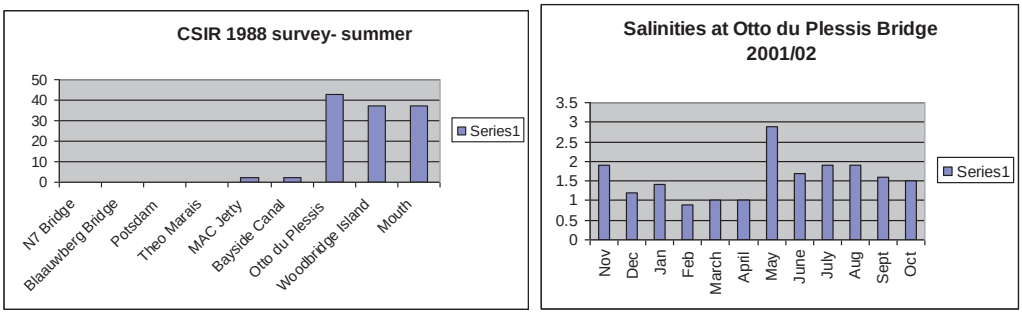
viii) The above data needs to be compiled and collated so that a hydrodynamics model can be established to optimize the various management options available.

Interim management measures

In parallel with the above-mentioned studies, it is proposed to implement some interim measures to alleviate current problems until longer-term solutions can be found. These include:

Reduction/manipulation of flows from Potsdam

Since the establishment of the channel along the east bank of Rietvlei(1991/92), the estuary has become increasingly freshwater dominated, as can be seen by comparing the salinities at Otto du Plessis Bridge in 1988 and 2001/02 (Fig. 6 below). In summer, with the river effectively drying up, the flow is made up predominantly of the effluent from Potsdam. Amongst other things, this has to a large extent eliminated the seasonal fluctuations in flow into the lagoon, and as a result, the mouth no longer closes. This is probably exacerbated by the increased sedimentation in the lower lagoon which further limits tidal penetration.



Figs 6 a and b: (a) Salinities in the Diep Estuary during a CSIR survey in the summer of 1988; and (b) Salinities at Otto du Plessis Bridge in 2001/02.

The capacity of Potsdam has recently been increased from 32 to 47 Ml/day and would be further increased to 100 Ml/day should the most recent proposal go ahead. At the same time, an increasing amount of the effluent is now being re-used – up to 20 Ml/day over the summer months since January 2006 (see Fig. 7 below). During those periods, the effluent discharge to the estuary is at times reduced to around 15 Ml/day. However, a monitoring programme undertaken between January and March, 2010 – which looked at the correlation between daily volumes of effluent discharged, salinity at two points in the estuary, and tidal height – suggested that discharges would need to be reduced to at least 10 Ml/day in order to achieve a significant increase in salinity in the estuary. Even then, the ingress of salt water is only likely to reach the Otto du Plessis Bridge at high spring tides. While the monitoring

programme was of limited duration, the conclusions are supported by the study done by WAM Technology in 2004, which suggested that flows from Potsdam could be reduced to 8 Ml/day before the mouth would be affected.

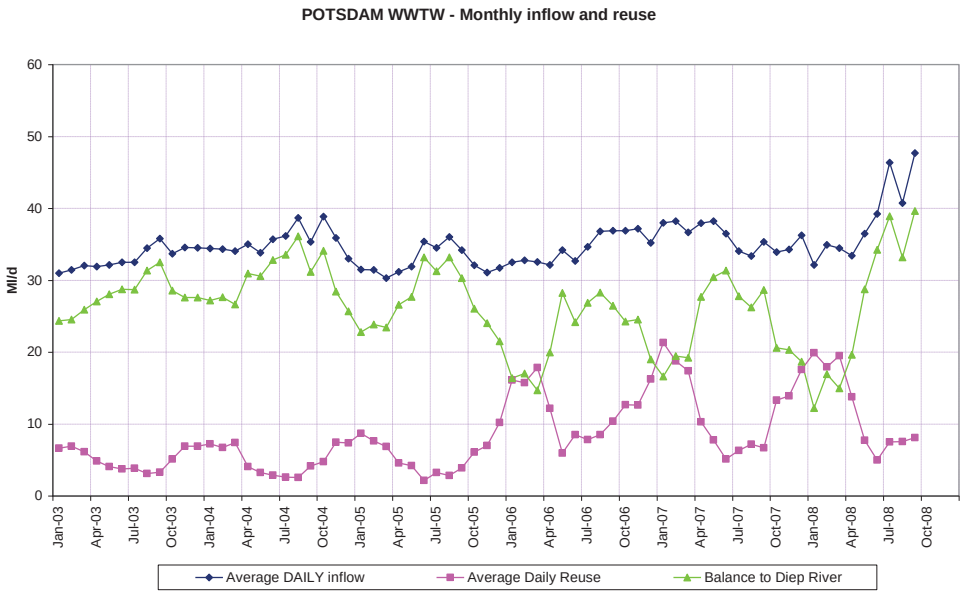


Fig. 7. Average daily flows of effluent from the Potsdam WWTW.

It is therefore proposed that a programme for the further reduction of effluent discharges from Potsdam be developed in collaboration with Water and Sanitation Services. Initially this should focus on trying to achieve such reductions on dates coinciding with high spring tides of the summer months.

The necessity for these measures may fall away should an alternative disposal option be identified and implemented.

Flows from the catchment

The flow-guaging station at Vissershok, which was operational between May 1967 and May 1982 recorded a Mean Annual Runoff of 44.4 million m^3. This was replaced by the guage at Adderley, which has been operational since 1998, and has recorded a Mean Annual Runoff of 40.17 million m^3. Both show significant variations from year to year, as well as between seasons(see Figure 8 below) Of significance for the estuary, and the proposed management of flows, is that flows from the river during the summer months are effectively zero.

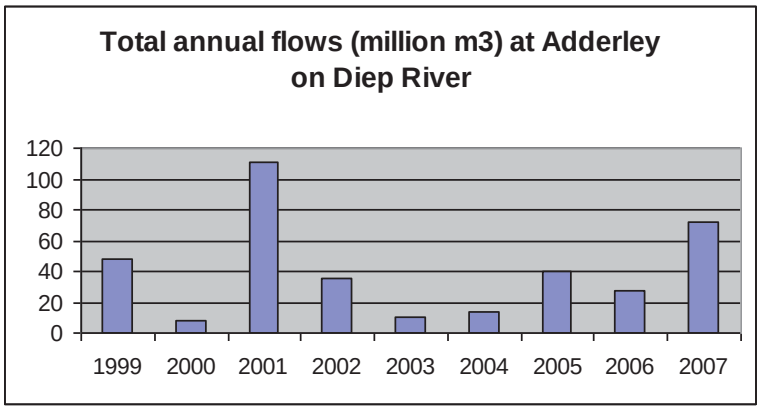


Fig. 8 (a) Variations in annual flow from the Diep River.

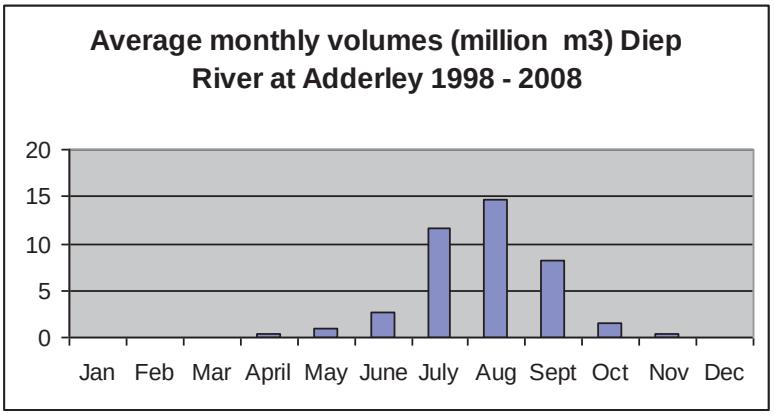


Fig. 8 (b) Seasonal fluctuations in the flow in the Diep River.

Although not immediately apparent from the above graphs, there have been suggestions that the runoff from the catchment has been reduced in recent years as a result of an increasing number of farm dams amongst others. The capacity of such dams, and their impact on flows, needs to be investigated as part of a Catchment Management Strategy. Other measures to be included in such a strategy include:

- Clearing of alien plants along the river channel, especially gum trees
- The promotion of appropriate agricultural practices to reduce infestation of invasive alien species.

Stormwater flows

The Stormwater Master Plan for the areas north of Rietvlei is in line with the City's Policy on Minimising the Impact of Stormwater from Urban Development on Receiving Waters, and promotes measures which facilitate the retention and infiltration of stormwater close to source. This should be implemented with a view to reducing stormwater flows into the estuary.

Management of water levels

Dust problem

While there is insufficient data at this stage to prove it, there have been suggestions from a variety of sources (including a specialist study conducted during the development of the 1994 Rietvlei Management Plan) that the construction and ongoing maintenance of the bypass channel along the east bank in 1991/92 has increased the rate of drainage of Rietvlei during the dry summer months by lowering the water table. This is further exacerbated by the channels which have been dug at a number of the stormwater discharge points along the boundaries of the vlei. And although the central pans have always dried out – and indeed need to go through seasonal changes in water levels to maintain their ecological function – the extent of this phenomenon may have been altered. Whether this is true or not, the dust emanating from the dry pans is a problem to residents in the area.

It is therefore proposed that measures be introduced to manage the water table with a view to limiting the rate and extent of drainage from the vlei, BUT within the constraints of the ecological requirements of the wetland (which still need to be determined). Once the ecological requirements have been established, a mechanism which will allow management of the water table will be developed and implemented. As far as possible, this should be based on natural, sustainable solutions (i.e. costly engineering solutions to be avoided), and may include the partial or complete filling in of the Potsdam bypass and stormwater channels.

In the interim, it is proposed:

i) that the maintenance excavations of these channels be discontinued, at least in certain sections; and
ii) the pumping of water from the northern lake onto the pans when they start to dry out in January should continue until a more permanent solution is found.

Flooding

Residents in areas which fall within the 1:100 -year floodline must be made aware of this fact, and a Disaster Management Plan must be put in place to facilitate response during a major storm event.

*5.1.2 **Water quality***

The data from the City's water quality monitoring programme shows that the water quality for most of the system – with the possible exception of the Flamingo Vlei area – is unacceptably poor in comparison with existing guidelines, particularly with regards to bacteriological contamination and nutrients. Fig. 9 below for example, shows that the water in Milnerton Lagoon has not been suitable for contact recreation since at least 2001, while Fig. 10 shows that the majority of Total Nitrogen samples at the Otto du Plessis Bridge are at levels indicative of eutrophic or hypertrophic conditions. This suggests that current management efforts are ineffective.

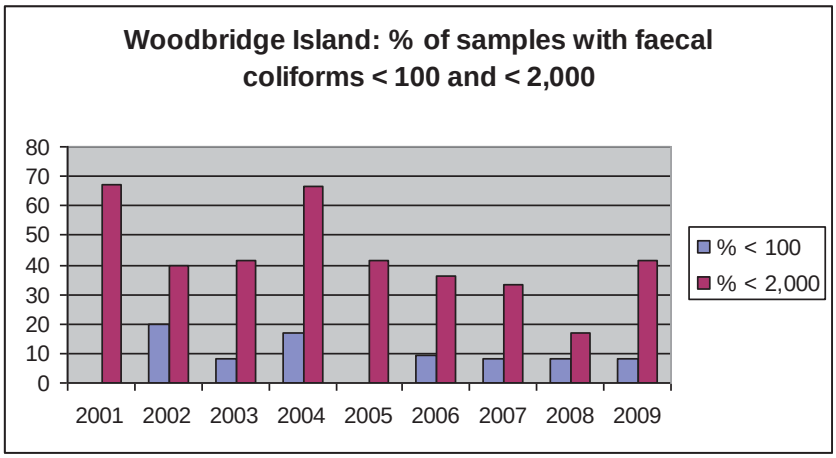


Fig. 9. Bacteriological quality of water at Woodbridge Island.

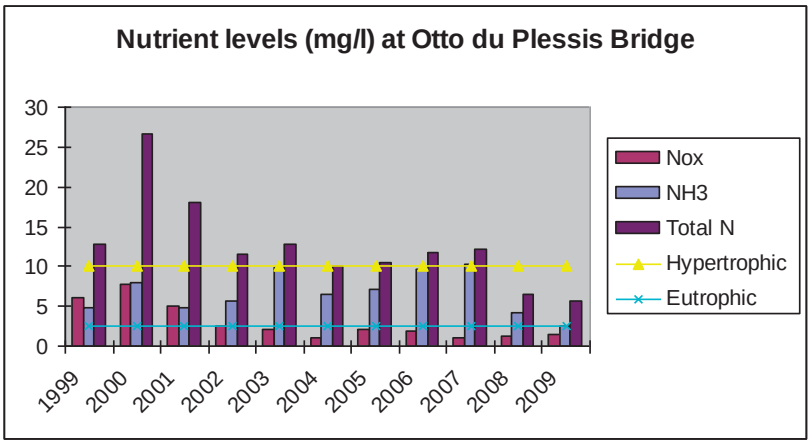


Fig. 10. Levels of nitrates and nitrites (Nox), Ammonia (NH^3) and Total Nitrogen in mg/l at Otto du Plessis Bridge. Values for Total Nitrogen > 2.5 are indicative of eutrophic conditions, and > 10 are indicative of hypertrophic conditions.

This situation needs to be addressed by the development of Resource Quality Objectives specific to the system, and the application of pollution prevention/ minimisation measures to each of the sources of pollution with a view to achieving these objectives. The sources include:

- Inflow from the river (which carries pollution from a variety of sources in the catchment)
- Potsdam and related infrastructure
- Stormwater
- Informal settlements and low-cost housing areas

The relative contribution of each of these sources also needs to be determined so that prevention efforts can be prioritized.

Setting of Resource Quality Objectives

The development of Resource Quality Objectives is provided for in Chapter 3, Parts 2 and 3 of the National Water Act (1998). The RQO should include target values for i) the freshwater inflow from the river; and ii) the estuary itself. These will be based

on existing guidelines for natural environments and/or recreation and, where appropriate, should elaborate interim targets for parameters of particular concern and a timeline for their achievement.

Pollution Prevention/ minimisation

Although the monitoring programme being undertaken by the City has provided an insight into the water quality of the estuary, many of the various sources of pollution still need to be properly quantified so as to obtain a better understanding of their relative contributions to the overall pollution load. This requires expanding and improving data collection on flows and contaminant levels, especially for stormwater drains. To date, the only in depth study which has been conducted on stormwater has been on the Bayside Canal, although a study of those on the East Bank was initiated in 2009 and is nearing completion.

In the interim, steps should also be taken to start reducing or, where possible, preventing the pollution at source.

i) Potsdam

During the summer months, when there is little or no flow from the river or stormwater drains, Potsdam is the primary source of water in the estuary. Thus the quality of the Potsdam effluent has a significant influence on water quality in the estuary during summer, if not the whole year round.

The effluent standards for Potsdam are set out in a permit issued by the Department of Water Affairs and Forestry in 2000 (and which effectively expired in 2004). A new permit is currently being processed by DWA as part of the current Potsdam expansion from a capacity of 32 Ml/day to 47 Ml/day, and could include a tightening of standards, although according to the DWA operational policy, they should, in fact, be moving to a management regime based on Receiving Water Quality Objectives. The latter have, however, yet to be determined for the Diep Estuary, although interim objectives have been proposed in this document (see Section 3.2.2).

The current permit requires the effluent to meet the General Standard for most parameters. It is also required to meet the Special Standard for Phosphate (Section 21 (1)(a) of the National Water Act. Exceptions are made for Nitrate/Nitrite as Nitrogen, which is set at 10 mg/l, and Faecal coliforms, which are set at 1000 counts/100 ml. Given that during the summer months there is effectively no dilution of the effluent, and the permitted levels exceed the water quality guidelines, any improvement in the situation would require a significant reduction in the permitted levels in the new permit.

On top of this, over the past few years – during the expansion process – Potsdam has not been able to meet many of these standards. For *E. coli*, for example, although the situation appeared to improve considerably in the latter half of 2008 and 2009, the effluent still regularly exceeds the standard and is, in fact, again showing an upward trend (see Figs 11(a) and (b) below).

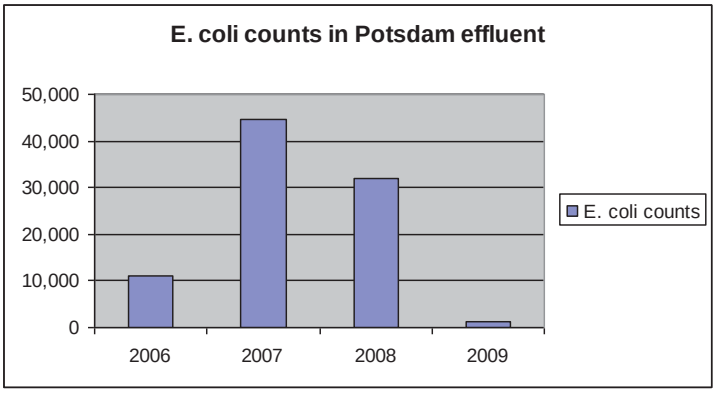


Fig. 11 (a) Average annual E.coli counts in Potsdam effluent.

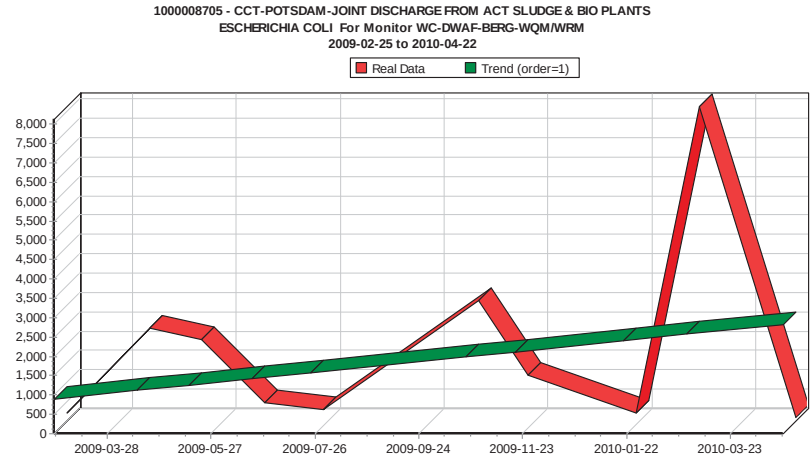


Fig. 11 (b) E.coli counts in Potsdam effluent for 2009/10 (provided by DWA).

This is of particular concern given the recent developments in relation to the investigation into WW Treatment expansion options for the broader Blaauwberg area, namely the Record of Decision issued by DEA & DP to further increase the capacity of Potsdam to 100 Ml/day. Such an expansion, with an associated increase in the volumes of effluent being discharged into Rietvlei, would lead to a further significant deterioration in the water quality. On the other hand, such an expansion combined with an alternative disposal system (i.e. one which does not involve discharging the Potsdam effluent into Rietvlei), could ultimately see a significant improvement in the water quality of the estuary. It is therefore critical, since this was not addressed in the EIA, that alternative disposal options for the effluent from Potsdam be investigated before any final decisions are taken.

ii) Sewerage infrastructure in the Milnerton/ Blaauberg area.

There have been a number of accidental spills of sewage into the estuary via the stormwater system which have had serious consequences for the biodiversity (and have health implications). These are the result of either blockages in the sewerage infrastructure in the catchment area or

malfunction of the sewage pump stations. The following actions are proposed to address these problems:

- Sewerage blockages

  The causes of these blockages are varied but in many cases are illegal discharges into the sewerage system. A system of recording and managing these blockages is being developed with a view to instituting preemptive maintenance and thereby a reduction of sewerage blockages.

- Pump stations

  All pump stations are monitored via a telemetry system and pump station malfunctions are generally expeditiously attended to without significant spillages. However, there have been significant spillages when telemetry systems fail and power outages occur. All the major pump stations adjacent to the estuary have therefore been equipped with standby generator sets. Minor pump stations will be serviced by mobile generators.

- Reporting and response to spillages

  Any significant spillages from either blockages or pump station malfunctions should immediately be reported to the Reserve Manager. They should then be treated and cleaned up using appropriate methodologies in consultation with Reserve staff.

iii) Stormwater drains.

The City's policy on minimizing impacts of stormwater on receiving waters – based on the concepts of Water Sensitive Urban Design and Sustainable Urban Drainage Systems - needs to be implemented. This includes the development of structural and non-structural best management practices for stormwater – such as retention ponds, vegetated swales, infiltration basins, bioretention cells, education, stormwater master planning etc, which are implemented at site or regional level as appropriate.

In addition, the flows and pollution loads of all existing stormwater discharges into the estuary need to be quantified and those having the greatest impact should be addressed. As mentioned above, the study on the stormwater drains along the eastern bank of the estuary is nearing completion, following which the recommended solutions should be implemented.

Following an earlier study, a number of proposals were made for managing the stormwater in the Bayside Canal – including the construction of an off-channel riparian reedbed for the treatment of stormwater low flows (chiefly suspended solids and attached pollutants) in undeveloped land immediately south of Parklands Main (Link) Road,

structural changes to increase the capacity of the canal and the introduction of litter management structures and practices. While implementation of these proposals was initiated during 2009/10, as of September 2010, these had not yet been completed. This needs to happen as soon as possible, following which they should be properly maintained.

Stormwater management systems on sites supporting industrial activities need to be inspected on a regular basis, and the policing of illegal discharges into stormwater drains needs to be improved.

Litter traps need to be placed on all stormwater discharges unless there is a strong chance of serious backflooding They should then be properly maintained to prevent litter, especially plastics, from entering the system.

iv) Informal settlements and low-cost housing areas

There are a number of informal settlements and low-cost housing areas in the area – some between the Blaauberg and N7 bridges – which have a significant impact on water quality via stormwater or direct runoff. These include Doornbach, Du Noon, Joe Slovo and Phoenix. The problem in low-cost housing areas is a consequence of both malfunctioning plumbing and the presence of backyard shacks without plumbing.

Doornbach is near Killarney and is right on the bank of the river. There are some chemical toilets on the edge of the area, but they are seldom used. Moreover, there are no roads and so it would not be possible to service toilets further into the settlement. Pressure needs to be put on relevant authorities to upgrade the area to a formal settlement – and in doing so, create a buffer zone along the river bank.

Stormwater from the Du Noon area discharges to the river above the Blaauberg Bridge, while Joe Slovo and Phoenix drain via the Erica Road stormwater drain, reaching the estuary opposite the tennis courts at Milnerton High. These have been addressed as part of the project on stormwater drains along the east bank.

It is also proposed to have an education/awareness-raising campaign emphasizing the health related problems around water and sanitation. This will be implemented in collaboration with the Department of Water Affairs, which has significant experience in this area.

v) Pollution sources in the river catchment

There are a variety of sources of pollution in the catchment, including:

- Waste-water treatment works (eg. Fisantekraal, Malmesbury) – and it is noted that the Malmesbury WWTW is currently not meeting the required standards.

- Stormwater from urban areas (formal and informal – eg. on the Mosselbank)
- Agriculture (runoff of fertilizers, pesticides etc, as well as discharges and runoff from eg. dairy farms). Many farms allow cattle to drink from the river which results in significant trampling, erosion and also contributes to pollution due to fouling of the water by cattle manure.
- Mining.

These all affect the water quality of the inflow from the river to the estuary, and need to be addressed as part of a Catchment Management Plan.

Mitigation measures

Reed beds act as sinks, and can be used to reduce nutrients in flows entering aquatic environments. However, this is not necessarily true for all situations. Moreover, their effectiveness tends to reduce over time, and the reedbeds therefore need to be managed – eg. harvested and removed for composting, burned etc. The reedbeds in the Diep Estuary have expanded significantly in recent years, and are a nuisance in some areas. A proper plan for their management needs to be developed and implemented.

Aerators could be used in emergency situations to prevent anoxic conditions from developing. They would need to be used in combination with an appropriate monitoring system which would provide early warning of such conditions.

5.1.3 ***Sediment quantity and quality***

While it is generally agreed that there have been and are considerable amounts of sediment entering the estuary from the catchment and other sources, this has not been quantified. It is therefore proposed that a series of sediment cores across the system should be taken to determine rates and quantities of sediment input from the catchment and other sources. These could also be used to determine historical patterns of salinity in the system.

In the interim, some preliminary work has been done in the catchment on guidelines for setback distances/conservation corridors with a view to reducing the silt load entering the estuary as a result of poor agricultural practices. These guidelines need to be further developed and implemented as part of a Cathcment Management Strategy.

Until relatively recently there had also not been any studies on the quality of the sediments or levels of bioaccumulation into the biota in the estuary since the work by Taljaard et al in 1992. However, in 2009, Jackson *et al* published a report on an investigation into levels of a range of metals in water and sediment samples from the Plankenburg and Diep Rivers which indicated high levels in both, with those for water exceeding the DWAF Water Quality Guidelines. In 2009/2010, DEA & DP funded a survey of heavy metal concentrations in the sediments and biota of the Diep and Berg estuaries, with biota including fish and invertebrate species. The results

indicated that trace metal concentrations in sediments from both the Diep and Berg estuaries exceeded relevant South African and international sediment quality guidelines at many stations – a significant increase over the levels found by Taljaard et al (1992). The concentrations of trace metals in biota (fish and invertebrates) were also high in most of the samples analysed and exceeded the South African legal limits for foodstuffs for a number of species commonly consumed by locals, including mullet (*Liza richardsonii)*, Mozambique Tilapia (*Oreochromis mossambicus),* Banded Tilapia (*Tilapia sparrmanii)* and carp (*Cyprinus carpio*).

Some 8 tonnes of fish are estimated to be harvested from the Rietvlei/Diep system annually, and it is important that those communities who might be consuming this fish are made aware of the potential health impacts. It is also recommended that surveys of heavy metals – and other potential contaminants – in the sediments and biota are conducted on a regular basis.

*5.1.4 **Monitoring***

The City's water quality monitoring programme – funded by the Catchment, Stormwater and River Management Branch - should be supplemented with annual surveys (or at least, every second year) of heavy metal levels in sediments and biota. If possible, these surveys should include a broader array of toxic constituents as well as bacteriology. The biological monitoring should include indicator species such as the sandprawn, other invertebrates, fish and wading birds. This would provide a good measure of overall ecosystem health, and help track the recovery of the system and progress towards the achievement of the Water Quality Objectives.

It is noted that the analytical techniques which are currently being utilized by Scientific Services, and which are suitable for freshwater, will need to be re-evaluated once tidal ingress to the estuary increases.

In addition, some of the more variable and key parameters need to be measured more regularly (eg. oxygen, ammonia, temperature and salinity). This should preferably be done on site from a small lab to be included in the new building. Amongst other things, it should be designed to provide an early warning system for anoxic conditions which could then trigger appropriate management interventions – for example, deployment of aerators during low oxygen conditions. Current monitoring is limited to surface samples, but when these samples show a drop in oxygen of below the target value (6 mg/l), additional samples should be taken lower down in the water column to determine the extent of the problem and need for intervention.

5.2 **Conservation, Planning and Sustainable Use**

*5.2.1 **Legal status of the Reserve***

The overarching management strategy for the area to date has been its declaration as a protected area since 1984 – initially as a Nature Area, and then as a Protected Natural Environment in terms of the Environment Conservation Act (1989) and then the NEM: Protected Areas Act (2003). This was successful in as much as it led to

the acquisition of the land (with WWF as the landowner), the establishment of an Advisory/Management Committee, and the development of a Management Plan in 1994.

Currently, however, the proclaimed boundaries of the reserve are not in line with the area which is currently being managed. This is being addressed as part of a new application to CapeNature by the City to have the reserve declared a Contract Nature Reserve. The formal submission of this application should be completed as soon as possible.

5.2.2 Urban Development and Planning

While there are no further opportunities for significant developments along the boundaries of the estuary itself, the west coast area to the north of Rietvlei is amongst the fastest growing in the City. The Integrated Zoning Scheme and the Spatial Development Plan for the City – currently under development – must ensure that any further rezoning for urban development in areas upstream and/or likely to impact on the estuary must be subject to stringent environmental conditions. These should include:

- the establishment of biodiversity corridors and buffer zones;
- installation of stormwater drainage in line with the Policy on Minimising the Impact of Stormwater from Urban Development on Receiving Waters;
- retention of existing natural wetlands on the site and incorporation into the development;
- restrictions on the construction of overhead transmission lines in the vicinity of the estuary;
- establishment of Environmental Liaison Committees to oversee compliance with the environmental conditions of the approvals.

5.2.3 Conservation and ecotourism development

A conservation development framework needs to be developed for the Northern District – which includes the Diep Estuary (cf that developed for the Southern District). Issues to be addressed include:

- The development of an on-site management facility, including office space for reserve staff and a small laboratory to facilitate the management of water quality;
- The erection of fencing or construction of berm and channel boundaries around the entire reserve.
- The establishment and/or upgrading of links to the Blaauberg Conservation Area, Potsdam Outspan, and Zoarvlei;
- Additional bird hides and other bird viewing facilities should be erected, and screened walkways for the existing ones constructed, possibly using reeds;
- Breeding features for birds should be established, particularly in and around the south lake (for example, an island at the tip of the Peninsula);
- Walking trails to be developed;

- o Plans to relocate the model aircraft site in 2014 (when their permit expires) need to be finalized.
- o A corridor between Vissershok and Atlantis needs to be provided for in the Catchment Management Strategy.

*5.2.4 **Biological research and monitoring***

Despite the fact that the area has been a Nature Reserve since 1984, there are a number of taxonomic groups which have not been studied in any detail. At the same time, as a consequence of the physical and chemical changes to the system, there have been changes to the biodiversity. It is therefore recommended that a structured programme be put in place to fill these gaps in knowledge through projects undertaken by the Nature Conservation students, and in collaboration with tertiary institutions[6]. This should include the identification of any threatened species present within the area.

Biological monitoring using indicator species should also be put in place, and a photographic record of changes to the reserve vegetation should be kept based on aerial photos (especially for historical changes) and fixed-point photography (cf. the MCA system).

*5.2.5 **Rehabilitation and habitat restoration***

Rehabilitation of the estuary must necessarily include issues of water quantity and quality. However, since these have already been addressed in earlier sections of this plan, this section is focused primarily on the biological aspects.

A rehabilitation plan covering both aquatic and terrestrial areas needs to be developed. This should include:

- The re-introduction of primary producers (such as *Zostera*) and benthic invertebrates, such as sandprawns into the lagoon[7]. However, these should not be attempted until the water and sediment quality have improved to suitable levels;
- Salt marsh vegetation (*Sarcocornia*) – although there is not much experience in propagating this.
- The establishment of sand plain fynbos in the Milnerton Ridge area..

Prior to this, there needs to be groundtruthing of the terrestrial vegetation which was originally low-lying strandveld and sand plain fynbos. It is noted that the shoreline areas around parts of the vlei have been transformed, and the substrate is no longer the same. In these areas, therefore, consideration could be given to bringing in plants which would specifically enhance bird habitat – for example, to promote the establishment of a heronry. Although there was not a heronry historically, this issue should be looked at in regional terms. For example, since the number of breeding

[6] It is noted that during 2010, a student project was completed on frogs in the reserve.
[7] It is noted that sandprawns have now returned to the lower lagoon, although it is not certain in what quantities.

pairs of herons at Century City has been reduced from 1,200 to 250 pairs, Rietvlei could provide opportunities to increase numbers in the region.

There was also a suggestion that consideration be given to “shallowing” the edges of the south lake to recreate pans, and possibly even to construct an island, to provide additional habitat for wading birds. However, there was concern over the possible impacts on indigenous fish species in the lake (eg. *Galaxius zebratus*) which require a minimum average depth of 50 cm. This proposal therefore needs further discussion.

Another area which needs attention is the erosion on the shores of north lake. These need to be stabilized.

*5.2.6 **Invasive species***

Initial work on an invasive alien species management plan for the Nature Reserve has consolidated existing information on invasive species, including:

- Aquatic and semi-aquatic plants – at least 9 species reported although some of these have yet to be verified;
- Grasses – at least 5 species reported, with *Paspalum* and *Pennisetum* (Kikuyu) being of greatest concern. *Paspalum* or vleigrass, was recorded as far back as 1985, and was reported by Withers et al (2002) to cover an area of some 78.54 ha (27% of the area studies – essentially Rietvlei). It is outcompeting the indigenous sedgeland species and is encroaching onto the Open Pans – the primary habitat for wading birds (see Fig. below).
- Other terrestrial plants – these have been the focus of initial work on invasive species in the area and the woody species at least are now largely under control;
- A variety of alien fish, mostly deliberately introduced;
- Mallard ducks – mainly in the lagoon area;
- Indigenous invasives such as *Typha* and *Phragmites* which only occurred in localized areas prior to 1967, but which have expanded their distribution significantly as a result of the increased nutrient levels.



Fig. 12 *Paspalum vaginatum* encroaching onto the pans at Rietvlei

A comprehensive invasive alien species management plan for the reserve needs to be completed as soon as possible. This should be in line with relevant national, provincial and city-wide policies and strategies with first steps including:

- The identification and GIS mapping of invasive species from all taxa;
- Assessment of the impacts of the IAS on conservation goals and management objectives;
- The identification of pathways/vectors for their introduction and dispersal;
- Prioritisation of species and pathways;
- Development and implementation of species-specific management strategies for priority species;
- Development and implementation of management strategies for priority pathways;
- Establishment of an early detection and rapid response strategy and an ongoing monitoring and evaluation system to determine the effectiveness of management interventions;
- Identification of needs and gaps in information and management capacity.

A plan to manage the reedbeds (*Phragmites* and *Typha*) also needs to be developed. In developing the plan, consideration needs to be given to the various management options which are available, including:

- Mechanical harvesting
- The manipulation of salinity to manage, for example, the *Typha capensis* problem in the Dolphin Beach ponds
- Herbicides
- Burning.

5.2.7 ***Resource Utilisation***

Fishing in the reserve is limited to recreational fishermen with appropriate permits and even then, only on specific days and/or sites, although there is thought to be a significant amount of illegal fishing. The exploitation of bait organisms is, however, allowed and catches have historically included mainly the sandprawn (*Callianassa*), harder and springer.

However, the *Callianassa* population has suffered a significant reduction in recent years as a result of water quality problems, and even though they appear to be returning now it is suggested that future exploitation should be controlled through the introduction of closed areas and seasons.

5.3 **Education and awareness**

Public awareness around the role and importance of estuaries and wetlands is crucial for the effective implementation of management programmes. Some specific proposals for improving the education and awareness activities around the Diep Estuary include:

- In the longer term, there should be a bigger public education and information centre, and consideration should be given to expanding the existing one.

- There should be displays on wetlands function and other interpretive material, including signage and a brochure on the rehabilitation programme.
- The information should include a component on water quality.
- The programme with school groups should be expanded and consideration should be given to having trained Xhosa-speaking bird-guides (cf. Intaka).
- Links should be established with the Two Oceans, the Wetland Forum and WESSA, especially in relation to opportunities for teacher training.
- A DVD documenting the rehabilitation of the Diep Estuary system should be produced. The Film Academy should be approached to do this as a student project/s. Another option would be to approach 50/50.
- A Catchment-to-Coast brochure highlighting the importance of landcare in protecting the Diep Estuary should be developed and distributed, especially to farmers in the catchment.
- There should be a specific initiative to make all relevant departments within the City aware of the current efforts to rehabilitate the Diep Estuary so as to ensure that decisions of such departments do not undermine the rehabilitation programme.

6 RESOURCE REQUIREMENTS

6.1 Staffing

The current level of staffing at the Nature Reserve is insufficient to cope with the additional work which will be required for full implementation of this Action Plan. Since the City does not have any additional posts available, other options for boosting the human resource capacity therefore need to be investigated. These include raising funds and appointing staff in partnership with relevant NGO's and other organizations.

In addition, there should be two students and an intern.

6.2 Finances

Many of the proposed actions can be undertaken by existing staff in the relevant organizations, and within existing budgets – for example, costs associated with the ongoing water quality monitoring programme and the pumping of water during the summer from the north lake onto the central pans. However, there are a number of new activities which have been proposed and for which funding has not yet been secured. These include:

- A number of projects which fall clearly within the mandate of the competent authorities, but for which funds have not as yet been secured because of competing priorities (eg. the Reserve Determination/s which is estimated to require R 1.2 million);
- Projects which have been recommended by studies funded by the City, but for which funds have not yet been secured (eg. the recommendations on source reduction measures arising from the study on the East Bank stormwater drains).[8]
- Project proposals which have arisen during the EMP development process and which at present are not covered by the budget of any particular department and for which funds have not been forthcoming despite the fact that some of them are critical to the effective management of the estuary.

The costs for the latter category of projects are estimated to be in the order of R 1.5 million. These could be covered by the Rietvlei Trust Fund which currently stands at around R 5 million. It is therefore recommended that the issues around accessing these funds be resolved as soon as possible so that at least some of the priority projects can be implemented.

Other potential sources of funds should also be investigated.

[8] It is understood that these are likely to amount to several hundred million rand, and it is unclear as to whether/when they will be implemented.

7 ACTION PLAN

The Situation Assessment (2008) highlighted significant problems in the Diep Estuary, with the following being identified as priorities:

- Water quantity and hydrodynamics
- Water quality
- Changes to biodiversity
- Conservation and legal status.

During the development of the Estuary Management Plan (EMP) a large number of proposals aimed at addressing these issues emerged. These were captured in the Action Plan 2009 – 2013 set out in Section 7 of the first edition of the Estuary Management Plan (2008). Since then, some of the proposed actions have been completed, while new proposals have emerged. This second edition of the EMP therefore includes a revised version of the Action Plan covering the period 2011 – 2015 in Section 7.2 below. There is also an updated list of those considered the highest priority in 7.1 below.

7.1 Revised List of Priority Actions

The status of the initial list of priorities is summarized in the table below, while a list of the acronyms used here and in subsequent tables can be found in Annex I:

	Action	Status	Constraints
1	Preliminary Determination of Ecological Reserve & Resource Quality Objectives	Some low confidence reserve determinations have been completed for parts of the catchment.	This is a DWA responsibility, & the Diep is not high priority at the national level of the Department, so funding has not been available.
2	Studies on the hydrology & geohydrology of the estuary	TOR in place but study not initiated. Partial funding available from TMF.	There have been difficulties in accessing the Rietvlei Trust Fund.
3	Topographic survey & DEM	Completed	
4	Study on East bank stormwater	In progress but behind schedule	
5	Field trials around salinity regime/ effluent management	Modified study implemented and completed	Infrastructural limitations prevented further reduction of Potsdam effluent within the time-frame.
6	Expansion of water quality monitoring programme to include sediments & biota	Once-off survey of heavy metals in sediments & biota funded by DEA & DP	Insufficient capacity at the City's Scientific Services & existing Service Contract.
7	On-site water quality monitoring capacity	Incorporated into plans for on-site office block	Building plans on track for completion in 2011.
8	IAS management plan	Preliminary draft completed, new proposals tabled.	Insufficient funds for work required (comprehensive assessment of
9	Formalisation of new reserve boundaries	In progress	Coordination with submissions for other reserves.
10	Assistant Reserve Manager		No posts available.

During the first two years of the implementation of the EMP, a Record of Decision (ROD) was issued giving initial approval for the expansion of Potsdam from 47 to 100 MgL/day. Since the EIA did not investigate alternative disposal options for the effluent, this appears to assume that the additional effluent will be discharged into Rietvlei. This will undermine the achievement of many of the operational objectives of this plan and alternatives need to be investigated as a matter of urgency.

Based on the above, the updated list of priorities is as follows:

i) Investigation into alternative options for the disposal of effluent from Potsdam, including recycling, re-use and disposal to sea;
ii) Sourcing of funding for a Comprehensive Determination of the Ecological Water Requirements and Resource Quality Objectives for the Estuary;
iii) Sourcing of funding for studies on the hydrology and geohydrology of the estuary possibly by resolving the issues around the use of funds from the Rietvlei Trust Fund;[9]
iv) Installation of a permanent salinity recorder/s;
v) Implementation of source reduction measures for the stormwater inputs along the East Bank of the estuary as per recommendations of the study underway;
vi) Institution of regular (at least every 5 years, and preferably every two years) surveys of heavy metals and other toxic contaminants in sediments and biota;
vii) Compilation of leaflet/brochure on potential health impacts of consumption of fish for distribution in surrounding communities;
viii) Construction of the on-site administrative block, including facilities for on-site monitoring capacity for key water quality parameters;
ix) Completion and implementation of the invasive species management plan;
x) Conclusion of an MoU with the Department of Agriculture Forestry and Fisheries (DAFF) regarding fish surveys.

In addition, while the catchment is beyond the scope of this plan, it is recommended that riverine buffer zones be implemented on a pilot basis in the catchment as per the study undertaken by GEOSS.[10]

[9] The results of this study would contribute to the reserve determination. Moreover, if it is implemented, it will include the installation of salinity recorders, in which case the next point will fall away.

[10] Conrad, J. and Carstens, M (2010) A methodology and guideline for improved hydrological functioning due to poor agricultural practices in the Diep River catchment, Western Cape. GEOSS Report No: G2010/08-06

7.2 Detailed Action Plan: 2011 - 2015

WATER QUANTITY MANAGEMENT				
Steps	**Date**	**Responsibility**	**Estimated Budget**	**Indicator**
Objective A: Re-establishment of a regime more typical of an estuarine system				
1. Comprehensive Ecological Reserve Determination for the estuary.	2011- 2013	DWA + Manager ERMD	R 1.2 million (including det. of resource quality objectives)	Target value for water quantity in place.
2. Investigation into alternative options for the disposal of Potsdam effluent	2011	Manager: WSS	TBD	Alternative options identified, assessed & costed, but implementation likely to be beyond the time-frame of this Action Plan.
3. Development & implementation of a programme for the reduction of discharges from Potsdam during the summer months to 10 MgL/day or below (at least at high spring tides).	2011 - 2015	Manager: WSS (Potsdam, Water Demand Management Committee, Reticulation) + Manager: ERMD	TBD	Achievement of optimal salinity regime and mouth conditions (closes late summer for a short period).
Objective B : Management of water levels, flood risk and seasonal drying				
1. Pumping of water from north lake onto the central pans during summer months as required (until an alternative solution has been determined).	January-April annually	Manager: ERMD (BM and E & H) + Manager: Roads & Stormwater (Operational Division)	R 200,000/ year	Reduction in complaints about dust.
2. Maintenance excavations of the bypass channel from below the Potsdam outlet to be discontinued.	Ongoing	Manager: ERMD + Manager: Roads & Stormwater, (Operational Division)	N/A[11]	Channel depth reduced.
3. Sourcing of funds to undertake study of hydrology & geohydrology of the estuary + execution of study.	2011/2013	Manager: ERMD: BM & Chair: Rietvlei MWG	R 375,000	Improved understanding of water balance in the system, and therefore capacity to manage it.

[11] N/A in relation to budget implies that the work will be done in-house and can be accomplished by existing staff and within normal running costs.

4. Development of a hydro-dynamics model based on the above data to support management decisions.	2013/14	ERMD: Manager: BM & Chair: Rietvlei MWG	TBD	Improved capacity to manage hydrodynamics.
5. Based on the hydrodynamics model, implement alternative solution.	2014 onwards	Manager: ERMD (BM and E & H)	TBD	Effective management of water levels, especially in the central pans during summer.
6. Ongoing monitoring of water levels, salinity etc. at stations established during hydrology study. (Could be done in-house, or by consultant).	2013 - 2015	Regional Director: DWA + Manager: Catchment, Stormwater & River Management Branch (CSRM)	R 5,000 per sampling run (if done by consultant).	Database to support management of hydrodynamics.
7. Study of the sediments – rates of sedimentation & source of sediments. Should include a bathymetric survey of the bypass channel every second year to assess fill rates.	2011/2012	Manager: ERMD: BM & Chair: Rietvlei MWG	TBD	Improved understanding of sedimentation + management proposals.
8. Development of a Disaster / Flood Management Plan, including the installation of an early warning system at the mouth.	2011	Manager: CSRM, Head: Disaster Management + Regional Director: DWA	TBD	Plan in place and water level recorder + extras in place.
9. Implement riverine buffer zones/set-back lines in the catchment	2011/12	Department of Agriculture	N/A	Reduction in sediment loads in the estuary

ESTUARINE ENVIRONMENTAL QUALITY MANAGEMENT				
Steps	**Date**	**Responsibility**	**Estimated Budget**	**Indicator**
Objective C : Establishment of binding Resource Quality Objectives				
1. Determination of Resource Quality Objectives using Rapid Determination methodology	2011	Regional Director: DWA	R 250,000	Resource Quality Objectives in place + requirements for Potsdam.
2. Gazetting of Resource Quality Objectives.	2011	Regional Director: DWA	N/A	Binding Resource Quality Objectives in place.
3. Sediment quality guidelines based on international practice.	2011/2012	DEA (Oceans & Coasts)	N/A	RSA sediment quality guidelines in place.
Objective D : To meet interim and longer-term water quality objectives				
1. Investigation into alternative options for the disposal of Potsdam effluent (see also A2).	2011	Manager: Water and Sanitation Services	TBD	Alternative options identified, assessed and costed, but implementation likely to be beyond the time-frame of this Action Plan.
2. Review of Potsdam permit standards and stormwater quality objectives should water quality in the receiving waters not improve.	January 2013	Manager: ERMD (BM and E & H) Regional Director: DWA, & DEA (Marine Pollution)	N/A	Revised permit conditions for Potsdam effluent and revised stormwater quality objectives.
3. Implementation of source reduction measures for contaminants in stormwater (as recommended in study).	2011 – 2015 & beyond	Manager:CSRM	TBD	Stormwater complies with recommended quality objectives.
4. Institution of regular surveys of toxic contaminants in sediments & biota (preferably every second year)	From 2012	Managers: CSRM/ ERMD	TBD	Improved information on trends in contamination.
5. Mapping and assessment of stormwater drains along the western and northern banks of the estuary.	2011	Manager: CSRM	TBD	Inclusion of all stormwater outlets on GIS map, and report on quantity and quality of flows.
6. Comparative assessment of pollution loads from various sources.	2012	Manager: CSRM	TBD	Comprehensive understanding of pollution sources to the estuary.

Steps	Date	Responsibility	Estimated Budget	Indicator
Objective E : Reduction in accidental discharges to the estuary				
1. Development of system for recording & managing blockages through preemptive maintenance	2011	Manager: Water and Sanitation Services: (Reticulation)	N/A	Reduction in blockages..
2. Install back-up generators (fixed or mobile) to cater for power outages.	2011/2012	Manager: Water and Sanitation Services: (Reticulation)	TBD	Reduction in frequency of accidental discharges as a result of pump station failures.
3. Inclusion of Reserve Management in incident reporting system, & development of a Response Plan.	2011/2012	Manager: Water and Sanitation Services: Reticulation + Manager: ERMD	N/A	Improved communications around and response to accidental spills.
Objective F : To reduce inputs from informal settlements				
1. Development of a community health & sanitation awareness programme	2011 – 2012	Regional Director: DWA + Manager: ERMD	R 50,000	Increased utilization of sanitation facilities.
Objective G : To manage short-term fluctuations in critical water quality parameters				
1. Establish on-site monitoring of key parameters.	2012	Reserve Management	TBD	Early warning of potential water quality problems eg. low oxygen events.
2. Develop response plan in the event of changes to critical parameters eg. aerators in the case of low oxygen.	2012	Reserve Management	TBD	Effective response to low oxygen and pollution events.

BIODIVERSITY MANAGEMENT				
Steps	**Date**	**Responsibility**	**Estimated Budget**	**Indicator**
Objective H : To improve understanding of the ecological requirements of the central pans (wading birds)				
1. Review of relevant literature & expert consultation.	2011	Manager: ERMD (BM and E & H)	R 20,000	Recommendations on ecological requirements in management of water levels in central pans.
Objective I : To improve knowledge of the biology of the estuary				
1. Identify gaps in the knowledge base and prioritise taxonomic groups, species, habitats etc.	2011	Reserve Manager & Chair: Rietvlei MWG	N/A	List of priority biological studies.
2. Develop a programme to address priorities, through student projects.	2011 – 2015	Reserve Manager & Chair: Rietvlei MWG	N/A	Structured programme in place to address priority knowledge gaps.
3. Approach tertiary institutions for possible involvement in this programme.	2011	Reserve Manager & Chair: Rietvlei MWG	TBD	Externally funded projects involving tertiary institutions.
4. MoU in place with DAFF on fish surveys	2011	CapeNature/DAFF/Reserve Manager	N/A	Improved understanding of the fish populations in the estuary.
Objective J : Invasive species management				
1. Development of an invasive species management plan for the RWNR (terrestrial and aquatic).	2011	Reserve Management + City's Invasive Species Unit (ISU)	R 60,000	Integrated approach to addressing invasive species in the estuary/Nature Reserve.
2. Ongoing maintenance clearing of terrestrial invasives (woody plants) in and near the reserve.	Ongoing	Reserve Management	R 100,000 for 2010/11	Priority areas cleared of woody plants.
3. Development & implementation of plan on invasive grasses (esp. *Paspalum*)	2011-2013	Reserve Management + City's ISU	TBD	Reduction of extent of invasive grasses
4. Development & implementation of programme on aquatic invasives.	2012- 2014	Reserve Management + City's ISU	TBD	Reduction in aquatic invasives.
5. Annual surveys with EDRR/SANBI for emerging species (eg. *Lythrum*) + establishment of volunteer network.	2011 - 2013	Reserve Management + EDRR + ISU	N/A	Early detection & removal of potential invasives

Steps	Date	Responsibility	Estimated Budget	Indicator
Objective K : Rehabilitation of biodiversity				
1. Rehabilitation of sand plain fynbos in Milnerton Ridge area.	2011 - 2015	Reserve Management	TBD	Sand plain fynbos re-established.
2. Rehabilitation of aquatic areas (once water quality has improved).	2013	Reserve Management	TBD	Aquatic biodiversity restored.
3. Rehabilitation of salt marsh vegetation.	2013	Reserve Management	TBD	Salt marsh vegetation restored.
4. Annual discussions with Working for Wetlands on priorities for wetland rehabilitation.	2011/2015	Reserve Management + Working for Wetlands	TBD	Partnership with Working for Wetlands & funding for agreed priorities.

CONSERVATION AND PLANNING INITIATIVES				
Steps	**Date**	**Responsibility**	**Estimated Budget**	**Indicator**
Objective L : Development and upgrading of Reserve infrastructure				
1. Appointment of building contractors	2011/12	Reserve Management + City Planners/Works	Approx. R 4 million	Construction of office block completed.
2. Development of a detailed assessment of fencing requirements, including budget and motivation.	February, 2011	Reserve Manager	TBD	Submission of budget request for at least priority fencing requirements.
3. Installation of fencing in priority areas	2012	Reserve Management + City Works	TBD	Priority areas fenced & reduction in wildlife kills.
Objective M : Conservation & ecotourism development				
1. A Conservation Development Framework for the North District – which includes the estuary - should be put in place (links, bird hides, breeding features, walking trails etc).	2011	Manager: ERMD + SDI & GIS + Reserve Manager	N/A	Structured approach to development of appropriate facilities, features etc in the reserve.
2. Implementation of the CDF.	2011 - 2015	Reserve Management	TBD	Facilities, features etc. in place.

LEGAL/POLICY MEASURES				
Steps	**Date**	**Responsibility**	**Estimated Budget**	**Indicator**
Objective N : to formalize the expanded boundaries of the reserve				
1. Formal submission of application for Contract Nature Reserve status – including expanded reserve boundaries to the Province (has been approved in principle).	2011	Manager: ERMD: BM	N/A	Rietvlei recognized as a Contract Nature Reserve with expanded boundaries.
Objective O : to formalize the Estuary Management Plan				
1. The EMP – including the Zonation Plan – to be formalised according to the National Protocol (to be finalized in March, 2011)	2011	Manager: ERMD: BM & Chair: Rietvlei MWG	N/A	Estuary Management Plan formally adopted.
Objective P : to improve protection of the reserve from encroachment of private gardens and invasive plants				
1. Make submission to City's IAS policy process on possible development of an appropriate by-law or other mechanism to facilitate this.	2011	Manager: ERMD: BM, Chair: Rietvlei MWG, City ISU	N/A	By-law approved and implementation initiated.

EDUCATION AND AWARENESS-RAISING				
Steps	**Date**	**Responsibility**	**Estimated Budget**	**Indicator**
Objective Q : To improve public awareness on the importance of wetlands in general and the Diep Estuary in particular				
1. Update and improve displays, posters brochures etc. To include socio-economic value, link to River Health Programme etc.	2011	Reserve Manager + Environmental Communications + Friends of Rietvlei	R 50,000	Updated material available for distribution.
2. Establish contact with Intaka re Xhosa-speaking guides.	2011	Reserve Manager + Avifauna Advisor	N/A	Xhosa-speaking guides available for school programme
3. Establish links with Two Oceans, the Wetland Forum etc re teacher training opportunities.	2011	Reserve Manager + Friends of Rietvlei	N/A	Teacher training programmes include material on wetlands
4. Develop a Catchment-to-Coast brochure to promote understanding of the links to catchment activities.	2011	Reserve Manager + Department of Agriculture (Landcare)	R 25,000	Brochure available for distribution to farmers, miners etc in the catchment.
Objective R : To promote awareness of and compliance with the Estuary Zonation Plan				
1. Displays, posters and brochures showing the zoning	July, 2012	Reserve Manager + ERMD (Communications) + Friends of Rietvlei	R 25,000	Awareness of Zonation Plan.
Objective S : To document and promote awareness of the rehabilitation initiative				
1. Investigate options for the production of a DVD.	2011	Reserve Manager + ERMD (Communications) + Friends of Rietvlei	TBD	Partnership with relevant institution.
2. Implement	2011 - 2015	Reserve Manager + ERMD (Communications) + Friends of Rietvlei		DVD documenting rehabilitation process, with clips aired on 50/50 & other relevant programmes
Objective T : To promote awareness of health & sanitation issues around the estuary				
1. Develop brochure in relevant languages	2011	Reserve Manager + Environmental Communications + DWA	R 25,000	Brochure available for use in community education programme.
2. Meetings with community leaders	2011-2012	Regional Director: DWA	N/A	Support of community leaders for educational programme.

3. Compilation of a leaflet/brochure on potential health impacts of consumption of fish from Rietvlei & distribution in surrounding communities	2010/11	DEA & DP	TBD	Community awareness of potential health impacts of fish from Rietvlei.
Objective U : To promote and market the Reserve				
1. Improve signage in line with new policy	2011	Reserve Manager + Roads Department	TBD	Increased number of visitors
2. Brochures provided to Cape Town Tourism	2010 (ongoing)	Reserve Manager	N/A	Increased number of visitors

RESOURCE REQUIREMENTS				
Steps	**Date**	**Responsibility**	**Estimated Budget**	**Indicator**
Objective V : To increase capacity of human resources				
1. Training in estuaries management (C.A.P.E. Training)	2011/2012	Manager: ERMD	R 10,000	Staff capacity increased.
Objective W : To improve availability of financial resources to implement the Action Plan				
1. Investigate mechanisms to access the funds from the Rietvlei Trust Fund and/or have the funds transferred to Friends of Rietvlei	2011	Manager: ERMD/ Rietvlei Management WG	N/A	Funds available to implement relevant aspects of the EMP/Action Plan.
2. Identify and target additional potential sources of funding	2011 ongoing	ERMD/ Rietvlei Management WG	N/A	Funds available to implement relevant aspects of the EMP/Action Plan.

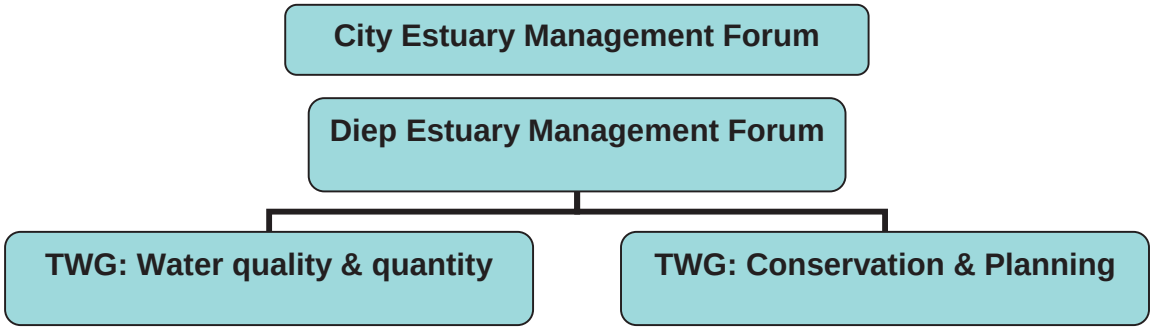
8. FRAMEWORK FOR IMPLEMENTATION

A Management Committee for the Rietvlei Nature Reserve has been in existence since the establishment of the reserve, and has taken on the responsibility for overseeing the implementation of the EMP. The original committee has been expanded to include a number of additional members, although it is noted that not all members are active.

Members of the committee include:

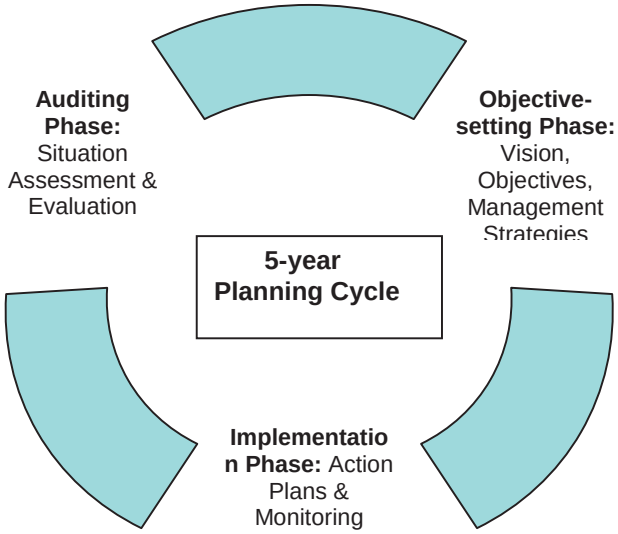
- City of Cape Town (various different divisions)
- Department of Water Affairs
- Cape Nature
- WWF
- Chevron
- Friends of Rietvlei
- Milnerton Aquatic Club
- Bird expert
- Department of Environmental Affairs (DEA – Oceans & Coasts (Estuaries & Pollution Divisions)
- Department of Agriculture (Landcare)
- Department of Environmental Affairs and Development Planning (W.Cape)
- Ratepayers

In addition, there should be two Technical Working Groups to continue providing guidance to the implementation of relevant aspects of the plan.



9. AUDITING AND EVALUATION

The Situation Assessment which preceded the development of this Estuary Management Plan should be regarded as the first of 5-yearly Evaluations in an ongoing cycle of planning for the management of the estuary as shown in the diagram below.



However, particularly in the initial 5-year period, it is recommended that progress on the implementation of the EMP is audited on a more regular basis as follows:

- There should be quarterly meetings of the Diep Estuary Management Forum (Rietvlei Management Working Group), with the minutes of these meetings being made available to the City Estuary Management Forum, CapeNature, the Provincial Coastal Committee, and other relevant bodies.
- There should be annual report backs to a open Public Meeting on progress in terms of implementation of the EMP/Action Plan. The report should be made on the basis of an annual “mini-audit” of progress by an external consultant, with the appointment of the consultant being facilitated by the Forum.

In the case of this first 5-year period, where a number of the actions in the second half of the period are dependant on the outcome of studies or other actions scheduled for the first two years, it is also proposed that a more thorough audit take place at the mid-point of the 5-year period, as well as at the end. This would be accompanied by revisions and/or refinements to the current EMP and Action Plan.

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Annex I: List of Acronyms:

BM	Biodiversity Management Branch (City)	EIA	Environmental Impact Assessment
CSRM	Catchment, Stormwater & River Management Branch (City)	EMP	Estuary Management Plan
DAFF	Department of Agriculture, Forestry and Fisheries	ERMD	Environmental Resource Management Department (City)
DEA	Department of Environment Affairs (National)	IAS	Invasive alien species
DEA & DP	Department of Environmental Affairs & Development Planning (W.Cape)	TBD	To be determined
DEM	Digital Elevation Model	TMF	Table Mountain Fund
DWA	Department of Water Affairs (National)	WSS	Water & Sanitation Services (City)
E & H	Environment & Heritage Branch (City)		

Annex II: Catchment Management Strategy for the Diep Estuary

In order to effectively manage the Diep Estuary, activities in the catchment which affect the estuary must be addressed through a Catchment Management Strategy. Issues to be covered include:

- A more accurate determination of the base flow of the river, and factors impacting the flow such as:.
  - the capacity of farm dams (registered and unregistered),
  - clearing of alien plants along the river channel, especially gum trees
  - the promotion of appropriate agricultural practices to reduce infestation of invasive alien species.

- Pollution sources in the river catchment including:

  - Waste-water treatment works (eg. Fisantekraal, Malmesbury) – and it is noted that the Malmesbury WWTW is currently not meeting the required standards.
  - Waste disposal sites eg. Vissershok.
  - Stormwater from urban areas (formal and informal – eg. on the Mosselbank)
  - Agriculture (runoff of fertilizers, pesticides etc, as well as discharges and runoff from eg. dairy farms). Many farms allow cattle to drink from the river which results in significant trampling, erosion and also contributes to pollution due to fouling of the water by cattle manure.
  - Mining.

- Sources of sediment:

  - Erosion as a result of poor agricultural practices.
  - Mining.

C.A.P.E. Estuaries Programme

Estuary Management Plan
for the
Zandvlei Estuary



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Prepared by Coastal & Environmental Consulting
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The proposals made in this plan are based on a series of discussions and workshops involving numerous individuals and organizations from relevant government agencies, research and academic institutions, non-governmental organizations and representatives of the local resident's associations. The active and enthusiastic participation in the process augurs well for the successful implementation of this plan and the rehabilitation of the estuary and we would like to thank all those involved for their very valuable contributions.

We would also like to note that while all the publications cited are listed in the bibliography, much of the information was taken from a few more substantial reports which are listed below. In these cases, the extent of the quotations would have made it cumbersome to reference every point in the text. We would therefore like to acknowledge them here as primary sources of information:

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1. INTRODUCTION

1.1 The management of estuaries in South Africa

The term estuary refers to the body of water which forms the interface between a river and the sea into which it flows. Estuaries may be permanently or periodically open to the sea. When open, they are characterized by fluctuations in water levels related to the tides, and by salinities which are measurably higher than freshwater as a result of seawater intrusion.

Estuaries are generally highly productive ecosystems, and provide a range of goods and services ranging from nursery areas for juvenile fish, to stopovers for migrant birds, and recreational opportunities for local inhabitants. Their productivity, combined with their natural beauty and the shelter they provide also means that they are highly sensitive and vulnerable to development, with many towns and cities, ports and harbours being deliberately located in and around them. As a result, many estuaries have been seriously degraded.

South Africa has approximately 260 estuaries, of which 62 are located within the Cape Floristic Region. Despite the fact that their value – particularly from a biodiversity perspective – has long been recognized, there has been a lack of effective management, largely due to the fact that they did not fit clearly within the mandate of any one government Department. This was highlighted during the recent development of a National Biodiversity Strategy and Action Plan, and has now been addressed through the inclusion of relevant provisions in the National Environmental Management: Integrated Coastal Management Act, 2008. Amongst other things, the Integrated Coastal Management Act introduces a requirement for Estuary Management Plans.

In parallel with the development of the legislation, the C.A.P.E. Estuaries Programme has provided funding for the development of Estuary Management Plans for a number of priority estuaries in the Cape Floristic Region, including Zandvlei.

1.2 The management of Zandvlei

The Zandvlei catchment falls entirely within the boundaries of the City of Cape Town, and is bordered by Muizenberg Mountain, Silvermine Plateau, Constantiaberg, Cecilia Ridge, Wynberg Hill, and a less conspicuous watershed along the eastern boundary. It is a relatively small catchment comprising an area of 92 km^2 or 9,655 ha, and is drained by a number of rivers and streams of which the main ones are the Little Princess Vlei Stream, Westlake Stream, the Keysers River, Langvlei Canal and the Sand River Canal/Diep River.

These rivers converge on Zandvlei, with the Keysers River and Westlake Stream entering it through an extensive reed bed on its north-western margin, while the Sand River canal enters the vlei east of Wildwood Island. The wetland area covers some 60 ha, while the main body of the vlei is 56 ha. In addition, the system includes a marina of 31 ha along its eastern margin, and an outlet channel of 9 ha which links to the sea on the north-western shore of False Bay.

For purposes of the Estuary Management Plan, the estuary is defined as the area from the estuary mouth, to the upstream end of the wetlands. Both the northern and lateral boundaries comprise the 100-year floodline as shown in Figure 1 below.

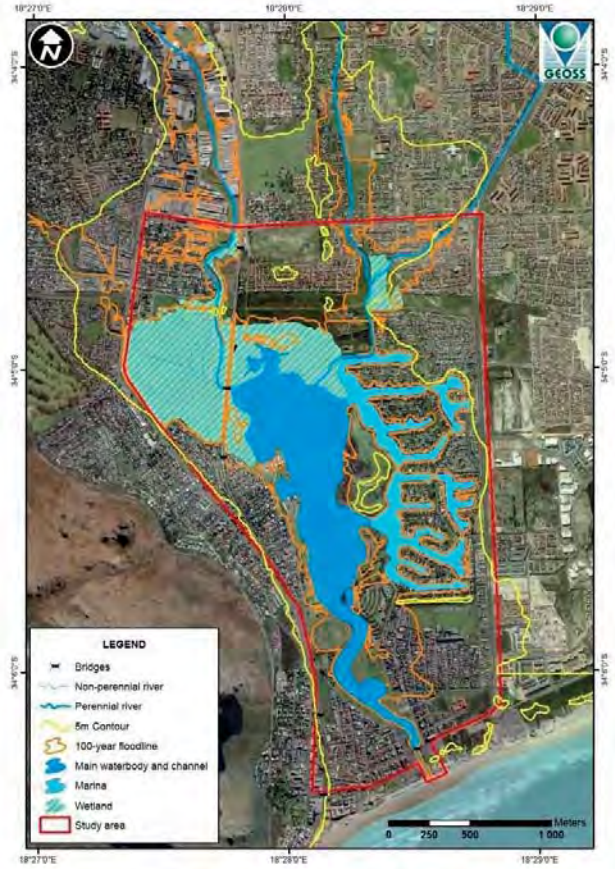


Figure 1: The Zandvlei Estuary comprising the channel, vlei, marina and wetland.

Land-use in the catchment is highly varied ranging from light industry to housing, agriculture, forestry and conservation. In general, the more heavily urbanized areas – including industrial and commercial areas and middle to lower-income housing – are situated in the eastern part of the catchment (42%) centering around the Diep and Sand Rivers and Langvlei Canal. Agricultural land, forested areas and middle to high-income housing are located in the west of the catchment (58%) along the Keysers River and Westlake Stream and their tributaries. The light industrial area of Retreat however, is adjacent to the Keysers River a short distance upstream of where it discharges into Zandvlei. A map of land-use in the catchment, reproduced from the Sand River Catchment Management Plan is shown in Fig. 2 below.

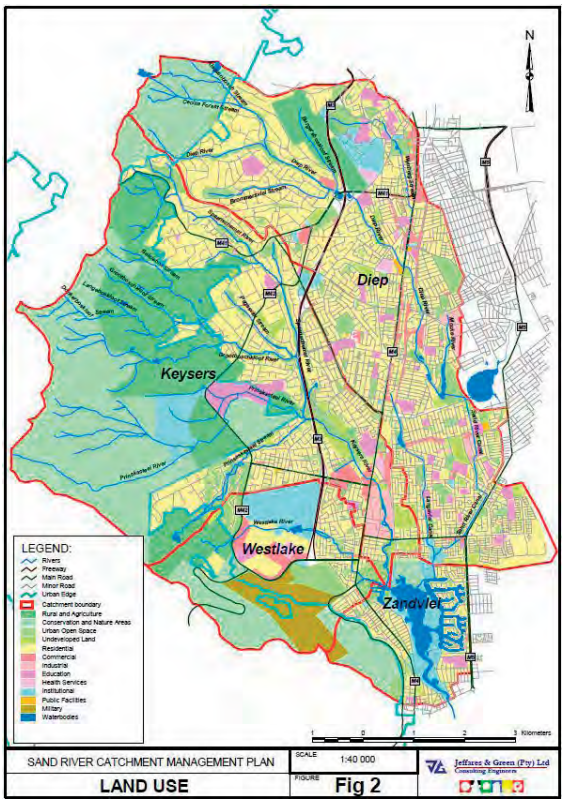


Fig. 2 Land-use in the catchment (reproduced from the Catchment Management Plan (Jeffares & Green, 2003)

Although the catchment as a whole has a relatively low population, the eastern parts, together with lower reaches of the river – including the estuary – fall within a highly urbanised environment. The 1996 census data put the population figure at 10,472 for Muizenberg, Lakeside and Marina da Gama alone while the projections from Thornton et al (1995) quoted above, suggest that the population for the catchment as a whole could be of the order of 100,000.

Despite the modifications that have taken place, Zandvlei remains highly valued for its natural attributes and the recreational opportunities which it affords. Recreational use includes various boating activities, picnicking, birdwatching, hiking and a limited amount of fishing, although bait collection is not permitted. It is regarded as being of regional importance in recreational terms, and hosts a number of sports events including an international kite-flying competition, provincial canoe championships, and various yachting events.

There is also an increased understanding of the need to maintain the environmental health of Zandvlei in order to optimize the recreational and conservation benefits. The GZENR also has a strong environmental education programme involving both learners from local schools, and a number of environmental clubs, and local residents are actively involved in the management of the area.

1.3 The Zandvlei Management Plan and Action Plan

According to the requirements of the CAPE Estuaries Programme, this management plan has been developed in two phases: i) a Situation Assessment; and ii) the development of the Estuary Management Plan and Action Plan. The latter was developed through a consultative process including public meetings, the development of a Vision and Strategic Objectives, and the establishment of Technical Working Groups comprising experts and public representatives.

This document – which comprises the Estuary Management Plan and an Action Plan for the period 2011 – 2015 – is the outcome of this process, and should be read in conjunction with the Situation Assessment.

2. VISION AND STRATEGIC OBJECTIVES

The Vision for the C.A.P.E. Estuaries Programme as a whole is: "***Our estuaries are beautiful, rich in plants and animals, they attract visitors, sustain our livelihoods and uplift our spirits."***

In this context, the following more specific Vision and Strategic Objectives for the Zandvlei Estuary were adopted following a public meeting in July, 2010.

Vision: Zandvlei is a beautiful and important component of Cape Town's natural assets. It is valued by the local community and visitors alike for recreation, education and other uses. It is also home to a rich diversity of flora and fauna and is used in a way that balances conservation with the needs of the users for the benefit of present and future generations.

Management Objectives

Overall Objective**:** *To manage Zandvlei and its environs, including the catchment, in a balanced manner that promotes the rehabilitation and conservation of its biodiversity values, maintains its suitability for recreation and education, and mitigates flooding of adjacent property***.**

Key management objectives:

1. *To develop a mechanism to manage the hydrodynamics of the estuary in a manner which:*
    - *does not compromise its biological integrity;*
    - *maintains salinity at optimal levels for healthy estuarine functioning;*
    - *enhances the role of the estuary as a nursery for marine migrants;*
    - *maintains the competitive advantage of pondweed over phytoplankton;*
    - *promotes flushing for water quality improvement;*
    - *reduces siltation;*
    - *optimises water depth fluctuations for healthy estuarine functioning while minimising flood risk and damage to shoreline properties and meeting recreational needs; and*
    - *takes account of the potential impacts of sea-level rise.*

2. *To prevent, reduce or minimise pollution from all sources so as to be able to restore the water quality to a standard suitable for supporting natural resources and human recreation.*

3. *To create conditions suitable for the restoration and ongoing protection of Zandvlei and its biodiversity, including:*
    - *establishing a zonation plan which designates conservation areas, areas for different uses (boating, walking, swimming etc);*
    - *introducing, where possible, buffer zones between the estuary and surrounding urban areas;*
    - *preventing introduction of alien species and eradicating or controlling established invasive species;*

- *improving water quality and increasing salinity through improved tidal exchange; and*
- *promoting sustainable use of resources.*

4. *To ensure that any relevant future planning and development decisions acknowledge the socio-economic value and conservation significance of the estuary and prevent any further development within the boundaries thereof.*

5. *To promote and manage recreation, education and eco-tourism in the estuary in a manner compatible with its conservation status.*

6. *To establish a coordinated and streamlined monitoring programme linked to clear operational objectives and indicators within a framework which facilitates adaptive management based on the monitoring results.*

3. OPERATIONAL OBJECTIVES

Over the years, there have been numerous changes to the physical structure of Zandvlei and the influent rivers. These, in turn, have given rise to changes to the volumes and quality of water and associated sediments flowing into it – both from the rivers and the sea - as well as to the biological communities which originally inhabited it. Given the extent of the development in the catchment and immediate surrounds, including the physical presence of structures such as the marina, roads and the railway bridge, the system will never function as a completely natural system again. At the same time, the estuary remains highly valuable from both a conservation and socio-economic perspective. The primary objective is therefore to develop a management regime which will restore the system to the extent possible, with a view to maintaining and enhancing its current value.

3.1 **Long-term objectives:**

3.1.1 Zandvlei should function optimally as an estuary with appropriate mouth conditions, tidal flows and salinity levels and water levels undergoing seasonal cycles sufficient to meet the needs of biota such as wading birds without compromising socio-economic values;

3.1.2 Water quantity and quality should meet Resource Quality Objectives to be developed through a reserve determination, with interim water quality targets based on the guidelines for recreation and freshwater and marine ecosystems as appropriate;

3.1.3 Biological communities should be restored to as close to natural species composition and structure as possible;

3.1.4 There should be an appropriate balance between conservation and recreational use of the system.

3.2 **Objectives for Action Plan: 2011 - 2015**

This management plan includes an Action Plan for the period 2011 – 2015 (see section 7). Since a number of the long-term objectives will not necessarily be achievable within this period, more detailed specific objectives which are intended to be met by 2015, if not before, are set out below.

3.2.1 Water Quantity and Circulation

Attempts to manipulate the amount of water in the estuary go back to 1866 when a decision was taken to close off and drain it so as to use it for agricultural purposes. This failed and later initiatives were instead focused on maintaining water levels for recreational boating and preventing flooding of the surrounding areas. The outlet channel was canalized in the 1950's, and was followed by the construction of a rubble weir just below the Royal Road Bridge. Although the original purpose of this weir was to protect a sewage pipe from scouring, it has subsequently been used in the management of water levels in the estuary together with the artificial opening and closure of the mouth.

The main impacts of managing the mouth and water levels have been:

- Reduced salinity levels, with consequential changes to the biodiversity much of which is now dominated by freshwater species. For example, vlei grasses such as *Ruppia maritima* and *R. cirrhosa* have been replaced by pondweed and there has been a decline of halotolerant species such as *Enteromorpha intestinalis* One exception is the fish population whose species diversity is still dominated by estuarine and estuary-dependent species, although the biomass is dominated by alien species (carp and catfish)[1] ;
- A diminishment of the role of the estuary as a nursery for certain species of commercially important fish;
- A reduction in the seasonal fluctuations of the water levels with a consequential loss of wading birds;
- Reduced flushing/increased residence time of water in the system (or parts thereof) increasing the potential for accumulation of pollutants and increased anoxia particularly of the bottom sediments.

Following a study by Ninham Shand (2000) which evaluated various engineering options for managing the Zandvlei mouth/water levels, the City implemented a new management regime from 2001.

In order to evaluate the effectiveness of this new approach, Ninham Shand (2000) also recommended a monitoring programme. This included monitoring of salinity, water levels, mouth conditions and various species/ biological parameters. Although only some elements of the proposed monitoring have been implemented, the results do suggest that there has been an improvement in the situation. Salinities have increased to some extent and there has been good recruitment of the fingerlings of a number of fish species – including Leervis and White Steenbras - which had not been seen for years have been present in recent surveys.

Although the apparent improvements need to be confirmed by a more targeted monitoring programme, it is proposed that this positive trend be taken a step further. At the same time, given the limitations of the current monitoring efforts, it is difficult to set long-term objectives. It is therefore proposed to set interim objectives for a number of parameters until better information is available.

The proposed interim objectives for the physical parameters are outlined below, while biological targets can be found in the section on biodiversity.

Salinity

In general, the salinity regime in the system should be such that it allows the re-establishment of fish and benthic communities in those areas which they previously occupied. While the fish populations are quite tolerant of low salinities – as evidenced by the fact that they are still dominated by estuarine species - they generally do not like hypersaline conditions. Invertebrates and plants on the other hand are more sensitive to salinity variations. The sandprawn *Callianassa*, for example, requires a salinity of between 16 - 17 ppt to be able to breed (although adults can tolerate lower levels), while *Potamogeton pectinatus* has been reported to be tolerant of salinities of between 5 and 20 ppt and has a competitive advantage over other macrophytes and phytoplankton at an ambient salinity of between 5 – 10

[1] Stephen Lamberth, pers. comm.).

ppt. In contrast, *Phragmites,* cannot survive in salinities > 16ppt for more than 3 months.

The existing ambient target salinities[2] are as follows:

- for the main body of the estuary:
    - in winter, between 5 ppt (surface) and 7 ppt (bottom); and
    - in summer 10 ppt throughout the water column;
- for the outlet channel:
    - in winter, 6 ppt (surface) and 18 ppt (bottom); and
    - in summer, 11 ppt (surface) and 13 ppt (bottom).

These targets will be retained until monitoring results from a more comprehensive salinity monitoring programme and the fish surveys are available, provided that:

i) the outlet channel is understood to extend up to a point parallel to the downstream end of the marina; and
ii) the bottom salinity in summer be increased to 18 ppt.[3]

Mouth conditions

Ideally the mouth should be de-canalised so that it can function more naturally. In the short-term the proposed operational objective is that the mouth should be kept open as much as possible during peak fish recruitment periods which are from August/September through November. Although historical records of the opening and closing of the mouth are intermittent and therefore likely to be inaccurate, they seem to indicate that in at least some years, the mouth has been kept open for between 5 – 14 days/month over this period (see Fig. 3 below)[4]. It is proposed that this should be achieved on a regular basis, although it is noted that this period conflicts with the yachting season, which runs from August through March/April, so that cognizance must be taken of depth requirements.

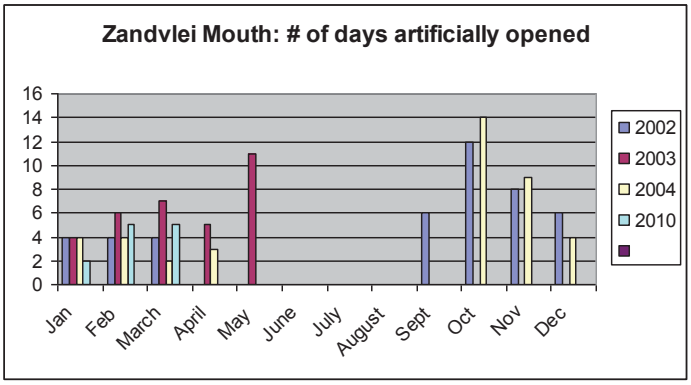


Fig.3. Number of days/month that the estuary mouth has been deliberately kept open.

[2] These are thought to have been based on the salinity required to ensure the competitive advantage of pondweed over other aquatic macrophytes and algae (Dick, 1992 quoted in Harding, 1999).
[3] Although *Callianassa* breeds primarily between May and August, in some areas there is a smaller breeding peak in December/January. Given that it is probably easier to achieve higher bottom salinities in summer, the chances of successful summer breeding should be maximized.
[4] Information provided by Talcott Persent.

In addition, the height of the weir will be lowered to 0.6m during the summer months (September to March/April) to facilitate the movement of fish and other biota into and out of the estuary. During winter it will be adjusted to 0.7m.

Water levels

The fluctuation in water levels is at present largely limited to a range of between 0.7 – 1.4m aMSL in order to prevent flooding, protect the revetments in the marina (the revetments were designed for an operating water level of 0.7m and some of the residences in the marina are threatened at water levels of 1.4m (and lower)), and to ensure sufficient water depths for boating purposes (1 metre). In addition, a depth of 0.8m is required to operate the weedharvester.

These levels will be retained for the main body of the estuary, except possibly for short periods when the mouth is opened during for longer periods to facilitate fish recruitment. The requirements of the yachting fraternity over this period should continue to be catered for by timing events to coincide with periods that the mouth is closed.

Water levels on the central pan should be manipulated using the weir such that they simulate the natural condition, namely that they retain some water for most of the year but dry out for a short period in late summer.

Sedimentation

Ninham Shand (2000) estimated that a total of 44 000 m^3 of sediment had accumulated in the vlei between 1988 and 2000. This equates to approximately 6.5 mm per year over the total vlei area or 77 mm for the 12 year period, compared with 50 mm (or 4.17 mm/year) for the 12 year period from 1958 to 1970. Most of the sedimentation took place in the "delta area" (where the Keysers and Westlake Rivers and Sand River canal enter the vlei) in spite of regular clearing of the lower reaches of the rivers.

In addition to the sediments from upstream, there is considerable encroachment of sea-borne sand (up to 6 000 m^3) into the Zandvlei outlet channel (City of Cape Town, 1989) right up to Thesen's Bridge (Martin Thompson, pers. comm.).

The riverine siltation is caused primarily by erosion in the catchment and proposals to address this were incorporated into the Sand River Catchment Management Plan. The goals of these proposals included:

- In relation to the siltation of the Sand River canal upstream of Military Road: Limit the silt load entering the water course to the extent that the average frequency of maintenance is not more than once in two years; and
- In relation to the siltation of Zandvlei at river discharge locations: to limit the silt load entering the vlei to the extent that the average frequency of dredging is not more than once in five years.

However, due to changes in the maintenance methodologies employed, these goals are no longer applicable. It is suggested that actual rates of sedimentation be measured, with the target being a reduction in annual rates.

Circulation

Flows of water within the system should be optimised so as to improve flushing and to avoid the creation of stagnant areas with the potential for development of anoxic conditions. This is thought to be a problem in the channels of the marina which are generally deeper than the main body of the estuary, and where there are dense growths of pondweed which can result in the accumulation of decaying organic matter on the bottom. Dissolved oxygen levels should meet water quality guidelines (see 3.2.2).

Thornton et al (1995) constructed a water balance for the estuary based on records from the flow gauging station at the outlet of Little Princess Vlei, the level recorder in Zandvlei, and various rainfall gauging stations in the area. Their estimates included:

- mean annual runoff of around 22 x 10^6 m^3
- direct precipitation of 0.89 x 10^6 m^3
- tidal inflows of around 3.1 x 10^6 m^3
- evaporation of 1.65 x 10^6 m^3
- residence time of 0.06 years.

These should be re-calculated for the current management regime and an appropriate target set.

3.2.2 Water Quality and Litter

The long term objective should be for the water quality to meet Resource Quality Objectives to be developed in terms of the National Water Act (1998) specifically for Zandvlei. Proposed interim targets for parameters of particular concern, based on existing guidelines for freshwater or marine ecosystems and/or full contact recreation as appropriate, are outlined below[5]. These exclude salinity, which was discussed in 3.2.1. They should be reviewed halfway through the 5-year period of the Action Plan at which time they should also be linked with the proposed DWA estuary monitoring programme.

Supplementary objectives are:

- To maintain the low number of accidental discharges of wastewater per year (eg. from pump station failures) although it is noted that these are sometimes a result of vandalism;
- To reduce the frequency of overflows from blocked manholes;
- To reduce dumping of litter and other waste into the stormwater drain system.[6]

[5] It is noted that there are no guidelines specific to estuaries, and that those listed include both marine and freshwater examples. Should guidelines specific to estuaries be developed, these should replace those currently included here.

[6] While records of litter removed from stormwater drains have been kept, they have not been analysed. It is suggested that a student project be used to generate the information required to set a numerical target for this objective.

Bacteriological targets

The targets for bacteriological parameters should be based on those for full contact recreation (especially given the high prevalence of HIV in the country, and the consequential lowered immune system of a substantial proportion of the population). The most important of these is *E.coli*, with others being Faecal coliforms and *Enterococci* as follows:

- *E. coli* – which are more specific to warm-bodied animals and show a high correlation with swimming-related gastric illness, with a target range of 0 – 130 counts (based on the DWAF South African Water Quality Guidelines: Recreational Use (2nd Edition, 1996)). To meet the target, the range should not be exceeded by the geometric mean of fortnightly samples over a three-month period.
- Faecal coliforms (including *E.coli*) – which are used as an indicator of general faecal contamination - for which the target range should be between 0 – 100 counts per 100 ml (based on the 1995 South African Water Quality Guidelines for Coastal Marine Waters). To meet this target, 80% of samples taken from the water body should fall within this range (i.e. less than 100 counts); and 95% of samples should be below 2,000 counts.
- *Enterococci* – there are currently no guidelines for South Africa, but guidance is obtainable from the Blue Flag Programme and/or World Health Organisation recommendations.

The proposed objective for Zandvlei is that the *E.coli* target should be met in all sections of the estuary which are zoned for recreational use within 3 years (i.e. by the end of 2013).

Nutrient targets

- The current guideline on dissolved inorganic nutrients for marine aquatic ecosystems is: "Waters should not contain concentrations of dissolved nutrients that are capable of causing excessive or nuisance growth of algae or other aquatic plants or reducing oxygen concentrations below the target range"(see below).
- The Coastal Water Quality Guidelines provide a more specific guideline for Total Ammonia-N – namely 600 *u*g/l - while the freshwater guideline for unionized ammonia (NH_3) – which is responsible for the toxicity of ammonia - is < 7 *u*g/l (DWAF, 1996). More recent guidelines developed through the Reserve Determination methods suggest that values of 0.015 - 0.058 mg/l (or 15 – 58 *u*g/l) are good. It is therefore proposed that this be adopted as the target range for Zandvlei.
- The DWAF Water Quality Guidelines: Aquatic Ecosystems provide a guideline for total inorganic nitrogen (NH_3 + NH_4 + NO_2 + NO_3) which states that i) concentrations should not deviate by more than 15% from that of the local water body; ii) the trophic status of the water body should not be increased; and iii) that the amplitude and frequency of natural cycles should not be changed. The Guidelines also state that concentrations below 0.5 mg/l indicate oligotrophic conditions, 0.5 – 2.5 mesotrophic, and 2.5 – 10 mg/l, eutrophic. However, according to Taljaard (pers. comm.) although only limited data is available for estuaries in South Africa, concentrations of 1 – 2 mg/l

were sufficient to stimulate dense macrophyte growth in the Sundays River. More recent guidelines developed through the Reserve Determination methods propose 0.25 – 1 mg/l as good and it is proposed that this be adopted as the target value for Zandvlei.

- Phosphorus occurs in a number of forms, but that which is immediately available to aquatic biota is Soluble Reactive Phosphate (SRP) or ortho-phosphate. The recent guidelines developed through the Reserve Determination methods suggests that values of between 0.005 - 0.025 mg/l (or 5 – 25 *u*g/l) are good and it is proposed that these be adopted as the target value for Zandvlei.

Dissolved oxygen

The current guideline on dissolved oxygen for marine aquatic ecosystems is: "For the east coast, the dissolved oxygen level should not fall below 10% of the established natural variation. For the south and east coasts the dissolved oxygen should not fall below 5 mg/l 99% of the time, and below 6 mg/l 95% of the time." The recent guidelines developed through the Reserve Determination methods suggests that values of between 6 – 8 mg/l are good and it is proposed that these be used as targets for Zandvlei.

Biological criteria

In general, the water quality should be sufficient to support all biological communities. Targets for chlorophyll *a* (a measure of phytoplankton growth/ eutrophication) and Cyanophyta (blue-green algae) are outlined below, while those for other key indicator species are discussed in Section 3.2.6.

- Chlorophyll *a* should not create nuisance conditions or produce surface scums. Mean annual concentrations should be < 15 ug/l. (DWAF WQ Guidelines)

- Cyanobacteria: there should be < 6 blue-green units[7] (DWAF WQ Guidelines), and 1 microgram per litre of cyanobacterial toxins (total microcystin-LR) (WHO guideline for full contact recreation).

3.2.3 Sediment quality

Apart from the impacts of siltation on circulation, mouth conditions etc, sediments tend to be a sink for contaminants with consequential impacts especially on bottom-dwelling organisms. It is therefore also important to quantify and manage sediment quality.

The following objectives are proposed for sediment quality:

[7] This refers to the number of blue-green units (colonies and filaments) counted in a two-minute scan of 0.5 mR of water at x200 magnification.

- In general, the sediment quality in the lagoon should be sufficient to allow the re-establishment of benthic invertebrates such as *Callianassa (*see also Section 3.2.6);
- Trace metals (based on the DEA guidelines)[8]:

Trace Metal	Target (mg/kg dry weight)
Arsenic	< 30
Cadmium	< 1.5
Chromium	< 50
Copper	< 50
Lead	< 100
Mercury	< 0.5
Nickel	< 50
Zinc	< 150
Combined levels of Cd & Hg	< 1.0
Combined levels of As, Cr, Cu, Pb, Ni & Zn	< 50

- The sediments should be restored as far as possible to their original condition (eg. particle size distribution, organic content etc).
- Bacteriological loads in the sediments should not pose a threat to human health.

3.2.4 Biodiversity, conservation and planning

The establishment of the GZENR was a major step forward for conservation in this area. The objective now should be to further enhance this accomplishment by improving the understanding and protection of the biodiversity in and around the Nature Reserve. To this end, the following targets are proposed:

Extension of Reserve Boundaries

The boundaries of the reserve should be expanded with a view to:

- Improving the connectivity between Table Mountain National Park, the False Bay Ecology Park, the coastal protection zone and the Kogelberg Biosphere Reserve;
- Including a 5 – 10 m buffer zone along the western shoreline of Zandvlei;
- Incorporating the highly sensitive road reserve area to the north of the reserve; and
- Generally, protecting the estuary from future developments.

[8] The values given are those which trigger precautionary measures when dumping dredged materials. Updated guidelines are in the process of development.

Biodiversity information – availability, management and use

There is a substantial amount of information available on certain groups of biota at Zandvlei – for example, birds, fish and plants. On the other hand, inventories for other groups – such as most invertebrates, amphibians and reptiles – are primarily based on ad hoc observations. At the same time, even where information is available, it has not necessarily been consolidated and/or analysed. A variety of interventions have been proposed to improve this situation according to the following proposed targets:

- Ultimately, there should be comprehensive qualitative and quantitative information available on all the biodiversity of the reserve. Priorities for the 2011 – 2015 period are invertebrates, and endangered and threatened species;
- An overview of trends for those groups where there is sufficient data available (eg. birds) and an understanding of how they have been influenced by environmental parameters;
- Availability of on-site weather-related information;
- All relevant information consolidated and accessible to all stakeholders.

Rehabilitation/Restoration Initiatives

The populations of many different species have been altered over the years as a consequence of changes to the estuary, including water quantity and quality. Targets for the recovery of some of the key indicator species/ groups are as follows:

- Benthic populations of *Callianassa* should be restored to their original distribution range and densities as far as possible. The Southern Waters Baseline Biotic Monitoring Report (2001) reported that the sandprawn populations were largely confined to the southern end of the main body of the estuary and the outlet channel, with numbers ranging from 114/m2 at the southern end, to 20/m2 in the north. While the distribution range is probably reasonably consistent with historical patterns, Shelton (1975) reported numbers up to 576/m2. Target densities should therefore be closer to the latter.

- The nursery role of the estuary for marine fish should be re-established as per the following targets:
  - Size frequency distributions should indicate a number of different cohorts at any one time;
  - Species composition & abundance should reflect that of temp open/closed systems of equivalent size in the cool/warm temperate biogeographical transition zone;
  - There should be high numbers of new recruits in the system over peak recruitment periods (September/November).

- The habitat for waders should be restored with a view to:
  - Increasing the numbers of resident species already present: for example, Three banded Plovers, Pied Avocet, Black-winged Stilt;
  - Increasing breeding opportunities; and

- Encouraging the return of waders previously present in the estuary :for example, Wood Sandpiper, Common Sandpiper, Marsh Sandpiper, Curlew Sandpiper, Common Greenshank, Little Stint, Sanderling, Common Whimbril, African Snipe, Kittlitz's Plover, Common Ringed Plover**.**

In addition to the populations of key species, there are a number of areas within the reserve which are degraded and which have been identified for rehabilitation/restoration (see Section 5.3.3) All of these initiatives should be completed by 2015 if not before.

Conservation, recreation and ecotourism development

The public should be encouraged to see Zandvlei as an asset by:

- Improving the biodiversity experience for visitors to Zandvlei;
- Making ecotourism opportunities available for example, by advertising Zandvlei as a primary birdwatching destination; and
- Improving facilities for visitors (eg. a restaurant, canoe hire facility etc).

3.2.5 Pondweed Management

The pondweed, *Potamogeton pectinatus*, occurs naturally in Zandvlei and is, in fact, an important component of the ecosystem, providing food and shelter for a variety of organisms, and helping to oxygenate the water. However, as a result of the high nutrient conditions, pondweed has been a problem in Zandvlei for many years, at times forming dense mats which restrict boating activities, exacerbate flooding and, when they start to decompose, causing unpleasant odours. The pondweed in Zandvlei has therefore been managed since 1976 by harvesting it using a mechanical harvester. Although this has been successful at times, overharvesting led to a crash in the population in the late 1970's, while a second collapse which occurred in the early 1990's was attributed to the decline in salinity in the estuary. On the other hand, the excessive levels of pondweed currently present have been attributed primarily to logistical problems such as inadequate maintenance planning for the harvesters.

Given the ecological importance of pondweed, the overall objective of management efforts must be to achieve a sustainable level of pondweed in the system while at the same time preventing the development of nuisance conditions. More specific objectives include:

- Improved understanding of pondweed dynamics and especially the role of temperature, salinity, nutrients and depth in controlling its growth;
- Ongoing maintenance of a "pondweed reserve" consisting of closely connected beds throughout the system;
- Refinement of the harvesting protocol based on a monitoring programme which allows effort to be linked to harvesting needs;
- The main channels in the recreational areas free of pondweed.

On the logistical side, objectives include:

- Reduction of downtime of the weed harvester through improved maintenance planning;
- Improved working conditions for the drivers/operators.



Fig. 4: The mechanical harvester at work in the marina.

3.2.6 Invasive Species

A variety of both indigenous and alien invasive species have affected Zandvlei and the surrounding areas, some for many years. These include terrestrial and aquatic species, plants and animals, vertebrates and invertebrates and species introduced deliberately as well as unintentionally. To date, efforts to manage this problem have been relatively *ad hoc* and uncoordinated with those in other parts of the City and beyond. The main objective therefore is to integrate invasive species management in the GZENR with other initiatives in the City, Province and country as appropriate. More specific objectives include:

- IAS management plan in place for the estuary/nature reserve;
- Implementation of the pilot of the Aquatic Weed Management Plan project in the Sand River Catchment;
- Zandvlei should be included in the City-wide survey of alien fish;
- Establishment of partnerships with the EDRR units of the City and SANBI and a network of volunteers for the early detection of alien plants in the Zandvlei area.

The targets for the IAS management plan for the GZENR should as far as possible be in line with relevant targets in the City's Integrated Metropolitan Environmental Policy (IMEP), which are as follows:

2014 Target:

Invasive Alien Plant management:

o 60% of the surface area of the Protected Areas and Biodiversity Network will be in maintenance (defined as cleared with three follow-up operations);

- Aquatic invasive plant species will be reduced to 80% of the 2009 coverage in the City's water bodies.

Invasive Alien Animal management:

- The Indian house crow population in the city will be eradicated;
- The guttural toad population in the city will be eradicated;
- The mallard duck population in the city will be eradicated.

3.2.7 Education and Communications

The existing environmental education programme is entirely oriented towards learners, particularly from the schools in the adjacent suburbs. There are also two environmental clubs which meet on a relatively regular basis. The programme involves interacting with the learners to identify issues of concern and to develop possible solutions. These are then translated into active campaigns such as litter clean-up days, removal of alien vegetation, recycling initiatives, development of signboards etc. They have also been involved in the Leopard Toad project, and schools can request specific programmes.

In terms of a target for the learner programmes, it is recommended that:

- the number of schools visiting the Education Centre regularly be increased from 4 to 6; and
- the number of Environmental Clubs be expanded from 3 to 5;
- a partnership be established between the learner programme and the development programme initiated by the canoeing club.

In addition:

- a community outreach programme targeting adults should be initiated through presentations/ meetings with at least 5 relevant organizations;
- links be established between local conservationists and the Early Detection and Rapid Response Programmes (EDRR) at the City and SANBI;
- new posters communicating information on the GZENR and particularly the issues being addressed through the EMP should be produced and placed on notice boards in Zandvlei itself, and at local clubs, shopping centres etc.

Finally, the upgrading of the Resource and Education Centres should be completed, and overnight camping facilities established.

It should be noted that in order to achieve these targets, additional financial and human resources will be required. Resource needs are discussed further in Section 6.

4 ESTUARY ZONATION PLAN

The northern part of the estuary around Wildwood Island was officially recognized as the Zandvlei Nature Reserve in 1977. This was expanded in 2006 from 22 ha to 200 ha by including Westlake Wetlands, Little Australia and Park Islands, the water body of the estuary up to the 1-in-100 year floodline, and some adjacent and nearby outlying areas, and is now known as the Greater Zandvlei Estuary Nature Reserve.

However, historical records show that parts of the estuary have been utilized for recreational purposes for over a century, and nowadays it is regarded as a regional recreational centre. There are a number of recreational facilities on the banks of the estuary which are used by large numbers of visitors especially during peak holiday periods while many residents use it on a more regular basis (see also Section 5.3).

One of the objectives of this management plan is therefore to achieve an appropriate balance between conservation and recreational use of the estuary. An important tool in achieving this objective is zonation, or the delineation of different use zones. The proposed zonation plan for the Greater Zandvlei Estuary Nature Reserve is based on the City of Cape Town's Guidelines for Visitor Use Zoning for Nature Reserves and Conservation Areas and is shown in Fig. 5 below.

4.1 City of Cape Town Zonation Guidelines

The guidelines make provision for the following zones and associated conservation objectives:

- Primary Conservation: Natural areas should be kept intact in order to protect habitat required to meet biodiversity targets for various vegetation types and to provide undisturbed habitat for a range of species. Where possible degraded areas should be rehabilitated.

- Conservation: Natural areas should be kept intact in order to protect habitat required to meet biodiversity targets for various vegetation types and to provide undisturbed habitat for a range of species. Where possible degraded areas should be rehabilitated.

- Low Intensity Leisure: Although some areas will be impacted by a range of activities and limited infrastructure, most areas should be kept largely intact and ecological processes should remain functioning. Where possible degraded areas should be rehabilitated.

- High Intensity Use: The activities and infrastructure in these areas should be managed to minimize impacts on biodiversity and visitor experience in other zones. Where feasible, non-crucial infrastructure should over time be removed from the reserve and the sites rehabilitated.

- Utility Zones: The activities and infrastructure in these areas should be managed to minimize impacts on biodiversity and visitor experience in other zones. Where feasible, non-crucial infrastructure should over time be removed from the reserve and the sites rehabilitated.

In addition, the guidelines make recommendations on the type of activities, frequency of use, group size, sophistication and type of facilities, user movement/transport and roads and footpaths. The specific details however, may vary from one reserve to the next, and the activities for Zandvlei are outlined below.

4.2 Visitor Use Zones in Zandvlei[9]

Primary Conservation zones require controlled access which is not feasible in the GZENR, at least at present. The zones in Zandvlei are therefore limited to three of the above, namely conservation, low intensity and high intensity use as shown in the map below:

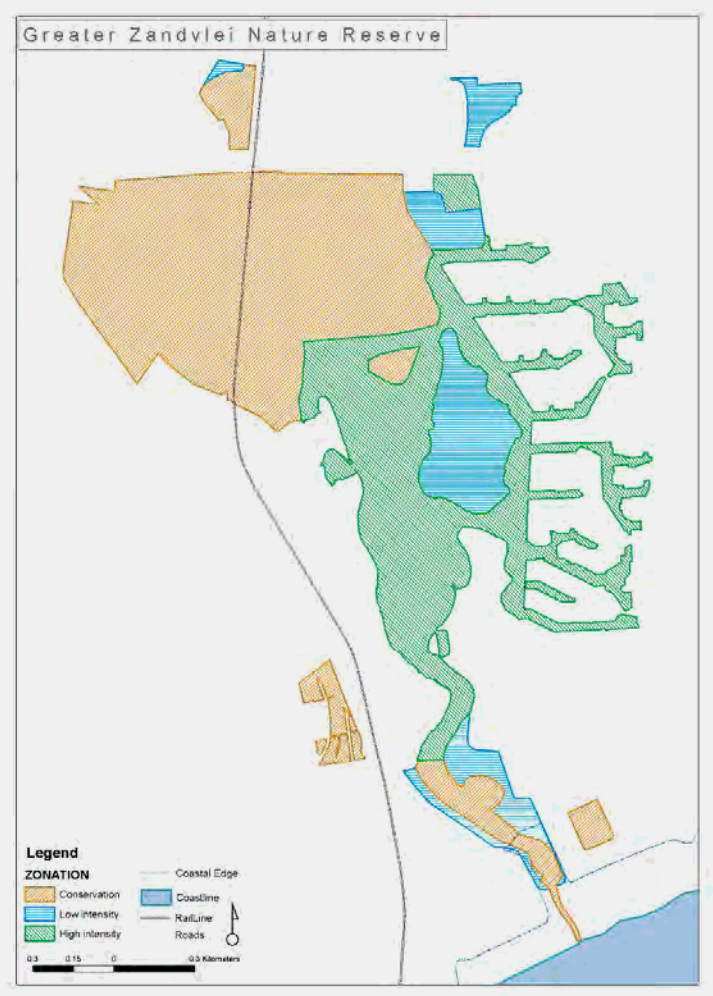


Fig. 5: Visitor use zones in the GZENR (provided by CoCT)

Within each of these zones, the specific activities allowed are detailed as follows, and as shown in Figure 6:[10]

[9] It should be noted that these proposals have been developed by the City and still need to go through a Public Participation process.

4.2.1 Conservation zones

The conservation zones may be used for self guided walks, bird watching, etc. Access to the land areas is pedestrian only, while the water body may be used by canoeists for relaxation purposes by individuals and small groups only i.e. not for competitive purposes. Moreover, canoes should not be launched or landed within these zones.

4.2.2 Low intensity use areas

In general these areas are intended for relatively frequent recreational and educational activities including walking, birdwatching etc. Facilities should be eco-friendly and promote conservation-related experiences and may include parking for access to this and other zones.

Specific activities permitted in the low intensity use areas at Zandvlei are as follows (with numbers corresponding to those on the map in Fig.6 below):

1. Keysers River Rehabilitation Block: this includes a small picnicking area on the NW border of the wetland;

2. Reedbed stand at the confluence of the Sand River and Langvlei Canal: this is used primarily as a thoroughfare rather than for recreation, although the general activities outlined above would be permitted;

3. Area adjacent to the Environmental Education and Resource Centres: this includes a small parking area for visitors as well as trails, bird-hides and picnicking areas.

4. Park Island: permitted activities include birdwatching, walking, running, and dogwalking on leashes only.

5. Lower West Bank: there are picnic spots (but no fires allowed) and children's playground facilities. Recreational fishing is permitted from the banks only.

6. Lower East Bank: permitted activities include walking, recreational fishing from the banks only, and dogwalking (dogs allowed to run free). There is also a playpark area, and special events (such as the Kite Festival) may be held with prior approval of the Reserve Manager.

4.2.3 High intensity use areas.

Apart from the City's administrative offices in the north-eastern corner of the Reserve, the high intensity use areas within the boundaries of the GZENR are limited to parts of the water body. These are used for a variety of boating activities as shown on the map below, and include regattas and other competitive events. Where these

[10] It should be noted that in terms of the regulations, recreational fishing in the estuary is allowed and at this stage is not restricted to any particular zone.

might impinge on the Conservation Zone, prior approval must be sought from the Reserve Manager.

In addition, there are areas and facilities along the western and eastern banks of the estuary which are used intensively for sport and recreation – including camping, picnicking and braaing – which, although they are outside of the boundaries of the estuary, nevertheless have the potential to impact on it.

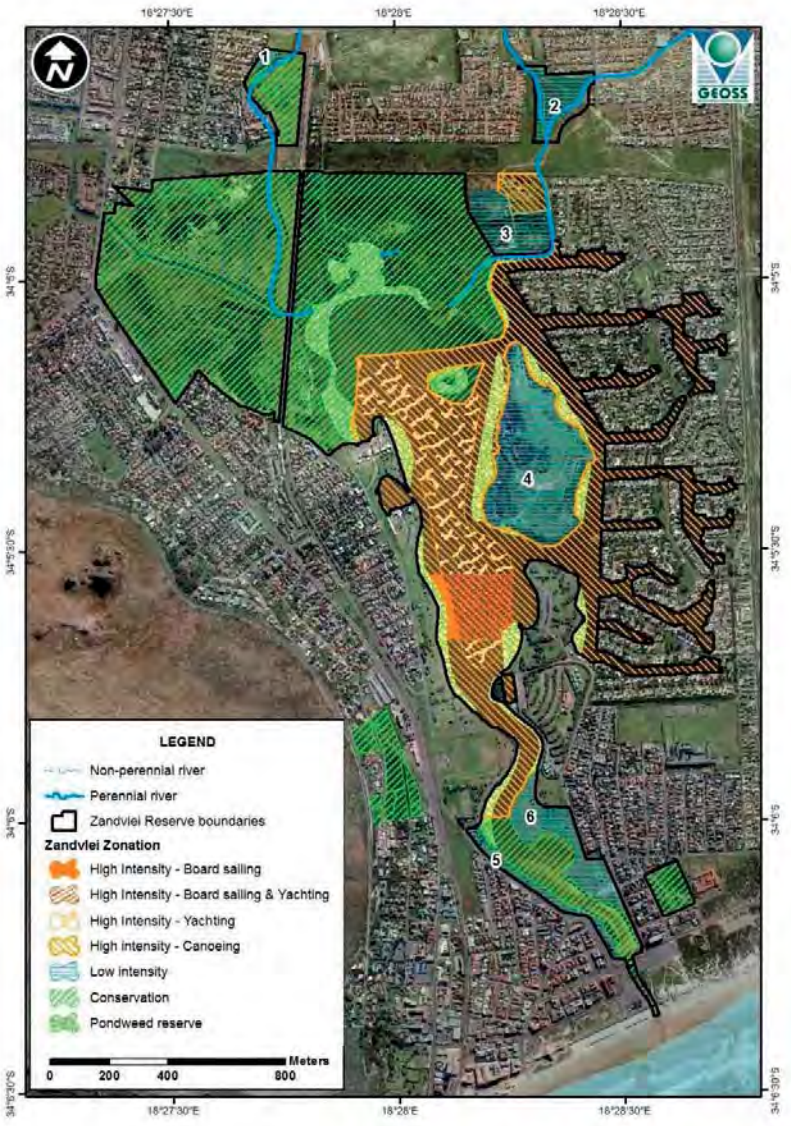


Figure 6: Areas zoned for high and low recreational activities at Zandvlei.

5 MANAGEMENT STRATEGIES

Zandvlei and its catchment have been progressively and extensively modified over the past 300 years giving rise to a range of problems. Given the nature of the changes, few, if any, of the problems are likely to be permanently solved. Rather, they will require ongoing management - as is reflected in the fact that the current list of issues is much the same as those identified thirty or more years ago. These include:

- The impact of the mouth/water level management regime on the natural functioning of the estuary (salinities, role as a fish nursery etc);
- Water quality issues – nutrients, bacteriological contamination and litter;
- Pondweed and other aquatic and semi-aquatic plants (alien or indigenous);
- Other introduced and invasive species, including Mallard ducks;
- Balancing recreational and conservation needs.

The management interventions proposed below are intended to build on existing initiatives.

5.1 Management of water quantity, salinity and circulation

5.1.1 Management of the mouth and water levels

Water levels in Zandvlei have, for many years, been managed primarily to provide water of sufficient depth for yachting, and to prevent flooding and/or the destabilisation of the revetments in Marina da Gama which were designed for an operating water level of 0.7 m aMSL. Concern over the resulting decrease in salinities in the estuary – and associated changes in the biodiversity – led to the implementation of a new management regime from 2001. This included reducing the height of the weir from 0.9 to around 0.7 m, with more emphasis being placed on the manipulation of the sandbar at the mouth to manage water levels as follows:

- In the rainy winter months[11], the sandbar is kept open so as to avoid flooding of the surrounding areas – unless there is a particularly dry spell, in which case the sandbar may be closed for short periods to restore water levels so as to meet the needs of the recreational users.
- During the summer months, the sandbar is kept closed except:
  - When water levels become too high (in excess of 1.0 m aMSL for long periods) since such levels destabilise the revetments in the marina);
  - When there is a high spring tide. This occurs 5 – 6 times each summer, and is intended to facilitate the intrusion of saline water into the estuary.

Since this does not always meet the water depth requirements for yachting (1m), this is being managed by scheduling the main yachting events for neap tide periods.

In order to assess the effectiveness of this regime, a monitoring programme was also initiated, and although it is deficient in some respects, the results indicate that

[11] Starting from the first heavy rain – varies between April and June.

salinities have increased – and may even be achieving current targets – and that there has been some recovery in the fish and sandprawn populations. Nevertheless, it is generally agreed that the situation could be further improved. To this end, the following interventions are proposed:

In the short-term:

- The rubble weir should be lowered to 0.6 m aMSL during the summer months (September to March) to increase tidal intrusion and to facilitate the passage of fish and other biota into and out of the estuary;
- A concerted effort should be made to keep the mouth open for a minimum of 10 days/month, and preferably more, during peak fish recruitment periods which are from August/September through November. It is noted that this is subject to constraints imposed by inflows to the vlei and prevailing weather conditions;
- Accurate records must be kept of mouth opening and closing;
- The yachting requirements will continue to be accommodated by scheduling events to coincide with neap tides.

In the medium to longer term, the sewer needs to be relocated so that the weir can be removed altogether. This is likely to entail raising it to run under the bridge, and since it is a gravity line, will require the construction of a new pump station at an estimated cost of R 12 million. As a first step, a proper costing needs to be done. It is also noted that this would require an EIA.

5.1.2 Management of central pans

Historically the water levels in the pans at the northern end of the Nature Reserve fluctuated on a seasonal basis, more or less drying up during the summer months, with the residual water having high salinity levels. These conditions attracted Teal and other waders. However, in the mid-1990's birds in the central pan area started dying of botulism because of the stagnant conditions which had developed there – possibly as a result of siltation. In 1995/96 a channel was dug to reconnect the pan to the main body of the vlei, and in 1999/2000 a weir was constructed across this channel so as to be able to control the water levels in the pan.

After a relatively short period the concrete base of the weir broke and it has not been operational since around 2004. The weir needs to be repaired and a protocol developed to manage its operation. It is suggested that this is done initially on a trial basis in combination with a study on its effectiveness in terms of encouraging the waders to return.

5.1.3 Reduce sedimentation

The primary cause of siltation in Zandvlei is erosion in the catchment. A number of general proposals to reduce erosion are included in the Sand River Catchment Management Plan. These include:

- Improvement of agricultural practices;

- Implementation of riverine buffer zones[12];
- Removal of alien vegetation (eg. Kikuyu) and restoration of riverine vegetation to improve riverbank stability
- Restoration/rehabilitation of altered water courses to a more natural state where possible.

The plan also lists a number of more specific projects, for example:

- Review and implementation of revised river maintenance programmes to eliminate undercutting and collapse of river banks in the Tokai and Constantia areas;
- Development and implementation of soil management guidelines/ regulations;
- Quantify silt removal requirements and construct silt traps at appropriate sites;
- Quantify the silt load entering Zandvlei and design a dredging operation.

The implementation of these projects should be encouraged, provided that a study should be undertaken to evaluate the costs and benefits of dredging in Zandvlei as there are many concerns over the potential environmental impacts thereof.

5.1.4 Optimising circulation

Circulation problems in the estuary can primarily be attributed to the conditions at the mouth and the construction of the Marina. The proposed changes to the weir and management of the mouth (5.1.1) will alleviate these to some extent, although not necessarily within the Marina. One additional possibility which has been proposed is the removal of accumulated tubeworm (*Ficopomatus enigmaticus*) colonies which are reported to be up to 2.5m thick in some areas, particularly under bridges, and which restrict the passage of boats/canoes. This needs to be further investigated.



Figure 7: Tubeworm colonies at Park Island Bridge (courtesy of Richard Borden)

[12] Proposals for riverine buffer zones have been developed as part of the work under the EMP for the Diep Estuary with a view to implementing them across the Western Cape.

5.1.5 Monitoring

The proposals by Ninham Shand (2000) which led to the implementation of the new management regime in 2001 also recommended the institution of a substantial restoration monitoring programme to evaluate the effectiveness of this regime. This included monitoring of salinity, water levels, mouth conditions and various species/ biological parameters.

Salinity is monitored as part of the Catchment, Stormwater and River Management Branch's (CSRM) water quality monitoring programme as well as through a Community Monitoring Programme. However, while the results suggest that the ambient targets are being met, it should be noted that there are no bottom samples being taken, the water quality monitoring programme is limited to a single station in Zandvlei (others in the catchment), and the CMP monitoring is not consistent at all stations and not linked to tides/mouth conditions.

It is therefore proposed that a more comprehensive salinity monitoring programme be undertaken over at least a 2-year period using either:

- A portable YSI multiprobe with standard temperature, salinity, oxygen, pH and turbidity probes which costs around R 145,000. This can be installed in a fixed position and then retrieved periodically to download data and to run salinity profiles along the length of the system;
- A hand-held YSI instrument (eg. EC300) which measures conductivity, temperature, salinity and TDS. which only costs around R 50,000. The latter presents fewer maintenance problems and has the advantage that measurements can be taken from multiple points (including depth profiles) simultaneously (at least on the same day) in the system. However, it requires staff to be available to take these measurements.

The monitoring programme should be designed to capture short term variations (i.e. daily measurements at multiple locations to examine the impact of mouth manipulations) as well as longer term seasonal variations (weekly measurements at a reduced number of sites).

In addition, the dates and times of the opening and closing of the mouth need to be properly documented and the records made available so that these can be correlated with fluctuations in salinity.

Water levels should be measured by a water level recorder at Thesen's Bridge but this has not been operational for three years and urgently needs to be repaired.

Biological monitoring: While monitoring of a number of species/taxa was recommended, financial constraints have resulted in this being limited to:

- A baseline study undertaken by Southern Waters in 2001 covering pondweed, sandprawns, tube worm, macrobenthos, zooplankton and fish;
- Monitoring of phytoplankton and algae as part of the Catchment Stormwater and River Management water quality monitoring programme;
- 24 hour surveys of fish populations by City staff (once off in 2003);
- Quarterly fish surveys being undertaken by DAFF (previously MCM), although due to a lack of capacity, the data has not yet been analysed.

Information on the biological populations is crucial to assessing the health of the system. It is therefore proposed that:

- Assistance with data capture in the form of a student project should be provided to DAFF to enable the analysis of the fish surveys to be brought up to date;
- An MoU should be developed between the City (Reserve staff) and DAFF to ensure regular (quarterly) fish surveys are continued according to an agreed protocol;
- A protocol should be developed for basic annual surveys of *Callianassa* populations which can be undertaken by Reserve staff; and
- There should be a detailed vegetation survey down to species level provide an indication of salinities, fresh water occurrence, groundwater inflows etc.

5.1.6 Information requirements

While a lot of work has been done on Zandvlei over the years, some additional information is required to support the management proposals. The following studies are proposed:

i) A study of the hydrology and geohydrology of the estuary needs to be undertaken in order to be able to get a clear understanding of the water balance in the system, including any seasonal variations therein. This will require an accurate determination of all flows into (from the river, groundwater, stormwater and effluent) and out of the system, circulation patterns, residence time etc. Once complete, the study should be able to recommend an optimal water balance.

ii) A study of the quantity and quality of sediments and the rate of sedimentation needs to be undertaken (including core sampling of sediments) with a view to determining their impact on drainage patterns, bird habitats and the environmental health of the system generally.

iii) A bathymetric survey to facilitate management and, in particular to look at possible barriers to the intrusion of seawater – such as the remnants of a causeway which was present in the estuary in 1954. (see below)

iv) Ultimately, a comprehensive reserve determination in terms of Chapter 3, Parts 2 and 3 of the National Water Act (1998) needs to be undertaken, noting that some of the above studies will contribute to this process.



Fig. 8: 1954 photograph of Zandvlei (courtesy Gavin Lawson)

5.2 Management of water quality and litter

There are a variety of potential sources of pollution to the estuary including run-off and effluent from residential, industrial and agricultural sources both from the catchment and directly into the estuary:

- Run-off from agricultural areas in the catchment – primarily vineyards in the Constantia Valley – is likely to contain fertilizers, organic waste and pesticides;
- There are 14 pump stations in the adjacent areas and although all pump stations are monitored by a telemetry system overflows do occur from time to time, the most recent in September, 2010 (see below). There is also a problem with blockages in the sewer system caused by people disposing of solid objects;
- There is an extensive system of stormwater drains around Zandvlei (see Fig. 9 below) which discharge directly into the estuary while others discharge into the rivers in the catchment;
- The Retreat industrial area borders on the Keysers River a short distance before it discharges into Zandvlei. This is a potential source of illegal discharges and stormwater runoff;
- Both the western and eastern banks of the vlei are bordered in parts by public open space which is used for a variety of recreational activities. These, as well as low-income residential areas upstream are sources of litter.

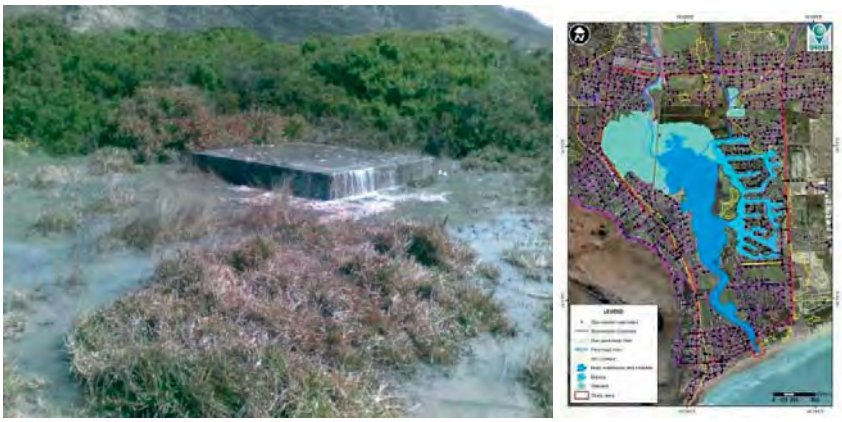


Fig. 9 (a) Overflow of sewage pump station in the Westlake area after being vandalized (Sept. 2010) (Courtesy C.Sheasby); and (b) network of stormwater drains around Zandvlei.

The water quality monitoring programme undertaken by the City indicates the following water quality problems:

- High – and increasing – levels of nutrients with Total Phosphorus, orthophosphates and Total Nitrogen indicating mesotrophic to eutrophic conditions;
- Levels of bacteriological contamination which exceed the water quality guidelines for full contact and, at times, even intermediate contact, recreation.

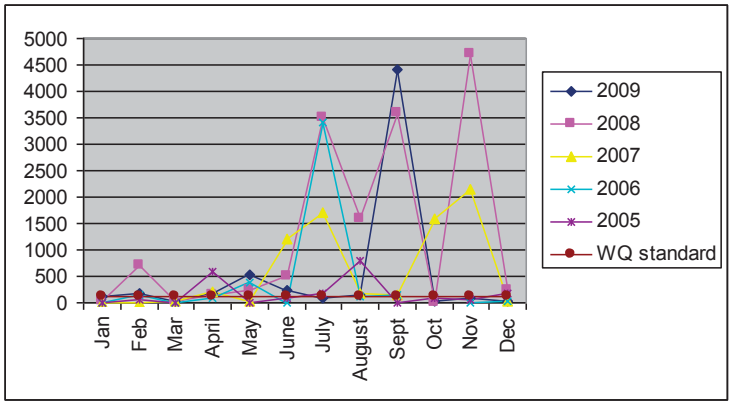


Fig.10 . Monthly *E.coli* levels at ZAV2 (2005 – 2009)

At the same time, there were some deficiencies in the monitoring programme which needed to be addressed.

In addition, despite ongoing efforts, there are large volumes of litter entering the system.



Fig. 11 (a) Accumulated litter in the Sand Canal just above the point of discharge into Zandvlei; and (b) a litter trap on the Sand Canal.

In general, the management of water quality should be in line with the national DEA and DWA policies on pollution and waste management which espouse a precautionary and pollution prevention approach. The following interventions are therefore proposed:

5.2.1 Resource Quality Objectives

The prevailing national strategy for managing the water quantity and quality requirements of aquatic ecosystems is through the setting of Resource Quality Objectives. This is provided for in the National Water Act (Act 36 of 1998) and the National Water Resource Strategy, and is intended to be implemented through Catchment Management Strategies and Agencies. However, Resource Quality

Objectives have not as yet been determined for Zandvlei or any of the rivers in the catchment although the establishment of an ecological reserve for the rivers was identified as a project under the Sand River Catchment Management Plan in 2003. This should be done as soon as possible.

5.2.2 Catchment management

The Sand River Catchment Management Plan (CMP) identifies the following sources of pollution in the catchment:

- Nutrient loading – runoff from urban areas, industrial waste, and fertilizers from agricultural lands and domestic gardens;
- Groundwater contamination;
- Bacteriological contamination from overflows of blocked sewers and informal ablutions;
- Litter and illegal dumping of refuse;
- Commercial and industrial areas.

The potential for pollution, as well as the impacts on water quality, are exacerbated by flooding and the extensive infestations of alien vegetation in and around the rivers. Water quality problems are summarized in Figure 7 of the CMP.

The CMP lists a large number of proposals aimed at addressing the sources of the pollution including:

- Identification & quantification of the pollution from various areas including the wine farms, commercial and industrial areas and other water bodies eg. Langvlei Inlet, Sand River Canal, Princess Vlei;
- Reduction of fertilizer use;
- Formalisation of maintenance plans for sewer lines, manholes and stormwater drains along the rivers and dams;
- Development and implementation of pollution abatement plans;
- Improve signage for ablution facilities;
- Additional/alternative locations for litter traps

Priority projects listed included:

i) Conduct study to establish ecological reserve for rivers
ii) Establish soil management & surveillance guidelines
iii) Determine impact of industry & commerce on Keysers River
iv) Determine impact of industry & commerce on Mocke River
v) Determine root causes of pollution at Langevlei
vi) Establish required pollution mitigation at Little Princess Vlei.

Where these have not been completed, they should be initiated as soon as possible. In addition, it is recommended that there should be engagement with the farming community - preferably through the Department of Agriculture – to improve land management practices.

The rehabilitation of particular areas of the catchment could also contribute to improving water quality. For example, the filtering function of the Westlake/Kirstenhof wetland could be enhanced by diverting the channels to pass through the wetland rather than bypassing it. Similarly, it is proposed that the Sand River should be rehabilitated in the Coniston area.

5.2.3 Prevention of Pollution from Industry and Commerce

As indicated above, there is limited information on pollution from industry and commerce. An assessment of this source should therefore be undertaken. In parallel with the assessment, there should be a campaign in collaboration with the City's Water Pollution Control Inspectors to improve housekeeping practices by industries, restaurants, complexes etc.

In addition, it is recommended that the Keyser's River Partnership be re-activated.

5.2.4 Stormwater

The City's policy on minimizing impacts of stormwater on receiving waters (prepared by the Catchment, Stormwater and River Management Branch) – based on the concepts of Water Sensitive Urban Design and Sustainable Urban Drainage Systems - needs to be implemented. This includes the development of structural and non-structural best management practices for stormwater – such as retention ponds, vegetated swales, infiltration basins, bioretention cells, education, stormwater master planning etc, which are implemented at site or regional level as appropriate.

In addition, the flows and pollution loads of all existing stormwater discharges into the estuary need to be quantified with a view to prioritizing those having the greatest impact.

5.2.5 Litter

Illegal dumping of solid waste (garden refuse and building rubble) is widespread but is particularly problematic in the middle reaches of the Diep and Keysers sub-catchments (CMP). To a large extent this is a social problem, and while there have been a number of initiatives in the past with only limited success, the following actions are proposed:

- The metal bypass side fences adjacent to the litter traps are frequently stolen for scrap metal. They should be replaced with a strong plastic product (eg. recycled plastic) and held in place with concrete blocks;
- There should be a mass action campaign on litter similar to that held a few years ago which did reduce litter for around 6 months;
- The City's Informal Settlement Task Team should be approached to look at service requirements for areas in which there are – or are likely to be – large numbers of backyard dwellers who at present are not catered for in terms of refuse removal services;
- The recently introduced charges for the disposal of waste at City dump-sites should be reconsidered as it encourages illegal dumping.

5.2.6 Water Quality Monitoring

There is currently a fairly extensive water quality monitoring programme being implemented by the City. This comprises:

A. Monthly sampling of stations in the catchment and Zandvlei (under the auspices of CSRM):

   o Chemistry and algae (of which two are in Zandvlei: ZAV2 at the centre of the estuary and WLW/ZAV10 in Westlake Wetlands)
   o Bacteriology (of which 6 stations are in Zandvlei: ZAV 1,2,3 & 5 from near the head of the estuary to the mouth, ZA Weir at the weir and at WLW/ZAV 10 in Westlake Wetlands.

See Fig. 12 below.

B. Quarterly samples for chemistry and bacteriology at 4 stations within the Marina da Gama channels (BM 20 – 23) as well as 4 stations in the catchment (Langvlei canal, Keysers River in the Retreat industrial area, WLW, and Silvermine) under the auspices of Biodiversity Management.



Fig. 12. Current water quality monitoring being undertaken by CSRM.

An analysis of this highlighted some concerns, namely:

- Chemical monitoring within Zandvlei proper is limited to a single station opposite the yacht club;
- All samples are being taken at the surface i.e there is no bottom sampling – which is where low oxygen levels are likely to occur;
- Whereas up until the mid-1990's fortnightly bacteriological samples were taken, sampling was subsequently reduced to monthly. This is problematic in relation to the target which states that the range for *E.coli* (0 – 130 counts) should not be

exceeded by the geometric mean of fortnightly samples over a three-month period;
- There appeared to be some discrepancies in the analytical methods being used for the CSRM and BM sampling;
- The BM sampling takes place on a quarterly basis which limits its usefulness;
- The data on the algal assemblages (identification and enumeration) has not been collated or analysed in detail.

The existing water quality monitoring programme will therefore be adjusted as follows:

- All sites (except at the weir[13]) will have both chemical (including chlorophyll *a*) and bacterial analyses undertaken – samples to be collected ~30 cm below the water surface;
- All samples to be collected on a monthly basis and quarterly monitoring at BM sites will fall away;
- At each site *in situ* measurements of dissolved oxygen and salinity should be taken near the surface and also just above bottom.
- All samples to be collected using a boat (including that in Westlake Wetlands);
- The consolidated network will comprise 9 sites as follows (and Fig. 12 above):

    - Zandvlei (ZAV1, ZAV2, ZAV5, ZAVweir) and
    - Marina da Gama (BM23 , BM20, BM22, ZAV9 and ZAV8).

Other monitoring points such as ZAV10 (Westlake Wetland) and the inflowing rivers (CR01, CR20, CR21 and CR22) will also be continued.

It is also proposed that:

i) Assistance be provided to Scientific Services in the form a student project to facilitate the collation and analysis of the data on algal assemblages;

ii) A protocol for data sharing be developed as the City had in a number of cases provided monitoring data for student projects and had not been sent copies of the resulting reports. Nor had the City been acknowledged as the source of the data.

5.2.7 Sediment quality

There is very limited information on toxic contaminants in Zandvlei or the catchment, although elevated levels of copper and zinc were reported in the lower Keyser's River in 2002. Since such contaminants tend to accumulate in sediments and biota, it is proposed that a survey of heavy metals in the sediments and biota of the estuary – and possibly other contaminants – be undertaken. If possible this should be included in any further such surveys undertaken by DEA & DP as a follow-up to their survey in the Diep and Berg estuaries.

[13] Scientific Services does not have a marine lab, so there are some problems analyzing the chemistry of samples with a strong marine influence.

5.3 Biodiversity, Conservation, Planning

Despite the fact that Zandvlei is, and will have to remain a highly managed system because of the historical modifications to it, it is clearly still important from a biodiversity and conservation perspective – as is evidenced by the declaration of the area as a Nature Reserve. This value needs to be protected and promoted, especially in the face of proposed future developments in the area.

The management interventions proposed here are intended to enhance our knowledge and understanding of the biodiversity of the Nature Reserve, and maintain and restore its integrity as far as possible

5.3.1 The GZENR – Boundaries and Facilities

The Greater Zandvlei Estuary Nature Reserve was formally established in October, 2006, expanding it from the 22ha Zandvlei Nature Reserve to some 200ha. There are currently proposals being considered to expand it further by incorporating some additional parcels of land as shown in Fig. 13 below.

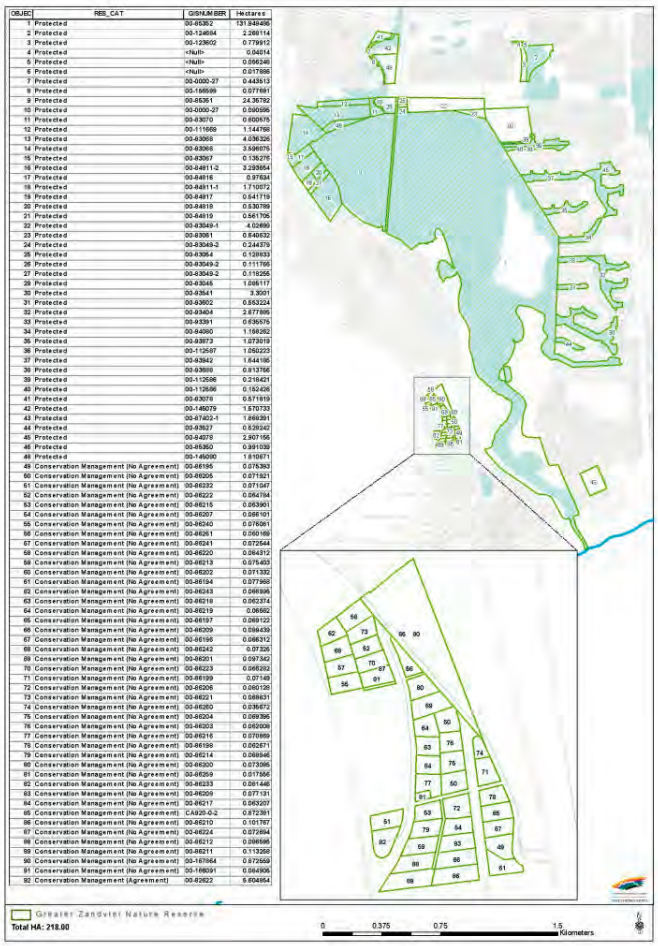


Fig. 13: Proposals for the expansion of the GZENR currently under consideration.

In the future, consideration should also be given to including:

- A buffer zone along the western boundary of the estuary (between the Sports Clubs/ recreational area and the estuary). This should be a linear strip of 5 – 10m with nodal points;
- The area to the north of the camp site;
- The road reserve adjacent to Military Road.

In identifying additional land to be incorporated into the reserve, particular attention should be given to building biodiversity corridors between the reserve and other protected and natural or semi-natural areas such as the mountain, the coast, Rondevlei, Princess Vlei, False Bay Ecology Park and even Pollsmoor dam and the dams on the wine farms.

In addition the facilities in the reserve need to be upgraded. At present a Resource Centre is being built next to the Education Centre using in-house staff. Additional resources need to be allocated for this to allow early completion and/or alternative sites/options need to be investigated. This is discussed further in Section 6.

5.3.2 Biodiversity information – status and management

It is proposed that biodiversity information collection is improved and expanded, and that better use is made of existing data as follows:

- The CWAC data should be analysed to look at trends in relation to various environmental factors – possibly through a student project;
- CWAC counts should be improved in terms of geographic coverage of the estuary, and, if possible, by increasing the counts to monthly even if only for a year or two;
- The data from counts of other (i.e. non-waders) birds should be consolidated and analysed;
- The proposed project on bird-ringing to look at the movement of bush birds should be implemented;
- Protocols for baseline and ongoing surveys of groups for which there is limited data should be acquired (eg. from CapeNature) or developed in consultation with experts and implemented through student projects. Priorities include inverterbrates and endangered or threatened species;
- Participation in the Butterfly census should be continued;
- The plant collection which is currently being established should be located in appropriate facilities in the Education/Resource Centre and launched at a public event;
- The vegetation maps should be updated and captured in a GIS system.

Although there is a weather station at Muizenberg, conditions away from the coast are sufficiently different to warrant the installation of additional stations and it is proposed to establish weather stations at the Zandvlei Sports Club and in the Nature Reserve.

In terms of managing the information, there are a number of relevant existing databases – in particular the Biodiversity database (www.biodiversity.org.za), the ADU website (http://cwac.adu.org.za/) which houses the CWAC data, and the ZIMP database (Zandvlei Inventory and Monitoring Project) which is accessible through the

Zandvlei Trust website (www.zandvleitrust.org.za). Each of these play different roles with the latter being more for public use, while the Biodiversity database has a more scientific role.

It is proposed that:

- all historical, current and future data be consolidated on the Biodiversity database;
- when the data is analysed the results should be put into a more accessible format and made available through the Zandvlei Trust website;
- links be established between the various websites.

Biological monitoring using indicator species should also be put in place, and a photographic record of changes to the reserve vegetation should be kept based on aerial photos (especially for historical changes) and fixed-point photography (cf. the MCA system).

5.3.3 Rehabilitation and restoration

A number of restoration/rehabilitation projects have either been completed or are underway, both in and around Zandvlei, and in the catchment. Additional projects to be addressed in the period covered by this plan include:

- The removal of the large berm of dumped material in the northern section of Zandvlei (Norfolk Park side adjacent to the Steenberg Rd Extension road reserve) and subsequent rehabilitation of the area;
- Rehabilitation of the additional land included into the reserve as proposed in 5.3.1 above;
- Restoration of the channels in Westlake Wetlands through a controlled burn of the reed beds;
- Implementation of the second phase of the Sand River reedbed project (at the confluence of the Sand River/Langevlei canals);
- Relocation of plants of particular interest from degraded areas outside of the reserve to conservation areas;
- Depending on the availability of appropriate material, the “shallowing” of the edges of the lower estuary to provide additional habitat for wading birds could be extended. Pre-planning should be completed as soon as possible.

There are also a number of rehabilitation proposals in the Catchment Management Plan, many of them aimed at decreasing erosion and/or improving water quality. Some of these have been mentioned earlier in this plan, but for full details, the CMP should be consulted.

5.3.4 Urban Development and Planning

There are currently two development proposals of significant concern to the area:

i) There is a long-standing proposal to build a new link between the M4 and M5 which would link up with Steenberg Rd (Steenberg Rd Extension). This is on the SDF maps and is supposed to happen within 5 – 10 years. If it goes ahead, it could have a major impact on the estuary. However, there is a

possibility that it is no longer a priority given the increased emphasis on provision of public transport.

ii) The road reserve for the proposed R300 Toll Road is south of blocks 12, 10, 25, 22 and north of blocks 48. 3, 2 (see Fig. x under 5.3.1). It would run between Main Road Lakeside in the west to Prince George (M5) in the east and then extend east of Prince George through Rondevlei, FBEP and Mitchells Plain to connect to the existing R300. However, there are also indications that this is unlikely to go ahead.

A watching brief should be kept on these initiatives.

5.3.5 Conservation, recreation and ecotourism development

Zandvlei has been used for recreational purposes since at least 1884, and is regarded as a regional recreational centre. During peak holiday periods there are some 2,000 and 3,000 visitors a day with popular activities include picnicking, braaiing, walking, boardsailing and fishing. It is also popular with residents for a variety of recreational uses as shown in the table below. [14] Turpie and Clark (2007) estimated the recreational value of the estuary as between R 1 – 5 million/year.

Zandvlei Recreational Users		
		October 2010
Canoeists/Kayakers		
Peninsula Canoe Club	Peninsula Canoe Club	232
Peninsula Canoe Club affiliates:	UCT	16
	Varsity College	8
	Bishop's School	10
Regular visitors from other clubs		119
Residents independent of clubs	Marina Da Gama only	379
	Total	**762**
Other Water-based Activities		
Residents with Pedalos	Marina Da Gama only	166
Stand Up Paddlers		41
Yacht Club		27
Wind surfers	estimated	30
Kite boarders	estimated	25
Sea Scouts/Girl Guides		?
Anglers	(in boats)	?
Land-based Activities		
Runners (Park Island only)	estimated	45
Bird Watchers		?
Anglers		?
Walkers		?
Dog-Walkers		?
Children's playgrounds		?

[14] Information provided by Ommund Sivertsen.

As can be seen from the table, very limited information is available on fishing. Despite this, concerns have been raised about the secondary impacts of fishing on the nature reserve, primarily as a result of poor fishing practices – for example, impacts on birds caused by abandoned hooks, fishing line etc. It is therefore proposed that a Code of Conduct for fishermen be introduced.

It is also proposed that, in addition to the zonation plan, a Visitor Management Plan should be developed which includes visible patrolling and policing.

In parallel with these initiatives, efforts should be made to further promote conservation-related recreational activities, including ecotourism developments. For example, the wide variety of birds in the area could be used to attract visitors to the reserve for a "bird watching experience". Other possibilities include canoe rentals and a coffee shop. These would help to market Muizenberg as an end destination in itself, rather than a place en route to other destinations and should be raised with the local Business Council with a view to establishing public-private partnerships.

5.4 **Pondweed Management**

In 1999, Southern Waters was contracted to develop management guidelines on amongst others, the "technique, frequency and extent of pondweed harvesting, including the identification of nursery areas". In addition, the consultant was to provide specifications for a monitoring programme to support the management efforts.

Prior to the development of these guidelines, the harvesting programme was based on a 4-weekly cycle drawn up by the Marina da Gama Residents Association, with each week covering a specific area (similar to that shown in Figure 14 below).

In addition, it was suggested that:

- Cutting be limited to a maximum depth of 0.45 – 0.5m;
- Cutting in the marina should be focused on providing central access for canoes and boats;
- There should be no cutting along the southeast or western shores of Park Island, in the northern section of the main vlei, or within 30m of any waterfowl nesting sites.

The conclusions/recommendations of Southern Water's 1999 report included the following:

- Mechanical harvesting and dredging/sediment removal were the most suitable management techniques;
- At least 3 cuttings per season would be required to keep the recreational areas clear of pondweed;
- The harvesting protocol should be more flexible – with harvesting being guided by surveys and monitoring – to allow for a more time and cost-effective approach;
- Training of operators;

- Harvesting should be concentrated around seasonal growth periods (peak is between January and April);
- At least 30% of the vlei and marina should be retained as "reserve" or nursery areas;
- Specific guidelines regarding depth of harvesting etc were provided for the recreational areas
- A detailed monitoring programme including seasonal surveys, logging of volumes of pondweed removed, and an assessment of the impact of harvesting on the fish nursery function.

In addition, the report stated that the recommended guidelines should be seen as a starting point for the management of pondweed, and that their implementation should be combined with monitoring and assessment with a view to fine-tuning the guidelines at a later stage.

Subsequent to this, The City's Parks Department – who are responsible for the harvesting programme - drew up an Annual Plan of Operation (2007) based largely on the Southern Waters Report, although it also covers other aquatic weeds and other areas (eg. Princess vlei, Rutter Road etc). It includes the following guidelines for harvesting of aquatic weeds (pondweed as well as alien species) in Zandvlei:

Frequency of Harvesting:

The minimum number of seasonal cuts required per area:

	Summer	Autumn	Winter	Spring
Zandvlei, marina	2	2	1	2

Time of harvesting:

Pondweed in Zandvlei attains its seasonal peak between October and April with growth declining during the winter months.[15]

	December to mid March	mid March to May	June to july	August to October	November
Zandvlei	Both machines at Zandvlei – control of pondweed	1 Machine at Zandvlei	Winter Repairs & Servicing	Both machines at Zandvlei	1 Machine at Zandvlei

Cutting limits:

	Distance from Shoreline property	Depth for canoes	Depths for Yachts
Zandvlei ,marina	2m	500mm	1.4m

All shoreline property owners at Marina Da Gama are responsible for clearing a 2m weed strip along their bank edge.

[15] Southern Waters (1999) identified January – April as the peak growing period.

Harvesting schedule:

There is an 8-week rotational schedule based on an adapted version of the proposals originally tabled by Marina da Gama residents as shown in the diagram below.[16]

Map of Zandvlei and Marina Canals indicating harvesting schedule

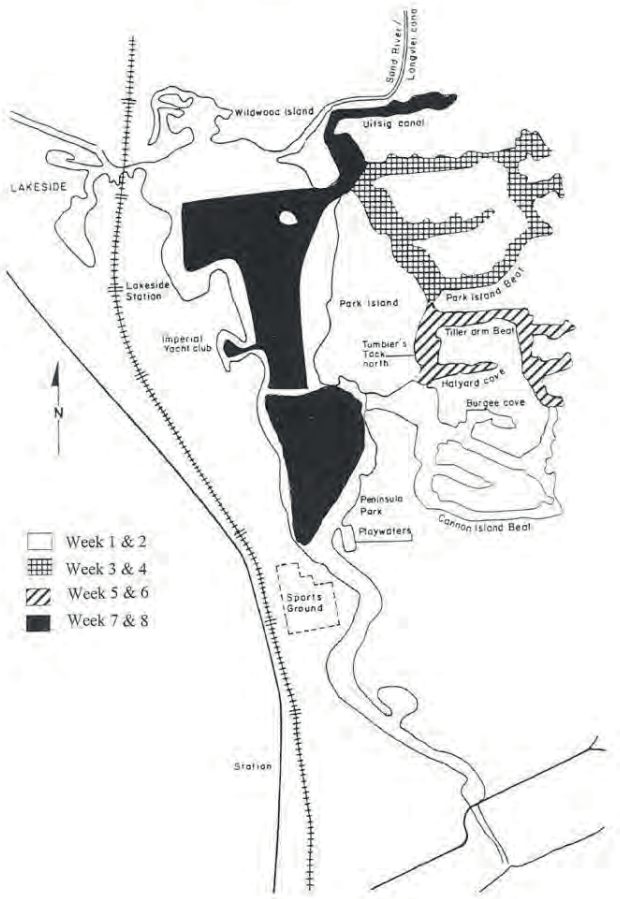


Fig. 14: 8-week cycle of current harvesting protocol

Based on the cutting rate of 0.14ha/hour (Southern Waters, 1999) and a 6-hour day, it should take about 8 machine weeks to cut the 35ha area – and 56 weeks to cut it 7 times/year as proposed. The current deployment of the machines – with two being based in Zandvlei for 26 weeks of the year – theoretically means that the current protocol allocates 66 machine weeks to Zandvlei which should be adequate to complete the harvesting. However, there are a number of constraints which hamper operations and this has frequently not been achieved. For example, the machines cannot operate in rainy weather and strong winds. They are ageing, and subject to extended breakdowns because parts not readily available. Between mid-August and mid-October, 2010, for example, at least 15 days were lost due to breakdowns. In

[16] Originally proposed as a 4-week schedule.

addition, operators have allegedly been requested to harvest in areas which should be the responsibility of residents.

This is of considerable concern given that, with the transfer of responsibility for the harvesting function to Biodiversity Management in January, 2011, only a single machine will be available for harvesting in Zandvlei. There is therefore a need to develop a new harvesting protocol which is more flexible with harvesting being guided by past experience, surveys and monitoring to allow for a more time and cost-effective approach – as was proposed by Southern Waters in 1999. To this end, a study of pondweed dynamics in combination with a monitoring programme should be instituted as soon as possible. In the interim, harvesting should continue on the following basis:

- The existing pondweed reserve areas be retained (as shown in Figure 6);
- Harvesting should be intensified over the peak growth period – January – April;
- Harvesting should continue to be planned on a rotational basis, but should be focused on the main channels, and cutting in the blind canals should be limited to once per season;
- Harvesting should be limited to a depth of 0.5m;
- There should be strict supervision of the operators by installing a GPS on the machine to track movements and times, amongst others to ensure that they are not cutting in areas outside of their responsibility;
- Residents responsible for 2m strip along channels;
- Any changes to the harvesting schedule to be approved by the Reserve Manager.

On the logistical side, the following interventions are proposed:

- Establishment of a stockpile of spare parts for the weed harvester;
- Training of additional drivers/ operators;
- Modification of the harvester to improve working conditions.

5.5 Invasive Species Management

Current management initiatives in the GZENR include:

5.5.1 Aquatic weeds

Common aquatic alien species include *Eichornia crassipes* (water hyacinth), *Ceratophyllum demersum* (hornwort), *Azolla filliculoides* (Red waterfern) and *Myriophyllum aquaticum* (Parrot's feather), although *Lemna spp* and *Salvinia molesta* have also been recorded. These species are generally concentrated in the upper reaches of the estuary, Westlake Wetlands and the influent rivers, where they inhibit recreational use (particularly water hyacinth) and exacerbate the potential for flooding.

In the main body of the vlei – where they are less common because of the salinity – any weeds that are present are removed as part of the *Potamogeton* harvesting programme, while weeds along the edges are removed by the GZENR staff.

In Westlake, there are several components to the management programme as follows:

- Annual mechanical clearing of weeds from the water courses (including river channels) by the City Council ahead of the winter rains to prevent flooding;
- *Ad hoc* clearing of areas not reached by the mechanical clearing eg. within the reeds on the sides of the channels, done either by Working for Wetlands or contractors at the request of – and funded by – Zandvlei Trust.

In addition, GZENR and Zandvlei Trust are currently running an experimental programme using biological controls in collaboration with Rhodes University (John Fowkes, pers. comm.).

5.5.2 Terrestrial plants

Invasive alien trees and grasses are common across the City including the GZENR. Those around Zandvlei include *Acacia spp* (Rooikrans and Port Jackson), Manatoka (*Myoporum tenuifolium*) and grasses such as Kikuyu (*Pennisetum clandestinum*), Pampas Grass (*Cortaderia selloana*) and the saltwater couchgrass (*Paspalum vaginatum*) which occurs along the banks of the estuary.

Clearing of terrestrial woody species is undertaken on an annual basis using herbicides, foliar sprays or manual removal as appropriate and these are now more or less under control. However, the proximity of urban areas makes it difficult to prevent re-invasions of vegetation such as kikuyu which is commonly used in gardens. Effectively controlling this would require a prohibition on its use, or the construction of some sort of barrier between the residences and the reserve.

5.1.3 Invasive animal species

Invasive animals include various species of fish mostly deliberately introduced by the conservation authorities to enhance fishing, as well as the guttural toad and mallard ducks. The grey squirrel has also recently been found in gardens in Frogmore Estate and poses a serious risk to the reserve as food sources include birds eggs, geckos etc. Guinea fowl, which are not indigenous to the Western Cape are also a problem as they compete with the Cape Francolin, and eat bulbs of fynbos species. Common pests such as the rat are most likely also present and it is noted that from a conservation perspective, domestic cats and dogs pose a threat to small mammals and birds in the reserve area. As for garden plants, preventing these from entering the reserve would require construction of some sort of barrier between the residences and the reserve.

To date efforts to manage animal species – such as the Mallard duck and alien fish - have been relatively *ad hoc*. A trial of an electric shocking methodology for the removal of alien fish was also undertaken some years ago. It was fairly successful on carp and Tilapia, but not as good for catfish, and it would need to be implemented over a 10-year period to achieve eradication.

5.1.4 Integrated IAS Management

The existing IAS initiatives at Zandvlei should be consolidated into an overall IAS plan which is integrated and aligned with the City's policy (under development) and strategy on IAS, as well as with national and provincial initiatives. The process of developing this plan should include:

- A thorough assessment of IAS and pathways in the GZENR;
- Prioritisation of species and pathways taking broader priorities into account;
- Development and implementation of strategies for priority species and pathways;
- Establishment of partnerships with Working for Water and Working for Wetlands to assist with management of aquatic invasives (ideally WfWater to clear, and Wf Wetlands to do restoration/rehabilitation work);
- Establishment of a partnership with the EDRR Units of the City and SANBI to facilitate the detection of emerging weeds (such as Purple Loosestrife) and the containment of species such as Pampas Grass which is present in Westlake Wetlands.

Other more specific activities include:

- Implementation of the pilot phase of the Aquatic Weed Management Plan project in the Sand River Catchment. This project covers 13 species: *Azolla filiculoides* - Red water fern; *Ceratophyllum demersum* - Rigid hornwort; *Commelina benghalensis* - Wandering Jew / tropical spiderwort; *Egeria densa* - Brazilian waterweed; *Eichornia crassipes* - Water hyacinth; *Ludwigia adscendens* subsp *diffusa* - Willow-herb; *Lythrum salicaria* - Purple Loosestrife; *Myriophyllum aquaticum* - Parrot's Feather; *Nasturtium officanale* - Watercress; *Persicaria (lapathifolia)* – Persicaria; *Pistia stratiodes* - Water lettuce / waterslaai; *Pontederia cordata* - Pickerel weed; and *Salvinia molesta* - Kariba weed.
- Seminar/presentation by EDRR units to the recreational users and residents and establishment of a network of volunteers for early detection;
- Interim culling of mallards (current population estimated at 500) until the national strategy kicks in;
- Investigate possibility of expanding the plant reference collection to include alien species;
- The CARA lists (and NEMBA lists once they are complete) and other information on IAS should be made available on local websites and on notice-boards in the reserve.

5.6 **Education and awareness**

Public awareness and understanding of the role and importance of estuaries and wetlands are crucial for the effective implementation of management programmes both in the Nature Reserve and in surrounding areas. This is particularly true in the case of Zandvlei where there is both a high level of recreational use, and low-income residential areas in relatively close proximity to the reserve and especially to the rivers flowing into it.

At present there is a well-established environmental education programme run by the Reserve staff with support from Zandvlei Trust. Moreover, members of the community are also involved in a salinity monitoring programme. The proposed actions below are intended to build on these existing initiatives.

i) Education and Resource Centre

There is an existing Environmental Education Centre adjacent to the City's administrative offices in the northern part of the Reserve. This is being upgraded and expanded to include a Resource Centre using internal resources. This is a drain on the time of the Reserve Staff, who are already stretched to capacity. Additional funds should be allocated to enable the hiring of contractors to complete this work.

There are also proposals to establish i) overnight camping facilities for the environmental education programme; and ii) an Interpretation Centre in the recreational area on the banks of the lower estuary. The various options for these – such as the existing camp site run by the City's Amenities Department – need to be explored further.

ii) Environmental education programmes

The existing schools programme should be continued and expanded in collaboration with Zandvlei Trust and WESSA to include additional schools, and to encourage regular visits and the establishment of environmental clubs to foster those with a real interest in the issues. The opportunity provided by the development programme initiated by the canoeing club should be taken up as a way of widening the learner's experience of the estuary.

An outreach programme should also be established to target the adults in those sections of the adjacent communities who currently have limited empathy with the estuary/nature reserve and its benefits. Approaches should be made through:

- Churches and women's organisations;
- Schools and sports clubs – by requesting opportunities to provide input at PTA and other meetings; and
- Presentations in the local library/ies.

Activities could include, for example, picnics for mothers and babies/toddlers, establishment of food gardens, as well as the more common environmental programmes such as recycling. The programme also needs to address the problem of people throwing material into the sewer system which results in blockages and overflows.

iii) Community monitoring programmes

Members of the Zandvlei community are already actively involved in a salinity monitoring programme. This active interest should be expanded to encourage people that regularly go out on the water, or visit parts of the Reserve to play a passive surveillance role for the early detection of alien invasive species. This should be initiated through a presentation/s by someone from the Early Detection and Rapid Response Unit at SANBI and the distribution of pamphlets and posters to raise awareness and facilitate identification of priority species.

iv) Communications materials

The information/messages should primarily be communicated by posters rather than pamphlets and flyers which are costly and are often just discarded. Posters should be put up in a number of different areas such as:

- All-weather boards in the recreational areas on the west bank and on Park Island;
- Notice boards at the Zandvlei Sports Club, libraries, shopping centres (eg. on the Zandvlei Trust notice board at Woolworths, the Shoprite in Military Road, and the Pick N Pay in Capricorn Park).

Provision has already been made for a number of new notice boards which will show the new boundaries of the reserve and provide general information on biodiversity. These should also be used to display the zonation map once complete as well as information on threats to biodiversity and health – such as pollution, invasive species and litter.

Articles should also be provided to the local newspapers and newsletters as well as to local organisations that could post them onto their websites (eg. Zandvlei Trust, the Marina da Gama Association, the Imperial Yacht Club etc).

v) Funding

Additional resources – financial and human – will be required to implement the proposed activities. It is therefore recommended that a proposal be drawn up with a view to submitting it to the National Lottery Board for funding – probably through the Zandvlei Trust.

Other potential sources of funding include the City (through the CTEET), Public Works Programme and the private sector – for example, companies distributing products with high volumes of packaging that contribute significantly to litter.

6 RESOURCE REQUIREMENTS

6.1 Staffing

The current level of staffing at the Nature Reserve is insufficient to cope with existing work, let alone the additional work which will be required for successful implementation of this Action Plan. Since the City does not have any additional posts available, other options for boosting the human resource capacity need to be investigated. These include raising funds and appointing staff in partnership with relevant NGO's and other organizations.

6.2 Facilities

The Reserve Staff are currently housed in offices of the City's Parks Department. An old building adjacent to the Environmental Education Centre is in the process of being upgraded as a Resource Centre and will include offices for the Reserve Staff. However, it is being done using internal resources (i.e. Reserve Staff themselves) as no funding is available to outsource the work. This should be rectified as soon as possible as it takes the time of the Reserve Staff away from their official responsibilities.

In the longer term, consideration should be given to relocating the Environmental Education Centre.

In addition, an investigation should be undertaken into options for the establishment of overnight camping facilities to be used for environmental education purposes.

6.3 Finances

Many of the actions proposed in this plan can be undertaken by existing staff in the relevant organizations, and within existing budgets – for example, the water quality monitoring programme which is funded by the Catchment, Stormwater and River Management Division of the City. However, there are also a number of new activities which have been proposed and for which funding has not yet been secured. A more detailed financing plan should therefore be developed as soon as possible which clearly distinguishes between:

- Those activities which are covered by existing budgets;
- Those which could be included into City and other budgets within the 5 year period of the Action Plan;
- Those for which alternative sources of funding should be sought.

The financing plan should also identify potential sources of additional funding.

7 ACTION PLAN

The Situation Assessment highlighted significant problems in Zandvlei, with the following being identified as priorities:

- Mouth conditions, water level management and salinity
- Water quality
- Pondweed management
- Invasive species
- Balancing recreation and conservation
- Coordinated and cost-effective monitoring programme
- Environmental education

During the development of the Estuary Management Plan a large number of proposals aimed at addressing these issues over the period 2011 – 2015 have emerged. These were discussed in Section 5, but are also are captured in the Action Plan set out in the tables under Section 7.2 which also provide a tentative time-frame and indicative budgets where possible. Given the number of proposals and the substantial resources required, those considered the highest priority are listed in 7.1 below, with additional detail being provided in the tables.

As indicated in Section 6, funds for the implementation of many of these activities has not yet been secured and it is proposed that a financing plan be developed to address this issue.

7.1 Priority Actions

Many of the impacts on Zandvlei are a result of activities in the catchment. Relevant remedial actions are detailed in the Sand River Catchment Plan (2003), and for the most part are not repeated here, although they are crucial to the effective management of the estuary. Thus, although it is not included in the list of priorities below, the implementation of the Catchment Management Plan should be regarded as a priority, and it is of concern that to date relatively few of the proposals have been effected because of a lack of funding.

Priorities more specific to Zandvlei include:

- Adjustment of mouth conditions to further facilitate tidal intrusion and passage of juvenile fish (short-term - reduction of weir height during summer, and increased number of days that the mouth is open during the recruitment period; longer-term – relocation of the sewer line and removal of the weir);
- Repair of the weir on the central pans and development of a protocol for its operation;
- Repair of the water level recorder at Thesen's Bridge;
- Analysis of historical fish survey data and development of a protocol and MoU to ensure regular fish survey data in future;
- Comprehensive salinity monitoring programme;
- Survey of heavy metals (and possibly other toxic contaminants) in the sediments and biota;
- Implementation of revised water quality monitoring programme;

- Analysis of CWAC data and increased CWAC counts for a 2-year period;
- Consolidation of information on Biodiversity database;
- Adaptation and refinement of pondweed harvesting protocol (including maintenance programme) to cope with new arrangements (transfer of function to Biodiversity Management which means that only one machine is available for Zandvlei);
- Development of an Invasive Species Management Plan;
- Development of a Visitor Management Plan;
- Development of a funding proposal to support expansion of the environmental education programme.

In addition, a financing plan needs to be developed to support the implementation of the Action Plan more generally.

A more comprehensive list of proposed activities is provided in Section 7.2 below.

7.2 Detailed Action Plan: 2011 – 2015

MANAGEMENT OF MOUTH CONDITIONS, WATER LEVELS, SALINITY AND CIRCULATION				
Steps	**Date**	**Responsibility**	**Estimated Budget**	**Indicator**
Objective A: Re-establishment of a regime more typical of an estuarine system				
1. Reduce the level of the weir to 0.6m during the summer months	Oct. 2010	Manager: CSRM	No additional costs	Salinities at target levels Increased fish recruitment
2. Increase the number of days of open mouth conditions between August & November within the constraints of inflow & weather.	August 2011	Manager: CSRM	No additional costs	Size frequency of fish populations shows multiple cohorts High numbers of recruits over this period.
3. Initiate EIA, budgeting process for removal of the weir, relocation of the sewer line & installation of a pump station.	2011	Manager: Reticulation	Est. costs for the entire job is R 12 million	Sewer line relocated to allow removal of the weir and improved tidal functioning of the estuary.
Objective B : Re-establishment of seasonal water level fluctuations on the central pans.				
1. Repair of the weir on the central pan	January 2011	Reserve Manager	TBD	Weir functioning as intended.
2. Development and implementation of a protocol for management of the weir and water levels.	2011	Reserve Manager with input from ZT & ADU.	No additional costs	Increased numbers of resident waders, breeding sites available, and return of migrant species.
Objective C: Reduction of sedimentation				
1. Implementation of relevant actions in Sand River Catchment Management Plan (improve agricultural practices, remove alien vegetation, restore riverine vegetation, construct silt traps etc)	2011 - 2015	Various: Manager: CSRM, Dept. of Agriculture, SANParks, City ISU etc.	TBD	Reduction in annual rates of sedimentation.
2. Study of quantity & quality of sediments & rate of sedimentation	2012	Manager: CSRM	TBD	Understanding of impacts of sedimentation on estuarine health.
3. Undertake a study to evaluate costs & benefits of dredging in Zandvlei	2012	Manager: CSRM	TBD	Report on costs & benefits of dredging
4. Implement riverine buffer zones	2012	DAFF	TBD	Reduced erosion

Steps	Date	Responsibility	Estimated Budget	Indicator
Objective D: Improve water circulation				
1. Investigation into options for remove of accumulated tubeworm colonies at strategic locations & implementation of recommendations	2011 - 12	Reserve Manager	TBD	Improved circulation through marina, reduction in anoxic conditions, improved passage for boats
2. Study of the hydrology & geohydrology, circulation patterns, residence time, bathymetry etc.	2013	Managers: CSRM/BM/ Reserve Manager	TBD	Improved understanding of the flows in the system to support management decisions.
3. Comprehensive Reserve Determination.	2014	Managers: CSRM/BM	TBD	Understanding of the flow requirements of the estuary.
Objective E : Monitoring of water levels, salinities, fish populations etc				
1. Water level recorder at Thesen's Bridge to be repaired & records kept on a database.	2011	Manager: CSRM	TBD (limited)	Regular & historical water level recordings available.
2. Accurate records to be kept of mouth opening & closing	2011 ongoing	Manager: CSRM	No additional costs	Accurate data available on # of days open/month
3. Comprehensive 2-year salinity monitoring programme	2012-2013	Managers: CSRM/BM	R 50,000 – R 250,000 depending on approach	In-depth understanding of salinity patterns in the estuary in relation to mouth management regime.
4. Analysis of historical fish survey data possibly through a student project	2011	Reserve Manager/ DAFF	No additional costs	Information on trends in fish populations btwn 2001 – 2010 available.
5. Development of a protocol and MoU btwn the City (BM) and DAFF on future fish surveys.	2011 ongoing	Reserve Manager/ CapeNature/DAFF	No additional costs	Fish surveys completed on a regular basis according to agreed protocol.
6. Development of protocol for basic annual surveys of *Callianassa* to be undertaken by Reserve staff.	2011 ongoing	Reserve Manager	No additional costs	*Callianassa* surveys completed on a regular basis according to agreed protocol.
7. Detailed vegetation survey to species level.	2013	Reserve Manager	TBD	Up-to-date vegetation map available.

WATER QUALITY MANAGEMENT				
Steps	**Date**	**Responsibility**	**Estimated Budget**	**Indicator**
Objective F : Establishment of binding Resource Quality Objectives				
1. Determination of Resource Quality Objectives using Rapid Determination methodology	2012	Manager: BM: CoCT	R 200,000	Resource Quality Objectives in place
Objective G : Reduction of pollution from sources in the catchment				
1. Implementation of relevant actions from the Sand River Catchment Management Plan (quantification of sources, reduction of fertilizer use, improved maintenance of reticulation, litter traps etc).	2011 - 2015	Managers: CSRM, WSS, & DAFF etc	TBD	Reduction in pollution load entering Zandvlei from the catchment.
2. Improve land management practices in the agricultural areas.	2012	DAFF	TBD	Reduction of nutrient/pesticide levels (and erosion).
3. Rehabilitation of the Sand River in the Coniston area.	2012	Manager: BM/CSRM	TBD	Reduction of silt & pollution loads entering Zandvlei from the Sand River
4. Awareness-raising campaign to improve housekeeping practices at industrial & commercial facilities	2012 - 2013	Manager: CSRM (Water Pollution Control Inspectors) + Reserve Manager	TBD	Reduction in illegal discharges to the influent rivers.
5. Re-activation of Keyser's River Partnership.	2011	Manager: BM/CSRM	TBD	Increased awareness & commitment by local businesses to environmental management.
Objective H : Reduction of pollution from stormwater discharges to the estuary				
1. Quantification of flows and pollution loads of stormwater discharges to the estuary.	2014	Manager: CSRM	TBD	Report identifying priority problem areas with recommendations for remediation.
2. Application of the City's Stormwater Policy to the stormwater system in the Zandvlei area.	2011 - 2015	Manager: CSRM	TBD	Best management practices for stormwater in place.

Steps	Date	Responsibility	Estimated Budget	Indicator
Objective I: Reduction of pollution from accidental spills				
1. Development of a Response Plan including procedures for incident reporting, ad hoc monitoring etc.	2011/2012	Manager: Water and Sanitation Services: Reticulation + Manager: ERMD	N/A	Improved communications around and response to accidental spills.
Objective J : Reduction of litter and dumping				
1. Replacement of metal bypass side-fences with plastic product cemented in place	2011	Manager: CSRM	TBD	Reduction in theft of metal structures associated with litter traps.
2. Mass action campaign on litter.	2011/12	Manager: Solid Waste Management/ CTEET	TBD	Reduction in volumes of litter removed from traps.
3. Investigation of service requirements in areas with large numbers of backyard dwellers (refuse removal & sanitation)	2011 (Underway)	Directors Water & Sanitation & Solid Waste Management (City)	N/A	Adequate provision for refuse removal for backyard dwellers.
4. Initiate discussions on charges for disposal of waste at City dumpsites.	2011	Managers: ERMD/CSRM + Director: Solid Waste Management	N/A	Reduction in illegal dumping.
Objective K : Improved understanding of environmental quality in the estuary				
1. Undertake a survey of toxic contaminants (heavy metals a priority) in the sediments and biota.	2012	Reserve Manager/ DEA & DP	R 75,000	Report on the levels of toxic contaminants in the estuary.
2. Implementation of revised water quality monitoring programme (see p. 37)	From 2011	Manager: CSRM + Scientific Services	No additional costs	Increased cost-effectiveness of monitoring.
3. Collation and analysis of data on algal assemblages through a student project.	2011/12	Reserve Manager + Scientific Services	No additional costs	Improved utilization of monitoring data.
4. Development of a protocol for data sharing (City data)	2011	Manager: CSRM + Scientific Services	No additional costs	Reports based on City data available to City and with due acknowledgement of data source.

BIODIVERSITY, CONSERVATION AND PLANNING				
Steps	**Date**	**Responsibility**	**Estimated Budget**	**Indicator**
Objective L: Further expansion of reserve to improve buffers and linkages.				
1. Initiate discussions with a view to incorporating a buffer zone along the western boundary of the estuary, the area north of the camp-site, and the road reserve adjacent to Military Road.	2011-2015	Manager: BM	No additional costs	Improved protection of biodiversity values.
2. Build biodiversity corridors to adjacent protected and semi-natural areas.	2011-2015	Manager: BM	No additional costs	Improved protection of biodiversity values.
Objective M: Improve and expand biodiversity information				
1. Analysis of existing CWAC data in relation to environmental factors	2011 - 2013	ADU	TBD	Information on trends in wading birds available.
2. Improve geographic coverage of CWAC counts at Zandvlei & implement a programme of monthly counts for a 2-year period	2011 - 2013	Reserve Manager, ADU, Cape Bird Club	No additional costs	Increased quality of information on wading birds
3. Consolidate & analyse counts of other birds	2011 - 2013	Reserve Manager, ADU, Cape Bird Club	No additional costs	Improved information available on non-wading birds
4. Implement proposed project on bird-ringing of bush birds	2012	Reserve Manager	TBD	Improved information available on bush birds
5. Source and/or develop protocols for surveys on other groups & implement through student projects	2011 - 2015	Reserve Manager	Limited additional costs	Quantitative information available for groups such as reptiles, amphibians, invertebrates etc.
6. Participate in Butterfly census	2011 – 2012?	Reserve Manager	No additional costs	Improved information available on butterflies
7. Provide facilities to house plant reference collection at Resource Centre & launch at public event.	2011	Reserve Manager	Limited additional costs	Reference collection available for educational and research purposes.
8. Update and digitize vegetation maps	2013	Reserve Manager	TBD	Vegetation information available in accessible format.
9. Establish weather stations at ZSC and in GZENR	2011	Reserve Manager + ZSC + Plant Cons. Unit/UCT	R 6,000	On-site weather data available.

Steps	Date	Responsibility	Estimated Budget	Indicator
10. Consolidate historical and current biodiversity information on Biodiversity database in accessible format.	2011/12	Reserve Manager	N/A	All relevant information available and accessible from Biodiversity database
11. Establish links between Biodiversity database, ADU/CWAC site and Zandvlei Trust website.	2011	Website/database managers	N/A	Freely available information on Zandvlei biodiversity.
12. Establish programme of biological monitoring of indicator species, including photographic records of vegetation changes.	2011/12	Reserve Manager	TBD	Adequate data available to be able to detect trends/changes in biodiversity.
Objective N : Restoration/rehabilitation of sites within the GZENR				
1. Remove berm in vicinity of Norfolk Park & rehabilitate the area	2011	Reserve Manager	TBD	Rehabilitation complete
2. Rehabilitate land proposed for incorporation (erfs 49 0- 92)	2012	Reserve Manager	TBD	Rehabilitation complete
3. Restoration of channels in Westlake Wetlands	2012	Reserve Manager	TBD	Rehabilitation complete
4. Implement 2nd phase of Sand River reedbed project	2013	Reserve Manager	TBD	Rehabilitation complete
5. Relocation of priority plants from degraded area to conservation areas	Ongoing	Reserve Manager	TBD	
6. "Shallowing"/rehabilitation of banks of lower estuary	Ad hoc	Reserve Manager	TBD	
Objective O: Visitor Management				
1. Development of a Visitor Management Plan	2011	Reserve Manager	TBD	Reduction in visitor impacts
2. Development of a Code of Conduct for fishermen	2011	Reserve Manager	No additional costs	Reduction in secondary impacts by fishermen
Objective p : Promotion of eco-friendly uses of Zandvlei				
1. Promotion of Zandvlei as a bird-watching destination	2011/12	Reserve Manager + Local Business Council	Private sector funds	Increased awareness of the value of Zandvlei
2. Provision of facilities such as canoe-hire, coffee shop/restaurant.	2011/12	Reserve Manager + Local Business Council	Private sector funds	Increased awareness of the value of Zandvlei

PONDWEED MANAGEMENT				
Steps	**Date**	**Responsibility**	**Estimated Budget**	**Indicator**
Objective Q: To improve understanding of pondweed dynamics.				
1. Appointment of consultants to investigate the role of temperature, salinity, nutrients, and depth in controlling pondweed growth (including bathymetry survey).	2011/12	Manager: BM	TBD	Availability of information on pondweed dynamics to improve effectiveness of harvesting
2. Accurate records to be kept of pondweed harvested (volumes, location, season etc).	2011 ongoing	Reserve Manager	No additional costs	Availability of information on pondweed dynamics to improve effectiveness of harvesting
Objective R: Improved time and cost-effectiveness of harvesting				
1. Adaptation and refinement of harvesting protocol	2011 ongoing	Reserve Manager	No additional costs	Main recreational channels free of pondweed
2. Logistical issues addressed (spare parts, training of operators, working conditions etc)	2011 ongoing	Reserve Manager	TBD	Reduction in work days lost as a result of downtime of harvester, operators off etc.
Objective S: To promote fulfillment by residents of their responsibilities				
1. Initiate discussions with Marina da Gama Association to ensure residents are aware of their responsibilities with regard to pondweed management.	2011	Reserve Manager	No additional costs	2 metre strip along marina channels cleared by residents.

INVASIVE SPECIES MANAGEMENT				
Steps	**Date**	**Responsibility**	**Estimated Budget**	**Indicator**
Objective T: Integration of IAS management both within the reserve and with external initiatives.				
1. Development of an IAS Management Plan for the GZENR through a process of assessment, prioritization and strategy development.	2011/12	Manager: BM + Invasive Species Coordinator (CoCT)	TBD	IAS Management Plan for GZENR adopted and ready for implementation.
2. Establishment of links with the EDRR units of the CoCT & SANBI as well as Working for Water, and Working for Wetlands	2011 ongoing	Reserve Manager	No additional costs	Additional expertise and capacity available to assist in IAS management within the GZENR.
3. Inclusion of Zandvlei in the City's/UCT survey of alien fish	2011	Invasive Species Coordinator (CoCT)/UCT	TBD	Information available on alien fish in Zandvlei.
Objective U: To prevent introductions of new alien species into Zandvlei				
1. Investigate the possibility of establishing a boat "cleaning station" at Zandvlei	2011	Reserve Manager, Invasive Species Coordinator (CoCT), + Zandvlei Sports Club	TBD	Reduced risk of introductions via boats from other areas
2. Produce educational material on the role of boats as a pathway for IAS introductions	2011	Reserve Manager, Invasive Species Coordinator (CoCT),	TBD	Increased awareness of the risk posed by boats
Objective V: To promote early detection of emergent species in Zandvlei				
1. Seminar/presentation to Zandvlei Sports Club, Zandvlei Trust etc	2011	EDRR Units of CoCT and SANBI	No additional costs	Identification of potential volunteers for monitoring
2. Establishment of a volunteer network for early detection in Zandvlei	2011 ongoing	EDRR Units of CoCT and SANBI	No additional costs	Early detection of priority emergent species.
3. Annual surveys for emergent species	2011 ongoing	EDRR Units of CoCT and SANBI	No additional costs	Early detection of priority emergent species.
Objective W: To promote more effective management of aquatic weeds				
1. Implementation of the pilot phase of the Aquatic Weed Management Plan in the Sand River catchment	2011 – 2013?	Invasive Species Coordinator (CoCT), Reserve Manager	TBD	Aquatic weeds reduced to 80% of the 2009 coverage.

Steps	Date	Responsibility	Estimated Budget	Indicator
Objective X: Ongoing control of existing IAS				
1. Continued ad hoc culling of mallards	2011 ongoing	Reserve Manager	No additional costs	Numbers maintained at manageable levels until National Strategy is implemented.
2. Continued control of existing aquatic and terrestrial plants	2011 ongoing	Reserve Manager	No additional costs	60% of the surface area in maintenance.

EDUCATION, AWARENESS-RAISING AND COMMUNICATIONS				
Steps	**Date**	**Responsibility**	**Estimated Budget**	**Indicator**
Objective Y : To expand the environmental education and outreach programme				
1. Identify additional schools interested in regular environmental education programmes.	2011/12	Reserve Manager + Education Officer + ZT + WESSA	Limited additional costs for transport	5 schools visiting Zandvlei on at least an annual basis
2. Foster interested learners through environmental clubs	2011/12	Reserve Manager + Education Officer	Limited additional costs for transport	5 environmental clubs active on a weekly basis
3. Establish partnership with the Zandvlei Canoeing Club's development programme to broaden the learner's experience	2011/12	Reserve Manager + Education Officer + Zandvlei Canoeing Club	Limited additional costs for transport	A number of members of environmental clubs participating in the canoeing development programme.
4. Establish an adult outreach programme through churches, women's organizations, schools (PTA), sports clubs etc.	2012	Reserve Manager + Education Officer	Limited additional costs	Increased appreciation of Zandvlei as a resource by members of local communities.
Objective Z: Expand the existing community monitoring programme				
1. Seminar/presentation to Zandvlei Sports Club, Zandvlei Trust etc & establishment of volunteer network.	2011	EDRR Units of CoCT and SANBI	No additional costs	Network of IAS monitoring volunteers in place
Objective AA: Improved communications on matters related to the reserve				
1. All-weather boards erected in various areas (west bank, Park Island etc)	2011	Reserve Manager	Limited costs	Strategically located notice boards in place
2. Erection of notice-boards in clubs, libraries, shopping centres etc.	2011	Reserve Manager, EDRR (SANBI), Zandvlei Trust	Limited costs	Strategically located notice boards in place
3. Relevant materials available for posting on notice-boards	2011 ongoing	Reserve Manager, EDRR (SANBI), IAS Coordinator (CoCT) Zandvlei Trust	TBD	Material available and on display covering various topics (Zonation map, EMP, pollution, litter, invasive species etc).
4. Articles provided to local newspapers, newsletters, websites etc.	2011 ongoing	Reserve Manager	No additional costs	Regular articles published.

RESOURCE REQUIREMENTS				
Steps	**Date**	**Responsibility**	**Estimated Budget**	**Indicator**
Objective AB : To increase capacity of human resources				
1. Identify opportunities for partnerships which will facilitate increase of HR capacity.	July, 2011	Manager: ERMD	TBD	External personnel available to assist Reserve Staff.
Objective AC : To upgrade and expand environmental education facilities and programme				
1. Completion of upgrading of Resource Centre	2011	Manager: ERMD	R 50,000	Resource Centre completed
2. Development of a proposal around environmental education for submission to the National Lottery Board	2011	Zandvlei Trust	Est. R 1.5 million	Funds available for expansion of environmental education programme.
3. Identification of other potential sources of funding & submission of applications	2011/12	Reserve Manager/Zandvlei Trust	TBD	Funds available for expansion of environmental education programme.
Objective AD : To improve availability of financial resources to implement other components of the Action Plan				
1. Development of a financing plan	2011	Manager: ERMD/ ZAC	N/A	Provision for listed activities in budget allocations & quantification of external funding needs.
2. Identify and target potential external sources of funding	2011 ongoing	Manager: ERMD/ ZAC	N/A	Funding available for implementation of Action Plan & related activities.

8. FRAMEWORK FOR IMPLEMENTATION

It is proposed that the existing Zandvlei Action Committee – with some additional members - be responsible for overseeing and driving the implementation of the EMP.

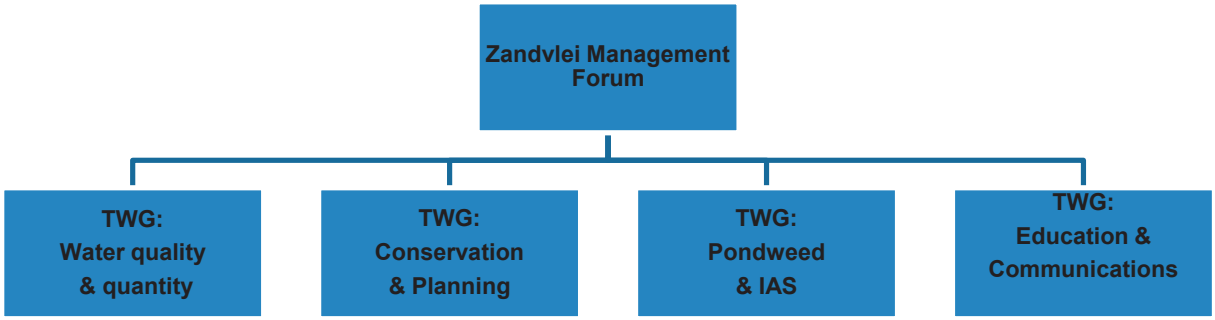
Existing members of the committee include:

- City of Cape Town (various different divisions)
- Zandvlei Trust
- Imperial Yacht Club
- Friends of Park Island
- Muizenberg and Lakeside Ratepayers Association
- Marina da Gama Association
- Sea Scouts base

Additional members should include:

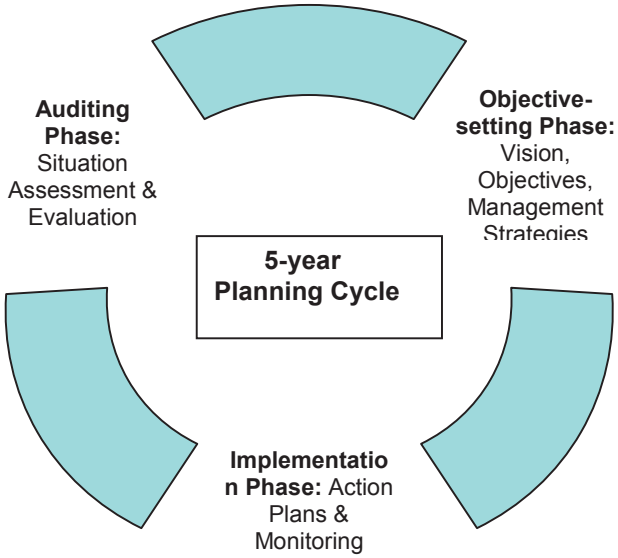
- Oceans and Coasts (DEA) (Estuaries and Pollution Divisions)
- DWA
- Department of Agriculture, Forestry and Fisheries (Landcare and Fisheries)
- Department of Environmental Affairs and Development Planning (W.Cape)
- Peninsula Canoe Club

In addition, there should be up to four Technical Working Groups to continue providing guidance to the implementation of relevant aspects of the plan.



9. AUDITING AND EVALUATION

The Situation Assessment which preceded the development of this Estuary Management Plan should be regarded as the first of 5-yearly Evaluations in an ongoing cycle of planning for the management of the estuary as shown in the diagram below.



However, particularly in the initial 5-year period, it is recommended that progress on the implementation of the EMP is audited on a more regular basis as follows:

- There should be quarterly meetings of the Zandvlei Management Forum with the minutes of these meetings being made available to an appropriate oversight body within the City, CapeNature, the Provincial Coastal Committee, and other relevant bodies.
- There should be annual report backs to an open Public Meeting on progress in terms of implementation of the EMP/Action Plan. The report should be made on the basis of an annual "mini-audit" of progress by an external consultant, with the appointment of the consultant being facilitated by the Forum.

In the case of this first 5-year period, where a number of the actions in the second half of the period are dependant on the outcome of studies or other actions scheduled for the first two years, it is also proposed that a more thorough audit take place at the mid-point of the 5-year period, as well as at the end. This would be accompanied by revisions and/or refinements to the current EMP and Action Plan.

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ESTUARY MANAGEMENT PLAN:

EERSTE RIVER ESTUARY

1. VISION

The Vision for the C.A.P.E. Estuaries Programme as a whole is: "Our estuaries are beautiful, rich in plants and animals, they attract visitors, sustain our livelihoods and uplift our spirits."

The Eerste River Estuary is part of an extensive urban environment and as such the vision for the estuary is:

"To manage the estuary and its catchment in such a manner as to reduce and minimise urban influence and pollutants on the estuary, where possible allow free and natural movement of the estuary mouth, manage alien invasive species, continuously work towards achieving high standards of water quality, recognise the estuary as an important marine nursery and biodiversity habitat and monitor the estuary in such a manner so as to intervene when urban influences have compromised the natural functioning of the estuary"

2. SITUATION ASSESSMENT AND CONTEXT

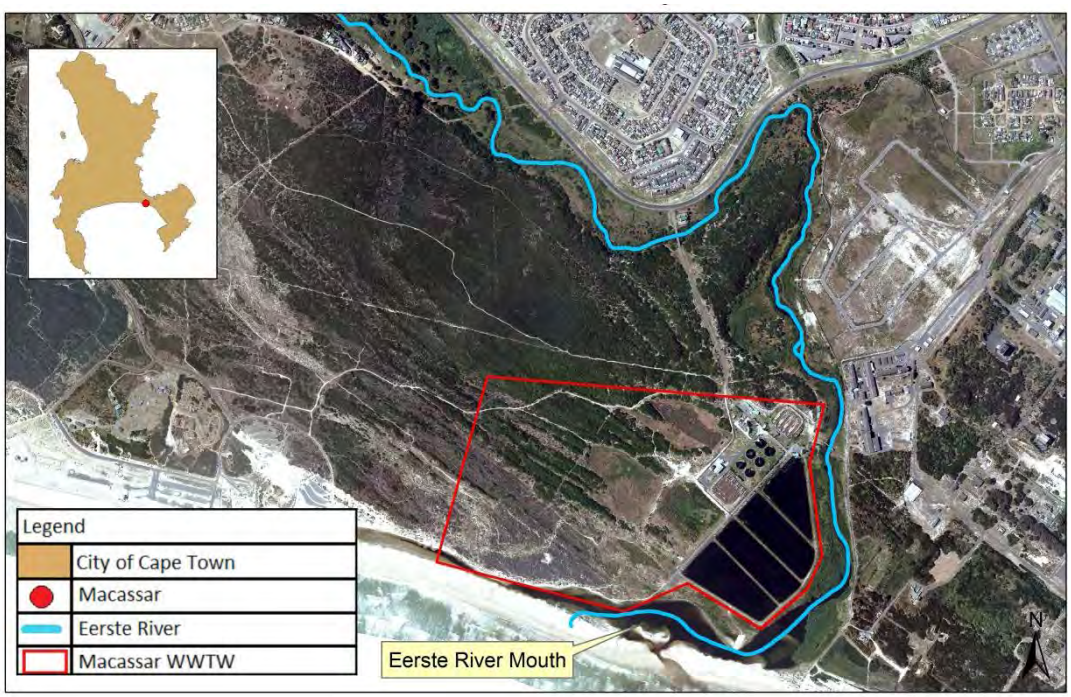


Figure 1: Eerste River Estuary

The Eerste River Estuary meets the ocean at Macassar Beach on the False Bay coastline. The Eerste River Estuary mouth forms the western boundary of the Helderberg Marine Protected Area (MPA) and as such must be considered a core component to the marine conservation objectives of the MPA.

The estuary is typified by a broad back ponding area with a highly mobile estuary mouth. The mouth is not canalised or fixed and is highly influenced by the prevailing coastal dynamics of a wind driven sand system as well as altered flow due to urban and farming impacts on the greater catchment area.

There are no residential properties located near the estuary, but a large sewage treatment facility (Macassar Wastewater Treatment Works) is located adjacent to the back ponding area and discharges final treated effluent directly into the estuary (see Figure 1). Some distance upstream is the suburb of Macassar which includes both residential and rural farming / small holding components. To the east of the estuary is the site of

the former AECI facility; redevelopment plans for this site are in the early phases, and it is not yet clear whether or how the site may be redeveloped.

The Eerste River is joined by the Kuils River approximately 4km upstream of the estuary. The latter river also receives treated effluent from a number of Wastewater Treatment Works (WWTW) located in the Kuils River catchment area. It is noteworthy that the Kuils River forms the backbone of the Kuils River Corridor which aims to connect CapeNature's Driftsands Nature Reserve with Macassar Dunes and the Coast.

The flow of the river at the mouth is persistent as a net seawards flow. This is partly due to the wastewater discharge contribution, which has the effect of keeping the mouth generally open.

While wind-blown sands generally encroach from the east, the longshore sediment supplies from wave action vary from west to east and therefore the location of the estuary mouth is inherently unstable. It is anticipated that climate change effects will result in greater instability of this system due to sea level rise and possible changes in wind dynamics. Significant meandering of the mouth to the west has been recorded leading to damage to an inappropriately located pump station and parking area in 2010/11.

Due to the fact that this system has a significant component of treated sewage effluent, the natural estuarine characteristics have been permanently altered. The objectives for managing such a system should therefore focus on protection of infrastructure while allowing beach and dune processes to function as naturally as possible.

2.1 WATER QUALITY OF ESTUARY

The condition of the estuary is highly influenced by the Greater Eerste-Kuils Catchment Area which chiefly results in the following:

- Altered seasonality and flow dynamics due to increased volumes as a result of urban run-off and discharge of wastewater effluent;
- Poor water quality due to litter, urban pollutants and wastewater effluent.
- Unplanned emergency overflow of untreated wastewater from the Macassar Wastewater Treatment Works

Comprehensive water quality monitoring is undertaken on a monthly basis by the City of Cape Town's Scientific Services Laboratory since 1989, and results indicate that the catchment as a whole has been significantly impacted by a range of urban land-uses and activities including the presence of several WWTWs, industrial areas, extensive high density formal and informal residential settlements and a major road network. The condition of the estuary itself is thus influenced by these upstream impacts and also more specifically by the presence of the Macassar WWTW within the estuarine environment.



Figure 2: Water Quality Sampling Points

Water quality monitoring points in the vicinity of Eerste River Estuary include:

- Eerste River (EK12)
- Eerste River estuary (EK17)
- Moddergatspruit – Macassar Road (EK18)
- Macassar Beach (XCS19)

The water quality of the Eerste River estuary is of concern, as it opens across a beach used for recreational purposes, as well as its influence on the Helderberg MPA.

2.2 SPECIES RECORDED IN THE CATCHMENT

The City of Cape Town's Alien Invasive Unit have recorded the following **invasive species** in the Eerste River Catchment (2012-2013):

Nasturtium officinale	Watercress
Commelina diffusa	Climbing dayflower
Lamium purpureum	Red deadnettle
Eichhornia crassipes	Water hyacinth
Ricinus communis	Castor bean
Acacia saligna	Port Jackson
Paraserianthes lophantha	Stinkbean
Canna indica	Indian shot
Persicaria decipiens	Slender knot-weed
Sagittaria platyphylla	Delta arrowhead
Melia azedarach	Syringa
Echium vulgare	Common Viper's Bugloss
Arundo donax	Giant reed
Lemna spp.	Duckweed
Various herbaceous species	

The Department of Agriculture, Forestry and Fisheries have recorded the following marine and freshwater species in the Eerste River Catchment (2013):

Marine Species	
Gilchristella aestuaria	Estuarine round herring
Atherina breviceps	Cape silverside
Psammogobius knysnaensis	Knysna sandgoby
Lichia amia	Leervis
Monodactylus falciformis	Cape moony
Mugilcephalus	Flathead mullet
Lithognathus lithognathus	White steenbras
Galeichthys feliceps	White sea catfish
Liza dumerilii	Groovy mullet
Liza tricuspidens	Striped mullet
Heteromycterus capensis	Cape sole
Solea bleekeri	Blackhand sole
Liza richardsonii	Harder
Pomatomus saltatrix	Elf
Rhabdosargus globiceps	White stumpnose
Etrumeus whiteheadi	Redeye round herring
Amblyrhynchotes honckenii	Blaasop
Anguilla bengalenis	African mottled eel
Anguilla marmorata	Madagascan mottled eel
Anguilla mossambica	Longfin eel

Freshwater Species	
Clarias gariepinus	Sharptooth catfish (invasive)
Cyprinus carpio	Carp (invasive)
Oncorhynchus mykiss	Rainbow trout (invasive)
Galaxias zebratus	Cape galaxias

2.3 RECREATION

Recreation in the estuary is minimal and is confined to occasional limited local recreational swimming. No commercial fishing is permitted however limited recreational fishing occurs. The size and scale of the estuary does not facilitate broader recreational use such as boating or sailing.

3. MANAGEMENT PLAN

The Eerste River Estuary has to date not had a specific management plan or long term objectives assigned to it, nor have specific roles and responsibilities been previously defined. As part of its new Integrated Coastal Management approach, the City has prioritised the management of small and large estuaries. Based on the situation assessment and the available information a number of management objectives have been defined. For each of these management objectives, a specific operational protocol has been developed.

These specific management protocols are intended to clearly define actions as well as responsibilities across City line departments. As implementation takes place and new information is gathered and understood, operational protocols may be amended and additional objectives and associated protocols added. Estuary management within an urban environment is seen as a long term approach following a principle of striving towards ongoing improvement in both the quality and management of our estuaries.

3.1 MANAGEMENT OBJECTIVES

The City has the following management objectives for the Eerste River Estuary:

A. Allow the estuary mouth to function naturally as part of the local coastal dynamic processes and intervene only under specific defined and documented circumstances
B. Reduce and minimise all sources of urban pollutants to the estuary
C. Regulation and development of infrastructure in or adjacent to the estuary
D. Allow the natural circulation and fluctuation in estuary water quantity to be determined by seasonal rainfall patterns, whenever possible
E. Monitor estuary dynamics and intervene if required
F. Monitor estuary water quality and work towards a high standard of water quality acceptable for public recreation and ecological functioning
G. Remove alien invasive species from the estuary
H. Appropriately regulate all recreational use of the estuary
I. Provide public awareness and education through a range of media
J. Undertake annual monitoring and sampling of the estuary's biodiversity
K. Implement an Estuary Emergency Contingency Plan in the event of a flooding, significant pollution event, oxygen depletion or other emergency events
L. Establish an estuary task team with relevant stakeholders
M. Regulate events and filming in the estuarine environment

OBJECTIVE A:

Allow the estuary mouth to function naturally as part of the local coastal dynamic processes and intervene only under specific defined and documented circumstances

LEGISLATION/STANDARDS:

Estuary mouth manipulation falls within the National Environmental Management Act (NEMA) Regulations in so far as mouth manipulation involves movement of sand and therefore triggers Activity 18 (Listing Notice 1). As such mouth manipulation may be undertaken either:

a) In terms of a *"management plan agreed to by the relevant environmental authority"*
b) In an emergency situation followed by notification to Department of Environmental Affairs and Development Planning (DEADP)

MANAGEMENT PROTOCOLS:

Due to the presence of the WWTW and the large volumes of effluent discharged into the estuary, it is likely that the mouth remains open for most of the year. However, lateral migration along the coast has been problematic in previous years, and it is therefore essential that protocols for opening and straightening of the river mouth are in place.

The following management protocols will be applied:

1) Risk of inland flooding
- The mouth of the estuary may be straightened and opened in the event that high rainfall prediction is indicative of a possible inland flooding event.
- Determination of this need as well as the responsibility for carrying out the action resides with the City's Catchment, Stormwater and River Management Branch.

2) Pollution or toxic event
- In the event of a toxic event in the estuary or catchment, the mouth may be mechanically opened to facilitate flushing of the estuary during high tide or high water levels. This action may also require the trapping of sea water in the estuary through the physical closing of the mouth for a short duration.
- Determination of this need resides with the City's Catchment, Stormwater and River Management Branch in consultation with the C.A.P.E. Estuary Programme Manager as well as the National Departments of Environmental Affairs (DEA) and Agriculture, Fisheries and Forestry (DAFF). Responsibility for carrying out the action resides with the City's Catchment, Stormwater and River Management Branch

3) Potential undermining of infrastructure or critical dune systems by estuary mouth movement.
- Where the estuary mouth moves or meanders in such a manner that it threatens critical dune systems or City infrastructure the mouth may be mechanically straightened or re-aligned.
- Determination of this need as well as the responsibility for carrying out the action resides with the City's Environmental Resource Management Department's Coastal Management Unit in consultation with the Helderberg district environmental office

RECORDS:

- All mouth manipulation, the reason, action and completion will be recorded in the City's Coastal Management Monitoring and Database System
- DEA, DAFF, DEADP and the C.A.P.E Estuary Programme will be informed of all mouth manipulation events by the City's Coastal Management Unit

MACHINE ACCESS FOR MOUTH MANIPULATION:

- In all circumstances listed within this management objective, access points and traverse routes for machinery to be used for mouth manipulation will be determined by the Environmental Resource Management Department
- As much as possible, access and traverse routes must adhere to existing road surfaces or previously disturbed areas.
- These access and traverse routes will be strictly adhered to at all times

OBJECTIVE B:

Reduce and minimise all sources of urban pollutants to the estuary

LEGISLATION/STANDARDS:

Pollution in the form of industrial waste, human waste, domestic waste and material waste is governed by a wide range of National Legislation and Standards.

- National Environmental Management Act (NEMA)
- National Water Act (NWA)
- National Waste Act
- Integrated Coastal Management Act (ICMA)

However, for practical reasons recognition must be given to the fact that both the catchment that feeds the estuary, the estuary itself as well as the marine environment with which the estuary interacts are all subject to various pollutant sources common within a highly developed and populated urban environment. As such, all means to reduce pollution into the estuary that are practical, cost effective and reasonable will be employed but targeting zero pollution within an urban environment is neither practical nor realistic.

MANAGEMENT PROTOCOLS:

To minimise and reduce all forms of pollution the following management protocols will be applied:

1) Regular and systematic litter removal from the general Eerste River Catchment area by the City's Solid Waste Management Department.
2) Monthly monitoring of water quality along the river by the City's Scientific Services Branch.
3) If deemed necessary, installation, clearing and maintenance of litter traps by the City's Operations and Assets Branch of the Roads and Stormwater Department.
4) On an ongoing basis and as required, implement interventions to reduce water pollution at source, through the application of the City's Water Quality Improvement Strategy and Implementation Plan.
5) On an ongoing basis, coordinating and liaising with the Winelands Municipality with regards to holistic management across the entire catchment

RECORDS:

1) All major pollution events to be recorded in the City's Coastal Monitoring Database. A major pollution event is defined as any pollution event deemed to be significantly greater than the level of background pollution present in the system. This may be determined either through water quality monitoring (i.e. a set of results that shows a significant spike in pollution, or through observation of an event (e.g. sewer overflow).

GENERAL

- In the event of major water based pollution events, the pollution event will be managed in accordance with the management protocol as set out in OBJECTIVE A.
- In the event of increased levels of litter within the catchment system a litter trap may be established at the most northern end of the back pond to reduce and minimise litter into the estuary

OBJECTIVE (C) :

Regulation of development of infrastructure in or adjacent to the estuary

LEGISLATION/STANDARDS:

Development of or building of any infrastructure within or adjacent to the estuary is regulated by the following:

a) National Environmental Management Act
b) City Zoning Scheme
c) Integrated Coastal Management Act
d) Coastal Edge and Setback Line
e) Floodplain and River Corridor Management Policy
f) Management of Urban Stormwater Impacts Policy

MANAGEMENT PROTOCOLS:

a) All development proposals must comply with relevant legislation and policies
b) Development proposals falling within the Coastal Edge/Setback Line or 1 in 50 year flood line should not be supported
c) The building or construction of any permanent or temporary structures that do not trigger NEMA regulations, but are adjacent to or within the estuary, require additional written permission from the City's Environmental Resource Management Department's Integrated Coastal Management Unit or the Helderberg district environmental office

RECORDS:

- Any written permission granted for a permanent or temporary structure to be recorded in the City's Coastal Monitoring Database

GENERAL:

- As the Eerste River Estuary forms part of the Helderberg MPA, construction of any permanent or temporary structures will in general not be supported unless strong rationale is provided with measurable benefits

OBJECTIVE (D):

Allow the natural circulation and fluctuation in estuary water quantity to be determined by seasonal rainfall patterns, whenever possible.

LEGISLATION/STANDARDS:

- National Water Act

MANAGEMENT PROTOCOLS:

a) At no time should the mouth of the estuary be impeded, diverted, blocked or altered unless under the specific conditions as defined in OBJECTIVE A
b) The estuary mouth may never be canalised or fixed
c) No water abstraction to be permitted from the back pond or estuary mouth
d) Water abstraction from the Eerste River Catchment to conform to all relevant legislation with strict permit conditions
e) On an ongoing basis, strive for improvement in wastewater discharge from the Macassar WWTW works to comply with permit conditions
f) On an ongoing basis, encourage the re-use of treated effluent from the various WWTWs in the greater catchment area

RECORDS:

- Permitted water abstraction from the Eerste River Catchment as well as permit conditions to be recorded in the City's Coastal Monitoring Database
- Cases and outcomes of any illegal water extraction in the Eerste River Catchment to be recorded in the City's Coastal Monitoring Database

GENERAL:

- In the event of major flow alteration, the City's Catchment, Stormwater and River Management Branch in conjunction with the Helderberg district environmental office to conduct an investigation to determine cause of flow change and make recommendations to rectify and restore flow regime

OBJECTIVE (E) :

Monitor estuary dynamics and intervene if required

LEGISLATION/STANDARDS:

- National Environmental Management Act

MANAGEMENT PROTOCOLS:

1) The City's Environmental Resource Management Department will develop an estuary dynamics monitoring programme based on aerial photography, including the establishment of baseline data, with the aim of annual assessment to determine whether changes in dynamics are taking place over time.

2) If the changing dynamics of the estuary are determined to be posing a management problem, the City's Catchment, Stormwater and River Management Branch in conjunction with the City's Environmental Resource Management Department will investigate and attempt to determine the cause. Areas of concern which may require intervention include, but are not limited to, increased rates of sedimentation and significant migration of the estuary or river mouth.

3) If it is determined that changes pose a management problem, the City will:
   a) Inform DAFF, DEA and the C.A.P.E. Estuary Programme Manager
   b) In consultation with DAFF, DEA and the C.A.P.E. Estuary Programme Manager determine the most appropriate plan of action
   c) Ensure compliance to NEMA if remedial action requires environmental authorisation

RECORDS:

- Changes in estuary dynamics to be monitored and recorded in the City's Coastal Management Monitoring and Database System.

GENERAL:

- Recognise that changes in estuary dynamics may form part of the natural variation in the estuary and as such retain a principle of least interference

OBJECTIVE F:

Monitor estuary water quality and work towards a high standard of water quality acceptable for public recreation and ecological functioning

LEGISLATION/STANDARDS:

- Water quality guidelines (DWA and DEA).

MANAGEMENT PROTOCOLS:

- Standardised water quality monitoring to be undertaken at one location within the estuary (EK17) and at various sites in the greater catchment area once per month (temperature, dissolved oxygen, conductivity/salinity, pH, total suspended solids, total phosphorus, orthophosphate, total nitrogen, soluble ammonia, nitrite & nitrate, faecal coliforms, *Escherichia coli* and enterococcus)

- ERMD to liaise with the Wastewater Department to ensure that data from the monitoring of the final effluent quality from Macassar Wastewater Treatment Works (and other relevant WWTWs) is provided to the Coastal Management Monitoring and Database System on a quarterly basis

- In the event that excessive poor water quality results are measured that threaten the estuary the management protocols established in OBJECTIVE A may be followed to restore improved water quality conditions

RECORDS:

- All water quality results will be recorded within Scientific Services' Laboratory Information Management System (LIMS) and the monthly Certificate of Analysis will be added to the City's Coastal Management Monitoring and Database System.

- All final effluent quality results obtained from the Wastewater department will be logged in the City's Coastal Management Monitoring and Database System

GENERAL:

- Estuary water quality management to be implemented in accordance with the Water and Sanitation Department's, and Catchment, Stormwater and River Management Branch's City-wide work programme, resources and priorities.

OBJECTIVE (G):

Remove alien invasive species from the estuary

LEGISLATION/STANDARDS:

- Conservation of Agricultural Resources Act, 43 of 1983 (CARA)
- National Environmental Biodiversity Act (NEMBA), 10 of 2004

MANAGEMENT PROTOCOLS:

The City's Invasive Species Unit to prepare an invasive species management plan for the estuary, to include, where relevant:

- Control of established invasive plants
- Control and management of invasive alien birds and animals where necessary
- Control and management of invasive alien fish, if deemed necessary
- Re-introduction of indigenous species where feasible
- Implementation of an early detection and rapid response programme to address new and emerging invasive alien species

RECORDS:

- The invasive species management plan will be appended to this Estuary Management Plan as Annexure A.

GENERAL:

- The estuary invasive species management plan to be implemented in accordance with the Invasive Species Unit city-wide work programme, resources and priorities.

- An integrated invasive species management approach will be followed in partnership with relevant stakeholders

OBJECTIVE (H):

Regulate all recreational use of the estuary

LEGISLATION/STANDARDS:

- DAFF Commercial Fishing Regulations
- DAFF Recreational Fishing Regulations
- DWA, Recreational Water Quality Standards
- Integrated Coastal Management Act
- City's Municipal Coastal Management Plan

MANAGEMENT PROTOCOLS:

- Only recreational fishing will be permitted, with a valid recreational fishing permit, available from the Post Office. This will be communicated through appropriate signage.
- No motorised water-craft of any kind permitted in the estuary or estuary mouth
- City's Marine and Coastal Law Enforcement Unit in conjunction with DAFF Fishery Control Officers to monitor, enforce and regulate
- Due to the close proximity of the WWTW, no swimming is permitted in the estuary. Signage to this effect will be installed.

RECORDS:

- Any non-compliance to regulations will be recorded in the City's Coastal Management Monitoring and Database System

GENERAL:

- The estuary recreational use management plan to be implemented in accordance with the Sport, Recreation and Amenities Department's City-wide work programme, resources and priorities.

- Appropriate recreation to be supported in line with the City's Social Development Strategy

OBJECTIVE (I):

Provide public awareness and education through a range of media

LEGISLATION/STANDARDS:

- None

MANAGEMENT PROTOCOLS:

Public education and awareness on the Eerste River Estuary may be provided in the following ways:

1) General catchment and estuary education and awareness through the City's Youth Environmental Schools (YES) Programme
2) General estuary education and awareness as part of the City's Educator Training Programme
3) General estuary education and awareness through the City's Nature Reserve Environmental Education

Programme
4) General City communication programmes focusing on awareness raising and education about pollution, its impact on human health and freshwater ecosystems
5) The installation of relevant and appropriate informative signage at the estuary

RECORDS:

- All signs and their locations to be recorded in the City's Coastal Management Monitoring and Database System.

GENERAL:

- All signage, regulatory and informative, must comply with the City's Coastal Signage Protocol
- The estuary public awareness and education management plan to be implemented in accordance with the Environmental Resource Management Department's city-wide work programme, resources and priorities.

OBJECTIVE J:

Undertake annual monitoring and sampling of the estuary's biodiversity

LEGISLATION/STANDARDS:

- None

MANAGEMENT PROTOCOLS:

ERMD in partnership with DAFF to undertake annual estuary biodiversity surveys through:

- Fish sampling through annual seine netting
- Bird counts
- Benthic sampling

RECORDS:

- All sampling results to be recorded in the City's Coastal Management Monitoring and Database System

GENERAL:

- Biodiversity sampling programme and schedule to be determined by DAFF
- The sampling programme is contingent on sufficient resources being made available for this programme

OBJECTIVE (K):

Implement an Estuary Emergency Contingency Plan in the event of a flooding, significant pollution event, oxygen depletion or other emergency events

LEGISLATION/STANDARDS:

- National Environmental Management Act

MANAGEMENT PROTOCOLS:

The following will be considered an Estuary Emergency requiring the Emergency Contingency Protocols to be implemented:

1) A land based (catchment) pollution event
2) Marine oil or pollution spill in False Bay
3) Rapid oxygen depletion
4) Marine / estuarine life die-off within the estuary

Emergency Contingency Protocols:

1) In the event of an emergency the estuary, estuary mouth and beach area (200m either side of the mouth) will be closed to the public and enforced by City Law Enforcement
2) The City's Coastal Co-ordinators will notify officials from DAFF, DEA and the C.A.P.E. Estuary programme manager
3) Where a land based pollution event is contaminating the estuary, the protocol established in OBJECTIVE A will be followed
4) Where there is a marine oil or pollution event, the estuary mouth will be boomed off and the Official Oil and Pollution Contingency Plan as per the City's Municipal Coastal Management Plan will become effective
5) In the event of a rapid oxygen depletion event, the estuary mouth will be breached and opened at low tide to allow high tide ocean water into the estuary, as per OBJECTIVE A.
6) In the event of significant marine life die-off, samples of dead marine life will be provided to DAFF and DEA for analysis. All remaining dead marine life will be recovered from the estuary by the City's Solid Waste Management department and disposed of at Vissershok Landfill site in accordance with City waste management procedures
7) The Estuary, estuary mouth and associated beach area will only be re-opened to public access once it is deemed safe

RECORDS:

- All estuary emergency events as well as the action taken will be recorded in the City's Coastal Management Monitoring and Database System
- DEA and DAFF to make any sampling results from a marine life die off available to the City

GENERAL:

- An emergency will only be declared if it is determined that the scale of the problem is such that it threatens the long term viability of the estuary as a functional ecosystem, or if it threatens the integrity of the Helderberg Marine Protected Area.
- This determination will be made by the City's Catchment, Stormwater and River Management Branch, in conjunction with the Environmental Resource Management Department. In the event of a biodiversity related emergency, ERMD will be the lead department in terms of decision-making.

OBJECTIVE (L):

Establish an estuary task team with relevant stakeholders

LEGISLATION/STANDARDS:

- Integrated Coastal Management Act

MANAGEMENT PROTOCOLS:

- Task team to be established as part of a city-wide Small Estuaries Task Team, which will include all estuaries except for the Zandvlei and Diep estuaries.
- Small Estuaries Task Team to meet on a quarterly basis

RECORDS:

- Action minutes of all meetings to be maintained as part of the City's Coastal Monitoring Database

GENERAL:

- Small Estuaries Task Team will function as a working group consisting of officials who are involved in management work related to the relevant estuaries
- Public engagement will be facilitated through the existing Sub-Council structure

OBJECTIVE M:

Regulation of Events and Filming

LEGISLATION/STANDARDS:

- City Filming and Events Policy
-

MANAGEMENT PROTOCOLS:

Any organisation or individual who wishes to hold, host or undertake a commercial or non-profit event or commercial filming of any kind on the estuary, or within the coastal edge surrounding the estuary must:

- Submit a formal application to the City's Events and Filming Office
- The application must be circulated to the Environmental Resource Management Department, Catchment, Stormwater and River Management Branch and Sport, Recreation and Amenities Department for consideration
- Officials from these departments will advise the Events and Filming Office on the suitability of the application and if supported the conditions attached to such support
- If approved, the final event or filming permit with attached conditions must be circulated to the Environmental Resource Management Department, Catchment Stormwater and River Management Branch and Sport, Recreation and Amenities Department at least 48 hours prior to the event or filming taking place

RECORDS:

- Events and Film Office to retain records of all applications, permits and conditions as well as any reported non-compliance

GENERAL:

- Event and filming applications for the estuary must demonstrate meaningful benefit

ESTUARY MANAGEMENT PLAN:

Hout Bay River Estuary

1. VISION

The Vision for the C.A.P.E. Estuaries Programme as a whole is: "Our estuaries are beautiful, rich in plants and animals, they attract visitors, sustain our livelihoods and uplift our spirits."

The Hout Bay River (also known as the Disa River) Estuary is part of an extensive urban environment and as such the vision for the estuary is:

"To manage the estuary and its catchment in such a manner as to reduce and minimise urban influence and pollutants on the estuary, where possible allow free and natural movement of the estuary mouth whilst ensuring that all risks to life and property are avoided, manage alien invasive species, continuously work towards achieving high standards of water quality, recognise the estuary as an important marine nursery and biodiversity habitat and monitor the estuary in such a manner so as to intervene when urban influences have compromised the natural functioning of the estuary"

2 SITUATION ASSESSMENT AND CONTEXT

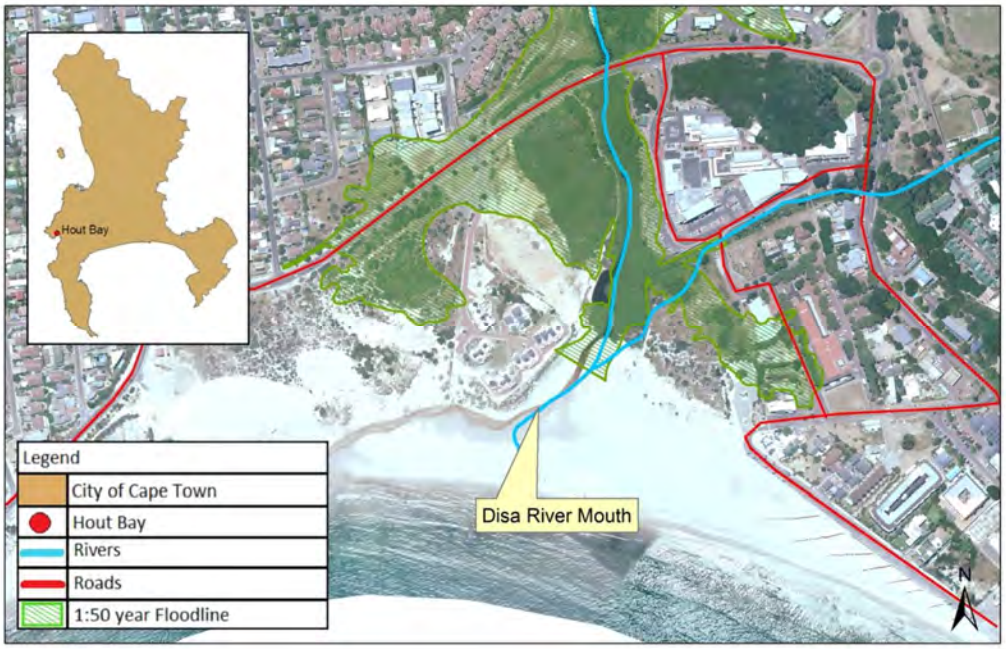


Figure 1: Hout Bay River Estuary

The Hout Bay River Estuary connects with the ocean at Hout Bay Beach. The estuary is an intermittently open system that opens when the Hout Bay River is in spate, but generally closes during summer. The river outlet is therefore not considered to be a true estuary with associated estuarine dependant species.

Reduction in natural flows due to retention of water in upper catchment dams, increase in urban stormwater flows, urban development, bank stabilisation and flood levees, sedimentation, litter from informal settlements, and stormwater discharges all impact the estuary and its contributing river. This has led to the alterations in the estuary's condition, water quality and depth.

Furthermore, the estuary is no longer in its natural state and tends to meander, effectively compromising efforts for dune rehabilitation. A Management and Rehabilitation Plan for the Hout Bay Dunes (Low, A B. and van Eeden J.D., Management and Rehabilitation plan for the Hout Bay Dunes. Volume 2. Vula Environmental Service, Vredenburg) has been compiled which points to sand accumulations on Hout Bay Beach contributing

to the unpredictable meandering of the river mouth. With the continuous accumulation of sand and no sand, estuary, or river management plan in place, the river embankment below the river mouth will continue to erode.

A number of developments are below the 1:50 flood line of the Hout Bay River and are therefore exposed to the effects of coastal dynamics, especially erosion.

2.1 WATER QUALITY OF ESTUARY

The condition of the estuary is highly influenced by the Hout Bay Catchment Area which chiefly results in the following:

- Altered seasonality and flow dynamics
- Poor water quality due to litter, urban pollutants and sewage.
- Occasional unplanned overflow of untreated sewage from the sewage reticulation network due to breakdown or damage

Comprehensive water quality monitoring has been undertaken on a monthly basis by the City's Scientific Services Laboratory since 1991, and results indicate that the upper reaches of the catchment are virtually pristine. However as the river traverses the increasingly dense residential area and adjacent informal settlement area of Imizamo Yethu the condition of the river deteriorates. Sporadically high bacterial contamination levels are of concern in the lower river reaches and outlet. Dog walkers need to be vigilant about removing pet waste; however the resident bird populations and horse riders also contribute to the bacterial load.

Water quality in the estuary can be of concern due to the fact that beachgoers (particularly children) sometimes enter the warmer waters in the river outlet. Stagnation of the water and concentration of pollutants when the mouth is closed means that there is potentially increased risk. Signage to warn about the potentially contaminated condition of the river outlet is in place.



Figure 2: Water quality monitoring points in the vicinity of Hout Bay River Estuary

Water quality sample collection points within the Hout Bay catchment area (arranged from the extreme upper catchment down towards the sea):

- Hout Bay near Princess St (DR02) - not estuarine

- Hout Bay at Victoria Road (above and below) (DR01)
- Hout Bay River estuary (DR05)
- Hout Bay beach (XCN10) - not estuarine

The water quality of the Hout Bay River estuary is potentially of concern as the mouth of the river opens across a recreational beach.

2.2 SPECIES RECORDED IN HOUT BAY RIVER CATCHMENT AREA

The City of Cape Town's Alien Invasive Unit have recorded the following **invasive species** in the Hout Bay River Catchment (2012-2013):

Invasive Species	
Nasturtium officinale	Watercress
Commelina diffusa	Climbing dayflower
Canna indica	Canna
Arundo donax	Giant reed
Ceratophyllum demersum	Hornwort
Lantana spp.	Lantana
Lemna spp.	Duckweed
Various herbaceous species	

The Department of Agriculture, Forestry and Fisheries have recorded the following marine and freshwater species in the Hout Bay River Catchment (2013):

Marine Species	
Psammogobius knysnaensis	Knysna sandgoby
Liza richardsonii	Harder
Anguilla mossambica	Longfin eel

Freshwater Species	
Sandelia capensis	Cape kurper
Oreochromis mossambicus	Mozambique tilapia
Tilapia sparrmanii	Banded tilapia
Gambusia affinis	Mosquitofish
Galaxias zebratus	Cape galaxias

2.3 RECREATION

Recreation in the estuary is minimal and is confined to local recreational swimming, dog walking / paddling in the back ponding area and in the estuary mouth. No commercial fishing is permitted. The size and scale of the estuary does not facilitate broader recreational use such as boating or sailing.

3) MANAGEMENT PLAN

The Hout Bay River Estuary has to date not had a specific management plan or long term objectives assigned to it, nor have specific roles and responsibilities been previously defined. As part of its new Integrated Coastal Management approach, the City has prioritised the management of small and large estuaries. Based on the situation assessment and the available information a number of management objectives have been defined. For each of these management objectives, a specific operational protocol has been developed.

These specific management protocols are intended to clearly define actions as well as responsibilities across City line departments. As implementation takes place and new information is gathered and understood, operational protocols may be amended and additional objectives and associated protocols added. Estuary management within an urban environment is seen as a long term approach following a principle of striving towards ongoing improvement in both the quality and management of our estuaries.

3.1 MANAGEMENT OBJECTIVES

The City has the following management objectives for the Hout Bay River Estuary:

A. Allow the estuary mouth to function naturally as part of the local coastal dynamic processes and intervene only under specific defined and documented circumstances
B. Reduce and minimise all sources of urban pollutants to the estuary
C. Regulation and development of infrastructure in or adjacent to the estuary
D. Allow the natural circulation and fluctuation in estuary water quantity to be determined by seasonal rainfall patterns, whenever possible
E. Monitor estuary dynamics and intervene if required
F. Monitor estuary water quality and work towards a high standard of water quality acceptable for public recreation and ecological functioning
G. Remove alien invasive species from the estuary
H. Appropriately regulate all recreational use of the estuary
I. Provide public awareness and education through a range of media
J. Undertake annual monitoring and sampling of the estuary's biodiversity
K. Implement an Estuary Emergency Contingency Plan in the event of a flooding, significant pollution event, oxygen depletion or other emergency events
L. Establish an estuary task team with relevant stakeholders
M. Regulate events and filming in the estuarine environment

OBJECTIVE A :

Allow the estuary mouth to function naturally as part of the local coastal dynamic processes and intervene only under specific defined and documented circumstances

LEGISLATION/STANDARDS:

Estuary mouth manipulation falls within the National Environmental Management Act Regulations. As such mouth manipulation must be done as either:

a) In terms of a *"management plan agreed to by the relevant environmental authority"*
b) In an emergency situation followed by notification to Department of Environmental Affairs and Development Planning (DEADP)

MANAGEMENT PROTOCOLS:

The following management protocols will be applied:

1) Risk of inland flooding

- The mouth of the estuary may be straightened and opened in the event that high rainfall prediction is indicative of a possible inland flooding event.
- Determination of this need as well as the responsibility for carrying out the action resides with the City's Catchment, Stormwater and River Management Branch.

2) Pollution or toxic event

- In the event of a toxic event in the estuary or catchment, the mouth may be mechanically opened to facilitate flushing of the estuary during high tide or high water levels. This action may also require the trapping of sea water in the estuary through the physical closing of the mouth for a short duration.
- Determination of this need resides with the City's Catchment, Stormwater and River Management Branch in consultation with the C.A.P.E. Estuary Programme Manager as well as the National Departments of Environmental Affairs (DEA) and Agriculture, Fisheries and Forestry (DAFF). Responsibility for carrying out the action resides with the City's Catchment, Stormwater and River Management Branch

3) Potential undermining of infrastructure or critical dune systems by estuary mouth movement.

- Where the estuary mouth moves or meanders in such a manner that it threatens City infrastructure or sensitive environmental components such as the dune system, the mouth may be mechanically straightened or re-aligned.
- Determination of this need as well as the responsibility for carrying out the action resides with the City's Environmental Resource Management Department's Coastal Management Unit in consultation with the Southern district environmental office

RECORDS:

- All mouth manipulation, the reason, action and completion thereof will be recorded in the City's Coastal Management Monitoring and Database System
- DEA, DAFF, DEADP and the C.A.P.E Estuary Programme will be informed by the City's Coastal Management Unit of all mouth manipulation

MACHINE ACCESS FOR MOUTH MANIPULATION:

- In all circumstances listed within this management objective, access points and traverse routes for machinery to be used for mouth manipulation will be determined by the Environmental Resource Management Department
- As much as possible, access and traverse routes must adhere to existing road surfaces or previously disturbed areas.
- These access and traverse routes will be strictly adhered to at all times

OBJECTIVE B :

Reduce and minimise all sources of urban pollutants to the estuary

LEGISLATION/STANDARDS:

Pollution in the form of industrial waste, human waste, domestic waste and material waste is governed by a wide range of National Legislation and Standards.

- National Environmental Management Act (NEMA)
- National Water Act (NWA)
- National Waste Act
- Integrated Coastal Management Act (ICMA)

However, for practical reasons recognition must be given to the fact that both the catchment that feeds the estuary, the estuary itself as well as the marine environment with which the estuary interacts are all subject to various pollutant sources common within a highly developed and populated urban environment. As such, all means to reduce pollution into the estuary that are practical, cost effective and reasonable will be employed but targeting zero pollution within an urban environment is neither practical nor realistic.

MANAGEMENT PROTOCOLS:

To reduce all forms of pollution the following management protocols will be applied:

1) Regular and systematic litter removal from the general Hout Bay Catchment area by the City's Solid Waste Management Department
2) Monthly monitoring of water quality along the river by the City's Scientific Services Branch.
3) Installation, clearing and maintenance of litter traps by the City's Operations and Assets Branch of the Roads and Stormwater Department.
4) Routine maintenance and upgrades will be performed to ensure the continued functioning of the low-flow storm water diversions along Victoria Road and below the cemetery side of Imizamo-yethu.
5) Litter traps to be constructed on both storm water lines to reduce the frequency with which the low flow diversions becpme blocked from litter.
6) On an ongoing basis and as required, implement interventions to reduce water pollution at source, through the application of the City's Water Quality Improvement Strategy and Implementation Plan.

RECORDS:

1) All major pollution events to be recorded in the City's Coastal Monitoring Database. A major pollution event is defined as any pollution event deemed to be significantly greater than the level of background pollution present in the system. This may be determined either through water quality monitoring (i.e. a set of results that shows a significant spike in pollution, or through observation of an event (e.g. sewer

overflow).

GENERAL

- In the event of major water based pollution events, the pollution event will be managed in accordance with the management protocol as set out in OBJECTIVE A.
- In the event of increased levels of litter within the catchment system a litter trap may be established at the most northern end of the back pond to reduce and minimise litter into the estuary

OBJECTIVE C :

Regulation of development of infrastructure in or adjacent to the estuary

LEGISLATION/STANDARDS:

Development or building of any infrastructure within or adjacent to the estuary is regulated by the following:

a) National Environmental Management Act
b) City of Cape Town Integrated Zoning Scheme
c) Integrated Coastal Management Act
d) Coastal Edge and Setback Line
e) Floodplain and River Corridor Management Policy
f) Management of Urban Stormwater Impacts Policy

MANAGEMENT PROTOCOLS:

a) All development proposals must comply with relevant legislation and policies
b) Development proposals falling within the Coastal Edge/Setback Line or 1 in 50 year flood line should not be supported
c) The building or construction of any permanent or temporary structures that do not trigger NEMA regulations, but are adjacent to or within the estuary, require additional written permission from the City's Environmental Resource Management Department's Integrated Coastal Management Unit or the Southern district environmental office

RECORDS:

- Any written permission granted for a permanent or temporary structure to be recorded in the City's Coastal Monitoring Database

GENERAL:

- Construction of any permanent or temporary structures will in general not be supported unless strong rationale is provided with measurable benefits

OBJECTIVE (D):

Allow the natural circulation and fluctuations in estuary water quantity to be determined by seasonal rainfall patterns, whenever possible.

LEGISLATION/STANDARDS:

- National Water Act

MANAGEMENT PROTOCOLS:

a) At no time should the mouth of the estuary be impeded, diverted, blocked or altered unless under the specific conditions as defined in OBJECTIVE A
b) The estuary mouth may never be canalised or fixed
c) No water abstraction to be permitted from the back pond or estuary mouth
d) Water abstraction from the Hout Bay River Catchment to conform to all relevant legislation with strict permit conditions

RECORDS:

- Permitted water abstraction from the Hout Bay River Catchment as well as permit conditions to be recorded in the City's Coastal Monitoring Database
- Cases and outcomes of any illegal water extraction in the Hout Bay River Catchment to be recorded in the City's Coastal Monitoring Database

GENERAL:

- In the event of major flow alteration, the City's Catchment, Stormwater and River Management Branch in conjunction with the Southern district environmental office to conduct an investigation to determine cause of flow change and make recommendations to rectify and restore the flow regime

OBJECTIVE (E) :

Monitor estuary dynamics and intervene if required

LEGISLATION/STANDARDS:

- National Environmental Management Act

MANAGEMENT PROTOCOLS:

1) The City's Environmental Resource Management Department will develop an estuary dynamics monitoring programme based on aerial photography, including the establishment of baseline data, with the aim of annual assessment to determine whether changes in dynamics are taking place over time.

2) If the changing dynamics of the estuary are determined to be posing a management problem, the City's Catchment, Stormwater and River Management Branch in conjunction with the City's Environmental Resource Management Department will investigate and attempt to determine the cause. Areas of concern

which may require intervention include, but are not limited to, increased rates of sedimentation and significant migration of the estuary or river mouth.

3) If it is determined that changes pose a management problem, the City will:
   a) Inform DAFF, DEA and the C.A.P.E. Estuary Programme Manager
   b) In consultation with DAFF, DEA and the C.A.P.E. Estuary Programme Manager determine the most appropriate plan of action
   c) Ensure compliance to NEMA if remedial action requires environmental authorisation

RECORDS:

- Changes in estuary dynamics to be monitored and recorded in the City's Coastal Management Monitoring and Database System.

GENERAL:

- Recognise that changes in estuary dynamics may form part of the natural variation in the estuary and as such retain a principle of least interference

OBJECTIVE (F):

Monitor estuary water quality and work towards a high standard of water quality acceptable for public recreation and ecological functioning

LEGISLATION/STANDARDS:

- Water quality guidelines (DWA and DEA).

MANAGEMENT PROTOCOLS:

- Standardised water quality monitoring to be undertaken at one location within the estuary (DR05) and at various sites in the greater catchment area once per month (temperature, dissolved oxygen, conductivity/salinity, pH, total suspended solids, total phosphorus, orthophosphate, total nitrogen, soluble ammonia, nitrite & nitrate, faecal coliforms, *Escherichia coli* and enterococcus)

- In the event that excessive poor water quality results are measured that threaten the estuary the management protocols established in OBJECTIVE A may be followed to restore improved water quality conditions

RECORDS:

- All water quality results will be recorded within Scientific Services' Laboratory Information Management System (LIMS)

GENERAL:

- Estuary water quality management to be implemented in accordance with the Catchment, Stormwater and River Management Branch City-wide work programme, resources and priorities.

OBJECTIVE (G):

Remove alien invasive species from the estuary

LEGISLATION/STANDARDS:

- Conservation of Agricultural Resources Act, 43 of 1983 (CARA)
- National Environmental Biodiversity Act (NEMBA), 10 of 2004

MANAGEMENT PROTOCOLS:

The City's Invasive Species Unit to prepare an invasive species management plan for the estuary, to include, where relevant:

- Control of established invasive plants
- Control and management of invasive alien birds and animals where necessary
- Control and management of invasive alien fish, if deemed necessary
- Re-introduction of indigenous species where feasible
- Implement an early detection and rapid response programme to address new and emerging invasive alien species

RECORDS:

- The invasive species management plan will be appended to this Estuary Management Plan as Annexure A.

GENERAL:

- The estuary invasive species management plan to be implemented in accordance with the Invasive Species Unit city-wide work programme, resources and priorities.
- An integrated invasive species management approach will be followed in partnership with relevant stakeholders

OBJECTIVE (H):

Regulate all recreational use of the estuary

LEGISLATION/STANDARDS:

- DAFF commercial fishing regulations
- DAFF recreational fishing regulations
- DWA, Recreational water quality standards
- Integrated Coastal Management Act
- City's Municipal Coastal Management Plan

MANAGEMENT PROTOCOLS:

- Only recreational fishing will be permitted, with a valid recreational fishing permit, available from the Post Office. This will be communicated through appropriate signage.
- No motorised water-craft of any kind permitted in the estuary or estuary mouth
- City's Marine and Coastal Law Enforcement Unit in conjunction with DAFF Fishery Control Officers to monitor, enforce and regulate
- City Health Department, in conjunction with Catchment, Stormwater and River Management, to determine recreational safety based on water quality results and to inform the public accordingly.

RECORDS:

- Any non-compliance to regulations will be recorded in the City's Coastal Management Monitoring and Database System

GENERAL:

- The estuary recreational use management plan to be implemented in accordance with the Sport, Recreation and Amenities Department's City-wide work programme, resources and priorities.

- Appropriate recreation to be supported in line with the City's Social Development Strategy

OBJECTIVE (I):

Provide public awareness and education through a range of media

LEGISLATION/STANDARDS:

- None

MANAGEMENT PROTOCOLS:

Public education and awareness on the Hout Bay River Estuary may be provided in the following ways:

1) General catchment and estuary education and awareness through the City's Youth Environmental Schools

(YES) Programme
2) General estuary education and awareness as part of the City's Educator Training Programme
3) General estuary education and awareness through the City's Nature Reserve Environmental Education Programme
4) General City communication programmes focusing on awareness raising and education about pollution, its impact on human health and freshwater ecosystems
5) The installation of relevant and appropriate informative signage at the estuary

RECORDS:

- All signs and their locations to be recorded in the City's Coastal Management Monitoring and Database System.

GENERAL:

- All signage, regulatory and informative, must comply with the City's Coastal Signage Protocol
- The estuary public awareness and education management plan to be implemented in accordance with the Environmental Resource Management Department city-wide work programme, resources and priorities.

OBJECTIVE J:

Undertake annual monitoring and sampling of the estuary's biodiversity

LEGISLATION/STANDARDS:

- None

MANAGEMENT PROTOCOLS:

In partnership with DAFF undertake annual estuary biodiversity surveys through:

- Fish sampling through annual seine netting
- Bird counts
- Benthic sampling

RECORDS:

- All sampling results to be recorded in the City's Coastal Management Monitoring and Database System, and the City's Biodiversity Database

GENERAL:

- Biodiversity sampling programme and schedule to be determined by DAFF
- The sampling programme is contingent on sufficient resources being made available for this programme

OBJECTIVE (K):

Implement an Estuary Emergency Contingency Plan in the event of a flood, significant pollution event, oxygen depletion or other emergency events

LEGISLATION/STANDARDS:

- National Environmental Management Act

MANAGEMENT PROTOCOLS:

The following will be considered an Estuary Emergency requiring the Emergency Contingency Protocols to be implemented:

1) A major land based pollution event
2) Marine oil or pollution spill in Hout Bay
3) Rapid oxygen depletion
4) Marine life die-off

Emergency Contingency Protocols:

1) In the event of an emergency the estuary, estuary mouth and beach area (200m either side of the mouth) will be closed to the public and enforced by City Law Enforcement
2) The City's Coastal Co-ordinators will notify officials from DAFF, DEA and the C.A.P.E. Estuary programme manager
3) Where a land based pollution event is contaminating the estuary, the protocol established in OBJECTIVE A will be followed
4) Where there is a marine oil or pollution event, the estuary mouth will be closed and the Official Oil and Pollution Contingency Plan as per the City's Municipal Coastal Management Plan will become effective
5) In the event of a rapid oxygen depletion event, the estuary mouth will be opened at low tide to allow the coming high tide to bring ocean water into the estuary, as per OBJECTIVE A.
6) In the event of significant marine life die-off, samples of dead marine life will be provided to DAFF and DEA for analysis. All remaining dead marine life will be recovered from the estuary by the City's Solid Waste Management department and disposed of at Vissershok Landfill site in accordance with City waste management procedures
7) The estuary, estuary mouth and associated beach area will only be re-opened to public access once it is deemed safe

RECORDS:

- All estuary emergency events as well as the action taken will be recorded in the City's Coastal Management Monitoring and Database System
- DEA and DAFF to make any sampling results from a marine life die off available to the City

GENERAL:

- An emergency will only be declared if it is determined that the scale of the problem is such that it threatens the long term viability of the estuary as a functional ecosystem
- This determination will be made by the City's Catchment, Stormwater and River Management Branch, in conjunction with the Environmental Resource Management Department. In the event of a biodiversity related emergency, ERMD will be the lead department in terms of decision-making.

OBJECTIVE (L):

Establish an estuary task team with relevant stakeholders

LEGISLATION/STANDARDS:

- Integrated Coastal Management Act

MANAGEMENT PROTOCOLS:

- Task team to be established as part of a city-wide Small Estuaries Task Team, which will include all estuaries except for the Zandvlei and Diep estuaries.
- Small Estuaries Task Team to meet on a quarterly basis

RECORDS:

- Action minutes of all meetings to be maintained as part of the City's Coastal Monitoring Database

GENERAL:

- Small Estuaries Task Team will function as a working group consisting of officials who are involved in management work related to the relevant estuaries
- Public engagement will be facilitated through the existing Sub-Council structure

OBJECTIVE M:

Regulation of Events and Filming

LEGISLATION/STANDARDS:

- City Filming and Events Policy
- Coastal events and filming Protocol

MANAGEMENT PROTOCOLS:

Any organisation or individual who wishes to hold, host or undertake a commercial or non-profit event or commercial filming of any kind on the estuary, or within the coastal edge surrounding the estuary must:

- Submit a formal application to the City's Events and Filming Office
- The application must be circulated to the Environmental Resource Management Department, Catchment, Stormwater and River Management Branch and Sport, Recreation and Amenities Department for consideration
- Officials from these departments will advise the Events and Filming Office on the suitability of the application and if supported the conditions attached to such support
- If approved, the final event or filming permit with attached conditions must be circulated to the Environmental Resource Management Department, Catchment, Stormwater and River Management Branch and Sport, Recreation and Amenities Department at least 48 hours prior to the event or filming taking place

RECORDS:

- Events and Film Office to retain records of all applications, permits and conditions as well as any reported non-compliance

GENERAL:

- Event and filming applications for the estuary must demonstrate meaningful benefit

ESTUARY MANAGEMENT PLAN:

LOURENS RIVER ESTUARY

1. VISION

The Vision for the C.A.P.E. Estuaries Programme as a whole is: "Our estuaries are beautiful, rich in plants and animals, they attract visitors, sustain our livelihoods and uplift our spirits."

The Lourens River Estuary is part of an extensive urban environment and as such the vision for the estuary is:

"To manage the estuary and its catchment in such a manner as to reduce and minimise urban influence and pollutants on the estuary, where possible allow free and natural movement of the estuary mouth, manage alien invasive species, continuously work towards achieving high standards of water quality, recognise the estuary as an important marine nursery and biodiversity habitat and monitor the estuary in such a manner so as to intervene when urban influences have compromised the natural functioning of the estuary"

2 SITUATION ASSESSMENT AND CONTEXT



Figure 1: Lourens River Estuary

The Lourens River was declared a Protected Natural Environment (PNE) in 1997 and is the only river in South Africa that is a declared PNE. The Lourens River originates in the Hottentots Holland Mountains, flows through Somerset West and discharges to the sea at the Strand Beach. The Estuary of the Lourens River also defines the Helderberg Marine Protected Area's (MPA) eastern boundary and as such, must be considered a core component to the marine conservation objectives of the MPA.

The estuary is connected to the sea by means of a small western overflow channel and naturally tends to be saline during summer and becomes less saline during periods of high rainfall.

The Lourens River Estuary has been impacted by the following urban impacts:

- agricultural and stormwater runoff
- bank stabilisation

- sewage pump station failures
- alien fish
- changes in run off due to urbanisation and surface hardening

Consequently, this has led to the decrease in the estuary's water quality. The overall condition of the Lourens River is generally regarded as fair.

The Strand Beach Road crosses the estuary approximately 100m from the high water mark of the sea, on the south of Beach Road. The estuary is abutted by the Lourens River Pump Station to the west and a recreational area to the east. North of Beach Road the estuary is abutted by the Strand Golf Course to the West and the residential properties to the east.

2.1 WATER QUALITY OF ESTUARY

The quality of the estuary is highly influenced by the Lourens River Catchment which mainly results in the following:

- Reduction in seasonal and natural water flow
- Increased water flow as a result of increased urban run-off
- Urban pollutants including litter, runoff from agricultural areas: Vergelegen, Morgenster and Lourensford Estate

Comprehensive water quality monitoring is undertaken on a monthly basis by the City's Scientific Services Laboratory since 2000 and results indicate that the overall condition of the Lourens River is fair both in terms of nutrient and bacterial levels. It is rated amongst the top three in terms of water quality compared to other rivers in the City. The estuary mouth is however moderately more impacted.



Figure 2: Water quality monitoring points in the vicinity of Lourens River Estuary

Water quality sample collection points in the Lourens River catchment:

- Lourens in P.O.S Hillcrest Road (LOU02)
- Lourens at Broadway Road (LOU04)
- Lourens on Beach Road (LOU05)

2.2 SPECIES RECORDED IN ESTUARY

The City of Cape Town's Alien Invasive Unit have recorded the following **invasive species** in the Lourens River Catchment (2012-2013):

Nasturtium officinale	Watercress
Ricinus communis	Castor bean
Acacia saligna	Port Jackson
Canna indica	Canna
Arundo donax	Giant reed
Eucalyptus spp.	
Various herbaceous species	

The Department of Agriculture, Forestry and Fisheries have recorded the following **marine and freshwater species** in the Lourens River Catchment (2013):

Marine Species	
Gilchristella aestuaria	Estuarine round herring
Atherina breviceps	Cape silverside
Psammogobius knysnaensis	Knysna sand goby
Lichia amia	Leervis
Monodactylus falciformis	Cape moony
Mugil cephalus	Flathead mullet
Lithognathus lithognathus	White steenbras
Galeichthys feliceps	White sea catfish
Liza richardsonii	Harder
Pomatomus saltatrix	Elf
Rhabdosargus globiceps	White stumpnose
Sandelia capensis	Cape kurper
Anguilla bengalensis labiata	African mottled eel
Anguilla marmorata	Madagascan mottled eel
Anguilla mossambica	Longfin eel

Freshwater Species	
Galaxias zebratus	Cape galaxias
Lepomis macrochirus	Bluegill sunfish
Micropterus punctulatus	Spotted bass
Micropterus salmoides	Largemouth bass
Tilapia sparrmanii	Banded tilapia
Cyprinus carpio	Carp
Tinca tinca	Tench
Perca fluviatilis	Perch
Oncorhynchus mykiss	Rainbow trout

2.3 RECREATION

There is no access to the Lourens river mouth for recreation as the beach area is fenced off due to the operations of the SOMCHEM/DENEL site to the west.

3 MANAGEMENT PLAN

The Lourens River Estuary has to date not had a specific management plan or long term objectives assigned to it, nor have specific roles and responsibilities been previously defined. As part of its new Integrated Coastal Management approach, the City has prioritised the management of small and large estuaries. Based on the situation assessment and the available information a number of management objectives have been defined. For each of these management objectives, a specific operational protocol has been developed.

These specific management protocols are intended to clearly define actions as well as responsibilities across City line departments. As implementation takes place and new information is gathered and understood, operational protocols may be amended and additional objectives and associated protocols added. Estuary management within an urban environment is seen as a long term approach following a principle of striving towards ongoing improvement in both the quality and management of our estuaries.

3.1 MANAGEMENT OBJECTIVES

The City has the following management objectives for the Lourens River Estuary:

A. Allow the estuary mouth to function naturally as part of the local coastal dynamic processes and intervene only under specific defined and documented circumstances
B. Reduce and minimise all sources of urban pollutants to the estuary
C. Regulation and development of infrastructure in or adjacent to the estuary
D. Allow the natural circulation and fluctuation in estuary water quantity to be determined by seasonal rainfall patterns, whenever possible
E. Monitor estuary dynamics and intervene if required
F. Monitor estuary water quality and work towards a high standard of water quality acceptable for public recreation and ecological functioning
G. Remove alien invasive species from the estuary
H. Appropriately regulate all recreational use of the estuary
I. Provide public awareness and education through a range of media
J. Undertake annual monitoring and sampling of the estuary's biodiversity
K. Implement an Estuary Emergency Contingency Plan in the event of a flood, significant pollution event, oxygen depletion or other emergency events
L. Establish an estuary task team with relevant stakeholders
M. Regulate events and filming in the estuarine environment

OBJECTIVE (A) :

Allow the estuary mouth to function naturally as part of the local coastal dynamic processes and only intervene under specific defined and documented circumstances

LEGISLATION/STANDARDS:

Estuary mouth manipulation falls within the National Environmental Management Act Regulations and Lourens River Protected Natural Environment P.N. 161/1997 as such, mouth manipulation must be done as either:

a) Part of a pre-approved management plan with authorisation from the Department of Environmental Affairs and Development Planning (DEADP)
b) In an emergency situation followed by DEADP notification
c) With Protected Natural Environmental (PNE) approval from the City of Cape Town Environmental & Heritage Management Branch

MANAGEMENT PROTOCOLS:

The following management protocols will be applied:

1) Risk of inland flooding

- The mouth of the estuary may be straightened and opened in the event that high rainfall prediction is indicative of a possible inland flooding event.
- Determination of this need as well as the responsibility for carrying out the action resides with the City's Catchment, Stormwater and River Management Branch.

2) Pollution or toxic event

- In the event of a toxic event in the estuary or catchment, the mouth may be mechanically opened to facilitate flushing of the estuary during high tide or high water levels. This action may also require the trapping of sea water in the estuary through the physical closing of the mouth for a short duration.
- Determination of this need resides with the City's Catchment, Stormwater and River Management Branch in consultation with the C.A.P.E. Estuary Programme Manager as well as the National Departments of Environmental Affairs (DEA) and Agriculture, Fisheries and Forestry (DAFF). Responsibility for carrying out the action resides with the City's Catchment, Stormwater and River Management Branch

3) Potential undermining of infrastructure or critical dune systems by estuary mouth movement.

- Where the estuary mouth moves or meanders in such a manner that it threatens City infrastructure or sensitive environmental components the mouth may be mechanically straightened or re-aligned.
- Determination of this need as well as the responsibility for carrying out the action resides with the City's Environmental Resource Management Department's Coastal Management Unit in consultation with the Helderberg district environmental office

RECORDS:

- All mouth manipulation, the reason, action and completion will be recorded in the City's Coastal Management Monitoring and Database System
- DEA, DAFF, DEADP and the C.A.P.E Estuary Programme will be informed of all mouth manipulation events

MACHINE ACCESS FOR MOUTH MANIPULATION:

- In all circumstances listed within this management objective, access points and traverse routes for machinery to be used for mouth manipulation will be determined by the Environmental Resource Management Department
- As much as possible, access and traverse routes must adhere to existing road surfaces or previously disturbed areas.
- These access and traverse routes will be strictly adhered to at all times

OBJECTIVE (B) :

Reduce and minimise all sources of urban pollutants to the estuary

LEGISLATION/STANDARDS:

Pollution in the form of industrial waste, human waste, domestic waste and material waste is governed by a wide range of National Legislation and Standards.

- National Environmental Management Act
- National Water Act
- National Waste Act
- Integrated Coastal Management Act
- Protected Natural Environment legislation - P.N. 161/1997

However, for practical reasons recognition must be given to the fact that both the catchment that feeds the estuary, the estuary itself as well as the marine environment with which the estuary interacts are all subject to various pollutant sources common within a highly developed and populated urban environment. As such, all means to reduce pollution into the estuary that are practical, cost effective and reasonable will be employed but targeting zero pollution within an urban environment is neither practical nor realistic.

MANAGEMENT PROTOCOLS:

To minimise and reduce all forms of pollution the following management protocols will be applied:

1) Regular and systematic litter removal from the greater Lourens River Catchment area by the City's Solid Waste Management Department
2) Monthly monitoring of water quality along the river by the City's Scientific Services Branch.
3) If deemed necessary, installation, clearing and maintenance of litter traps by the City's Operations and Assets Branch of the Roads and Stormwater Department.
4) On an ongoing basis and as required, implement interventions to reduce water pollution at source, through the application of the City's Water Quality Improvement Strategy and Implementation Plan.
5) Promoting the implementation of Sustainable Urban Drainage Systems in new development applications to limit the direct input of stormwater into the Lourens River (Management of Urban Stormwater Impacts Policy - 2009)

RECORDS:

1) All major pollution events to be recorded in the City's Coastal Monitoring Database. A major pollution event is defined as any pollution event deemed to be significantly greater than the level of background pollution present in the system. This may be determined either through water quality monitoring (i.e. a set of results that shows a significant spike in pollution), or through observation of an event (e.g. sewer overflow).

GENERAL

- In the event of major water based pollution events, the pollution event will be managed in accordance with the management protocol as set out in OBJECTIVE A.
- In the event of increased levels of litter within the catchment system a litter trap may be established at the most northern end of the back pond to reduce and minimise litter into the estuary

OBJECTIVE (C) :

Regulation of development of infrastructure in or adjacent to the estuary

LEGISLATION/STANDARDS:

Development or building of any infrastructure within or adjacent to the estuary is regulated by the following:

a) National Environmental Management Act
b) City of Cape Town Integrated Zoning Scheme
c) Integrated Coastal Management Act
d) Coastal Edge and Setback Line
e) Floodplain and River Corridor Management Policy
f) Management of Urban Stormwater Impacts Policy
g) Protected Natural Environment legislation - P.N 161/1997

MANAGEMENT PROTOCOLS:

a) All development proposals must comply with relevant legislation and policies
b) Development proposals falling within the Coastal Edge/Setback Line or 1 in 50 year flood line should not be supported
c) The building or construction of any permanent or temporary structures that do not trigger NEMA regulations, but are adjacent to or within the estuary, require additional written permission from the City's Environmental Resource Management Department's Integrated Coastal Management Unit or the Helderberg district environmental office

RECORDS:

- Any written permission granted for a permanent or temporary structure to be recorded in the City's Coastal Monitoring Database

GENERAL:

- Construction of any permanent or temporary structures will in general not be supported unless strong rationale is provided with measurable benefits

OBJECTIVE (D):

Allow the natural circulation and fluctuations in estuary water quantity to be determined by seasonal rainfall patterns, whenever possible.

LEGISLATION/STANDARDS:

- National Water Act

MANAGEMENT PROTOCOLS:

a) At no time should the mouth of the estuary be impeded, diverted, blocked or altered unless under the specific conditions as defined in OBJECTIVE A
b) The estuary mouth may never be canalised or fixed
c) No water abstraction to be permitted from the back pond or estuary mouth
d) Water abstraction from the Lourens River Catchment to conform to all relevant legislation with strict permit conditions

RECORDS:

- Permitted water abstraction from the Lourens River Catchment as well as permit conditions to be recorded in the City's Coastal Monitoring Database
- Cases and outcomes of illegal water extraction in the Lourens River Estuary Catchment to be recorded in the City's Coastal Monitoring Database

GENERAL:

- In the event of major flow alteration, the City's Catchment, Stormwater and River Management Branch in conjunction with the Helderberg district environmental office to conduct an investigation to determine cause of flow change and make recommendations to rectify and restore the flow regime

OBJECTIVE (E) :

Monitor estuary dynamics and intervene if required

LEGISLATION/STANDARDS:

- National Environmental Management Act

MANAGEMENT PROTOCOLS:

1) The City's Environmental Resource Management Department will develop an estuary dynamics monitoring programme based on aerial photography, including the establishment of baseline data, with the aim of annual assessment to determine whether changes in dynamics are taking place over time.

2) If the changing dynamics of the estuary are determined to be posing a management problem, the City's

Catchment, Stormwater and River Management Branch in conjunction with the City's Environmental Resource Management Department will investigate and attempt to determine the cause. Areas of concern which may require intervention include, but are not limited to, increased rates of sedimentation and significant migration of the estuary or river mouth.

3) If it is determined that changes pose a management problem, the City will:
   a) Inform DAFF, DEA and the C.A.P.E. Estuary Programme Manager
   b) In consultation with DAFF, DEA and the C.A.P.E. Estuary Programme Manager determine the most appropriate plan of action
   c) Ensure compliance to NEMA if remedial action requires environmental authorisation

RECORDS:

- Changes in estuary dynamics to be monitored and recorded in the City's Coastal Management Monitoring and Database System.

GENERAL:

- Recognise that changes in estuary dynamics may form part of the natural variation in the estuary and as such retain a principle of least interference

OBJECTIVE F:

Monitor estuary water quality and work towards a high standard of water quality acceptable for public recreation and ecological functioning

LEGISLATION/STANDARDS:

- Water quality guidelines (DWA and DEA).

MANAGEMENT PROTOCOLS:

- Standardised water quality monitoring to be undertaken at one location within the estuary (LOU05) and at various sites in the greater catchment area once per month (temperature, dissolved oxygen, conductivity/salinity, pH, total suspended solids, total phosphorus, orthophosphate, total nitrogen, soluble ammonia, nitrite & nitrate, faecal coliforms, and *Escherichia coli*

- In the event that excessive poor water quality results are measured that threaten the estuary the management protocols established in OBJECTIVE A may be followed to restore improved water quality conditions

RECORDS:

- All water quality results will be recorded within Scientific Services' Laboratory Information Management System (LIMS)

GENERAL

- The estuary water quality management plan to be implemented in accordance with the Catchment, Stormwater and River Management Branch City-wide work programme, resources and priorities.

OBJECTIVE (G):

Remove alien invasive species from the estuary

LEGISLATION/STANDARDS:

- Conservation of Agricultural Resources Act, 43 of 1983 (CARA)
- National Environmental Biodiversity Act (NEMBA), 10 of 2004

MANAGEMENT PROTOCOLS:

The City's Invasive Species Unit to prepare an invasive species management plan for the estuary, to include, where relevant:

- Control of established invasive plants
- Control and management of invasive alien birds and animals where necessary
- Control and management of invasive alien fish, if deemed necessary
- Re-introduction of indigenous species where feasible
- Implementation of an early detection and rapid response programme to address new and emerging invasive alien species

RECORDS:

- The invasive species management plan will be appended to this Estuary Management Plan as Annexure A.

GENERAL:

- The estuary invasive species management plan to be implemented in accordance with the Invasive Species Unit city-wide work programme, resources and priorities.
- An integrated invasive species management approach will be followed in partnership with relevant stakeholders

OBJECTIVE (H):

Regulate all recreational use of the estuary

LEGISLATION/STANDARDS:

- DAFF commercial fishing regulations
- DAFF recreational fishing regulations
- DWA, Recreational water quality standards
- Integrated Coastal Management Act
- City's Municipal Coastal Management Plan
- Protected Natural Environment - P.N. 161/1997

MANAGEMENT PROTOCOLS:

- Although the estuary is small and the estuary mouth is fenced off, access is possible slightly upstream. Little to no recreation takes place in the surrounding area.
- Only recreational fishing will be permitted, with a valid recreational fishing permit, available from the Post Office. This will be communicated through appropriate signage.
- No motorised water-craft of any kind permitted in the estuary or estuary mouth
- City's Marine and Coastal Law Enforcement Unit in conjunction with DAFF Fishery Control Officers to monitor, enforce and regulate
- City Health Department, in conjunction with Catchment, Stormwater and River Management, to determine recreational safety based on water quality results and to inform the public accordingly.

RECORDS:

- Any non-compliance to regulations will be recorded in the City's Coastal Management Monitoring and Database System

OBJECTIVE (I):

Provide public awareness and education through a range of media

LEGISLATION/STANDARDS:

- None

MANAGEMENT PROTOCOLS:

Public education and awareness on the Lourens River Estuary may be provided in the following ways:

1) General catchment and estuary education and awareness through the City's Youth Environmental Schools (YES) Programme
2) General estuary education and awareness as part of the City's Educator Training Programme
3) General estuary education and awareness through the City's Nature Reserve Environmental Education Programme
4) General City communication programmes focusing on awareness raising and education about pollution, its impact on human health and freshwater ecosystems
5) The installation of relevant and appropriate informative signage at the estuary

RECORDS:

- All signs and their locations to be recorded in the City's Coastal Management Monitoring and Database System

GENERAL:

- All signage, regulatory and informative, must comply with the City's Coastal Signage Protocol
- The estuary public awareness and education management plan to be implemented in accordance with the Environmental Resource Management Department city-wide work programme, resources and priorities.

OBJECTIVE J:

Undertake annual monitoring and sampling of the estuary's biodiversity

LEGISLATION/STANDARDS:

- None

MANAGEMENT PROTOCOLS:

In partnership with DAFF and the Biodiversity Management Branch undertake annual estuary biodiversity surveys through:

- Fish sampling through annual seine netting
- Bird counts
- Benthic sampling

RECORDS:

- All sampling results to be recorded in the City's Coastal Management Monitoring and Database System

GENERAL:

- Biodiversity sampling programme and schedule to be determined by DAFF
- The sampling programme is contingent on sufficient resources being made available for this programme

OBJECTIVE (K):

Implement an Estuary Emergency Contingency Plan in the event of a flood, significant pollution event, oxygen depletion or other emergency events

LEGISLATION/STANDARDS:

- National Environmental Management Act

MANAGEMENT PROTOCOLS:

The following will be considered an Estuary Emergency requiring the Emergency Contingency Protocols to be implemented:

1) A major land based pollution event
2) Marine oil or pollution spill in the surrounding area
3) Rapid oxygen depletion
4) Marine life die-off

Emergency Contingency Protocols:

1) In the event of an emergency the estuary, estuary mouth and beach area (200m either side of the mouth) will be closed to the public and enforced by City Law Enforcement
2) The City's Coastal Co-ordinators will notify officials from DAFF, DEA and the C.A.P.E. Estuary programme manager
3) Where a land based pollution event is contaminating the estuary, the protocol established in OBJECTIVE A will be followed
4) Where there is a marine oil or pollution event, the estuary mouth will be closed and the Official Oil and Pollution Contingency Plan as per the City's Municipal Coastal Management Plan will become effective
5) In the event of a rapid oxygen depletion event, the estuary mouth will be opened at low tide to allow the coming high tide to bring ocean water into the estuary, as per OBJECTIVE A.
6) In the event of significant marine life die-off, samples of dead marine life will be provided to DAFF and DEA for analysis. All remaining dead marine life will be recovered from the estuary by the City's Solid Waste Management department and disposed of at Vissershok Landfill site in accordance with City waste management procedures
7) The beach will only be re-opened to public access once it is deemed safe

RECORDS:

- All estuary emergency events as well as the action taken will be recorded in the City's Coastal Management Monitoring and Database System
- DEA and DAFF to make any sampling results from a marine life die off available to the City

GENERAL:

- An emergency will only be declared if it is determined that the scale of the problem is such that it threatens the long term viability of the estuary as a functional ecosystem
- This determination will be made by the City's Catchment, Stormwater and River Management Branch, in conjunction with the Environmental Resource Management Department. In the event of a biodiversity related emergency, ERMD will be the lead department in terms of decision-making.

OBJECTIVE (L):

Establish an estuary task team with relevant stakeholders

LEGISLATION/STANDARDS:

- Integrated Coastal Management Act

MANAGEMENT PROTOCOLS:

- Task team to be established as part of the city-wide "Small Estuaries Task Team", which will include all estuaries except for the Zandvlei and Diep estuaries.
- Small Estuaries Task Team to meet on a quarterly basis

RECORDS:

- Minutes of all meetings to be maintained as part of the City's Coastal Monitoring Database

GENERAL:

- Small Estuaries Task Team will function as a working group consisting of officials who are involved in management work related to the relevant estuaries
- Public engagement will be facilitated through the existing Sub-Council structure and the existing Lourens River PNE Management Advisory Committee

OBJECTIVE (M):

Regulation of Events and Filming

LEGISLATION/STANDARDS:

- City Filming and Events Policy

MANAGEMENT PROTOCOLS:

Any organisation or individual who wishes to hold, host or undertake a commercial or non-profit event or commercial filming of any kind on the estuary, or within the coastal edge surrounding the estuary must:

- Submit a formal application to the City's Events and Filming Office
- The application must be circulated to the Environmental Resource Management Department, Catchment, Stormwater and River Management Branch and Sport, Recreation and Amenities Department for consideration
- Officials from these departments will advise the Events and Filming Office on the suitability of the application and if supported the conditions attached to such support
- If approved, the final event or filming permit with attached conditions must be circulated to the Environmental Resource Management Department, Catchment, Stormwater and River Management Branch and Sport, Recreation and Amenities Department at least 48 hours prior to the event or filming taking place

RECORDS:

- Events and Film Office to retain records of all applications, permits and conditions as well as any reported non-compliance

GENERAL:

- Event and filming applications for the estuary must demonstrate meaningful benefit

ESTUARY MANAGEMENT PLAN:

SILVERMINE ESTUARY

1. VISION

The Vision for the C.A.P.E. Estuaries Programme as a whole is: "Our estuaries are beautiful, rich in plants and animals, they attract visitors, sustain our livelihoods and uplift our spirits."

The Silvermine Estuary is part of an extensive urban environment and as such the vision for the estuary is:

"To manage the estuary and its catchment in such a manner as to reduce and minimise urban influence and pollutants on the estuary, where possible allow free and natural movement of the estuary mouth, manage alien invasive species, continuously work towards achieving high standards of water quality, recognise the estuary as an important marine nursery and biodiversity habitat and monitor the estuary in such a manner so as to intervene when urban influences have compromised the natural functioning of the estuary"

2 SITUATION ASSESSMENT AND CONTEXT

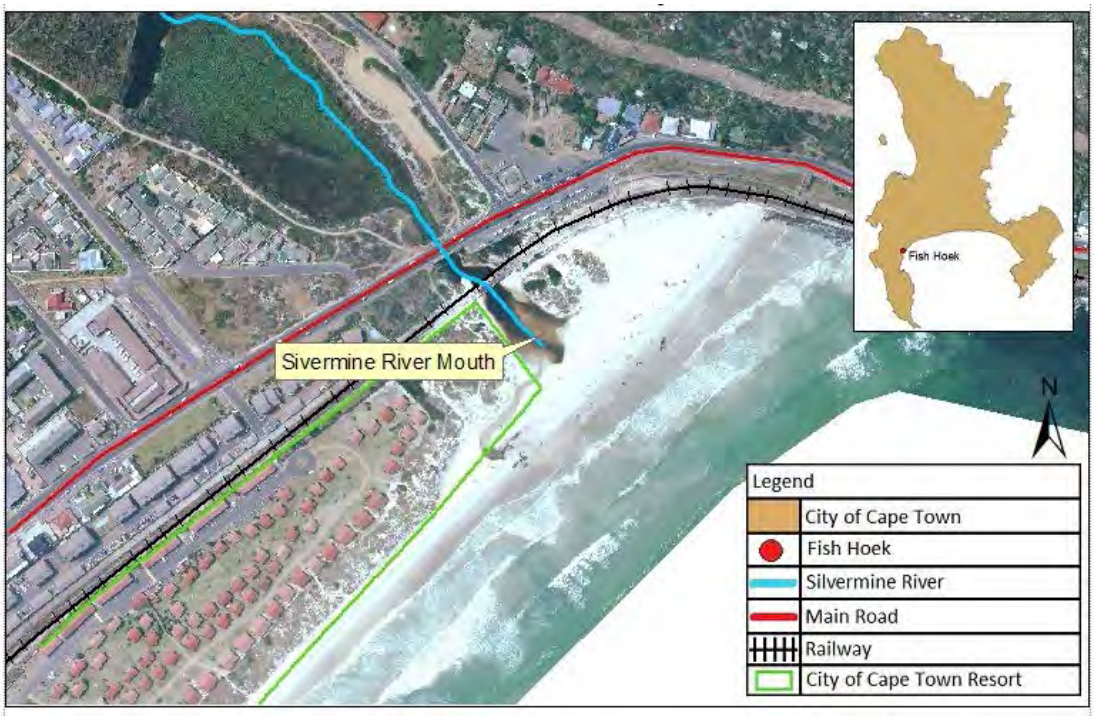


Figure 1: Silvermine River Estuary

Fish Hoek Bay's north-eastern corner is home to the Silvermine River Estuary. It is considered to be a small confined estuary, and is spanned by road and rail bridges providing vital connectivity between the river and coastline. The mouth of the estuary is generally closed during the dry season and occasionally open during winter.

The estuary's ability to effectively function as an ecological corridor has been threatened by rubble within the river channel and beneath the bridges, informal dwelling taking place under the bridge, stormwater drainage, and overflows from the sewage pump station.

The estuary act as a focal point on the beach for recreational activities, however those coming into contact with

the estuary's water expose themselves to possible health risks as the water quality of the estuary is considered to be poor due to stagnation of the water .

2.1 WATER QUALITY OF ESTUARY

The quality of the estuary is highly influenced by the Silvermine River Catchment which mainly results in the following:

- Reduction in seasonal and natural water flow
- Increased water flow as a result of increased urban run-off
- Urban pollutants including litter and other contaminants



Figure 2: Water quality monitoring points in the vicinity the Silvermine Estuary

Water quality sampling points:

- SIL02: Silvermine River at footbridge on wetland near Clovelly Beach
- SIL04: Silvermine River West Stormwater
- SIL06: Silvermine River at Bridge on Main Rd, Clovelly
- XCS17: Silvermine River Mouth

2.2 SPECIES RECORDED IN ESTUARY

The City of Cape Town's Alien Invasive Unit have recorded the following **invasive species** in the Silvermine River Catchment (2012-2013):

Nasturtium officinale	Watercress
Schinus terebinthifolius	Brazilian Pepper Tree
Myoporum montanum	Waterbush
Pittosporum undulatum	Victorian Box
Echium plantagineum	Purple Viper's Bugloss
Acacia saligna	Port Jackson
Persicaria lapathifolia	Willow Weed
Rapistrum rugosum	Turnipweed

The Department of Agriculture, Forestry and Fisheries have recorded the following marine and freshwater species in the Silvermine River Catchment (2013):

Marine Species	
Psammogobius knysnaensis	Knysna sand goby
Monodactylus falciformis	Cape moony
Mugil cephalus	Flathead mullet
Lithognathus lithognathus	White steenbras
Liza richardsonii	Harder

Freshwater Species	
Lepomis macrochirus	Bluegill sunfish
Micropterus dolomieu	Smallmouth bass
Tilapia sparrmanii	Banded tilapia
Galaxias zebratus	Cape Galaxias

2.3 RECREATION

Recreation in the estuary is minimal and is confined to local recreational swimming and paddling in the back ponding area and in the estuary mouth. No commercial fishing is permitted. The size and scale of the estuary does not facilitate broader recreational use such as boating or sailing.

3 MANAGEMENT PLAN

The Silvermine River Estuary has to date not had a specific management plan or long term objectives assigned to it, nor have specific roles and responsibilities been previously defined. As part of its new Integrated Coastal Management approach, the City has prioritised the management of small and large estuaries. Based on the situation assessment and the available information a number of management objectives have been defined. For each of these management objectives, a specific operational protocol has been developed.

These specific management protocols are intended to clearly define actions as well as responsibilities across City line departments. As implementation takes place and new information is gathered and understood, operational protocols may be amended and additional objectives and associated protocols added. Estuary management within an urban environment is seen as a long term approach following a principle of striving towards ongoing improvement in both the quality and management of our estuaries.

4 MANAGEMENT OBJECTIVES

The City has the following management objectives for the Silvermine River Estuary:

A. Allow the estuary mouth to function naturally as part of the local coastal dynamic processes and intervene only under specific defined and documented circumstances
B. Reduce and minimise all sources of urban pollutants to the estuary
C. Regulation and development of infrastructure in or adjacent to the estuary
D. Allow the natural circulation and fluctuation in estuary water quantity to be determined by seasonal rainfall patterns, whenever possible
E. Monitor estuary dynamics and intervene if required
F. Monitor estuary water quality and work towards a high standard of water quality acceptable for public recreation and ecological functioning
G. Remove alien invasive species from the estuary

H. Appropriately regulate all recreational use of the estuary
I. Provide public awareness and education through a range of media
J. Undertake annual monitoring and sampling of the estuary's biodiversity
K. Implement an Estuary Emergency Contingency Plan in the event of a flooding, significant pollution event, oxygen depletion or other emergency events
L. Establish an estuary task team with relevant stakeholders
M. Regulate events and filming in the estuarine environment

OBJECTIVE (A) :

Allow the estuary mouth to function naturally as part of the local coastal dynamic processes and intervene only under specific defined and documented circumstances

LEGISLATION/STANDARDS:

Estuary mouth manipulation falls within the National Environmental Management Act (NEMA) Regulations in so far as mouth manipulation involves movement of sand and therefore triggers Activity 18 (Listing Notice 1). As such mouth manipulation may be undertaken either:

a) In terms of a *"management plan agreed to by the relevant environmental authority"*
b) In an emergency situation followed by notification to Department of Environmental Affairs and Development Planning (DEADP)

MANAGEMENT PROTOCOLS:

The following management protocols will be applied:

1) Risk of inland flooding
- The mouth of the estuary may be straightened and opened in the event that high rainfall prediction is indicative of a possible inland flooding event.
- Determination of this need as well as the responsibility for carrying out the action resides with the City's Catchment, Stormwater and River Management Branch.

2) Pollution or toxic event
- In the event of a toxic event in the estuary or catchment, the mouth may be mechanically opened to facilitate flushing of the estuary during high tide or high water levels. This action may also require the trapping of sea water in the estuary through the physical closing of the mouth for a short duration.
- Determination of this need resides with the City's Catchment, Stormwater and River Management Branch in consultation with the C.A.P.E. Estuary Programme Manager as well as the National Departments of Environmental Affairs (DEA) and Agriculture, Fisheries and Forestry (DAFF). Responsibility for carrying out the action resides with the City's Catchment, Stormwater and River Management Branch

3) Potential undermining of infrastructure or critical dune systems by estuary mouth movement.
- Where the estuary mouth moves or meanders in such a manner that it threatens critical dune systems or City infrastructure the mouth may be mechanically straightened or re-aligned.
- Determination of this need as well as the responsibility for carrying out the action resides with the City's Environmental Resource Management Department's Coastal Management Unit in consultation with the Southern district environmental office

RECORDS:

- All mouth manipulation, the reason, action and completion will be recorded in the City's Coastal Management Monitoring and Database System
- DEA, DAFF, DEADP and the C.A.P.E Estuary Programme will be informed of all mouth manipulation events by the City's Coastal Management Unit

MACHINERY ACCESS FOR MOUTH MANIPULATION:

- In all circumstances listed within this management objective, access points and traverse routes for machinery to be used for mouth manipulation will be determined by the Environmental Resource Management Department
- As much as possible, access and traverse routes must adhere to existing road surfaces or previously disturbed areas.
- These access and traverse routes will be strictly adhered to at all times

OBJECTIVE (B) :

Reduce and minimise all sources of urban pollutants to the estuary

LEGISLATION/STANDARDS:

Pollution in the form of industrial waste, human waste, domestic waste and material waste is governed by a wide range of National Legislation and Standards.

- National Environmental Management Act (NEMA)
- National Water Act (NWA)
- National Waste Act
- Integrated Coastal Management Act (ICMA)

However, for practical reasons recognition must be given to the fact that both the catchment that feeds the estuary, the estuary itself as well as the marine environment with which the estuary interacts are all subject to various pollutant sources common within a highly developed and populated urban environment. As such, all means to reduce pollution into the estuary that are practical, cost effective and reasonable will be employed but targeting zero pollution within an urban environment is neither practical nor realistic.

MANAGEMENT PROTOCOLS:

To minimise and reduce all forms of pollution the following management protocols will be applied:

1) Regular and systematic litter removal from the general Silvermine River Catchment area by the City's Solid Waste Management Department.
2) Monthly monitoring of water quality along the river by the City's Scientific Services Branch.
3) If deemed necessary, installation, clearing and maintenance of litter traps by the City's Operations and Assets Branch of the Roads and Stormwater Department.
4) On an ongoing basis and as required, implement interventions to reduce water pollution at source, through the application of the City's Water Quality Improvement Strategy and Implementation Plan.

RECORDS:

1) All major pollution events to be recorded in the City's Coastal Monitoring Database. A major pollution event is defined as any pollution event deemed to be significantly greater than the level of background pollution present in the system. This may be determined either through water quality monitoring (i.e. a set of results that shows a significant spike in pollution, or through observation of an event (e.g. sewer overflow).

GENERAL

- In the event of major water based pollution events, the pollution event will be managed in accordance with the management protocol as set out in OBJECTIVE A.
- In the event of increased levels of litter within the catchment system a litter trap may be established at the most northern end of the back pond to reduce and minimise litter into the estuary

OBJECTIVE (C) :

Regulation of development of infrastructure in or adjacent to the estuary

LEGISLATION/STANDARDS:

Development of the building of any infrastructure within or adjacent to the estuary is regulated by the following:

a) National Environmental Management Act
b) City Zoning Scheme
c) Integrated Coastal Management Act
d) Coastal Edge and Setback Line
e) Floodplain and River Corridor Management Policy
f) Management of Urban Stormwater Impacts Policy

MANAGEMENT PROTOCOLS:

a) All development proposals must comply with relevant legislation and policies
b) Development proposals falling within the Coastal Edge/Setback Line or 1 in 50 year flood line should not be supported
c) The building or construction of any permanent or temporary structures that do not trigger NEMA regulations, but are adjacent to or within the estuary, require additional written permission from the City's Environmental Resource Management Department's Integrated Coastal Management Unit or the Southern district environmental office

RECORDS:

- Any written permission granted for a permanent or temporary structure to be recorded in the City's Coastal Monitoring Database

GENERAL:

- Construction of any permanent or temporary structures will in general not be supported unless strong rationale is provided with measurable benefits

OBJECTIVE (D):

Allow the natural circulation and fluctuation in estuary water quantity to be determined by seasonal rainfall patterns, whenever possible.

LEGISLATION/STANDARDS:

- National Water Act

MANAGEMENT PROTOCOLS:

a) At no time should the mouth of the estuary be impeded, diverted, blocked or altered unless under the specific conditions as defined in OBJECTIVE A
b) The estuary mouth may never be canalised or fixed
c) No water abstraction to be permitted from the back pond or estuary mouth
d) Water abstraction from the Silvermine River Catchment to conform to all relevant legislation with strict permit conditions

RECORDS:

- Permitted water abstraction from the Silvermine River Catchment as well as permit conditions to be recorded in the City's Coastal Monitoring Database
- Cases and outcomes of any illegal water extraction in the Silvermine River Catchment to be recorded in the City's Coastal Monitoring Database

GENERAL:

- In the event of major flow alteration, the City's Catchment, Stormwater and River Management Branch in conjunction with the Southern district environmental office to conduct an investigation to determine cause of flow change and make recommendations to rectify and restore flow regime

OBJECTIVE (E) :

Monitor estuary dynamics and intervene if required

LEGISLATION/STANDARDS:

- National Environmental Management Act

MANAGEMENT PROTOCOLS:

1) The City's Environmental Resource Management Department will develop an estuary dynamics monitoring programme based on aerial photography, including the establishment of baseline data, with the aim of annual assessment to determine whether changes in dynamics are taking place over time.

2) If the changing dynamics of the estuary are determined to be posing a management problem, the City's Catchment, Stormwater and River Management Branch in conjunction with the City's Environmental

Resource Management Department will investigate and attempt to determine the cause. Areas of concern which may require intervention include, but are not limited to, increased rates of sedimentation and significant migration of the estuary or river mouth.

3) If it is determined that changes pose a management problem, the City will:
   a) Inform DAFF, DEA and the C.A.P.E. Estuary Programme Manager
   b) In consultation with DAFF, DEA and the C.A.P.E. Estuary Programme Manager determine the most appropriate plan of action
   c) Ensure compliance to NEMA if remedial action requires environmental authorisation

RECORDS:

- Changes in estuary dynamics to be monitored and recorded in the City's Coastal Management Monitoring and Database System.

GENERAL:

- Recognise that changes in estuary dynamics may form part of the natural variation in the estuary and as such retain a principle of least interference

OBJECTIVE F:

Monitor estuary water quality and work towards a high standard of water quality acceptable for public recreation and ecological functioning

LEGISLATION/STANDARDS:

- Water quality guidelines (DWA and DEA).

MANAGEMENT PROTOCOLS:

- Standardised water quality monitoring to be undertaken at one location within the estuary (XCS17) and at various sites in the greater catchment area once per month (temperature, dissolved oxygen, conductivity/salinity, pH, total suspended solids, total phosphorus, orthophosphate, total nitrogen, soluble ammonia, nitrite & nitrate, faecal coliforms, *Escherichia coli* and enterococcus)

- In the event that excessive poor water quality results are measured that threaten the estuary the management protocols established in OBJECTIVE A may be followed to restore improved water quality conditions

RECORDS:

- All water quality results will be recorded within Scientific Services' Laboratory Information Management System (LIMS) and the monthly Certificate of Analysis will be added to the City's Coastal Management Monitoring and Database System.

GENERAL:

- Estuary water quality management to be implemented in accordance with the Catchment, Stormwater and River Management Branch's City-wide work programme, resources and priorities.

OBJECTIVE (G):

Remove alien invasive species from the estuary

LEGISLATION/STANDARDS:

- Conservation of Agricultural Resources Act, 43 of 1983 (CARA)
- National Environmental Biodiversity Act (NEMBA), 10 of 2004

MANAGEMENT PROTOCOLS:

The City's Invasive Species Unit to prepare an invasive species management plan for the estuary, to include, where relevant:

- Control of established invasive plants
- Control and management of invasive alien birds and animals where necessary
- Control and management of invasive alien fish, if deemed necessary
- Re-introduction of indigenous species where feasible
- Implementation of an early detection and rapid response programme to address new and emerging invasive alien species

RECORDS:

- The invasive species management plan will be appended to this Estuary Management Plan as Annexure A.

GENERAL:

- The estuary invasive species management plan to be implemented in accordance with the Invasive Species Unit city-wide work programme, resources and priorities.

- An integrated invasive species management approach will be followed in partnership with relevant stakeholders

OBJECTIVE (H):

Regulate all recreational use of the estuary

LEGISLATION/STANDARDS:

- DAFF Commercial Fishing Regulations
- DAFF Recreational Fishing Regulations
- DWA, Recreational Water Quality Standards
- Integrated Coastal Management Act
- City's Municipal Coastal Management Plan

MANAGEMENT PROTOCOLS:

- Only recreational fishing will be permitted, with a valid recreational fishing permit, available from the Post Office. This will be communicated through appropriate signage.
- No motorised water-craft of any kind permitted in the estuary or estuary mouth
- City's Marine and Coastal Law Enforcement Unit in conjunction with DAFF Fishery Control Officers to monitor, enforce and regulate

RECORDS:

- Any non-compliance to regulations will be recorded in the City's Coastal Management Monitoring and Database System

GENERAL:

- The estuary recreational use management plan to be implemented in accordance with the Sport, Recreation and Amenities Department's City-wide work programme, resources and priorities.
- Appropriate recreation to be supported in line with the City's Social Development Strategy

OBJECTIVE (I):

Provide public awareness and education through a range of media

LEGISLATION/STANDARDS:

- None

MANAGEMENT PROTOCOLS:

Public education and awareness on the Silvermine Estuary may be provided in the following ways:

1) General catchment and estuary education and awareness through the City's Youth Environmental Schools (YES) Programme
2) General estuary education and awareness as part of the City's Educator Training Programme
3) General estuary education and awareness through the City's Nature Reserve Environmental Education Programme
4) General City communication programmes focusing on awareness raising and education about pollution, its impact on human health and freshwater ecosystems
5) The installation of relevant and appropriate informative signage at the estuary

RECORDS:

- All signs and their locations to be recorded in the City's Coastal Management Monitoring and Database System

GENERAL:

- All signage, regulatory and informative, must comply with the City's Coastal Signage Protocol
- The estuary public awareness and education management plan to be implemented in accordance with the Environmental Resource Management Department's city-wide work programme, resources and priorities.

OBJECTIVE J:

Undertake annual monitoring and sampling of the estuary's biodiversity

LEGISLATION/STANDARDS:

- None

MANAGEMENT PROTOCOLS:

In partnership with DAFF undertake annual estuary biodiversity surveys through:

- Fish sampling through annual seine netting
- Bird counts
- Benthic sampling

RECORDS:

- All sampling results to be recorded in the City's Coastal Management Monitoring and Database System

GENERAL:

- Biodiversity sampling programme and schedule to be determined by DAFF
- The sampling programme is contingent on sufficient resources being made available for this programme

OBJECTIVE (K):

Implement an Estuary Emergency Contingency Plan in the event of a flooding, significant pollution event, oxygen depletion or other emergency events

LEGISLATION/STANDARDS:

- National Environmental Management Act

MANAGEMENT PROTOCOLS:

The following will be considered an Estuary Emergency requiring the Emergency Contingency Protocols to be implemented:

1) A land based (catchment) pollution event
2) Marine oil or pollution spill in False Bay
3) Rapid oxygen depletion
4) Marine / estuarine life die-off within the estuary

Emergency Contingency Protocols:

1) In the event of an emergency the estuary, estuary mouth and beach area (200m either side of the mouth) will be closed to the public and enforced by City Law Enforcement
2) The City's Coastal Co-ordinators will notify officials from DAFF, DEA and the C.A.P.E. Estuary programme manager
3) Where a land based pollution event is contaminating the estuary, the protocol established in OBJECTIVE A will be followed
4) Where there is a marine oil or pollution event, the estuary mouth will be boomed off and the Official Oil and Pollution Contingency Plan as per the City's Municipal Coastal Management Plan will become effective
5) In the event of a rapid oxygen depletion event, the estuary mouth will be breached and opened at low tide to allow high tide ocean water into the estuary, as per OBJECTIVE A.
6) In the event of significant marine life die-off, samples of dead marine life will be provided to DAFF and DEA for analysis. All remaining dead marine life will be recovered from the estuary by the City's Solid Waste Management department and disposed of at Vissershok Landfill site in accordance with City waste management procedures
7) The Estuary, estuary mouth and associated beach area will only be re-opened to public access once it is deemed safe

RECORDS:

- All estuary emergency events as well as the action taken will be recorded in the City's Coastal Management Monitoring and Database System
- DEA and DAFF to make any sampling results from a marine life die off available to the City

GENERAL:

- An emergency will only be declared if it is determined that the scale of the problem is such that it threatens the long term viability of the estuary as a functional ecosystem.
- This determination will be made by the City's Catchment, Stormwater and River Management Branch, in conjunction with the Environmental Resource Management Department. In the event of a biodiversity related emergency, ERMD will be the lead department in terms of decision-making.

OBJECTIVE (L):

Establish an estuary task team with relevant stakeholders

LEGISLATION/STANDARDS:

- Integrated Coastal Management Act

MANAGEMENT PROTOCOLS:

- Task team to be established as part of a city-wide Small Estuaries Task Team, which will include all estuaries except for the Zandvlei and Diep estuaries.
- Small Estuaries Task Team to meet on a quarterly basis

RECORDS:

- Action minutes of all meetings to be maintained as part of the City's Coastal Monitoring Database

GENERAL:

- Small Estuaries Task Team will function as a working group consisting of officials who are involved in management work related to the relevant estuaries
- Public engagement will be facilitated through the existing Sub-Council structure

OBJECTIVE M:

Regulation of Events and Filming

LEGISLATION/STANDARDS:

- City Filming and Events Policy

MANAGEMENT PROTOCOLS:

Any organisation or individual who wishes to hold, host or undertake a commercial or non-profit event or commercial filming of any kind on the estuary, or within the coastal edge surrounding the estuary must:

- Submit a formal application to the City's Events and Filming Office
- The application must be circulated to the Environmental Resource Management Department, Catchment, Stormwater and River Management Branch and Sport, Recreation and Amenities Department for consideration
- Officials from these departments will advise the Events and Filming Office on the suitability of the application and if supported the conditions attached to such support
- If approved, the final event or filming permit with attached conditions must be circulated to the Environmental Resource Management Department, Catchment Stormwater and River Management Branch and Sport, Recreation and Amenities Department at least 48 hours prior to the event or filming taking place

RECORDS:

- Events and Film Office to retain records of all applications, permits and conditions as well as any reported non-compliance

GENERAL:

- Event and filming applications for the estuary must demonstrate meaningful benefit

ESTUARY MANAGEMENT PLAN:

SIR LOWRY'S PASS RIVER ESTUARY

1. VISION

The Vision for the C.A.P.E. Estuaries Programme as a whole is: "Our estuaries are beautiful, rich in plants and animals, they attract visitors, sustain our livelihoods and uplift our spirits."

The Sir Lowry's Pass River Estuary is part of an extensive urban environment and as such the vision for the estuary is:

"To manage the estuary and its catchment in such a manner as to reduce and minimise urban influence and pollutants on the estuary, where possible allow free and natural movement of the estuary mouth, manage alien invasive species, continuously work towards achieving high standards of water quality, recognise the estuary as an important marine nursery and biodiversity habitat and monitor the estuary in such a manner so as to intervene when urban influences have compromised the natural functioning of the estuary"

2 SITUATION ASSESSMENT AND CONTEXT

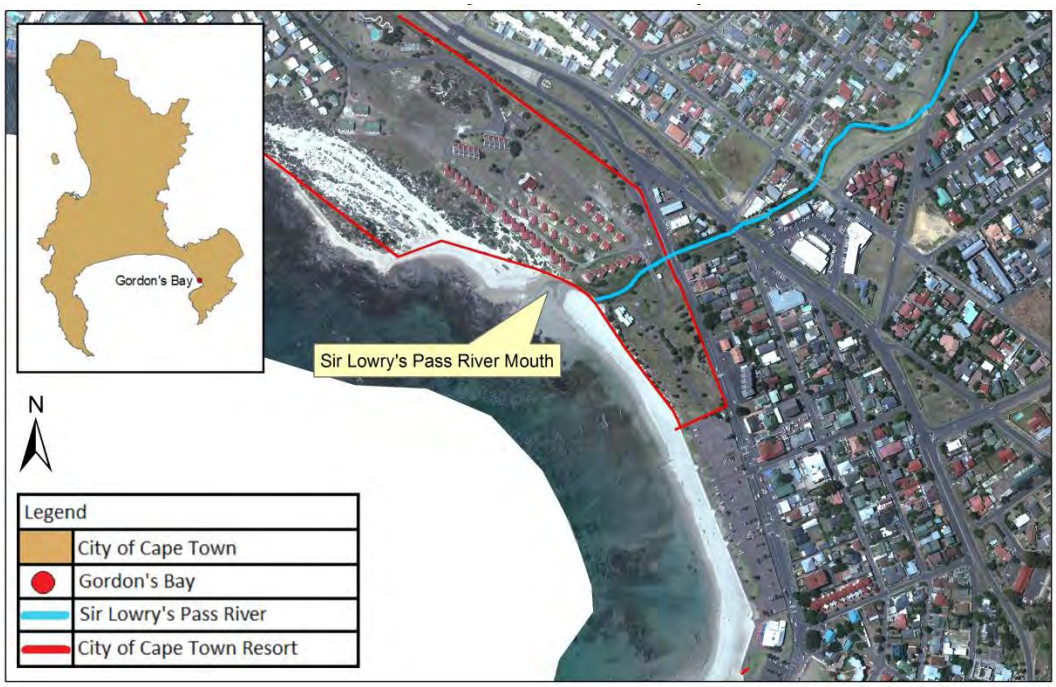


Figure 1: Historic extent of the Sir Lowry's Pass River Estuary

The Sir Lowry's Pass River Estuary is located on the western side Gordon's Bay. The estuary is confined by Hendon Park Resort to the west, Beach Road Bridge to the north, and Hendon Park recreational braai area to the east (see Figure 1).

The Sir Lowry's Pass River originates on the slopes of the Hottentots Holland mountains. Much of the lower part of the river is contained between earth banks stabilised by vegetation, and is partially canalised in places. Flow in the lower channel is sporadic consisting almost entirely of runoff from the local residential area.

An artificial diversion channel which splits the river at the Gordon's Bay Wastewater Treatment Works (WWTW) and delivers the bulk of river flows and treated effluent from the WWTW to the sea at a location west of Harbour Island. Due to this significant change in the hydrology of the original river, few of the original estuarine characteristics remain. The river mouth thus opens only periodically depending on the season.

The estuary has aesthetic and marginal recreational value due to its close proximity to resorts and recreational areas, and as such, the water quality of the estuary must be maintained at a level suitable to facilitate low levels of intermediate contact recreation (wading / walking through the water).

3 WATER QUALITY OF ESTUARY

The quality of the estuary (historic channel) is highly influenced by the Sir Lowry's Pass River Catchment, particularly the residential developments in the extreme lower end of the catchment which mainly results in the following:

- Reduction in seasonal and natural water flow
- Urban pollutants including litter and contaminants

Comprehensive water quality monitoring is undertaken on a monthly basis by the City's Scientific Services Laboratory since 2002, and results indicate the condition of the estuary and the portion of river flowing in the historic channel is fair from a water quality perspective but moderately to highly impacted in terms of ecological functioning. Water quality in the artificial diversion canal is impacted by the discharge of final effluent from the WWTW.



Figure 2: Water quality monitoring points in the vicinity of the Sir Lowry's Pass River catchment and Estuary (historic river channel)

Water quality sample collection points in the Sir Lowry's Pass River catchment:

- Sir Lowry's at Hibiscus Road (SIR07) – diversion canal
- Sir Lowry's at Dolphin Rd (SIR04) – historic channel
- Sir Lowry's at Hendon Park (SIR05) – historic channel

3.1 SPECIES RECORDED IN ESTUARY

Invasive Species

- No Records

Marine Species

- No Records

Freshwater Species

- No Records

4 RECREATION

Recreation in the estuary (historic river outlet) is minimal, as the size and scale of the estuary does not support any recreational activities. As the Sir Lowry's Pass River is diverted upstream this estuary receives minimal quantities of water.

The estuary is located in an intensively used recreational area (camp site and beach) and thus it is the water quality and condition of the estuary has a vital role to play in the health and aesthetics of the area.

Recreation in or at the outlet of the artificial diversion canal is not advisable since it conveys treated effluent to the sea.

5 MANAGEMENT PLAN

The Sir Lowry's Pass River Estuary has to date not had a specific management plan or long term objectives assigned to it, nor have specific roles and responsibilities been previously defined. As part of its new Integrated Coastal Management approach, the City has prioritised the management of small and large estuaries. Based on the situation assessment and the available information a number of management objectives have been defined. For each of these management objectives, a specific operational protocol has been developed.

These specific management protocols are intended to clearly define actions as well as responsibilities across City line departments. As implementation takes place and new information is gathered and understood, operational protocols may be amended and additional objectives and associated protocols added. Estuary management within an urban environment is seen as a long term approach following a principle of striving towards ongoing improvement in both the quality and management of our estuaries.

MANAGEMENT OBJECTIVES

The City has the following management objectives for the Sir Lowry's Pass River Estuary:

A. Allow the estuary mouth to function naturally as part of the local coastal dynamic processes and intervene only under specific defined and documented circumstances
B. Reduce and minimise all sources of urban pollutants to the estuary
C. Regulation and development of infrastructure in or adjacent to the estuary
D. Allow the natural circulation and fluctuation in estuary water quantity to be determined by seasonal rainfall patterns, whenever possible
E. Monitor estuary dynamics and intervene if required
F. Monitor estuary water quality and work towards a high standard of water quality acceptable for public recreation and ecological functioning
G. Remove alien invasive species from the estuary
H. Appropriately regulate all recreational use of the estuary
I. Provide public awareness and education through a range of media

J. Undertake annual monitoring and sampling of the estuary's biodiversity
K. Implement an Estuary Emergency Contingency Plan in the event of a flood, significant pollution event, oxygen depletion or other emergency events
L. Establish an estuary task team with relevant stakeholders
M. Regulate events and filming in the estuarine environment

OBJECTIVE (A) :

Allow the estuary mouth to function naturally as part of the local coastal dynamic processes and intervene only under specific defined and documented circumstances

LEGISLATION/STANDARDS:

Estuary mouth manipulation falls within the National Environmental Management Act Regulations. As such mouth manipulation must be done as either:

a) Part of a pre-approved management plan authorisation from Department of Environmental Affairs and Development Planning (DEADP)
b) In an emergency situation followed by DEADP notification

MANAGEMENT PROTOCOLS:

The following management protocols will be applied:

1) Risk of inland flooding

- Inland flooding is unlikely due to the small amount of water present in the river. However, in the event that a high rainfall prediction is indicative of a possible inland flooding event, the mouth of the estuary may be straightened and opened to address this.
- Determination of this need as well as the responsibility for carrying out the action resides with the City's Catchment, Stormwater and River Management Branch

2) Pollution or toxic event

- In the event of a toxic event in the estuary or catchment, the mouth may be mechanically opened to facilitate flushing of the estuary during high tide or high water levels. This action may also require the trapping of sea water in the estuary through the physical closing of the mouth for a short duration.
- Determination of this need resides with the City's Catchment, Stormwater and River Management Branch in consultation with the C.A.P.E. Estuary Programme Manager as well as the National Departments: Department of Environmental Affairs (DEA) and Department of Agriculture, Fisheries and Forestry (DAFF). Responsibility for carrying out the action resides with the City's Catchment, Stormwater and River Management Branch

3) Potential undermining of infrastructure or critical dune systems by estuary mouth movement.

- Where the estuary mouth moves or meanders in such a manner that it threatens critical dune systems or City infrastructure the mouth may be mechanically straightened or re-aligned.
- Determination of this need as well as the responsibility for carrying out the action resides with the City's Environmental Resource Management Department's Coastal Management Unit in consultation with the Helderberg district environmental office

RECORDS:

- All mouth manipulation, the reason, action and completion will be recorded in the City's Coastal Management Monitoring and Database System
- DEA, DAFF, DEADP and the C.A.P.E Estuary Programme will be informed of all mouth manipulation events

MACHINE ACCESS FOR MOUTH MANIPULATION:

- In all circumstances listed within this management objective, access points and traverse routes for machinery to be used for mouth manipulation will be determined by the Environmental Resource Management Department
- As much as possible, access and traverse routes must adhere to existing road surfaces or previously disturbed areas.
- These access and traverse routes will be strictly adhered to at all times

OBJECTIVE (B) :

Reduce and minimise all sources of urban pollutants to the estuary

LEGISLATION/STANDARDS:

Pollution in the form of industrial waste, human waste, domestic waste and material waste is governed by a wide range of National Legislation and Standards.

- National Environmental Management Act (NEMA)
- National Water Act (NWA)
- National Waste Act
- Integrated Coastal Management Act

However, for practical reasons recognition must be given to the fact that both the catchment that feeds the estuary, the estuary itself as well as the marine environment with which the estuary interacts are all subject to various pollutant sources common within a highly developed and populated urban environment. As such, all means to reduce pollution into the estuary that are practical, cost effective and reasonable will be employed but targeting zero pollution within an urban environment is neither practical nor realistic

MANAGEMENT PROTOCOLS:

To minimise and reduce all forms of pollution the following management protocols will be applied:

1) Regular and systematic litter removal from the greater Sir Lowry's Pass River Catchment area by the City's Solid Waste Management Department
2) Monthly monitoring of water quality along the river by the City's Scientific Services Branch.
3) If deemed necessary, installation, clearing and maintenance of litter traps by the City's Operations and Assets Branch of the Roads and Stormwater Department.
4) On an ongoing basis and as required, implement interventions to reduce water pollution at source, through the application of the City's Water Quality Improvement Strategy and Implementation Plan.
5) Promoting the implementation of Sustainable Urban Drainage Systems in new development applications to limit the direct input of stormwater into the Sir Lowry's Pass River (Management of Urban Stormwater Impacts Policy - 2009)

RECORDS:

1) All major pollution events to be recorded in the City's Coastal Monitoring Database. A major pollution event is defined as any pollution event deemed to be significantly greater than the level of background pollution present in the system. This may be determined either through water quality monitoring (i.e. a set of results that shows a significant spike in pollution), or through observation of an event (e.g. sewer overflow).

GENERAL

- In the event of major water based pollution events, the pollution event will be managed in accordance with the management protocol as set out in OBJECTIVE A.
- In the event of increased levels of litter within the catchment system a litter trap may be established at the upper end of the back pond to reduce and minimise litter into the estuary

OBJECTIVE (C) :

Regulation of development of infrastructure in or adjacent to the estuary

LEGISLATION/STANDARDS:

Development of the building of any infrastructure within or adjacent to the estuary is regulated by the following:

a) National Environmental Management Act
b) City Zoning Scheme
c) Integrated Coastal Management Act
d) Coastal Edge and Setback Line
e) Floodplain and River Corridor Management Policy
f) Management of Urban Stormwater Impacts Policy

MANAGEMENT PROTOCOLS:

a) All development proposals must comply with relevant legislation and policies
b) Development proposals falling within the Coastal Edge/Setback Line or 1 in 50 year flood line should not be supported
c) The building or construction of any permanent or temporary structures that do not trigger NEMA regulations, but are adjacent to or within the estuary, require additional written permission from the City's Environmental Resource Management Department's Integrated Coastal Management Unit or the Helderberg district environmental office

RECORDS:

- Any written permission granted for a permanent or temporary structure to be recorded in the City's

Coastal Monitoring Database

GENERAL:

- Construction of any permanent or temporary structures will in general not be supported unless strong rationale is provided with measurable benefits

OBJECTIVE (D):

Allow the natural circulation and fluctuations in estuary water quantity to be determined by seasonal rainfall patterns, whenever possible.

LEGISLATION/STANDARDS:

- National Water Act

MANAGEMENT PROTOCOLS:

a) At no time should the mouth of the estuary be impeded, diverted, blocked or altered unless under the specific conditions as defined in OBJECTIVE A
b) The estuary mouth may never be canalised or fixed
c) No water abstraction to be permitted from the back pond or estuary mouth
d) Water abstraction from the Sir Lowry's Pass River Catchment to conform to all relevant legislation with strict permit conditions
e) Encourage the re-use of treated effluent from the WWTW

RECORDS:

- Permitted water abstraction from the Sir Lowry's Pass River Catchment as well as permit conditions to be recorded in the City's Coastal Monitoring Database

- Cases and outcomes of an illegal water extraction in the Sir Lowry's Pass River Catchment to be recorded in the City's Coastal Monitoring Database

GENERAL:

- In the event of major flow alteration, the City's Catchment, Stormwater and River Management Branch in conjunction with the Helderberg district environmental office to conduct an investigation to determine cause of flow change and make recommendations to rectify and restore the flow regime

OBJECTIVE (E) :

Monitor estuary dynamics and intervene if required

LEGISLATION/STANDARDS:

- National Environmental Management Act

MANAGEMENT PROTOCOLS:

1) The City's Environmental Resource Management Department will develop an estuary dynamics monitoring programme based on aerial photography, including the establishment of baseline data, with the aim of annual assessment to determine whether changes in dynamics are taking place over time.

2) If the changing dynamics of the estuary are determined to be posing a management problem, the City's Catchment, Stormwater and River Management Branch in conjunction with the City's Environmental Resource Management Department will investigate and attempt to determine the cause. Areas of concern which may require intervention include, but are not limited to, increased rates of sedimentation and significant migration of the estuary or river mouth.

3) If it is determined that changes pose a management problem, the City will:
   a) Inform DAFF, DEA and the C.A.P.E. Estuary Programme Manager
   b) In consultation with DAFF, DEA and the C.A.P.E. Estuary Programme Manager determine the most appropriate plan of action
   c) Ensure compliance to NEMA if remedial action requires environmental authorisation

RECORDS:

- Changes in estuary dynamics to be monitored and recorded in the City's Coastal Management Monitoring and Database System.

GENERAL:

- Recognise that changes in estuary dynamics may form part of the natural variation in the estuary and as such retain a principle of least interference

OBJECTIVE F:

Monitor estuary water quality and work towards a high standard of water quality acceptable for public recreation and ecological functioning

LEGISLATION/STANDARDS:

- Water quality guidelines (DWA and DEA).

MANAGEMENT PROTOCOLS:

- Standardised water quality monitoring to be undertaken at one location within the estuary (SIR05) and at various sites in the greater catchment area once per month (temperature, dissolved oxygen, conductivity/salinity, pH, total suspended solids, total phosphorus, orthophosphate, total nitrogen, soluble ammonia, nitrite & nitrate, faecal coliforms, and *Escherichia coli*

- ERMD to liaise with the Wastewater Department to ensure that data from the monitoring of the final effluent quality from the Gordon's Bay Wastewater Treatment Works is provided to the Coastal Management Monitoring and Database System on a quarterly basis

- In the event that excessive poor water quality results are measured that threaten the estuary the management protocols established in OBJECTIVE A may be followed to restore improved water quality conditions

RECORDS:

- All water quality results will be recorded within Scientific Services' Laboratory Information Management System (LIMS)

GENERAL

- The estuary water quality management plan to be implemented in accordance with the Catchment, Stormwater and River Management Branch City-wide work programme, resources and priorities.

OBJECTIVE (G):

Remove alien invasive species from the estuary

LEGISLATION/STANDARDS:

- Conservation of Agricultural Resources Act, 43 of 1983 (CARA)
- National Environmental Biodiversity Act (NEMBA), 10 of 2004

MANAGEMENT PROTOCOLS:

The City's Invasive Species Unit to prepare an invasive species management plan for the estuary, to include, where relevant:

- Control of established invasive plants
- Control and management of invasive alien birds and animals where necessary
- Control and management of invasive alien fish, if deemed necessary
- Re-introduction of indigenous species where feasible
- Implementation of an early detection and rapid response programme to address new and emerging invasive alien species

RECORDS:

- The invasive species management plan will be appended to this Estuary Management Plan as Annexure A.

GENERAL:

- The estuary invasive species management plan to be implemented in accordance with the Invasive Species Unit city-wide work programme, resources and priorities.
- An integrated invasive species management approach will be followed in partnership with relevant stakeholders

OBJECTIVE (H):

Regulate all recreational use of the estuary

LEGISLATION/STANDARDS:

- DAFF commercial fishing regulations
- DAFF recreational fishing regulations
- DWA, Recreational water quality standards
- Integrated Coastal Management Act
- City's Municipal Coastal Management Plan

MANAGEMENT PROTOCOLS:

- Although the estuary is small, there is the possibility for limited recreation to take place.
- Only recreational fishing will be permitted, with a valid recreational fishing permit, available from the Post Office. This will be communicated through appropriate signage.
- No motorised water-craft of any kind permitted in the estuary or estuary mouth
- City's Marine and Coastal Law Enforcement Unit in conjunction with DAFF Fishery Control Officers to monitor, enforce and regulate
- City Health Department, in conjunction with Catchment, Stormwater and River Management, to determine recreational safety based on water quality results and to inform the public accordingly.

RECORDS:

- Any non-compliance to regulations will be recorded in the City's Coastal Management Monitoring and Database System

GENERAL:

- The estuary recreational use management plan to be implemented in accordance with the Sport, Recreation and Amenities Department's City-wide work programme, resources and priorities.
- Appropriate recreation to be supported in line with the City's Social Development Strategy

OBJECTIVE (I):

Provide public awareness and education through a range of media

LEGISLATION/STANDARDS:

- None

MANAGEMENT PROTOCOLS:

Public education and awareness on the Sir Lowry's River Estuary will be provided in the following ways:

1) General catchment and estuary education and awareness through the City's Youth Environmental Schools (YES) Programme
2) General estuary education and awareness as part of the City's Educator Training Programme
3) General estuary education and awareness through the City's Nature Reserve Environmental Education Programme
4) General City communication programmes focusing on awareness raising and education about pollution, its impact on human health and freshwater ecosystems
5) The installation of relevant and appropriate informative signage at the estuary

RECORDS:

- All signs and their locations to be recorded in the City's Coastal Management Monitoring and Database System

GENERAL:

- All signage, regulatory and informative, must comply with the City's Coastal Signage Protocol
- The estuary public awareness and education management plan to be implemented in accordance with the Environmental Resource Management Department city-wide work programme, resources and priorities.

OBJECTIVE (J):

Undertake annual monitoring and sampling of the estuary's biodiversity

LEGISLATION/STANDARDS:

- None

MANAGEMENT PROTOCOLS:

In partnership with DAFF undertake annual estuary biodiversity surveys through:

- Fish sampling through annual seine netting
- Bird counts

- Benthic sampling

RECORDS:

- All sampling results to be recorded in the City's Coastal Management Monitoring and Database System

GENERAL:

- Biodiversity sampling programme and schedule to be determined by DAFF

OBJECTIVE (K):

Implement an Estuary Emergency Contingency Plan in the event of a flood, significant pollution event, oxygen depletion or other emergency events

LEGISLATION/STANDARDS:

- National Environmental Management Act

MANAGEMENT PROTOCOLS:

The following will be considered an Estuary Emergency requiring the Emergency Contingency Protocols to be implemented:

1) A major land based pollution event
2) Marine oil or pollution spill in the surrounding area
3) Rapid oxygen depletion
4) Marine life die-off

Emergency Contingency Protocols:

1) In the event of an emergency the estuary, estuary mouth and beach area (200m either side of the mouth) will be closed to the public and enforced by City Law Enforcement
2) The City's Coastal Co-ordinators will notify officials from DAFF, DEA and the C.A.P.E. Estuary programme manager
3) Where a land based pollution event is contaminating the estuary, the protocol established in OBJECTIVE A will be followed
4) Where there is a marine oil or pollution event, the estuary mouth will be closed and the Official Oil and Pollution Contingency Plan as per the City's Municipal Coastal Management Plan will become effective
5) In the event of a rapid oxygen depletion event, the estuary mouth will be opened at low tide to allow the coming high tide to bring ocean water into the estuary, as per OBJECTIVE A.
6) In the event of significant marine life die-off, samples of dead marine life will be provided to DAFF and DEA for analysis. All remaining dead marine life will be recovered from the estuary by the City's Solid Waste Management department and disposed of at Vissershok Landfill site in

accordance with City waste management procedures

7) The beach and estuary area will only be re-opened to public access once it is deemed safe

RECORDS:

- All estuary emergency events as well as the action taken will be recorded in the City's Coastal Management Monitoring and Database System
- DEA and DAFF to make any sampling results from a marine life die off available to the City

GENERAL:

- An emergency will only be declared if it is determined that the scale of the problem is such that it threatens the long term viability of the estuary as a functional ecosystem
- This determination will be made by the City's Catchment, Stormwater and River Management Branch, in conjunction with the Environmental Resource Management Department. In the event of a biodiversity related emergency, ERMD will be the lead department in terms of decision-making.

OBJECTIVE (L):

Establish an estuary task team with relevant stakeholders

LEGISLATION/STANDARDS:

- Integrated Coastal Management Act

MANAGEMENT PROTOCOLS:

- Task team to be established as part of the city-wide "Small Estuaries Task Team", which will include all estuaries except for the Zandvlei and Diep estuaries.
- Small Estuaries Task Team to meet on a quarterly basis

RECORDS:

- Minutes of all meetings to be maintained as part of the City's Coastal Monitoring Database

GENERAL:

- Small Estuaries Task Team will function as a working group consisting of officials who are involved in management work related to the relevant estuaries
- Public engagement will be facilitated through the existing Sub-Council structure

OBJECTIVE (M):

Regulation of Events and Filming

LEGISLATION/STANDARDS:

- City Filming and Events Policy

MANAGEMENT PROTOCOLS:

Any organisation or individual who wishes to hold, host or undertake a commercial event or commercial filming of any kind on the estuary, or within the coastal edge surrounding the estuary must:

- Submit a formal application to the City's Events and Filming Office
- The application must be circulated to the Environmental Resource Management Department, Catchment, Stormwater and River Management Branch and Sport, Recreation and Amenities Department for consideration
- Officials from these departments will advise the Events and Filming Office on the suitability of the application and if supported the conditions attached to such support
- If approved, the final event or filming permit with attached conditions must be circulated to the Environmental Resource Management Department, Catchment, Stormwater and River Management Branch and Sport, Recreation and Amenities Department at least 48 hours prior to the event or filming taking place

RECORDS:

- Events and Film Office to retain records of all applications, permits and conditions as well as any reported non-compliance

GENERAL:

- Event and filming applications for the estuary must demonstrate meaningful benefit

ESTUARY MANAGEMENT PLAN:

ZEEKOEVLEI ESTUARY

1. VISION

The Vision for the C.A.P.E. Estuaries Programme as a whole is: "Our estuaries are beautiful, rich in plants and animals, they attract visitors, sustain our livelihoods and uplift our spirits."

The Zeekoevlei Estuary is part of an extensive urban environment and as such the vision for the estuary is:

"To manage the estuary and its catchment in such a manner as to reduce and minimise urban influence and pollutants on the estuary, where possible allow free and natural movement of the estuary mouth, manage alien invasive species, continuously work towards achieving high standards of water quality, recognise the estuary as an important marine nursery and biodiversity habitat and monitor the estuary in such a manner so as to intervene when urban influences have compromised the natural functioning of the estuary"

2.1 SITUATION ASSESSMENT AND CONTEXT

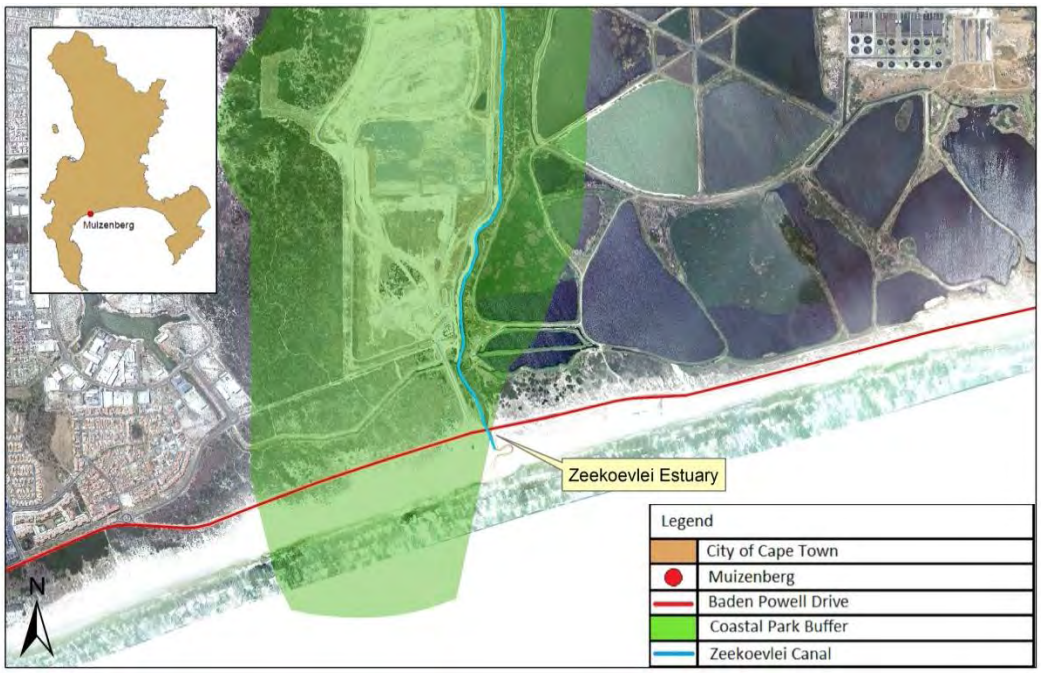


Figure 1: Historical extent of the Zeekoevlei Estuary

The Zeekoevlei River Estuary is the outlet of the Zeekoevlei Catchment drainage area which encompasses the Big and Little Lotus Rivers and Zeekoevlei. The outlet channel extends from the Zeekoevlei weir to the sea (a distance of approximately 3km). The channel also receives final sewage effluent from the Cape Flats Waste Water Treatment Works (WWTW) and, as such, it forms an important component of the City's urban drainage system. The outlet channel is surrounded by City infrastructure - the Coastal Park landfill site to the north and the Cape Flats WWTW to the east. In addition, Baden Powell – a major east-west transport artery - crosses the Zeekoevlei outlet channel a short distance upstream of its entry point to the sea. The Zeekoevlei Catchment and its associated aquatic ecosystems have over many decades become significantly impacted and nutrient enriched and unfortunately do not support any endemic or threatened species.

The Zeekoevlei River mouth, as with all river mouths, is subject to considerable movement. While interventions

have been put in place in the past to prevent the eastward migration of the river mouth, the river is still subject to significant westward migration. This migration is not limited to the east-west plain, but may also move in a northerly direction due to erosion. The rate of this erosion is dependent on other factors such as rainfall events, storm surges and tides. The north-westerly erosion caused by the river's migration poses a significant threat to Baden Powell Drive and therefore requires management intervention to protect this key infrastructure. While the City is mindful of not interfering with dynamic coastal processes, the potential implications of not managing these dynamics within the context of an already altered environment are serious.

It is highly unlikely that this system retains any true estuarine characteristics due to the significant alteration of the flow regime and channel, and the impact of discharges from the WWTW.

2.2 WATER QUALITY OF ESTUARY

The condition of the estuary is influenced mainly by the nearby Cape Flats WWTW and, to a lesser extent, by the Zeekoevlei Catchment. Limited overflows from the upstream Zeekoevlei down the channel towards the sea outlet occur mainly in winter – the flow in the Zeekoevlei estuary is thus overwhelmingly dominated by the discharge from the WWTW.

The condition of the estuary is thus influenced by the following:

- Alteration of natural water flow patterns
- Increased water flow as a result of discharge from the Cape Flats WWTW
- Urban pollutants including litter, contaminants and treated waste water from the neighbouring Cape Flats WWTW

Comprehensive water quality monitoring has been undertaken on a monthly basis by the City's Scientific Services Laboratory since 1981 on the Zeekoevlei waterbody itself but not within the outlet channel.

Fortnightly microbiological monitoring takes place at various coastal locations along the False Bay shoreline.

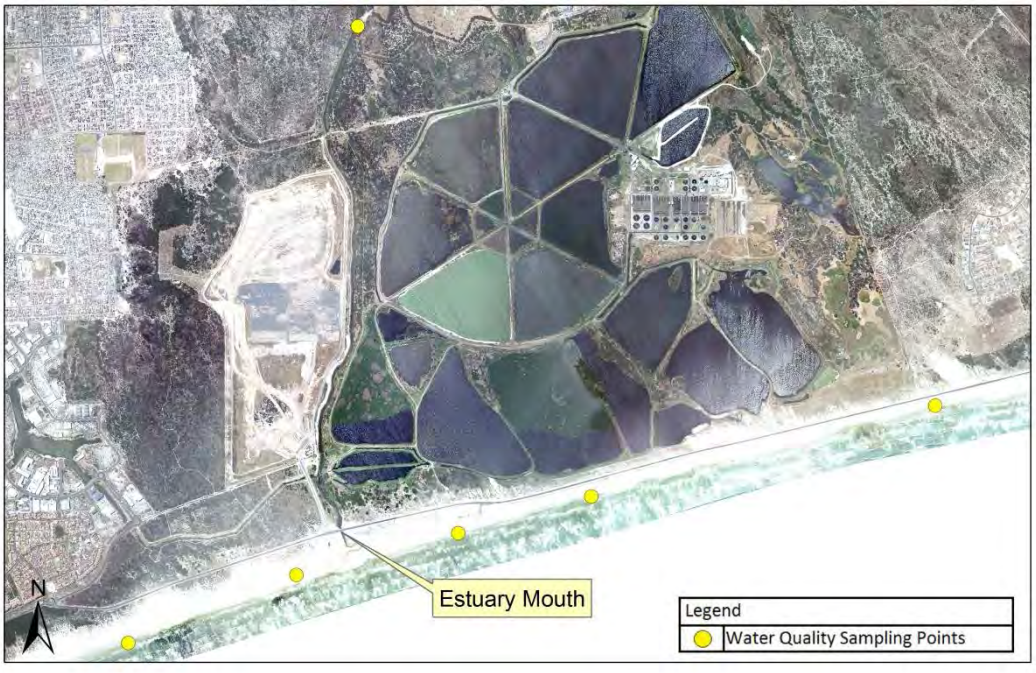


Figure 2: Water quality sampling points in the vicinity of the Zeekoevlei outlet

2.3 SPECIES RECORDED IN THE CATCHMENT

The City of Cape Town's Alien Invasive Unit have recorded the following **invasive species** in the Zeekoevlei Catchment (2012-2013):

Acacia cyclops	Rooikrans
Acacia saligna	Port Jackson
Eucalyptus cladocalyx	Sugar Gum
Layatera arborea	Tree Mallow
Ipomoea violacea	Beach Moonflower
Myoporum tenuifolium subsp. montanum	Manatoka

The Department of Agriculture, Forestry and Fisheries have recorded the following marine and freshwater species in the Zeekoevlei Catchment (2013):

Marine Species	
Mugil cephalus	Flathead Mullet
Myxus capensis	Freshwater mullet
Lithognathus lithognathus	White steenbras
Liza richardsonii	Harder
Anguilla mossambica	Longfin Eel

Freshwater Species	
Clarias gariepinus	Sharptooth catfish
Cyprinus carpio	Carp
Micropterus salmoides	Largemouth bass
Tilapia rendalli	Redbreast tilapia
Tilapia sparrmani	Banded tilapia
Tilapia zillii	Redbelly tilapia
Gambusia affinis	Mosquitofish

2.4 RECREATION

Recreation in the estuary is minimal. Recreational swimming in the back ponding area and in the estuary mouth is not allowed due to the discharge of treated sewage effluent. No commercial fishing is permitted, however limited recreational fishing occurs. The size and scale of the estuary does not facilitate broader recreational use such as boating or sailing.

3 MANAGEMENT PLAN

The Zeekoevlei Estuary has to date not had a specific management plan or long term objectives assigned to it, nor have specific roles and responsibilities been previously defined. As part of its new Integrated Coastal Management approach, the City has prioritised the management of small and large estuaries. Based on the situation assessment and the available information a number of management objectives have been defined. For each of these management objectives, a specific operational protocol has been developed.

These specific management protocols are intended to clearly define actions as well as responsibilities across City line departments. As implementation takes place and new information is gathered and understood, operational protocols may be amended and additional objectives and associated protocols added. Estuary management within an urban environment is seen as a long term approach following a principle of striving

towards ongoing improvement in both the quality and management of our estuaries.

3.1. MANAGEMENT OBJECTIVES

The City has the following management objectives for the Zeekoevlei Estuary:

A. Allow the estuary mouth to function naturally as part of the local coastal dynamic processes and intervene only under specific defined and documented circumstances
B. Reduce and minimise all sources of urban pollutants to the estuary
C. Regulation and development of infrastructure in or adjacent to the estuary
D. Allow the natural circulation and fluctuation in estuary water quantity to be determined by seasonal rainfall patterns, whenever possible
E. Monitor estuary dynamics and intervene if required
F. Monitor estuary water quality and work towards a high standard of water quality acceptable for public recreation and ecological functioning
G. Remove alien invasive species from the estuary
H. Appropriately regulate all recreational use of the estuary
I. Provide public awareness and education through a range of media
J. Undertake annual monitoring and sampling of the estuary's biodiversity
K. Implement an Estuary Emergency Contingency Plan in the event of a flooding, significant pollution event, oxygen depletion or other emergency events
L. Establish an estuary task team with relevant stakeholders
M. Regulate events and filming in the estuarine environment

OBJECTIVE (A) :

Allow the estuary mouth to function naturally as part of the local coastal dynamic processes and intervene only under specific defined and documented circumstances

LEGISLATION/STANDARDS:

Estuary mouth manipulation falls within the National Environmental Management Act (NEMA) Regulations in so far as mouth manipulation involves movement of sand and therefore triggers Activity 18 (Listing Notice 1). As such mouth manipulation may be undertaken either:

a) In terms of a *"management plan agreed to by the relevant environmental authority"*
b) In an emergency situation followed by notification to Department of Environmental Affairs and Development Planning (DEADP)

MANAGEMENT PROTOCOLS:

Due to the presence of the WWTW and the large volumes of effluent discharged into the estuary, it is likely that the mouth remains open for most of the year. However, migration along the coast has been problematic in previous years, and it is therefore essential that protocols for opening and straightening of the river mouth are in place.

The following management protocols will be applied:

1) Risk of inland flooding
- The mouth of the estuary may be straightened and opened in the event that high rainfall prediction is indicative of a possible inland flooding event.
- Determination of this need as well as the responsibility for carrying out the action resides with the City's Catchment, Stormwater and River Management Branch.

2) Pollution or toxic event
- In the event of a toxic event in the estuary or catchment, the mouth may be mechanically opened to facilitate flushing of the estuary during high tide or high water levels. This action may also require the trapping of sea water in the estuary through the physical closing of the mouth for a short duration.
- Determination of this need resides with the City's Catchment, Stormwater and River Management Branch in consultation with the C.A.P.E. Estuary Programme Manager as well as the National Departments of Environmental Affairs (DEA) and Agriculture, Fisheries and Forestry (DAFF). Responsibility for carrying out the action resides with the City's Catchment, Stormwater and River Management Branch

3) Potential undermining of infrastructure or critical dune systems by estuary mouth movement.
- Where the estuary mouth moves or meanders in such a manner that it threatens critical dune systems or City infrastructure the mouth may be mechanically straightened or re-aligned.
- Determination of this need as well as the responsibility for carrying out the action resides with the City's Environmental Resource Management Department's Coastal Management Unit in consultation with the Southern district environmental office

RECORDS:

- All mouth manipulation, the reason, action and completion will be recorded in the City's Coastal Management Monitoring and Database System
- DEA, DAFF, DEADP and the C.A.P.E Estuary Programme will be informed of all mouth manipulation events by the City's Coastal Management Unit

MACHINE ACCESS FOR MOUTH MANIPULATION:

- In all circumstances listed within this management objective, access points and traverse routes for machinery to be used for mouth manipulation will be determined by the Environmental Resource Management Department
- As much as possible, access and traverse routes must adhere to existing road surfaces or previously disturbed areas.
- These access and traverse routes will be strictly adhered to at all times

GENERAL:

- To prevent the movement of the river mouth and the associated risk to critical infrastructure, the City will re-direct the river mouth in a southerly direction so that it follows a straight and direct route to the sea. The proposed activities will be undertaken by the City's Roads and Storm Water Department or their appointed contractor. Environmental Compliance will be managed by the City's Environmental Resource Management Department.

- The operation of re-directing the river mouth will initially require a stretch of beach to be graded open through the use of heavy machinery. In terms of Activity 18, Listing Notice 1, this intervention involves purely the "moving of sand, shells and shell grit". This will avoid the immediate threat of damage to Baden Powell Drive.

OBJECTIVE (B) :

Reduce and minimise all sources of urban pollutants to the estuary

LEGISLATION/STANDARDS:

Pollution in the form of industrial waste, human waste, domestic waste and material waste is governed by a wide range of National Legislation and Standards.

- National Environmental Management Act (NEMA)
- National Water Act (NWA)
- National Waste Act
- Integrated Coastal Management Act (ICMA)

However, for practical reasons recognition must be given to the fact that both the catchment that feeds the estuary, the estuary itself as well as the marine environment with which the estuary interacts are all subject to various pollutant sources common within a highly developed and populated urban environment. As such, all means to reduce pollution into the estuary that are practical, cost effective and reasonable will be employed but targeting zero pollution within an urban environment is neither practical nor realistic.

MANAGEMENT PROTOCOLS:

To minimise and reduce all forms of pollution the following management protocols will be applied:

1) Regular and systematic litter removal from the general Zeekoevlei Catchment area by the City's Solid Waste Management Department.
2) Monthly monitoring of water quality along the river by the City's Scientific Services Branch.
3) If deemed necessary, installation, clearing and maintenance of litter traps by the City's Operations and

Assets Branch of the Roads and Stormwater Department.

4) On an ongoing basis and as required, implement interventions to reduce water pollution at source, through the application of the City's Water Quality Improvement Strategy and Implementation Plan.

RECORDS:

1) All major pollution events to be recorded in the City's Coastal Monitoring Database. A major pollution event is defined as any pollution event deemed to be significantly greater than the level of background pollution present in the system. This may be determined either through water quality monitoring (i.e. a set of results that shows a significant spike in pollution, or through observation of an event (e.g. sewer overflow).

GENERAL

- In the event of major water based pollution events, the pollution event will be managed in accordance with the management protocol as set out in OBJECTIVE A.
- In the event of increased levels of litter within the catchment system a litter trap may be established at the most northern end of Beach Road Bridge to reduce and minimise litter into the estuary

OBJECTIVE (C) :

Regulation of development of infrastructure in or adjacent to the estuary

LEGISLATION/STANDARDS:

Development of or building of any infrastructure within or adjacent to the estuary is regulated by the following:

a) National Environmental Management Act
b) City Zoning Scheme
c) Integrated Coastal Management Act
d) Coastal Edge and Setback Line
e) Floodplain and River Corridor Management Policy
f) Management of Urban Stormwater Impacts Policy

MANAGEMENT PROTOCOLS:

a) All development proposals must comply with relevant legislation and policies
b) Development proposals falling within the Coastal Edge/Setback Line or 1 in 50 year flood line should not be supported
c) The building or construction of any permanent or temporary structures that do not trigger NEMA regulations, but are adjacent to or within the estuary, require additional written permission from the City's Environmental Resource Management Department's Integrated Coastal Management Unit or the Southern district environmental office

RECORDS:

- Any written permission granted for a permanent or temporary structure to be recorded in the City's Coastal Monitoring Database

GENERAL:

- Construction of any permanent or temporary structures will in general not be supported unless strong rationale is provided with measurable benefits

OBJECTIVE (D):

Allow the natural circulation and fluctuation in estuary water quantity to be determined by seasonal rainfall patterns, whenever possible.

LEGISLATION/STANDARDS:

- National Water Act

MANAGEMENT PROTOCOLS:

a) At no time should the mouth of the estuary be impeded, diverted, blocked or altered unless under the specific conditions as defined in OBJECTIVE A
b) The estuary mouth may never be further canalised or fixed
c) No water abstraction to be permitted from the back pond or estuary mouth
d) Water abstraction from the Zeekoevlei Catchment to conform to all relevant legislation with strict permit conditions
e) On an ongoing basis, strive for improvement in wastewater discharge from the Cape Flats WWTW works to comply with permit conditions

RECORDS:

- Permitted water extraction from the Zeekoevlei Catchment as well as permit conditions to be recorded in the City's Coastal Monitoring Database and the City's Catchment, Stormwater and River Management Department as well as the Department of Water Affairs to be informed about the abstraction

- Cases and outcomes of an illegal water extraction in the Zeekoevlei Catchment to be recorded in the City's Coastal Monitoring Database

GENERAL:

- In the event of major flow alteration, the City's Catchment, Stormwater and River Management Branch in conjunction with the Southern district environmental office to conduct an investigation to determine cause of flow change and make recommendations to rectify and restore flow regime

OBJECTIVE (E) :

Monitor estuary dynamics and intervene if required

LEGISLATION/STANDARDS:

- National Environmental Management Act

MANAGEMENT PROTOCOLS:

1) The City's Environmental Resource Management Department will develop an estuary dynamics monitoring programme based on aerial photography, including the establishment of baseline data, with the aim of annual assessment to determine whether changes in dynamics are taking place over time.

2) If the changing dynamics of the estuary are determined to be posing a management problem, the City's Catchment, Stormwater and River Management Branch in conjunction with the City's Environmental Resource Management Department will investigate and attempt to determine the cause. Areas of concern which may require intervention include, but are not limited to, increased rates of sedimentation and significant migration of the estuary or river mouth.

3) If it is determined that changes pose a management problem, the City will:
   a) Inform DAFF, DEA and the C.A.P.E. Estuary Programme Manager
   b) In consultation with DAFF, DEA and the C.A.P.E. Estuary Programme Manager determine the most appropriate plan of action
   c) Ensure compliance to NEMA if remedial action requires environmental authorisation

RECORDS:

- Changes in estuary dynamics to be monitored and recorded in the City's Coastal Management Monitoring and Database System.

GENERAL:

- Recognise that changes in estuary dynamics may form part of the natural variation in the estuary and as such retain a principle of least interference

OBJECTIVE F:

Monitor estuary water quality and work towards a high standard of water quality acceptable for public recreation and ecological functioning

LEGISLATION/STANDARDS:

- Water quality guidelines (DWA and DEA).

MANAGEMENT PROTOCOLS:

- Standardised water quality monitoring to be undertaken at one location within the estuarine environment and at various sites in the greater catchment area once per month (temperature, dissolved oxygen, conductivity/salinity, pH, total suspended solids, total phosphorus, orthophosphate, total nitrogen, soluble ammonia, nitrite & nitrate, faecal coliforms, *Escherichia coli* and enterococcus)

- ERMD to liaise with the Wastewater Department to ensure that data from the monitoring of the final effluent quality from Cape Flats Wastewater Treatment Works (and other relevant WWTWs) is provided to the Coastal Management Monitoring and Database System on a quarterly basis

- In the event that excessive poor water quality results are measured that threaten the estuary the management protocols established in OBJECTIVE A may be followed to restore improved water quality conditions

RECORDS:

- All water quality results will be recorded within Scientific Services' Laboratory Information Management System (LIMS) and the monthly Certificate of Analysis will be added to the City's Coastal Management Monitoring and Database System.
- All final effluent quality results obtained from the Wastewater department will be logged in the City's Coastal Management Monitoring and Database System

GENERAL:

- Estuary water quality management to be implemented in accordance with the Water and Sanitation Department's, and Catchment, Stormwater and River Management Branch's City-wide work programme, resources and priorities.

OBJECTIVE (F):

Remove alien invasive species from the estuary

LEGISLATION/STANDARDS:

- Conservation of Agricultural Resources Act, 43 of 1983 (CARA)
- National Environmental Biodiversity Act (NEMBA), 10 of 2004

MANAGEMENT PROTOCOLS:

The City's Invasive Species Unit to prepare an invasive species management plan for the estuary, to include, where relevant:

- Control of established invasive plants
- Control and management of invasive alien birds and animals where necessary
- Control and management of invasive alien fish, if deemed necessary
- Re-introduction of indigenous species where feasible
- Implementation of an early detection and rapid response programme to address new and emerging invasive alien species

RECORDS:

- The invasive species management plan will be appended to this Estuary Management Plan as Annexure A.

GENERAL:

- The estuary invasive species management plan to be implemented in accordance with the Invasive Species Unit city-wide work programme, resources and priorities.
- An integrated invasive species management approach will be followed in partnership with relevant stakeholders

OBJECTIVE (H):

Regulate all recreational use of the estuary

LEGISLATION/STANDARDS:

- DAFF commercial fishing regulations
- DAFF recreational fishing regulations
- DWA, Recreational water quality standards
- Integrated Coastal Management Act
- City's Municipal Coastal Management Plan

MANAGEMENT PROTOCOLS:

- Only recreational fishing will be permitted, with a valid recreational fishing permit, available from the Post Office. This will be communicated through appropriate signage.
- No motorised water-craft of any kind permitted in the estuary or estuary mouth
- City's Marine and Coastal Law Enforcement Unit in conjunction with DAFF Fishery Control Officers to monitor, enforce and regulate
- Due to the close proximity of the WWTW, no swimming is permitted in the estuary. Signage to this effect will be installed.

RECORDS:

- Any non-compliance to regulations will be recorded in the City's Coastal Management Monitoring and Database System

GENERAL:

- The estuary recreational use management plan to be implemented in accordance with the Sport, Recreation and Amenities Department's City-wide work programme, resources and priorities.
- Appropriate recreation to be supported in line with the City's Social Development Strategy

OBJECTIVE (I):

Provide public awareness and education through a range of media

LEGISLATION/STANDARDS:

- None

MANAGEMENT PROTOCOLS:

Public education and awareness on the Zeekoevlei Estuary will be provided in the following ways:

1) General catchment and estuary education and awareness through the City's Youth Environmental Schools (YES) Programme
2) General estuary education and awareness as part of the City's Educator Training Programme
3) General estuary education and awareness through the City's Nature Reserve Environmental Education Programme
4) General City communication programmes focusing on awareness raising and education about pollution, its impact on human health and freshwater ecosystems
5) The installation of relevant and appropriate informative signage at the estuary

RECORDS:

- All signs and their locations to be recorded in the City's Coastal Management Monitoring and Database System.

GENERAL:

- All signage, regulatory and informative, must comply with the City's Coastal Signage Protocol
- The estuary public awareness and education management plan to be implemented in accordance with the Environmental Resource Management Department's city-wide work programme, resources and priorities.

OBJECTIVE J:

Undertake annual monitoring and sampling of the estuaries biodiversity

LEGISLATION/STANDARDS:

- None

MANAGEMENT PROTOCOLS:

ERMD in partnership with DAFF to undertake annual estuary biodiversity surveys through:

- Fish sampling through annual seine netting

- Bird counts
- Benthic sampling

RECORDS:

- All sampling results to be recorded in the City's Coastal Management Monitoring and Database System

GENERAL:

- Biodiversity sampling programme and schedule to be determined by DAFF
- The sampling programme is contingent on sufficient resources being made available for this programme

OBJECTIVE (K):

Implement an Estuary Emergency Contingency Plan in the event of a flooding, significant pollution event, oxygen depletion or other emergency events

LEGISLATION/STANDARDS:

- National Environmental Management Act

MANAGEMENT PROTOCOLS:

The following will be considered an Estuary Emergency requiring the Emergency Contingency Protocols to be implemented:

1) A land based (catchment) pollution event
2) Marine oil or pollution spill in False Bay
3) Rapid oxygen depletion
4) Marine / estuarine life die-off within the estuary

Emergency Contingency Protocols:

1) In the event of an emergency the estuary, estuary mouth and beach area (200m either side of the mouth) will be closed to the public and enforced by City Law Enforcement
2) The City's Coastal Co-ordinators will notify officials from DAFF, DEA and the C.A.P.E. Estuary programme manager
3) Where a land based pollution event is contaminating the estuary, the protocol established in OBJECTIVE A will be followed
4) Where there is a marine oil or pollution event, the estuary mouth will be boomed off and the Official Oil and Pollution Contingency Plan as per the City's Municipal Coastal Management Plan will become effective
5) In the event of a rapid oxygen depletion event, the estuary mouth will be breached and opened at low tide to allow high tide ocean water into the estuary, as per OBJECTIVE A.
6) In the event of significant marine life die-off, samples of dead marine life will be provided to DAFF and DEA for analysis. All remaining dead marine life will be recovered from the estuary by the City's Solid Waste Management department and disposed of at Vissershok Landfill site in accordance with City

waste management procedures

7) The Estuary, estuary mouth and associated beach area will only be re-opened to public access once it is deemed safe

RECORDS:

- All estuary emergency events as well as the action taken will be recorded in the City's Coastal Management Monitoring and Database System
- DEA and DAFF to make any sampling results from a marine life die off available to the City

GENERAL:

- An emergency will only be declared if it is determined that the scale of the problem is such that it threatens the long term viability of the estuary as a functional ecosystem
- This determination will be made by the City's Catchment, Stormwater and River Management Branch, in conjunction with the Environmental Resource Management Department. In the event of a biodiversity related emergency, ERMD will be the lead department in terms of decision-making.

OBJECTIVE (L):

Establish an estuary task team with relevant stakeholders

LEGISLATION/STANDARDS:

- Integrated Coastal Management Act

MANAGEMENT PROTOCOLS:

- Task team to be established as part of a city-wide Small Estuaries Task Team, which will include all estuaries except for the Zandvlei and Diep estuaries.
- Small Estuaries Task Team to meet on a quarterly basis

RECORDS:

- Action minutes of all meetings to be maintained as part of the City's Coastal Monitoring Database

GENERAL:

- Small Estuaries Task Team will function as a working group consisting of officials who are involved in management work related to the relevant estuaries
- Public engagement will be facilitated through the existing Sub-Council structure

OBJECTIVE M:

Regulation of Events and Filming

LEGISLATION/STANDARDS:

- City Filming and Events Policy

MANAGEMENT PROTOCOLS:

Any organisation or individual who wishes to hold, host or undertake a commercial or non-profit event or commercial filming of any kind on the estuary, or within the coastal edge surrounding the estuary must:

- Submit a formal application to the City's Events and Filming Office
- The application must be circulated to the Environmental Resource Management Department, Catchment, Stormwater and River Management Branch and Sport, Recreation and Amenities Department for consideration
- Officials from these departments will advise the Events and Filming Office on the suitability of the application and if supported the conditions attached to such support
- If approved, the final event or filming permit with attached conditions must be circulated to the Environmental Resource Management Department, Catchment Stormwater and River Management Branch and Sport, Recreation and Amenities Department at least 48 hours prior to the event or filming taking place

RECORDS:

- Events and Film Office to retain records of all applications, permits and conditions as well as any reported non-compliance

GENERAL:

- Event and filming applications for the estuary must demonstrate meaningful benefit

Chapter 24: Water quality monitoring and public health protocol

1. Management issue

Monitoring of beach water quality at designated beaches within the City of Cape Town jurisdiction in accordance with national guidelines is necessary to ensure that users of the beaches are not exposed to health risks associated with polluted water. Samples are to be collected at listed beaches twice per month throughout the year. Since beaches are also utilised during winter by surfers and kite boarders, there will be no restriction of monitoring to a "summer bathing period".

2. Roles and responsibilities

Sport and Recreation is responsible for management of the City's designated beaches and City Health (Environmental Health) is responsible for monitoring the quality of water to ensure that the public are not exposed to health risks while utilising these beaches.

Environmental Health must, in cooperation with Sport and Recreation, place health warning signs at closed beaches and Law Enforcement must ensure that the public do not utilise these closed beaches.

The Stormwater & Sustainability branch co-ordinates and funds the coastal water quality monitoring programme.

Scientific Services and Environmental Health officials collect samples at the various designated sampling points in accordance with a Service Level Agreement between Scientific Services and City Health (Health Sub- Districts).

Scientific Services undertakes the analysis of the water samples in terms of a Service Level Agreement with the abovementioned funding line function.

The Environmental Resource Management Department assists with coastal management advice and is responsible for the compilation and implementation of Coastal Management Plans that are required in terms of the NEM: Integrated Coastal Management Act.

3. Recreational Water Quality Guidelines

From 2015, coastal water quality results will be assessed and measured against national guidelines set by the Department of Environmental Affairs (DEA) for safe recreational use. These are currently merely "guidelines" and have not been legislated. The DEA guidelines replace the Department of Water Affairs guidelines which have been in place since 1995. During 2014 the City will implement the monitoring and laboratory reporting protocols necessary for the transition between these two guidelines. It is important to note that these Water Quality Guidelines have the same upper limit as Blue Flag standards.

In terms of the new DEA guidelines, the "Sufficient/Fair" grade will be applied as the minimum requirement for determining acceptable water quality over the long term (90^{th} percentile statistic to be calculated over a minimum consecutive period of 12 months).

GRADE	**INTERPRETATION**	**INTESTINAL ENTEROCOCCI** (counts per 100 ml)	***E. coli*** (counts per 100 ml)
Excellent (2.9% GI illness risk)	ACCEPTABLE	≤ 100 (95 percentile)	≤ 250 (95 percentile)

Good (5% GI illness risk)	ACCEPTABLE	≤ 200 (95 percentile)	≤ 500 (95 percentile)
Sufficient/Fair (8.5% GI illness risk)	**ACCEPTABLE**	**≤ 185 (90 percentile)**	**≤ 500 (90 percentile)**
Poor (>8.5% GI illness risk)	UNACCEPTABLE	> 185 (90 percentile)	> 500 (90 percentile)

Table 1: Microbial quality grades as stipulated in the RSA DEA interim guidelines for recreational waters of South Africa's COASTAL marine environment (RSA DEA 2011).

4. Monitoring Procedure

Water samples will be taken every second week at pre-determined locations on designated beaches (Annexure A) by trained personnel. Sampling procedure and equipment utilised follows protocols defined by the City's Scientific Services laboratory.

The water samples are tested by Scientific Services using standard accredited methods for the following indicator organisms:

- *Escherichia coli*
- Enterococci

The results are assessed by Scientific Services microbiological technical personnel who advise internal City role players regarding any public health concerns so that appropriate action can be taken (see section 5 below).

5. Procedure to be followed for non-compliant sample results

Investigation and resolution of pollution issues is to be undertaken co-operatively with affected line departments. Such investigations could include the following departments: Environmental Health; Stormwater and Sustainability; Sports and Recreation; Environmental Resource Management; and Water and Sanitation (Scientific Services, Reticulation, Water Pollution Control). Investigations will be led by Stormwater and Sustainability.

Media releases notifying the public about beach closures and other related information may be required in certain cases and these are to be issued by City Health. The Executive Director City Health authorises the relevant Health District Manager to make arrangements to prepare and disseminate such media releases.

6. Reporting

The City will disseminate Coastal Water Quality statistics for public information as part of the biennial State of the Environment Report.

Annexure A

The following is a list of Cape Town's beaches where water quality monitoring takes place:

Atlantic Coast

1. Silwerstroom tidal pool
2. Melkbosstrand
3. Blouberg Beach (big bay)
4. Blouberg Beach (small bay)
5. Tableview Beach
6. Milnerton Beach
7. Granger Bay Beach
8. Mouille Point Beach
9. Three Anchor Bay
10. Rocklands Beach
11. Milton Tidal Pool
12. Sunset Beach pool
13. Saunders Rocks Beach
14. Saunders Rocks Tidal Pool
15. Clifton 4th Beach
16. Clifton Maidens Cove
17. Maidens Cove Tidal Pool 1
18. Maidens Cove Tidal Pool 2
19. Camps Bay Beach
20. Camps Bay Pool
21. Horne Bay
22. Bakoven Bungalows
23. Oudekraal Resort
24. Llandudno Beach
25. Hout Bay Beach, East
26. Kommetjie, Long Beach
27. Kommetjie, the Kom
28. Scarborough Beach

False Bay

29. Millers Point
30. Fisherman's beach
31. Boulders beach
32. Seaforth beach
33. Long Beach Simons Town
34. Glencairn beach
35. Fish Hoek beach
36. Silvermine River Mouth
37. Kalk Bay Harbour beach
38. Kalk Bay tidal pool
39. Kalk Bay beach
40. Dalebrook Pool
41. St James Pool
42. Sandowne Hotel
43. Muizenberg Station
44. Muizenberg Pavilion
45. Sunrise Beach
46. Lifebox 21
47. Lifebox 23
48. Sonwabe
49. Ribbon Parking Area
50. Lifebox 30
51. Strandfontein Point
52. Strandfontein Pool
53. Lukannon Drive
54. Mnandi beach east
55. Mnandi beach west
56. Monwabisi tidal pool
57. Monwabisi Beach
58. Macassar Beach
59. Strand – Lourens River Mouth
60. Strand – Woltemade Street
61. Strand – Springbok Café
62. Strand – Pier
63. Strand – Harmony Resort
64. Gordons Bay – Sir Lowry's River
65. Gordon's Bay – van Riebeek Hotel
66. Gordon's Bay – Harbour
67. Gordon's Bay – Bikini Beach
68. Kogel Bay Beach

Chapter 25: Coastal Signage and Information

1. Introduction

It is the City's responsibility to ensure that appropriate signage is put in place to inform beach users and protect the sensitive coastal environment.

Signage plays a number of key roles, providing general information to visitors and beach users, safety and hazard information as well as information on regulations and rules. In order for signage measures to be effective it is essential that all beach users are made fully aware of the environmental hazards, lifeguard services, local information, and rules and regulations prevalent in the coastal environment they are utilising.

This information is best conveyed through visible and understandable coastal signage. However, unmaintained, uncoordinated, and poorly located coastal signage exists in areas along the City's coastline. Such signage presents a high risk of misinforming beach-users, undermining safety measures and regulations, and is detrimental to coastal aesthetics. Furthermore, if inappropriately managed and implemented coastal signage may result in clutter and environmental and aesthetic degradation.

To ensure consistency, transparency, effective communication, and consistent branding and aesthetics, the City of Cape Town has developed a Coastal Signage Protocol. This Coastal Signage Protocol is an internal City protocol that directs all City line functions in their operations. In addition, all external organisations displaying coastal signage within the jurisdiction of the City of Cape Town will be required to adhere to the City's Coastal Signage Protocol.

2. Definition and Intent

Coastal signage is defined as any object, product, replica, advertising structure, mural, device, board, poster or billboard which serves to publicly display information in the coastal zone, on beaches, the sea-shore and in the ocean.

The intention of this protocol is to provide the City of Cape Town's beach users with clearly visible, understandable, informative, consistent and well maintained coastal signage, which will enable users to make informed decisions on beach safety and behavioural conduct while utilising the coastal zone. The protocol also intends to manage coastal signage in a manner which respects environmental integrity and maintains the natural aesthetic appeal of the coastal environment, while also being aligned to the City's brand guidelines

3. General Principles

The City's coastal signage protocol is informed and guided by the following principles:

- The City recognises its coastline is one of its greatest economic, environmental and social assets and is committed to maintaining its coastal environment to the highest standards.
- The City recognises its responsibility to provide beach users with information on the possible risks, available services, and relevant rules and regulations applicable in the designated coastal zone, while the actions and subsequent safety of the beach user is the responsibility of the beach user.
- The City recognises its municipal responsibility in line with the ICM Act (Act 24 of 2008) to signpost entry points of coastal access land.
- The City recognises that repetitive, unnecessary, unmanaged, and poorly located signage has the potential to detract from the integrity and character of a location. The City's coastline is characterised by high intensity recreational nodal points as well as extensive natural coastal areas which are utilised on a far lower intensity. This use pattern of the coastline must inform the necessity of coastal signage.

- The City recognises the need for consistency and standards in its coastal signage and the need to develop coastal signage to achieve a uniform identity.
- This protocol recognises and is aligned with the City's Outdoor Signage and Advertising By-Law (By-law No. 10518) which identifies beaches, sea shores, and oceans as a maximum area of control under Schedule 1, and makes provision for a municipality to apply certain minimum standards above those identified in the By-law in such localities.
- The protocol is aligned to the City's brand guidelines.

4. Administrative Process

- This Coastal Signage Protocol applies to all City line functions erecting signage on the City's beaches, coastal amenities or rocky shore lines.
- All City partner organisations, independent organisations, individuals, as well as externally funded organisations erecting coastal signage within the jurisdiction and boundaries of the City of Cape Town will be required to adhere in full to this Coastal Signage Protocol.
- All enquiries and applications for evaluation and approval to erect coastal signage shall be referred to the City's coastal coordinators, as well as the relevant District Environmental and Heritage Management Branch Office.
- Any City line function, City partner or external organisation wanting to erect coastal signage must apply in writing to the City's coastal coordinators and must provide all information as stipulated under point 2 of Section B in the City's Outdoor Signage and Advertising By-Law.

5. Coastal Signage Protocols - Municipal Coastal Signage

Municipal coastal signage is categorised as primary and secondary signage. Primary signage is used for the collective representation of risk and safety orientated information. Secondary signage is used for specific risk and safety information, and for general information purposes - this may include information boards, sponsorship acknowledgements, interpretive and directional signage.

5.1. Primary Signage

- Primary signage refers to the main and largest information boards present at the main pedestrian access point and main parking area of each of the City's beaches.
- The number of primary signage boards erected per City beach will be determined by the coastal coordinators in conjunction with the relevant area or beach manager, and will reflect the number and location of major pedestrian access points.

5.2. Secondary Signage

Secondary signage takes the form of smaller signage boards in the coastal area and refers to individual hazard signs in high risk areas, interpretive and directional signage, or general information signage.

5.3. Content

All **primary signage** must contain the following information, at a minimum:
- City logo and beach name
- Hazards specific to the area
- Risk management information specific to the area
- Regulations specific to the area

- Emergency contact details which must include the following mandatory numbers:
  - City Emergency call centre (107)
  - NSRI
  - Relevant local Law Enforcement office
  - A unique reference number linked to an emergency response database

The content of **secondary signage** is determined by the subject matter to which it refers. All secondary signage must contain at a minimum:

- City logo
- Emergency contact details which must include the following mandatory numbers:
  - City Emergency call centre (107)
  - NSRI
  - A unique reference number linked to an emergency response database

5.4. Design

The design, layout and size specifications for coastal signage are developed by the City of Cape Town's Integrated Strategic Communication and Branding department. These specifications form part of the City's overall brand identity, and are required to be implemented in order to ensure consistency of branding across all of the City's communication products.

These specifications are contained within the City's corporate identity and brand guidelines. These specifications may be updated and amended from time to time, as required.

5.4.1. Signage Structure

- Signage must comply with the National Building and Regulations Standards Act 103 of 1977 as per the City's Outdoor Advertising and Signage By-Law i.e. signage must be constructed of the requisite strength and must be securely attached, in order that it not pose a threat to the public.
- Consideration must be given to the corrosive nature of the coastal environment when determining structural materials.
- The use of epoxy coated galvanised steel (Chromadek or similar product) for sign-boards, and galvanised steel or treated wood for poles is encouraged.

5.4.2. Signage Size

- Primary signage must be of a sufficient size to allow for identification as the main signage board
- Secondary signage should not be larger than primary signage
- Overall size and dimensions of primary and secondary signage must adhere to the City's corporate identity and brand guidelines.

5.4.3. Colour

- Background colour must provide suitable contrast so as to promote optimum readability of text and symbols.
- Text, symbol and graphic colours must adhere to the City's corporate identity and brand guidelines.

5.4.4. Text

- Primary signage text must be of a sufficient size to promote optimum readability from a distance of no less than 5 metres
- Secondary signage text must be of a sufficient size to promote optimum readability from a distance of no less than 3 metres
- Font(s) used must adhere to the City's corporate identity and brand guidelines.

5.4.5. Symbols

- Uniform symbols to be used to represent hazards, risk management information and regulations, to allow for easy identification and familiarity.
- Symbols used must adhere to the City's corporate identity and brand guidelines.

5.4.6. Height and Location

- Signage should be mounted as close as practical to an adult observer's line of sight; the centre of the sign should be approximately 1.5m above ground level.
- Signage must be installed in positions which allow the best opportunity to capture the attention of the visitors and encourage reading.
- Signage should be placed at consistent locations to enable recognition and familiarisation. It is recommended that signage is placed on the right hand side of entrance-ways and access points.
- Signage should be placed on an existing artificial surface (e.g. walkway, parking area), where available. Unless no other options are available, signage is not to be permanently placed on natural surfaces such as sand or rocks.
- Signs may not unreasonably adversely impact on views and vistas.
- Care should be taken to ensure that the placement of the sign would not become a hazard or obstruction to people or vehicles
- Care should be taken to ensure that physical features such as vegetation do not obscure the sign.
- Care should be taken to ensure that placement of signage does not pose a hazard to the natural environment.
- Care should be taken to ensure that signs are not placed too close to other signs so as not to be obscured or create clutter or confusion.

5.5. Maintenance of Municipal Coastal Signage

- All signs must be logged in the Coastal Monitoring Database. All signs will be assigned a unique reference number linked to their location to enable efficient emergency response.
- All coastal signage must be inspected regularly (at least quarterly) by the relevant Sport, Recreation and Amenities officials for damage or theft.
- The outcome of inspections must be noted, and communicated in writing to the City's coastal coordinators.
- All signage must be cleaned and trimmed of foliage overgrowth during inspections.

5.6. Removal, Replacement and Relocation of Municipal Coastal Signage

- All damaged, faded or otherwise illegible signage, and all obsolete or incorrect signage must be removed from the coastal zone as a matter of priority.
- It is at the discretion of the area/beach manager, in consultation with the City's coastal coordinators, to remove all signs displaying repetitive or unnecessary information, all obsolete or incorrect signage, all damaged, faded or otherwise illegible signage, or any signage contravening the principles of this protocol.

- It is at the discretion of the area/beach manager, in consultation with the coastal coordinators, to relocate any signage to enable improved visibility of the signage.

5.7. Procurement of Municipal Coastal Signage

- The stipulations of this signage protocol must be included as part of any procurement or tender process for municipal coastal signage within the City of Cape Town.

6. Commercially Sponsored and Non-Profit Coastal Signage

- All commercially sponsored and non-profit coastal signage to be erected within the coastal zone, is to be administered as per Schedules 16 and 17 of the City's Outdoor Advertising and Signage By-Law (By-law No. 10518).
- All signs must be logged in the Coastal Monitoring Database

7. Roles and Responsibilities

The following City departments contribute to the implementation of this protocol:

- The Sports, Recreation and Amenities department is responsible for determining the requisite number and location of informational signage at the City's beaches. They are also responsible for the maintenance of coastal signage, the production and installation of new coastal signage, and the removal of damaged, obsolete or incorrect signage.
- The Environmental Resource Management department is responsible for administering and implementing the Outdoor Advertising and Signage Policy and By-law. ERMD also plays a supporting function, by ensuring that the environmental and visual impact of signage is minimised. Additionally, ERMD is responsible for signage related to specific environmental topics (e.g. whale strandings).
- The Integrated Strategic Communication and Branding department is responsible for setting the City's corporate identity and brand guidelines.

Chapter 26: Coastal Cleaning Protocol

1. Introduction

Beach cleaning is an activity that plays a vital role in maintaining a high standard of coastal space that contributes to the social and economic value of the coast. However, kelp wrack and other natural marine debris play a significant role in the natural coastal processes taking place on our coast where wind driven systems and sand movement are predominant features. As such, uncontrolled, unregulated and unplanned beach cleaning has the potential to significantly negatively impact on the coast's natural dynamic systems and thereby contribute to the deterioration of the City's coastline.

Accordingly the City of Cape Town has developed a Beach Cleaning Protocol that meets socio-economic needs while protecting natural coastal processes and dynamics. This Beach Cleaning Protocol is an internal City policy that directs all City line functions in their operations. In addition all external organisations funded by various means to contribute to beach cleanliness in Cape Town, will be required to adhere to the City Beach Cleaning Protocol.

2. Definition and Intent

Beach Cleaning is defined as a service activity provided by the City of Cape Town that removes waste material from City beaches and rocky shores between the low water mark and the first fixed infrastructure on City owned boundaries.

The intention of the protocol is to provide the City of Cape Town and its communities with a clean beach and coastal environment to the highest standards free of waste material while protecting the natural coastal processes and dynamics.

3. General Principles

The City's Beach Cleaning Protocol is informed by the following guiding principles:

- All beaches and rocky shores will be primarily managed as ecological systems vulnerable to human induced changes and activities.
- The City's coastline is one of our greatest economic, environmental and social assets and as such should, to the best of our abilities, be kept free of waste material.
- Our coastline is utilised in many different ways with distinct high intensity recreational nodal points across the City, as well as extensive natural coastal areas utilised on a far lower intensity. This use pattern of the coastline must inform the Beach Cleaning Protocol and direct City efforts.
- Maintaining a waste free coastal environment is a shared responsibility between the City, its citizens, user groups as well as external organisations. This principle of shared responsibility must at all times be communicated and re-enforced to all coastal users.

4. Waste Categories

The following definitions of waste will apply to the Beach Cleaning Protocol:

- Human induced/resultant waste: This includes all litter and domestic waste (plastics, paper, cigarette butts, cans, cardboards, bottles, organic waste etc) and commercial waste products
- Domestic animal waste: dog and other domestic animal excrement

The following is NOT defined or considered as waste, but is central to the Beach Cleaning Protocol:

- Kelp Wrack
- Red Bait
- Shells and shell fragments

The following coastal waste is excluded from this protocol as it is specifically addressed in separate Council Policies and protocols

- Marine Animal Carcasses (will be dealt with as per the City's Large Marine Animal Stranding Policy)
- Oil, toxic and hazardous waste (Will be dealt with as per the Disaster Management Policy)

5. Roles and Responsibilities

This Coastal Cleaning Protocol applies to all City line functions undertaking cleaning and waste removal actions on the City's beaches or rocky shore lines. Specific reference is made to the lead service delivery department, Solid Waste Management, although the protocol remains applicable to Sport, Recreation and Amenities, Environmental Resource Management, City Parks, Disaster Risk Management and Transport, Roads and Stormwater.

All City partner organisations, independent organisations, individuals as well as externally funded organisations undertaking beach cleaning work (for example CoastCare) within the jurisdiction and boundaries of the City of Cape Town, will be required to adhere in full to this Beach Cleaning Protocol or permission for their work will be removed.

6. Governance

The City of Cape Town will apply the following governance principles in relation to the Beach Cleaning Protocol to ensure optimum opportunity for beach cleaning operations while minimising risk of injury to person or persons:

- The City retains the rights to close affected beaches to public access in the event of significant waste removal operations
- City law enforcement agencies will have the authority to prevent public access to the affected area where needed and may remove general public and unauthorised individuals from the area
- The City will ensure ongoing communication through the media in this regard

7. Beach Cleaning Protocols

7.1. **General Protocols**

- All beaches will be managed as ecological systems;
- Under no circumstances will human waste be buried on the coast/beach. Natural waste may under exceptional circumstances be buried on the coast/beach with permission from the Manager: Area Cleaning and the City of Cape Town's Coastal Coordinators.
- All marine mammal carcasses must be managed in accordance with the Large Marine Animal Strandings Policy for the City of Cape Town;
    - In the event of a whale or dolphin carcass Disaster Management Call Centre must be contacted to initiate the Large Marine Animal Strandings Policy
    - All animal carcasses will be removed to the appropriate landfill site unless requested for dissection by National Government's Oceans and Coasts Department.
- No litter bins, dustbins and cleansing containers will be located on beaches or rocky shores but at the back of beaches and rocky shores

7.2. **Kelp Wrack and Red Bait**

- For all areas demarcated as Kelp Cleaning Areas (Annexure A) all kelp wrack and Redbait shall be removed from the coast and taken to the appropriate landfill site;
- No kelp may be removed from the coast at any time by private individuals or organisations unless in possession of a permit issued by National Government
- All tidal pools to be kept free of kelp
- No kelp or redbait is to be removed from any other area on the coast. Where extreme storm events result in abnormal amounts of kelp wrack being deposited, removal of kelp wrack to a landfill site from "Natural Coastal Areas" may be requested by the relevant Beach Manager (in consultation with the Coastal Coordinators. Completion of these ad hoc requests will be at the discretion of the Area Cleaning Manager.
- Frequency of kelp and redbait removal from the demarcated areas will be done according to the Cleaning Schedule. This Cleaning Schedule will be determined by the Area Cleaning Manager and communicated in writing to the relevant Sport, Recreation and Amenities as well as the Environmental Area Managers for their records.
- The Kelp Cleaning Schedule will be frequent during summer months (1st October to 30th April) and reduced to as needed during winter (May to September).
- Kelp and redbait may be stockpiled prior to removal to the landfill site. All stockpiling will be done at the locations indicated on the maps. No kelp or redbait may be stockpiled for longer than three days;
- On the request of the relevant Beach Manager, collected kelp will be distributed to reasonable locations and central points for the use in dune rehabilitation. This kelp will NOT be litter picked by Area Cleaning prior to distribution for dune rehabilitation,
- Once distributed for dune rehabilitation, the Beach Manager will be responsible for removing the kelp to the landfill site if NOT used for dune rehabilitation as intended.

7.3. **Deep Sand Cleaning**

- For all areas demarcated as Deep Cleaning Areas (in the attached aerial photographs), deep sand cleaning may occur in the defined nodal area (as mapped);
- The frequency of deep sand cleaning will be restricted to the following:
    - Deep sand cleaning may only take place between the 1st October and 30th April
    - Each deep sand cleaning beach will be deep cleaned at least twice during this period and a maximum of three times at the discretion of the Solid Waste Department
    - No Deep Sand Cleansing will take place during windy conditions,
- The Deep Sand Cleaning machine may only enter and exit the beach at the formalised access point.

7.4. **Litter Picking and Waste Removal**

- All coastal areas will be litter picked according to the annual cleansing schedule which, where appropriate, will be determined by the Manager: Area Cleaning. A copy of the schedule, or ad hoc or seasonal work, will be supplied to Sports, Recreation and Amenities as well as the Environmental Area Managers for their records.
- On request by the relevant Sport, Recreation and Amenities or Environmental Manager, major waste material in the form of large drift wood, concrete blocks, metal poles etc that may emerge on the beaches or be washed ashore, shall be removed by Area Cleaning at their discretion.
- No private organisations may conduct beach cleaning activities without approval by the Council's Solid Waste Management Department.

7.5. **Shells and Shell Fragments**

In compliance with national legislation, the City and its partners will not remove any shells or shell fragments from the beach as part of its cleaning activities.

ANNEXURE A: Kelp Cleaning Nodes






Milnerton
Legend
Stockpile Point
Kelp Removal Zone: 6,020 m.sq
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 10 20 40 60 80
Meters


Three Anchor Bay
Legend
Stockpile Point
Kelp Removal Zone: 1,213 m.sq
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 10 20 40 60 80
Meters


Rocklands
Legend
Stockpile Point
Kelp Removal Zone: 1,905 m.sq
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 10 20 40 60 80
Meters


Queens Beach
Legend
Stockpile Point
Kelp Removal Zone: 7,079 m.sq
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 15 30 60 90 120
Meters


Saunders
Legend
Stockpile Point
Kelp Removal Zone: 3,767 m.sq
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 15 30 60 90 120
Meters


Clifton
Legend
Stockpile Point
Kelp Removal Zone: 23.025 m.sq
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 37.5 75 150 225 300
Meters


Camps Bay
Legend
Stockpile Point
Kelp Removal Zone: 50,425 m.sq
Deep Cleansing Zone
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 50 100 200 300 400
Meters


Llundudno
Legend
Stockpile Point
Kelp Removal Zone:15,859 m.sq
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 20 40 80 120 160
Meters


Hout Bay West
Legend
Stockpile Point
Kelp Removal Zone:3,907 m.sq
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 15 30 60 90 120
Meters


Hout Bay East
Legend
Stockpile Point
Kelp Removal Zone:12,097 m.sq
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 15 30 60 90 120
Meters


Fish Hoek
Legend
Stockpile Point
Kelp Removal Zone:24,352 m.sq
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 25 50 100 150 200
Meters

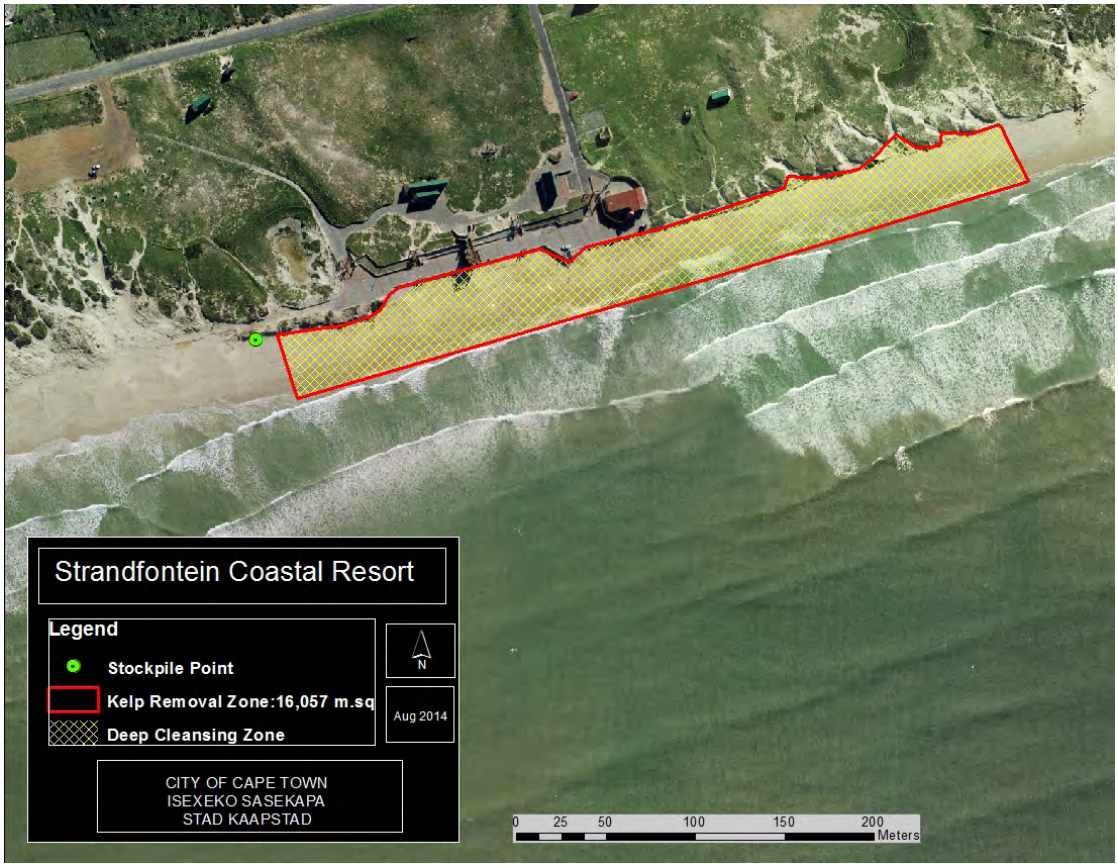

Danger Beach
Legend
Stockpile Point
Kelp Removal Zone:6,563 m.sq
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 15 30 60 90 120
Meters


St James
Legend
Stockpile Point
Kelp Removal Zone:3,902 m.sq
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 12.5 25 50 75 100
Meters


Muizenberg
Legend
Stockpile Point
Kelp Removal Zone:46,457 m.sq
Deep Cleansing Zone
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 55 110 220 330 440
Meters


Sunrise Beach
Legend
Stockpile Point
Kelp Removal Zone:11,006 m.sq
Deep Cleansing Zone
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 20 40 80 120 160
Meters


Strandfontein
Legend
Stockpile Point
Kelp Removal Zone:18,791 m.sq
Deep Cleansing Zone
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 25 50 100 150 200
Meters


Strandfontein Coastal Resort
Legend
Stockpile Point
Kelp Removal Zone:16,057 m.sq
Deep Cleansing Zone
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 25 50 100 150 200
Meters


Mnandi West
Legend
Stockpile Point
Kelp Removal Zone:8,885 m.sq
Deep Cleansing Zone
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 15 30 60 90 120
Meters


Mnandi_East
Legend
Stockpile Point
Kelp Removal Zone:32,623 m.sq
Deep Cleansing Zone
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 37.5 75 150 225 300
Meters


Monwabisi
Legend
Stockpile Point
Kelp Removal Zone:16,450 m.sq
Deep Cleansing Zone
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 37.5 75 150 225 300
Meters


Macassar
Legend
Stockpile Point
Kelp Removal Zone: 9,773 m.sq
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 25 50 100 150 200
Meters


Strand North
Legend
Stockpile Point
Kelp Removal Zone: 185,054 m.sq
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 95 190 380 570 760
Meters


Strand South
Legend
Stockpile Point
Kelp Removal Zone: 41,540 m.sq
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 37.5 75 150 225 300
Meters


Gordons Bay
Legend
Stockpile Point
Kelp Removal Zone: 18,761 m.sq
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 30 60 120 180 240
Meters


Bikini Beach
Legend
Stockpile Point
Kelp Removal Zone: 3,704 m.sq
N
Aug 2014
CITY OF CAPE TOWN
ISEXEKO SASEKAPA
STAD KAAPSTAD
0 15 30 60 90 120
Meters

Chapter 27: Coastal Monitoring Programme

1. Introduction

The coastline of the city is a harsh and highly dynamic environment, where the biophysical attributes of the coastline are in a constant state of flux. Some of this change is cyclical and predictable, taking place over relatively short (seasonal) temporal scales, whilst other change is unseasonable and less predictable. Less predictable change may still be cyclic, but may take place over longer and less defined periods of time. Such change may also be a result of climate variation as opposed to human induced climate change. Reflecting seasonal dynamics at a broad scale is the accretion of beaches within False Bay (on the eastern side of the city) in winter and the erosion of these beaches in summer. The opposite pattern occurs on the west coast where beaches generally erode in winter and accrete in summer. Examples of less predictable coastal dynamics include migrating estuary mouths, localised beach regression and accretion events as well as storm surge induced coastal erosion. These unpredictable examples often result in abrupt changes in coastal geomorphology. Both abrupt changes, and to a lesser extent, the known trends in seasonal dynamics, impact on coastal infrastructure and ultimately the City's ability to maintain effective service delivery.

The dynamic and at times unpredictable nature of the coastline is a source of risk to the City. Exposure to this risk is set to be compounded considering the warming of the earth's atmosphere. Global warming is expected to have a significant impact on coastal dynamics, where fluctuations in environmental systems are set to become more pronounced. This is a key concern to the City considering the value of the coastline from an EGS perspective, but also due to the amount of critical infrastructure located along the coastline. The City's Sea-Level Rise Risk Assessment (SLRRA) identified an area totalling 25km² that is highly vulnerable to the expected impacts of sea-level rise, storm surges and subsequent coastal erosion. Within this area, it is estimated that there is approximately R5 billion worth of City infrastructure that is at risk.

2. Strategic intent of the Coastal Monitoring Programme

Considering the value invested along Cape Town's coastline and considering the potential impacts of coastal processes on city infrastructure and property, it is imperative that the City takes active measures to enhance our understanding of coastal dynamics. With this knowledge of coastal processes, how they function and what influences them, the City will be capacitated to make more informed and risk-averse decisions relating to the general management of the coast.

The development of a Coastal Monitoring Programme (CMP) will be used to improve our knowledge of coastal processes. The CMP is a GIS based programme that collects information about the coast and stores this information in a systematic manner. Information primarily linked to time series indicating coastal changes across a spectrum of coastal processes can be extracted. This information will not only be used to inform and guide day to day operational decision making that impacts on (or is impacted by) the coast but will also, through the identification of trends, be used to inform higher level strategic policy intents on how the City needs to respond to and manage the coast i.e. adopting the precautionary principle when planning for coastal development at the city-wide scale. The value and importance of the CMP increases over time – the more data that is collected over time, the greater our understanding of how the coast functions as a complex system will be enhanced.

3. Constituents of the Coastal Monitoring Programme

The CMP will monitor a range of aspects along the city's coastline. These include the following:

3.1. Coastal change through aerial imagery time series analysis

The City takes aerial imagery for the entire metropolitan area every year. The times series analysis of aerial imagery offers a powerful tool to determine not only trends in coastal processes, but to determine the impact on city decision making on coastal processes. The CMP has identified numerous locations along the coastline which will be the focus of aerial imagery analysis.



Figure 1: Time series analysis of aerial imagery depicting a migrating dune between 2009 (left) and 2011 (right) in Table Bay, Cape Town.

3.2. Coastal change through fixed point photography time series analysis

Fixed point photography is used within the CMP to determine trends in coastal change from an alternative perspective to that of aerial imagery. The CMP has identified a number of locations along the Cape Town coastline where images have been taken to capture specific areas of interest and importance. Images from the same locations, with the same photographic settings, are taken once a year during the same tidal period (i.e. low tide) and these images are then systematically incorporated into the CMP (Figure 2).



Figure 2: Coastal change over time from 1895 (left) to 2012 (right). Source: Weekend Argus

3.3. Coastal change through coastal profile monitoring

Tracking change of the profile of the coastal littoral active zone is a critical component of the CMP. The CMP extracts a Digital Elevation Model (DEM) (Figure x) from digital aerial imagery to determine the shape of coastal topography and more importantly to determine how the surface of the coast changes over time. In practical terms the analysis of beach profiles enable the City to determine rates of erosion (whether caused by storm surges or migrating estuary mouths) and accretion (whether caused by migrating dune systems or linked to seasonal trends) along the coast. Importantly, quantities of loss or gain in coastal sub straight may be determined through the analysis of the DEM.

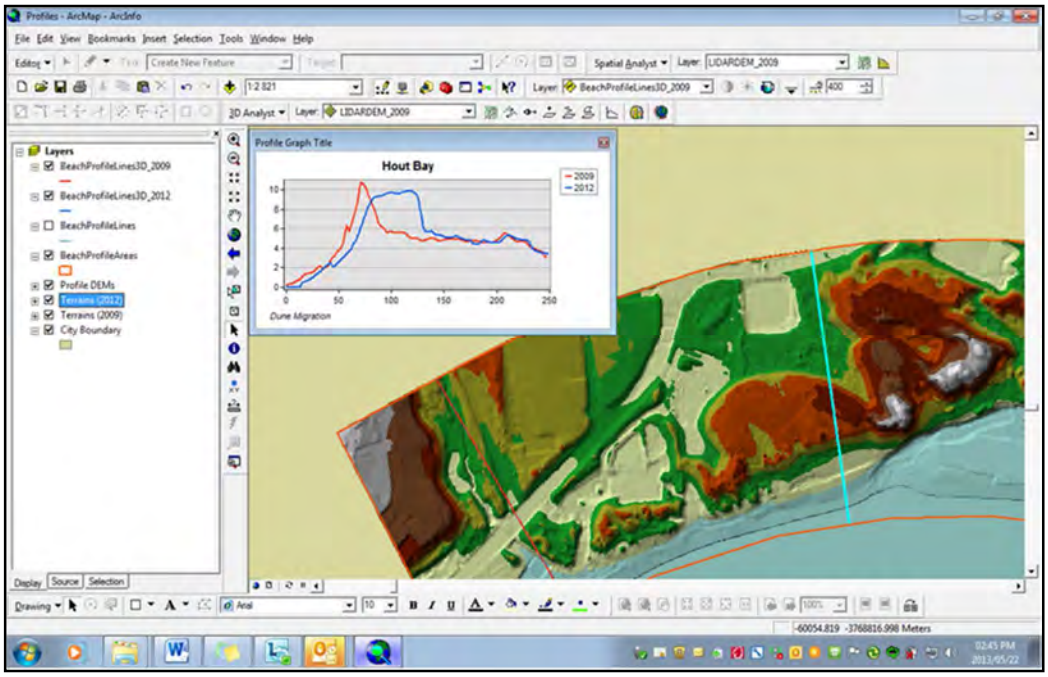


Figure 3: Screenshot of the CMP DEM used to extract profile data of a migrating dune system in Hout Bay.

3.4. Storm surge run-up monitoring

The City undertook a Sea-level Rise Risk Assessment in 2008. As part of this assessment a GIS based model was developed to determine vulnerable areas of the coastline to storm surges over the next 25 years. Spatial data from actual storm surge events, in particular wave run-up, is collected and plugged into the CMP. The comparison between actual events and the modelled predictions is useful in determining which infrastructure is at risk and to what degree for the entire length of the City's coastline. In addition to capturing wave run-up, the CMP captures characteristics associated with the storm event. These characteristics include peak wind strength and direction, maximum wave height in relation to peak tide, swell direction etc. Through associating this information with wave run-up positions, the CMP will enable the City to disaggregate risk per location and forecast which location will be at higher risk to storm damage.



Figure 4: Wave run-up measurements taken from an actual storm event with a differential GPS and overlaid with the GIS inundation model

4. Developing a collective picture of our coastal system

The CMP has applied, as far as possible, these monitoring informants to specific regions of the coast. Thus, through the use of fixed point photography, coastal profile monitoring, wave run-up measurements and the use of aerial imagery per location over time, a more holistic understanding of coastal processes and what the influences are, is generated. Further to this, the CMP is a flexible and robust programme that is designed to withstand staff turn-over and which can be adjusted according to the City's requirements and data needs over time.

5. Future development of the Coastal Monitoring Programme

The CMP will be further developed to monitor additional aspects, including, but not limited to:

- Marine animal strandings
- Pollution events
- Recreational use trends
- Disasters

Chapter 28: Education, Awareness, and Training

1. Introduction

Coastal education, awareness and training programmes form an important part of the City's Environmental Awareness, Education and Training strategies for the public, staff and councillors. These programmes, which include a comprehensive education and training programme as part of its Blue Flag Beach Programme, focus on raising awareness and educating school learners, educators and the general public. The City also has in place education and training programmes for its own staff and councillors.

2. General Policy Principles

The City of Cape Town has committed to providing high quality coastal education, awareness and training programmes in accordance with the following general principles:

- All products, lessons and events must be interactive, creative and fun
- All information presented must be factually correct
- All information, lessons and events must be language sensitive
- All interventions must have a monitoring and evaluation plan in place

For school learners:

- Lessons must be well structured, including a suitable introduction and consolidation component
- Lessons must be aligned to the Western Cape Education Department's curriculum
- Literacy and numeracy skills must be included in activities

3. Policy Considerations

The City of Cape Town has two of relevant policies in place, namely:

1. Public Environmental Awareness, Education and Training Strategy
2. Environmental Awareness, Education and Training Strategy for City Staff and Councillors

3. Definitions

Environmental education is not confined to the classroom and not aimed only at children; despite the formal ring to the term 'education', it has life-long relevance to people from all walks of life.

Environmental awareness involves communication campaigns for reaching various audiences, developing messages and selecting and/or producing the appropriate resources and media to reach these audiences. The aim of environmental awareness is to make people from all walks of life aware of specific environmental issues.

Training is a particular form of education, aimed at developing specific skills, in relation to specific tasks which are often job-related.

4. Programme details

Three categories of programmes are run as part of the City's overall coastal environmental education and training strategy:

- Learner education and awareness programmes
- Educator education, awareness and training programmes
- Staff education, awareness and training programmes

4.1 Learner education programmes

This programme forms part of the City's Youth Environmental Schools (YES) programme, a general environmental education programme which is centred around various environmental commemorative days and weeks.

The coastal education programme is centred around Marine Week in October. The programme is particularly focused on learners from vulnerable communities, especially those close to the coastline. The timing of Marine Week in October offers the opportunity for City staff to engage with learners before the summer holiday season.

Coastal education and awareness programmes offered as part of the YES programme include:

- General beach and water safety and awareness
- Shark safety and awareness
- Coastal and marine ecosystems and the food web
- Responsible tourism
- Coastal and marine pollution and pollution prevention
- Blue Flag beach awareness

The Blue Flag EE programme is annually hosted during the Blue Flag season starting on the 1st of December and ending 30th of March. The focus of the programme is on beach eco systems, waste and pollution, water safety, responsible tourism and general Blue Flag and environmental awareness.

In addition to the Marine Week and Blue Flag EE programme, a comprehensive nature reserve based programme is in place at the City's coastal nature reserves e.g. the Blaauwberg Nature Reserve, Wolfgat Nature Reserve and Witzands Aquifer Reserve This programme focuses on coastal and marine biodiversity and the impact that people can have on these ecosystems.

4.2 Educator training programme

A teacher education and training programme also takes place annually. This programme is aimed at capacitating local educators to conduct their own environmental education and awareness programmes, with coastal management as focus areas. As part of the Blue Flag EE programme educators are trained on how to use Blue Flag beaches as outdoor classrooms.

Focus areas include:

- Human impacts on the coastal environment
- Climate change and sea level rise
- Disaster risk management
- Pollution and Waste
- Responsible tourism
- Coastal and Marine eco-systems
- Resource use

4.3 Staff education and training

Staff education and training programmes focus on:

- Developing practical skills, as well as the understanding behind the skills
- Recognising and build on trainees' existing skills

This component forms part of the overall City staff environmental education and training programme as well as workplace skills plan training programme.

Environmental law enforcement and legal compliance have been identified as priority areas that are integral to the competency of staff working in areas concerned with the environment. This includes staff working in the utility services, whose work has a direct or indirect impact on the natural environment.

Training interventions like Environmental Management Inspectors, Fisheries Permitting, Skipper licensing, Coastal Engineering, basic coastal awareness training courses are also offered to better equip staff for their different roles and functions.

5. Partners

The City of Cape Town works with a number of key external partners to deliver coastal education and awareness programmes. These partners include: The Two Oceans Aquarium, Shark Spotters, Wildlife and Environmental Society of South Africa (WESSA), Afri-Oceans Conservation Alliance, Save Our Seas, the Centre for Conservation Education, and the Soetwater environmental centre, Western Province Lifesavers.

Additionally, a number of different line departments contribute to the City's coastal education and training programme, including: Environmental Resource Management, Sports, Recreation and Amenities, Solid Waste, Water and Sanitation and Tourism

6. Roles and Responsibilities

The Environmental Resource Management Department is responsible for the overall management and co-ordination of the City's coastal education and awareness programmes as well as the Blue Flag EE and Information programme. ERMD works in conjunction with its internal City partners and external partners to deliver high quality coastal education, awareness and training interventions.

In order to ensure consistency and accuracy of messaging, internal and external partners wishing to launch new coastal education, awareness and training programmes should first consult with the Environmental Resource Management Department's Environmental Capacity Building and Training Unit. This will ensure that the programme is aligned to the City's environmental education goals and objectives. Partners will remain responsible for the budgeting and management of their own programmes.

Chapter 29: City of Cape Town Events Policy

CITY OF CAPE TOWN

EVENTS POLICY
(POLICY NUMBER 12329)

[REPLACES PREVIOUS EVENTS POLICY
APPROVED ON 29 OCTOBER 2008]

APPROVED BY COUNCIL : 29 MAY 2013
C26/05/13

1. DEFINITIONS AND ABBREVIATIONS

For the purposes of this policy, except where clearly indicated otherwise, the words and expressions set out below have the following meaning:

Approved budget	an annual budget which is approved by a Municipal council and includes such an annual budget as revised by an adjustments budget in terms of section 28 of the Local Government: Municipal Finance Management Act, 2003 (Act No. 56 of 2003).
Business events	Events where there is a business purpose for Hosting. For example, a new product launch or an industry gathering which promotes investment.
By-law	Legislation passed by the council of a municipality which is binding in the municipality on the persons to whom it applies.
City events	Events supported, partnered or organised by the City of Cape Town, Event Hosting Departments.
City of Cape Town Event Service Departments	City Departments who render services to events including but not limited to Health Services, Disaster Management, Fire and Rescue Services, Metro Police, Traffic Services, Law Enforcement, Transport, Roads and Storm Water, Waste Management, Water Services, Electricity and Legal Services.
City of Cape Town Event Hosting Departments	City Departments who lead, partner and host events as part of their business plans, including but not limited to: Events, Place Marketing, Strategic Facilities, the Cape Town Stadium, Tourism, Arts and Culture, Economic Development, Sport and Recreation, Communications, Social Development and Early Childhood Development and the Mayor's office or any other department that hosts events.
City Services	All services rendered by the City to events.
City	The City of Cape Town, a Metropolitan Municipality constituted in terms of the Local Government: Municipal Structures Act, 1998, (Act No. 117 of 1998) and the Province of the Western Cape: Provincial Notice 479/2000 dated 22 September 2000.
Commercial sponsorship agreement	An agreement concluded between the City of Cape Town and an event organiser where a financial transfer is made by the City in return for a rights package.
Commercialisation of events	Activities at events in which the City of Cape Town wishes to generate an income through commercial initiatives associated with events.

Community cultural events	Community based cultural activities such as festivals and cultural club activities.
Community sport events	Community based events such as school sports and local and regional sporting leagues.
Corporate hospitality	The provision of food, liquid refreshments (alcoholic and non-alcoholic) and entertainment to the public or invited guests within a permanent or temporary demarcated hospitality area which may be located in a stadium or a venue or along a route or within the immediate or outer precincts thereof.
Council	The Council of the City of Cape Town, established by Provincial Notice 479 of 2000 issued in terms of section 12 of the Local Government: Municipal Structures Act, 1998(Act No. 117 of 1998)
Delegation	In relation to a duty includes an instruction to perform the duty. Delegate has a corresponding meaning.
Demonstration	Any demonstration by one or more persons, but not more than 15 persons, for or against any person, cause, action or failure to take action. In terms of the Regulation of Gatherings Act, 1993 (Act No. 205 of 1993).
Environmentally sustainable	The provision of a service or the hosting of an event in a manner aimed at ensuring that risk of harm to the environment and to human health and safety is minimised. Potential benefit to the environment and human health is maximised to the extent that it is reasonably possible and that legislation intended to protect the environment, human health and safety is complied with.
Event organiser	Any peson who plans, is in charge of, manages, supervises or holds event or sponsorship rights to an event or in any manner controls or has material interest in the hosting of an event.
Event services	Goods and services required at events including but not limited to temporary fencing, temporary toilets, temporary structures, security services, etc.
Event	Sporting, entertainment, recreational, religious, cultural, exhibition, organisational or similar activities, hosted at a stadium, venue or along a route or within their respective precincts.
Event Risk Categorisation	A categorisation determined by the SAPS National Police commissioner relating to the safety and security risk associated with each event as defined in Section 6 of the Safety at Sports and Recreational Events Act, 2010 (Act No. 2, 2010).

Event Greening	The process of incorporating social and environmental responsible decision making into the organising, implementation and participation of an event. It involves incorporating sustainable development principles and practices into all levels of event organisation and aims to ensure that an event is hosted responsibly.
Event Operational Committee	A committee consisting of members of the Event permit office, city service departments and members of city hosting departments and relevant stakeholders whose responsibility is to evaluate event plans submitted by event organisers, ensure compliance with a range of legal requirements and ensure the safe management of events in the city.
Event Permit Office	The department responsible for coordinating event permit applications, coordinating the approval and rejection of events in accordance with the City's legal and operational requirements and issuing a permit with appropriate conditions.
Event Permit Officer	The head of the City of Cape Town Events Permit Office and any other official delegated by him or her.
Executive director: TEAM	The person appointed by the Council as executive director of the Tourism, Events and Marketing Department and shall include any person acting in that position or to whom authority is delegated.
Executive director	A person appointed by the Council to head a Directorate in the City and shall include any person acting in that position or to whom authority is delegated.
Executive Mayor	The person elected in terms of section 55 of the Local Government: Municipal Structures Act 1998 (Act No. 117 of 1998) to be the Executive Mayor of the City and shall include any person acting in that position or to whom authority is delegated.
Functions	Parties or community activities that do not impact on City Services or any applicable laws. These could be private functions, such as birthday parties or weddings, or community functions such as sports or social club get-togethers.
Fundraising events	Where the sole or main purpose of the event is a fundraising initiative for charity.
Gathering	Any assembly, concourse or procession of more than 15 persons in or on any public road as defined in the Road Traffic Act, 1989 (Act No. 29 of 1989), or any other public place or premises wholly or partly open to the air.

	In terms of the Regulation of Gatherings Act, 1993 (Act No. 205 of 1993).
Guest management	The process of managing guests – from invitations to arrival and servicing guests at events.
Local economic development events	Events where the sole purpose is to provide opportunities to trade to SMMEs, informal traders e.g. night markets.
Mayoral committee	The committee appointed by the Executive Mayor to assist the Executive Mayor in terms of Section 60 of the Local Government: Municipal Structures Act,1998 (Act No. 117 of 1998)
Mayoral events	Events supported and/or funded by the Executive Mayor's office.
National days events	Events held to commemorate national days or events of national importance. For example, national Women's Day on 9 August, Human Rights day 24 March and Mandela day on 18 July.
Outdoor Advertising and Signage	Any outdoor advertisement or signage, regulated in terms of the City's outdoor advertising and signage by-law, displayed at an event venue or route, or displayed to market an event.
Person	Includes any sphere of government, natural and juristic person.
Purpose built venue	Permanently constructed venues designed specifically to host events, such as stadiums, convention centres, theatres, conference venues, banqueting facilities and sporting facilities.
Rate card	A departmental tariff schedule which indicates charges for services rendered and equipment rentals. Rate cards are updated annually.
Revenue generation at events	A series of activities where income is generated to off-set costs.
Religious events	Events organised by religious organisations, which attract large numbers of participants, who require the event to be hosted in a stadium or similar large capacity facility. These events may have high profile speakers but attract mainly community participants.
Rights package	A series of rights acquired by the City through supporting events. The package of rights is a commercial transaction where the City obtains rights to promote its brand through various event activities. For example, marketing opportunities, media opportunities, hospitality and tickets.

Special Events Committee	A committee appointed by the Council of the City of Cape Town in terms of Section 80 of the Local Government: Municipal Structures Act, 1998 (Act No. 117 of 1998) to facilitate the selection of events that the Council wishes to support.
Service delivery events	Events to celebrate milestones achieved by Council departments. These events may include inter-governmental service delivery events. For example, the opening of a new facility, handing over of housing to residents, etc.
Strategic facilities	Facilities owned by the City of Cape Town which primary purpose is hosting of events e.g. Cape Town Stadium, City Hall, Athlone Stadium, the Goodhope Centre, the Grand Parade and any other facility the City deems to be a strategic facility.
Sub-council	A metropolitan sub-council established in terms of section 62 of the Local Government: Municipal Structures Act,1998 (Act No. 117 of 1998)
Tourist	A person who spends more than 24 hours in an area outside their normal place of work or residence.
Venue owner	Any person or legal entity now or who, in the future, will directly or indirectly own, lease, rent or who now or will in the future, acquire and/or exercise the powers of an owner or occupier of a venue used for events.
Venue	Any area or place, where an event is hosted, that has seated or standing spectator capacity within a permanent or temporary structure. This area or place may be erected or demarcated by an enclosed or semi-enclosed temporary or permanent structure.
Visitor	A person who visits an attraction or destination for a day (less than 24 hours).
CBO	Community Based Organisation
PBO	Public Benefit Organisation
City (CoCT)	City of Cape Town Municipality
IDP	Integrated Development Plan
NGO	Non-Governmental Organisation
PGWC	Provincial Government of the Western Cape
SMME	Small, Medium, Micro Enterprises
TEAM	Tourism, Events and Marketing directorate

SCM Supply Chain Management

2. PROBLEM STATEMENT

2.1. Cape Town has a strong track record as an events destination and has hosted major global events such as the 1995 Rugby World Cup, 2003 Cricket World Cup and 2010 FIFA World Cup.

2.2. Cape Town has developed a strong global brand and wishes to utilise this strength to develop as an events destination of choice and to further build the city's brand identity. This branding is critical for business perceptions about the City as an investment destination.

2.3. The City's events programme is listed as a strategic objective in the Integrated Development Plan (IDP). Extensive research has been conducted on the impact of hosting strategic events and on local economic growth and development.

2.4. The City plays an important role in: the regulation of events, partnerships with events organised in the City, events organisation, facilitation and the provision of services at events. The Events Policy is needed to improve the management of events in the City of Cape Town.

2.5. The City of Cape Town also wishes to exploit events hosted in the City to achieve City objectives such as: economic growth, job creation, social inclusivity, environmental and event greening goals.

3. DESIRED OUTCOME

3.1. The Events Policy aims to create mutually beneficial outcomes for Cape Town residents, businesses and visitors by using the platforms created by events to contribute to Cape Town's growth, development and inclusivity.

3.2. The Events Policy will assist and guide the City in managing event related activities in an efficient and effective manner thereby providing clarity to all role players and stakeholders. The Events policy aims to create an enabling mechanism for new approaches to event initiatives.

3.3. Cape Town would like to ensure that it becomes a city for great events for visitors to the city and the events industry, by creating stability in the City's events calendar and clearly defining processes and systems that support events.

3.4. Cape Town aspires to being a thought leader in the hosting of events and encourages innovation, new initiatives and creativity in areas such as the creation of new events, commercialisation of events, event greening, job creation projects and other innovative initiatives that can be implemented through the hosting of events.

4. STRATEGIC FOCUS AREAS (INTENT)

4.1. The strategic focus areas of the City are enshrined in the City's Integrated Development Plan (IDP) and are categorised into five pillars: The Opportunity city, the Well-run city, the Safe city, the Caring city and the Inclusive city.

4.2. Events create platforms that have the ability to support all five pillars. This policy particularly focusses on supporting the Opportunity city, the Safe city and the Inclusive city.

4.3. The underlying principles of the 'Opportunity city' in relation to events is through creating necessity for co-operation, connectivity and constructive partnerships with the public and private sectors and thereby contributing to enhancing existing growth sectors. Events assist in defining market identity and the global positioning of the destination. A long-term event strategy can catalyse infrastructure and capacity upgrades. Events stimulate the local economy by increasing local visitor numbers.

4.4. The underlying principles of the 'Safe city' relates to the events permit process. By regulating the activities at events in accordance with the City by-law's, the City ensures that events comply with safety and environmental criteria as set out in the events by-law.

4.5. The underlying principle of the 'Inclusive city' is to ensure accessibility for Cape Town residents to events hosted in the City. This includes access to event support, trading, vending and other economic opportunities and the ability to attend and participate in events. The 'Inclusive city' also refers to creating event platforms where the diverse communities of Cape Town integrate in a single public space.

5. PURPOSE

5.1. The purpose of the revised Events Policy is to achieve alignment of the City of Cape Town's policy to the following:

5.1.1. Event operations in the City of Cape Town organisationally to the Tourism, Events and Marketing directorate business plans.
5.1.2. New strategic imperatives of the City of Cape Town as set out in the IDP.
5.1.3. Update requirements of the Hosting and Service departments.
5.1.4. New legislation, specifically the Safety at Sports and Recreational Events Act, 2010(Act No. 2 of 2010).
5.1.5. To promote co-operation and collaboration between internal and external stakeholders.
5.1.6. To promote a positive legacy linked to the hosting of events.
5.1.7. To ensure events are managed to achieve economic development, job creation, social inclusivity and event greening goals.

5.2. The Events Policy prescribes processes to be followed by the City for providing event support, commercial partnerships, event permits, and co-ordination of the City's events calendar, event bidding, hospitality, guest management, ticketing, event marketing and event services.

5.3. To create a platform for the review of the events by-law.

6. SCOPE OF APPLICATION

This policy is applicable to:

6.1. Events within the City's jurisdictional area, which may in any way require the services of the City, have implications for public safety, the environment and local communities and which occur in a public and/or private place as contemplated in the City's Events by-law and the Safety at Sports and Recreational Events Act, 2010(Act No. 2 of 2010).

6.2. Organisations and/or any of the spheres of government and across the event spectrum (cultural, business, sport etc.) and in private sector venues which impact on the public resources and have implications for community public safety and the environment.

6.3. Sporting, cultural and business events which may or may not impact on City Services but could have a significant impact on the City's objectives for tourism, events and marketing.

6.4. Events which are hosted in conjunction with neighbouring municipalities. These events will be subject to a formalised agreement between the City of Cape Town and the neighbouring municipality/ies. Where events, hosted in the jurisdictional areas of neighbouring municipalities, impact on the City infrastructure the City will engage with the municipality to manage the impact on the City's infrastructure. Such engagement will be subject to formalised agreements between the City of Cape Town and the respective municipalities.

6.5. The City's Events Policy does not apply to public gatherings and demonstrations as defined in the Regulation of Gatherings Act, 1993 (Act No. 205 of 1993)

6.6. The City's Events Policy does not apply to workshops and meetings organised by City departments.

6.7. The City's Events Policy does not apply to private or community functions which:

6.7.1. do not require the services of the City,
6.7.2. do not have implications for public safety, the environment and local communities. This must be verified by the event permit department.
6.7.3. comply with all applicable legislation.

6.8. The City of Cape Town does not contribute financial support to specific political party events.

7. REGULATORY CONTEXT

The policy is developed and guided by the following legislation and regulations:

1. The Constitution of the Republic of South Africa, 1996 (Act No. 108of 1996), section 156 (1) (a), read with Part B of Schedule 4
2. Safety at Sports and Recreational Events Act, 2010 (Act No. 2 of 2010)
3. The Disaster Management Act, 2002 (Act No. 57 of 2002)
4. The National Environmental Management Act, 1998 (Act No.107 of 1998)
5. Local Government: Municipal Finance Management Act 2003,(Act No. 56 of 2003) (MFMA)

6. Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)
7. Private Security Industry Regulating Authority
8. National Health Act, 2003 (Act No. 61 of 2003)
9. SANS 10400 of 1990 Application of National Building Regulations
10. Fire Brigade Services Act, 1987 (Act No. 99 of 1987)
11. National Road Traffic Act, 1996 (Act No. 93 of 1996)
12. Land Use Planning Ordinance, no 15 of 1985
13. Cape Town Zoning Scheme
14. Regulation of Gatherings Act, 1993, (Act No. 205 of 1993)
15. City of Cape Town's Events by-law
16. City of Cape Town Outdoor Advertising and Signage By-law
17. City of Cape Town System of Delegations
18. City of Cape Town Catering Policy
19. City of Cape Town Entertainment Policy
20. City of Cape Town Integrated Metropolitan Environmental Policy
21. City of Cape Town Integrated Development Plan
22. City of Cape Town's Smart Events Handbook

8. ROLE PLAYERS AND STAKEHOLDERS.

There are a wide variety of existing and potential stakeholders. These range from City of Cape Town Event Service and City of Cape Town Event Hosting departments, city agencies and other spheres of government and the private sector.

The principal stakeholders are the Tourism, Events and Marketing Directorate (TEAM), the City Hosting Departments and the City Service Departments.

The table below is an outline of the affected role-players and stakeholders:

Arts and Culture Department	Internal
Cape Town Stadium	Internal
City of Cape Town Communication	Internal
Council	Internal
Directorate: Safety and Security	Internal
Events Department	Internal
Economic Development	Internal
Electricity department	Internal
Environmental and Heritage Resource Management	Internal
Finance Department	Internal
Legal Department	Internal
Mayor's Office	Internal
Place Marketing Department	Internal
Planning and Building Development Department	Internal
Roads and Stormwater	Internal
Supply Chain Management Department	Internal
Sport and Recreation Department	Internal
Strategic Assets Department	Internal
Tourism Department	Internal
Transport Department	Internal
Water Department	Internal
National Government Departments	External government
National Parliament	External government
Provincial Government of the Western Cape	External government
Convention Bureaux (WESGRO)	External

Cape Town Tourism	External
Business Associations Chamber of Commerce, NAFCOC	External
Communities	External
Cultural and Creative Industry	External
Design Industry	External
Diplomatic Corps	External
Events Industry	External
Event Greening Industry	External
Faith Based Organisations	External
Major facility and property owners	External
Media	External
Municipal Institutes	External
National Departments	External
Participants at events	External
Private sector sponsors	External
Rate Payers Associations	External
Residents	External
South African Police Services	External
Sports Federations and professional clubs	External
Tourism Industry	External
Traders (Informal)	External
Vendors / Service Providers	External

9. POLICY DIRECTIVE DETAILS

In order to promote effective management of events in the City of Cape Town municipality the following policy directive details will apply:

9.1. CLASSIFICATION OF EVENTS

In this policy events are classified according to the desired strategic outcomes.

A.	International events	International sporting, business or cultural events that are hosted in Cape Town. These events may range from large scale, with global media coverage, to small scale events.
B.	Cape Town iconic events	Annual events on the Cape Town events calendar. These events attract measurable visitors and tourists to Cape Town.
C.	Incubator events	Annual events on the Cape Town calendar. These events attract mainly Cape Town communities but show potential to attract visitors and tourists to Cape Town.
D.	Leverage events	Events that take place outside Cape Town where the City participates in order to market Cape Town on a national or global platform.
E.	Cape Town community events	These events take place in a community, for community purposes and are attended mainly by the community. They may be Mayoral events,

service delivery events, fundraising events, local economic development, emerging sport and cultural events, religious events and events celebrating national days of significance.

9.1.2 The above classification is not a reference to the scale or size of events but rather to the core market of participants and spectators that the event attracts, ranging from a high proportion of visitors (e.g. international events and Cape Town iconic events) to mainly Cape Town residents (e.g. community events).

9.1.3 Events are also classified according to their security risk as defined in Section 2 of the Safety at Sports and Recreational Events Act, 2010 (Act No. 2 of 2010) and the City of Cape Town Events by-law. These classifications are applied in the events permitting process.

9.2. MANAGEMENT OF THE CITY EVENTS CALENDAR

9.2.1. In order to improve planning for events, an official City of Cape Town Events Calendar will be published and updated monthly.

9.2.2. The management of the calendar will be the responsibility of the Events Department.

9.2.3. The events approved by council as part of the council budget will form the basis of the annual events calendar.

9.2.4. All City hosting departments are required to submit their event dates to the Events Department for inclusion on the Events Calendar.

9.2.5. The Events Department will be responsible for the development of an electronic calendar solution which will have both internal functionality for City departments to interface with and an external calendar to provide information to the public.

9.2.6. Guidelines for the Official City Events Calendar will be drawn up to support the management of the Events Calendar.

9.2.7. City hosting departments will be advised of successful inclusion or if an event presents a significant clash, in which case a mutually agreed upon solution will be found.

9.3. EVENTS SUPPORT

9.3.1 Supporting events

9.3.1.1. The City may from time to time choose to support an event owner in delivering events in the City of Cape Town.

9.3.1.2. The support will take the form of direct funding of an event or subsidising the cost of city services and/or event services needed for hosting the event.

9.3.1.3. As the owner of the event will in all instances be a single provider as envisaged in the Supply Chain Management policy 289.2,

9.3.1.4. The process of appointment or support of an event will be undertaken through this policy.

9.3.2 Events the City wishes to support

Below is a list of guidelines indicating the types of events the City may wish to partner:

A. Events that attract a high proportion of visitors to Cape Town.
B. A media attraction, particularly international and national media.
C. Events that provide the City with marketing opportunities.
D. Demonstrates a positive economic, social and environmental impact.
E. Supports the City's facilities and Strategic Facilities.
F. Events that address seasonality in the City's events calendar.
G. Applies responsible tourism and sustainable living principles.
H. Events that apply event greening principles.
I. Information on trading opportunities for local traders.
J. Job creation opportunities as a result of the event.
K. Information on local suppliers.
L. Lasting legacies from the hosting of the event.
M. Creates access for communities and assists with geographic spread and social integration

9.3.3. Event support requirements

9.3.3.1. A City hosting department can only contemplate supporting an event if the City Hosting Department has the funding approved in the budget.

9.3.4. Types of funding

9.3.4.1. The City of Cape Town may choose the level of funding it wishes to provide to an event organiser. The different funding models may be defined in the following categories:

A. Sponsor	The City may choose to support or fund an event organiser by securing a rights package to promote the City of Cape Town in return for a financial transfer.
B. Host city	The City may choose to fund with event owner up to a maximum of 50% of the costs of staging the event.
C. Commercial funding agreement	The City may choose to fund an event owner by purchasing a rights package in return for the funding.
D. Event organiser	The City may choose to create its own events to achieve strategic objectives.

9.3.5. Financial and legal mechanisms to facilitate funding

9.3.5.1. Funding of events can be facilitated through the following financial and legal mechanisms:

A.	Funding transfer	Facilitated through a commercial sponsorship agreement.
B.	Cash transfer	Facilitated through the Section 67 mechanism as provided for the in Municipal Finance Management Act (MFMA).
C.	Inter-departmental transfer	Facilitates the provision of city services at events after necessary authority is obtain as described in 9.3.7 .
D.	Subsidising events by providing event infrastructure and or services	To assist event organisers with goods and services by direct procurement. Such procurement takes place after authority is obtained to support the event as described in 9.3.7.
E.	Revenue sharing	Facilitates the City to participate in revenue generation income of the event

9.3.6. Application process for event support

9.3.6.1. Event organisers are required to submit an application for event support to the City of Cape Town.

9.3.6.2. The application should be aligned to the guidelines as outlined below.

9.3.6.3. An application form on a standard template will be provided to applicants by the Events Department.

9.3.6.4. Applications for event support must be submitted to the Events Department.

9.3.6.5. Event support applications should be made at least 90 days in advance in order to facilitate the decision-making processes.

9.3.6.6. Event funding applications received less than 90 days before the anticipated event day will not be considered.

9.3.6.7. The City of Cape Town will provide applicants with an acknowledgement of receipt once an application has been lodged.

9.3.6.8. It is anticipated that application submission will be facilitated by an electronic application system, inclusive of process related alerts to the applicant, through an events portal in the future.

9.3.7. Decision making process for event support with a financial transfer

9.3.7.1. The decision making process will be facilitated through Council systems and structures such as Council meetings, the budget process, the Special Events Committee and the following City of Cape Town system of delegations.

9.3.7.2. Authorisation to provide event support must be obtained in the processes outlined in 9.3.7.3

Type of event	Mechanism
9.3.7.3. Annual events	The City will develop a list of events that it wishes to support annually. These events will form part of the budget process.
9.3.7.4. Event support applications	All event support requests received through the event support application system will be considered by the Special Events Committee. Decision-making within their delegations or recommendations for support will be made to Council.

9.3.8. Decision making process for event support without a financial transfer

9.3.8.1. The City of Cape Town regularly receives requests for support that do not have financial implications, for example:

Type of event	Mechanism
9.3.8.2. Letters of support for booklets and publications	Requests for letters of support for publications must be sent to the Office of the Executive Mayor. Only letters signed by the Executive Mayor will be considered official.
9.3.8.3. Appearances or representation at events	Requests for appearances or representation at events should be sent to the office of the Executive Mayor.
9.3.8.4. Event permit process	An application for an event permit, must be submitted to the Events Department.
9.3.8.5. Event logistics assistance	Event organisers, e.g. National Departments request that the City of Cape Town events department staff

		assist them with local logistics and planning for events.
9.3.8.6.	Enabler	The City creates an event friendly environment, enabling event organisers to obtain the necessary guidance and approvals for their events. This includes facilitating the promotion of low-carbon event delivery in keeping with the City's support for developing a green economy and ensuring a positive legacy from the event.
9.3.8.7.	Event Permitting	This is through facilitated through the Event Permit office. The City creates an enabling environment for events by creating a co-ordination function which enables event organisers to interact with all required city services.

9.3.9. Guidelines for event support applications

In addition to the guidelines outlined in 9.3.2 of this document, the provision of the following pertinent information will be required in order to assess the reputational and legal risk the City may expose itself to by partnering with an event:

9.3.9.1. Company board members and the management teams experience in organising previous events.

9.3.9.2. Event track record (if the event was previously organised).

9.3.9.3. Any research information, including economic and environmental impact studies.

9.3.9.4. Carbon footprint of the event, or an indication of measures to reduce energy demands / waste and to limit the impact on sensitive environments.

9.3.9.5. Other event partners, particularly sponsors and media partners.

9.3.9.6. The financial model of the event.

9.3.9.7. Information on the beneficiaries of the proceeds from the event including whether the fundraising purpose of the event is for profit or not-for-profit.

9.3.9.8. The City of Cape Town does not contribute financially to specific political party events.

9.3.10. Reporting

9.3.10.1. The Events Department will provide quarterly reports to the Portfolio Committee for Tourism, Events and Marketing.

9.3.10.2. Event owners, who are beneficiaries of City Event Support are required to provide the City of Cape Town with a post event report which provides actual information on tickets or entries sold (where possible), geographical information of where such sales originated, information on the participants and spectators, accommodation, transport used, a media and marketing report, economic opportunities, jobs created, event greening initiatives implemented, challenges, issues and complaints, areas of improvement. A report is required 30 days after the event.

9.3.10.3. More detailed impact studies which may be undertaken relating to Economic Impact, Environmental Management and Social Impact can be submitted at a later stage when the studies are complete.

9.3.10.4. Event owners may be requested to make a presentation to the Portfolio Committee for Tourism, Events and Marketing.

9.4. EVENT BIDDING

The City may wish to pro-actively bid to host events. The bidding process can be a complex process which requires both financial and non-financial support.

9.4.1. Event screening

9.4.1.1. City hosting departments may screen for events in the future that it believes the City may wish to host.

9.4.1.2. The City of Cape Town wishes to identify events to bid for based on the same criteria as outlined in 9.3.2 and 9.3.9.

9.4.1.3. Future events can be identified 3 – 15 years in advance but the ideal time-frame is 5 years.

9.4.1.4. City hosting departments may also be approached by external federations, city agencies or other spheres of government to bid for events.

9.4.1.5. City hosting departments should obtain the necessary information and sanction of the applicable organising body and ensure the Events Department is kept informed.

9.4.1.6. The City of Cape Town's Events Department will keep a bidding register which is a record of all events that the City of Cape Town has expressed an interest in hosting in the future

9.4.1.7. Recommendation on support bidding events will be made by the Special Events committee.

9.4.1.8. The decision to support a bid resides in Council.

9.4.1.9. The City's hosting department is required to ensure that a report is submitted to Council and that funding to support the event is requested on the budget in the financial year where such funding may become applicable.

9.4.1.10. In the event that the budget implications for hosting an events is so large that it requires assistance from more than one sphere of

government, it is the hosting departments responsibility to manage the process and solicit the support in order to make the business plan viable.

9.4.2. Non-financial support for bidding

9.4.2.1. Such support includes letters of support from the Executive Mayor and access to City of Cape Town Mayoral Committee members for networking and assistance with information.

9.4.2.2. Only letters of support signed by the Executive Mayor will be deemed valid.

9.4.3. Financial support for bidding

9.4.3.1. Support that may result in expenditure includes the developing and printing of bid books, hosting dinners and making presentations at venues outside the City. In some cases the City may be required to pay an upfront bidding fee and sign a host city agreement.

9.5. EVENT PERMITS

9.5.1. Events permits are required for hosting events in the City of Cape Town.

9.5.2. Event organisers are required to apply for an event permit in terms of the City of Cape Town events by-law and this policy.

9.5.3. Event organisers are required to apply for an event risk categorisation from the South African Police Service as defined in section 6 of the Safety at Sports and Recreational Events Act, 2010 (Act No. 2 of 2010).

9.5.4. Event organisers are required to comply with all applicable laws.

9.5.5. The City of Cape Town may from time-to-time issue operational guidelines to assist Event Organisers in planning events.

9.5.7. Approval/Rejection of Event Permit Applications

9.5.7.1. The Events Operational Committee or the appointed Event Permit Officer (for less complex events) can approve or reject an application provided that such approval or rejection is aligned to the guidelines outlined below.

9.5.7.2. Approval of the event is achieved through the issuing of a permit by the City of Cape Town only.

9.5.7.3. The time-frames for approvals may vary depending on the supporting information submitted

9.5.7.4. A two-step process will be introduced in which the Event date and proposed venue is approved, subject to the submission of plans.

9.5.8. Guidelines for permit approvals/rejection

9.5.8.1. Adherence to the City's policies, legislation and By-Laws
9.5.8.2. Adherence to other applicable laws, notably the Safety at Sports and Recreational Events Act, 2010 (Act No. 2 of 2010)
9.5.8.3. Submission of all required plans and documentation in order to make assessments.
9.5.8.4. The impact of the event on the surrounding area/community/environment
9.5.8.5. The impact of the event on the transport network
9.5.8.6. Safety and risk management in relation to the event
9.5.8.7. Compliance with health and safety
9.5.8.8. Other events planned and approved in the City which may impact on the event
9.5.8.9. The previous event history of the event, event organiser and/or event venue
9.5.8.10. Event application or Event Plan not submitted timeously.
9.5.8.11. Event application or Event Plan incomplete.
9.5.8.12. Event Plan not completed and submitted for approval.
9.5.8.13. Event Plan submitted but not approved.
9.5.8.14. Organiser or any party involved in staging the event has a previous record of non-compliance
9.5.8.15. Sufficient City services available to provide services to the event.
9.5.8.16. Frequency of use in environmentally sensitive areas.
9.5.8.17. Nuisance, health and noise concerns are not satisfactorily addressed.
9.5.8.18. Comment and support received from the applicable ward councillor and the rate payers association
9.5.8.19. Where overwhelming objections have been received by a range of stakeholders to the event taking place.

9.5.8. Submission of a permit application is not an approval of the event.
9.5.9. Receiving financial support from a City Hosting Department does not constitute an approval.
9.5.10. The City of Cape Town reserves the right to refuse an event.
9.5.11. The City of Cape Town reserves the right to approve events at short notice provided that such events are unforeseen, of national or regional interest and on the instruction of the Executive Mayor. Such events must comply with all the guidelines listed in 9.5.7. above.
9.5.12. The permit must be kept by both the Event Organiser and the Venue and be available for scrutiny at all times.
9.5.13. Should an event proceed without a City of Cape Town Events permit, the event is deemed illegal and the City of Cape Town may take appropriate action to address the non-compliance. .

9.6. MONITORING AND EVALUATION OF EVENTS

9.6.1. The Event Organiser and Venue Owner are responsible for ensuring that all conditions of the permit are strictly adhered to.
9.6.2. If permit conditions are not adhered to, the City of Cape Town, through its Law Enforcement unit can take action by shutting the event down.
9.6.3. Applicable punitive measures are set out in the City of Cape Town Events Amendment By-law, 2009

9.7. EVENT RESEARCH

9.7.1. The City of Cape Town envisages establishing a research unit which will lead a process to standardise event impact assessments for all events hosted in the City of Cape Town.

9.7.2. Event organisers are encouraged to assist this process by providing to the City of Cape Town event impact information for their respective events.

9.7. CITY OF CAPE TOWN INTER-DEPARTMENTAL CO-ORDINATION

9.7.1. City hosting departments are required to provide the Events Permit Unit with a list of events they will be supporting, as soon as city support for such events is confirmed.

9.7.2. The City hosting departments are required to provide the Events Permit Unit with the name of the relevant project manager.

9.7.3. All events supported by the City of Cape Town must be legally complaint and therefore require an event permit, where the events fall within the scope of this policy.

9.7.4. The event permit unit will advise the project manager if an application for the event has been lodged.

9.7.5. If no application has been lodged or information is outstanding, the project manager must facilitate the submission of the outstanding information from the event organiser.

9.7.6. A monthly, inter-departmental meeting will be held to discuss the forthcoming city events calendar.

9.8. INTER-GOVERNMENTAL CO-ORDINATION

9.8.1. Inter-governmental coordination is required as event organisers often approach more than one sphere of government for support and participation in an event.

9.8.2. In addition, some provincial and national departments such as the Department of Cultural Affairs and Sport, Department of the Premier, Department of Economic Development, Department of Environmental Affairs, WESGRO, Cape Town Tourism, Department of Arts and many others, may provide event organisers with grants towards hosting events in the City.

9.8.3. The City of Cape Town's Events Department will be responsible for the set-up of an information sharing forum where inter-governmental co-ordination is established for discussing strategies, objectives and co-operation at events.

9.8.4. This forum will meet at least once a quarter or as required.

9.9. HOSPITALITY AT EVENTS

9.9.1. The City of Cape Town may, from time to time, wish to host media launches and/or hospitality at events at for example, events taking place at strategic assets, or as part of the rights package.

9.9.2. This is additional to the provisions in the City of Cape Town entertainment and gift giving policy. This is also outlined in clause 2.3 of the entertainment and gift giving policy, 2008.

9.9.3. The provisions are additional to the provisions in the City of Cape Town catering policy.

9.9.4. The purpose of hosting guests may be part of a strategy to promote the City of Cape Town's strategic assets, council facilities or as part of a marketing activation activity.

9.9.5. The service may include the provision of the following: Hospitality area/venue rental, catering, beverages (including alcohol), hiring of entertainment, décor rental, furniture rentals.

9.9.6. The relevant City of Cape Town executive director approves the decision for hospitality at a selected event which complies with conditions outlined in 9.9.4.

9.9.7. All procurement supporting the provision of hospitality at events must be in accordance with the Supply Chain Management policy.

9.10. GUEST LIST AND INVITATION MANAGEMENT

9.10.1. Guest lists must be compiled by the City Hosting Department and approved by the relevant executive director.

9.10.2. The Events Department can assist in managing the invitation process on behalf of the City Hosting Department, if requested.

9.11. TICKET DISTRIBUTION

9.11.1. The City of Cape Town may receive or purchase tickets to events.

9.11.2. Distribution of such tickets can be for the following groups and purposes: vulnerable groups, charitable causes, development projects, key stakeholders in a department, members of Mayoral Committee, the Portfolio committees, as prizes in city organised competitions (in accordance with the consumer protection act, section 11) and City of Cape Town staff.

9.11.3. City of Cape Town staff, Mayoral Committee members and Portfolio Committee members may receive tickets and entries to events on the following conditions which includes but are not limited to :

9.11.3.1. The member has will assist the City of Cape Town with post event report feedback

9.11.3.2. The member is the project manager for the event and his/her presence is required as part of their duties

9.11.3.3. The member will assist in networking with key guests invited to a particular event, such networks to be beneficial to the City of Cape Town.

9.11.3.4. The member is overseeing the implementation of projects at the events such as the vulnerable groups, charitable causes, development project and prizes, such support shall be reasonable.

9.11.3.5. The member participates in the event

9.11.3.6. The member wins a competition in which tickets are prizes.

9.11.4. Ticket distribution can be facilitated by the Event Hosting Department or the Events Department.

9.11.5. A record of ticket distribution for events must be kept by the City Hosting Department.

9.12. EVENT MARKETING

9.12.1. Marketing activities for events include the placement and production of posters, pamphlets, advertisements in the press, publications, outdoor billboards, flag poles, mobile advertising platforms and digital marketing platforms.

9.12.2. Event hosting departments may activate these activities at events provided there is sufficient budget and the necessary supply chain management processes are followed.

9.12.3. Event hosting departments must inform the Executive director: Tourism, Events and Marketing, of planned activities in order to ensure co-ordination with other city event activities.

9.12.4. All outdoor advertising for events must comply with the City of Cape Town Outdoor Advertising and Signage By-Law.

9.13. EVENT SERVICES

9.13.1. City of Cape Town hosting departments may need to procure event services in support of events.

9.13.2. Event services include but are not limited to: Fencing, private security, toilets, stage, sound and technical, electrical generators, professional event organisers, safety officers, temporary infrastructure, cleansing and waste management, volunteers, promotional clothing, staff catering, public transport provision through My Citi or Metrorail, dedicated transport (busses), corporate gifts, venue hire, road closure adverts, road/traffic signage, professional speakers/programme directors, entertainment and consultants for monitoring and evaluation.

9.13.3. Event hosting departments may procure City services including but not limited to: Law enforcement, traffic services, metro police, disaster management, fire services, water, health, medics, cleansing, electricity, poster stickers and lamp pole hiring for event flags.

9.13.4. Event hosting departments may procure event services, provided there is sufficient budget and authority to support an event has been obtained.

9.13.5. All procurement must be in alignment with the Supply Chain Management Policy

9.13.6. No advance payments are permitted.

9.14. THE ROLE OF CITY STRUCTURES AND DEPARTMENTS

9.14.1. Role of the City of Cape Town hosting departments

9.14.1.1. City of Cape Town hosting departments may initiate events and initiate bids to host events.

9.14.1.2. City of Cape Town hosting departments are responsible for Community Sports events, Community Cultural events, Local Economic Development events, Business Events and Service Delivery Events.

9.14.1.3. Hosting departments can organise and project manage events relevant to their functional area, if the events are relevant to their business plans.

9.14.1.4. If an event is project managed by the Events Department due to its significance to the City of Cape Town, the relevant functional department will be a co-hosting department and responsible for providing developmental content.

9.14.2. Role of City of Cape Town service departments

9.14.2.1. To ensure that events comply with the applicable legislation.

9.14.2.2. To ensure that events are safe.

9.14.2.3. To ensure that access to event services is aligned with the City's strategic objectives through accessibility to services.

9.14.3. Role of the sub-councils in event support

9.14.3.1. Sub-councils participate in events, through their delegations and budgets, as event organisers providing event support and approving the use of local facilities.

9.14.3.2. Events hosted in sub-councils must comply with the City of Cape Town Event by-law, the Safety at Sports and Recreational Events Act, 2010 (Act No. 2 of 2010) and all applicable laws.

10. IMPLEMENTATION, EVALUATION AND REVIEW

10.1. This policy framework is important for the management of events in the City of Cape Town. It provides an administrative procedure for the management of events.

10.2. The revised events policy will be implemented once approved by Council.

10.3. Monitoring and evaluation of this policy will be performed by the Events Department.

10.4. Directorates are to advise the Events Department of any blockages within the policy implementation framework.

10.5. Changes in legislation must be taken into account for future amendments to this policy.

10.6. Any amendments to this policy must be re-submitted to Council for review and approval.

Chapter 3: Coastal Land Policy: Purchase and Leasing

1. Introduction

In defining a Coastal Urban Edge as part of the City's Spatial Development Framework, the City has communicated a clear intent reflected in its Integrated Coastal Management Policy that the coastline is a core social and economic asset to the City and its communities and must be administered and held as a "common good", accessible to all and retained for future generations. In defining the Coastal Urban Edge the City, amongst many principles and methodologies, considered existing land use rights as one of many central determinants to ensure fairness and equity while acknowledging existing rights. This process of respecting existing land use rights minimised the extent of private land falling in the area between the high water mark and the Coastal Urban Edge. However, not all land within this defined coastal space falls under the direct administration of the City. Small pockets of private land without development rights remain, while significant portions of coastal land fall under the administration of a range of government departments.

To ensure the effective realisation of the City's clear intent to ensure that the coastline is managed, maintained and kept as a common asset accessible to all, a policy is needed to guide decisions in an open and transparent manner regarding:

- The possible acquisition of private land seaward of the Coastal Edge as defined in the Cape Town Spatial Development Framework, to ensure that the land is City owned as a common good and to ensure that future risk both private and public is minimised
- The preferred cessation of alienation of City owned land seaward of the Coastal Edge as defined in the Cape Town Spatial Development Framework
- To ensure that the City enters into formal discussions and agreements with other government departments who administer land seaward of the Coastal Edge as defined in the Cape Town Spatial Development Framework, to either formalise and ensure:
    - Transfer of the land to the City
    - Formal binding agreements in the management and land use of the coastal land under administration of other government departments
- Guide and structure any lease agreements that the City may enter into with private individuals, organisations or commercial entities for land parcels falling within the coastal zone as defined in the Cape Town Spatial Development Framework
- Consolidate state ownership of coastal land where this land is unsuitable for development owing to zoning and environmental regulations and/ or environmental change.

2. Guiding Principles

- Enhance the coordinated management of sensitive coastal environment. This aligns with the City's sustainability goals and the 'Towards 2040' Ecological Transition promoted by the Economic Development Partnership (EDP).
- IDP Objective 1.1: Create an enabling environment to attract investment that generates growth and job creation while minimising the risk of private owners purchasing undevelopable land
- IDP Objective 1.3: Promote a sustainable environment through the efficient utilisation of resources
- IDP Objective 4.2: Provide facilities that make citizens feel at home
- 2040 Ecological Transition: Incentivising and fast-tracking the green agenda
- Consistency and transparency in decision making on the coastline
- Retain the coastline as a "common good"
- Ensure that future risk both private and public is minimised

3. Policy Directives

3.1. Acquisition of Private Land in the Coastal Environment

The City *may* consider purchasing private land in the Coastal Environment under one or more of the following conditions:

- The land is of current strategic value for coastal protection as a buffer between the highwater mark and infrastructure
- The land is of strategic value for possible future coastal protection measures
- The land is of value as part of the "coastal common good" and should be held in public ownership in the best interests of current and future generations
- The land is of coastal conservation value
- The land is not suitable for any form of development due to environmental and coastal constraints
- The land is of strategic value for public coastal access, public amenity development or the enhancement of economic and commercial activities associated with the coast

In considering acquiring private land the following shall apply:

- All negotiations shall be led by the City's Property Management Department
- At no time and under no circumstances is the City obligated to acquire private land
- The City's Policy and By-law on the Management of Council's Immovable Property
- Existing rights and zoning will be taken into account when land values are determined
- Process of acquisition is preceded by proof of funding by the Department seeking acquisition

3.2. Alienation of City owned land

No City owned or administered land seaward of the Coastal Urban Edge as defined by the Spatial Development Framework shall be alienated or sold. Where City owned land is required for strategic purposes of national or regional importance such as harbour construction, the City may consider alienating land when:

- The social and economic value to the broader community of the explicit strategic purpose demonstrably and significantly outweighs the environmental implications or loss
- The strategic purpose in no way substantially reduces or compromises general public coastal access
- The alienation of the land is supported by a positive finding through a Strategic Environmental and Social Assessment

3.3. Leasing of City owned land

The City may lease out land or infrastructure seaward of the Coastal Urban Edge under the following conditions:

- The activity is non-commercial and supports the general community, including but not limited to, recreational clubs, lifesaving facility/club, sea rescue facility or club, safety, educational or awareness centre, not for profit community upliftment programmes or where the activity provides a formal service to the City
- Where a commercial activity contributes to the social and economic development of the City through the use of EXISTING infrastructure by creating employment, services and facilities that contribute to the economy.
- Public advertising of all proposed leases will take place in accordance with Council Policy prior to finalisation

In entering into a new lease agreement the City may:

- Limit all lease agreements to lease periods not exceeding 10 years, save for exceptional circumstances
- Retain the right within the lease agreements to terminate the lease on a specified and reasonable notice period and under specific and appropriate circumstances

Regarding existing agreements:

- Cession and assignment of leases will only be permitted where it is already authorised by the lease agreement or by applicable law;
- Where the option to acquire exists, this will be respected if a suitable alternative is not available;
- Where the option to extend the lease exists, this will be respected.

3.4. Coastal land administered by other state departments

Significant portions of coastal land located seaward of the Coastal Urban Edge is held under the administration of other organs of state including but not limited to the Provincial Government, National Department of Public Works, Passenger Rail Agency of South Africa (PRASA) and others.

For all coastal land that falls seaward of the Coastal Urban Edge and which is administered by one of these organs of state, the City shall enter into discussions with the relevant organ of state to either:

- Have the ownership of the land transferred to the City by mutual agreement with no required obligation through relevant means which may include land transfer, purchase or land swap
- Enter into a formal written agreement with the relevant organ of state to ensure that the land is managed and administered in line with the City's coastal objectives and complies with the City's Zoning Scheme and in particular the City's proposed Coastal Overlay Zone and which ensures City input and collaboration on any decision making with respect to the coastal land

Chapter 30: Coastal Committees

1. Introduction

The Integrated Coastal Management Act (ICM) makes provision in Section 42 for the establishment of Municipal Coastal Committees with the intention of broad stakeholder engagement in the management of the coastline.

"***42.Establishment and functions of municipal coastal committees***

*(1) Each metropolitan municipality and each district municipality that has jurisdiction over any part of the coastal zone **may** establish a coastal committee for the municipality and, subject to subsection (4), determine its powers.*

(2) Any local municipality that has jurisdiction over any part of the coastal zone may establish a coastal committee for the municipality and, subject to subsection (4), determine its powers, which may include the power to establish local subcommittees of the municipal coastal committee.

(3) A municipal coastal committee contemplated in subsections (1) and (2) may include—

- *a) persons with expertise in fields relevant to coastal management; and*
- *b) representatives of the management authorities of coastal protected areas or special management areas within the municipality; and*
- *c) representatives of communities or organisations with a particular interest in contributing to effective coastal management, such as port authorities, organs of state, persons whose livelihoods or businesses rely on the use of coastal resources, environmental interest groups and research organisations.*

(4) A municipal coastal committee contemplated in subsections (1) and (2) may—

- *a) promote integrated coastal management in the municipality and the coordinated and effective implementation of this Act and the municipal coastal management programme;*
- *b) advise the municipal manager, the municipal council and the provincial coastal committee on matters concerning coastal management within the area of jurisdiction of the municipal coastal committee;*
- *c) advise the municipality on developing, finalising, reviewing and amending the municipal coastal management programme;*
- *d) promote a co-ordinated, inclusive and integrated approach to coastal management within the municipality by providing a forum for, and promoting, dialogue, co-operation and co-ordination between the key organs of state and other persons involved in coastal management within its area of jurisdiction;*
- *e) promote the integration of coastal management concerns and objectives into the municipality's integrated development plan and spatial development framework and into other municipal plans, programmes and policies that affect the coastal environment; and*
- *f) perform any coastal governance function delegated to it."*

It is important to note is that the legislation dos not prescribe that a Municipal Coastal Committee MUST be established, but rather that the local authority MAY establish a Municipal Coastal Committee if it wishes.

2. Importance of public and stakeholder engagement

The City of Cape Town recognises the importance of public and stakeholder engagement in the management and governance of Cape Town. This commitment by the City is fulfilled in a number of ways including:

- The open governance structure of Council and its Committees
- Broad public and stakeholder engagement and consultation in the formulation of the City's Integrated Development Plan (IDP)
- The required adherence to the City's Public Participation Policy in the development and adoption of any Council Policy or Bylaw
- The opportunity for the public to engage with the City through the Sub-Council system

Public and stakeholder engagement and consultation with regards the management of the City's coastline is particularly relevant due to the diverse nature of interest groups, user groups, commercial activities, economic growth opportunities and employment creation potential.

However it is this very diversity as well as the extent of the coastline (306km) and its variability (highly developed vs rural) that makes the establishment of a viable, meaningful and representative Municipal Coastal Committee for Cape Town impractical. As such the City has opted not to form a Municipal Coastal Committee but to rather use existing functional structures to ensure public and stakeholder engagement and input into the management of the coastline.

3. Coastal Public and Stakeholder Engagement and Input in Cape Town

Public and stakeholder engagement and input into the management of Cape Town's coastline will be actively facilitated through the following mechanisms:

a) Public and stakeholder engagement and comment on all proposed coastal policies and bylaws prior to adoption by the City of Cape Town
b) Public and stakeholder engagement and comment on the City's Coastal Management Programme (CMP) (this document) prior to adoption by the City of Cape Town
c) Public and stakeholder engagement and comment on any substantive review or amendment of individual chapters of the City's CMP after its initial adoption
d) Public and stakeholder engagement and comment, as required by the National Environmental Management Act (NEMA), on any land use or activity that requires an Environmental Impact Assessment
e) Direct engagement with the City on all coastal matters through the existing structures of Ward Councillors, Ward Forums and Sub Councils

4. Public Coastal Monitoring and Reporting

Chapter 31 of this CMP describes the structured biennial City Coastal Report to be prepared as the Monitoring and Evaluation of the implementation of the City's CMP as well as the state of its coast. As described in Chapter 30, this biennial report will be made available to the public

Chapter 31: Monitoring, Evaluation and Reporting

1. Introduction

The Integrated Coastal Management Act (ICM) requires in Section 49 (d) that the Municipal Coastal Management Programme (CMP) includes:

"(d) performance indicators to measure progress with the achievement of those objectives."

Ongoing monitoring and reporting of the implementation of and compliance to the adopted CMP is an essential component of good governance and commitment to ongoing improvement.

As such the City of Cape Town will prepare a bi-annual (every two years) City Coastal Report.

2. Bi-Annual City Coastal Report

The bi-annual City Coastal Report will include the following:

a) Measurable indicators and reporting of the State of the Coast
b) Record all notices and prosecutions served in terms of the Coastal Bylaw, the ICM Act or any other legislation relevant to the coast
c) Record all non-compliance to approved management protocols
d) Record all interventions related to any coastal emergencies
e) Present the most current Coastal Risk Register

3. Ongoing Review of the Coastal Management Programme

The City's Coastal Management programme will undergo formal review very five years as prescribed by the Act.

However, as it is considered a "living" document, individual chapters may be reviewed, updated, amended or added as the need arises. In this case, a review or addition of a chapter to the City's CMP will be done in accordance with Council processes and will include public and stakeholder consultation

Chapter 4: City Of Cape Town Coastal Set-Back Delineation: Method And Process

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ACRONYMS

BioNet:	Biodiversity Network
City:	City of Cape Town Metropolitan Municipality, established in terms of the Local Government: Municipal Structures Act, 1998 read with the Province of the Western Cape: Provincial Gazette 558 dated 22 September 2000
city:	Cape Town
CPZ:	Coastal Protection Zone
CT:SDF:	City of Cape Town Spatial Development Framework
DEA:	Department of Environmental Affairs
DEA&DP:	Department of Environmental Affairs and Development Planning
EGS:	Ecosystems Goods and Services
GIS:	Geographic Information System
HWM:	High-Water Mark
ICMA:	Integrated Coastal Management Act

ICM Bill:	Integrated Coastal Management Bill
I & APs:	Interested and Affected Parties
LLD:	Land Levelling Datum
MCMP:	Municipal Coastal Management Programme
ODM:	Overberg District Municipality
POS:	Public Open Space
PPP:	Public Participation Process
PSE:	Participatory Stakeholder Engagement
SDE:	Scenic Drive Envelope
SDNMP:	Scenic Drives Network Management Plan
SEMA:	Specific Environmental Management Act
SLRRA:	Sea-Level Rise Risk Assessment
TMNP:	Table Mountain National Park
TEV:	Total Economic Value

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1. EXECUTIVE SUMMARY

The City of Cape Town's (the City) coastline is a complex space - it is a nexus of social, economic, ecological and legislative systems managed by three different tiers of government often with overlapping roles and responsibilities. Although the coastline is one of Cape Town's most important socio-economic and environmental assets, paradoxically, the coastline is also a source of risk to the City. This coastal risk is currently being compounded by the absence of a city-wide strategic decision support framework required to promote informed and risk averse coastal planning decisions. Historically decisions relating to the coast have by enlarge been ad hoc, piecemeal and reactive. Climate change is expected to heighten the challenge of risk governance at the municipal level into the future. In responding to these challenges, the City commenced with the delineation of a set-back in 2007. The primary intent of the City's set-back is to guide and shape municipal decision making that is consistent, strategic, promotes sustainable coastal development and ultimately retains the coast as an asset in the interests of the broader public.

It is well known that set-backs have a range of significant socio-economic implications. As risk is essentially a human value, the City considered it non-negotiable to apply a multidisciplinary and iterative approach that considered a range of socio-economic and biophysical elements in defining its set-back. Through broad scale engagement and the required deliberation with interested and affected parties since 2007, the City has determined a set-back that is based on scientific, practitioner and community based knowledge and as such is grounded within the realities of a developing city scale context. Most importantly this approach has produced a set-back that achieves a balance between socio-economic imperatives whilst simultaneously installing risk averse principles in City planning.

A critical component in developing a set-back is the recognition that there is neither legislation nor planning mechanisms in South Africa designed to resolve and to manage existing infrastructure at risk. Further to this, set-backs are not designed nor equipped to manage risk retrospectively. The City is therefore in the process of developing a range of supportive planning and land use regulatory mechanisms, notable the overlay zone and the by-law, designed to both give regulatory support to City's set-back as well as address the much neglected matter of existing property and infrastructure at risk to coastal hazards.

2. INTRODUCTION

The City commenced work on delineating its coastal set-back in 2007. The City realised the importance of undertaking proactive measures with the intent to address a multitude of growing pressures along the City's coastline[1]. The determination of a coastal set-back that considered the connections between socio-economic and environmental systems was identified as the most appropriate and effective approach towards managing these pressures within a complex and dynamic space. This approach was used with the intent of achieving five primary objectives, namely to promote access to the coast, to promote increased degrees of Integrated Coastal Management (ICM) within the City, to reduce risk to the City, to ensure that the socio-economic opportunities the coast currently provides are retained and enhanced into the future in perpetuity and to ensure the conservation of remaining functional coastal ecosystems.

[1] The coastline in terms of this report is defined as the dynamic interface between land and sea masses where this dyanmic space contributes both directly and indirectly to the livelihoods of the residents of Cape Town.

The City's Spatial Development Framework (CT:SDF) was approved on the 8th of May 2012 under two different sets of legislation. It was approved as a component of the City's Integrated Development Plan in terms of the Municipal Systems Act (Act No 32 of 2000, section 34) as well as the Land Use Planning Ordinance (No. 15 of 1985, section 4(6)). The CT:SDF, together with the Provincial Spatial Development Framework forms the spatial planning document applicable to the municipal area of the City. The CT:SDF defines and spatially demarcates the City's Coastal Urban Edge. This report therefore represents the City's formal submission to the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) to formalise the City's Coastal Urban Edge as the set-back line in terms of the Integrated Coastal Management Act (ICMA) (Act 24 of 2008). As the City views the Coastal Urban Edge and draft set-back line as one and the same, for purposes of clarity this line will be referred to throughout as the draft set-back line. In addition to this numerous references are made to the Coastal Protection Zone (CPZ) and Coastal Protection Zone by-law in the various annexures. The CPZ in the annexures refers to the space between the draft set-back and High-Water Mark (HWM). The City acknowledges that this is different to the definition and intention given to the CPZ in the ICMA. In light of this, and as per the City's Integrated Coastal Management By-law, will rename the space between the HWM and the draft set-back as the "Coastal Environment" to avoid confusion. The City will in turn define a new CPZ in accordance with the requirements of ICMA.

2.1 Background and context

Cape Town's coastline is approximately 307km in length, making it the largest coastal metropolis in South Africa. The coastline of Cape Town extends from Silwerstroomstrand (18˚20'34.959"E and 33˚34'14.994"S) on the west coast to just south of Koggelbaai (18˚50'44.905"E and 34˚16'10.554"S) on the east coast. Cape Town is renowned for its beaches and coastal beauty which are arguably its greatest socio-economic and environmental asset, providing a support base, both directly and indirectly, to a coastal population with vast socio-economic inequalities. Value from the coast is derived from a multiplicity of ecosystems goods and services (EGS) as a consequence of the coast's unique biophysical attributes. Ecosystems goods and services may be broadly categorised as cultural, regulatory, supportive and provisional. Reflecting the value of the coastline, and based on cultural services alone, it is estimated that the city's beaches can be valued at approximately R77 million per annum. This figure reflects only a fraction of the Total Economic Value (TEV) as it is based purely on the cultural value of beaches alone in Cape Town. It does not reflect the regulatory, provisional and support value (de Wit *et al*, 2009).

Paradoxically, however, the coastline also contributes to the City's risk profile. The coastline of the city is a harsh and highly dynamic environment, where the biophysical attributes of the coastline are in a constant state of flux. Some of this change is cyclical and predictable, taking place over relatively short (seasonal) temporal scales, whilst other change is unseasonable and unpredictable[2]. Reflecting seasonal dynamics at a broad scale is the accretion of beaches within False Bay (on the eastern side of the city) in winter and the erosion of these beaches in summer. The opposite pattern occurs on the west coast where beaches generally erode in winter and accrete in summer. These seasonal cycles in coastal dynamics are primarily driven by two major atmospheric systems. These include the periodic mid-latitude cyclones (storms) that occur during the winter months which typically result in higher seas, and the south Atlantic high pressure system that results in south easterlies during the summer months, and subsequently calmer seas (Tadross *et al,* 2012). Examples of less predictable coastal dynamics include migrating estuary mouths, localised beach regression and accretion events as well as storm surges. These unpredictable examples often result in abrupt changes in coastal

[2] Less predictable change may still be cyclic, but just over longer and less defined periods of time. Such change may also be a result of climate variation as opposed to human induced climate change.

geomorphology. Both of these abrupt changes, and to a lesser extent, the predicted seasonal dynamics, impact on coastal infrastructure and ultimately the City's ability to maintain effective service delivery.

The dynamic and at times unpredictable nature of the coastline is a source of risk to the City. Exposure to this risk is set to be compounded considering the warming of the earth's atmosphere. Global warming is expected to have a significant impact on coastal dynamics, where fluctuations in environmental systems are set to become more pronounced. This is a key concern to the City considering the value of the coastline from an EGS perspective, but also due to the amount of critical infrastructure located along the coastline. The City's Sea-Level Rise Risk Assessment (SLRRA) identified an area totalling 25km² that is highly vulnerable to the expected impacts of sea-level rise, storm surges and subsequent coastal erosion (Cartwright, 2008). Within this area, it is estimated that there is approximately R5 billion[3] worth of City infrastructure that is at risk (Cartwright, 2008).

Considering globalisation, market driven economies and the priority of promoting economic growth through development[4], it is expected that growth in the city (as in the case of many world cities) is set to increase significantly into the future (Figure 1) (CCT, 2012). With the perception that coastal frontage property equates to economic wealth and gain, much of this growth is expected to have an impact on the coast.

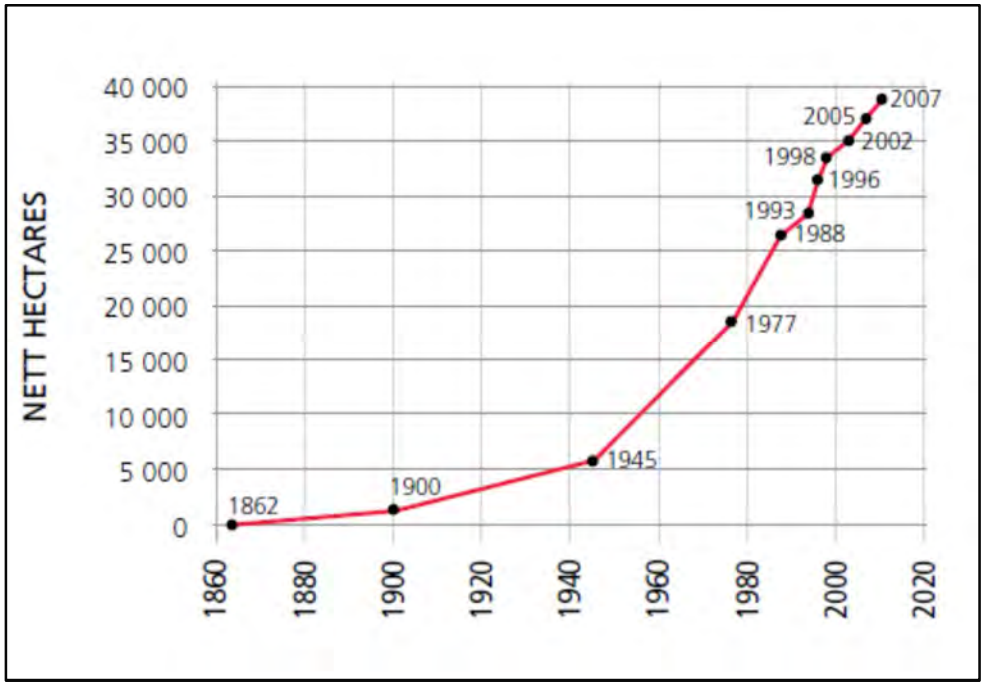


Figure 1: City of Cape Town growth from 1860 to 2007

(Source: CCT, 2012).

[3] This value reflects the cumulative value of infrastructure at risk at all points along the coastline over the next 25 years. Considering that the coastline of the city is not a homogenous environment, this risk zone will not be impacted upon uniformly.

[4] The approach of using development as a means to address poverty and unemployment is formally represented by the Accelerated and Shared Growth Initiative of South Africa. This initiative has set a target of achieving an average growth rate of 6% in GDP per annum. Added to this, 5 of the 8 Spatial Development Initiatives identified by the South African Government occur within coastal regions (South African Info, 2008).

Considering these factors of expected growth, increased pressure, value of the coast, coastal dynamic processes, the presence of critical infrastructure, the expected impacts of climate change, and the potential the coast has of becoming a source of risk to the City, it is imperative that appropriate regulatory mechanisms are developed to facilitate more effective governance and management of the coast. This will be critical towards ensuring the sustainability of the coast, ensuring the socio-economic potential of the coast is optimised and ultimately contributes to the prosperity of the city.

2.2 Report structure

This report details the City's method and process in delineating its draft coastal set-back. The report begins with determining objectives (Section 2.3) followed by a description of the City's legal mandate with respect to defining a coastal set-back in terms of the ICMA (Section 2.4). Section 3 begins with identifying and describing general principles that the City considers essential in establishing coastal set-backs. Following from this general overview, the report details a range of specific informants, based on a local level analysis, that were used to define the draft set-back for the city's entire coastline (Section 4). Section 5 details the City's methodology of delineating estuaries for inclusion within the City's set-back.

This report also details the process the City has undertaken in developing its draft coastal set-back. This primarily focuses on the stakeholder engagement process, both informally (Section 6.1) and formally (Section 6.2). Section 7 draws a comparison between the City's approach and that used in Overberg District Municipality (ODM).

Section 8 describes the 'bigger picture', providing information on the various supportive coastal regulatory mechanisms the City intends to develop in order to achieve the intent of the City's draft set-back. Section 9 outlines the implications to the City of not having a set-back in place. Section 10 concludes the report through summarising the method, process and proposed supportive coastal regulatory mechanisms outlined in Section 9. References, acknowledgment and annexures are provided in Sections 11, 12 and 13 respectively.

2.3 Objectives of the report

This report represents the City's submission to DEA&DP for the formalisation of the City's draft set-back in terms of the requirements of ICMA. The objectives of this report are therefore to:

1) Report on internal processes and consultations as well as the extensive Public Participation Process (PPP) undertaken in the formalisation of the City's draft set-back as the coastal urban edge in terms of the CT:SDF;
2) Provide a formal report to DEA&DP on the City's draft set-back delineation methodology;
3) Provide a comparison between the City's methodology, the Western Cape Methodology and the Overberg District Municipality's (ODM) Methodology,
4) Report on the City's progress and intentions with respect to the following supportive regulatory mechanisms to the coastal set-back:
    a. Municipal Coastal Management Programme
    b. Integrated Coastal Management Policy
    c. Coastal By-law

d. Coastal Protection Overlay Zones

5) Highlight the implications and risks to the City of not having a set-back line in place.

2.4 Meeting the requirements of the Integrated Coastal Management Act

The South African government in May 1997 began an extensive and integrated process of public participation research analysis to develop the White Paper for Sustainable Coastal Development in South Africa. The policy, in essence, "…aims to achieve sustainable development through a dedicated and integrated coastal management approach, in partnership with all South Africans" (DEAT, 2000: Foreword). Within this, policy provision was made for a Plan of Action which outlines in detail how the aims and objectives of the White Paper are to be met (DEAT, 2006). Resulting from this, and as a component of the *Plan of Action,* an Integrated Coastal Management Bill (ICM Bill) was made available for public comment in December 2006. In September 2008 it was accepted by the National Council of Provinces and on the 1st of December 2009, with the exception of certain sections, it became legally enforceable in South Africa. The ICMA is therefore South Africa's first legal instrument designated for promoting integrated management of the coastal zone and as such a tool towards assisting the White Paper in achieving its goals.

2.4.1 Section 25 of the ICMA: establishment of coastal set-back Lines

The establishment of a set-back for coastal municipalities is a legal requirement of the ICMA. In terms of Section 25 of the ICMA, set-backs must be established:

I. "to protect coastal public property, private property and private safety;
II. to protect the coastal protection zone;
III. to preserve the aesthetic values of the coastal zone;
IV. for any other reason consistent with the objectives of this Act; and
V. prohibit or restrict the building, erection, alteration or extension of structures that are wholly or partially seaward of that coastal set-back line" (ICMA, 2008: 42).

In general terms, a set-back is used as a planning mechanism to guide decision makers to more effectively regulate coastal development and to avoid risk from coastal hazards into the future. The focus of this regulation centres on the need to minimize the impact of development on sensitive coastal ecosystems, to retain and promote access to the coast, to prevent exposure of coastal property to risk from coastal processes, such as storm surges, coastal erosion, beach regression, migrating dune systems, and to retain the aesthetics and sense of place of the coastal space.

The City has defined its draft set-back in terms of the requirements of the ICMA. Through the application of the set-back, the City intends to manage the impact of development and activities on the coast to retain and improve the value and opportunities the coast provides. In addition to this the draft set-back will be used to ensure the coast remains accessible to all. To achieve these broader imperatives, set-backs require supportive regulatory mechanisms which will in turn require an integrative and multidisciplinary approach. The use of supportive regulatory mechanisms is also a requirement of the ICMA which states that local municipalities must incorporate set-backs into municipal coastal planning schemes. In recognition of the value of set-backs from a spatial planning perspective the City's draft set-back has been used to define the City's Coastal Urban Edge.

3. METHOD: GENERAL PRINCIPLES FOR THE DELINEATION OF CAPE TOWN'S SET-BACK

3.1 Introduction: socio-Institutional and biophysical response towards managing coastal risk

Although coastal dynamics and climate change pose a significant threat to the City, it is not the change of environmental systems in itself that will increases the City's risk profile. Rather it is the interaction of dynamic coastal processes, climate change pressures, the location of infrastructure along the coast and most critically the planning decisions that influence the location and nature of this infrastructure that determines the City's risk profile (Figure 2). With an increasingly transformed coastline, the presence of infrastructure within this dynamic space and the predicted impacts of climate change, there is a real threat that the opportunities the coastal environment currently provides will not only decrease into the future, but through continued inappropriate decision making and management interventions, the coast in itself will become an economic burden to the City. As it is now well known that the coast is a dynamic and unpredictable space, and that risk associated with the coast is expected to increase as a consequence of climate change, the City is developing planning mechanisms to more effectively guide and shape decisions to avoid the growth of risk into the future. The set-back is one such mechanism.



Figure 2: Hout Bay, Cape Town

A sediment by-pass system trying to re-establish itself and connect to Sandy Bay. It is not the migration of the dune system that is the problem, but rather the inappropriate decisions taken to allow infrastructure to be built in a high risk space *(Image courtesy of the Aerial Perspective: www.aerialphoto.co.za).*

The predicted impacts of global warming and the associated intensification of risk requires that there is a fundamental shift in the manner in which decisions are made in relation to the coast. Decision making needs to adopt a more risk averse approach, where the complex relations between coastal processes, infrastructure and risk management are taken into account. If the status quo remains

where there is a lack of a strategic city-wide decision support framework, decisions relating to coastal infrastructure and development will remain limited to an *ad hoc* and reactive and basis and risk to the city from the coast will increase.

There are multiple approaches, both globally and in South Africa, that have been used to manage the coast as a dynamic and risk space. According to Cartwright (2009) these approaches can be divided into six broad approaches:

1. 'holding the line', where coastal retreat from erosion is prevented through the installation of hard engineering interventions such as sea walls;
2. a phased retreat approach, whereby coastal infrastructure is re-aligned as a consequence of advancing coastal erosion;
3. socio-institutional learning, such as the establishment of set-backs to regulate development and activities along the coast;
4. biological responses (ecosystems-based management);
5. on-going decision making and iterative progress, and
6. 'do nothing and wait and see' approach where no intervention is undertaken to alter the status quo.

The City has developed a mechanism that has merged socio-institutional and biological responses, thus combining the merits of both, into a single strategy. Whilst socio-institutional responses include a range of approaches[5], this report is primarily focussed on the development of a coastal set-back for the City. Key to the success of any set-back line is the understanding of the unique local context within which the coast exists and to which the set-back will be applied. As set-backs have significant socio-economic implications, set-back methodologies must draw in and reflect localised social, economic and environmental interests. The application of set-backs to manage risk is not only the most cost effective approach from a cost benefit perspective (Figure 3), but it acts on the most critical issue: socio-institutional transformation through more appropriate and risk averse decision making. This approach will guide and shape decisions that are made in the sensitive coastal space, and it will ensure that the range of benefits and opportunities the coast provides will be retained and enhanced into the future. Thus, this socio-institutional and biological approach will ensure that when decisions are made, these decisions will be made in the interest of the broader community.

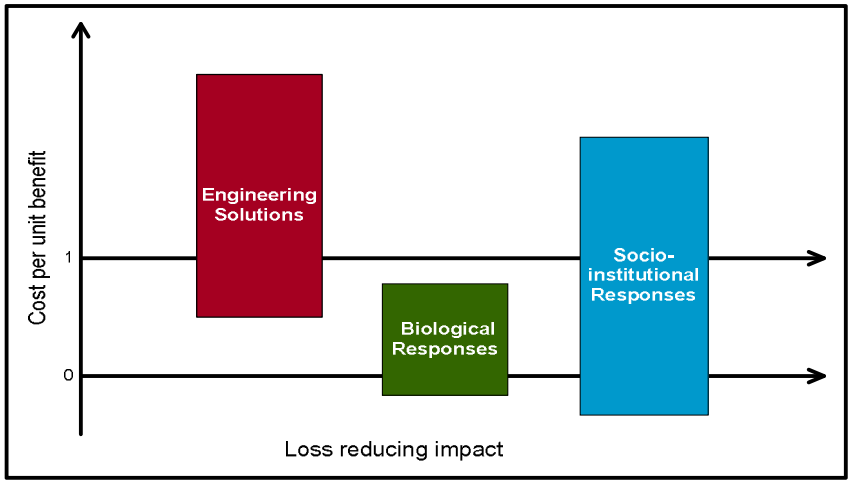


Figure 3: Cost benefit of a range of coastal protection interventions

A stylised representation of the range of cost benefit per unit for engineering, biological and socio-institutional responses (Source: Cartwright, 2009).

[5] Other socio-institutional responses include vulnerability mapping, application of coastal legislation, research and monitoring, early warning systems, disaster management systems etc. (Cartwright, 2008). Whilst the City has these in place, the intention of this report is to focus on the City's coastal set-back.

3.2 14 Key principles in developing a set-back

There are 12 key principles that are critical towards achieving an effective and pragmatic set-back. These 12 key principles are identified as (taken from Colenbrander *et al,* in press*)*:

1. The coast must be acknowledged as a complex and connected space, where social-ecological systems are inherently linked;
2. The social, economic and environmental implications of set-backs require that set-back methodologies shift away from a myopic focus on modelling biophysical risk to a more inclusive multi-disciplinarity that draws in socio-economic and broader environmental dimensions;
3. Risk from coastal modelling must be treated as indicative and not absolute;
4. Adopting a multi-disciplinary approach is key to aiding municipal planners to identify and navigate the tensions that arise out of the process of defining set-backs at a localised scale;
5. The inclusion of localised socio-economic and environmental dimensions is central to the effectiveness of set-backs, ICM and ultimately sustainable coastal development;
6. As local contexts require local solutions, set-back methodologies must be developed and grounded within local realities;
7. In the case where set-backs are defined internally within municipalities, municipal authorities must be capacitated. The capacitation of municipalities must be seen as the preferred alternative as with capacitation comes both institutional memory and local knowledge of the coast. It is this 'grounded' knowledge that is likely to yield set-backs that are connected to the social, economic and environmental nuances of the coast and which is critical in developing an effective and pragmatic set-back;
8. Set-backs must be developed in a way that promotes their integration into locally developed planning and building regulation schemes;
9. Practicality and simplicity: the coastal zone is a complex space. The effectiveness of a set-back is largely dependent upon its practical application;
10. Risk from coastal hazards is a shared problem. The development of set-backs to manage this risk must be founded on a collectively determined resolution between authorities and the public: the process must determine the outcome;
11. The determination of set-backs must be an iterative process informed by scientific, practitioner and community based knowledge;
12. The process of defining set-backs requires negotiation and dialogue over meaningful periods of time with I & APs;

These principles have been applied in the determination of the City's set-back. Based on these principles, the set-back forms the foundation from which to stimulate and promote the triple bottom line: economic development and access to the coast, the improvement of livelihoods of coastal communities through promoting economic and social opportunities whilst simultaneously reducing risk and finally the preservation of coastal ecosystems and associated goods and services.

The coast of South Africa is remarkably variable, in both socio-economic and biophysical attributes. Even within the city, there are vast differences in the socio-economic and biophysical attributes of the False Bay coastline compared to that of the West coast. These localised differences necessitate that local solutions are developed for local conditions. It is these unique conditions that must determine the informants used in developing the methodology for determining set-backs. In the case of Cape Town, it is the combination of a highly urbanised coastline interspersed by fragmented swathes of undeveloped land together with vastly differing socio-economic conditions along the coast that has largely influenced the City's set-back methodology.

3.3 A complex urban and peri-urban coastal environment: a practical approach

Cape Town is a metropolis. Much of the coastline has already been developed extensively, in many places up to the HWM. In some places, such as Sea Point and the Foreshore, reclamation has taken place. The coastline has therefore been completely altered in certain areas. However, interspersed between these developed segments of the coastline are stretches of undeveloped land retaining functional coastal ecosystems. It is these vastly differing segments of coastline and associated socio-economic attributes that has necessitated a practical approach towards defining a set-back that works for the City.

The placement of set-backs has real implications for property owners, especially where property may fall within (seaward of) set-backs. The implications are varied, but the most significant being the potential devaluation of the property as a consequence of set-backs defining risk zones. The recent experience in the Overberg District Municipality is a case in point where the process of defining the set-back line was met with much negativity and in some cases the position of the set-back was contested (DEA&DP, 2011). Considering that different models yield different results based on different input parameters and the subsequent uncertainty surrounding the prediction of risk from storm surges, coastal erosion and sea-level-rise, challenging the position of the set-back in relation to cadastral boundaries was fully justified.

Due to the presence of private properties with existing development rights in close proximity to the high-water mark, and the potential legal challenges that may arise through including properties within set-backs, the City has deliberately excluded properties with development rights from the City's draft set-back. This approach applies to properties with development rights that are potentially at risk from storm surges and coastal processes. Through adopting this approach, and as a general, rule of thumb, the City's draft set-back line follows the most seaward cadastral boundary of properties with development rights in developed areas. The opposite is true for less developed sections of the coast (land predominantly owned by the City) where coastal ecosystems are still intact and as such the City's set-back is extended further inland based on additional key informants. A detailed description of these informants is provided in Section 4: Key Informants in the Delineation of Cape Town's Set-back.

This approach has resulted in the following outcomes:

- A practical approach that seeks to achieve uncomplicated outcomes;
- This approach has enabled the City to focus on the priority areas of less developed coastal stretches;
- In these less developed areas the City is in the position to prevent inappropriate decision making (Figure 2, 5, 11 and 18 refers) in terms of coastal development recurring and increasing into the future;
- As a consequence the City's social risk profile is reduced;
- Reduce the unnecessary burden of environmental legislation on already developed footprints;
- Develop appropriate spatial planning mechanisms and equip the City to address and manage existing infrastructure at risk to coastal processes and storm surges, and These attributes have in turn resulted in majority (97%) public support and buy-in to the City's set-back.

This approach has been undertaken to get the 'basics' right first: prevention of further inappropriately located development along less developed stretches of the City's coast. As a consequence of this approach, and the deliberate exclusion of private property with existing rights from the draft set-back, there is a substantial amount of property and infrastructure that is located landward of the draft set-back, but is still at risk from storm surges and coastal erosion (Figure 4).

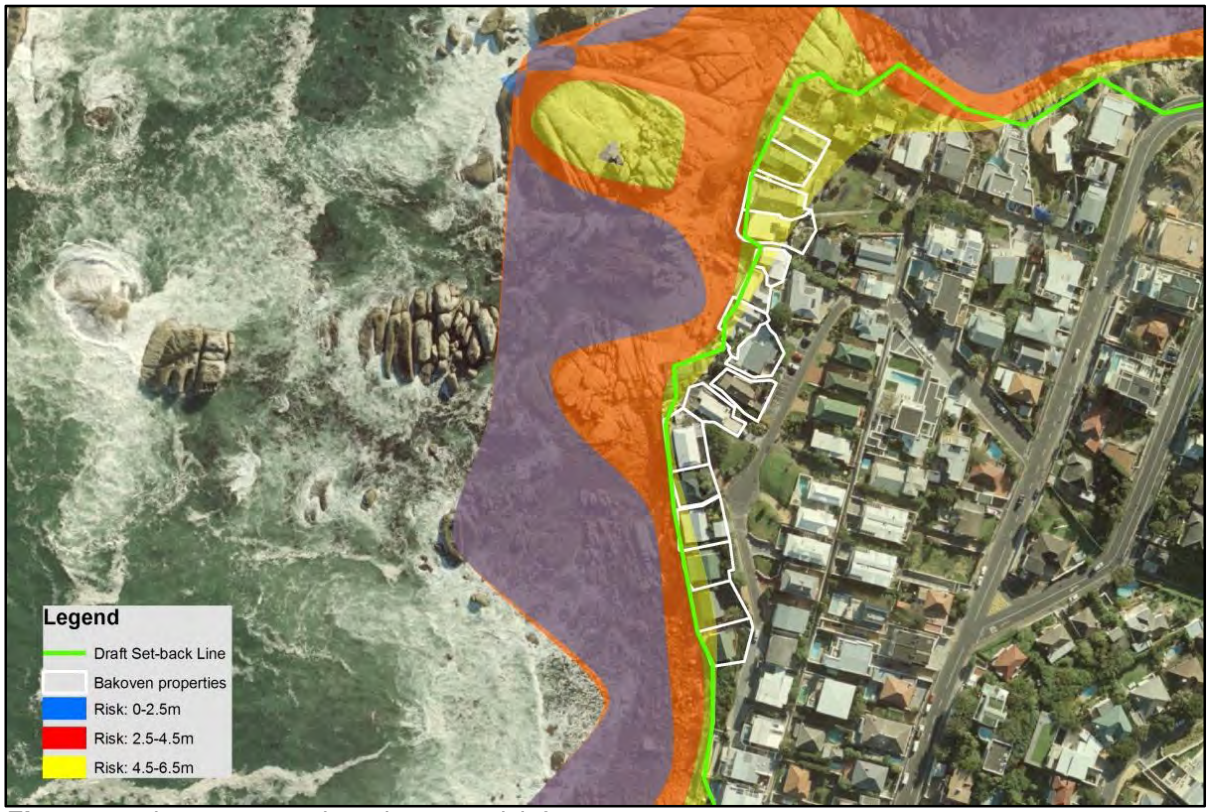


Figure 4: Private property in Bakoven at risk from storm surges

Properties such as these are on the landward side of the City's draft set-back but are still at risk from storm surges. Many of these properties can no longer claim insurance for damage caused by storm surges. Addressing this requires additional supportive regulatory frameworks (Section 8).

Addressing existing property at risk is a complex matter as it draws in legalities relating to property rights and impacts on property values. This cannot be adequately addressed through the application of another set-back. In addition to this set-backs are not designed nor equipped to address existing infrastructure at risk. Due to the ineffectiveness of set-backs in retrospectively responding to risk, the management of risk in these circumstances requires additional supportive regulatory mechanisms and is best dealt with through a policy approach. Although not directly linked to the City's method of defining a set-back, this report provides further detail on these regulatory mechanisms and the City's Integrated Coastal Management Policy (Annexure M) to give a broader context to the method and process in defining set-backs and how the City intends to manage existing infrastructure at risk into the future. This detail is covered in Section 8: Process Forward: Supportive Planning and Regulatory Mechanisms for the City's Set-back.

3.4 Table Mountain National Park

Cape Town's coastline is approximately 307km long. Of this, 67km (22%) of the length of this coastline falls within Table Mountain National Park. This land is administered by the South African

National Parks. In addition to national park land, there are other parcels of land that are located along the coast within the City's area of jurisdiction, but which is not administered by the City. Examples of these parcels of land include land surrounding the Koeberg Nuclear Station (Eskom), crown land and ports (National Ports Authority). As the City does not have any jurisdiction over this land, the City has not demarcated a set-back within these parcels of land. The City's existing draft set-back is therefore not contiguous for the entire length of coastline but is punctuated by gaps reflecting these various parcels of land.

4. METHOD: KEY INFORMANTS TO THE DELINEATION OF CAPE TOWN'S SET-BACK

The intention of a set-back line is to guide planning decisions to promote sustainable coastal development whilst simultaneously retaining and enhancing the ecosystems services provided by our coastal resources. To achieve this, it is important that the key coastal issues themselves are used to inform the process of defining a set-back. The effectiveness of a set-back is therefore largely dependent on our ability to grasp coastal issues at the local level and which span a variety of disciplines. Adopting a trans-disciplinary approach assists in the development of a more holistic understanding of the coast and the nature of connections between the various informants. This approach is paramount in efforts towards achieving the City's goals of retaining the coast as an asset and increasing the opportunities the coast provides into the future. Based on this trans-disciplinary approach, the following key socio-economic and environmental informants have been used in delineating the City's set-back line (Section 4.1. to 4.5 details how these informants were incorporated into the City's set-back):

- The socio-economic imperative of promoting access to the coast and redressing the inequalities of South Africa's past of exclusion;
- Risk from sea-level rise, storm surges and coastal erosion;
- Risk from coastal dynamic processes;
- The need to retain the sense of place, coastal aesthetics and heritage value of the coast;
- Protection of coastal systems and processes, and
- The importance of retaining biodiversity as a central pillar towards addressing these challenges.

Whilst these informants have been listed separately, there are strong connections between them. For example, by protecting coastal biodiversity corridors, not only are coastal aesthetics and sense of place retained, but the buffer potential that these systems provide to storm surges is retained. This in turn reduces the potential for transferring risk to coastal communities. The recreational and amenity value of the coast as an important social asset is also retained. The recognition of the coast as a coupled socio-economic and environmental system is critical not only in the process of defining a set-back but is central to the principals of ICM.

4.1 Set-back informant one: promoting access to the coast

The coast of Cape Town is an important socio-economic asset. Considering the vast inequalities of coastal communities along the City's coastline, and South Arica's apartheid past, it is imperative that previously disadvantaged communities are afforded the same opportunity to gain access to the coast to improve their livelihoods as did the ruling white minority in the past. The presence of communities

along the Cape Flats coastline is an example of 'Environmental Apartheid': different races were forced to live separately in terms of the Group Areas Act. In addition to this, certain races were forced to relocate to less desirable areas that are subject to harsh environmental conditions which include persistent and strong winds, wind-blown sand, salt spray etc. The Cape Flats is no exception. The desire to improve the livelihoods of previously disadvantaged communities through tapping into coastal resources of the Cape Flats coastline must therefore be balanced with avoiding risk arising from the harsh environmental and coastal conditions. Finding this balance between promoting access to the coast whilst remaining risk averse is critical and requires in-depth research. In the event of inappropriate coastal planning, the City unintentionally generates risk. Paradoxically, this risk is then transferred back to the local community to which such developments were intended to benefit.



Figure 5: Macassar Pavilion

Macassar Pavilion was developed to promote access to the coast through enhancing the recreational and amenity value of the coast. However, due to its location in a harsh environmental space exposed to strong south easters and wind-blown sand, the Pavilion is now derelict and subject to anti-social behaviour of prostitution, crime and drug abuse. The risk associated with these social ills has been transferred to the local communities to which this Pavilion was originally supposed to benefit.

Realising the impacts on spatial form of City development as a consequence of coastal set-backs, the process of designating coastal access was drawn into the principles contained within the set-back methodology. The City has identified two tiers of access according to the scale at which access is promoted along the coast. The first scale, or macro scale, is at the level of promoting broad scale socio-economic benefits through connecting communities to the coast by means of nodal growth. The second tier or micro scale is at the level of promoting safe and environmentally sensitive access to the beach via designated access paths, i.e. shoreline or coastal access. The City's set-back has been established with the intention to promote and enhance both tiers of access.

4.1.1 Macro scale access: nodal growth points

The intent to address the inequalities of the past through connecting communities to the coast via development, and ensuring that this development takes place in nodal rather than strip form is

reflected in the CT:SDF. The CT:SDF has identified a number of nodal growth points along the City's coastline. Current priorities are Silwerstroomstrand on the west coast as well as Strandfontein, Mnandi and Monwabisi in the Cape Flats region of the False Bay coastline. Along the False Bay coastline, where the need to promote access to the coast is more intense, nodal growth areas were identified in a study entitled *Rapid Planning Review of Potential Future Development Areas along False Bay Coastline* undertaken in 2009 (Annexure A). The study area focussed on the stretch of coast between Strandfontein and Monwabisi and investigated future urban development opportunities for the Cape Flats coastline. The study included the following:

- The development of a concise synthesis of strategy and policy imperatives that inform development along the coast;
- The identification of key development challenges and opportunities experienced within the study area;
- The identification of zones for development opportunity along the relevant section of the coastline;
- The identification of a set of guiding principles that should inform development proposals along this stretch of coastline, and
- A detailed analysis of the local biophysical informants that may restrict development at the identified zones of opportunity (CCT, 2009).

The outcomes of the study identified four key coastal nodal development opportunities at the sub-regional scale. These four nodal points were identified as Monwabisi, Mnandi, Blue Waters and the Strandfontein Pavilion (Figure 6).

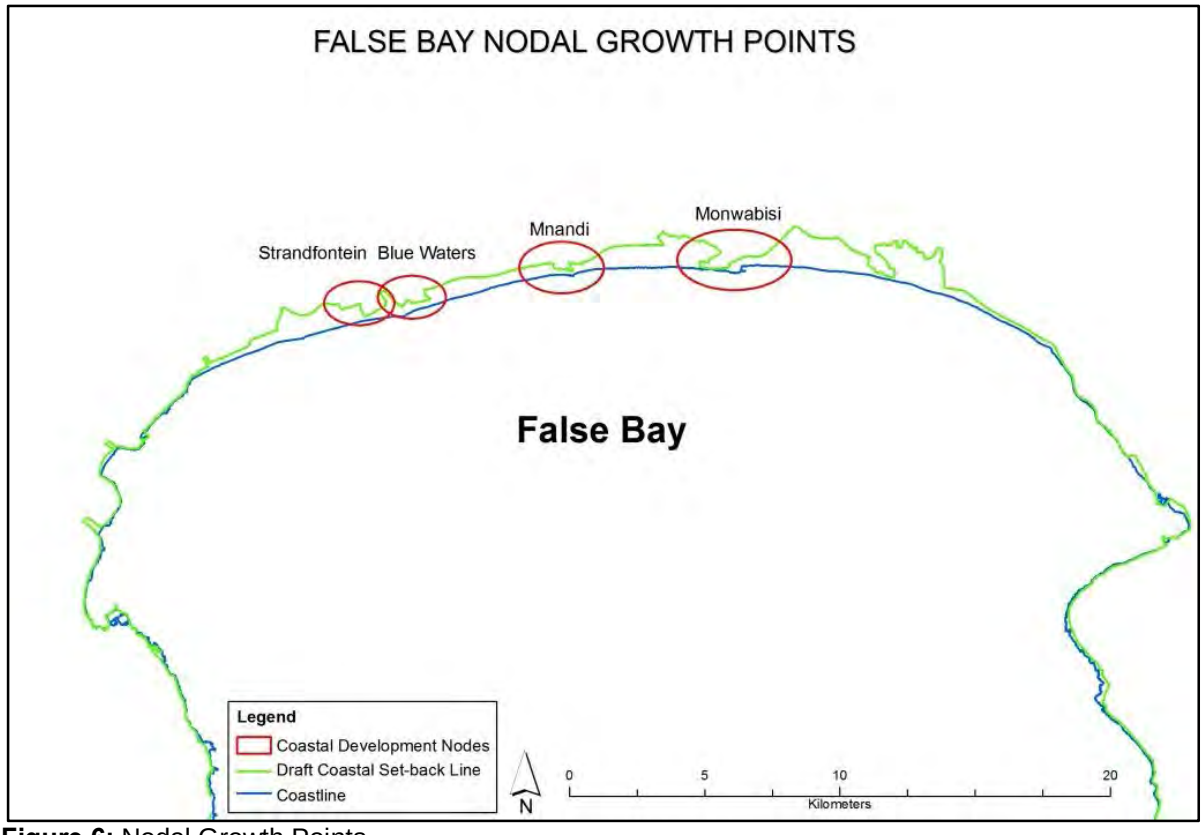


Figure 6: Nodal Growth Points

The four nodal growth points identified for the False Bay coastline

Provision was therefore made for these growth points in defining the City's coastal set-back. Although these nodal growth points have been defined in terms of the need to promote access to the coast, the specific footprint of these nodal growth points were further refined based on key informants of biodiversity corridors, dynamic coastal processes, risk from sea-level rise and storm surges etc (Figure 7). When funding is available and development does take place with these nodal growth points, more detailed studies as well as environmental authorisations will be required to limit the impact to the broader environment and to ensure that social risk to coastal hazards is reduced.

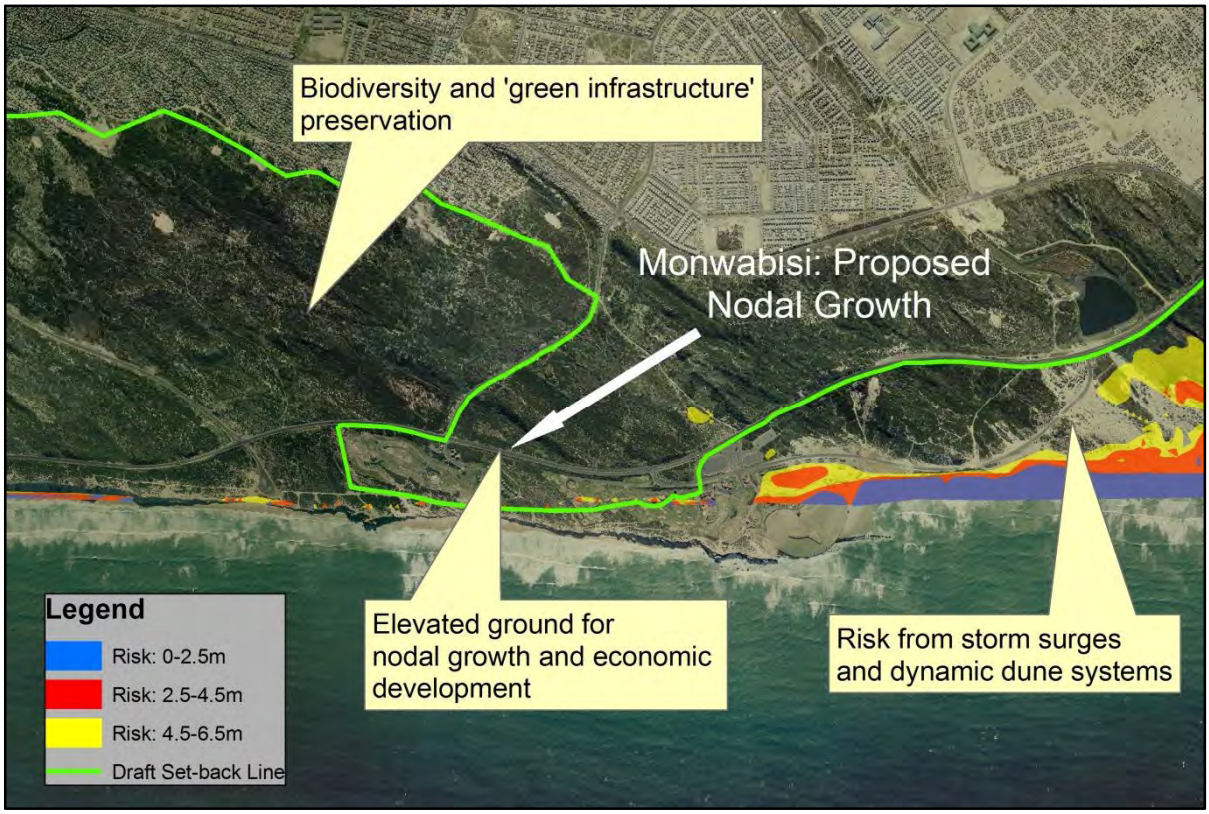


Figure 7: Monwabisi Coastal Resort

The City has defined a set-back that both promotes access to the coast through nodal growth whilst simultaneously ***retaining 'green infrastructure' and*** *demarcating areas to be avoided due to sea-level rise, storm surges and coastal dynamic processes.*

4.1.2 Micro scale access: access to the beach

As important as it is to unlock the economic potential of the coast through nodal growth points, it is similarly important to retain access to the coast on a smaller scale through designated coastal access paths. Access to the beach may become compromised due to a number of factors. The greatest threat to equitable access to the beach is strip development and subsequent privatisation of the coast (Figure 8).



Figure 8: Privatisation of the coast, Salt Rock, KZN

Access to the beach by the general public along this stretch of coast in KZN is severely compromised.

The only remaining access points along this stretch of coast in KZN are isolated servitudes, where there is little or no space allowed for supporting amenities such as car parks, showers, ablutions etc. (Figure 9). The City does not wish to repeat this.



Figure 9: Servitude at Salt Rock KZN

No space left for supporting amenities.

Through the promotion of nodal development along remaining less altered coastlines, coastal areas will remain accessible to all, and these access points will be supported by the necessary amenities.

4.2 Set-back informant two: sea-level rise, storm surges and coastal erosion

The City completed a Sea-Level Rise Risk Assessment (SLRRA) in 2009. The intention of the assessment was to:

- Spatially model the predicted sea-level changes in a range of scenarios (time series, incremental climate change, shear events, and storm frequency and intensity);
- Model the form that those changes will take;
- Understand the associated impacts on existing coastal systems, infrastructure and property;
- Provide guidance on and information about implications for future coastal development;
- Identify high risk areas that are prone to high impact, and
- Begin to understand and develop long-term adaptation and mitigation measures against these coastal hazards.

The outcomes of this research has enabled the City to make more informed decisions in terms of future planning, preparedness and the promotion of risk averse decision making along the City's coastline. The term 'risk' in itself is subjective and requires careful consideration. In understanding and managing risk, key questions need to be considered: What is risk? How do different sectors perceive risk? What are the drivers of risk? How is risk experienced and how does it manifest across different scales? In acknowledgement of the complexity of the term 'risk', the City's SLRRA was undertaken in five different phases. These phases included:

Phase 1: Sea-Level Rise Model (March 2008) (Annexure B)
Phase 2: Risk and Impact Identification (May 2008)
Phase 3: Quantifying the Risk (June 2008)
Phase 4: Sea-Level Rise Adaptation + Risk Mitigation Measures (July 2008)
Phase 5: Full investigation of alongshore features of vulnerability on the City of Cape Town coastline (December 2009) (Annexure C)

Whilst the SLRRA examined risk from both a physical and socio-economic perspective through these various phases, Phases 1 and 5 focussed primarily on physical risk and the most appropriate responses to manage this risk respectively. Phase 1 and Phase 5 were therefore key phases in the development of the City's set-back in terms of addressing risk from physical coastal processes. More emphasis has therefore been placed on Phase 1 and 5 in this report (full reports provided as Annexures B and C) whilst Phases 2 to 4 in this report are limited to brief descriptions.

4.2.1 Phase 1: spatially modelling sea-level rise and storm surge events through GIS

As a starting point to understand physical risk from sea-level rise and storm surges, a Geographic Information System (GIS) was used to develop the risk model. This model spatially demarcates areas that may be physically impacted upon by storm surges and sea-level rise. This model was developed based on the following scenarios:

- Scenario 1: Present Day Worst Case Scenario;
- Scenario 2: Sea-level Rise Scenarios Into the Near Future, and
- Scenario 3: Sea-level Rise Scenarios after the Collapse of the Polar Ice Sheets.

As there is much uncertainty regarding the timing, extent and acceleration rates of the polar ice sheet melt and the eventual contribution to sea-level rise and coastal erosion, Scenario 3 has not been used to inform the development of the City's draft set-back. The report will therefore focus on Scenarios 1 and 2.

Scenario 1: Present Day Very Worst Case Scenarios

This scenario presents the current worse case storm surge and is based on the simultaneous occurrence of an extreme tide[6] and an extreme storm, an event with a nominal return period of 500 years (Brundrit, 2008). Such an event has not occurred along the Cape coast in recent years but it did occur along the KZN coast on 19th and 20th of March 2007. Measurements[7] were taken from this extreme storm in KZN and were incorporated into the Present Day Very Worst Case Scenario, particularly in respect of exposed and very exposed portions of the coastline. Based on the degree of exposure, three inundation levels were determined and built into the model. These three inundation levels (Figure 10) include the following:

- Land Levelling Datum (LLD) +2m in sheltered environments;
- LLD+4.5m above mean sea-level in exposed environments, and
- LLD+6.5m above the mean sea-level in very exposed environments

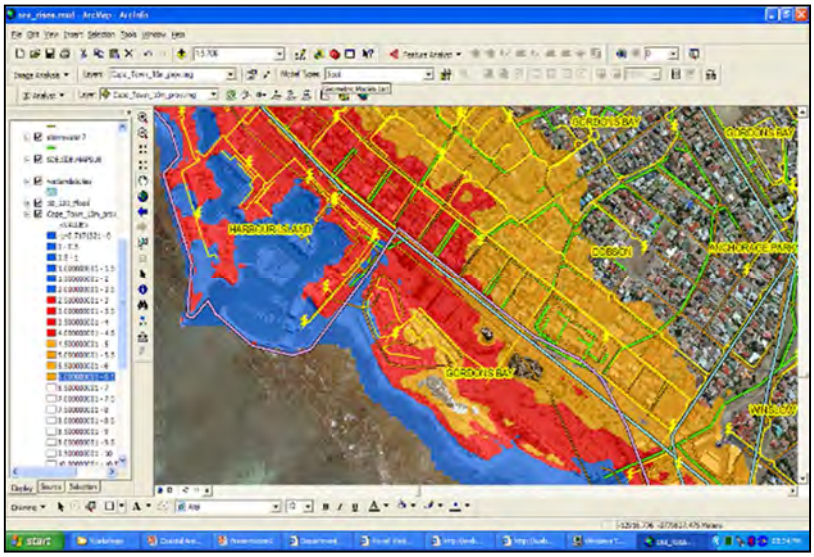


Figure 10: Flood risk scenarios for the City over the next 25 years

The inundation levels in the model are depicted in different colours for analytical purposes namely; blue, red and orange for LLD +2m, LLD+4.5m and LLD+6.5m respectively. With these scenarios, the inundation levels are not considered permanent, but rather as levels of temporary inundation typically experienced during a storm surge event[8].

Scenario 2: The Scenario at the End of the Next Decade

This scenario models the likely trends into the future based on increased storminess and sea-level rise. Global observations indicate a statistically significant rise in sea-level of approximately 50cm over the next decade (Brundrit, 2008).The levels used in Scenario 2 and the details of the inundation to be expected are the same as Scenario 1. However, with the incremental rise in sea-level and the

[6] Highest Astronomical Tide of the Year (HATOY)
[7] Key statistics include a return period of 30 years and an erosion line consistently located between the 4m and 5m contours.
[8] This model assumed the coast as a homogenous environment and applied a 'blanket' approach to the entire coastline as the initial investigation. The coastline does however vary and has localised biophysical factors that influence risk. In acknowledgement of this, the City undertook a final investigation in Phase 5 as a means to fine tune this model and disaggrate risk by incorporating the local biophysical factors. The outcomes of Phase 5 are covered in more detail in Section 4.2.5.

expected increase in storminess[9], it is the return period that is expected to change. Rather than being a Very Worst Case Scenario with a return period of 500 years, Scenario 2 is expected to occur whenever an extreme storm occurs at the same time as any (fortnightly) spring high tide in the spring or autumn (Brundrit, 2008). With the expectation of storms becoming more frequent, in conjunction with the incremental rise in sea-level, the scenario at the end of the next decade becomes realistic rather than an unusual event and hence is used to predict the expected trends for the Cape Town coastline (Brundrit, 2008).

4.2.2 Phase 2: risk and impact identification

The main objectives of Phase 2 of the SLRRA were to:

- Determine the manner in which risk manifests as a consequence of sea-level rise impacts (coastal erosion, direct and indirect inundation of infrastructure, disruption of services, loss of habitat, etc.) and how this will affect the City of Cape Town.

- To develop an understanding of potential sea-level rise impacts based on Scenarios 1 and 2 on the present infrastructure and amenities along the City's coastline. Information was gained through hosting workshops primarily at an operational level across multiple departments responsible for City infrastructure and services, natural resource management, commercial and residential property and policies for ensuring compliance. Information from the workshops provided detail on the linkages between the expected impacts, and consolidated priorities.

4.2.3 Phase 3: quantifying the risk

Phase 3 of this study described and quantified the risk of sea-level rise for the City. This study involved drawing on projections of sea-level rise for the Cape Town coastline based on the projections determined in Phases 1 and 2, and assessing the socio-economic risks that might be associated with this phenomenon; more specifically, quantifying and detailing the risks to the City of Cape Town and its citizens of sea-level rise over a time period of 5-100 years.

In determining the economic impact the study relied on a collection of three proxy values – measures as a means to quantify economic loss:

- The first proxy value applied is the loss of real estate as the coastline becomes increasingly exposed to storm surges and existing properties are damaged and vacant land becomes both uninsurable and undesirable for development;
- The second proxy variable applied in this analysis is foregone tourism revenue. The Cape's coastline and beaches contribute to the City's tourism appeal, and
- As a third proxy, the cost of replacing certain public infrastructure that could be damaged by sea-level rise was included.

This economic impact is therefore represented by the formula:

$R_e = f_e \sum$(loss of private property value + loss of tourism revenue + loss of public infrastructure)

Where f_e represents the probability of a sea-level rise event e, where "e" is a sea-level rise event as described in Scenarios 1-3 (Cartwright, 2008).

[9] Increase in storminess is not restricted to mid-latitude cyclones, but also increases in intensity and duration of south easterlies (and subsequent south easterly driven wave chop) arising from the south Atlantic high pressure system.

Table 1: Quantifying the risk based on the flood risk scenarios over the next 25 years

25 years	Inundation level 1	Inundation level 2	Inundation level 3
Seal-level	2.5m	4.5	6.5
Probability in next 25 yrs.	95%	85%	20%
Threatened value	R5.2 billion (US $500 million)	R23.8 billion (US $2.3 billion)	R54.8 billion (US $5.4 billion)
Value at risk	R4.9 billion (US $490 million)	R20.2 billion (US $2 billion)	R11.0 billion (US $1.1 billion)

It should be noted that the City is unlikely to be confronted by the full extent of these costs in a single storm surge event; that would require the simultaneous impact from a storm surge at all points around the coastline and we know that due to local biophysical conditions that vary greatly along the City's coastline, the run-up of such events will vary significantly according to the location of the coast. Rather, the figures represent the cumulative risk and costs over a 25 year period at all points along the coast (Cartwright, 2008). In addition to this, these values are based on the assumption that the loss of tourism revenue, property and infrastructure is absolute rather than partial.

4.2.4 Phase 4: sea-level rise adaptation and risk mitigation measures

Phase 4 of the report aimed to identify adaptation and management measures to lower the risk profile of the City. This was undertaken by assessing the broad costs and merits of different approaches used to counter the impacts of sea-level rise in conjunction with storm surge events. It was found that the risk of sea-level rise could be significantly reduced by proactive socio-institutional responses to the problem. The Phase 4 report has outlined a number of measures and their costs and benefits that could be considered to reduce sea-level rise and storm surge risk for the City of Cape Town under the categories of:

- First resort: No regrets options – a risk averse approach;
- Second resort: Additional socio-institutional measures – i.e. development of set-backs;
- Third resort: Additional biological measures – an ecosystems based management approach, and
- Last resort: Additional physical measures – the use of hard engineering structures.

Based on the identification of the various adaptive options, comprehensive feedback was provided to officials that participated in the workshops held for Phase 2. This provided an enabling platform for a participatory approach with multiple stakeholders to determine trade-offs that might arise from the implementation of climate change adaptation measures. Further to this, this phase substantiated the importance of proactive measures and the potential long term consequences of deteriorating economic conditions from runaway climate change (Cartwright, 2008).

4.2.5 Phase 5: investigation of longshore features and adaptation options

Phase 5 of the SLRRA consisted of two reports. The first report was used to further refine the model generated in Phase 1 through the consideration of local biophysical factors that influence risk from storm surge events. The report distinguished areas in terms of their exposure to risk based on alongshore features such as wave set-up and wave run-up, wave shoaling, off-shore bathymetry, swell diffraction into shadow zones, focussing effects, coastal geomorphology as well as the extent and nature of coastal development. Included within this report are how these local biophysical factors interact with each other and how these interactions affect degrees of risk.

Based on this report, a total of 19 locations (Tables 2, 3 and 4 and Figure 12) were identified as being vulnerable. The vulnerability was determined by a binary assessment of four biophysical factors, namely wave-setup, wave run-up, coastal geology and development risk. A score of 1 was allocated to those areas that are perceived to be exposed to storm surges, and a score of 0 was given if the location is not exposed to that component. The assessment was conducted using the expert opinion of a group consisting of local oceanographers, coastal management practitioners and engineers, all of whom were drawing on in-depth knowledge of the city's coastline. The assessment not only provided a reasonable measure of the total sea-level rise risk at a given location, but it also provided important insight into the specific nature of sea-level rise risk at different locations.

Table Bay

Table Bay is an area of gently sloping bottom contours and a sandy coast fringed by low dunes and occasional rocky outcrops. Part of the coast is sheltered by Robben Island. The coast is eroding in the south, and is particularly vulnerable where it is backed by the lagoon of Diep River.

Table 2: Components of sea-level rise vulnerability for Table Bay

Location	Wave set-up	Wave run-up	Coastal geology. Hard or soft surfaces.	Development risk	Comment
Melkbosstrand	1	0	0	1	Exposed to big swell, but with some shelter from offshore reefs and a shallow bathymetry. Beachfront development and dune removal is problematic.
Blouberg (Bay)	1	0	0	1	Sheltered behind Robben Island, the beach should be an area of sand accretion. However, extensive development has encroached too close to the waterline. Protection is needed.
Tableview beachfront	1	0	0	1	Exposed to big waves, where the Beach Road will become at risk. Protection is needed.
Milnerton beach	1	1	0	1	Exposed to big waves and, at high tide, surging breakers. This is an eroding beach with a diminishing steep dune cordon. Potential major issue if the protection

					to Otto du Plessis Drive is lost.
Milnerton to harbour	1	0	1	1	Shadow zone, no big waves. Harbour construction has led to gradual erosion and set-back, with on-going loss of coastal infrastructure. Sea wall needs constant maintenance. Oil pipeline is strategic.

Atlantic Coast

The Atlantic Coast is a rocky coast with cliffs, offshore reefs and extensive kelp beds. Deep water is found close to the shore, permitting big waves to crash onto the coast so that protection is needed for any infrastructure at sea-level.

Table 3: Components of sea-level rise vulnerability for the Atlantic coast

Location	**Wave set-up**	**Wave run-up**	**Coastal geology. Hard or Soft Surfaces**	**Developmen t Risk**	**Comment**
Green Point & Sea Point	1	0	1	1	Exposed to big waves, but some shelter from offshore reefs. The coast is on an exposed wave cut platform at some height above the sea, but needs the protection of a strong sea wall requiring continuous maintenance.
Glen Beach	1	0	0	1	A small pocket beach with some protection. High value beach houses are exposed.
Camps Bay	1	1	0	1	This beach is exposed to big waves. Wide beach, but high sea-levels can reach the Beach Road.
Bakoven cottages	1	1	1	1	Very exposed to big waves and wave run up, and constantly under threat, as the houses are low down and on a hard rocky surface.
Kommetjie	1	1	0	1	Very exposed as deep water close inshore. Development has taken place in the protective dune field, reducing its effectiveness.
Witsands	1	1	0	0	Very exposed single building in dynamic dune field.

False Bay Coast

The western side of False Bay is steep and well sheltered from waves approaching from the south west. Within False Bay, the bottom contours are gently shoaling to the sandy northern shores. The eastern side of False Bay is steep.

Table 4: Components of sea-level rise vulnerability for the False Bay coast

Location	Wave set-up	Wave run-up	Coastal Geology. Hard or Soft Surfaces	Development Risk	Comment
Glencairn	1	0	0	1	Railway line running along a low wave-cut platform. Sheltered in shadow zone, but perhaps the foundations of the railway line in the backing wetland need continual maintenance.
Fish Hoek dune section	1	0	0	0	In shadow zone, but backing wetland may lead to vulnerability.
Kalk Bay	0	1	1	1	In shadow zone from southwest, but exposed to focussing from the south-east, so that harbour provides some protection.
Muizenberg corner	1	0	0	1	In the edge of the shadow zone, but protected by a wide and very flat beach with spilling breakers.
Strandfontein – Baden Powell Drive / Treatment Works / Landfill	1	0	1	1	Not too exposed but the road and the infrastructure are too close to the water's edge.
Monwabisi and Macassar Pavilions	1	1	0	1	Exposed to surging breakers at high tide and during storm events, with erosion of dune field.
Strand (entire beach front)	1	0	1	1	Exposed beach with protection from offshore reefs, but infrastructure constructed close to water and poorly planned sea-walls.
Bikini beach	1	0	0	1	In swell shadow, but infrastructure too close to water and needs protection.

					Beach sand erodes.

The identification of the vulnerable areas based on the influence of local biophysical factors and the subsequent disaggregation of risk has been key to the process of understanding risk at a localised scale. A great deal of risk from sea-level rise and storm surges can be removed by timely interventions, but deciding exactly how to respond and who should take responsibility is difficult. The second report of Phase 5 therefore focussed on determining ways and means of ensuring a coherent and strategic approach towards prioritising actions and promoting consistent decision making with respect to managing this risk. The nature of risk from sea-level rise and storm surge events requires that set-backs are complimented by additional regulatory mechanisms. A holistic overview of coastal regulatory mechanisms and how they link together is provided in Section 8.

4.2.6 Comparative study: actual wave-run up vs. modelled predictions

This study was undertaken as an addendum to Phase 5 of the SLRRA. On the 31st August 2008 the city experienced an extreme storm surge event. A sub-tropical cyclone developed approximately 600km west of Cape Town and at the same time a secondary severe low pressure system also developed which resulted in a case of explosive cyclogenesis. The combination of these low pressure systems resulted in significant erosion and damage to infrastructure along the city's coastline (Figure 11).



Figure 11: Storm surge event on the 31st August 2008

Coastal erosion at the Milnerton Golf Clubhouse.

The purpose of this study was to draw a comparison between actual wave run-up[10] heights at vulnerable locations (Figure 12) experienced by the 2008 storm with the City's model as well as the model developed by Mather *et al* used to predict extreme wave run-up heights.

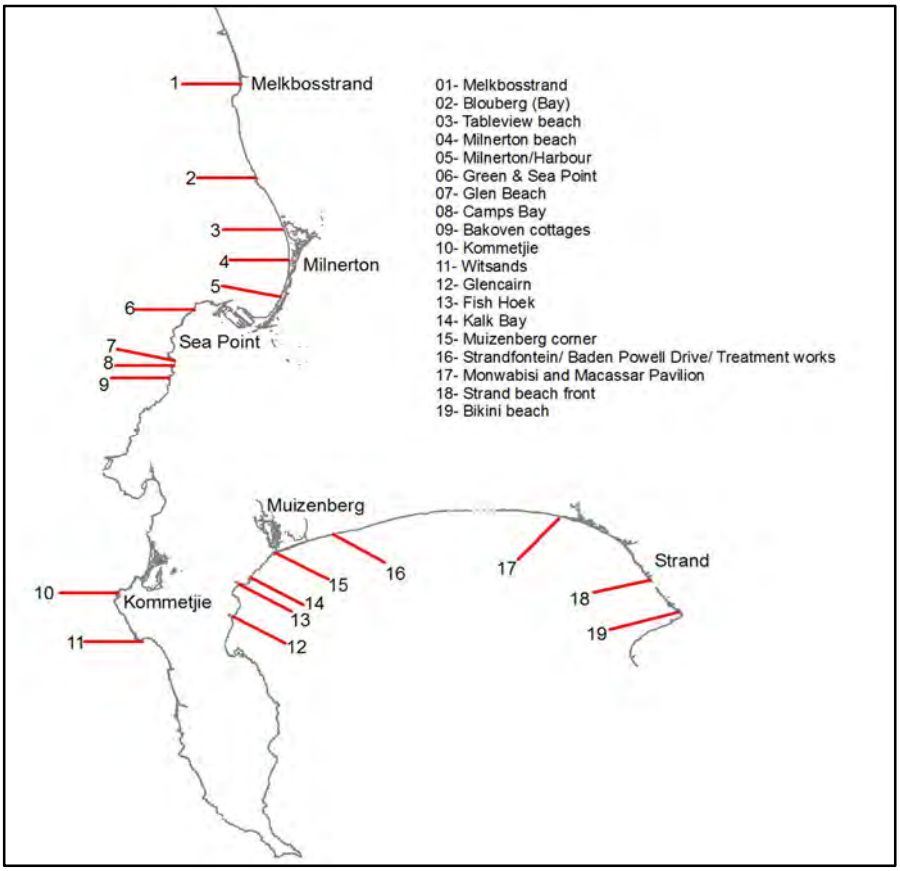


Figure 12: Vulnerable areas of the City's coastline

Being able to accurately predict wave run-up heights is an important component in the development and placement of set-backs. The Mather *et al* model is generally accepted as the most robust wave run-up model in South Africa and as such was used for one of the comparisons. The model uses distances offshore x_h to water depth *h* to estimate a near-shore profile slope as $S = h/x_h$ where the depth of closure is the suggested choice for *h*. Extreme run-up R_x is then expressed in terms of S as $R_x/H_0 = CS^{2/3}$ (Mather *et al,* 2011)(Figure 13).

[10] Extreme wave run-up may be defined as the maximum level, relative to the still water level reached by a wave or by a series of waves (Mather, *et al*, 2011).

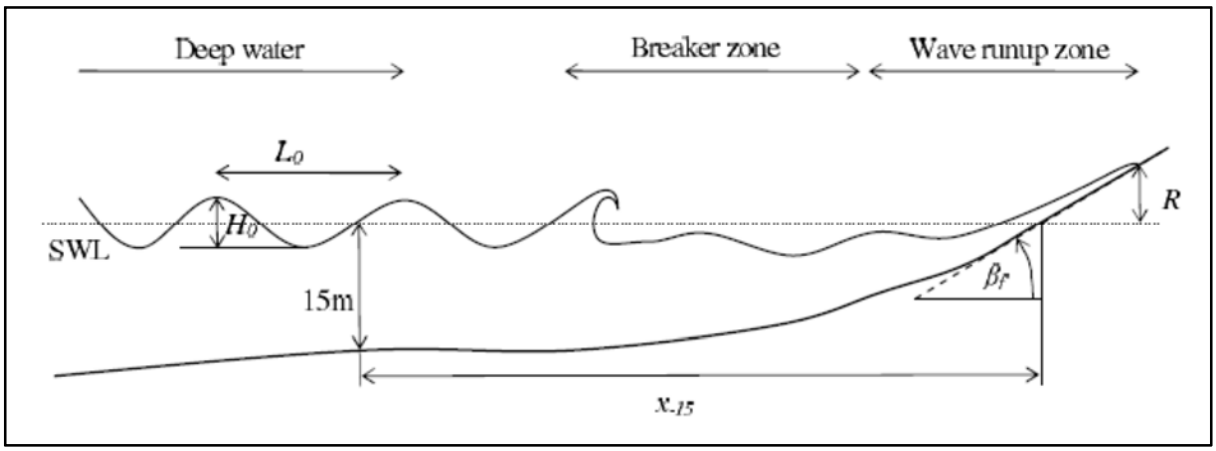


Figure 13: Parameters used in the Mather *et al* model

R is the run-up value, x_{15} is the chart distance from the shoreline to the 15m isobath, H_0 is deep water significant wave height (Source: Mather et al, 2011).

In the equation as $R_x/H_0 = CS^{2/3}$, C is a dimensionless coefficient that is used to predict wave run-up based on different coastline types. Figures for upper/lower bounds and median values are shown in Table 5.

Table 5: Coefficients for the various types of coastline used in the Mather *et al* model

Coastline Type	Upper Bound	Median	Lower Bound
Open coast	$C = 10$	$C = 7.5$	$C = 3.0$
Large embayment	$C = 10$	$C = 5.0$	$C = 3.0$
Small embayment	$C = 10$	$C = 4.0$	$C = 3.0$

(Source: Mather *et al,* 2011)

In the comparative study the coefficients used in the model were selected in accordance with the median values as suggested by Mather *et al*. The results indicate that there is some variation between the predicted wave run-up between both the City's as well as the Mather *et al* model and the actual wave run-up measurements taken from the August 2008 storm surge event (Annexure D). In some instances actual wave run-up exceeded the predictions from both models (Figure 14) and in other areas, the actual wave run-up was less than the height predicted.



Figure 14: Hout Bay - modelled risk compared with a real life event.

Actual wave run-up height measured with a differential GPS from the 31st August 2008 storm surge event overlaid with the City's SLRRA model.

The variation in results between an actual event and modelled predictions are to be expected. This is because there are a number of variables that may have non-linear relationships that interact over time and space. This complexity cannot be adequatly represented by an empirical model. Some of these anomolies include scalar influences in identifying the appropriate coefficicent value to represent coastline type, the influence of wave set-up and tidal levels during the event and local oceanographic and atmospheric influences, such as swell refraction, swell shadow, wind direction and wind strength during the event. Additional surf zone influenes include infra-gravity waves, swash action and incident wave energy that may influence wave run-up height (Mather, *et al* 2011). Lastly, and perhaps most critically, is the influence of erosion that may take place during a storm surge event. Erosion during an event alters the beach and dune profile which will influence wave run-up heights. In addition to this, overtopping rates, especially in cases where the topography may subside landward of the dune cordon, may increase during a storm surge event.

Based on the results from these comparisons , the following may be deduced:

- Risk based on modelled outcomes should be treated as indicative rather than definitive;
- Risk cannot be pinpointed absolutely: there are a number of influencing variables that may interact over temporal and spatial scales with non-linear relationships that cannot be measured absolutely, and
- The results highlight the importance of ground truthing and taking into consideration the influence of local biophysical factors as opposed to applying models across broad scales based on a desktop analysis.

4.3 Set-back informant three: coastal dynamic processes

There are a number of processes that make the city's coastline a highly dynamic space. At a broad scale, these processes are largely driven by the two major atmospheric conditions: namely the sub-tropical-driven cyclones in winter and the mid-Atlantic high pressure system driving south easterlies in summer. The following processes were identified to determine the dynamic coastal process zone along Cape Town's coast:

- Wind-blown sand and migrating dune systems;
- Migrating estuary mouths, and
- Coastal erosion.

Key to identifying and understanding the behaviour of these processes was the local knowledge of municipal authorities. This knowledge was gleaned from a core group of municipal coastal practitioners that have a combined experience of 60 years of managing the city's coastline. Understanding these processes through this detailed knowledge is fundamental in planning for coastal processes through the use of set-backs.

4.3.1 Wind-blown sand and migrating dune systems

Historically speaking, many of Cape Town's dune systems were highly mobile wind-driven systems which migrated inland beyond the existing urban coastal fringe. This extensive development has had two primary consequences. Firstly, many coastal processes, such as sediment by-pass systems, are no longer functioning which in turn is having an impact on sediment budgets along the city's coastline (Figure 15). In some regions this is resulting in beach regression and coastal erosion. The second impact of this extensive development is that the space in which these dynamic processes function, has been encroached upon. As the drivers of these migrating dune systems are by-enlarge still in place i.e. south easterly winds and sediment supply from the sea, these migrating systems are constantly in the process of reforming in the remaining littoral active zone in an attempt to follow their historic pathways. The end result is the encroachment of sand onto coastal infrastructure and property.

Given the context that Cape Town has developed into a metro, the City has applied a practical approach towards delineating coastal dynamic zones. Whilst these zones have the potential to re-establish themselves to their historical pathways, allowing them to do so would have major financial and service delivery implications to the city and its citizens.



Figure 15: Historic sediment by-pass system in Hout Bay

Development has severely compromised this sediment by-pass system.

Due to the extent the City's coastline has been developed and considering the impracticality of relocating infrastructure from these dynamic spaces, the City cannot re-establish these historical pathways. Instead the City has used the draft set-back to demarcate remaining dynamic spaces and within these remaining spaces apply management interventions to mitigate the impacts of these dynamic processes on the built environment (Figure 16).



Figure 16: Position of the draft set-back in Hout Bay

An example of demarcating remaining dynamic systems in Hout Bay. The set-back has been positioned along the urban fringe where such systems will be actively managed.

Conversely, in peri-urban and rural areas, where existing wind-driven dune systems are largely intact, the set-back has shifted further inland to demarcate these spaces (Figure 17) as a means to prevent the same mistake of inappropriate development (Figure 2, 5, 11 and 18 refers) in dynamic zones from recurring into the future.

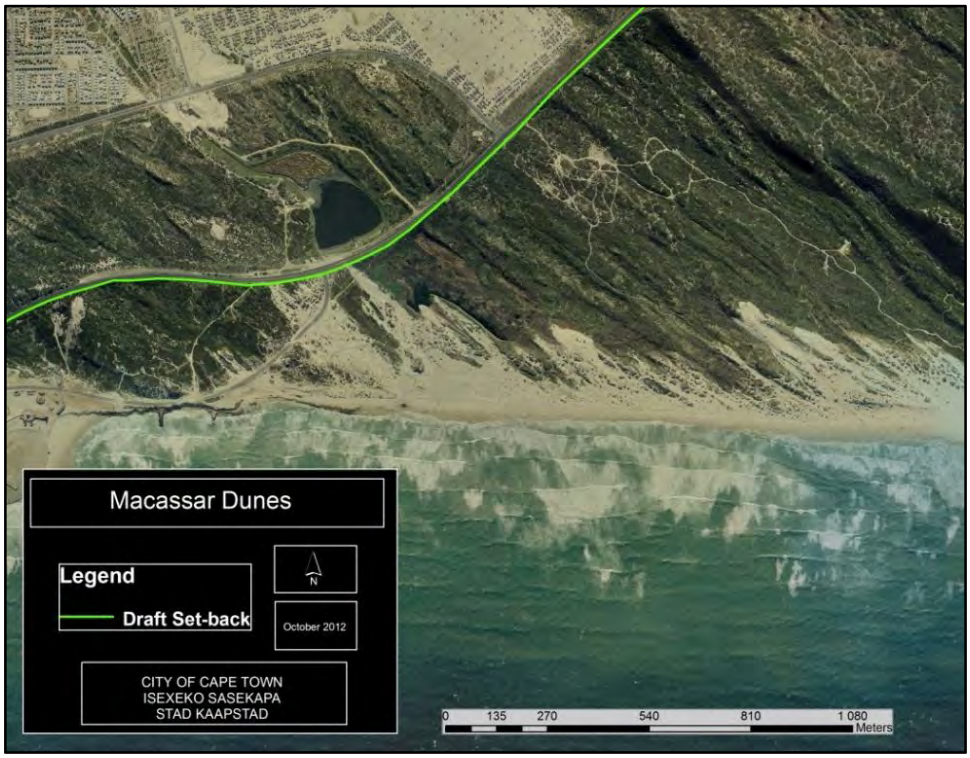


Figure **17**: Position of the draft set-back in Macassar

It would be unwise to allow development seaward of the draft set-back due to the presence of a highly dynamic wind-driven sand environment and the social risks that would arise as a consequence.

4.3.2 Migrating estuary mouths

The direction, timing and rate of migrating estuary mouths are impossible to predict. The City of Cape Town has numerous estuaries that are subject to this unpredictable movement. In the past, such migration has resulted in coastal erosion which in turn has undermined and damaged critical infrastructure (Figure18).



Figure 18: Macassar Pavilion and the Eerste River

Damage to the Macassar Pavilion (foreground) and a sewer pump station (background) due to the westward migration of the Eerste River mouth.

As a consequence of the potential destruction that migrating mouths may cause together with their unpredictable nature, the City's set-back has been positioned with the intent to create space to allow estuaries to migrate as they would naturally do along less altered stretches of the City's coast. Whilst conservative estimates may be applied in defining areas in which estuaries are expected to migrate, the presence of private property in close proximity to some estuaries (typically in developed stretches of the coast – Figure 19 refers) necessitates that the same principle is applied whereby the set-back, as a means to avoid the legal implications that may arise as a consequence of the position of a set-back in relation to private properties with development rights, is defined on the estuary side of the cadastral boundary of those properties. Whilst this approach avoids the legal difficulties, properties located landward of the set-back adjacent to estuaries may still be at risk to estuarine related risk: i.e. erosion, storm surge induced flooding etc. Again set-backs in isolation are not equipped to respond to existing infrastructure at risk and requires the application of planning mechanisms to manage the

complex matter of existing property at risk to coastal hazards. In these cases overlay zones will be developed and applied. Overlay zones are discussed in more detail in Section 8.1.1.



Figure 19: Diep River Estuary

Estuary mouths in built up areas are no longer able to migrate as they would naturally do.

4.4 Set-back informant four: scenic drives, aesthetics and sense of place

The City is world renowned for its aesthetics and coastal beauty. Much of Cape Town's beauty is witnessed in transit along Cape Town's extensive road network. However, development that has no regard for or does not contribute to the value and experience of scenic routes tends to have a significant negative impact on Cape Town's scenic value. It is for this reason that the City has implemented a Scenic Drive Network Management Plan (SDNMP). This management plan identifies routes which traverse areas of outstanding scenic quality in Cape Town and attempts to establish a sustainable balance between the conservation of its associated natural and built amenities and the development of the tourism and recreational potential linked to these routes (CCT, 2003).

The SDNMP has identified a total of 57 scenic routes throughout the City, 17 of which fall within or border[11] the City's coastal draft set-back (Table 6).

[11] The management unit of a scenic drive consists of the Scenic Drive Envelope (SDE). The SDE consists of carriageway, the road reserve immediately adjacent public land and the first erven abutting any of these.

Table 6: Scenic Drive Routes falling wholly or partially within the City's draft set-back

Route	Route Name	Start Point	End Point
2	Main Road	Smithswinkel	Muizenberg
4	Witsand Main Road	Plateau Rd	Slangkop Rd
5	Soetwater Main Road	Witsand Rd	Slangkop Rd
6	Slangkop Road	Kommetjie	Witsand Main Road
7	Glencairn Expressway	Main Road	Kommetjie Main Road
11	Chapman's Peak Drive	C. Peak Hotel	Die Hoek Lookout
16b 17a	Princess Street Victoria Rd	Victoria Rd Victoria Rd	Hout Bay Main Rd Princess Street
17b	Victoria Road	Victoria Rd	Bakoven
17c	Victoria & Beach Roads	Bakoven	Portswood
18	Camps Bay Drive	Kloof Nek	Victoria Rd
25a	Atlantic & Roal Roads	Atlantic/Main Rd	Sunrise Circle
25b	Baden Powell Drive	Main Road	CCT boundary
35	Melkbosstrand Road	N7	West Coast Road R27
36a &b	Otto Du Plessis Drive	Melkbos urban area	Marine Drive
36c&d	Marine Drive R27	Ott Du Plessis	Racecourse Rd
38a	R44 / Beach Rd-North	Study area boundary	Lourens River Crossing
38b	R44 / Beach Rd-East	Lourens River	Beach/Faure Marine Dv

Whilst the priority of the set-back is to reduce risk to the City, the alignment of the set-back with scenic routes along sections of Cape Town's coastline will compliment and assist both the SDNMP and the ICMA (section 25(1)(a)(iii)).

4.5 Set-back informant five: biodiversity betwork

The City's Biodiversity Network (BioNet) has been approved nationally as a fine-scale plan for the City. The BioNet, in conjunction with the need to promote access to coastal resources, is the central pillar to the set-back in less altered stretches of the coastline. The BioNet has been used as the 'baseline' layer from which to achieve the broader objectives of the set-back. For this reason the City has ensured that the draft set-back, as far as possible, is aligned with the BioNet along the coastal fringe. This alignment is critical to ensure that the objectives of both the BioNet and the set-back are achieved under a single strategy.

The determination of the BioNet was based on the National Vegetation Type target percentages as determined for the 2004 National Spatial Biodiversity Assessment and was applied at the city level to recognise vegetation subtypes (CCT, 2009). The preservation of the BioNet is fundamental towards addressing the following socio-economic imperatives:

- Retaining aesthetics and sense of place (cultural benefit);
- Improving the buffer potential against storm surges, coastal erosion and wind-blown sand as a means to reduce the social risk and build resilience (regulatory benefit);
- Improve the recreational and amenity value of the coast (provisional benefit), and

- Promote equitable access to the coast through the retention of green corridors as opposed to strip development (cultural).

The BioNet was determined in 2009 through a systematic conservation planning approach as a means to prioritise remnant indigenous vegetation based on factors of connectivity, habitat condition, and location of rare and endangered flora (CCT, 2009)(Annexure E). A product of the systematic conservation planning approach was the BioNet GIS shapefile. The BioNet GIS shapefile was generated through a combination of software tools, namely C-Plan and Marxan. After extensive ground truthing of vegetation remnants from 2007 to 2008, C-plan was run using habitat condition as an additional informant. Following this analysis Marxan was applied. A key attribute to the Marxan software is its capability (through the Boundary Length Modifier Tool) of identifying additional remnants required to improve connectivity among selected remnants and thus determine feasible corridors in the BioNet[12] (CCT, 2009).

Biodiversity corridors are important in preserving ecological processes such as the dispersal and migration of plants and animals which in turn is necessary to conserve healthy populations in the long term (CCT, 2009). In acknowledgement of the importance of these corridors, the City's draft set-back was defined based on the presence of corridors in the coastal belt. Where the BioNet corridors abutted the coast, the set-back line was delineated on the landward side of these corridors (Figure 20). The BioNet is the nationally recognised fine scale conservation plan; as such it must be integrated with the set-back line.

[12] In addition to the identification of corridors, the conservation planning analysis through the application of C-Plan and Marxan also identified 59 different vegetation types in the city. These vegetation types were in turn categorised according to conservation status. A total of 10 categories were identified. Further detail on this is available in Annexure E.

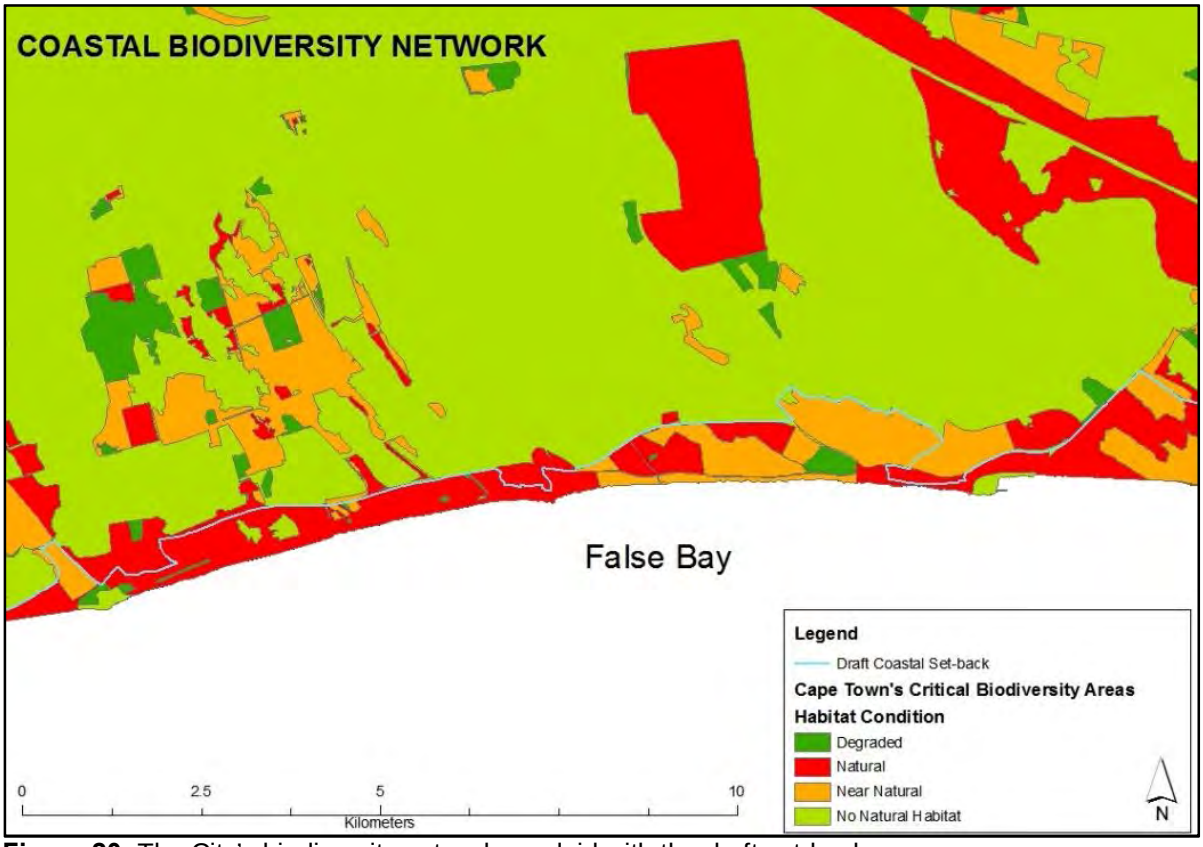


Figure 20: The City's biodiversity network overlaid with the draft set-back

The presence of biodiversity corridors in the coastal belt was a key informant to defining the City's set-back. In this case the set-back is positioned to include a critical corridor between Strandfontein and Macassar.

5. ESTUARIES

A total of 12 estuaries have been identified for inclusion within the City's set-back (Table 7).

Table 7: Estuaries identified within the City of Cape Town

	Name	**Location**	**Coordinates**
1	Sout River	Melkbosstrand	18˚26'40.464"E and 33˚42'47.927"S
2	Diep River (Rietvlei)	Milnerton	18˚29'4.598"E and 33˚53'22.89"S
3	Disa River	Hout Bay	18˚21'22.202"E and 34˚2'40.636"S
4	Bokramspruit	Kommetjie	18˚19'57.633"E and 34˚8'3.659"S
5	Else River	Glencairn	18˚25'53.349"E and 34˚9'37.508"S

6	Silvermine River	Fish Hoek	18˚26'40.464"E and 33˚42'47.927"S
7	Zandvlei	Muizenberg	18˚26'20.122"E and 34˚7'77.946"S
8	Zeekoe	East Beach	18˚30'17.762"E and 34˚5'54.308"S
9	Eerste River	Macassar	18˚45'13.402"E and 34˚4'43.777"S
10	Lourens River	Strand	18˚48'39.034"E and 34˚6'0.187"S
11	Sir Lowry's River	Gordon's Bay	18˚51'53.622"E and 34˚9'20.016"S
12	Steenbras River	Steenbras Nature Reserve	18˚49'9.883"E and 34˚11'41.348"S

The City's set-back has only been defined within City administered land. Thus estuaries falling within Table Mountain National Park (TMNP) (Table 8) were not included in the City's estuary delineation process.

Table 8: Estuaries falling within Table Mountain National Park

	Name	Location	Coordinates
1	Wildevoelvlei River	Kommetjie, TMNP	18˚20'35.833"E and 34˚7'38.679"S
2	Schuster River	Cape Point, TMNP	18˚22'15.265"E and 34˚12'7.361"S
3	Krom River	Cape Point, TMNP	18˚22'42.243"E and 34˚13'51.391"S
4	Buffels River	Cape Point, TMNP	18˚27'42.415"E and 34˚19'5.653"S

Besides those rivers located within TMNP, the only other river that has been excluded from the set-back delineation process is the Salt River in the Paarden Eiland industrial complex. The Salt River is canalised and is not considered a functional estuarine system. Whilst there is a risk element of flooding from the Salt River canal, this element is addressed through the City's Floodplain and River Corridor Management Policy and Storm Water By-law (Section 5.2, Annexure F and G respectively).

5.1 Method: delineating the City's estuaries

Water courses that are classified as being either permanently or temporally open to the sea are defined as estuaries. The spatial extent of estuaries, in terms of the requirements of the ICMA, may be defined based on a variety of parameters. These parameters may be split according to two broad categories: the inland reach of estuaries (vertical) and the width of estuaries (lateral). The vertical extent of estuaries is determined by:

- The inland point at which tidal influence is no longer measurable, or

- The inland point at which salinity is measurable higher as a consequence of the influence of the sea, or
- The landward most limit of either of the influences (whichever influence penetrates furthest inland).

The lateral extent of estuaries may be defined based on the following parameters:

- The location of the 50 year flood line in relation to the estuary up to the estuaries inland limit, or
- The location of the 5m contour in relation to the estuary up to the estuaries inland limit, or
- The spatial extent to which vegetation associated with estuarine environments is present.

A status quo analysis of data sources applicable to estuarine delineation was undertaken (Table 9). The following data sources were identified:

- Van Niekerk, L., & Turpie, J. K. (2012). *South African National Biodiversity Assessment 2011: Technical Report. Volume 3: Estuary Component*. CSIR Report Number CSIR/NRE/ECOS/ER/2011/0045/B. Council for Scientific and Industrial Research, Stellenbosch (Annexure H)
- Catchment Management Department, City of Cape Town: 50 and 100 year delineation of selected estuaries (Due to the sheer size of these reports, they have not been included as annexures. They are however available upon request).
- Geomatics Department, City of Cape Town: Digital Elevation Models extracted from LiDAR data (spatial data available upon request).

Table 9: Analysis of data sources available for estuary delineation

Data source	Description	Advantages	Drawbacks
Catchment Management Department, City of Cape Town: 1985-2003	50 and 100 year estuary floodlines were determined by external consultants commissioned by the City. These delineations were based on advanced modelling which considered a wide range of factors.	*Reliability*: In-depth detailed studies conducted by external consultants taking into account a wide range of factors (e.g. topographical surveys, backwater analyses, surface roughness coefficients and vegetation cover). *Transparency*: Detailed meta-data available in all cases but one (Disa River, Hout Bay)	*Reliability*: Studies sometimes conducted as long ago as 1985. Floodplain for the entire river, not only the estuary, needs to set a boundary inland. *Transparency*: Lack of meta-data in the case of the Disa River.
CSIR 2011	Delineations based on digitized Spot 5 imagery (dating back from 2008), the estuaries' lateral boundaries were delineated based on "associated wetlands, intertidal mud and sand flats, beaches and foreshore environments that are affected by riverine or tidal flood events" (Edgar 2000, cited in Van	*Validity:* Data up to date, as lines drawn in 2011, some floodplains were delineated based on on-site inspections.	*Reliability*: Study takes into account a smaller account of input factors, coarse delineations. 5-meter contours were used, but not as accurate as elevations generated by LiDAR

	Niekerk and Turpie 2011, p.31) as well as 5-meter contours from the Chief Directorate Surveys and Mapping, or digitized based on orthophotos when the Directorate data was lacking. "Where no orthophotos were available (13 systems[13]), floodplains were mapped from Spot 5 imagery using changes in topography and vegetation types as indicators. The estuary mouth was taken as the downstream boundary of an estuary or, where the mouth was closed, the middle of the sand berm between the open water and the sea. The upstream boundary was determined as the limits of tidal variation or salinity penetration, whichever penetrates furthest. Wherever possible the upstream boundary was derived from the literature, expert judgment or field observations". (Van Niekerk and Turpie 2011, p. 31-32).		data. *Transparency*: The CSIR has not detailed which methodology, or combinations of methods it has applied per estuary.
Geomatics Department, City of Cape Town: 2009	Digital Elevation Models in raster format (pixel size of 2*2) extracted from LiDAR remote sensing data, and useful for delineating extremely accurate contours.	*Accuracy*: LiDAR data- (XY +- 30cm, Heights +- 15cm), and 5m contours generally a good proxy for delimitating 50 year floodplains (Van Niekerk and Turpie 2011, p. 34-35).	*Validity*: coarse, only takes into account topography, not other factors such as soil porosity, vegetation cover, much space for interpretation (where to set the estuary mouth).

The City, through the application of GIS, overlaid the relevant spatial layers per estuary for the entire coastline of Cape Town. The individual analysis of each estuary in relation to the spatial data allowed the City to develop a holistic perspective of the spatial extents, both vertically and laterally, of the 12 estuaries. Based on this analysis, each estuary was delineated as part of the City's set-back.

5.1.1 Developed flatlands: flood lines and the 5m contour

[13] Within the City, this applied only to the Steenbras River.

Some of the City's estuaries are located in areas where the topography is flat. Notably this includes estuaries along the False Bay coastline, in particular the Zandvlei, Zeekoe, Eerste and Lourens estuaries. Applying the 5m meter contour to define estuaries in these instances becomes problematic as, due to the flat topography, the 5m contour includes extensive areas. The extent of these areas defined by the 5m contour is not representative of estuaries, estuarine vegetation nor does it provide a realistic representation of the area prone to flood risk. Though using the 50 year flood line refines the spatial extent, the 50 year flood line still includes significant areas that are developed adjacent to estuaries. These developed areas which are at risk to a 50 or a 100 year flood event, have not been included within the City's set-back. The same principle (as described in more detail in Section 3.3) applies whereby the City wishes to avoid impacting on development rights through inclusion of such areas within its set-back. A set-back is not equipped to solve and address the issue of existing development at risk and as such requires a more comprehensive planning mechanism in an overlay zone (discussed further in Section 8.1.) Such areas are also addressed through the Floodplain and River Corridor Management Policy (section 5.2 refers).

5.2 Beyond estuaries: the role of the City's Floodplain and River Corridor Management Policy and Storm Water By-law

Flood lines determined by the City's Catchment Management Department extend beyond estuaries and include water bodies within catchment headlands. These flood lines are supported by regulatory mechanisms developed by the City's Roads and Storm Water Department. A Floodplain and River Corridor Management Policy was approved by Council on the 27th of May 2009 and has been incorporated into the City's Integrated Development Plan. At a broad level, the policy, aims to:

- reduce the impact of flooding on community livelihoods and regional economies, and
- safeguard human health, protect natural aquatic environments, and improve and maintain recreational water quality

This policy in turn is regularised through the Storm Water Management By-law. Within the by-law, "Storm water system" is defined as:

"…both the constructed and natural facilities, including pipes, culverts, water courses and their associated floodplains, whether over or under public or privately owned land, used or required for the management, collection, conveyance, temporary storage, control, monitoring, treatment, use and disposal of storm water" (CCT, 2009).

The inclusion of "water courses and their associated floodplains" captures estuaries within the definition of a storm water system. Thus both the policy and the by-law become applicable to not only water bodies such as inland rivers, but estuaries too in a manner that:

- "limits or reduces exposure to flood risk by avoiding hazardous, uneconomic or unwise use of floodplains, thereby protecting life, property and community infrastructure;
- Protects and enhances the intrinsic value and the environmental goods and services provided by watercourses, wetlands and associated riparian areas and floodplains;
- Facilitates the beneficial integration of watercourses into urban landscapes by creating an aesthetically pleasing public resource which will ultimately allow for the social and economic upliftment of communities adjacent to watercourses and wetlands;
- Provide an effective decision making tool for officials, developers and consultants by introducing an element of predictability with regards to applications for development along watercourses/river corridors and adjacent to wetlands, and
- Promote sustainable development from engineering, environmental and socio-economic perspectives".

The objectives of the Floodplain and River Corridor Management Policy as well as Stormwater By-law is consistent with the requirement of the ICMA in terms of promoting risk averse decision making to water bodies from source to sea.

6. THE PUBLIC PARTICIPATION PROCESS

The establishment of set-backs have significant socio-economic implications, for both property owners as well as for communities. These may impact on property rights, value of property and real estate, opportunities to benefit from coastal resources through nodal coastal development, access to the coast, livelihoods etc. Consequentially engagement with stakeholders surrounding the position of set-backs is often emotionally charged and can be contentious. Considering this, and considering the complexity of coastal legislation, it is imperative that the stakeholder engagement process takes place over periods of time that allow and encourage dialogue and meaningful two-way communication between the implementing authority and Interested and Affected Parties (I&APs). This is key in allowing the process to determine the outcome.

Recognising the sensitivity required in this process of defining a set-back, the City purposefully engaged with I&APs on an informal basis over an extended period of time prior to undertaking the formal PPP. The intent of these engagements was essentially to co-produce knowledge between the public and City officials surrounding coastal issues and how the concept of set-backs can be used to address these issues.

6.1 Informal stakeholder engagement

The City's informal stakeholder engagement process was initiated in 2007 and continues today. It consists of the following:

- Informal engagements with rate payer associations across the City of Cape Town;
- Presentations to ratepayer and interest groups focussing on:
    - Identifying pressures along the City's coastline
    - Identifying the impacts of these pressures and understanding how these impacts are experienced
    - Legal mandate of the City to establish coastal regulatory mechanisms, especially set-backs
    - The City's proposed methodology for determining the draft coastal set-back
    - Obtaining feedback from the public as key to shaping the City's methodology
- Site inspections and 'demonstrations' with local ward councillors

This process culminated in the delineation of the draft set-back line which was in turn presented to the officials of each of the City's planning districts in 2010 for further input and consideration. Following from this process the City entered the formal PPP process.

6.2 Formal stakeholder engagement

Following from the informal stakeholder engagement process and consultation with the planning districts, the City further refined its set-back methodology and adjusted the position of the set-back accordingly. In addition to this the City developed a supportive draft by-law as a means to regulate activities in the space between the HWM and the draft set-back. Both the draft set-back and the draft by-law were taken through an extensive PPP process. Publicising of the draft by-law in conjunction

with the draft set-back enabled the public to not only determine the position of the draft set-back at an erf scale for the entire coastline, but it also enabled the public to gain an understanding of the regulatory context and 'meaning' of the draft set-back thus making the PPP transparent and effective.

6.2.1 The City of Cape Town's Spatial Development Framework public participation process

The City's draft set-back was incorporated into the CT:SDF, where it is termed the Coastal Urban Edge. The CT:SDF defines clear strategies and policy statements that will be used to guide the preparation of sector plans, lower-order spatial plans, detailed policies, guidelines and implementation plans and will also be used to assess development applications (CT:SDF, 2012).

The CT:SDF identifies the following key strategies applicable to the draft coastal set-back:

KEY STRATEGY 1:	Manage urban growth, and create a balance between urban development and environmental protection
Sub-strategy:	Encourage a more compact form of development
Policy Statement No. 23:	Contain the development footprint of the city, and protect natural, urban and heritage assets with development edges
Sub-strategy:	Appropriately manage urban development impacts on natural resources and critical biodiversity networks
Policy Statement No. 27:	Manage urban development along the coast in a sustainable and precautionary manner
KEY STRATEGY 3:	Build an inclusive, integrated and vibrant city
Sub-strategy:	Promote accessible, citywide destination places
Policy Statement No. 50:	Develop high quality, accessible destinations and public spaces in newly developed and neglected areas

These key strategies and policy statements are fundamental to the intents of the City's draft coastal set-back and were communicated extensively through the CT:SDF PPP (Annexure I)[14] from 2007 to 2010 (Figure 21).

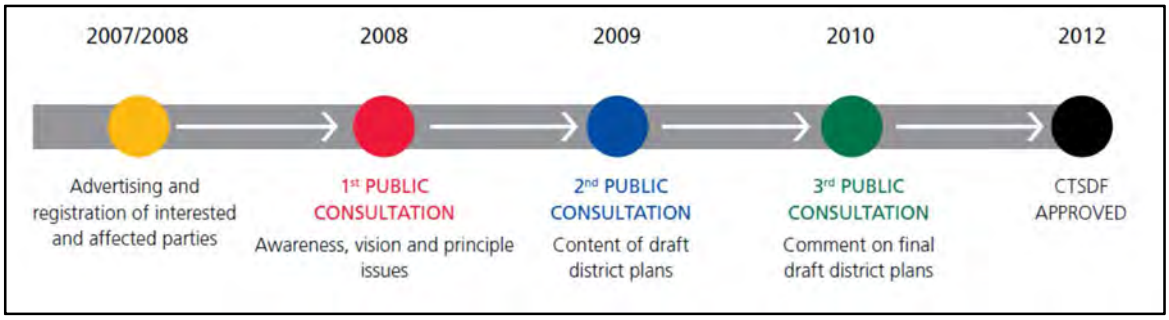


Figure 21: The City's Spatial Development Framework Public Participation Process timeline

6.2.2 Coastal by-law public participation process

[14] Sub-annexures to Annexure I are available upon request.

The City's draft coastal by-law was developed with the intent of regulating the space between the HWM and the draft set-back (further details on the City's by-law provided in Section 8.1.2). The PPP for the draft by-law was not only important for re-iterating the position of the proposed set-back, but critically it provided an opportunity for I&APs to gain an understanding of the context of the set-back and the potential implications the draft set-back would have for the public. The publicising of the draft by-law also enabled the public to make informed comments on the City's approach to developing coastal regulations. Whilst the by-law received 97% support (Annexure J: Comments Response Report), the draft by-law is currently being revised to ensure better alignment with the City's Planning Development and Building Management Department's regulations. When these revisions are complete, the draft by-law will once again be taken through the PPP.

7. COMPARISONS WITH THE OVERBERG DISTRICT SET-BACK DELINEATION METHOD

The City was represented on the Steering Committee: Development of a Methodology for Defining and Adopting Coastal Development Set-back Lines for the Western Cape Province. This process was completed in May 2010. The City played an active role in this steering committee and made recommendations based on the City's approach towards defining set-backs as well as sharing lessons learnt from the City's own stakeholder engagement process. It is noted that whilst this process was initiated by the Development Facilitation Unit of the of the DEA&DP with the intent to determine the official method for set-back delineation for the Western Cape Province, the subsequent set-back methodology applied in ODM deviated from the proposed Western Cape Provincial methodology. It is also noted that the method applied in the ODM was undertaken with a view to further refine the Western Cape methodology. The City has drawn a comparison between the method and process adopted in Cape Town with the method and process applied in the ODM.

7.1 Unique areas require unique solutions

Overberg District Municipality and the Cape Town metro are vastly different in many respects, not to mention the extent to which the City's coastline has been developed, altered and in some cases reclaimed. The highly altered and in many places 'fixed' coastline, as well as vastly differing socio-economic attributes brings unique challenges to the City. Naturally the City requires locally tailored responses to manage the city's unique coastal space. Even within the City's area of jurisdiction, the coastline varies significantly (i.e. from False Bay to the West Coast) not only in terms of physical attributes (including developed state) and oceanographic climate (such as bathymetry, swell shadow and wave set-up), but the socio-economic attributes along the city's coastline differ substantially as well.

Applying a standardised methodology across the Western Cape Province based on a set of generically determined and empirically orientated formulas does not empower municipalities to consider and factor in local nuances (both biophysical and socio-economic) that are critical in generating effective and pragmatic set-backs. For this reason, it is imperative that the determination of set-backs are rather guided by a set of regionally agreed upon principles which include that the set-back delineation process is undertaken at a local level by practitioners who have local knowledge and that in instances where the set-back is modelled, the position of the modelled portion of the set-back is ground-truthed. The ground-truthing of remotely modelled set-backs is critical to ensure that the line

on the map is in fact 'connected' to reality on the ground. These are key principles that the City has applied in the process of delineating its draft set-back and which differ to the method applied in ODM.

7.2 Timescales and public engagement

The Public Participation Process (PPP) for the delineation of the set-back in the ODM took place over a period of 6 months between 17th January 2011 and 22nd August 2011 (SSI, 2011). This consisted of two rounds of public engagement. Each round consisted of a total of 5 focus group meetings (in centrally located venues) as well as ad hoc telephonic, e-mail and face to face communication between Interested and Affected Parties (I&APs) during this period (SSI, 2011). The final round of public engagement followed a six week comment period (SSI, 2011).

The process of defining a coastal set-back for ODM was largely viewed in a negative light by the I&APs which may have been partly attributed to the misinterpretation of information provided (SSI, 2011). According to R. Cox (pers. comm., 28 February 212) the perception by I&APs was that such an exercise was "out of the blue" and that this sudden enforcement was reflective of an authoritarian style of governance which in turn led to this negativity and in some respects hostility. Perception, whether informed or not, has the potential to derail delicate discussions surrounding the establishment of set-backs. This is especially true where perception may be shared collectively amongst the public. In acknowledgement of the "power of perception" and the need to engage with I&APs over meaningful periods of time, the City proactively initiated engagement on both an informal and formal level. This process commenced in 2007 and culminated in the successful adoption of the CT:SDF and overwhelming support of the by-law (Annexure J).

7.3 Modelling, local biophysical factors and ground truthing

The method employed in the OMD is largely dependent upon empirical modelling which has been applied at a broad scale from remote desktop analysis. The application of these models over broad spatial areas is primarily a consequence of economies of scale: due to budget and time restrictions imposed on this project[15], the broad-scale application of models to determine physical risk is used as the most feasible means towards meeting budget and deadline requirements. Although such an approach reduces resources required, thereby enabling project consultants to meet deadlines and budget limitations, the budget and temporal limitations imposed also result in the exclusion of local biophysical factors in the determination of hazard areas. Local biophysical factors, such as bathymetry, swell shadow, wave refraction, beach profile and sub-straight have a significant influence on coastal erosion and wave run-up. It is therefore critical that these local elements are incorporated into the process of modelling and determining hazard areas.

The City, in its 5th and final phase of the SLRRA, fined tuned the original model developed in Phase 1 by collating data on local bio-physical attributes and factoring this data into the model (Section 4.2.5 and Annexure B). This enabled the City to identify a total of 19 vulnerable locations as identified in Tables 2, 3 and 4 and Figure 11). Further to this, the finer resolution study has enabled the City to disaggregate risk per location and thus more accurately determine the landward extent of hazard areas. Within an urbanised environment this is critical in the development of coastal planning and building development regulations.

[15] This is by no means deliberate, but merely a product of the fiscal structures of governning bodies which are largely infleunced by budgetary expenditure being restricted to annual cycles.

7.4 Socio-economic dimensions, spatial planning and urban design

The ODM methodology makes recommendations as to the importance of aligning and integrating the set-back with local spatial planning schemes, as the two should not be treated as mutually exclusive, but rather mutually dependant. Whilst the coastal set-back should be used as the primary informant to shape spatial planning schemes along the coastal fringe to promote risk averse coastal development, spatial planning schemes are also largely shaped by socio-economic priorities and at times may be in conflict to the objectives and 'position' of a coastal set-back. This is especially so considering the perception that coastal frontage property equates to economic wealth and gain as well as the potential the coast offers in addressing the legacy of the apartheid era through redistribution of resources. Whilst it is clear that the two mechanisms need to be aligned, the method in the ODM is largely silent on how this can be practically and measurably achieved. Again this may be attributed to the limitations under which the relevant consultants had to work.

Whilst the City has relied on the use of a model to determine hazard areas, the identification of hazard zones forms only one component of the broader process of defining the City's set-back. The consideration of socio-economic and politicised factors requires stakeholder engagement over meaningful periods of time at a site specific scale. This is not only critical to ensure that the set-back is workable, effective and practical, but that the set-back is aligned to, and meets the needs of the local spatial planning schemes. Due to the socio-economic disparities and resulting priorities along the city's coastline, the City initiated the process of engaging with coastal communities and ward councillors at the outset of determining its draft coastal set-back in 2007. This local level engagement process was used to gain a sensitive understanding into the various socio-economic pressures and imperatives present along the coast. A key outcome of this process was the stark realisation of the lack of access to the coast (and associated opportunity) for previously disadvantaged communities. This led to the identification of key coastal nodal growth areas (Figure 6 and Annexure A refers) as a way to address this priority.

7.5 A management set-back line and a limited development set-back line

The method in ODM proposes the refinement of the two lines identified in the Western Cape Methodology. These two lines are represented as a management set-back and a limited or controlled development set-back. The City has identified a single line, where this line is supported by additional coastal regulatory mechanisms. The following sections underline the difference between the City's approach and the recommended set-back lines in the ODM method.

7.5.1 Management set-back Line

The ODM method proposes that the management set-back line "Demarcates the area seaward of current developments, and includes the area below the projected hazard zone where no development has taken place, and currently/immediately threatened properties in areas where development is already present in the risk zone. The zone is demarcated manually based on local knowledge of the development line and local planning intricacies" (SSI, 2011: 15).

The management set-back proposed in the ODM is essentially equivalent to the City's set-back, the only difference being that in urban areas the position of the line still excludes (properties fall on the

landward side of the draft set-back) current/immediately threatened properties. As indicated in Section 3.3, this approach has been applied to facilitate efficiency and practicality through avoiding legal challenges of incorporating properties with development rights seaward of set-backs. The City's draft set-back, as a general rule of thumb, skirts closer to the HWM in urban areas whilst in less developed rural areas, the City's draft set-back moves further inland. It is the remaining un-developed spaces that require immediate and effective governance to prevent the existing coastal issues (property at risk from coastal erosion and storm surges) from recurring and increasing into the future.

7.5.2 Limited or controlled development set-back Line

The limited or controlled development set-back: "This area is equated to the Coastal Protection Zone within which coastal sensitivities need to be taken into account in all development decisions. This zone is determined based on local sensitivities such as long-term coastal processes risks, coastal vegetation, wetlands, estuaries and socio-cultural features. It includes developed areas where the projected erosion risk extends over existing developed areas but where realistic planning horizons mean that development approvals are unlikely to be refused" (SSI, 2011:15).

Much of Cape Town's coastline is in a highly developed state, a significant proportion of which is in close proximity to the HWM and in some cases on reclaimed land. The deliberate exclusion of property with development rights from the draft set-back in developed areas means that that there are numerous properties along the City's coastline that fall on the landward side of the set-back, but which are still at risk from coastal erosion, storm surge events and general coastal processes. Governing property that is currently at risk is a complex process and requires more substantive regulatory responses than a second set-back line. In light of this, the City is in the process of developing a Coastal Overlay Zone as a land use mechanism that will become applicable to coastal hazard areas, both seaward and landward of the draft set-back. Further detail on the mechanics of the Coastal Overlay Zone regulatory mechanism is provided in Section 8.1.1. The City is also mindful of not over-complicating the coastal space by creating multiple lines based on empirical modelling which are in effect theoretical lines.

8. PROCESS FORWARD: SUPPORTIVE PLANNING AND REGULATORY MECHANISMS FOR THE CITY'S SET-BACK

The City's draft set-back requires supportive regulatory mechanisms to ensure the objectives of the set-back are achieved. The City has delineated its draft set-back and by-law as a priority to manage activities within remaining critical open spaces between the draft set-back and HWM along the length of the city's coastline. In addition to this, the City requires more substantive land use regulatory mechanisms to effectively address the complex issue of existing property and infrastructure at risk to coastal hazards. The following sections provide an outline and intent of the key regulatory mechanisms the City is developing as a means to retain the value of the coast and reduce the City's risk profile. A report requesting support for the development of various policy and regulatory mechanisms was submitted to the City's Economic, Environment and Spatial Planning Directorate in 2011 (Annexure K). The report and the proposed regulatory mechanisms were supported (Annexure L).

8.1 Integrated Coastal Management Policy

The City has developed a draft Integrated Coastal Management Policy (Annexure M). This policy provides a strategic and overarching guideline that defines the rationale for the development of the City's coastal regulatory mechanisms. The policy also determines the vision, objectives and principles which will be used as a platform to promote consistent decision making across the City and to meet the principles of the ICMA. The policy will be supported by the City's Municipal Coastal Management Programme (MCMP) and which this MCMP will be operationalized through the Coastal Overlay Zone, Coastal By-law, the Coastal Economic and Spatial Development Plan and a range of Coastal Operational Management Protocols.

8.1.1 Coastal overlay zone: managing risk through existing land use management regulatory systems

The City's proposed by-law will focus on the regulation of activities between the HWM and the City's draft set-back. Considering the extent to which the City's coastline has been developed, and the close proximity of this development to the HWM, there is a significant amount of development that is at risk from coastal hazards, namely from storm surge, wind-blown sand, migrating river mouth induced coastal erosion and coastal flooding from estuaries. Managing existing properties and infrastructure currently at risk (especially where this risk is expected to increase into the future due to sea-level rise) through regulatory mechanisms requires sensitive negotiation with property owners due to existing land use rights. The City's ability to retrospectively address existing property that may be at risk through land use planning mechanisms will ultimately determine the City's effectiveness at managing risk posed by coastal hazards.

The City, in 2013, introduced a single unified zoning scheme (to replace its current fragmented zoning schemes) for its entire area of jurisdiction. Amongst others, the new scheme includes a mechanism to introduce overlay zones for specific purposes. Providing the opportunity to impose additional regulations in respect of specifically demarcated areas, or in respect of specific management issues across the city as a whole, this mechanism will provide the necessary flexibility to deal with diversity and uniqueness across the city and accommodate different objectives (such as those already spelled out in the CT:SDF). As such, developing a Coastal Overlay Zone is considered the most appropriate mechanism to manage and regulate land use and building development both seaward and landward of the City's draft coastal set-back, as it will be institutionalised as part of, and in a way that makes use of the City's already existing statutory development management systems and processes. Taking this approach will ensure alignment with and benefit from existing regulatory regimes and institutional systems and processes.

Forming part of the zoning scheme regulations (development management), an overlay zone is therefore a more detailed zoning mechanism that is applied in addition to the base zone of a property. The introduction of overlay zones is not an inevitable consequence of local area planning initiatives as identified through District SDPs, but rather a consequence of the critical need identified in the CT:SDF for targeted and specific development rules in addition to the underlying general base zone of land in the coastal area (CT:SDF, 2012). In the case of property or infrastructure at risk from coastal hazards, additional development rules in the overlay zone will be applied. Thus, overlay zones will be used as critical tool for strategic land use and building development not only to achieve a shared vision for Cape Town in terms of the CT:SDF, but also as a means to reduce the City's risk profile.

8.1.2 Draft Integrated Coastal Management By-law: regulating activities

The City has drafted a coastal by-law in terms of the provisions made in the Constitution of South Africa (Act 108 of 1996). Section 156(2) of the Constitution provides that a municipality may make and administer by-laws for the effective administration of the matters which it has the right to administer, and to exercise any power concerning a matter reasonably necessary for, or incidental to, the effective performance of its functions. The draft by-law will be applicable to the space between the City's draft coastal set-back and the HWM.

The City's draft coastal by-law is being developed with the intention to regulate a range of activities along the city's coastline. These activities stand to have significant negative coastal socio-economic and environmental impacts if they are not addressed. Key activities that the by-law focusses on include the following:

- Encroachment into coastal Public Open Space (to be addressed jointly by the overlay zone);
- Illegal structures (to be addressed jointly with the overlay zone);
- Harvesting of natural resources;
- Recreational activities: i.e. fireworks, use of jet skis etc.;
- Interference with coastal processes or the littoral active zone;
- Activities that impact on coastal biodiversity;
- Overnighting on beaches;
- The use of fires;
- Activities that may impact on public access to the coast;
- Pollution and littering;
- Commercial activities and trading, and
- Private functions.

The City views the development and implementation of the Coastal By-law as a critical local regulatory mechanism for a variety of reasons. In terms of promoting ICM, these include the following:

- To promote improved integration between the various City departments with respect to management of activities that have an impact on the coast;
- To equip the City to more effectively deal with illegal activities taking place along the City's coastline;
- To ease the administrative burden on both DEA and DEA&DP with respect to ensuring environmental compliance;
- To cover the gaps in existing coastal and environmental legislation in terms of coastal activities;
- Promote efficiency of legal proceedings;
- Promote consistency in decision making with respect to regulating coastal activities, and
- Achieve the objectives as set out in the ICMA.

8.1.3 Aligning the City's Draft Coastal By-law with ICMA

While the City's draft coastal by-law has been established in terms of the provisions made by the Constitution, the intention and objectives of the proposed coastal by-law are closely linked to the principles of ICMA and would be one of the City's most useful tools towards achieving the intent of

the City's MCMP. As such, it is the City's intention to align the draft coastal by-law in accordance with the requirements of the ICMA and ultimately use the by-law to implement the MCMP.

The ICMA empowers municipalities to make by-laws for the effective administration of coastal access land (section 20(2)); empowers metropolitan municipalities to establish a coastal committee (section 42); to establish and implement a municipal coastal management programme (section 48); to make by-laws to implement, administer and enforce municipal coastal management programmes (section 50); and for municipalities to develop coastal planning schemes (section 56(3)(d)).

The City will continue with the development and implementation of its by-law in terms of the Constitution as an interim measure until such time that the City's MCMP is formalised. Upon formalisation of the City's MCMP, the by-law will be adjusted to meet the requirements of the ICMA.

8.2 Coastal Protection Zone and the Municipal Coastal Management Programme

Section 28 of the ICMA requires that the MEC determines a Coastal Protection Zone where the intent of the CPZ is to:

- "protect the ecological integrity, natural character and the economic, social and aesthetic value of coastal public property;
- Avoid increasing the effect or severity of natural hazards in the coastal zone;
- Protect people, property and economic activities from risk arising from dynamic coastal processes, including the risk of sea-level rise;
- maintain the natural functioning of the littoral active zone;
- maintain the productive capacity of the coastal zone by protecting the ecological integrity of the coastal environment; and
- make land near the sea shore available to organs of state and other authorised persons for –
    - Performing rescue operations; or
    - Temporarily depositing objects and materials washed up by the sea or tidal waters" (ICMA, 2008:36).

The Coastal Protection Zone defines the area to which the City's MCMP will be applied. The CPZ will be defined based on the landward most limit of the overlay zones (Figure 22).



Figure 22: An example of the spatial configuration of coastal planning mechanisms.

9. A CITY WITHOUT A SET-BACK?

Without a coastal set-back line the status quo of ad hoc, ill informed, piece-meal and reactive decision making within the City will continue. This in turn will increase the City's risk profile. The City stresses the fact that this risk is not limited to physical damage that may arise from coastal dynamic processes or storm surges, but that risk created from inappropriate decision making will manifest in a variety of broader environmental and socio-economic forms.

In the absence of a formal set-back, applications for *ad hoc* set-back lines by the public will continue to increase. These *ad hoc* set-backs are problematic for a number of reasons, namely:

- Applications for *ad hoc* set-backs at an erf scale are inappropriate and disruptive towards the City's efforts in achieving consistency in determining its own set-back;
- Acceptance of *ad hoc* set-backs interrupts and reduces the potential for linear integration of the more desired application of continuous set-backs at broader scales;
- There are legal uncertainties surrounding these *ad hoc* set-backs especially in terms of land use rights that may be affected in the future;
- *Ad hoc* set-backs are issued by the competent authority without undertaking site inspections or ground truthing, and
- *Ad hoc* set-backs are issued by the competent authority without conducting the necessary and relevant research.

Collectively these issues that arise as a consequence of not having a formal set-back in place restricts the City's ability to achieve the objectives of the ICMA. In addition the absence of a formal

set-back increases the City's legislative burden which has cost implications from a staffing perspective, time delays and ultimately service delivery delays. At a grassroots level this translates into the gradual deterioration of the coast and with it the socio-economic opportunities the coast provides. The end result is that the coast is gradually being converted from an asset to a burden.

10. CONCLUSION

The City has undertaken a thorough process in delineating its draft coastal set-back. The process is being led by the City's Environmental Resource Management Department (ERMD) that has a combined experience of over 60 years in the field on Integrated Coastal Management. More importantly, officials within the ERMD have an intricate knowledge of the city's coastline which is critical in developing a grounded, effective and pragmatic coastal set-back.

The City's draft set-back is embedded within the CT:SDF. This was undertaken with the knowledge that the effectiveness of a coastal set-back is largely dependent on how closely local planning schemes are aligned with the set-back. Whilst on a map this alignment is represented by the City's urban edge in terms of the CT:SDF and the draft set-back in terms of ICMA as a single line, from a City governance perspective this single line represents the synthesis of planning for socio-economic priorities into the future whilst simultaneously promoting a risk averse approach to coastal development. The investigation into the influence of local biophysical factors and the subsequent disaggregation of risk per location was critical to the process of defining risk areas and integrating these risk areas within the CT:SDF.

The alignment of the CT:SDF and the draft set-back has not only reduced the scope for confusion within an already complex and dynamic space, but such an approach has achieved a measure of practicality. The fusion of the CT:SDF with the draft set-back as one line has created clarity, not only for City officials in terms of guiding coastal planning and promoting risk averse and appropriate decisions, but it has also provided an appropriate platform of clarity for potential developers and investors. The formalisation of the City's draft set-back will also streamline the Environmental Authorisation process. These key traits have resulted in overwhelming public support for the City's draft coastal set-back and supporting regulatory mechanisms.

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13. ANNEXURES

REPORT TO PLANNING AND ENVIRONMENT PORTFOLIO COMMITTEE

CITY OF CAPE TOWN | ISIXEKO SASEKAPA | STAD KAAPSTAD

1. **ITEM NUMBER : PLAN 15/08/09**

2. **SUBJECT:**
RAPID PLANNING REVIEW OF POTENTIAL FUTURE DEVELOPMENT AREAS ALONG FALSE BAY COASTLINE (CAPE FLATS AND KHAYELITSHA/MITCHELLS PLAIN DISTRICTS)

ONDERWERP:
SNELBEPLANNINGSOORSIG VAN MOONTLIKE TOEKOMSTIGE ONTWIKKELINGSGEBIEDE AAN DIE VALSBAAIKUS (KAAPSE VLAKTE- EN KHAYELITSHA/MITCHELLS PLAIN-DISTRIK)

ISIHLOKO:
UHLAZIYO OLUKHAWULEZAYO LOCWANGCISO LOPHUHLISO OLUNOKUQHUBEKA KWIXESHA ELIZAYO KWIINDAWO EZINGAKUNXWEME LWASE-FALSE BAY (KWIZITHILI ZE-CAPE FLATS NASEKHAYELITSHA/MITCHELLS PLAIN)

3. **PURPOSE**

This report seeks endorsement from the Planning and Environment Portfolio Committee (PEPCO) for a set of sub-regional guiding principles for development relating to a stretch of the False Bay coastline (from Strandfontein Pavilion to Monwabisi) based on a rapid planning investigation into future urban development opportunities in the area.

4. **STRATEGIC INTENT**

Spatial and land use planning should aim to promote:

- *Shared Economic Growth and Development*
- *Sustainable Urban Infrastructure and Services*
- *Energy Efficiency for a Sustainable Future*
- *Public Transport Systems*
- *Integrated Human Settlements*
- *Safety and Security*
- *Health, Social and Human Capital Development*
- *Good Governance and Regulatory Reform*

City leadership in clarifying the City's expectations of development and providing development guidelines in appropriate locations along the coast upfront creates a predictable decision-making culture for development, which is in the interests of good governance and regulatory reform.

5. FOR DECISION BY

Delegated: for decision by PEPCO
The terms of reference of this committee is policy formulation and implementation monitoring within *inter alia* the following functional areas:

The Planning function which includes:
Citywide Planning & Urban Design services
(1) To develop policy relating to the functions described in terms of reference of this committee (excluding the functions listed on 37(7)) and to recommend same to the Executive Mayor.
(6) To ensure public participation in the development of policy, legislation, IDP's and budget.

(System of Delegations, City of Cape Town, June 2009)

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6. EXECUTIVE SUMMARY

Cape Town's coastline is seen as one of its greatest natural and economic assets. Relatively little urban development has occurred along False Bay, particularly the stretch of coastline between Strandfontein and Macassar. To date, apartheid policies of contained township development, as well as environmental constraints and unique climatic conditions have historically limited development along False Bay.

Recent city policy has acknowledged this historic deficiency and recommended that development appropriate to the specific context, and mindful of environmental constraints and imperatives, should be encouraged to facilitate urban development that is people-centered, is spatially and socially integrated, and which maximizes the coastline's amenity opportunities.

As a means to reflect on the possibilities for coastal development along this stretch of coastline, a rapid planning review was undertaken, focusing on a 15km stretch of the False Bay coastline between Strandfontein Pavilion and Monwabisi Coastal Resort (see Annexure A.1). This was presented to sub councils 10 and 12 in April and May of 2009 for comment and support before submission of the rapid planning review to PEPCO for endorsement (see Annexure A.7).

The outcomes of the study reflect four key, but varied, coastal nodal development opportunities at the sub-regional scale including Monwabisi, Mnandi, Bluewaters and Strandfontein Pavillion nodes. It is proposed that development of these nodes should be informed by the set of guiding principles as identified in the Chapter 8 (Discussion/Contents) of this report and that site planning within the coastal nodes take informants identified in Annexure A.5 and A.6 into consideration when developing proposals. Furthermore, it is proposed that planning resources be prioritized around the Monwabisi and Mnandi coastal nodes due to existing planning initiatives and funding allocation by the Neighbourhood Development Partnership Grant Programme and Presidential Urban Renewal Programme respectively.

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7. RECOMMENDATIONS

Delegated: for decision by PEPCO

It is recommended that:

(a) PEPCO endorse the set of sub-regional guiding principles for development relating to the stretch of the False Bay coastline (from Strandfontein Pavilion to Monwabisi) based on a rapid planning investigation into future urban development opportunities in the area;

(b) The Rapid Planning Review of potential future development areas along the False Bay coastline serve as an input to the District Planning process and local planning initiatives.

(c) That the main nodal opportunities (Monwabisi and Mnandi / Kapteinsklip) be prioritized for planning intervention due to existing initiatives and funding allocation (through the Urban Renewal and Neighbourhood Development Partnership Grant programmes respectively) for these projects.

AANBEVELING

Gedelegeer vir besluitneming deur die portefeuljekomitee oor beplanning en omgewingsake (PEPCO):

Daar word soos volg aanbeveel:

(a) Dat PEPCO die stel subgebiedsrigsnoere vir die ontwikkeling van die stuk Valsbaaikus (van die Strandfontein-paviljoen tot by Monwabisi) op grond van 'n snelbeplanningsondersoek na toekomstige stedelikeontwikkelingsgeleenthede in die gebied onderskryf.

(b) Dat die snelbeplanningsoorsig van moontlike toekomstige ontwikkelingsgebiede aan die Valsbaaikus by die distriksbeplanningsproses en plaaslikeregeringsprojekte ingevoer word.

(c) Dat die hoof- nodale geleenthede (Monwabisi en Mnandi/Kapteinsklip) die voorrang geniet vir beplanningsintervensie, aangesien dit reeds (deur die program vir stadsvernuwing, en die vennootskapsprogram vir buurtontwikkeling onderskeidelik) deur veldtogte en finansiering gerugsteun word.

IZINDULULO

Zithunyelwe kwi-PEPCO ukuba ithathe isiqqibo

Kundululwa ukuba :

(a) I-PEPCO iqinisele imithetho-siseko esisikhokelo sengingqana sophuhliso oluphathelele kwindawo engakunxweme lwe-False Bay (ukusuka eStrandfontein Pavilion ukuya eMonwabisi) esekelwe kuphando locwangciso olukhawulezayo lwamathuba ophuhliso lwedolophu kule ndawo;

(b) UHlaziyo loCwangciso oluKhawulezayo lophuhliso olunokuqhubeka kwixesha elizayo kwindawo engakunxweme lwe-False Bay liza kuba ligalelo kwinkqubo yoCwangciso lweSithili kunye naminye imisebenzi yocwangciso yale ngingqi.

(c) Amathuba apho zidibana khona ezi ndawo (Monwabisi and Mnandi / Kapteinsklip) abonwe nje ngawona aphambili kwimisebenzi yocwangciso ngenxa yokuqhubekayo kwezi ndawo ngoku kwakunye nemali ebekelwe bucala (essiibonelelo seenkqubo ze-Urban Renewal and Neighbourhood Development Partnership ngokulandelelanayo) ukulungiselela ezi projekthi.

8. DISCUSSION/CONTENTS

Cape Town's coastline is seen as one of its greatest natural and economic assets. To date, extensive development has occurred along many coastal areas in Cape Town, including: Camps Bay, Clifton, Sea Point, Hout Bay, Table View, Simonstown, Fish Hoek, Muizenberg, Strand, and Gordon's Bay. Areas that have to date not been developed face increasing development pressure.

Relatively little urban development has occurred along False Bay, particularly the stretch of coastline between Strandfontein and Macassar. This is attributable to two main reasons. Firstly, Apartheid policies of contained township development for coloured and black groups and planning approaches of the time resulted in townships along the coastline having little or no spatial relationship with the coast. Development along the False Bay coastline (FBC) over the last number of decades was limited to a number of coastal resorts that were designated for use by so-called 'non-white' residents of Cape Town. These coastal resorts include Strandfontein, Bluewaters, Mnandi, and Monwabisi.

Secondly, environmental constraints and unique climatic conditions have historically limited development along False Bay. Recent recognition of biodiversity value and maintaining connectivity of green spaces within the City has prompted the conservation of biodiversity corridors, such as the biodiversity corridor along False Bay coastline. Part of which is conserved by the Wolfgat Nature Reserve. Sea level rise is also an imminent threat to development at the coast, the impacts of which will have significant effects on existing coastal systems, built infrastructure, and property. Therefore, coastal inundation is considered as a key informant to development along the False Bay coast. Fortunately, because the primary dune system along this stretch of coastline is in a relatively good state, the impact of coastal inundation during storm surges and incremental climate change is minimal. Provided that the integrity of the coastal dune systems along the False Bay coast are maintained, development would be possible with little or no impact from coastal inundation.

To date, residents living in close proximity of the False Bay coastline remain disconnected from it. This is due in part to the limitations and decline of coastal resorts within the study area. Recent city policy has acknowledged this historic deficiency and recommended that development appropriate to the specific context, and mindful of environmental constraints and imperatives, should be encouraged to facilitate urban development that is people-centered, is spatially and socially integrated, which maximizes its amenity opportunities, and which better connects settlements such as Khayelitsha and Mitchells Plain with the coast.

As a means to confirm the possibilities for coastal development along this stretch of coastline, a rapid planning investigation was undertaken focusing on a 15km stretch of the FBC, between Strandfontein Pavilion and Monwabisi Coastal Resort (see Annexure A.1).

The focus of the rapid planning investigation is the following:

- To develop a concise synthesis of current strategy and policy imperatives, which inform development along the coast. (see Annexure A.2)
- To identify key development challenges and opportunities experienced within the study area. (see Annexure A.3).
- To define zones of development opportunity along the relevant section of the False Bay coastline. (see Annexure A.4).
- To identify a set of guiding principles that should inform any development proposals along this stretch of coastline.
- A detailed analysis of the local physical informants to development at identified zones of opportunity. (see Annexure A.6).

- To identify a set of local development guidelines, to be considered when planning development within the proposed coastal development nodes (see Annexure A.7).

The outcomes of the study reflect four key, but varied, coastal nodal development opportunities at the sub-regional scale including Monwabisi, Mnandi, Bluewaters and Strandfontein Pavillion nodes. It is proposed that Monwabisi and Mnandi be prioritized due to existing planning initiatives and funding allocation to these nodes. Monwabisi Coastal Node is a Neighbourhood Development Partnership Grant Project (NDPG) with funding allocated to the City of Cape Town by National Treasury. In this regard, the Spatial Planning and Urban Design Department is currently conducting an investigation into the feasibility of developing the broader coastal node. The Department of Sports, Recreation and Amenities is running a project (with NDPG support) focussed on upgrading amenities at the resort. Furthermore the Spatial Planning and Urban Design Department, in conjunction with the Presidential Urban Renewal Programme, is in the process of establishing a planning and urban design framework for the development of the Kapteinsklip precinct, including the Mnandi Resort area. The objective is to enhance the precinct as a destination place and new coastal development node. The process is currently at the prefeasibility stage, and upon completion will inform an implementation process.

It is proposed that the following guiding principles for development at the sub-regional and local scale, inform development proposals along the False Bay Coastline and within coastal development nodes respectively. These are informed by an understanding of context and planning imperatives.

- **Guiding Principle 1: Promote nodal development in identified zones of opportunity:** All development should be nodal rather than strip development and should be situated in the zones of highest opportunity as identified in the preceding analysis. These nodes include Strandfontein Pavilion, Mnandi, Monwabisi and Blue Waters coastal resorts.

- **Guiding Principle 2: Maintain a continuous east west ecological corridor:** East-west biodiversity connectivity (especially for faunal movement) must be maintained. Strandveld corridors connecting larger remnants should be a minimum of 200m wide to sustain ecological functioning. Faunal corridors of Strandveld vegetation should be a minimum of 20m wide with a buffer of 25m on either side. This amounts to a minimum combined corridor width of 70m to ensure connectivity for faunal species.

- **Guiding Principle 3: Ensure public access to and along the coast is maintained:** Public access to the coast should be a foremost consideration in any development proposal for coastal nodes. Infrastructure that facilitates public access and experience of the coastline such as boardwalks, hiking trails and viewing platforms are critical. No privatisation of the coastline to the detriment of public access to and along it should be considered.

- **Guiding Principle 4: Address inequities through promoting active, diverse and safe coastal nodes which become destination places:** The coastal nodes should become vibrant people places. The coastal nodes should be considered as distinct from each other and could reflect varying roles which should be a response to local contextual conditions and need.

  Public recreational and tourism opportunities should be the key component of the coastal nodes. Activities that maximise people's experience of the coastline are envisaged. These should aim to provide recreational, social and local economic opportunity in areas where they are greatly needed.

Residential development and intensification of underdeveloped areas should be pursued as a means to create the necessary thresholds to support such destination places.

Safety and security in respect of any development along the FBC should receive priority. High intensity mixed-use development within appropriate areas of coastal nodes should be promoted to facilitate/maximise surveillance.

- **Guiding Principle 5: Design with due regard for coastal processes:** At nodal development areas environmental constraints (wind, sand, storm surges, coastal inundation/sea level rise, etc.) and coastal processes must be key informants to development guidelines and local design considerations. In particular, shelter from the elements and maintenance of infrastructure should be afforded careful consideration to ensure sustainability from a maintenance perspective.

  Roads in an east west direction in close proximity to the frontal dune system should be avoided along this coastline as they cannot be sustainably managed, given the mobility of sand in particular. North south access roads should be promoted to provide access to coastal nodes.

  A minimum buffer of 50m from primary dune areas should be respected to ensure that development impact on coastal processes is mitigated as far as possible.

- **Guiding Principle 6: Maintain visual quality along the False Bay coast:** The scenic beauty of the FBC is a significant asset, which needs to be managed effectively. Mitigating visual impact should be given attention in visually sensitive areas.

  The scenic drive status of Baden Powell Drive should be a consideration in any development proposal and the visual impact of development along this route should be carefully considered. Furthermore, areas with the potential to enable the visual experience of the FBC by the public should be enhanced, and made secure for public enjoyment.

The rapid planning investigation also identifies informants, at the site level, which should be considered in the development of nodal development proposals. (see Annexure A.6 and A.7).

8.1. Constitutional and Policy Implications

All relevant constitutional and council policy informants have been considered in undertaking this investigation.

8.2. Environmental implications

Does your report result in any of the following:

No ☐

Yes (if yes, please complete the section below by clicking on the relevant tick boxes)

Loss of or negative impact on natural space and/or natural vegetation, rivers, vleis or wetlands?	☐	Loss of or negative impact on the city's heritage, cultural and scenic resources?	☐
An increase in waste production or concentration, pollution or water usage?	☐	Development or any construction within 500m of the coastline?	☒

Does your activity comply with the National Environmental Management Act (NEMA)?
(mark by clicking on the tick box)

Yes ☒ No ☐

Does your report complement and support the City's approved IMEP strategies?
(if yes, please select from list below by clicking on the relevant tick box)

Biodiversity Strategy and Biodiversity Network	☒	Coastal Zone Management Strategy	☒	Energy and Climate Change Strategy	☒
Environmental Education and Training Strategy	☐	Heritage Management Strategy	☐	Air Quality Management Plan	☐
Integrated Waste Management Strategy	☐	Invasive Species Strategy	☐		

Do the activities/actions arising from your report:
(if yes, please select from list below by clicking on the relevant tick box)

Enhance Cape Town's unique environmental assets?	☒	Negatively impact on Cape Town's unique environmental assets?	☐

8.3. Legal Implications

This report is an investigation into the potential for development along the False Bay Coastline. Guidelines are proposed and no steps are required to comply with any legal requirements. Legal informants, insofar as they are relevant to this environment, were taken into account as part of the preparation of the report.

8.4. Staff Implications

Does your report impact on staff resources or result in any additional staffing resources being required?

No ☒

Yes ☐

8.5. Risk Implications

Does this report and/or its recommendations expose the City to any risk?
(i.e. does it have any adverse influence on service delivery?)
No ☒
Yes ☐

8.6. Other Services Consulted

Department of Environmental Resource Management: Biodiversity Management Branch (Dr. Patricia Holmes – tel: 021 514 4170)

Department of Environmental Resource Management (Ms. Janet Bodenstein – tel: 021 487 2133

Spatial Planning and Urban Design Department: Metropolitan Spatial Planning Branch (Mrs. Anele Horn – tel: 021 400 2161)

Department of Sports, Recreation and Amenities (Mr. Joe Olivier - tel: 021 400 4181).

These departments have supported the proposed development guidelines and provided input and comment regarding this rapid planning review.

ANNEXURES

Annexure A1:	The study area (Map)
Annexure A2:	Strategy and policy imperatives
Annexure A3:	Summary of the key development challenges and opportunities
Annexure A4:	Zones of opportunity
Annexure A5:	Local informants: Coastal Nodes
Annexure A6:	Local guidelines: Coastal Nodes
Annexure A7:	Subcouncil meeting minutes

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DIRECTORATE	*Strategy and Planning*
FILE REF NO	
SIGNATURE : DIRECTOR	

☑ REPORT COMPLIANT WITH THE PROVISIONS OF COUNCIL'S DELEGATIONS, POLICIES, BY-LAWS AND ALL LEGISLATION RELATING TO THE MATTER UNDER CONSIDERATION.

LEGAL COMPLIANCE

☐ NON-COMPLIANT

COMMENT :

DATE 21 July 2009

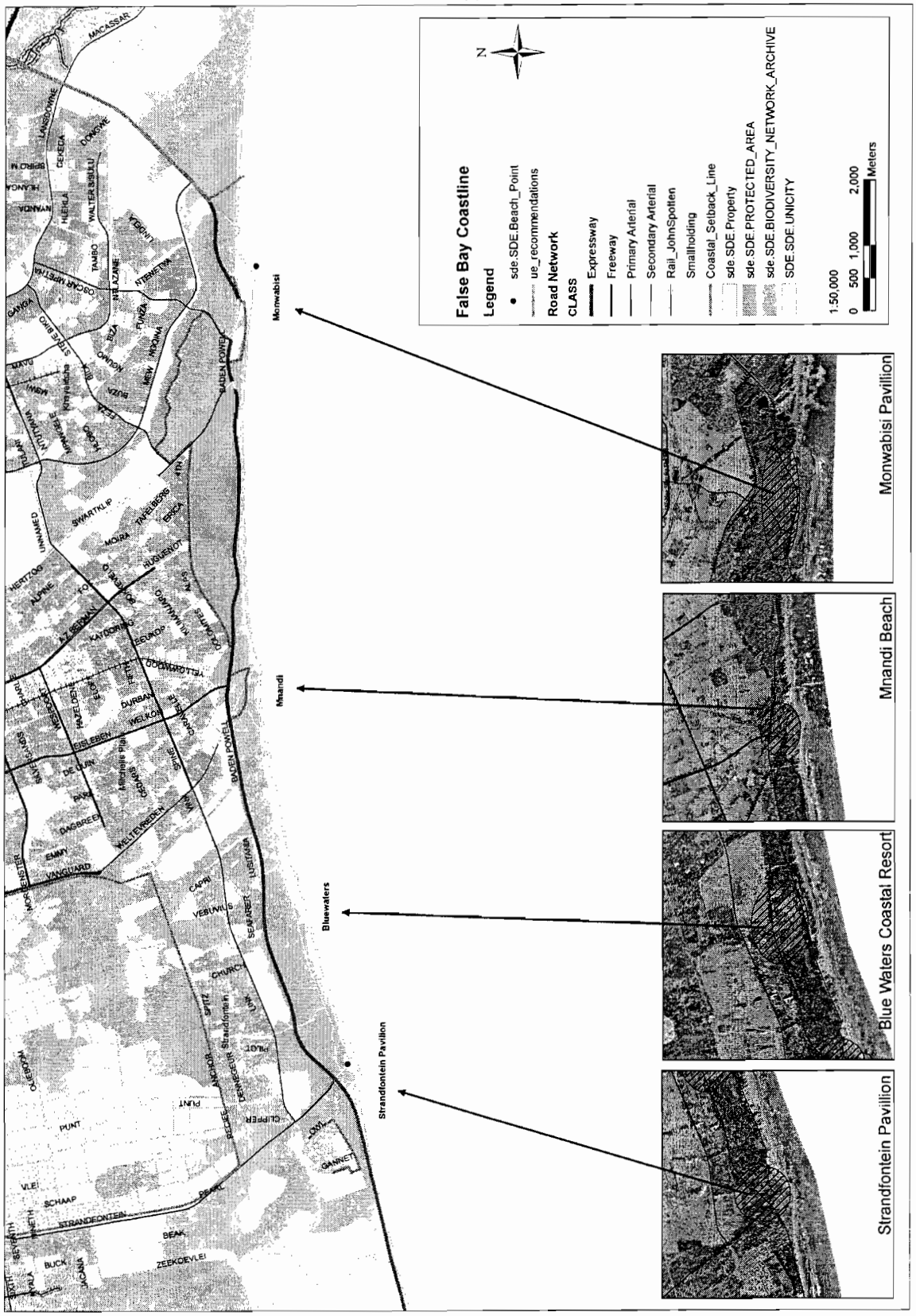
EXECUTIVE DIRECTOR
PIET VAN ZYL

Comment:

For review and approval by PEPCO.

DATE 23.07.2009

ANNEXURE A.1 – The study area



City-wide policy and planning frameworks that inform the development of the False Bay Coast include:

- Future Cape Town: An argument for the long-term spatial development of Cape Town (2006);
- City of Cape Town: Coastal Zone Management Strategy (2003);
- The Biodiversity Strategy (2003);
- Draft City of Cape Town - Coastal Development Guidelines report (2007);
- Draft City Development Edges Policy: Urban and Coastal Edge (April, 2009) and
- Draft Cape Town Spatial Development Framework and Draft District SDP/EMF Documents (Districts F and G)

All of the abovementioned documents subscribe to the vision of managing this coastline in an innovative and integrated manner that will ensure the environmentally sustainable functioning of its natural systems while optimizing its economic and social benefits (CoCT (b), 2005/06). There is also general alignment with reference to the principles relating to the "meeting of the coast."

Two key high level spatial directives emanating from the abovementioned policy and planning frameworks reviewed are clear:

- Firstly, meeting the coast should involve the creation of special people places. Celebrating the coast as a city destination place supports citywide policy imperatives of creating more great people places. Appropriate development at the coast contributes to the unique sense of place of Cape Town by creating new special places.
- Secondly, the creation of special people places should carried out while creating and maintaining a "functional coastal biodiversity corridor". We need to be mindful of the biodiversity imperatives of this significant coastal asset so that this great opportunity can be enjoyed by present and future generations.

ANNEXURE A.3 - Summary of the key development challenges and opportunities

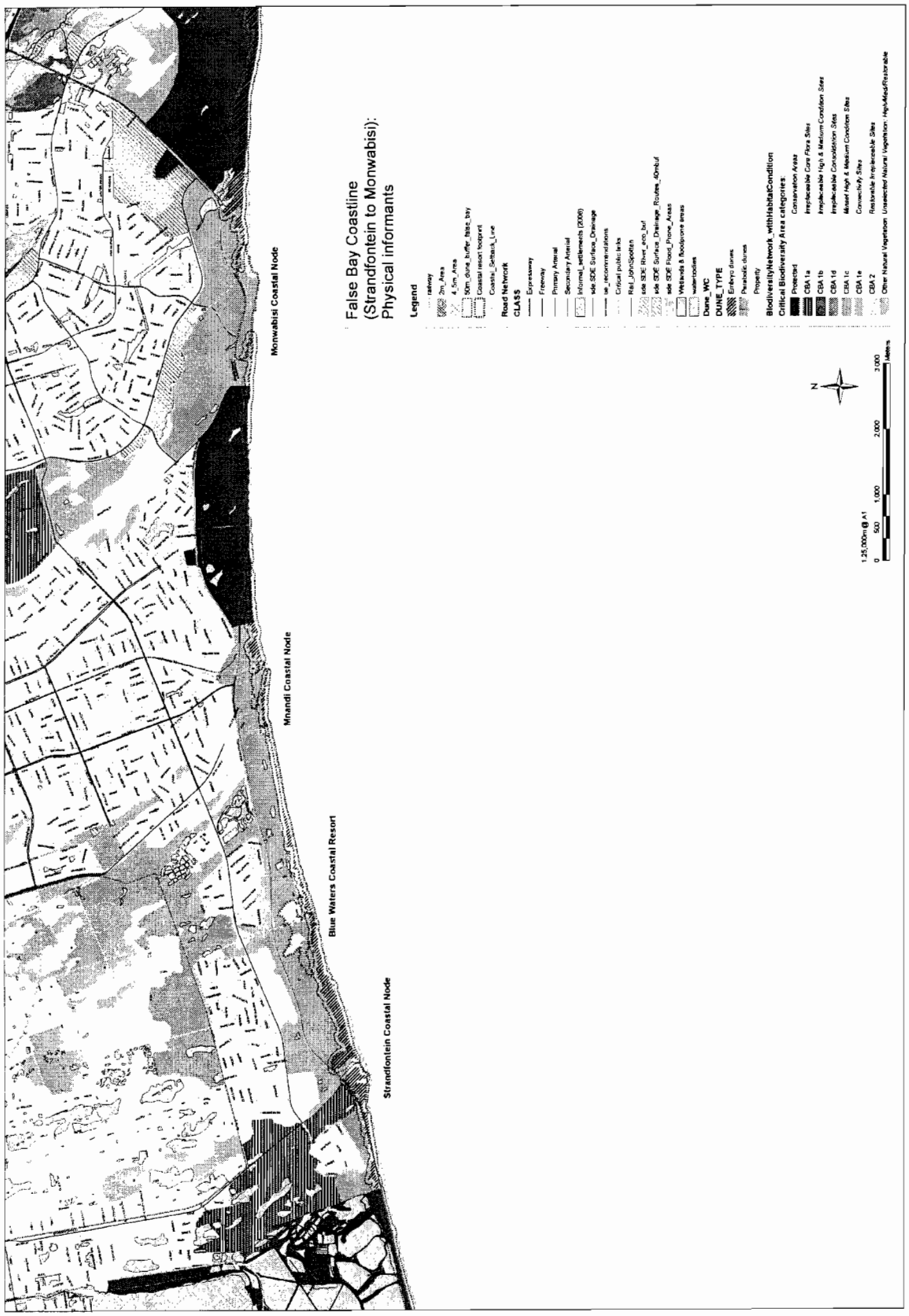
The following key development challenges and opportunities have been identified in respect of analysis of the sub-regional physical informants to development within the study area. Physical informants analyzed include coastal primary dune areas and associated buffers, coastal inundation and storm surge areas, topography, critical biodiversity areas, access and movement desire lines, settlement patterns, and existing infrastructure and coastal resort footprints (see figure below – False Bay physical informants: Strandfontein to Monwabisi).

(i) Challenges

- Achieving balance between the need for development and the maintenance of the integrity of a biodiversity corridor and other biophysical systems is a key challenge. Maintaining and enhancing a green corridor along the False Bay coast is seen as critical given the City wide importance of the False Bay coastline as one of the last remaining major ecological corridors.
- Limited physical linkage between communities and existing underdeveloped coastal recreation areas needs to be addressed. Development aimed at creating better access to the coast should actively seek means to create more accessible, safer and mixed use destination places that are sustainable and that enhance communities" (particularly poor communities) experience of the coastline.
- The inherent tension between the need to protect nature areas and the imperative to meet the coast to create 'great people places' requires careful consideration in determining guidelines for development in coastal nodes.
- Lack of safety and security along the FBC and particularly at existing coastal recreation nodes is a significant constraint. Mono-functionality of the existing resorts results in limited thresholds in terms of the users of these areas throughout the year.
- Land invasion, especially between Monwabisi and Khayelitsha remains a risk given the uncertainty over the future of this area. Ever-increasing levels of urbanisation and an escalating housing backlog means that land invasion will increase over time.

(ii) Opportunities

- Maintaining the integrity of the False Bay coastal biodiversity corridor between coastal development areas presents key recreational opportunities such as recreational walks on hiking trails and boardwalks, environmental education, lookout points and scenic views etc. The minimum corridor width for Dune Strandveld vegetation connecting larger remnants is 200m, with an accepted width of 70m to maintain connectivity for faunal movement where the east-west corridor intersects with coastal development nodes.
- Higher intensity activities of a mixed-use nature at coastal nodes could create the necessary preconditions to promote thresholds to support well functioning destination places. This will have a positive impact on the current safety and security challenge. Disturbed areas and existing infrastructure at coastal resorts present opportunities for higher intensity mixed land uses.
- Baden Powell Drive is identified as a scenic drive. Appropriate development at certain coastal nodes along its length could create destination points along its course, thereby further enhancing the functionality of the route as a scenic route. The City of Cape Town: Scenic policy guidelines should be considered when compiling detailed planning frameworks for identified zones of opportunity.
- Sea-level rise is a real threat to all coastal areas, both natural and developed. However, the advantage of the False Bay Coastline lies in the primary dune systems, which provides protection to areas landward of the dunes. Design and development with due regard for coastal processes will enable sustainable development along the False Bay Coast.


False Bay Coastline
(Strandfontein to Monwabisi):
Physical informants
Legend
railway
2m_Area
4.5m_Area
50m_dune_buffer_false_bay
Coastal resort footprint
Coastal_Setback_Line
Road Network
CLASS
Expressway
Freeway
Primary Arterial
Secondary Arterial
Informal_settlements (2006)
sde.SDE.Surface_Drainage
we_reconnaissance
Critical public links
Rail_JohnSpotten
sde.SDE.River_and_buf
sde.SDE.Surface_Drainage_Routes_40mbuf
sde.SDE.Flood_Prone_Areas
Wetlands & floodplains areas
waterbodies
Dune_WC
DUNE_TYPE
Embryo dunes
Parabolic dunes
Property
BiodiversityNetwork_withHabitatCondition
Critical Biodiversity Area categories:
Protected
Conservation Areas
CBA 1a
Irreplaceable Core Flora Sites
CBA 1b
Irreplaceable High & Medium Condition Sites
CBA 1d
Irreplaceable Consolidation Sites
CBA 1c
Mixed High & Medium Condition Sites
CBA 1e
Connectivity Sites
CBA 2
Restorable Irreplaceable Sites
Other Natural Vegetation
Unrestricted Natural Vegetation: High/Med/Restorable
N
1:25,000 @ A1
0
500
1,000
2,000
3,000
Meters
Monwabisi Coastal Node
Mnandi Coastal Node
Blue Waters Coastal Resort
Strandfontein Coastal Node

ANNEXURE A.4 – Zones of opportunity

Taking into consideration the key challenges and opportunities, as well as the key policy and planning imperatives, it is apparent that specific zones of opportunity can be identified. Each of the zones shares a number of common characteristics in that they are areas in which the key opportunities identified are present. They present opportunities to optimise meeting the coast in a manner that respects existing natural systems and maximises linkages with adjacent communities.

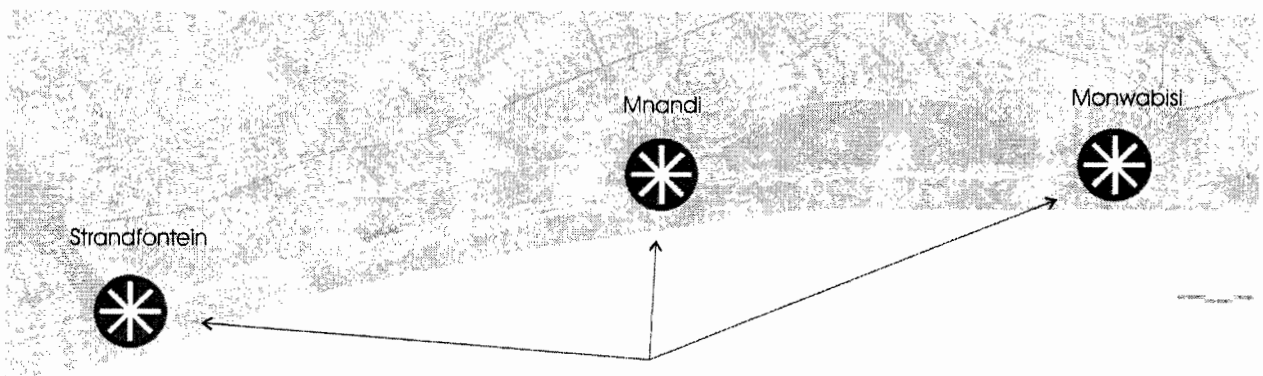
The rationale for identifying these coastal development zones includes:

- Areas that will facilitate nodal development at the coast as opposed to strip development
- Focussing on existing areas of environmental disturbance and existing infrastructure.
- Minimising potential impacts on dynamic coastal processes and critical biodiversity remnants.
- Capitalising on areas with high levels of accessibility within the study area (transport routes of sub-metropolitan and metropolitan significance)

The zones of higher intensity coastal development opportunity include (see figure below – coastal development zones of opportunity):

- Strandfontein Pavilion
- Mnandi Beach Resort,
- Monwabisi Coastal Resort.

It is envisaged that these locations accommodate high intensity mixed use activities that promote the creation of higher intensity destination places in meeting the False Bay coast. Blue Waters Resort and Promenade represents a lower intensity coastal development zone of opportunity due to its suitability (less accessible, more exposed to environmental processes etc) as a predominantly recreation and tourism node.



Coastal Development Zones
of Opportunity

ANNEXURE A.5 – Local Informants: Coastal Nodes

The following section is an extract from the False Bay Coastal Investigation technical report, which identifies the local physical informants in relation to identified zones of opportunity. These informants form the basis for determining development guidelines for each of the coastal nodes.

A.5.1 Monwabisi Coastal Node

At the local scale the following informants are applicable (refer to figure A.5.1):

- Relief (steep hill slopes; gentle slopes)

Most of the landscape in this zone consists of undulating plains. A larger dune ridge is situated to the immediate south of Mew Way, extending southwards from Monwabisi Park informal settlement to the primary dune system to the east of Monwabisi Resort. The area to the north of Mowabisi Resort on the landward side of Baden Powell Drive is of a gentler gradient, and may be better suited to development.

- Primary dunes

The extent of primary/embryonic dunes is limited within the Monwabisi Coastal Node area as this part of the coastline is made predominantly of rocky outcrops. There has been limited development in proximity to these dunes, thus they are in a relatively good condition. Future development should continue to respect a 50m buffer from primary dune areas.

- Flood prone areas

Due to the levels of protection provided by the primary dune system and the rocky coastline at Monwabisi Coastal Node, the area is at low risk from inundation and storm surge flooding. A stormwater detention pond exists south of Enkanini Informal Settlement, between Mew Way and Baden Powell Drive. The seepage from the detention pond flows southwards towards the ocean to the east of Monwabisi Resort.

- Green links

'High & medium condition' biodiversity sites are located within the Monwabisi Coastal Node. Ecological corridor linkages are required in this area to maintain biodiversity connectivity

- Movement desire lines

A strong desire line of movement exists between Monwabisi Park informal settlement and Monwabisi Resort. This desire line extends through harsh natural terrain and presents the opportunity to provide direct access with active land use interfaces fronting onto it.

- Informal settlements

The expansion of Monwabisi Park informal settlement south of Khayelitsha, on the seaward side of Mew Way, has resulted in increased development pressure on the biodiversity corridor at Monwabisi Coastal Node. Since Baden Powell runs relatively close to the coast at Monwabisi Coastal Node, it has been easier for informal settlements to expand southwards towards the coast.

- Existing areas of disturbance

Facilities existing at the resort include the beach and tidal pool area, an administration office, braai facilities, and a caravan park and overnight chalets. The footprint of Monwabisi Coastal Node is quite extensive due to the overnight camping facilities and chalets and other day recreation facilities.

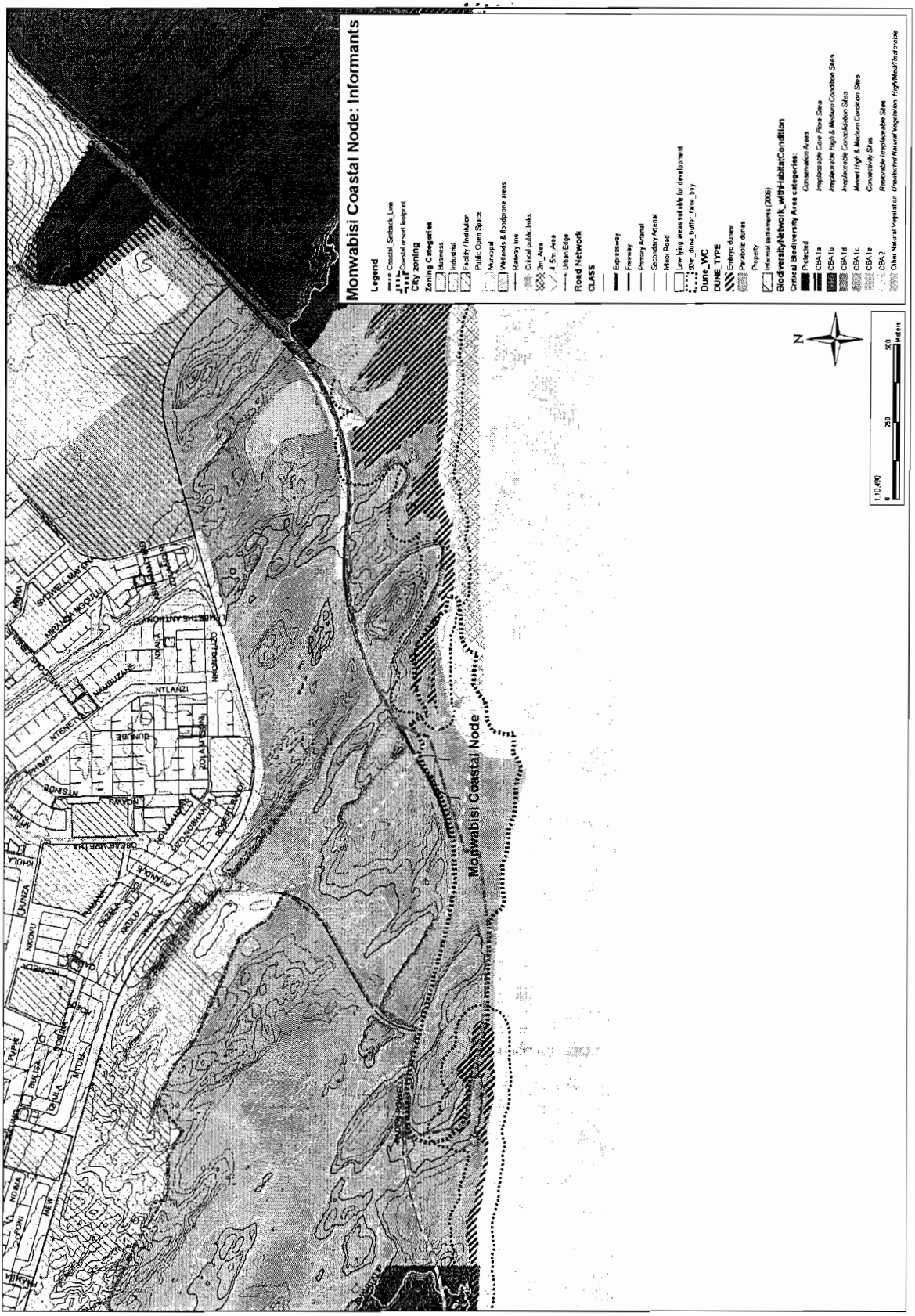


Figure A.5.1: Monwabisi Coastal Node - Informants

A.5.2 Mnandi Coastal Node

At the local scale the following informants are applicable (refer to figure A.5.2):

- Relief (steep hill slopes; gentle slopes)

Steep dune slopes exist within the Mnandi precinct, separating Mnandi coastal node from Kapteinsklip. The existence of these steep dune slopes reinforces the scenic quality of Baden Powell Drive.

- Primary dunes

Primary/embryonic dunes are not prevalent within the Mnandi Coastal Node area as this part of the coastline comprises predominantly rocky outcrops. Impact levels on existing primary dunes are low to moderate due to limited development impact.

- Flood prone areas

Due to the levels of protection provided by the primary dune system and the rocky coastline at Mnandi Coastal Node, the area is at low risk from inundation and storm surge flooding.

- Green links

The Mnandi Coastal Node is located within a 'high & medium condition' biodiversity site. An east-west ecological corridor linkage needs to be determined in this area to maintain biodiversity connectivity. A corridor link may be most appropriate along the southern boundary of Baden Powell Drive since this area is mostly covered by steep hill slopes.

- Movement desire lines

A strong desire line exists between Kapteinsklip Station and Mnandi Coastal Node. This desire line is enhanced by the pedestrian bridge linking these precincts across Baden Powell Drive. However, since there is no form of activity along this desire line, pedestrian movement during times of low activity is unsafe.

- Informal settlements

A small informal settlement exists on City-owned land north of Baden Powell Drive in close proximity of Kapteinsklip Station. Since there is no immediate planning for the area, the potential expansion of this informal settlement is a quite tangible threat to future development within the node.

- Existing areas of disturbance

Existing facilities available at the resort include the Mnandi Blue Flag Beach area, day recreation facilities, and extensive parking facilities. Facilities are scattered throughout the Mnandi Coastal Node are in relatively good condition and are in keeping with the standard of Mnandi Blue Flag Beach.

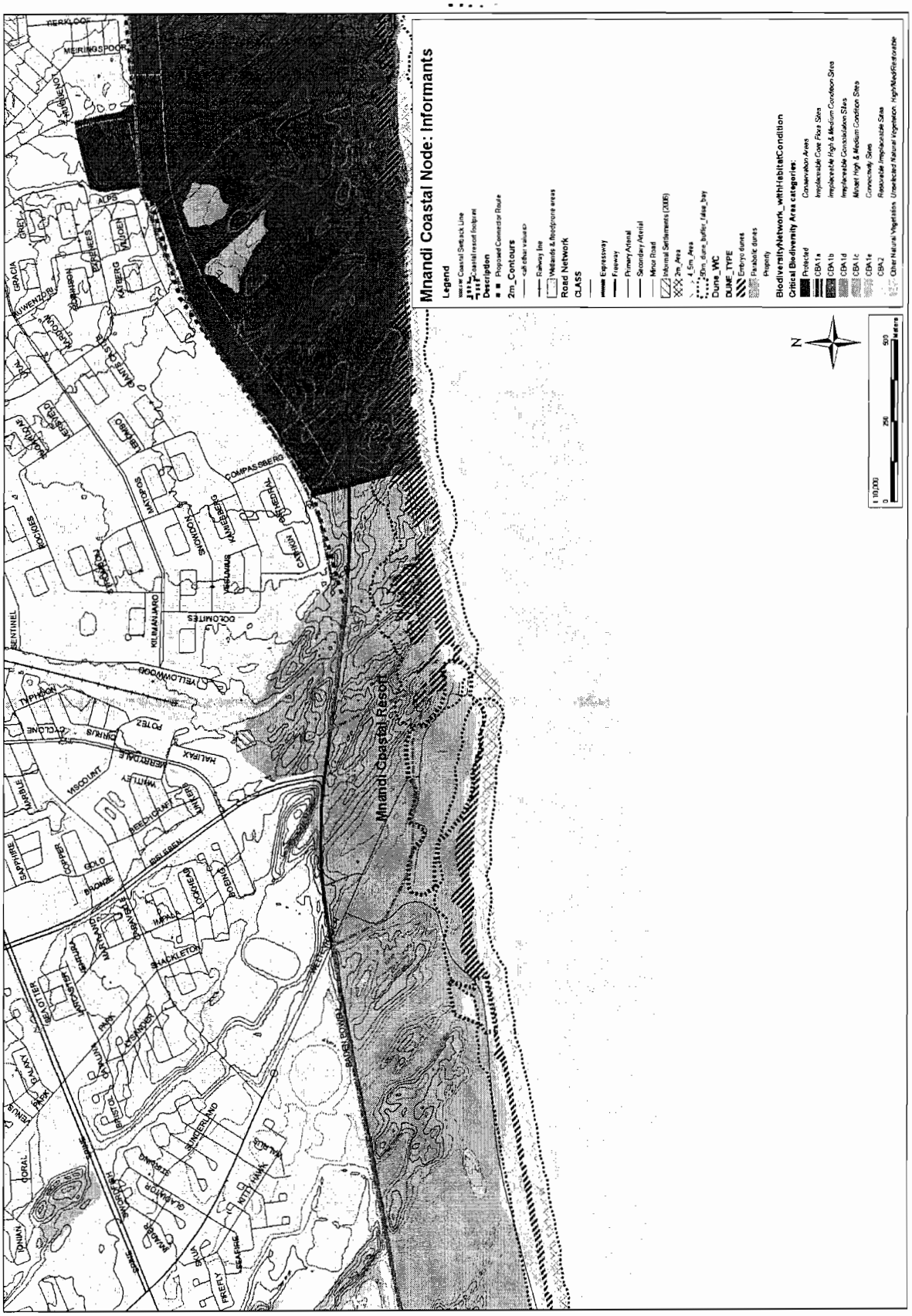


Figure A.5.2: Mnandi Coastal Node - Informants

A.5.3 Strandfontein Pavilion Coastal Node

At the local scale the following informants are applicable (refer to figure A.5.3):

- Relief (steep hill slopes; gentle slopes)

Relief is a significant informant to areas suitable for development. 2m contours, used to analyze the relief for the area indicate that steep slopes exist along the eastern side of Strandfontein Road (between Spine Road and Baden Powell Drive), with the primary ridge lines extending northwards into the False Bay Ecology Park and into Philippi.

Other slopes exist to the east of Strandfontein Sports Complex. These are major informants to the determination of functional ecological corridor links. Areas of gentler gradient should be considered more for development.

- Primary dunes

Primary/embryonic dunes are prevalent within the Strandfontein Resort area. These areas are partially vegetated and dissected by roads. Primary dunes have been moderately impacted on by urban development within the coastal node.

- Flood prone areas

Low-lying areas prone to flooding exist south of the Strandfontein Sports Complex. However, these are isolated depressions which do not form part of any larger watercourses or wetland systems.

Certain areas within the existing Strandfontein Resort footprint are prone to inundation during storm surges. However, the impacts of storm surges on the coastal node are moderate due to the integrity of the primary dune system.

- Green links

Parts of the Strandfontein Coastal Node are identified as 'high & medium condition' sites (refer to figure 6). These sites are selected areas in terms of national biodiversity targets. They require further articulation in terms of functional ecological connectivity in terms of physical analysis of the area.

- Movement desire lines

Currently, the coastal node is dislocated from the Strandfontein Community. Pedestrian and NMT links are virtually non-existent. However, footpaths are visible between the pavilion area and Strandfontein Sports Complex.

In addition, Camp Street is a tarred road, which provides vehicular access to Strandfontein coastal node. Camp Street does not provide vehicular access onto Baden Powell Drive as it passes underneath it. Other desire lines to the coast are visible from Pelikan Heights. It is most likely that these are unsafe passages for pedestrians.

- Informal settlements

A small informal settlement exists on City-owned land north of Baden Powell Drive and west of Camp Street. Since there is no immediate planning for the area, the potential expansion of this informal settlement presents a tangible threat to land suitable for development as well as the existing biodiversity corridor.

- Existing areas of disturbance

The existing Strandfontein coastal resort footprint constitutes an area of existing disturbance and could present opportunities for development. Existing facilities available at the resort include a tidal pool, a concrete berm/windbreak, a beach office, ablution facilities, and substantial parking

facilities. Structures are scattered throughout the resort area with extensive grass embankments in between.



Figure A.5.3: Strandfontein Coastal Node - Informants

A.5.4 Blue Waters Coastal Resort

At the local scale the following informants are applicable (refer to figure A.5.4):

- Relief (steep hill slopes; gentle slopes)

This section of the FBC is a relatively flat plain. Blue Waters Coastal Resort is partially protected by the parabolic dunes in the coastal zone, which provide sheltered from cold on-shore winds at night. Most of the Blue Waters overnight accommodation (chalets and camping areas) are found within this protected zone.

- Primary dunes

Extensive embryonic dune systems defend this stretch of the coast. However, these are significantly impacted on by built infrastructure. The Middelbank Promenade area is situated directly within the primary dune system up to the high water mark. In addition, Lukannon Drive, linking Strandfontein and Mnandi Coastal Nodes, and providing access to Blue waters Resort, dissects the Primary dune system and is often covered by windblown sand.

- Flood prone areas

The coastal zone at Blue Waters is fairly well protected from inundation by the primary dune system. There are a few isolated depressions on the landward side of the dunes which are prone to flooding.

- Green links

With the exception of the Blue Waters Resort area, this stretch of the coastal zone is identified as a 'high & medium condition' site. These sites are selected areas in terms of national biodiversity targets. They require further articulation in terms of functional ecological connectivity in terms of physical analysis of the area.

It is proposed that the existing resort footprint be rationalised to a more contained and manageable size. This will free up more land for rehabilitation of natural vegetation.

- Movement desire lines

Like Camp Street to the west of Blue Waters, Nautilus Road is an underpass with no road access being provided onto Baden Powell Drive. Nautilus Road to the east of Blue Waters provides direct access from Strandfontein to the coast.

At present, road access to Blue Waters Resort can only be obtained via Lukannon Drive between Strandfontein and Mnandi Coastal Nodes. This is problematic as Lukannon Drive is plagued by windblown sand, which has to be cleared regularly to keep the road open. This road is also unsafe, especially at night, as there is no lighting and there is very little activity apart from fishermen.

Salerno Way, which extends from Spine Road to Baden Powell Drive, is viewed as a critical movement desire line. The possible extension of Salerno Way to meet the road infrastructure at Blue Waters Resport would provide the opportunity for access to the Resort to be obtained from Baden Powell Drive.

- Existing areas of disturbance

Blue Waters is a predominantly recreational node. Infrastructure at Blue Waters Resort is currently scattered over a large footprint. The level of disturbance is moderate. Existing facilities and activities include a caravan park and chalets, staff housing, Department of Sports, Recreation and Amenities district offices, Blue Waters Life Saving Club (Beach area), braai areas on the seaward side of Lukannon Drive (Beach area).

The Blue Waters Resort was developed under the Apartheid Separate Amenities Act, No. 49 of 1953, which forced 'non-white' persons to use the resort, with the result of a false market being created for it. These days the resort is not seen as an attraction for most middle income holiday-makers. However, there is still some level of usage by the lower income segment of the market. More recently, a temporary refugee camp has been established to accommodate the overflow of foreign migrants to the city.

Structures are scattered over a large footprint, making inefficient use of available land. Extensive grassed areas exist on the periphery used for camping and daily recreation activities such as braaing and picnicking. Only certain portions of these areas are being maintained, while others have been overgrown with natural vegetation.

Infrastructure at Blue Waters Promenade area is a significant disturbance to coastal processes, especially embryonic dune movement. The promenade is highly visible and the towers are used as lookout points. This area is especially prone to vandalism (graffiti, theft, etc.) and vagrancy due to the general lack of activity limited to fishermen. There are a number of under-utilised parking areas along Lukannon Drive.

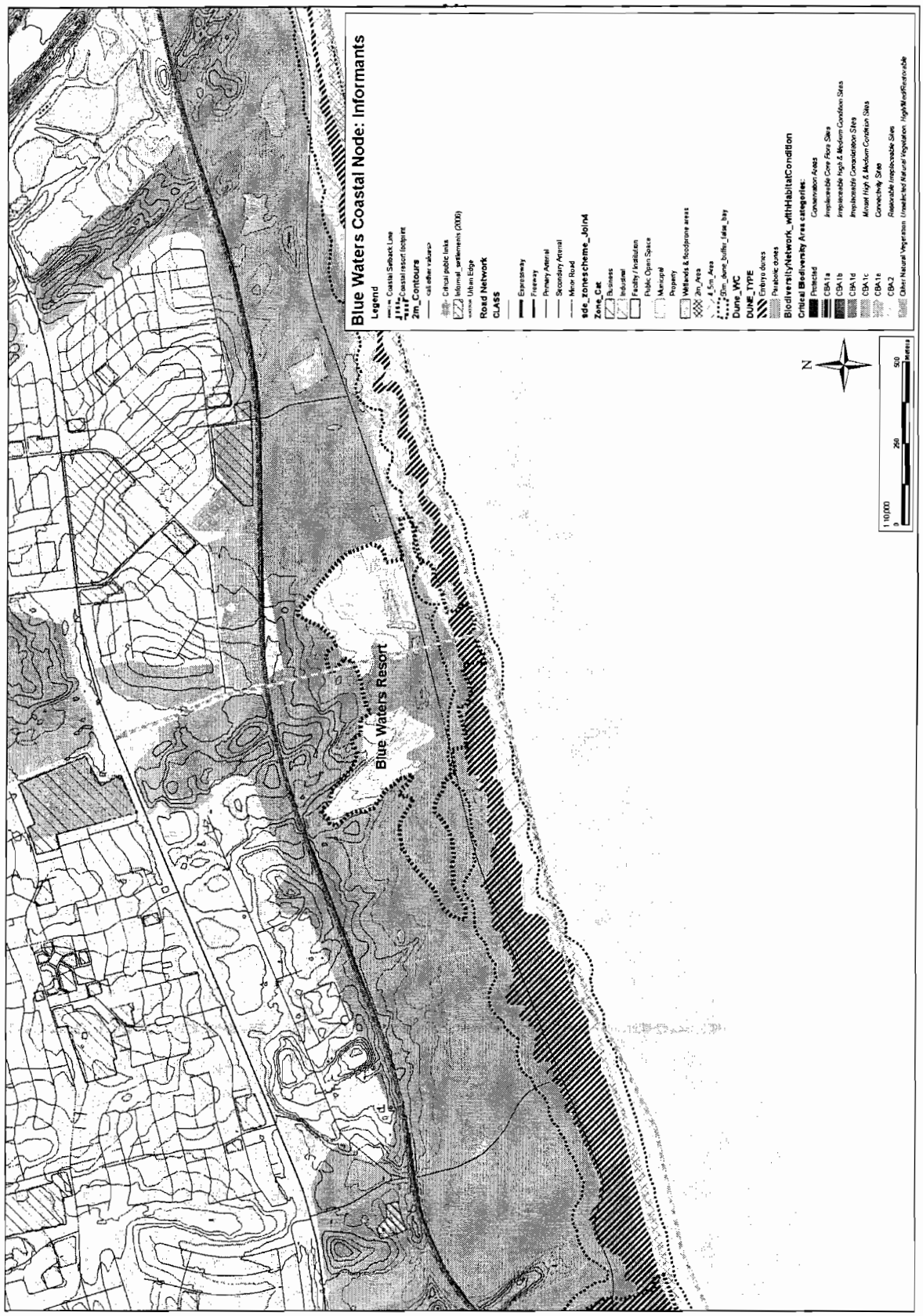


Figure A.5.4: Blue Waters Coastal Node - Informants

Annexure A.6 - Local Guidelines: Coastal Nodes

The purpose of this section is to provide localised development guidelines that reflect an understanding of the local context of the proposed coastal development nodes.

A.6.1 Monwabisi Resort

Local guidelines are developed in terms of generalised sub-regional guidelines for development (refer to figure A.6.1):

(1) Maintain a continuous east-west biodiversity corridor

a. Any development proposals in relation to the node should maintain and enhance a functional green link connecting Wolfgat Nature Reserve and Macassar Dunes Nature Reserve, running along the southern edge of Monwabisi Park Informal Settlement.
b. The biodiversity corridor should extend along the major dune ridge in a south-easterly direction towards the eastern edge of the Monwabisi Coastal Node.

(2) Ensure public access to and along the coast is maintained

a. A new access to the resort area off Oscar Mpetha Road, should be considered to provide direction public access to the focal point of the resort area tidal pool).
b. Safe north-south pedestrian movement should be prioritized between Khayelitsha and the resort area as part of any development proposals.
c. Any development proposal should enhance opportunity for public access along the coastline. This should be focussed on clearly demarcated footpaths designed so as to reduce impact on sensitive environments.

(3) Promote active, diverse and safe coastal nodes which become destination places

a. Promote active multi-functional places supporting higher thresholds for public services and public facilities:

- The broader nodal area should be developed as a high density mixed use coastal node linked to Khayelitsha via a development corridor. This type of development should occur in identified areas to the north of Baden Powell Drive.

b. Safe public destination places which promote tourism development

- Development within the existing resort footprint of Monwabisi should the focus on public facilities, tourism infrastructure which could include low impact or sensitively designed overnight accommodation. This development should contribute to the destination role of the resort.
- Existing resort buildings should be upgraded or reused where appropriate.

(4) Design with due regard for coastal processes

a. The beach area around the tidal pool as well as grass areas within the primary dune system should be rehabilitated. Protected natural dune corridors should serve as connectors of protected areas.
b. Active open space activities should be used as transitional areas between natural areas and urban development.
c. New development should avoid sensitive areas around the coastal cliffs to the west of the resort area.

(5) Maintain visual quality along the False Bay coast

a. The visual sensitivity of the Baden Powell scenic drive should be responded to when developing in proximity of this alignment.

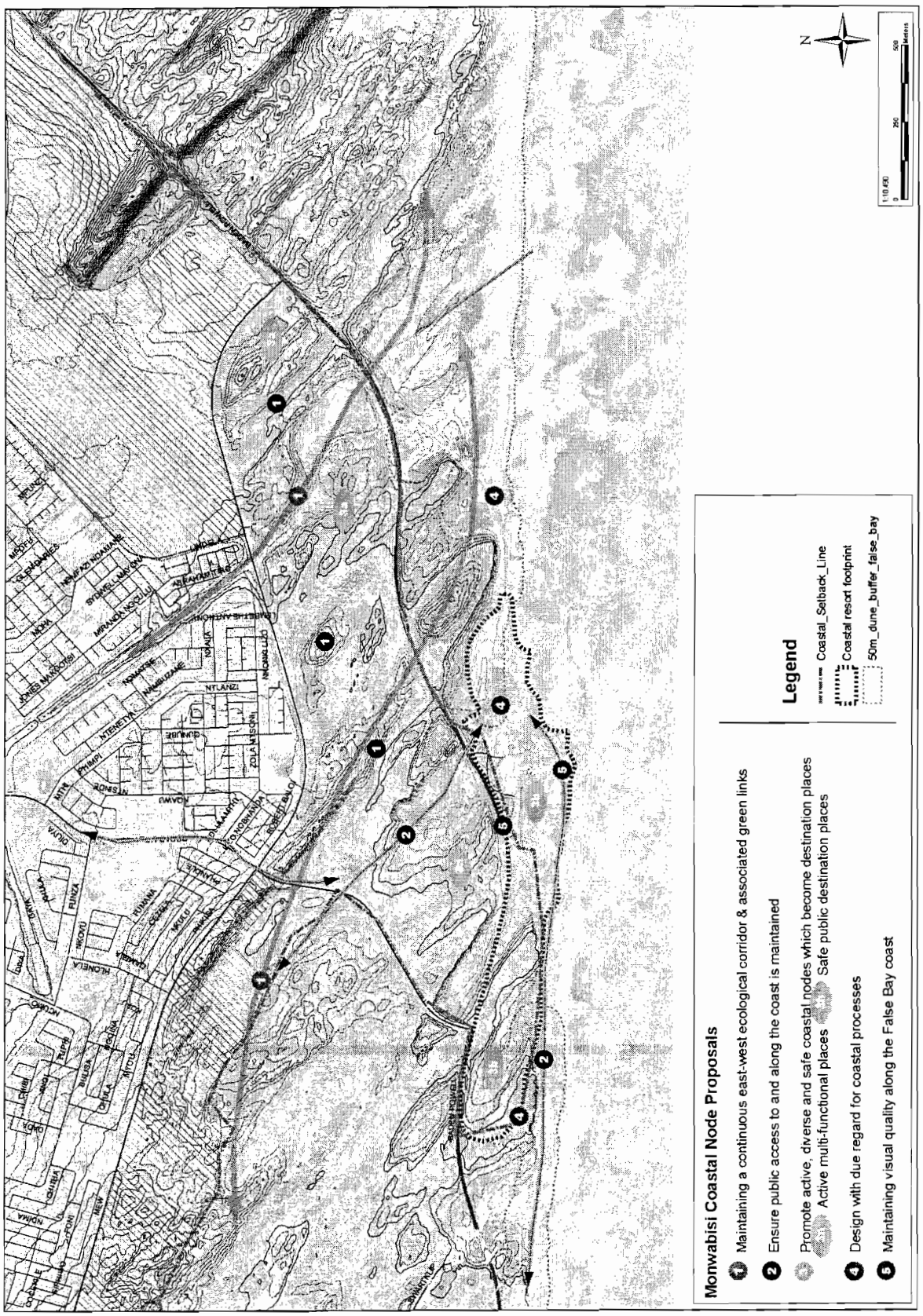


Figure A.6.1: Monwabisi Coastal Node - Proposals

A.6.2 Mnandi

Local guidelines are developed in terms of generalised sub-regional guidelines for development (refer to figure A.6.2):

(1) Maintain a continuous east-west biodiversity corridor

a. An east-west biodiversity link along the southern edge of Baden Powell Drive should be maintained. This alignment coincides with the major dune ridge running through Mnandi Coastal Node.
b. Biodiversity outside the coastal node between Baden Powell Drive and the high water mark should be protected. This includes embryonic dunes within this area.

(2) Ensure public access to and along the coast is maintained

a. NMT access from Kapteinsklip Station to Mnandi Coastal Node should be enabled and strengthened by new development within the precinct.
b. Public access along the coastline should be retained as an integral element of the any development proposal.

(3) Promote active, diverse and safe coastal nodes which become destination places

3a Active multi-functional places supporting higher thresholds for public services and public facilities:

- Land north of Baden Powell Drive (Kapteinsklip Station Precinct) should be developed in accordance with transit-oriented development principles to encourage a vibrant mixed use station precinct.
- Development relating to the resort area should include higher intensity mixed use activity promoting increased activity within the coastal node. Positive relationships should be ensured between development and upgraded public areas (resort and beachfront areas).

3b Safe public destination places which promote tourism development

- The existing resort footprint of Mnandi should be upgraded and public spaces and facilities enhanced with low intensity recreational and tourism infrastructure. This will reinforce the status of Mnandi Beach as a 'blue flag' beach and increase the tourism potential of the area.

(4) Design with due regard for coastal processes

a. The major dune ridge running in a south-easterly direction from the eastern section of Mnandi Coastal Node to the Baden Powell/Eisleben t-junction should be protected.
b. Embryonic dunes as well as the identified 50m dune buffer should be protected from any urban development. Therefore, development along the southern edge of the resort area should be managed to facilitate an appropriate transition between urban development and the coast.
c. The possible partial closure of Lukannon Drive should be investigated to encourage the rehabilitation of the embryonic dune system along this stretch of the coast and reinforce north-south links as the access to the coast.

(5) Maintain visual quality along the False Bay coast

a. The visual sensitivity of Baden Powell Drive should be adhered to by wrapping development around the existing Mnandi Resort footprint.

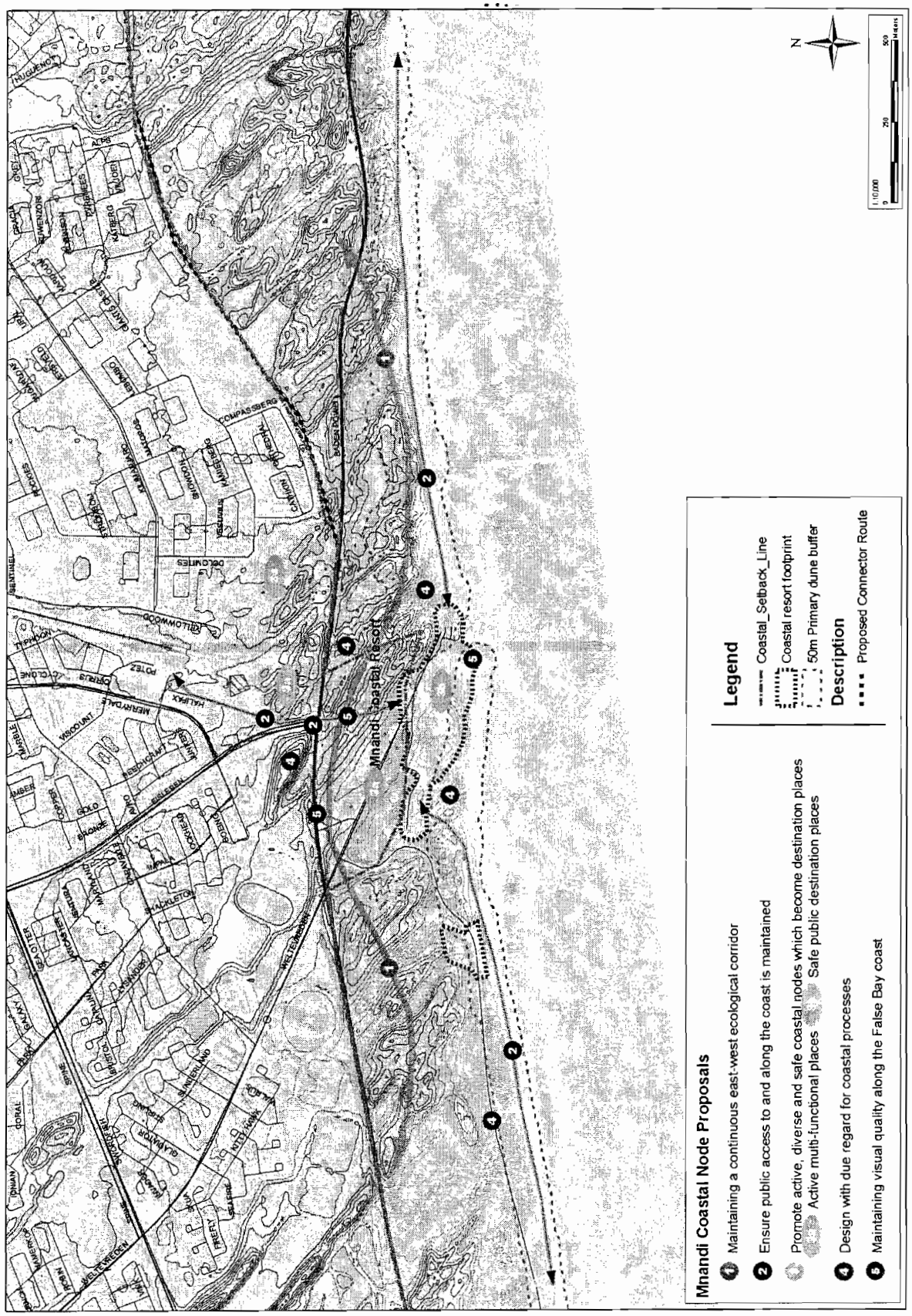


Figure A.6.2: Mnandi Coastal Node - Proposals

A.6.3 Strandfontein

Local guidelines are developed in terms of generalised sub-regional guidelines for development (refer to figure A.6.3):

(1) Maintain a continuous east-west biodiversity corridor

a. An east west biodiversity corridor should be maintained in the area between the eastern edges of Pelican Heights and the Strandfontein Sports Complex, and the southern edge of Pelikan Heights and the high water mark up to Strandfontein Coastal Node. The corridor should also include the dune ridge running between Strandfontein Road and the western boundary of the Strandfontein Sports Complex. The alignment of the biodiversity corridor should run along the seaward side of Baden Powell Drive where it intersects with Strandfontein Coastal Node, and continue along the landward side of the primary dune to the east of the coastal node.

(2) Ensure public access to and along the coast is maintained

a. NMT access between Strandfontein Sports Complex and Strandfontein Coastal Node should be enabled by new development in and around the resort area.
b. Public access along the coastline should be retained as an integral element of the development proposal

(3) Promote active, diverse and safe coastal nodes which become destination places

3a Active multi-functional places supporting higher thresholds for public services and public facilities:

- South of Spine Road, North of Baden Powell Drive, west of Camp Road and east of the dune, and adjacent to the eastern edge of the Strandfontein Sports Complex.
- East of the ridge, which is adjacent to the eastern edge of Strandfontein Road, south of the southern boundary of the Strandfontein Sports complex, north of Baden Powell Drive and west of the dune ridge identified east of the Strandfontein Sports complex.
- West of Camp Road, south of Baden Powell Road and north of the proposed east west green link (which is proposed approximately 50m north of Lukannon Drive), east of the existing eastern edge of the coastal resort and
- The area east of Camp Road, south of Spine Road and north of Baden Powell Drive comprises underdeveloped land which is home to various public institutions. The land is owned by the City of Cape Town and is leased to these institutions. The ad hoc and disjointed nature of the development has resulted in sub-optimal use of the land and thus it is proposed that the land is redeveloped and land uses intensified. This should be a mixed use precinct.

3b Safe public destination places which promote tourism development

- Urban development should seek to create a positive interface and well defined edge to the Strandfontein sports complex.
- Low intensity recreational and tourism infrastructure should focus within the disturbed area within the resort footprint.

(4) Design with due regard for coastal processes

a. Major dune ridges running along the eastern edge of Strandfontein Road between Strandfontein Road and the western edge of the Strandfontein Sports Complex and and to the western edge of the Strandfontein Sports Complex south of Spine Road and north of Baden Powell Drive should not be developed.
b. The embryonic dune, as well as a 50m buffer adjacent to the dune which has been identified along the entire length of the stretch of coastline in proximity to the Strandfontein node should be protected from any urban development.

c. The dune system and its restoration should be an integral part of the proposed recreational and tourism infrastructure proposed at the existing coastal resort.
d. The partial closure of Lukannon drive and facilitating access to the existing resort via a north south link should be considered.

(5) Maintain visual quality along the False Bay coast

a. The development of Strandfontein resort should celebrate its role as a gateway to the coast. Design should be sensitive to the role of Baden Powell Drive as a scenic drive.

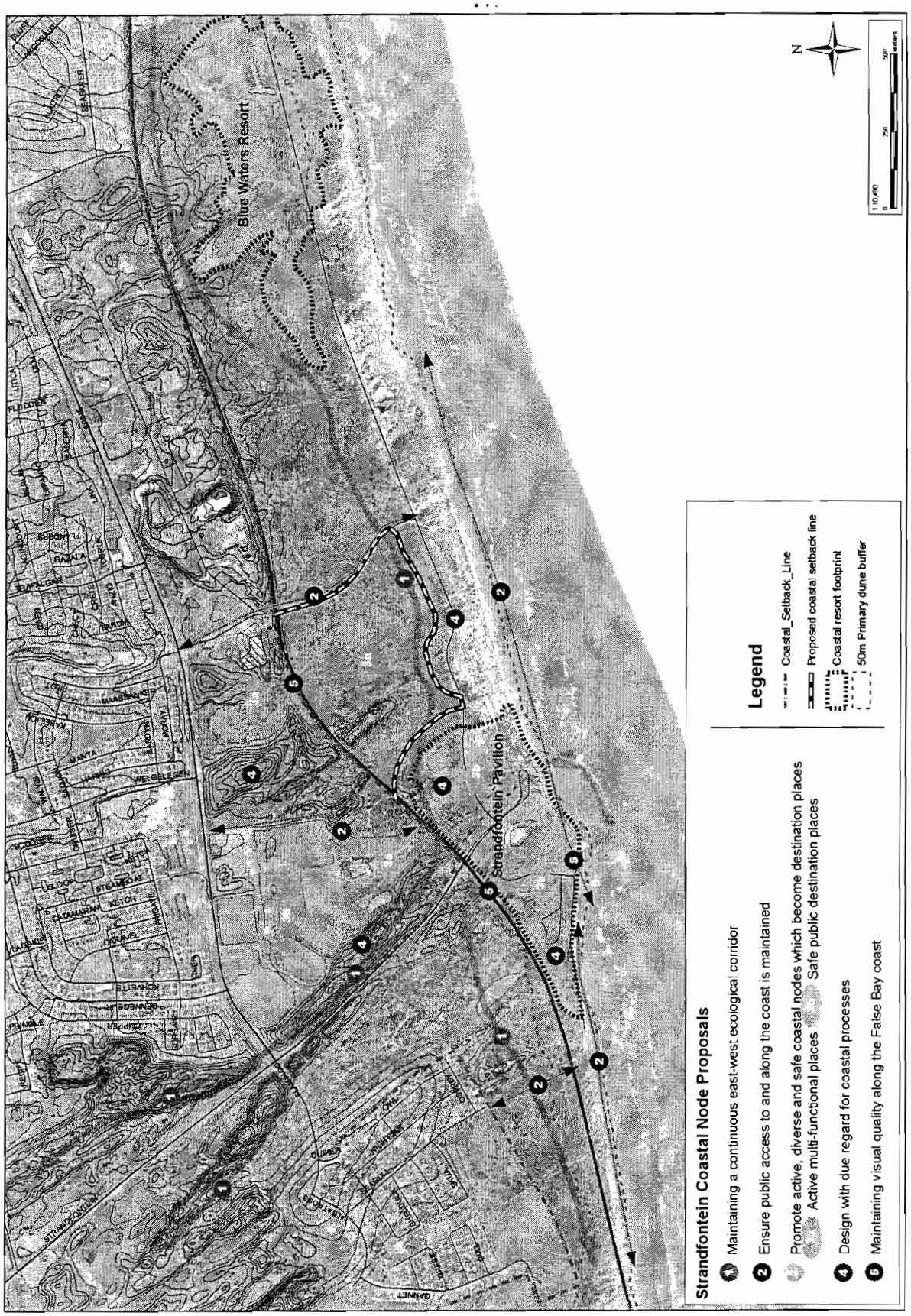


Figure A.6.3: Strandfontein Coastal Node - Proposals

A.6.4 Blue Waters Resort

The characteristics of the Blue Waters resort are distinctly different from the other three coastal development zones discussed. It is recommended that the Blue Waters Resort should remain a community resort which is easily accessible, particularly to local residents of the adjacent residential areas. Improvements should be made to existing resort infrastructure and beach facilities (refer to figure A.6.4).

(1) Maintain a continuous east-west biodiversity corridor

a. Essentially, the entire strip of the coastal zone on the seaward side of Baden Powell Drive between Strandfontein and Mnandi Coastal Nodes should be identified as a green corridor link, with Blue Waters Resort continuing to function within this link.

(2) Ensure public access to and along the coast is maintained

a. Consideration should be given to extending Salerno Way from Baden Powell Drive to meet the coast, in order to increase local access to the resort.
b. Consideration should be given to linking Salerno Street link with existing road infrastructure at the Department of Sports, Recreation and Amenities district offices, and provide north-south access to the coast at Blue Waters Promenade in order to provide direct and safer access to the resort and beach areas off Baden Powell Drive.
c. Camp and Nautilus Streets are existing north-south road links providing direct access to the coast for the residents of Strandfontein. Parking areas with ablution facilities should be provided on the landward side of the primary dune area, with boardwalks linking parking areas with the beach.
d. Any development proposals should maintain public access along the coast (e.g. through the provision of a structured east-west coastal pedestrian walkway).

(3) Promote active, diverse and safe coastal nodes which become destination places

3a Active multi-functional places supporting higher thresholds for public services and public facilities:

- Due to the role of Blue Waters Resort as a low intensity recreational node, no high intensity development is proposed.

3b Safe public destination places which promote tourism development

- Development should focus on upgrading and consolidation of existing infrastructure within the report footprint with a focus on tourism and recreation infrastructure.
- Consolidation of infrastructure should enable the shrinking of the grassed resort area and the re-establishment of natural vegetation (within areas such as the camp site).
- Consideration should be given to upgrading the chalet area and potential increased development of tourism accommodation in a low impact manner..
- The current main entrance to Blue Waters along Lukannon Drive is seen as a gateway precinct to the entire node. Consideration should be given to appropriately enhancing this precinct by means of landscaping (parking areas and visible signage) and high quality public recreation areas to maximise the public experience and promote tourism.

(4) Design with due regard for coastal processes

a. The existing resort footprint should be consolidated in order to restore under-utilised areas to their natural state, ensure more efficient use of land to facilitate the development of a higher quality multi-functional public destination place.
b. Consideration should be given to the closure of Lukannon Drive between Strandfontein and Mnandi Coastal Nodes, and the rationalisation of parking and ablution facilities along its

length to north-south road links to reduce the development impact of infrastructure on the primary dune system and also to minimise the maintenance costs.

(5) Maintain visual quality along the False Bay coast

a. The visual quality of the area should be maintained and enhanced where possible. To this extent, consideration should be given to investigation the potential of the little 'koppie' to the south-west of the district offices, as well as the towers at Blue Waters Promenade as public lookout points.
b. The visual sensitivity of the Baden Powell scenic drive should be responded to when developing in proximity of this alignment.

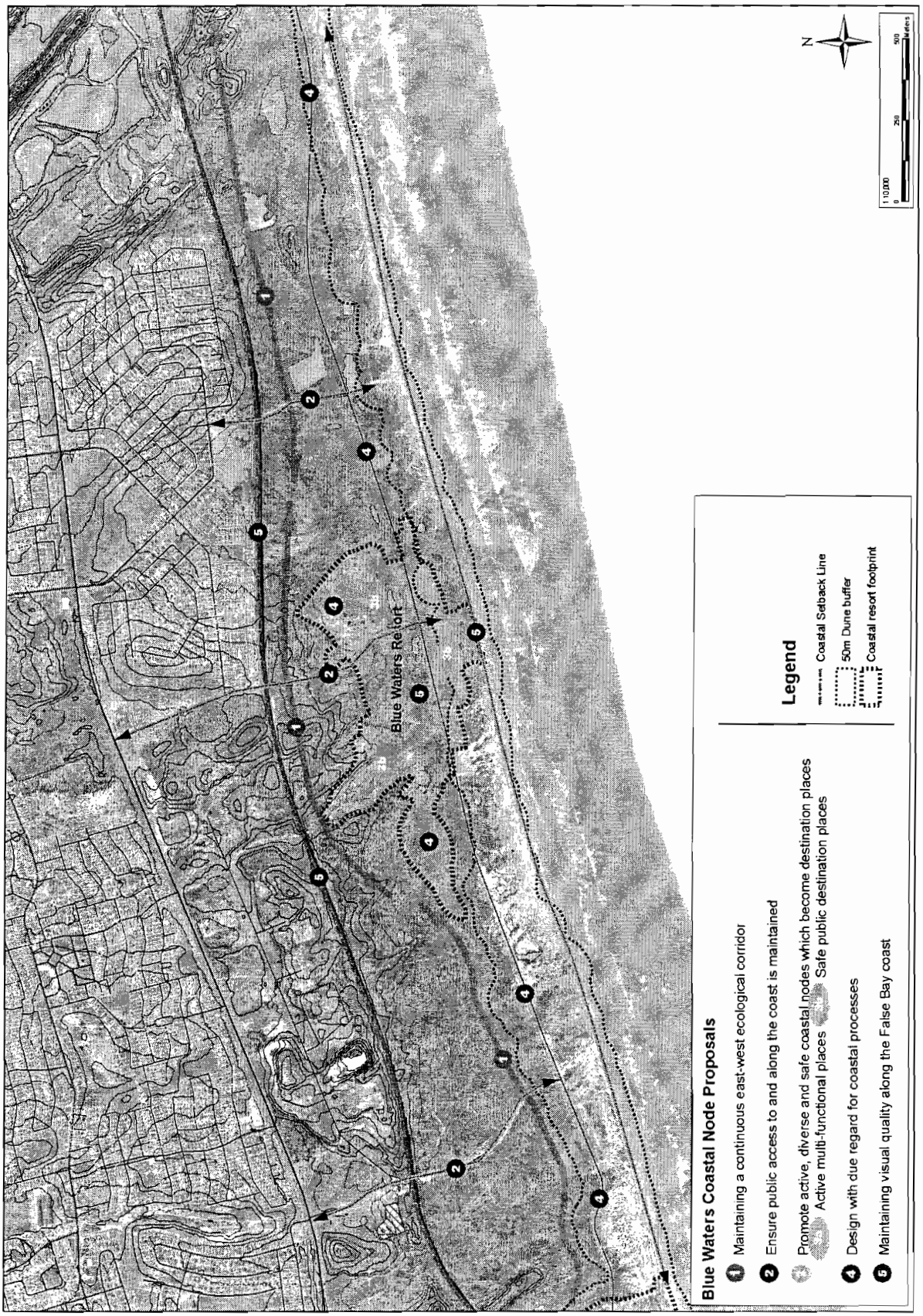


Figure A.6.4: Blue Waters Coastal Node – Proposals

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Agenda Item No	10SUB10/05/09
Subject	RAPID PLANNING REVIEW OF POTENTIAL FUTURE DEVELOPMENT AREAS ALONG FALSE BAY COASTLINE (DISTRICTS G 7 F)
SubCouncil	Charlotte Maxeke SubCouncil
Meeting Date	Monday, May 18, 2009
Resolution	;#Noted;#
Date Closed	Saturday, May 30, 2009

Resolution Detail

Mr Siwisa mentioned that he attended Sub-council 12 meeting and Mitchell's Plain people have been very vocal about development of False Bay coast line and it will also benefit the community of Khayelitsha since the document is submitted to this Sub-council for comments before it can be submitted to PEPCO for endorsement as per recommendations.

Resolved that

The report be noted by Sub-council 10.

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Agenda Item No	12SUB12/04/09
Subject	RAPID PLANNING REVIEW OF POTENTIAL FUTURE DEVELOOPMENT AREAS ALONG FALSE BAY COASTLINE (DISTRICTS G & F)
SubCouncil	Mitchells Plain SubCouncil
Meeting Date	Thursday, April 30, 2009
Resolution	;#Noted;#
Date Closed	Thursday, April 30, 2009

Resolution Detail

This item was dealt with item 12SUB08/04/09

Action: Refer to L Boyd (author)

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Global Climate Change and Adaptation – A Sea-Level Rise Risk Assessment.

PROPOSAL NUMBER: R030800032
REFERENCE NUMBER: GLOBAL CLIMATE CHANGE

Prepared For:
The City of Cape Town
Delivery Address:
Environmental Resource Management Department
City of Cape Town

Phase one:
Sea Level Rise Model
Report prepared by Prof. Geoff Brundrit
March 2008

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The scientific evidence is now overwhelming: climate change presents very serious risks, and it demands an urgent global response. *Stern Review 2007*

A storm swell, coinciding with a Saros spring high tide, struck the Kwa Zulu Natal coast on 19/20 March 2007. At its peak, the storm produced swells of ~8.5m, caused significant coastal erosion and unprecedented damage to coastal property, estimated at more than one billion rand. *Smith et al 2007*

Coasts are projected to be exposed to increasing risks, including coastal erosion, due to climate change and sea level rise. The effect will be exacerbated by increasing human pressure on coastal areas. *IPCC Fourth Assessment Report Feb 2007*

Sea level will rise between 18 and 59cm by 2100. *IPCC AR4 Feb 2007*

I find it almost inconceivable that "business-as-usual" climate change will not result in a rise in sea level measured in metres within a century. *James Hansen NASA July 2007*

It became apparent that, concerning the melting of the Greenland and Antarctic ice sheets, we really don't know enough. *Rajendra Pachauri, IPCC Chair Nov 2007*

The 2007 melting season set a new record for snowmelt over the Greenland ice sheet.

EOS 25 Sep 2007

Arctic sea ice declined rapidly to unprecedented low extents in the summer of 2007.

EOS 8 Jan 2008

Current models suggest virtually complete elimination of the Greenland ice sheet and a resulting contribution to sea level of about 7m if global average warming were sustained for millennia in excess of 1.9 to 4.6 degrees Celsius relative to pre-industrial values.

IPCC Synthesis Report Nov 2007

The benefits of strong early action on climate change outweigh the costs.

Stern Review 2007

INTRODUCTION

The City of Cape Town have awarded LaquaR Consultants CC the contract for their Proposal Number: R03-404/06-07

Reference: Global Climate Change

Date: January – July 2008.

An extract from the Terms of Reference of the contract, relevant to this first Phase One, now follows.

TERMS OF REFERENCE

Global Climate Change: Coastal Climate Change and Adaptation - A Sea-Level Rise Risk Assessment for the City of Cape Town

1. Background and Introduction:

The City of Cape Town administers approximately 307 km of coastline, arguably its single greatest economic and social asset. In October 2003 the City formally adopted a Coastal Zone Management Strategy with the intention of managing and safeguarding the coastal asset for current and future generations.

The City's coast provides a range of social and economic opportunities including recreational and amenity areas, sought after housing and development opportunities as well as core economic attributes. In addition, the City's coast is a dynamic ecological system that supports a wide range of species, ecological systems and ecological services.

Global climate change predictions suggest that amongst others, sea level rise and an increase in the intensity and frequency of storm events may have significant impact on

coastlines across the globe. Cape Town with its extensive coastline may be particularly vulnerable to these predicted changes.

2. Motivation and Aim of Project

The aim of the Sea-Level Rise Risk Assessment Project is to:

- Model the predicted sea-level changes in a range of scenario's (time series, incremental climate change, shear events, and storm frequency and intensity).
- Model the form that those changes will take.
- Understand the associated impacts on existing coastal systems, infrastructure and property
- Provide guidance and implications to future coastal development (to be included in the City's Coastal Development Guidelines)
- Identify high risk areas that are prone to high impact
- Begin to understand and develop long-term mitigation measures.

The primary objective of this study is therefore:

To model and understand the ramifications of predicted sea-level rise and increased storm events for the City of Caped Town, thereby providing information that may be used for future planning, preparedness and risk mitigation.

3. Project Phases

The project will be undertaken in four distinct phases. Each phase of the project will provide specific outcomes and deliverables.

Phase One: Climate Change Sea-Level Rise Model

Phase one of the project will model the predicted sea-level changes in a range of scenarios. A computer based GIS model will be developed that will demonstrate the coastal changes resulting from sea-level rise. The model must be developed in such a way that variables within the model may be changes to accommodate variations within predictions as well as illustrate the impacts of catastrophic and combined events. The GIS model must make use of existing climate and climate change models, the City's aerial photography and survey data, contour maps and infrastructure information (hard and soft coastal edges).

The model must be designed to incorporate and demonstrate, at a minimum, the following information:

- Time series: Show changes over time within a 5-100 year horizon based on best available climate change predictions.
- Demonstrate the impacts of sea-level rise based on incremental change in climate patterns
- Demonstrate the impacts of sea-level rise based on shear events, i.e. dramatic and immediate change in sea-levels.
- Demonstrate the impacts of combination events (i.e. sea-level rise combined with spring high tide, a storm event coupled with a high rainfall event).

- Model and demonstrate the form that these changes will take, taking into account the different coastal edges (hard man-made surfaces such as the Sea Point Promenade, rocky shores, sandy beaches and coastal estuaries).

In order to achieve the **Phase One: Climate Change Sea Level Rise Model** requirements, the following approach is taken.

- Review the nature of extreme sea level events along the coastline of the City of Cape Town, so as to establish the various contributions/components/constituents that might evolve under the effects of climate change. This will be achieved through a re-interpretation of sea level records from the SA Navy Tidal Network stations at Simon's Town and Cape Town. This forms the **First Study**, which provides a **Present Day Very Worst Case Scenario** of extreme sea levels for use in the GIS Inundation Model for the coastline of the City of Cape Town.

- Review global projections of the influence of climate change on sea level, as given in studies such as the recent Assessment Reports of the Inter-Governmental Panel on Climate Change. This will provide estimates of the influence of climate change on local constituents of sea level in the vertical, as a series of projections on decadal and centennial scales, together with their range of uncertainties. The **Second Study** gives estimates of sea level rise for the coastline of the City of Cape Town in the near future, and provides the **Scenario at the End of the Next Decade** for the GIS model. The **Third Study** focuses on the much more uncertain longer term situation when wholesale ice melting is expected to lead to greatly enhanced sea level rise, and provides the **Polar Ice Sheet Melt Scenario** and its effects on the coastline of the City of Cape Town on century time scales.

- Build these projections of sea level rise into the Geographic Information System (GIS) terrain model of the metropolitan area, maintained by the Geomatics Department of the City of Cape Town. This will generate illustrative scenarios of future inundation of coastal land, and the identification of vulnerable locations. Overlays of the infrastructure and services within the GIS model will then begin

to highlight the potential negative consequences of climate change from inundation in these vulnerable locations.

THE FIRST STUDY

EXTREME SEA LEVELS ALONG THE COASTLINE OF THE CITY OF CAPE TOWN

There is concern about the impact of extreme sea levels on infrastructure and services along the coastline of the City of Cape Town, especially with the threats of sea level rise and increased storminess associated with global warming. The purpose of this first study is to summarise what is known about present day sea levels, with an emphasis on extreme events and on particularly vulnerable sections of the coastline. Once this study is complete, it will be possible to shift the focus onto the implications of the future addition of sea level rise to the situation.

There are essentially three factors that contribute to present day sea level: tides, weather effects and wave set-up, though the last mentioned only affects surf zones. They have different characteristics, so the three factors need to be carefully combined to assess their total contribution and potential impact. The material relevant to the coastline of the City of Cape Town is extracted and embellished in this study.

The Tides

The tides are completely predictable and affect the entire coastline in a uniform way. However, tidal heights vary on a daily, fortnightly, seasonal and on a year to year basis. The detail is provided in the Tide Tables published on an annual basis by the

Hydrographic Office of the South African Navy, and the information for Granger Bay (Table Bay) and Simon's Bay (False Bay) is particularly relevant to this study.

In this study, the Land Levelling Datum (LLD), rather than Chart Datum (CD), is used as a baseline for all heights and levels, so that they are immediately recognizable by the Geographic Information System Inundation Model being developed by the City of Cape Town. The relationship between LLD and CD over the years is tabulated in the Tide Tables.

Tidal Characteristics	Simon's Bay	Granger Bay
Mean Tide Level (MTL)	LLD+16cm	LLD+15cm
Mean High Water Neaps (MHWN)	LLD+44cm	LLD+43cm
Mean High Water Springs (MHWS)	LLD+90cm	LLD+86cm
Highest Astronomical Tide (HAT)	LLD+124cm	LLD+120cm

In summary the tides for these two ports are very similar, so that it is possible to use the longer and more reliable information from Simon's Bay as being representative of the entire coast of the City of Cape Town.

Within each fortnight between full moon and new moon, high tide over the days of neap tide typically only reaches levels of 44cm above LLD whilst, over the days of spring tides, the high tide reaches 90cm above LLD. The overall maximum spring high tide is much higher, being the Highest Astronomical Tide at LLD+124cm. The tide does not reach HAT every year. HAT is the maximum tidal height reached in the 18.6 year cycle of the precession of the Moon's ascending node (also known as the Saros cycle). The mean for the other tidal measures is also taken over this long 18.6 year cycle time.

When it comes to extreme tides, only high water at spring tides occurring around the time of full and new moon, rather than at neap tides, need to be taken into account. These spring high tides exhibit great variability in height, but have a regular pattern (the equinoctial, lunar perigee and Saros cycles) over the long term. In any given year, the spring high tides peak in the seasons of spring and autumn as part of the equinoctial cycle, so that the Highest Astronomical Tide of the Year (HATOY) will occur in one of the months within spring or autumn. HATOY will also be higher in those years when the Moon's perigee occurs in spring or autumn, which happens every 4.4 years. Finally HATOY will reach HAT in the peak year of the Saros cycle.

The values and times of HATOY at Simon's Bay in recent years are tabulated to illustrate this.

Year	HATOY	Time and Date
2003	HAT-6cm	O4h29 Mar 20
2004	HAT-11cm	03h39 Apr 6
2005	HAT-8cm	04h16 Feb 10
2006	HAT-1cm	04h10 Mar 1
2007	HAT-2cm	03h57 Mar 20
2008	HAT-10cm	03h50 Apr 7

The highest tides are restricted to a few hours on particular days in particular months in particular years and are completely predictable. If the tides are the determining factor in extreme sea level (*Searson and Brundrit 1995*), it will be important to note these times of particular vulnerability. The dates and times and heights can be extracted from the Tide Tables, which are published each year by the Hydrographer of the South African Navy.

The Weather Effect

The effect of passing synoptic weather systems means that observed sea level can be higher than the predicted tide when the air pressure is low and when the wind piles the water up against the coast (passing mid-latitude depressions; low pressure systems; cold fronts). As with the tides, the entire coastline is affected. Synoptic weather effects last for two or three days, but their predictability is limited to little more than one week. Forecasts of severe weather are issued by the South African Weather Service.

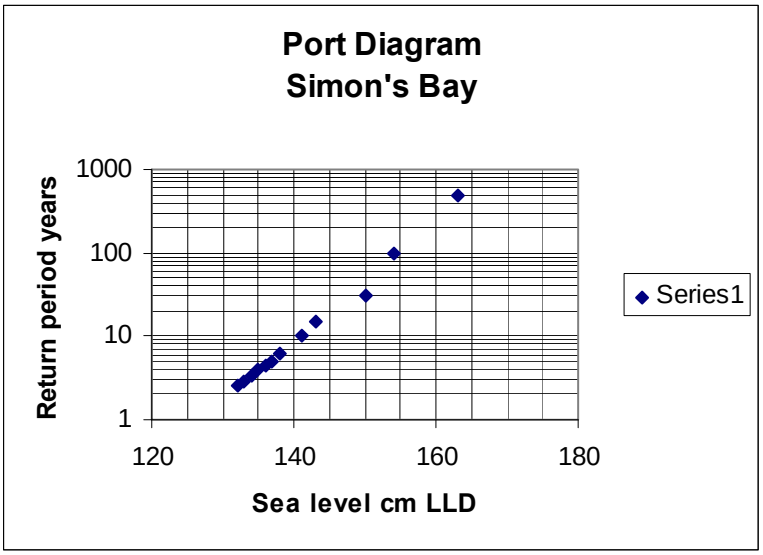
While individual depressions do vary in their intensity and duration, their statistical characteristics vary little from season to season or from year to year. An overall description can be obtained from a 30 year record of hourly observations of sea level from Simon's Bay between 1960 and 1990 (*Searson and Brundrit 1995*). The almost 250 000 hourly deviations of sea level from the predicted tide, due to the synoptic weather effect, form an essentially normal distribution with a standard deviation of 8.2cm.

For further study of the extreme values, the deviations can be grouped into monthly maxima for each month of the 30 year period. The overall monthly maximum deviation in the 30 year record was + 39cm, whilst in 15 of the 360 monthly maxima, the deviation exceeded +25cm. The spread of these extreme monthly maximum deviations was not uniform over the three decades. Three occurred in the 1960s, two in the 1970s and the remaining ten were in the 1980s. Whilst this might suggest that there is a tendency towards increasing storminess, it should be noted that the overall maximum deviation of +39cm occurred in August 1963.

Sea Level

The 30 year record of observations of sea level can be analysed for extremes of the joint effect of tides and weather on sea level around the coast of the City of Cape Town. Such an analysis gives the mean sea level as LLD+17cm, with a 30 year maximum sea level of LLD+150cm. The 30 year observed maximum sea level at Simon's Bay occurred on 25 September 1981, on a peak spring high tide with a height of LLD+119cm and an extreme storm with a deviation of +31cm. Indeed the seven highest observed sea levels at Simon's Bay in this thirty year period all coincided with near equinoctial spring high tides, emphasizing the enhanced vulnerability from such events. Although this 30 year maximum sea level exceeds HAT, it does not approach the level of (LLD+124) + 39cm, or LLD+163cm, which would be achieved on the simultaneous occurrence of HAT (an 18.6 year tide event) and a 30 year storm event. Such a joint extreme event has a return period of some 500 years. A Port Diagram showing the detailed return periods for

extreme sea levels at Simon's Bay is shown in *Searson and Brundrit 1995*, whilst a simplified Port Diagram, based on annual maxima, follows.



The observed annual maximum sea levels are used in the Simon's Bay Port Diagram for return periods up to 30 years, whilst the sea levels of LLD+154cm at a return period of 100 years and LLD+163cm for a return period of 500 years are extrapolations for illustration.

KZN Storm of March 2007

The simultaneous occurrence of a tidal height close to HAT and an estimated 30 year storm occurred along the coast of Kwa Zulu Natal in the early hours of 19 March 2007 (*Smith, Guastella, Bundy and Mather 2007*). The measurements taken at that time provide a valuable resource for confirming the approach taken for the coast of the City of Cape Town, and for suggesting values that should be used on exposed coasts.

The Highest Astronomical Tide for Durban is LLD+139cm. A ten year record of sea level observations from Durban from 1980-1990 again shows the deviation of observed sea level from the predicted tide to be normally distributed, with a standard deviation of 10.3cm (*Searson and Brundrit 1995*). The maximum deviation over the ten years gives an extra height of +37cm. The simultaneous occurrence of HAT and a ten year storm leads to a sea level of LLD+176cm with a return period of some 180 years. By contrast, the earlier ten year record of sea level observations gives a maximum sea level of LLD+159cm.

Turning to the situation on the KZN coast early on the morning of 19 March 2007, the observed sea level was LLD+188cm. The predicted early morning high tide for 19 March was only LLD+133cm, giving a contribution from the storm of +55cm. Such an extreme storm probably has a return period approaching 100 years. It should be noted that the predicted tide for the next day, early morning on 20 March 2007 was the HATOY for

2007 at LLD+137cm. If the storm had persisted or occurred at that time, the observed sea level would have been LLD+192cm and even greater damage would have been caused.

Wave Set-up and Storm Impact

The effect of wave set-up can now be summarized. This occurs due to interactions in the surf zone, where there is an increase in the water level leading to more vigorous run-up in the swash and intensified erosion of dune faces and other soft material. Measurements were made during the storm on the KZN coast in the early morning of 19 March 2007, and are reported in *Smith, Guastella, Bundy and Mather (2007)*. Referring these measurements to Land Levelling Datum rather than Chart Datum, the landward edge of the swash zone was surveyed at LLD+700cm in the Durban area, whilst at Ballito and Salt Rock the same swash levels were recorded at locations with a southerly aspect, adjacent to headlands. The erosion line for this storm was consistently located between the 4 and 5m contours above mean sea level, with the high water mark retreating by between 10-30m in a few hours as the nearshore sand was rapidly washed away. These extraordinary levels are consistent with the extreme intensity of the storm and the dramatic damage along the coast. “Roads were damaged at Margate, Uvongo, St Michael’s-on-Sea, Port Shepstone, Umkomaas, Durban, Umdloti, Ballito and Zinkwazi. The South Coast railway-line experienced severe damage at Mtwalume and Sezela. Private property along the coast was also damaged. The provisional repair bill exceeds one billion rand. (*Smith, Guastella, Bundy and Mather 2007*)”.





Potential Damage from Coastal Erosion

Coastal type and exposure influenced the severity of damage along the KZN coast. Sandy and rocky coastal sections generally withstood the storm's onslaught, but mixed coastlines of rock and sand, especially pocket beaches, were severely impacted. Many built structures that failed were located adjacent to, or upon rocky, headlands and within bays encompassed by rock shelves. Wave energy was focused in these areas, especially where over wash was not allowed to dissipate naturally.

There are lessons for the identification of areas along the coastline of the City of Cape Town which are vulnerable to the impacts from severe storms. Dunes must be high enough (at least 5m for the erosion line) and wide enough (room for a high water retreat of 30m) to afford protection from the sea. Once breached, infrastructure and services on land beyond the dunes is exposed to the risk of direct attack from the sea. A careful investigation of the land behind the sandy beaches of Table Bay and False Bay is indicated. Deep water channels leading into pocket beaches can be a focusing conduit for wave energy from destructive storms. An important lesson from the KZN storm is that buildings too close to the sea at the head of pocket beaches are at particular risk of severe damage. There are many exposed pocket beaches along the Atlantic coast of the Cape Peninsula. It should not be forgotten that the KZN storm was a cut-off low, leading to long wave surge from the east, a synoptic situation which also on occasion affects the western coastline of False Bay.

Scenario One

This is the **Present Day Very Worst Case Scenario** for the 300km coastline under the jurisdiction of the City of Cape Town. It results from the simultaneous occurrence of an extreme tide and an extreme storm, an event with a nominal return period of 500 years. Such an event has not occurred along the Cape coast in recent years but it did occur along the KZN coast on 19/20 March 2007. Measurements taken from the KZN extreme event have been incorporated into this Present Day Very Worst Case Scenario, particularly in respect of exposed and very exposed portions of the coastline. The erosion damage in KZN was spectacular, and similar damage should be anticipated along vulnerable sections of the Cape Town coast in such circumstances. The identification of these vulnerable sections of the Cape Town coast is an important output from this scenario.

The permissible resolution for sea levels in the GIS Inundation Model is 0.5m, and expected levels for scenarios should be rounded up from the levels reported earlier in the historic analysis. The maximum levels that should, therefore, be expected to be reached by the sea in this Present Day Very Worst Case Scenario are:

- LLD+2m in sheltered environments,
- LLD+4.5m in exposed environments, and
- LLD+6.5m in very exposed environments.

The levels reached in the exposed and very exposed environments along flat sandy beaches and into pocket beaches, are due to extreme swash heights associated with wave set up and run up in the surf zones from ~8m waves at the breakpoint. Even higher levels were measured at the limit of the swash zones in places where the greatest damage was caused along the KZN coast.

The inundation to be shown in the GIS reconstruction should identify those sections of the Cape Town coast that are most at risk in this Present Day Very Worst Case Scenario. Vulnerable infrastructure and services should be highlighted. Of particular interest will be where existing (dune) protection is eroded away in the storm and seawater is able to reach into unexpected areas of low-lying land. Because this scenario is possible (though unlikely) in the present day situation, it deserves to be carefully studied so that the extent of potential economic loss can be assessed.

SECOND STUDY

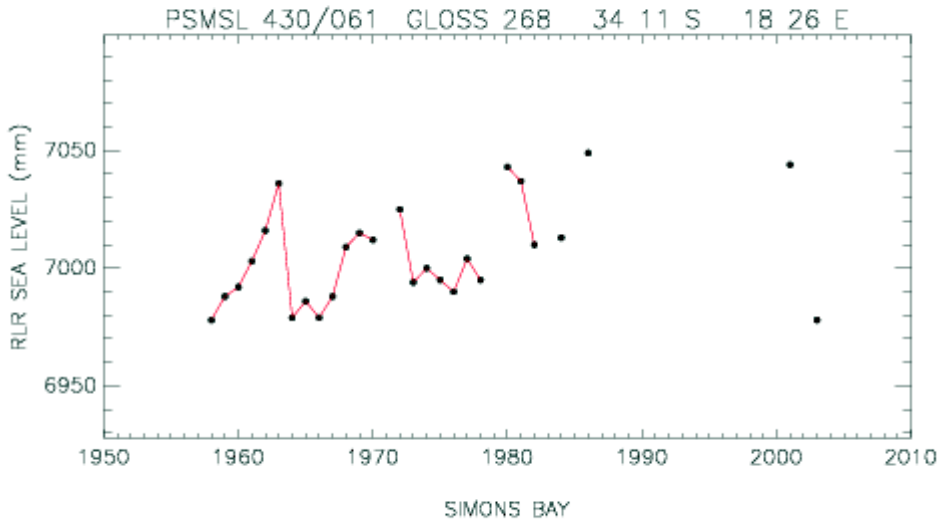
SEA LEVEL RISE PROJECTIONS IN THE NEAR FUTURE

ALONG THE COASTLINE OF THE CITY OF CAPE TOWN

Observations of sea level globally show a statistically significant sea level rise as part of human-induced climate change. At present, the rate of sea level rise is slow, but it does appear to be accelerating. This second study is intended to describe the situation along the coastline of the City of Cape Town, and to extrapolate from this situation so as to provide an estimate of the likely trends in the near future. The potential massive contribution to sea level rise from new climate change processes such as the melting of the polar ice sheets is the subject of the third study.

The primary effects of climate change in the coastal zone are the potential modifications due to sea level rise and storminess. The latest sea level rise predictions and their applicability to southern Africa are reviewed in *Theron 2007*, providing a useful context within which to place this study of sea level rise along the coastline of the City of Cape Town. Any analysis of sea level rise requires careful and consistent observations of sea level over several decades. These are not really available in South Africa (*Brundrit 1995*), nor in Africa as a whole (*Woodworth, Aman and Aarup 2007*).

A relatively long record of annual mean sea level is available for Simon's Bay from the Permanent Service for Mean Sea Level, which applies rigorous quality checks on such data. The PSMSL uses RSR sea level rather than LLD as its datum. At Simon's Bay, RSR is 6.846m below LLD, so that 7.000m RSR is 15.4cm above LLD.



It can be seen that there is reliable data only over a thirty year period from 1958 to 1986, but nothing in more recent years. Some important conclusions can be drawn from the reliable data. Annual mean sea level appears to shift between two distinct warmer and cooler climate states. Similar warmer and cooler states are found in annual sea surface temperature observations for the South Atlantic. Both climate states exhibit an upward trend in sea level of approximately 2mm per year, which is consistent with the accepted global rate of sea level rise over the same period. This means that more recent estimates of global sea level rise can be used as proxies for extending the rate of sea level rise into the period of unreliable data for Simon's Bay.

The Intergovernmental Panel on Climate Change in its Fourth Assessment Report has provided a Summary for Policy Makers of its 2007 Climate Change Synthesis Report. In discussing observed changes in climate and their effects, the IPCC reports as follows. "Rising sea level is consistent with warming. Global average sea level has risen since 1961 at an average rate of 1.8 [1.3 to 2.3] mm per year and since 1993 at 3.1 [2.4 to 3.8]

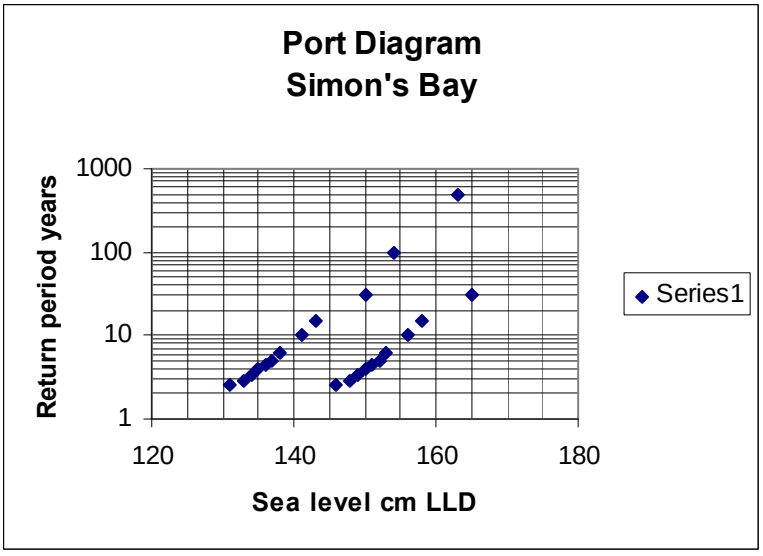
mm per year", and "Whether the faster rate for 1993 to 2003 reflects decadal variation or an increase in the longer term trend is uncertain".

In its projections of future changes in climate over the 21st century, the IPCC draws on a set of models of sea level rise at 2090-2100 relative to 1980-1999, which exclude rapid dynamical changes in ice flow. This is an important reservation. The recently documented ice melting, both at sea and on the polar ice-caps, has led the IPCC to abandon its earlier projections. Now in its Synthesis Report of November 2007, it states that "because understanding of some important effects driving sea level rise is too limited, this report does not assess the likelihood, nor provide a best estimate or upper bound for (future) sea level rise".

It would therefore appear to be prudent to restrict projections of sea level rise based on extrapolations of current trends to the next decade alone. Even there, the extrapolations would cover a wide range, depending on whether sea level rise reverts to its earlier rate, maintains its new rate, or continues to accelerate at a constant rate.

Decade	revert	steady	accelerate
1980-1989	1.8cm	1.8cm	1.8cm
1990-1999	3.1cm	3.1cm	3.1cm
2000-2009	1.8cm	3.1cm	4.4cm
2010-2019	1.8cm	3.1cm	5.7cm
accumulated	8.5cm	11.1cm	15.0cm

At the end of the next decade, the sea level to be expected is not a great change from present day circumstances. Thus there is little threat of additional inundation. What is different is how often any particular sea level can be expected. This can be seen by plotting additional points on the earlier Port Diagram for Simon's Bay. As well as the return periods based on the original observed annual maximum sea levels from 1960-1990, and the extrapolations for return periods of 100 and 500years, the new points increase each observed sea level by 15cm, whilst retaining their return period. This is the Port Diagram relevant to the present day and to the end of the next decade.



The present day extreme sea level of LLD+163cm with an expected return period of 500 years should be compared with the sea level of LLD+165cm expected to occur with a return period of only thirty years at the end of the next decade. While the observed maximum sea level of LLD+150cm from 1960-1990 is expected to occur with a return period of just four years at the end of the next decade. In the future, storms will cause more damage because they are built upon higher sea levels. Given that climate change is expected to increase the frequency of extreme storms, the situation could well become even more serious.

Scenario Two

This is the **Scenario at the End of the Next Decade** after the acceleration in sea level rise which is expected to add 15cm to base levels. Given the resolution of 0.5m in the GIS Inundation Model, the levels to be used in this Scenario Two and the details of the inundation to be expected are the same as in Scenario One!

- LLD+2m in sheltered environments,
- LLD+4.5m in exposed environments, and
- LLD+6.5m in very exposed environments.

Thus, every conclusion to be drawn from the impact of Scenario One on the infrastructure and services provided by the City of Cape Town is immediately relevant to this Scenario at the End of the Next Decade.

It is the circumstances of how often this Scenario Two is expected that are different. Rather than being a Very Worst Case Scenario with a return period of 500 years, Scenario Two is to be expected whenever an extreme storm occurs at the same time as any (fortnightly) spring high tide in the spring or autumn. With the further expectation that extreme storms will become more frequent under climate change, this Scenario at the End of the Next Decade is a realistic expectation rather than an unusual event for the end of the next decade.

All the effort made in understanding the impacts and vulnerabilities of present day Scenario One can then be used to illustrate what might be expected as the norm for Scenario Two at the end of the next decade, when extreme spring and autumn storms coincide with spring tides.

THIRD STUDY

SEA LEVEL RISE SCENARIOS ALONG THE COASTLINE OF THE CITY OF CAPE TOWN AFTER COLLAPSE OF THE POLAR ICE SHEETS

The timing of future sea level rise in the longer term is problematic. The Intergovernmental Panel for Climate Change has withdrawn any upper bound estimate to its forecasts of sea level rise over the 21st century. An alternative and preferable approach for the longer term future is to link sea level rise to the possible stabilization levels of greenhouse gases in the atmosphere and the accompanying global warming and polar ice melt. This is the approach which is recommended in the *Stern Review (2007)*, and then followed in the *IPCC Synthesis Report (Nov 2007)*.

The following linkages of climate change are expected from the sets of climate models which are used in the *Stern Review (2007).* It should be noted that the present level of carbon dioxide equivalent is at 380ppm, and rising. Any stabilization level will require urgent global action on constraining the input of greenhouse gases into the atmosphere.

Scenario A.

450ppm carbon dioxide equivalent stabilization level

2 degree Celsius temperature rise

1m sea level rise from thermal expansion only

Rising intensity and frequency of storms

Onset of irreversible melting of the Greenland Ice Sheet

Initiation of further sea level rise as the melting progresses

Scenario B.

550ppm carbon dioxide equivalent stabilization level

3 degree Celsius temperature rise

1.5m sea level rise from thermal expansion only

Significant contribution to sea level rise from the Greenland Ice Sheet

Increasing risk of collapse of the West Antarctic Ice Sheet

Sea level rise of a few metres

Scenario C.

750ppm carbon dioxide equivalent stabilization level

4 degree Celsius temperature rise

2m sea level rise from thermal expansion only

Yet more storminess

Onset of collapse of the West Antarctic Ice Sheet

Eventual sea level rise of over ten metres

These linkages are illustrated with median levels of each quantity; there are considerable spreads about these median levels. Lower stabilization levels are unlikely. It is important to recognize that no time scales are provided for these scenarios. However, the gradual progression of climate change through the stabilization levels, global warming and polar ice melt will provide better estimates of the timing and extent of global sea level rise.

The *IPPC Synthesis Report (2007)* follows the *Stern Review(2007)* and considers projections of future climate change over and beyond the 21st century. Rapid sea level rise on century time scales cannot be excluded. Net ice loss will set in with a global

average warming in excess of 2 degrees Celsius, marking the onset of an accelerating ice melt contribution to sea level rise. The complete elimination of the Greenland Ice Sheet will eventually lead to a contribution to sea level rise of 7m. These temperatures correspond to those of the last inter-glacial of 125000 years ago, when sea level was 4 to 6 m higher than present levels. Around the Cape Peninsula the sea level at this time is reasonably well marked as the 18 foot wave cut platform. It should be noted that this feature has been utilized for road and rail communication, eg the railway line from Muizenberg to Simon's Town!

The prime effect of the rapid sea level rise over the longer term future is the permanent inundation of low lying coastal areas, rather than the intermittent effect of storm damage. As sea level rise continues, it will lead to the wholesale disruption of services along the coast. In the GIS model, these scenarios extracted from the *Stern Review (2007)* can be illustrated with a mean sea level rising from LLD in steps of 1m up to LLD+12m.

Scenario Three

When wholesale melting of the Greenland and West Antarctica Ice Sheets begins to contribute to sea level rise, the anticipated levels will be greatly in excess of earlier levels. This leads to the **Polar Ice Sheet Melt Scenario.** There is much uncertainty about the extent and the timing of the melting of the polar ice sheets and their eventual contribution to sea level rise and coastal inundation. Consequently, this Scenario Three is fundamentally different from the earlier scenarios. The focus should be on Mean Sea Level and the changes to be expected from the ice melt alone, so as to provide an every day scenario for these circumstances. It will map the location of the new coastline. Tides and storms can be added later, if need be, to illustrate the variability to be expected on a day by day basis.

Because storms are excluded, there is now no difference between sheltered and exposed sections of coast; all experience the same sea level. In the GIS model, only one colour will be needed to illustrate the inundation from sea level rise affecting the entire coast. I suggest that this be shown as LLD, LLD+2m, LLD+4m, LLD+6m etc moving steadily upwards in steps of 2m to (say) LLD+12m. (Perhaps the levels should be taken up to when the Cape Peninsula becomes an island!)

In this Polar Ice Sheet Melt Scenario, the important information that will come from the GIS inundation model will be the **order** in which different land areas are overwhelmed in the inexorable rise in sea level. Emphasis can then be placed on separate categories of infrastructure and services, such as loss of industrial areas, residential areas and disruption of the transport networks. The information on the order in which disruption will occur will aid in preparation for adaptive planning for the very worst consequences of sea level rise on the City of Cape Town. Remember that there is great uncertainty on the timing of such a long lead time scenario; this is a scenario not a prediction.

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THE THREE SCENARIOS

AS INPUT TO THE GIS INUNDATION MODEL

Three Scenarios are presented, one from each of the three studies.

Scenario One.

This is the **Present Day Very Worst Case Scenario** for the 300km coastline under the jurisdiction of the City of Cape Town. It results from the simultaneous occurrence of an extreme tide and an extreme storm, an event with a nominal return period of 500 years. Such an event has not occurred along the Cape coast in recent years but it did occur along the KZN coast on 19/20 March 2007. Measurements taken from the KZN extreme event have been incorporated into this Present Day Very Worst Case Scenario, particularly in respect of exposed and very exposed portions of the coastline. The erosion damage in KZN was spectacular, and similar damage should be anticipated along vulnerable sections of the Cape Town coast in such circumstances. The identification of these vulnerable sections of the Cape Town coast is an important output from this scenario.

The scenario should use three colours to identify inundation of three sections of the coastline:

1. Sheltered and hard (rocky or armoured) sections of the coast.

2. Exposed sandy beach (and low-lying) sections of the coast, subject to erosion from the storm.

3. Very exposed sandy beach (and low-lying) sections of the coast, subject to extreme erosion.

The maximum levels that should be expected to be reached by the sea in this Present Day Very Worst Case Scenario in the environments as above are:

LLD+2m in sheltered environments,

LLD+4.5m in exposed environments, and

LLD+6.5m in very exposed environments.

The levels reached in the exposed and very exposed environments along flat sandy beaches are due to extreme swash heights associated with wave set up and run up in the surf zones from ~8m waves at the breakpoint. Even higher levels were measured at the limit of the swash zones in places where the greatest damage was caused along the KZN coast.

The inundation shown in the GIS reconstruction should identify those sections of the Cape Town coast that are most at risk in this Present Day Very Worst Case Scenario. Vulnerable infrastructure and services should be highlighted. Of particular interest will be where existing (dune) protection is eroded away in the storm and seawater is able to reach into unexpected areas of low-lying land. Because this scenario is possible (though unlikely) in the present day situation, it deserves to be carefully studied so that the extent of potential economic loss can be assessed.

Scenario Two

This is the **Scenario at the End of the Next Decade** after the acceleration in sea level rise which is expected to add 50cm to base levels. The levels to be used in this Scenario Two and the details of the inundation to be expected are the same as in Scenario

One! Thus, every conclusion to be drawn from the impact of Scenario One on the infrastructure and services provided by the City of Cape Town is immediately relevant to this Scenario at the End of the Next Decade.

It is the circumstances of how often this Scenario Two is expected that are different. Rather than being a Very Worst Case Scenario with a return period of 500 years, Scenario Two is to be expected whenever an extreme storm occurs at the same time as any (fortnightly) spring high tide in the spring or autumn. With the expectation that extreme storms will become more frequent, this Scenario at the End of the Next Decade is a realistic rather than an unusual event for the end of the next decade.

All the effort made in understanding the impacts and vulnerabilities of Scenario One can then be used to illustrate what might be expected as the norm for big spring and autumn storms at the end of the next decade in Scenario Two.

Scenario Three

When wholesale melting of the Greenland and West Antarctica Ice Sheets begins to contribute to sea level rise, the anticipated levels will be greatly in excess of earlier levels. This leads to the **Polar Ice Sheet Melt Scenario.** There is much uncertainty about the extent and the timing of the melting of the polar ice sheets and their eventual contribution to sea level rise and coastal inundation. Consequently, this Scenario Three is fundamentally different from the earlier scenarios. The focus should be on Mean Sea Level and the changes to be expected from the ice melt alone, so as to provide an every day scenario for these circumstances. It will map the location of the new coastline. Tides and storms can be added later, if need be, to illustrate the variability to be expected on a day by day basis.

Because storms are excluded, there is now no difference between sheltered and exposed sections of coast; all experience the same sea level. In the GIS model, only one colour will be needed to illustrate the inundation from sea level rise affecting the entire coast. I suggest that this be shown as LLD, LLD+2m, LLD+4m, LLD+6m etc moving steadily upwards in steps of 2m to (say) LLD+12m. (Perhaps the levels should be taken up to when the Cape Peninsula becomes an island!)

In this Polar Ice Sheet Melt Scenario, the important information that will come from the GIS inundation model will be the **order** in which different land areas are overwhelmed in the inexorable rise in sea level. Emphasis can then be placed on separate categories of infrastructure and services, such as loss of industrial areas, residential areas and disruption of the transport networks. The information on the order in which disruption will occur will aid in preparation for adaptive planning for the very worst consequences of sea level rise on the City of Cape Town. Remember that there is great uncertainty on the timing of such a long lead time scenario; this is a scenario not a prediction.

Global Climate Change and Adaptation: City of Cape Town sea-level rise risk assessment

Phase 5: Full investigation of alongshore features of vulnerability on the City of Cape Town coastline, and their incorporation into the City of Cape Town Geographic Information System (GIS).

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December 2009

econologic
economics for people & planet

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Glossary of terms as applied in this document

Mean sea-level: Mean sea level (MSL) is a measure of the average height of the ocean's surface (such as the halfway point between the mean high tide and the mean low tide); used as a standard in calculating land elevation.[1] Can be influenced by prevailing winds, but not tides, storms or changes in air pressure.

Still water: A measure of sea-level as it is affected by changes in mean sea level, tides and atmospheric pressure, but not by wind or waves. Equivalent to the sea-level if it were recorded within a glass cylinder, that was only open top and bottom.

Wave run-up: A function of sea depth. Occurs where there is appreciable wave height at the beach. Wave run-up affects the "water's edge".

Wave set-up: Is a function of swell height, which in turn is a function of the direction of the swell, the ocean from which the swell approaches and the orientation of the coastline relative to the approaching swell. Wave set-up determines the size of the swell at the break, which in turn affects the size (and energy) of the waves at the beach. Wave height at the break is typically three times the wave size at the beach.

Sheltered coastline: Exposed to changes in mean sea-level, but not exposed to wave set-up or wave run-up.

Exposed coastline: Coastline that is vulnerable to changes in mean sea-level and wave set-up.

Very exposed coastline: A section of coastline that is exposed to changes in mean sea-level, and because of its bathymetry, orientation and shape is also exposed to wave set-up and wave run-up.

Low risk coastline: Coastline that is sheltered, contains a geology that either absorbs or withstands wave energy without changing and does not contain valuable or strategic infrastructure or sensitive ecological habitats.

Medium risk coastline: "Exposed" coastline that contains some valuable infrastructure.

High risk coastline: "Very exposed" coastline that contains valuable infrastructure or sensitive ecological habitats.

Very big wave events: Storms with waves that exceed 10 metres in peak-to-trough amplitude.

[1] Proudman Oceanographic Laboratory

1. Introduction

The terms of reference require that this Phase 5 "improve(s) understanding of the extent and manner in which City of Cape Town's coastline is likely to be impacted by sea level rise. It is propose to achieve this by adding the influence of local factors such as offshore bathymetry, storm direction and coastal geography to the sea level rise model developed in Phases 1-4, and by including an understanding of how the various influences on sea-level rise interact with each other at a specific locations and over time."

The study is written up in two self contained reports. This, the first of the reports, incorporates ocean and coastal dynamics into the GIS model developed in Phases 1-4. The initial model relied heavily on altitude (height above sea-level) to identify the location of sea-level rise risks. This phase develops that model by adding the influence of coastal topography and geology, as well as the swell direction and the extent and nature of coastal development.

The second report integrates the findings of the first report into a coastal vulnerability assessment and proposes means of taking sea-level rise adaptation decisions so as to ensure coherence and effective prioritisation.

2. Summary of the Capabilities of the Existing GIS

The primary objective of the early phases (1-4) of this study was to model and understand the ramifications of predicted sea-level rise and increased storm events for the City of Cape Town, thereby providing information that may be used for future planning, preparedness and risk mitigation. This was achieved through a computer-based Geographic Information System (GIS), housed in the City of Cape Town Geomatics Division.

The GIS model demonstrates the potential changes to the coast resulting from sea-level rise. Variables within the model are able to be changed to accommodate variations in predictions as well as illustrating the impacts of catastrophic and combined events. The model incorporates the City's aerial photography, survey data, contour maps and overlays of the infrastructure and services. Examples of the output of the GIS inundation model for the entire City of Cape Town and for the Strand area are shown in Figures 1 and 2 below.



Figure 1: The exposure of the City of Cape Town to the worst case storms to be expected.

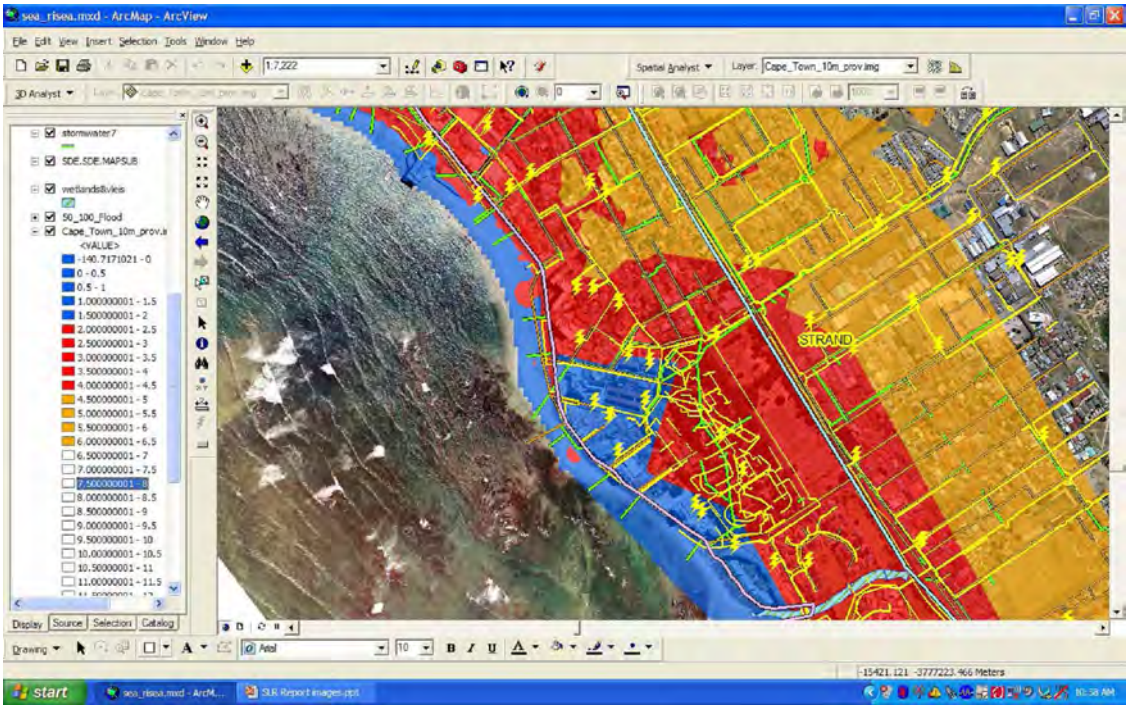


Figure 2: A snap shot image (1:7,222) of the Strand area (a low-lying area without much protection), depicting the three inundation areas used in the GIS inundation model

The nature of extreme sea level events along the coastline of the City of Cape Town was investigated through a re-interpretation of sea level records from the SA Navy Tidal Network stations at Simon's Town and Cape Town, to give extreme sea levels relevant to sheltered coasts. Where the coast is not protected, particularly on sandy beaches, the extreme waves associated with severe storms can lead to wave set-up, which needs to be added to the sea levels on such exposed coasts. When deep water is found close to the coast, the coast becomes very exposed, and both wave run-up and wave set-up need to be added to the sea level. These additional amounts can be estimated from the wave climatology derived from the wave recorder off the coast at Slangkop, and from observations of extreme storm events at the coast.

The interpretation of the extreme sea levels, and the corresponding inundation areas at risk, depends critically on the degree of exposure along each stretch of coast. All sea levels are referenced with respect to Land Levelling Datum, which is close to Mean Sea Level.

- The blue inundation area, up to LLD+2m, is relevant to **sheltered environments** along the coast.
- The red inundation area, between LLD+2m and LLD+4.5m, is the extra area relevant to **exposed coastal environments**, and

- The orange inundation area, between LLD+4.5m and LLD+6.5m, is the extra area relevant to **very exposed coastal environments.**

Figure 1 shows the extent of the three areas at risk around the entire coast of the City of Cape Town. There is a contrast between the extent of the areas at risk on the steep cliffs of the Peninsula and the lower coastline of Table Bay and northern False Bay. The vulnerability of low-lying lagoons, both existing and reclaimed is also apparent. A snapshot of a vulnerable area at the Strand, Figure 2, shows the capability of the original GIS model to illustrate the three inundation areas, and identify some of the municipal infrastructure (roads, electricity etc) that is at risk.

The actual degree of exposure relevant to each section of coast has not been incorporated into the existing GIS. Rather, all three categories of exposure are given at every section. This constitutes a limitation to the use of the GIS, and its value as an interpretative tool. The determination of the degree of exposure relevant to each stretch of coast, its incorporation into the GIS, and its risk interpretation are the principal objectives of Phase 5 of this project.

3. Influence of Sea Level Rise on the Vulnerability from Extreme Storms

Figure 1 can be used immediately to illustrate the consequences of the very worst sea level situation that can be expected at the present time. Such a situation would arise only if an extreme weather event along the coast coincided with an extreme spring high tide, a situation with a nominal return period of 500 years. Then, the blue inundation area would be appropriate for a sheltered coast, the red inundation area for an exposed coast and the orange inundation area for a very exposed coast.

Global projections of the influence of climate change on sea level, as given in studies such as the recent Assessment Reports of the Inter-Governmental Panel on Climate Change (IPCC), suggest that sea level rise over the next decade will be restricted to some 20cm. The principal influence of this projected sea level rise will be that storms will be built on a higher foundation. There will be little difference to the sea levels reached in these storms over the next decade. Thus the blue, red and orange inundation areas will remain valid. What will be different is the frequency with which the sea level of LLD+2m, relevant to sheltered areas, will be achieved at the end of the next decade, compared to present. Rather than being associated with a return period of 500 years, the return period will shorten to some 30 years. In this way the return period of high sea-level rise events is a log function of land levelling datum, and relatively small increases in sea-level (such as have already been observed) have a disproportionate effect on the frequency of extreme sea-levels.

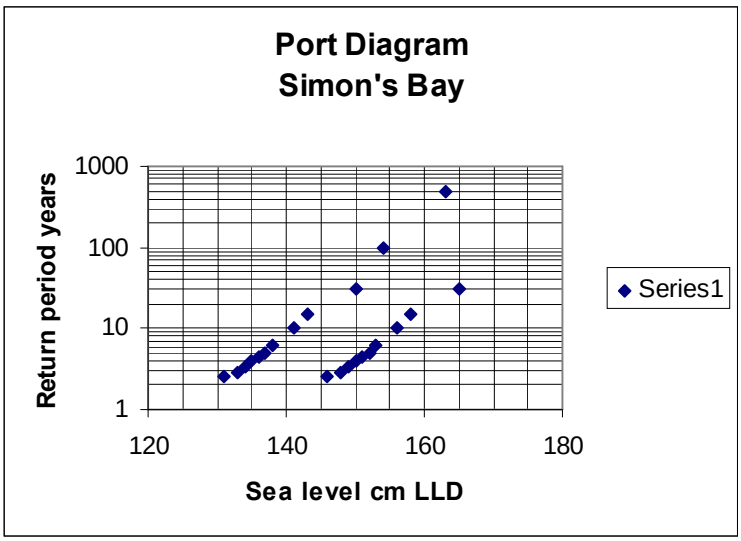


Figure 3: Extreme sea levels expected in sheltered areas at the present time, and after sea level rise of 20cm.

The blue areas all around the coast will be inundated at increasingly shorter intervals, and the risk of damage to the first line of defense will grow. The blue areas will be a valuable guide in setting out the new Coastal Protection Zone for the City of Cape Town.

An assessment of the adequacy of the present protection to the blue inundation areas all around the coast of the City of Cape Town is urgently needed. This is the first recommendation of this Part 1 of Phase 5 of the Study.

When it comes to the red and orange inundation areas marked in Figure 1, these are only relevant at those parts of the coast that are exposed or very exposed. The degree of exposure will be limited to those parts of the coast where the big storm waves are able to penetrate right up to the coast, without any appreciable dissipation. Exposure to big storms is addressed in Section 4 (below).

4. Key Directions for Extreme Storm Waves and their Characteristics in the Open Ocean.

4.1 Wave Climatology

A wave climatology for the South African coastline has been assembled from observations made by the CSIR Wave Research Group, and reported by Rossouw (1989). The wave recording site of principal interest to the City of Cape Town is referred to as Slangkop. This deep water recording site was situated 14km offshore of Slangkop lighthouse in 170m of water. A total of 11424 records of wave height at 6 hourly

intervals, provided 63% coverage over the 12 years prior to 1988. These records provide the significant wave height, H_S defined as the average of the highest one-third of all wave heights in the recording interval. A statistical analysis of the significant wave heights permits estimates of the median H_S, and the expected return periods of its extreme values.

Table 1: Significant Wave Height Statistics from Slangkop 1976-1988

Significant wave height H_S	
Median value	2.54m
Value at a return period of 1 year	7.61m
Value at a return period of 10 year	9.37m
Value at a return period of 100 year	11.11m

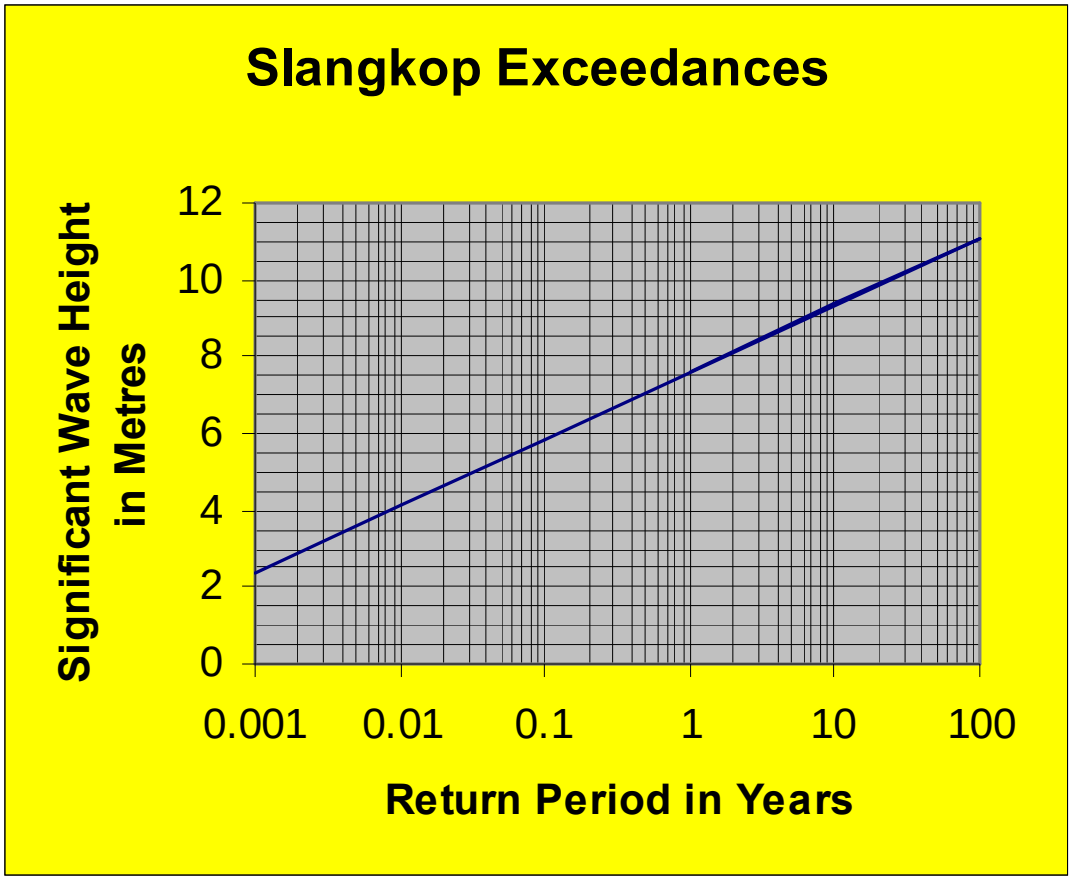


Figure 4: Significant wave height exceedances at Slangkop

The median peak period of the waves measured at Slangkop was 12.4 seconds, whilst the peak period exceeded 15.5 seconds for 10% of the time.

The wave recorder in use at that time did not record wave direction. In order to obtain directional data, the records from Voluntary Observing Ships were used. This data was obtained intermittently, with the most useful data coming from the shipping lanes to the northwest of Cape Town and to the east of Cape Point. In the area to the northwest, waves are from between the south and west (140 to 280 degrees) for 90% of the time while, in the area to the east, there is a broader spread, with waves from the east occurring just 8% of the time.

In more recent years, the site of the Slangkop wave recorder has been moved closer inshore, to a water depth of 70m, in order to avoid downtime from damage by passing ships. It is now possible to monitor wave conditions at Slangkop in real time at http://www.wavenet.csir.co.za The instrumentation has also improved, with the significant wave height being calculated for an interval of 4 hours and wave direction being included since 2000. The results from recent years have confirmed the detail of the earlier wave climatology.

4.2 Big Wave Events from the South-West

The archived wave observations from Slangkop and other wave recorders along the coast of South Africa make it possible to investigate the character of big wave events. Following Van der Borch (2004), a big wave event is defined as one which has a significant wave height exceeding 6.5m for at least 6 hours. This is done to exclude isolated short-term exceedances. Between 1983 and 2003, the records from Slangkop identified 32 such big wave events over the 21 year period, with the actual dates given in Appendix 1.

These 32 big wave events are not distributed uniformly over the 21 year period. They all occur during the winter months of each year, but are clustered together in particular groups of years.

Table 2: Years in which more than one big storm event occurred

1983		**1989**	**1990**	**1991**		**1995**	**1996**	**1997**		**2000**	**2001**	**2002**
3		3	3	2		2	2	2		2	2	4

Table 2 shows that 25 big wave events occurred in 10 particular years, with the other 7 events spread over the remaining 11 years. There appears to be a link between these years with several big wave events, and the years of persistent occurrence of warmer than usual sea surface temperatures in the coastal ocean off south western Africa.

As the second recommendation in this report, an investigation of this possible correlation is suggested as this may provide early warning of likely big storm events in the next winter.

The average significant wave height within these 32 big wave events is 7.72m, with standard deviation 1.01m, which can be compared with the value of the significant wave height at a return period of one year of 7.61m, as given in Table 3.1. The average of the maximum individual wave heights within each big wave event is 12.66m, with a standard deviation of 1.80m, so that the events can certainly be classed as big wave events. The overall maximum individual wave within these 32 big wave events reached 17.09m.

Measured wave direction is available for the nine big wave events from 2000 to 2003. Compared to the directions from the overall wave climatology of Rossouw (1989), there is a more restricted directional spread, with 95% of the records taken within the big wave events being from the south-west between 200 and 260 degrees.

Table 3: Directional wave distribution in percentages for Big Wave Events at Slangkop

		Wave	**Direction in**	**Degrees**		
	200-210	210-220	220-230	230-240	240-250	250-260
Percentage	4%	9%	23%	35%	20%	4%

The period of the swell for these big wave events ranged from 10 seconds to 16 seconds, with a lengthening during the peak of the event.

The daily weather bulletins issued by the South African Weather Service were analysed to identify the nature of the synoptic weather conditions forcing each of the 32 big wave events. The vast majority were associated with the passage of cold fronts (19), cyclo-genesis (7) and even explosive cyclo-genesis (5). The one exception was due to a cut-off low to the south of Cape Town in early September 2001, the event with the individual maximum wave height of 17.09m. Details of the synoptic weather conditions are also to be found in Appendix 1.

4.3 Very Big Wave Events from the South-West

Three of the Big Wave Events investigated in the previous section had significant wave heights which exceeded ten metres, and can be referred to as Very Big Wave Events. Since 2003, there has been yet another Very Big Wave Event, which should be added to the list of four Very Big Wave Events in recent years, deserving of special attention.

The dates of these Very Big Wave Events were as follows:

- **16 May 1984**: Explosive cyclo-genesis of a very deep depression to the south west of Cape Town led to an extreme storm with hurricane force winds and a significant wave height reaching 11 metres. The significant wave height in this storm was sustained at over 8m for over eighteen hours. Considerable damage was incurred by the coastal infrastructure of the south western Cape (Jury et al 1986).

- **5 September 2001**: A cut off low, south west of Cape Town gave rise to strong winds and a significant wave height of over 10 metres. This storm gave rise to the highest individual wave height ever recorded at the Slangkop wave recorder, reaching a massive 17.09 metres. This storm played havoc with shipping, and the bulk carrier Ikan Tanda was grounded on the beach at Scarborough.

- **25 May 2002**: A deepening depression, travelling rapidly to the south of Cape Town was associated with significant wave heights reaching 10 metres.

- **31 August 2008**: A severe storm passing to the south of Cape Town with waves with significant wave heights exceeding 10 metres, at Slangkop, gave rise to very high sea levels along the Atlantic seaboard of the Cape Peninsula. The next day, these high waves entered False Bay and reached relatively unprotected areas of the western shore, where they caused considerable damage to coastal infrastructure. The railway line to Simon's Town was closed for several days, and Jager Walk at Fish Hoek sustained damage of over R1m).

"Very Big Wave Events" with significant wave heights exceeding ten metres should, according to the exceedance diagram in Figure 4, be associated with a return period of 11 years. The occurrence of four Very Big Wave Events over the past 26 years, particularly the occurrence of three such events on the past eight years, suggests that either the frequency or the intensity of Very Big Wave Events is increasing. However, the short record and the tendency of storm events to clump together in the record means that such a conclusion is difficult to confirm.

4.4 Big Wave Events from the South-East

Big wave events from the east will not register at Slangkop, due to the sheltering effect of the Cape Peninsula. Wave recordings are next made at the offshore FA Platform 100km south of Mossel Bay, and wave directions are only available even further east at East London. This means that accurate information on waves entering False Bay from

the south east, and usually associated with so-called Black South-Easter meteorological conditions, are hard to find. Recourse has to be made to anecdotal information.

Five big wave events (significant wave height exceeding 6.5 metres and sustained for at least 6 hours) were measured in 2001 and 2002 at East London, and provided directional information. Two of these events were also noted at the FA Platform, but none were noted at Slangkop. Only the first event was associated with waves from the south east, with its peak on 16/17 August 2002, and significant wave heights of 8m. At the FA Platform individual waves were exceeding 14m and this big wave event would have entered False Bay. The records kept at Kalk Bay harbour confirm that rough seas were experienced there on 17 August 2002. Other events of importance at Kalk Bay include 21 April 1996 when two people were swept off the harbour wall and drowned, as well as the storm on 1 September 2008 when considerable damage was caused all along the coast

The records maintained at Kalk Bay Harbour by Marianne Jordaan provide useful anecdotal evidence of the frequency of wave events associated with rough sea conditions and damage at the harbour. Over the past thirty months, the harbour records reveal the following nine instances.

- 13 Feb 2007 Woman knocked into the water.
- 26 June 2007 Wave damage within the harbor.
- 1 Oct 2007 Moorings break.
- 29 April 2008 Rough seas.
- 17 June 2008 Rough seas with more damage.
- 31 August 2008 and 1 Sept 2008. High winds and heavy swell from SW, reaching round to Kalk Bay.
- 11 Nov 2008 Water over harbour wall from heavy SE swell associated with cut-off low.
- 15 to 20 May 2009 bad weather.
- 24 June 2009 SW swell wrapping round. Moorings broken on boats.

It is important to note that these events are spread throughout the year, although there is some influence of winter storms. There are no measurements of actual wave heights at Kalk Bay harbour, though waves reflected off the harbour wall will tend to create standing wave patterns, which will be almost double the height of the incoming waves. These storm waves are responsible for the damage to property in the harbour.

5. Shoaling Effects on Waves, from the Open Ocean to the Surf Break

5.1 Refraction due to Offshore Bathymetry

Refraction effects will reduce the significant wave heights in a straightforward way. The detail requires a comparison between the direction of propagation of the big wave events and the direction of shoaling of the bottom contours as the waves approach the coast. Refraction of an incoming big wave, centred in direction 56.75 degrees at water depth of 70 metres (at the Slangkop buoy), will occur as the wave enters shallow water. If the shoaling direction at the inshore contour is oriented at a greater angle than 56.75 degrees, the incoming wave will gradually bend to the right as it moves into the shallower water. In contrast, if the shoaling direction is oriented at a lesser angle than 56.75 degrees the incoming wave will gradually bend to the left. The extent of the refraction will depend on the amount of shoaling from the deeper water, with more refraction for shallower water, and an eventual alignment of the wave direction with the shoaling direction in the surf zone.

Snell's Law can be used to set up an appropriate Refraction Table at various depths of shallow water and shoaling directions for incident wave direction of 56.25 degrees. At the same time, the proportionate decrease in the incident significant wave height due to the spread of the refracted wave can be noted.

Table 4: Refraction Table for Incident Wave Direction of 56.25 Degrees

Shoaling	-22.5	0	22.5	45	**56.25**	67.5	90	112.5	135
Direction	NNW	N	NNE	NE		ENE	E	ESE	SE
Depth	40m								
Refraction	23.4	39.0	**47.3**	**53.5**	**56.25**	**59.0**	**65.2**	73.6	87.1
Ht Ratio	0.54	0.85	**0.96**	**1**	**1**	**1**	**0.96**	0.85	0.54
Depth	20m								
Refraction	9.1	26.4	**39.8**	**51.0**	**56.25**	**61.5**	**72.7**	86.1	103.4
Ht Ratio	0.48	0.79	**0.93**	**0.99**	**1**	**0.99**	**0.93**	0.79	0.48
Depth	10m								
Refraction	-0.7	18.3	**34.6**	**49.2**	**56.25**	**63.3**	**77.9**	94.2	113.2
Ht Ratio	0.46	0.76	**0.92**	**0.99**	**1**	**0.99**	**0.92**	0.76	0.46

The proportionate decrease in the incident significant wave height in the 40m, 20m and 10m shallow water remains above 0.90 for shoaling directions between NNE (22.5

degrees) and E (90 degrees) where the refraction from the incident direction of 56.25 degrees remains between 34.6 and 77.9 degrees. The correspondence with the spread of the incident wave from 33.75 to 78.75 degrees should be particularly noted. This means that contours with shoaling directions between NNE and E can be considered to be potentially exposed to big storm waves, as there is little reduction in the significant wave height despite the effect of refraction.

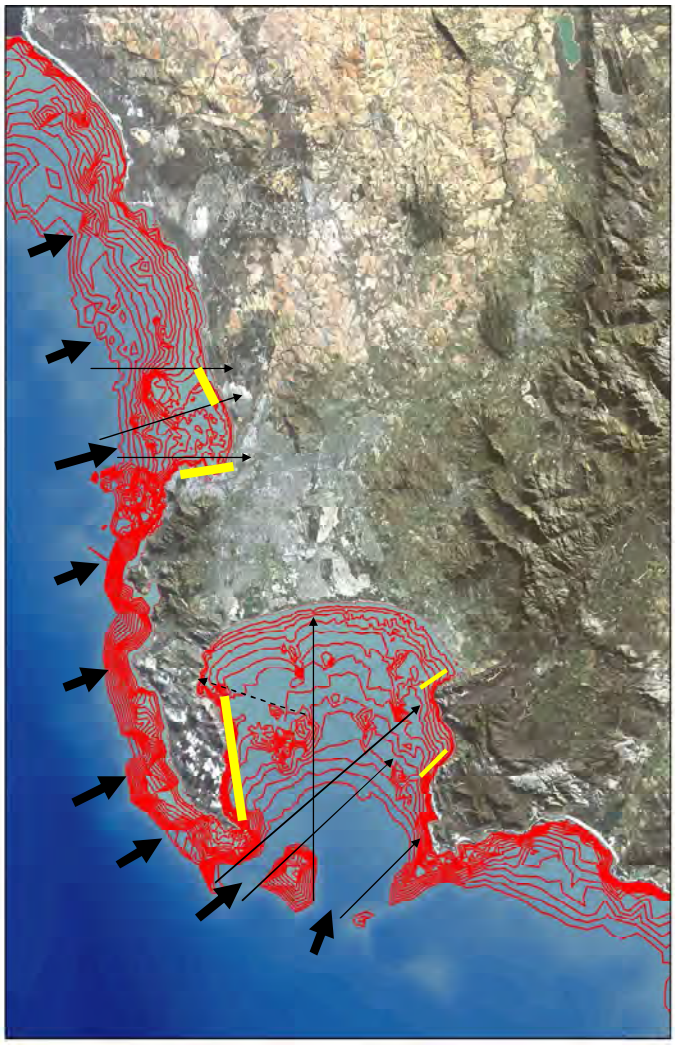


Figure 5. Bathymetry around the Cape Peninsula down to a depth of 70m at 5m intervals.

Much of the Atlantic coast has a shoaling direction between NNE and E, and can be marked as areas potentially exposed to big wave events. The two major exceptions are the coast behind Robben Island, and the sheltered southern end of Table Bay, east of Green Point. There is also a contrast between the gradually sloping bottom contours of

Table Bay, with its sandy beaches, and the steeply sloping contours of the Atlantic coast of the Peninsula, with its cliffs interspersed with mainly pocket beaches. False Bay has gently sloping bottom contours to its northern sandy beaches, but the sides have steeply sloping contours to cliffs and pocket beaches. The entire western shore of False Bay north of Cape Point is potentially sheltered to waves from the south west, whilst everywhere else except for Gordons Bay is potentially exposed.

These coastlines are only potentially exposed because offshore reefs, where they occur, may provide some real protection. By contrast, deep water close inshore can result in a very exposed coast. In the wave shadow, the coastline is only potentially sheltered, because diffraction can transfer significant amounts of wave energy into the shadow zone, particularly if only a small diffraction angle is required. These various possibilities are now explored.

5.2 Bottom Dissipation from Offshore Reefs

Rough bottom topography such as off shore reefs should cause a loss of wave height as wave energy is dissipated through bottom friction. In the north-east corner of False Bay, there is an opportunity to compare observations of break-point significant wave height at a return period of one year, as measured in studies of bathing beaches, with the same significant wave height measured at the Slangkop wave recorder.

Table 5: Significant wave heights with 1 year return periods, at beach break-points on the north-east corner of False Bay and at the Slangkop wave buoy.

	Gordon's Bay	Strand	Macassar	Slangkop
Sign. wave height	1.7m	3.3m	4.9m	7.6m
Ratio to Slangkop	22%	43%	64%	

There is a gradual decrease in significant wave height along the coast from Macassar to Gordon's Bay, due to the effect of refraction and the passage of the waves entering False Bay moving over increasingly greater areas of offshore reef before reaching the coast. The route from the mouth of False Bay to Macassar avoids much of the offshore reef areas, and follows the long gradually shoaling sandy bottom. Even this route sees a reduction to a significant wave height at Macassar of 4.9m over the 7.6m experienced at the Slangkop buoy, for a one year return period. It is worth noting that when high waves coincide with a high tide at Macassar, the beach becomes dangerous for swimming, and erosion of the shore-side dune field is experienced.

5.3 Focusing Effects in False Bay

As waves pass over isolated shallow areas, refraction around the shallow feature can lead to focusing of wave energy and higher waves on the coast. This is a localised effect, which has not been well studied. An exception is the focusing of south-west swell entering False Bay and being focused as the waves pass over the shallow Rocky Bank. Wave energy is then concentrated into the direction that cuts the eastern coast of False Bay at Kogelbaai, a locality associated with fishermen being washed off rocks. It is also possible that the lack of an extensive offshore reef may contribute to the heightened energy on this stretch of coast. A study from Ian Hunter of the South African Weather Service is included as Appendix 3.

5.4 Diffraction into Shadow Zones

The western shore of False Bay from Muizenberg southwards lies in the shadow zone of big wave events travelling through the entrance to False Bay. The waves can be diffracted into the shadow zone and, after refraction by the bathymetry, can reach the coast. The general rule for diffraction is that the greater the angle through which the waves are bent by diffraction, the greater will be the reduction in wave height and wave energy. Thus the big wave events from the south west will have decreasing impact as one moves southward down the coast from Muizenberg/Kalk Bay to Fish Hoek/Simon's Town. Nevertheless the biggest events will still be associated with considerable damage between Muizenberg and Kalk Bay and, even on occasions such as 1 September 2008, at Fish Hoek.

In the same way, there will be considerable interaction between the waves and the bathymetry, as the big storm waves enter Table Bay. Green Point will shelter much of the north facing coast close to the Port of Cape Town, while the breakwaters will protect the Port itself.

6. Coastal vulnerability

So far this study has dealt with wave set-up. That is the waves from the big wave events reaching the outer edge of the surf zone from the open sea. Now attention turns to wave run-up as determined by conditions in the surf zone and on the coast itself. Roughly speaking waves will break when they are close enough to the coast for the water depth to be less than 80% of the wave height. Thus the edge of the surf zone where the waves are 10m in height will be in a water depth of roughly 8m. The resulting width of the surf zone will depend upon the beach slope under the waves from the surf break-point to the shore, on whether the beach is flat or steep. Given that individual waves vary

considerably in height, the position of the break-point and the width of the surf zone will also vary considerably. It is the biggest waves that count so that the significant wave height is usually taken as determining the surf break-point and the width of the surf zone. It should also be clear that a tidal range, which approaches 2m at springs, will also have an influence on the character of the surf zone, with possible differences between high tide and low tide.

There will also be differences in the character of the breakers within the surf zone. Details of breaker types and surf zone characteristics can be found in Appendix 4. On relatively flat beaches, plunging breakers can dump much of their energy at the outer break-point itself while, on steep beaches with deep water close to the shore, surging breakers can bring substantial wave energy close to the shore and cause much damage. The very flattest beaches can be associated with spilling breakers that spread their loss of wave energy evenly through the surf zone. Again, the character of the surf zone at each location is not fixed, as there may be differences in breaker types at different states of the tide.

The critical situation is when deep water close inshore allows the wave energy to approach the shore. This may be on a hard coast where cliffs drop deeply into the sea, or where a steep beach is really a dune face, with surging breakers rapidly eroding that dune face. Pocket beaches, a combination of both hard and soft coasts with deep water close to the shore, may be particularly vulnerable.

The experience of the City of Cape Town in repeated maintenance of its protection measures around the coast can be compared with the degree of exposure as revealed in this study.

Exposure, and the associated risk of sea-level rise, is location specific. In this study exposure is disaggregated according to specific location's exposure to wave set-up, wave run-up, the natural predisposition of a location as a function of the coastal geology (hardness and softness of the coastline, where soft coastline is typically less exposed than hard coastline, but particular combinations of hard and soft can lead to heightened risks), and the value or strategic nature of the development in that area.

The table below scores 20 locations that are known to be on the City of Cape Town's list of potentially exposed locations in terms of these four criteria. Applying a binary system, a score of 1 is allocated to those areas that are perceived to be exposed to the specific component of sea-level rise risk, and a score of 0 is given if the location is not exposed to that component. The assessment was conducted using the expert opinion of a group consisting of local oceanographers, coastal conservationists and engineers, all of whom were drawing on a history of experience with the City of Cape town coastline. The assessment not only provides a reasonable measure of the total sea-level rise risk at

a given location – and disaggregating risk per location is important – but it also provides important insight into the specific nature of sea-level rise risk at different locations.

Table 6: Components of sea-level rise vulnerability for different locations around the City of Cape Town coastline

	Wave set-up	Wave run-up	Coastal geology. Hard or soft surfaces.	Development risk	Comment
Table Bay: This is an area of gently sloping bottom contours and a sandy coast fringed by low dunes and occasional rocky outcrops. Part of the coast is sheltered by Robben Island. The coast is eroding in the south, and is particularly vulnerable where it is backed by the lagoon of the Diep River.					
Melkbosstrand	1	0	0	1	Exposed to big well, but with some shelter from offshore reefs. Beachfront development and dune removal is problematic.
Blouberg (Bay)	1	0	0	1	Sheltered behind Robben Island, the beach should be an area of sand accretion. However, extensive development has encroached too close to the waterline. Protection is needed.
Tableview beachfront	1	0	0	1	Exposed to big waves, where the Beach Road will become at risk. Protection is needed.
Milnerton beach	1	1	0	1	Exposed to big waves and, at high tide, surging breakers. This is an eroding beach with a diminishing steep dune cordon. Potential major issue if the protection to Otto du Plessis Drive is lost.
Milnerton to harbour	1	0	1	1	Shadow zone, no big waves. Harbour construction has led to gradual erosion and set-back, with ongoing loss of coastal infrastructure. Sea wall needs constant maintenance. Oil pipeline is strategic.

Atlantic Coast: This is a rocky coast with cliffs, offshore reefs and extensive kelp beds. Deep water is found close to the shore, permitting big waves to crash onto the coast so that protection is needed for any infrastructure at sea level.					
Green Point & Sea Point	1	0	1	1	Exposed to big waves, but some shelter from offshore reefs. The coast is on an exposed wave cut platform at some height above the sea, but needs the protection of a strong sea wall requiring continuous maintenance.
Glen Beach	1	0	0	1	A small pocket beach with some protection. High value beach houses are exposed.
Camps Bay	1	1	0	1	This beach is exposed to big waves. Wide beach, but high sea levels can reach the Beach Road.
Bakoven cottages	1	1	1	1	Very exposed to big waves and wave run up, and constantly under threat, as the houses are low down and on a hard rocky surface.
Kommetjie	1	1	0	1	Very exposed as deep water close inshore. Development has taken place in the protective dunefield, reducing its effectiveness.
Witsands	1	1	0	0	Very exposed single building in dynamic dunefield.
False Bay Coast: Western coast is steep but well sheltered from big waves from the southwest. Within False Bay, the bottom contours are gently shoaling to the sandy northern shore. The eastern coast is steep.					
Glencairn	1	0	0	1	Railway line running along a low wave-cut platform. Sheltered in shadow zone, but perhaps the foundations of the railway line in the backing wetland need continual

					maintenance.
Fish Hoek dune section	1	0	0	0	In shadow zone, but backing wetland may lead to vulnerability.
Kalk Bay	0	1	1	1	In shadow zone from southwest, but exposed to focussing from the south-east, so that harbour provides.
Muizenberg corner	1	0	0	1	In the edge of the shadow zone, but protected by a wide and very flat beach with spilling breakers.
Strandfonetin – Baden Powell Drive / Treatment Works / Landfill	1	0	1	1	Not too exposed but the road and the infrastructure are too close to the water's edge.
Monwabisi and Macassar Pavilions	1	1	0	1	Exposed to surging breakers at high tide and during storm events, with erosion of dune field
Strand (entire beach front)	1	0	1	1	Exposed beach with protection from offshore reefs, but infrastructure constructed close to water and poorly planned sea-walls.
Bikini beach	1	0	0	1	In swell shadow, but infrastructure too close to water and needs protection. Beach sand erodes.

In many of these key locations, further study is needed. The character of the surf zone under different conditions of tide and storm will identify the requirements for protection. The occurrence of surging breakers and the erosion of natural dune protection is particularly important. Such local assessments can be made through video monitoring.

7. Incorporation into the GIS

The coastal bathymetry, as illustrated in Figure 5 with contours at 5m intervals down to 70m, has been incorporated into the GIS maintained by the Geomatics Division of the City of Cape Town. This resolution is sufficient for estimates of the effect on significant wave height from refraction, offshore reefs, focusing, and diffraction as the waves move from the open ocean to the surf break. These studies can be summarized as follows.

- The refraction study shows that those parts of the coast with an offshore shoaling direction between NNE and E will be potentially exposed to the big storm waves from the south west. The red areas of the GIS, corresponding to extreme sea levels on the coast of up to LLD+4.5m, will then be potentially appropriate but could be reduced due to other effects.
- The Atlantic coast of the Peninsula itself, because deep water can come close to the coast, will be potentially very exposed to big storm waves from the south west. The orange areas of the GIS, corresponding to extreme sea levels on the coast of up to LLD+6.5m will then be potentially appropriate, but could be reduced due to other effects. Table Bay and the northern and eastern coasts of False Bay would remain as potentially exposed coasts.
- Finally those parts of the coast in the shadow of big storm waves from the south west, such as the lee of Robben Island, the southern coast of Table Bay and the western coast of False Bay, will be potentially sheltered. The blue areas of the GIS, corresponding to extreme sea levels on the coast of only up to LLD+2m, will then be potentially appropriate, but could be increased due to other effects.
- The effect of bottom dissipation as waves travel over shallow water can reduce the significant wave height between the open ocean and the surf break. The study into the north-east corner of False Bay shows that the reduction in significant wave height can exceed 40%, which means that the contribution of wave set-up on exposed coasts can be reduced by a similar amount. This reduction can be used as a first estimate of the bottom dissipation effect on exposed coasts in Table Bay and False Bay. There the extreme sea levels in the red areas should be reduced by 1m to LLD+3.5m.
- Offshore reefs can have an even greater effect, particularly if combined with kelp beds. Areas of coast which are potentially very exposed can actually be sheltered, though this will be a very localized effect.

- Focusing can have the effect of increasing the significant wave energy at points along the coast. The prime example is in False Bay where storm waves from the south west are focused onto the coast at Kogelbaai, countering the dissipation effect in the bay and returning that part of the coast to exposed or even very exposed status. A similar focusing may affect Kalk Bay with big storm waves from the south east.
- Diffraction of wave energy into a wave shadow can mean that a previously sheltered coastline becomes exposed. The amount of exposure to wave set-up can be estimated as thirty percent of the significant wave height at the surf break. It is this additional factor that is responsible for damage to the north western corner of False Bay from big storms from the south west, and for the massive breakwaters protecting Table Bay harbour.

- Finally, if the energy in the big storm waves is undiminished in reaching the coastline at the water's edge, then the potential of an exposed or very exposed coastline can be fully realised. On a hard coast, reflection of the waves off the coast can lead to a doubling of wave height in a greatly enhanced standing wave. On a steep sandy beach, a surging breaker can erode a dune face at an astonishing speed.

Particular areas can be highlighted for special study. The techniques for assessing exposure and protection as the waves move from the open sea to the surf break, as summarized above, can be used in these special studies. If the result is not sufficiently detailed, a period of wave observations at the particular location may be needed to provide the missing detail.

In order to establish the characteristics of the surf zone in the locality of interest, monitoring over various extreme sea levels due to tides and storms through video techniques can provide relevant assessments. The various infrastructure overlays can then be used to investigate the risks of damage.

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9. Appendices

Appendix 1: Big Storm Dates and Corresponding Synoptic Situation

Table A1: Big Storm Dates and Corresponding Synoptic Situation

Slangkop		
12-16 May 83		Cold front
18-22 May 83		Cyclogenesis
20-26 Jun 83		Cold front
13-19 May84		Explosive cyclogenesis
28-31 Mar 86		Cold front
27-30 Oct 88		Cold front
28 Mar-3 Apr 89		Cold front
13-16 Jul 89		Cold front
23-27 Aug 89		Cold front
18-22 May 90		Explosive cyclogenesis
10-14 July 90		Cold front
8-12 Aug 90		Cold front
23-27 Jul 91		Cyclogenesis
29 Jul-2 Aug 91		Cold front
20-26 Jun 92		Cold front
18-22 Jun 94		Cold front
5-9 Jul 95		Explosive cyclogenesis
15-19 Jul 95		Cyclogenesis
13-18 Jun 96		Cold front
23-27 Sep 96		Cold front
20-24 Jun 97		Explosive cyclogenesis
25-29 June 97		Explosive cyclogenesis
1-4 Aug 99		Cyclogenesis
13-16 Jul 00	Direction SW	Cold front
16-21 Jul 00	Direction SW	Cyclogenesis
18-21 Aug 01	Direction SW	Cold front
3-7 Sep 01	Direction SW	Cut off low
21-26 May 02	Direction SW	Cyclogenesis
16-20 Jun 02	Direction SW	Cold front
25-30 Jul 02	Direction SW	Cyclogenesis
31 Jul-4 Aug 02	Direction SW	Cold front
17-21 Aug 03	Direction SW	Cold front

Appendix 2: Refraction due to offshore bathymetry

Refraction effects will reduce the significant wave heights in a straightforward way. The detail requires a comparison between the direction of propagation of the big wave events and the direction of shoaling of the bottom contours as the waves approach the coast. These directions will first be converted to the sectors defined by the compass directions.

Table A2: Wave directions during big wave events from 2000-2004 at Slangkop

200-210	210-220	220-230	230-240	240-250	250-260
4	9	23	35	20	4

Compass directions SW and WSW cover angles between 213.75 and 258.75 degrees (45 degree spread with midpoint at 236.25 degrees), which include around 90% of observations of the big wave events. This is chosen as the composite direction from which the big waves come. It will be necessary to turn this around and note that 236.25-180=56.25 degrees is the principal direction in which the big wave events are travelling, with a spread of 33.75 to 78.75 degrees. Thus the big wave events are travelling in compass directions NE and ENE.

A first step is to represent the shelf bathymetry with contour segments, selected from the limited compass direction set, so that the directions may be easily compared with the direction of travel of the big waves. For example the contours off Camps Bay may be N-S, whilst those off the north shore of False Bay may be E-W. The segmented contours are associated with a single shoaling direction. Off Camps Bay, this single shoaling direction is likely to be E, and off the north shore of False Bay, the single shoaling direction is likely to be N.

For refraction of the incoming storm waves, the set of shoaling directions must make an acute angle with the incoming wave. Other shoaling directions are completely sheltered from refraction, though diffraction may bring waves into the sheltered coast, (Eg. the coast of False Bay, south of Muizenberg). With the incoming wave moving in a direction centred at 56.25 degrees, the relevant shoaling directions must lie between -33.75 degrees (or 326.25 degrees) and 146.25 degrees, as given in the following table.

Table A3: Relevant Shoaling Directions as Angles Clockwise from North

Direction	NNW	N	NNE	NE	ENE	E	ESE	SE
Angle	-22.5	0	22.5	45	67.5	90	112.5	135

Refraction of the incoming wave in direction 56.75 degrees at water depth of 70 metres (at the Slangkop buoy) will occur as the wave enters shallow water. If the shoaling direction at the inshore segmented contour is oriented at a greater angle than 56.75

degrees, the incoming wave will gradually bend to the right as it moves into the shallower water. Whilst, if the shoaling direction is oriented at a lesser angle than 56.75 degrees, the incoming wave will gradually bend to the left. The extent of the refraction will depend on the amount of shoaling from the deeper water, with more refraction for shallower water.

Snell's Law can be used to set up Table A.4 as an appropriate Refraction Table at various depths of shallow water and shoaling directions for incident wave direction of 56.25 degrees. At the same time, the proportionate decrease in the incident significant wave height due to the spread of the refracted wave can be noted.

Table A4: Refraction Table for Incident Wave Direction of 56.25 Degrees

Shoaling	-22.5	0	22.5	45	**56.25**	67.5	90	112.5	135
Direction	NNW	N	NNE	NE		ENE	E	ESE	SE
Depth	40m								
Refraction	23.4	39.0	**47.3**	**53.5**	**56.25**	**59.0**	**65.2**	73.6	87.1
Ht Ratio	0.54	0.85	**0.96**	**1**	**1**	**1**	**0.96**	0.85	0.54
Depth	20m								
Refraction	9.1	26.4	**39.8**	**51.0**	**56.25**	**61.5**	**72.7**	86.1	103.4
Ht Ratio	0.48	0.79	**0.93**	**0.99**	**1**	**0.99**	**0.93**	0.79	0.48
Depth	10m								
Refraction	-0.7	18.3	**34.6**	**49.2**	**56.25**	**63.3**	**77.9**	94.2	113.2
Ht Ratio	0.46	0.76	**0.92**	**0.99**	**1**	**0.99**	**0.92**	0.76	0.46

The proportionate decrease in the incident significant wave height in the 40m, 20m and 10m shallow water remains above 0.90 for shoaling directions between NNE (22.5 degrees) and E (90 degrees) where the refraction from the incident direction of 56.25 degrees remains between 34.6 and 77.9 degrees. The correspondence with the spread of the incident wave from 33.75 to 78.75 degrees should be particularly noted. This means that segmented contours corresponding to shoaling directions between NNE and E can be considered to be potentially exposed to big storm waves, as there is little reduction in the significant wave height despite the effect of refraction.

Appendix 3: Weather Systems and Enhanced Wave Conditions in False Bay – 12 November 2008

Last Wednesday 12 November 2008 heavy seas once again crashed over the breakwater into the Kalk Bay fishing harbour threatening the adjacent restaurants. Fortunately the wave conditions did not reach the extremes of 1 September when considerable damage was incurred – not just in Kalk Bay but all along the coast from Table Bay to East London.

Earlier this year on 17 June heavy seas resulted in some of the concrete fish-cleaning tables inside the harbour being smashed. Thus enhanced wave conditions in this area are by no means rare. They also occur along other sections of the False Bay coastline - between Steenbras River Mouth and Cape Hangklip numerous crosses mark the spots where rock anglers have been caught unawares.

Divers and small boats have similarly fallen foul of these sudden, short-lived events.



Figure A1: A cross located just to the west of Steenbras River Mouth marks one of many spots where rogue waves have washed fisherman into the sea. The swell direction at the time of these tragedies is invariably SW'ly – with wave focussing taking place as a result of bathymetrical features

Heavy SE'ly swell entering False Bay – cut-off low/ blocking high combination
In 1965 a naval cutter (ship's boat with sailing gear) was becalmed off Kalk Bay when a sudden, quick succession of steep high waves capsized the vessel, resulting in the loss of 7 of the 11 crew members. In this case the swell direction was SE'ly. This latest event (12 November 2008) was also a case of a heavy SE'ly swell entering the Bay – and being focussed onto the Kalk Bay area. These events are almost always associated with a cut-off low event (COL). See Figure A2, the sea level pressure analysis on the morning of 12 November.

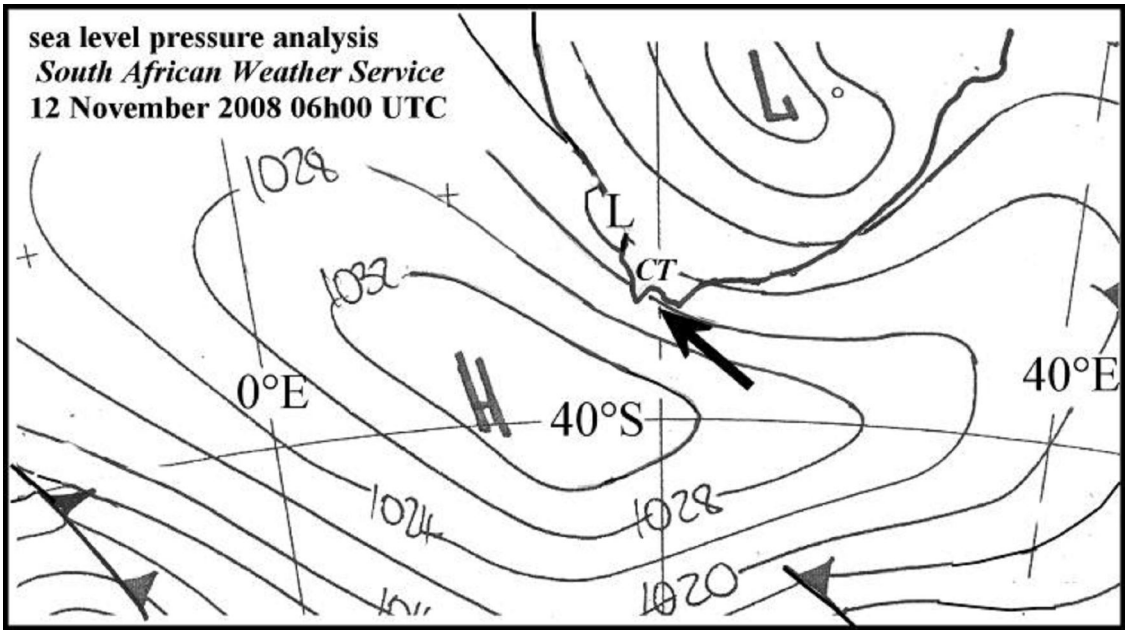


Figure A1: SAWS sea level pressure analysis for 06h00 on 12 November 2008. Note that the wind is angled across the isobars due to friction and pressure gradients increasing rapidly with time

The term 'cut-off' actually refers to the upper air circulation but this sea level analysis shows the typical pattern - a tight SE'ly fetch zone (arrowed) squeezed in between a COL / Blocking High combination. Compared with the normal Cape SE'er the high is generally further south, the low is deep (not your normal shallow, coastal low) – and sometimes located offshore. Both systems are *semi-stationary*, thus increasing the wave generation 'duration' factor.

There is a longer-than-normal fetch zone and all of this combines to build up an unusually heavy SE'ly swell. The swell period is relatively short, but Whittle Rock is shallow – refraction and focussing still come into play. The blue arrows in Figure 4 apply, with thickness representing wave energy.

Note that the sea state on the Western Cape's *west* coast remains relatively calm in these (deep) SE'ly conditions – the wind being offshore and there thus being a very limited fetch.

Heavy SW'ly swell – intense mid-latitude trough

The extreme wave conditions of 31 August and 1 September were associated with a deep mid-latitude trough moving fairly rapidly eastwards (cf stationarity of COL / Blocking High combination).

Rocky Bank (which rises to 22m, 5nm southeast of Cape Point) has been identified by means of wave refraction diagrams as the bathymetric feature responsible for focusing a heavy SW'ly swell onto the coast between Steenbras River Mouth and Rooiels. However, in the case of a particularly long period SW'ly swell the effect of the Bank is to refract the wave energy even more – and focus it onto the Kalk Bay area Thus abnormal wave conditions in Kalk Bay can be associated with both heavy SW'ly and heavy SE'ly swell conditions.

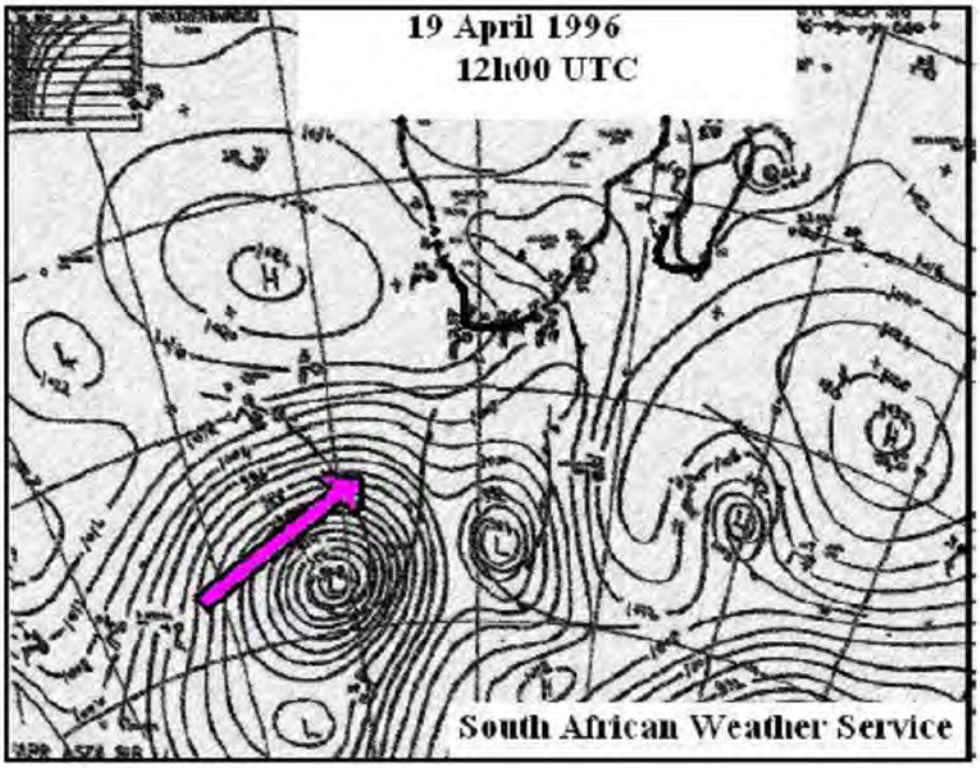


Figure A2: Sea level pressure analysis for 12h00 UTC on 19 April 1996. The arrow indicates the tight SW'ly fetch zone in which winds upwards of 60 kts were probably present. In the associated vortex central pressure dropped below 950 hPa.

Figure A2 shows the sea level pressure analysis associated with a long-period ***SW'ly swell*** that resulted in the deaths of 2 people, swept off the Kalk Bay breakwater on 21 April 1996 (cf red arrows in fig A3). Note that the date of the analysis is 19 April – 2 days before the swell arrived in False Bay. As the SW'ly swell travelled the ~ 2000 km wave energy would have been shifting into the longer periods (i.e. longer wavelengths). Even at 22m depth Rocky Bank had a marked effect, turning and focussing the swell into the northwestern corner of False Bay.

During the period 30 August to 2 September 2008, when many millions of rands damage was done to coastal infrastructure, the dominant wave-generating synoptic scale weather system was again a relatively fast-moving, intense mid-latitude trough. The near-record (deep sea) wave heights may well have been related to the propagation speed of the front and the extensive SW'ly fetch zone it dragged behind it.

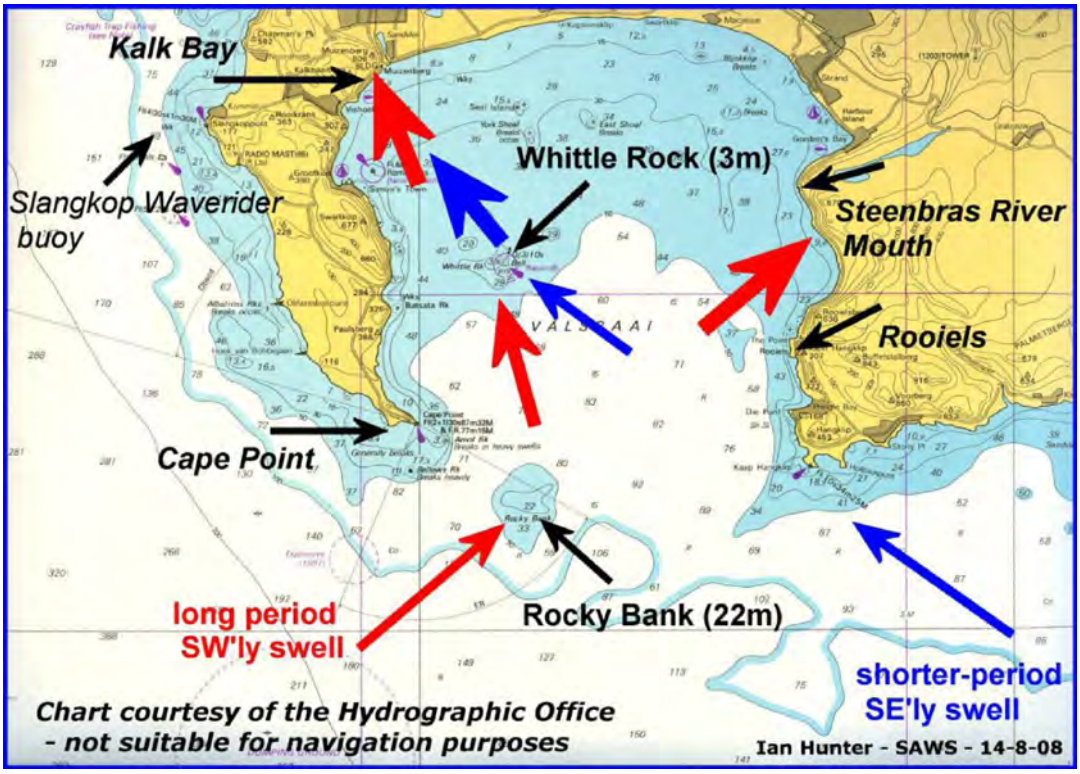


Figure A3: Refraction and focusing in False Bay – SW'ly (red) vs SE'ly (blue) swell conditions

Figure A3 has been annotated so as to indicate the relevant swell directions and some of the wave focusing areas associated with them. In the open ocean south of Cape Town a heavy SW'LY swell is far more common than one from the southeast, but in years when numerous cut-off lows are experienced over the Western Cape (e.g. 2008), Kalk Bay may suffer almost equally under both conditions.

Appendix 4: Wave type and energy

Characterisation of breaker types can be established through the surf scaling parameter E

$E = (2*PI^2*H_b) / (g*T^2*\tan^2(beta))$ H_b is breakpoint wave height
T is wave period
Beta is surf zone bottom slope

E is also related to the Iribarren Number given by the square of the bottom slope divided by the wave steepness.

Spilling breakers	20<E	dissipates energy evenly through entire surf zone.
Plunging breakers	2.5<E<20	dumps energy at the break point.
Surging breakers	E<2.5	carries energy to beach to be reflected.

Flat beaches, such as Muizenberg, are associated with spilling breakers and are referred to as dissipative beaches. Steep beaches, where deep water comes close to the coast, are associated with surging breakers and are referred to as reflective beaches. Estimates of inshore bottom slope are needed for the calculation of surf scaling parameter, particularly on exposed beaches. The bathymetric charts may not give enough information close to shore, but video studies can help.

Estimates of wave period can be obtained from the observations of the big storm waves at the Slangkop buoy. An estimate of the break point wave height can be obtained from the deep(er) water wave height at the Slangkop buoy by using Komar's approximation.
$H_b = 0.39\, g^{0.2}\, (T\, H_0^2)^{0.4}$ T period, H_b break point height, H_0 buoy height.

Appendix 5: Terms of Reference for Phase 5 study

The primary objective of this study is to improve understanding of the extent and manner in which City of Cape Town's coastline is likely to be impacted by sea level rise. It is propose to achieve this by adding the influence of local factors such as offshore bathymetry, storm direction and coastal geography to the sea level rise model developed in Phases 1-4, and by including an understanding of how the various influences on sea-level rise interact with each other at a specific locations and over time.
Realising this primary objective rests on the incorporation of data pertaining to:

- Knowledge of the offshore wave climatology.

- The detail of the coastal bathymetry and its influence on wave run up.

Both these data are limited by the resolution of available observations. This appears to be recognised in the Terms of Reference by the restriction of the wave directions to the coarse compass directions NW, W, SW, S and SE. The course resolution will place constraints on the type of model and the accuracy of the results that can be expected from such models. Nevertheless, it should be possible in this Phase 5 to achieve the outcomes asked for in the Terms of Reference, namely:

- Develop a finer scaled and more accurate approach to the existing GIS model by identifying areas at risk due to a uniquely varying shoreline, bathymetry and coastal geography;
- Apply five storm direction scenario's to the City's coastline (NW, W, SW, S and SE);
- Identify key risk areas for each storm direction scenario based on swell direction, bathymetry, shoreline, swell shadows and coastal geography, and
- Improve the level of accuracy in the predictions for sea level rise events

Once these key risk areas have been identified, further observation programmes at a greater resolution can be contemplated, with a view to obtaining more predictive capability from the use of sophisticated inshore wave models.

The approach proposed for this study is to add to the factors in the existing GIS to enable impact variability along the coast to be assessed and predictability improved. The following aspects will be investigated:

- Swell dynamics i.e. characteristics of swell direction;
- Correlations that may exist between the various swell characteristics i.e. average wave height and wave length may be associated to a particular swell direction, time of year, wind direction, weather pattern etc;
- Coastal areas that will receive specific swell head-on, and those that will be sheltered from swell based on the five different storm direction scenarios;
- Critical coastal bathymetry. Shallow offshore banks will play a significant role in reducing swell energy reaching the coast whereas deeper near-shore bathymetry will result in increased wave energy reaching the coast;
- The effect of coastal geology and topography on hinterland vulnerability (sandy shore vs rocky shore)
- The direction and dynamics of longshore drift;
- The presence, state and influence of other natural barriers i.e. kelp forests in terms of reducing the impacts of storm swell and in which areas;
- The physical composition of the beach: A combination of rocks and sand tends to be more susceptible to erosion, and
- Vulnerable areas as a result of human development and activity.

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Global Climate Change and Adaptation: City of Cape Town sea-level rise risk assessment.

Phase 5: Sea-level rise vulnerability assessment and adaptation options

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1. Introduction

People have been adapting to variability in the City of Cape Town's coastal zone for as long as they have lived there, but anthropogenic climate change presents novel challenges and is exposing the imprudence of some of the coastal development that has taken place.

Phase 3 of this study (Brundrit et al., 2008) estimated that 25 km^2 of land interior to the City of Cape Town's 307 kilometre coastline is currently exposed to high sea-events 2.5 metres above land levelling datum (LLD), caused by a coinciding extreme high tide and storm surge. There is R5 billion worth of infrastructure and property within Cape Town's 2.5 metre contour, and although no single event would affect all of this at the same time, it is clear that the City is exposed to sea-level rise risks. Seas 2.5 metres above LLD are not common, but as storms become more frequent and the mean sea-level platform on which these storms and tides manifest is raised, this could change.

In the initial component of this Phase 5, Brundrit advanced the work undertaken in Phases 1-4 by identifying those areas of the City of Cape Town's coastline that are particularly vulnerable to this "current worst case" scenario. In mapping this vulnerability, Brundrit applied four physical attributes – (1) wave set-up as influenced by bathymetry, swell direction, swell conversion and shoaling (2) wave run-up as influenced by the topography of the coast and bathymetry (3) geological predisposition of the coastline as influenced by the hardness or softness of the coastline and (4) the extent and nature of coastal development – to the altitude parameter that was used exclusively in Phases 1-4:

i. **Wave set-up** is a function of wind, swell direction and the extent to which waves are refracted by the coastal topography; refraction reduces wave energy. Brundrit shows that most significant sea-surges off the Cape Town coast approach from the south-west (200 - 260°). Coastlines that front directly to these seas are the most vulnerable. Offshore reefs, islands and wave refraction typically reduce exposure to wave set-up. Thirty two "wave set-up events" – waves off the coast of over 6.5 metres lasting longer than 6 hours – were recorded off the City of Cape Town's Atlantic coastline between 1981 and 2003. Brundrit notes a correlation between these events and warmer sea surface water south west of Cape Town, and suggests a better understanding of the relationship between atmospheric temperature, sea temperatures in this region and large waves is important.

ii. **Wave run-up** is defined by the extent to which waves advance inland once they have broken, and the energy with which they advance. Wave run-up is reduced by bottom friction and accordingly coastlines with gradual gradients, coarse shallow sea-surface bottoms (such as those with reefs) and beaches protected by kelp tend to be less prone to wave run-up. Conversely where deep water is found close to the coastline, wave run-up can cause aggressive coastal erosion and damage. Wave run-up can be influenced by "wave focusing" – the convergence of waves from different angles, as is the case at Kogelbaai in False Bay.

iii. **Coastal geology** determines the hardness or softness of the coastline. The hardness (rockiness or sea-wall) or softness (sand or vegetation) of a coastline in turn determines its "natural" ability to withstand or recover from sea-level rise risks and its predisposition to storm damage. As a rule of thumb soft coastlines are more able to absorb wave energy and withstand sea-level rise impacts than hard coastlines. Well engineered coastlines can, of course, reduce sea-level rise risk but the danger is that poorly engineered coastlines either transfer or concentrate wave energy onto a single point or are over-topped by high seas. The engineering of coastlines usually takes place at the expense of natural buffers, and where (hard) engineered defences are breached the coast is particularly vulnerable. In this way some of the most vulnerable coastlines are those that involve a combination of hard and soft surfaces. Roads built on beaches and sea-walls in conjunction with sand dunes, are particularly vulnerable.

iv. **Value and strategic nature of the development.** From the City of Cape Town's perspective, coastal vulnerability is a function of the assets (natural or constructed) that the coastline contains. This is true in two ways. Firstly the assets, whether houses, roads or wetlands, are a part of the coastline's composition and determine the damage that a given storm event can cause. Secondly, the value (both economic and strategic) that the coastline contains determines the extent of what is at risk from sea-level rise. If a section of coastline containing a major access road to the City is at risk from sea-level rise, this is probably a greater priority than a remote section of coastline at which only sand and rocks are exposed. Similarly, if a wetland that prevents flooding and provides a habitat for rare species is at risk, this is arguably a greater priority than a section of coastline containing only common vegetation and no specific habitats. The nature and extent of development provides further important insight into who is liable for sea-level rise damage and the cost of adaptation measures. Private infrastructure - houses for example - that have been constructed naively close to the sea may present the potential for significant loss of value (especially where the houses are high value), but may not be considered the City's responsibility. Public infrastructure or infrastructure that if damaged will have a significant impact on the public may in contrast be considered a high priority for the City.

By screening for exposure to wave set-up and wave run-up Brundrit was able to identify those areas that were respectively:

- "Sheltered": Currently exposed to events 2 metres above land levelling datum, and most sensitive to changes in mean sea-level.

- "Exposed": Currently vulnerable to some wave run-up and set-up capable of causing events 4.5 metres above land levelling datum. These areas are exposed to changes in both mean sea-level and the changing nature of storms and sea-surges.

- "Highly exposed": Currently prone to events of 6.5 metres and vulnerable to both wave set-up and run-up. For these areas the changing nature and frequency of storms is critical, and the rising mean sea-level is important.

Figure 1 shows (in yellow) "sheltered" coastlines as well as the extent of the exposure of Cape Town's Atlantic coast to storm action. Local experts drew on their knowledge of past events to "ground truth" this work and a collective effort identified "hot spots" around the City of Cape Town's coastline. Hot spot locations are particularly vulnerable to coastal damage. In taking this step it was necessary to add the distribution of valuable infrastructure and human settlement to Brundrit's physical and climate oriented map.

A key realisation to come from Brundrit's work is that different coastal settlements are vulnerable to different combinations of change in mean sea-level, swell direction and size and wave run-up.

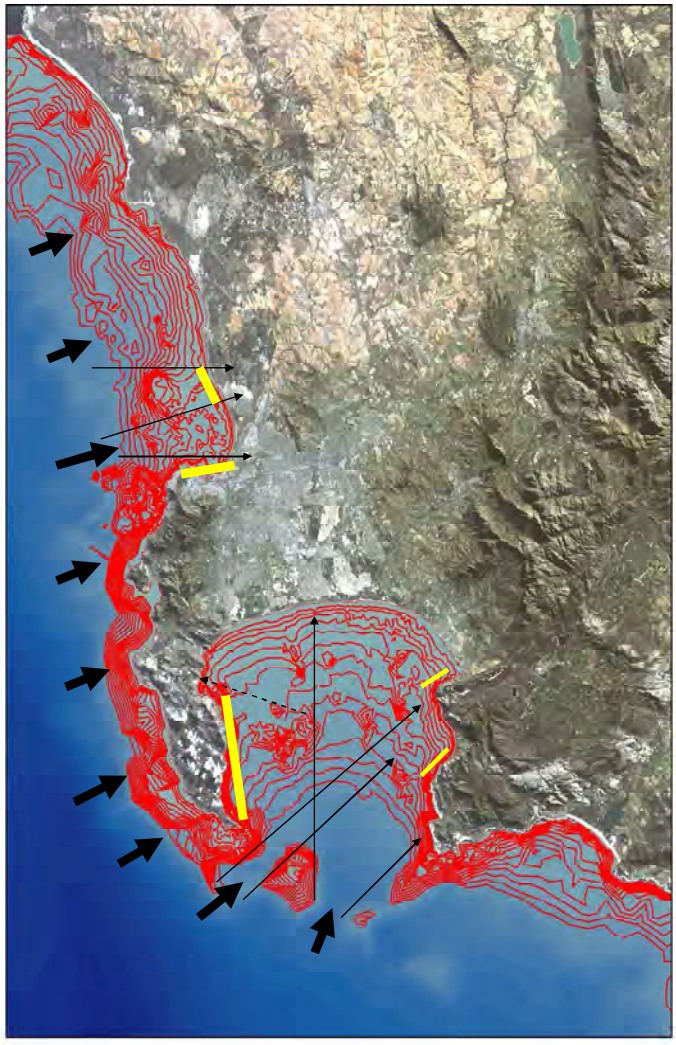


Figure 1: Sheltered and vulnerable regions based on wave set-up and wave run-up. (Source: Brundrit, 2009).

The hotspots were then subjected to an additional screen that involved including hardness and softness of the coastline and the extent and nature of coastal development to the parameter of wave set-up and run-up. The four parameters were used to provide a screen that differentiated the extent and reason for vulnerability at the respective "hot-spot" locations (see Section 3).

2. New risks to Cape Town's coastal zone

In most instances the list of vulnerable "hot spot" locations confirms what people in the City of Cape Town already know. In some instances efforts are already underway to protect these areas. This might suggest that approaches used to cope with sea-level rise events in the past, provided they are maintained, will serve Cape Town's residents well in the future. After all many of the topographical and geological parameters applied in identifying exposure to wave run-up and wave set-up are not changing over time frames that are significant to planners.

New concerns over coastal vulnerability in Cape Town are based both on (1) the increasing value of infrastructure, property and human life found proximal to the coastline and (2) changes in mean sea-level (land levelling datum) and the frequency and intensity of storms. There is further concern over the lack of a coherent approach in dealing with arising threats, and the reliance on ad-hoc and reactive responses. The basis for these concerns is expounded below:

2.1 Mean sea-level:

Measures of mean sea-level are complicated because the sea is neither level nor rising at a uniform rate around the world. The Intergovernmental Panel on Climate Change's (IPCC) Fourth Assessment Report (2007) cited an average change in sea-levels of 0.17 (0.12-1.22) metres over the 20th Century and projected an upper-limit increase of 0.59 (0.18-0.59) metres by 2100. For all but the world's low lying islands these changes are within the bounds of previous high tides and severe storm surges. However Krabill et al. (2004), Velicogna and Wahr (2006), Rignot and Kanagaratnam (2006), Hansen[1] (2007) and Tol et al. (2008) have questioned the IPCC projections. Much of their work is focussed on the potential for non-linear, rapid melting of the Greenland and West Antarctic Ice Sheets. Such events would result in sea-level rise an order of magnitude greater than those projected by the IPCC. The likelihood of larger and more rapid sea-level increases appears to be supported by a range of anecdotal observations recorded in UNEP's 2008/9 Year Book[2]. Collectively this evidence suggests that atmospheric temperature increases are merely the catalyst for complex ice sheet collapse processes that, once underway, become driven by more than temperature. UNEP (2009) notes:

[1]Jim Hansen is head of NASA's Goddard Institute for Space Studies.

[2] The Year Book was released on 10 March 2009 in Nairobi.

- In 2008, for the second year in a row, there was an ice-free channel in the Northwest Passage through the islands of northern Canada. 2008 also witnessed the opening of the Northern Sea Route along the Arctic Siberian coast. The two passages have probably not been open simultaneously since before the last ice age some 100,000 years ago.

- The Greenland Ice Sheet, which could raise sea levels by six metres if it melted away, is currently losing more than 100 cubic kilometres a year. This is faster than can be explained by natural melting.

- Losses from the West Antarctic Ice Sheet increased by 60 per cent between 1996 and 2006, while losses from the Antarctic Peninsula increased by 140 per cent over the same period.

There is, then, some uncertainty over the extent and rate of climate change induced sea-level rise. What is clear is that globally sea-levels are rising, the rate of rise is increasing and relatively small increases in mean sea-level have disproportionately large impacts on the damage that storms cause to the coastal zone.

Measurements taken at Port Nolloth between 1962 and 1987 (Brundrit, 1995) and Durban between 1970 and 2003 (Mather 2007) show average rises of 1.2±0.4 mm per annum and a 2.7±0.05 mm rise per annum, respectively. Based on this Brundrit concludes that mean sea-level in Cape Town is probably rising in line with the global mean, and is currently 0.2 metres above the average for the past 100,000 years. In the context of a tidal flux for the same region of 2 metres and storms that produce 2 metre waves, this may not sound particularly significant, but (as shown in Figure 2) a small increase in mean sea-level reduces the frequency with which a 1.7 metre sea-level rise event occurs from one in 700 years to one in 40 years. Sea-level rises lag atmospheric warming due to the processes that govern thermal expansion of the oceans. The mean sea-level rises that are already inevitable, based on existing atmospheric warming, will see dramatic coastal events becoming more common along the Cape Town coastline. Not only would this reduce the recovery time between events, but it would also allow the sea to impact upon sections of the coastline that have little resilience to such impacts.

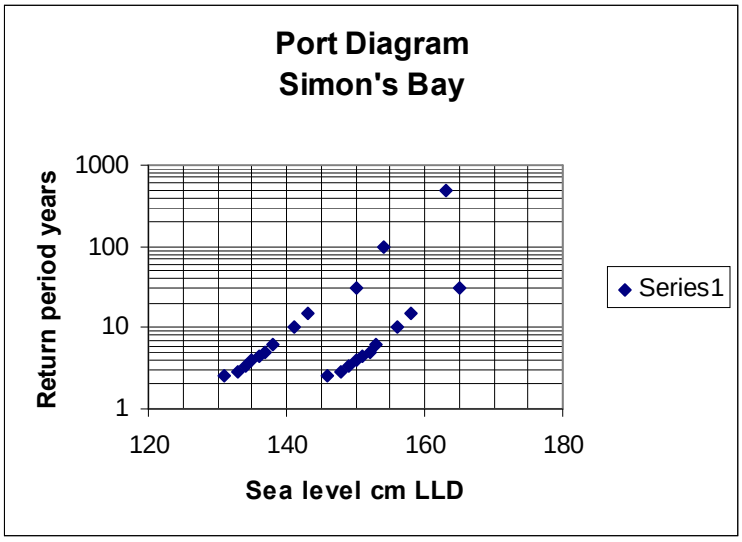


Figure 2: Return period of extreme sea levels expected in sheltered areas at the present time, and after sea-level rise of 20cm. The figure shows that return times of extreme sea-level events are a log function of land levelling datum; small changes in land levelling datum have a disproportionate impact on the frequency of extreme events.

2.2 Coastal storms:

The risks caused by changes in mean sea-level are compounded by the anticipated impacts of climate change on the intensity and frequency of storms. SwissRe (2009) projects a small decrease in the number of extra-tropical cyclones, but a 15-20 per cent increase in the occurrence of severe extra-tropical cyclones, particularly in the southern hemisphere. SwissRe's conclusion is supported by Lambert and Fyfe (2006) and broadly consistent with the findings of Bengtsson et al. (2006), who cite a "poleward shift" of mid-latitude storm tracks.

Definitive local studies of the relationship between atmospheric temperature and storms are still emerging, but the available downscaled evidence is consistent with the international trend (Tadross[3] pers. comm.). A more specific hypothesis (Brundrit, 2008) proposes that the Atlantic coastline is being exposed to increasing frequency and intensity of south-west storms – the storms that have accounted for all of the major sea-level rise events in the past three decades (Schumann and Brink, 1990) - but definitive support for this is not yet available. MacDeevit and Hewitson (2007) projected a doubling of the incidents of extreme winds (7.6 m/s) in the Western Cape by 2081-2100, and it is known that increases in wind speed cause a disproportionate increase in wave height. Brundrit (2009) shows that "very big wave events" have occurred every 11 years on average over the past two hundred years, but notes four such events in Cape Town in the past twenty six years.

[3] Mark Tadross is a climatologist at the University of Cape Town's Climate Systems Analysis Group.

In short there is the distinct possibility that either or both the frequency and intensity of the south west storms that cause most of the coastal damage in the City of Cape Town, could be exacerbated by climate change and monitoring this change will be particularly crucial for those locations exposed to south west wave set-up and wave run-up.

2.3 Socio-economic development:

Cape Town's physical and climatological predisposition to coastal vulnerability is aggravated by institutional and socio-economic developments. Much of the peninsula's transport infrastructure (most notably the False Bay Railway line) is built on a wave-cut platform created 125,000 years ago by sea-levels 4-6 metres higher than present. At the same time coastal property has become increasingly sought-after and the value of coastal development has escalated. The country's White Paper on Sustainable Coastal Management (2000) describes the coast as a "national asset" and encourages "sustainable economic use" of this asset without compromising its "ecological integrity". In the past, however, land reclamation, the removal of coastal dunes, the stabilisation of sand that has historically replenished beaches, the development of estuaries (Turpie, 2004) and sand mining have collectively reduced many of the coast's natural buffers, exposing sections of the coastline to damage from increasingly variable and rising seas.

Cape Town's coastal development has altered the "hardness" and "softness" of coastline, which in turn influences the impacts that given waves, tides and changes to mean sea-level have on the coastline. As a rough rule softer coastlines – that is coastlines with a combination of vegetation, kelp, reefs, sand and natural contours – absorb wave energy better than hard coastlines containing rocks or walls. Soft coastlines can, however, be more damaged by storms and where the natural forms of replenishment and rehabilitation have been curtailed, can be easily perturbed and permanently damaged.

2.4 Coastal governance:

Institutionally the governance of coastal zones in Cape Town is patchy. Most beaches are officially "crown land" and under the jurisdiction of national government, but the land immediately adjacent to beaches belongs to an array of national government departments, agencies and local authorities. The public company Portnet is responsible for the Cape Town harbour, but The City of Cape Town is obliged to extend and maintain services to individuals and companies that own coastal land and have received planning permission. Unfortunately the authorities granting planning permission are not always the same authorities that are cognisant of sea-level rise risks.

The situation is compounded by the historical exclusion of much of Cape Town's population from coastal amenities and coastal properties. Under apartheid, black and coloured people were not able to share in the development of coastal property that proved lucrative for white Capetonians, and were not permitted to share public amenities such as beaches and swimming

pools. Politically motivated restrictions to coastal access in the past make current attempts to prevent coastal development sensitive.

3. Assessing sea-level rise risk at Cape Town's coastal locations

Table 1: Components of sea-level rise vulnerability for different exposed locations around the City of Cape Town coastline

	Wave set-up	Wave run-up	Coastal geology. Hard or soft surfaces.	Risk to infra-structure and ecological assets	Comment
Table Bay: This is an area of gently sloping bottom contours and a sandy coast fringed by low dunes and occasional rocky outcrops. Part of the coast is sheltered by Robben Island. The coast is eroding in the south, and is particularly vulnerable where it is backed by the lagoon of the Diep River.					
Melkbosstrand	1	0	0	1	Exposed to big well, but with some shelter from offshore reefs. Beachfront development and dune removal is problematic.
Blouberg (Bay)	1	0	0	1	Sheltered behind Robben Island, the beach should be an area of sand accretion. However, extensive development has encroached too close to the waterline. Protection is needed.
Tableview beachfront	1	0	0	1	Exposed to big waves, where the Beach Road will become at risk. Protection is needed.
Milnerton beach	1	1	0	1	Exposed to big waves and, at high tide, surging breakers. This is an eroding beach

					with a diminishing steep dune cordon. Potential major issue if the protection to Otto du Plessis Drive is lost.
Milnerton to harbour	1	0	1	1	Shadow zone, no big waves. Harbour construction has led to gradual erosion and set-back, with ongoing loss of coastal infrastructure. Sea wall needs constant maintenance. Oil pipeline is strategic.
Atlantic Coast: This is a rocky coast with cliffs, offshore reefs and extensive kelp beds. Deep water is found close to the shore, permitting big waves to crash onto the coast so that protection is needed for any infrastructure at sea level.					
Green Point & Sea Point	1	0	1	1	Exposed to big waves, but some shelter from offshore reefs. The coast is on an exposed wave cut platform at some height above the sea, but needs the protection of a strong sea wall requiring continuous maintenance.
Glen Beach	1	0	0	1	A small pocket beach with some protection. High value beach houses are exposed.
Camps Bay	1	1	0	1	This beach is exposed to big waves. Wide beach, but high sea levels can reach the Beach Road.
Bakoven cottages	1	1	1	1	Very exposed to big waves and wave run up, and constantly under threat, as the houses are low down and on a hard rocky surface.
Kommetjie	1	1	0	1	Very exposed as deep water close inshore.

					Development has taken place in the protective dunefield, reducing its effectiveness.
Witsands	1	1	0	0	Very exposed single building in dynamic dunefield.
False Bay Coast: Western coast is steep but well sheltered from big waves from the southwest. Within False Bay, the bottom contours are gently shoaling to the sandy northern shore. The eastern coast is steep.					
Glencairn	1	0	0	1	Railway line running along a low wave-cut platform. Sheltered in shadow zone, but perhaps the foundations of the railway line in the backing wetland need continual maintenance.
Fish Hoek dune section	1	0	0	0	In shadow zone, but backing wetland may lead to vulnerability.
Kalk Bay	0	1	1	1	In shadow zone from southwest, but exposed to focussing from the south-east, so that harbour provides.
Muizenberg corner	1	0	0	1	In the edge of the shadow zone, but protected by a wide and very flat beach with spilling breakers.
Strandfonetin – Baden Powell Drive / Treatment Works /	1	0	1	1	Not too exposed but the road and the infrastructure are too close to the water's edge.

Landfill.					
Monwabisi and Macassar Pavilions.	1	1	0	1	Exposed to surging breakers at high tide and during storm events, with erosion of dune field.
Strand (entire beach front).	1	0	1	1	Exposed beach with protection from offshore reefs, but infrastructure constructed close to water and poorly planned sea-walls.
Bikini beach	1	0	0	1	In swell shadow, but infrastructure too close to water and needs protection. Beach sand erodes.

The risk analysis in Table 1 provides a number of important insights. Most obvious is that sea-level rise risk – a term that is applied at various scales and in an increasing number of contexts - is location specific and the result of different causes. The same sea-level rise event can affect places located quite close together, in very different ways due to the topography of the location, the orientation of the coastline relative to swell direction, the hardness or softness of the coast and the extent and type of coastal development. Understanding the particular combination of wave run-up, wave set-up, coastal erosion, change in still water level and imprudently located construction that affects a given location, is essential in correctly monitoring the changing nature of this risk under climate change and in the formulation of effective adaptation measures.

Secondly unless the respective components of sea-level rise are understood, it is very difficult to manage the trade-offs between development and coastal protection in a coherent manner. The most appropriate responses to wave-set up risks and wave run-up risks will, for example, differ. Equally the construction of hard infrastructure at a location that is naturally “soft”, but prone to wave set-up (such as Llandudno beach), is unlikely to be effective and likely to cause unforeseen consequences. Similarly the use of soft measures – such as sand replenishment – at hard locations that experience exposure to wave set-up (such as Bakoven) is unlikely to prove effective.

A further insight to emerge clearly from the analysis is that most sea-level rise risks have their origins in ill-advised coastal development. Climate change induced sea-level rise is exposing poor coastal management. At all but two of the vulnerable locations, it is housing and infrastructure that is central to the sea-level rise risk, and whilst some of this is only at risk due to sea-level rise, most of it would be vulnerable even if the ocean was not rising. This is not to say that infrastructure and housing is the problem (this is clearly not the case), but to highlight the importance of applying diligence and caution in locating development. The City of Cape Town's coastal zone is dynamic and subject to climate change influences. Development that impedes the coastal equilibrium, and the shift in this equilibrium, invites economic and social risk. The OECD (2009) encourages "Climate conscious development"; the basis of this approach is based on an understanding that in an urban context the built environment defines the relationship between people and the natural environment. In the context of integrated coastal zone management and sea-level rise, the built environment should reduce and not amplify sea-level rise risks or transfer them to another location.

An interesting distinction arises when the type of coastal development is examined. The houses at Bakoven are vulnerable to wave run-up, wave set-up, due the hard nature of the coast and because houses have been built perilously close to the sea. The housing investment is, however, largely private and accordingly the City of Cape Town may not feel under any obligation to protect these houses but should ensure that any private measures undertaken to protect the houses is compliant with legislation. In contrast the infrastructure between Milnerton and the harbour is of public significance and includes an oil pipeline and a major feeder road for the City. In addition some of the coastal erosion in this region has been caused by the construction of the Cape Town port. Clearly both the infrastructure itself, the implication of the infrastructure being damaged and the potential liability is a public issue at this location and, unlike at Bakoven, should be prioritised for public attention.

Table 2: Combined risk caused by wave run-up, wave set-up, nature of coastline and extent of development at exposed locations around the City of Cape Town's coastline.

	Aggregate risk
Melkbosstrand	2
Blouberg (Bay)	2
Tableview beachfront	2
Milnerton beach	3
Milnerton to harbour	3
Green Point & Sea Point	3

Glen Beach	2
Camps Bay	3
Bakoven cottages	4
Kommetjie	3
Witsands	2
Glencairn	2
Fish Hoek dune section	1
Kalk Bay	3
Muizenberg corner	2
Strandfonetin – Baden Powell Drive / Treatment Works / Landfill.	3
Monwabisi and Macassar Pavilions.	3
Strand (entire beach front).	3
Bikini beach	2

Table 2 aggregates the different components of sea-level rise risks at different locations. The aggregation conceals important information, including information on that can be used to lower risk, but the aggregation does provide a sense of which locations are most exposed and most likely to require attention in the short term.

4. Adapting to sea-level rise

In the face of rising sea-levels, increasing frequency and intensity and of storm surges and pressure for coastal development, the challenge for the City of Cape Town is how to respond. Timely responses can reduce the cost of sea-level rise impacts, but responses themselves impose costs (Stern et al., 2006; Tol, 2006).

Responses to sea-level rise fall under the broad rubric of climate change adaptation. When climate adaptation concerns coastal zones the general consensus is that is that the best responses are location specific and take place under the remit of "integrated coastal zone

management" (ICZM).[4] The conceptual merits of ICZM are seldom disputed, but for local decision makers the challenge remains how to apply this theory in the face of intractable trade-offs and difficult to quantify risks. Specific to this challenge are the uncertainties surrounding, the extent of expected sea-level rise events, the timing of sea-level rise events, and establishing acceptable levels of public risk ("how safe is safe enough?"). Inherent uncertainties regarding future concentrations of greenhouse gases (IPCC, 2007) let alone how these concentrations will translate into changes in atmospheric temperature and ocean dynamics, make these questions impossible to answer precisely. What is clear is that the level of certainty that has, in the past, been assumed with regards to sea-levels along the Cape Town coast, no longer applies. This necessarily has implications for development planning, insurance, investment and emergency relief.

3.1 Adaptation as a set of decisions

In a stylised sense the options available to the City of Cape Town can be illustrated as in Figure 3.

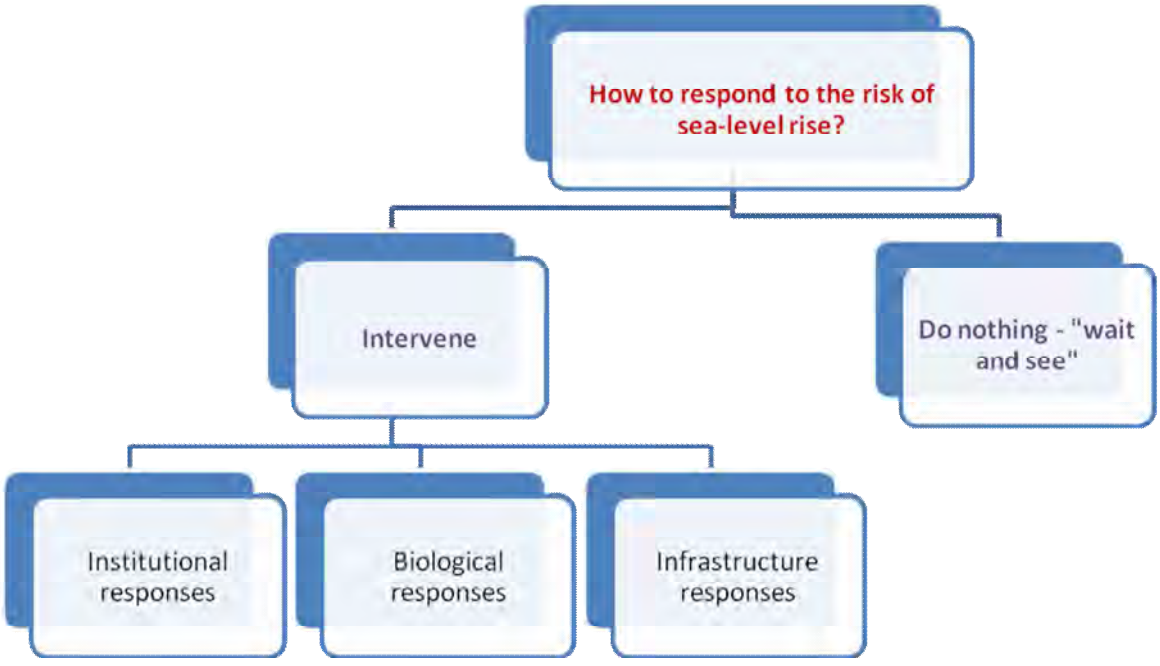


Figure 3: Options available in responding to sea-level rise risks.

The defining decision confronting the City of Cape Town is whether or not to do anything about sea-level rise at all. Adopting a "wait and see" approach is not as insouciant as it may

[4] ICZM aims to "Consider over the long term to balance environmental, economic, social, cultural and recreational objectives, all within the limits set by natural dynamics" (Commission of European Communities, 2000)

sound. Past interventions have not been particularly effective, a delay permits additional information to emerge on the nature of the threat - information that can be applied in crafting a more appropriate response. The City of Cape Town needs to avoid setting a precedent that will see it called upon to safeguard its coastline in an untenable number of cases. By intervening to ensure people's safety in the face of a sovereign threat, it is possible to promote moral hazard in the form of civil apathy or worse, a continuation of hazardous coastal development. The final, and often most relevant appeal of the "wait and see" approach lies in its avoidance of the costs that are often incurred in adaptation efforts. This cost avoidance, however, can represent a false economy. Stern et al. (2006) and SwissRe (2009b) emphasise that money spent avoiding climate change impacts in the immediate term, save much larger amounts of money required to deal with the consequences of these impacts. The merits of early action are both moral and financial, but where this ignored in favour of a "wait and see" approach there should at least be an increased investment in disaster relief capacity.

Assuming that something must be, the next decision involves selecting "what". Phase 4 of this study identified a range of options. The most attractive of these were considered "no regrets" in their nature; the sort of options that the City of Cape Town should be doing even if sea-level rise were not a threat, but which will reduce the risk of sea-level rise if implemented. These include not reclaiming additional land, protecting wetlands, estuaries and dune cordons from further degradation, maintaining drains and stormwater systems so as that they operate to their specifications and alleviating poverty so as to reduce exposure to a wide range of risks, including the risks imposed by sea-level rise.

The more difficult decisions lie in selecting options specifically aimed at countering the sea-level rise risk. Phase 4 classified options into:

- Infrastructure interventions – sea-walls, groynes, barrages and barriers, raising infrastructure, revetments, rock armour, dolosse and gabions, off shore reefs, beach nourishment, water pumps, beach drainage.
- Biological interventions – dune cordons with vegetation, estuary and wetland rehabilitation, kelp beds.
- Socio-institutional interventions – vulnerability mapping, risk communication, apply legislation (Coastal Development Guidelines, Integrated Coastal Management Bill, White Paper on Sustainable Coastal Management), apply a coastal buffer zone, prevent sand mining, research and monitoring, early warning system, heightened disaster management system and insurance market correction.

Different approaches to deciding on options are illustrated (below) by their application to the sea-level rise adaptation options identified in Phase 4 in the context of a known City of Cape Town "hot spot", the Milnerton Golf Club. The club is constructed on a sandspit between the Milnerton Lagoon and the sea. The affronting beach is protected from large wave erosion by Robben Island, but the construction of the Cape Town harbour and foreshore land reclamation

have altered the near-shore currents so as to accelerate beach erosion at Milnerton. It is the coastal erosion caused by redirected long-shore currents and higher mean sea-levels to which the golf club is most exposed, although the lagoon on the landward side of the golf club exposes the building to the possibility of erosion from both sides. The local golf club is in currently in danger of being undercut and collapsing. The club's private efforts to protect its building have included sand bags and some beach replenishment, but these have not proven effective to date.

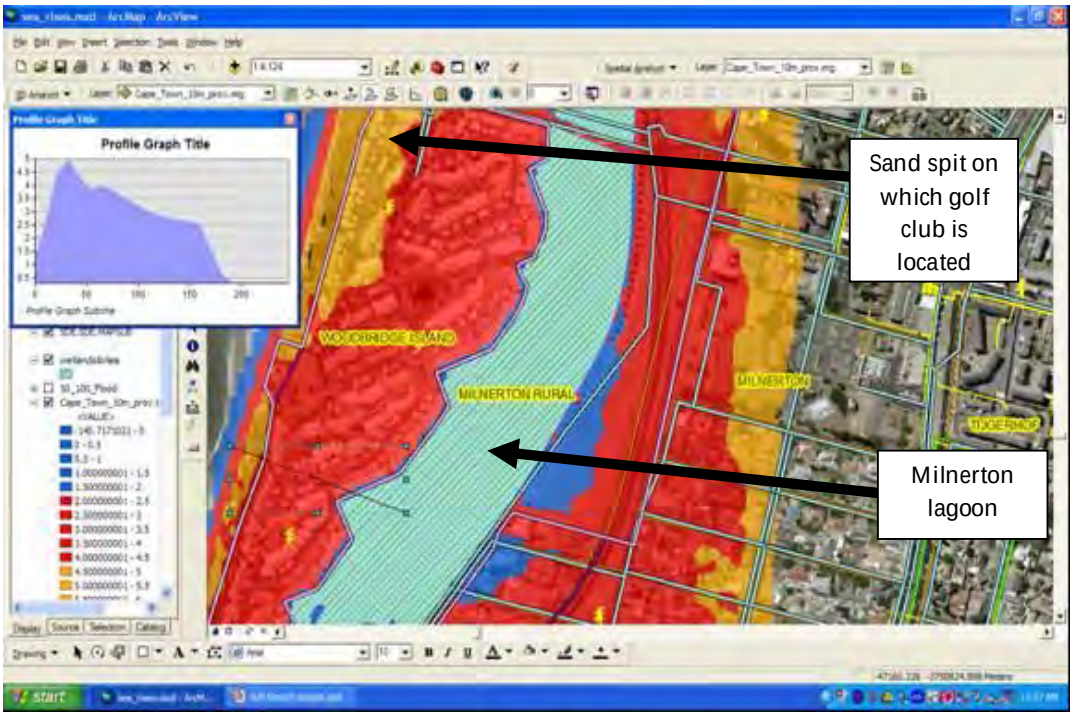


Figure 4: The Milnerton lagoon area close to where the Milnerton Golf Course is located showing the impact of a 2.5 metre (blue), 4.5 metre (red) and 6.5 metre (orange) sea-level rise increase, and the general exposure of the region to coastal erosion. (Source: Phase 2 of this Study).

3.2 Cost benefit analysis (CBA)

The conventional way of selecting adaptation options has involved cost benefit analysis (CBA) (Stern et al., 2006; Von Ierland et al., 2007; Hallegatte, 2008; SwissRe, 2009b); the options that save the greatest cost for the least expense are considered most desirable. Adopting this approach can be useful in securing financial and political support and CBA can be used - as demonstrated by SwissRe (2009b) - to distinguish between measures that:

- Are cost negative and therefore create savings, many of which are "no regret" options.

- Present economic benefits that outweigh the cost of implementation, and should be considered a prudent investment.
- Cost more than they save but which may be deemed necessary to protect human life, heritage or biodiversity.

A more interesting application for CBA involves its application in establishing long-term differences between biological, infrastructural and socio-economic options. Data and appropriate valuations remains a problem but when applied across a wide number adaptation options under different circumstances at different locations it becomes clear that generally (this is not always the case), socio-institutional options offer better returns than biological options, which offer better returns than infrastructural options (Figure 5 and 6).

There are, however, limitations to CBA. Typically the data required for such analyses are not available. It can be difficult to accurately assess both cost and benefits when the exact nature and timing of the threat is unknown, this type of analysis tends to treat options as discrete while in practice it is combinations of options that are likely to be most effective and there is subjectivity involved in valuing environmental goods and services and heritage products that are not traded in markets but recognised as being valuable in preventing sea-level rise impacts. Perhaps most critically CBA tends to suggest levels of precision and certainty in decision making that are not warranted, and even disingenuous, in the context of climate change impacts.

CBA can be useful as a decision support tool, but to apply it exclusively so as to attain some form of "financially optimal" solution to sea-level rise verges on hubris.

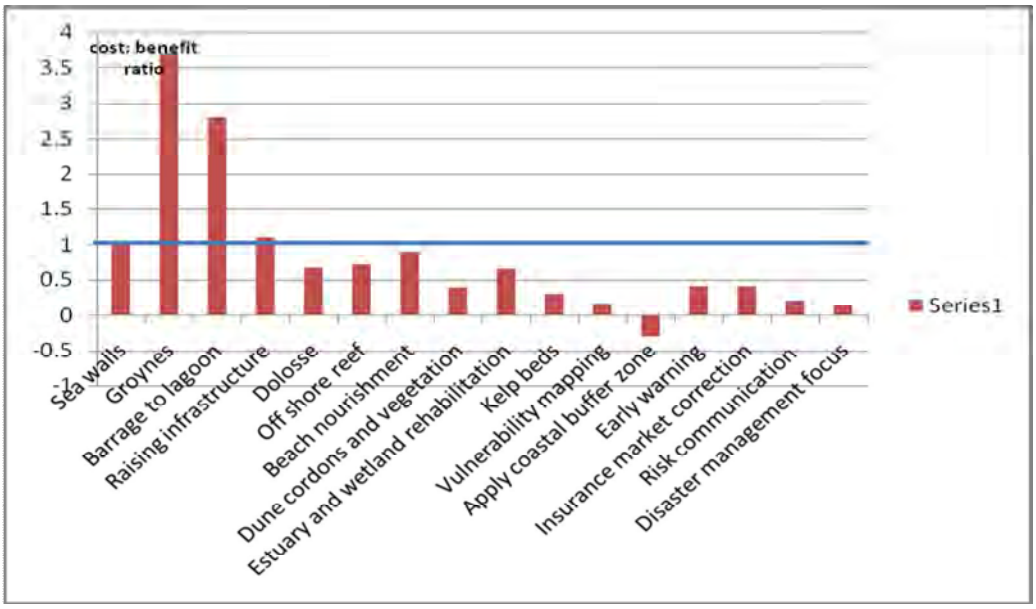


Figure 5: Hypothetical cost: benefit ratio for the adaptation options available to the Milnerton Golf Club (based on SwissRe (2009b)) estimates for sea-level rise damage in Florida. In practice it is difficult data to make these calculations and such efforts struggle to apply appropriate timeframes and values to costs and impacts. The analysis can be useful in showing that some options (those below the horizontal "zero" line) save money, some options (those below the blue line at 1) save more money than they cost, and some options (those above the blue horizontal line at 1) simply cost money.

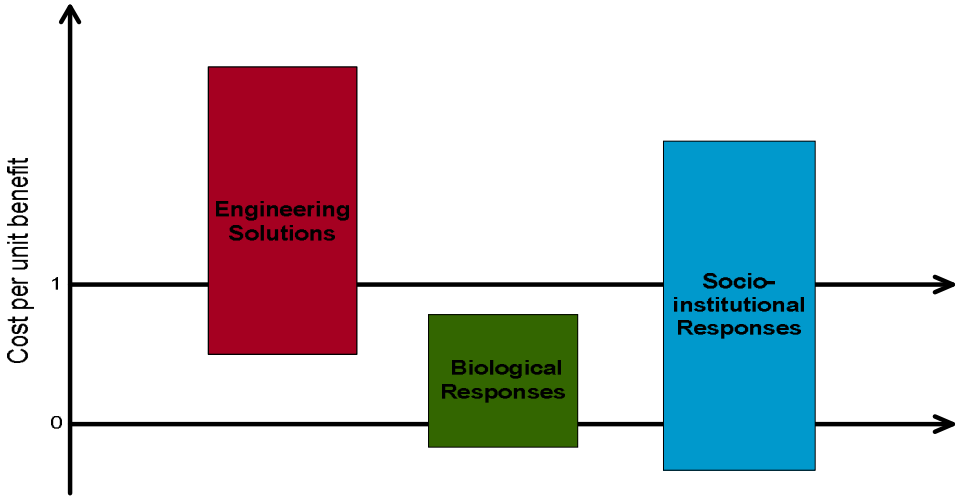


Figure 6: A stylised representation of the range of cost per unit benefit of general infrastructure (engineering), biological and socio-institutional adaptation options. (Source: Cartwright and Constable, 2009).

3.3 Multi-criteria assessment (MCA)

A more robust means of taking sea-level rise adaptation decisions involves subjecting options to a multi-criteria assessment (MCA). Under this approach options are interrogated in terms of an agreed upon set of assessment criteria, with the intention being to create multi-disciplinary consensus on the most appropriate course of action. Crucially MCA is well suited to create the type of institutional capacity that is required for effective climate change adaptation. Climate change adaptation theory emphasises the importance of "socio-institutional learning" (Downing et al. 2007), monitoring, reflexive institutions, ongoing decision making and iterative progress, all of which is more likely under MCA than CBA.

MCAs have been criticised for their subjectivity. The questions, "Who gets to select the criteria?" and "Who gets to perform the assessment?" are legitimate, but crucially MCAs of sea-level rise risks are capable of bringing together South Africa's particularly divergent development needs and integrating the needs of private land owners, local governments, provincial governments, various departments within national government and conservation authorities all of which have responsibilities towards Cape Town's coastline.

For the City of Cape Town the type of criteria that are relevant include:

- Risk reduction: The extent to which the options reduces risk of sea-level rise.
- Ease of implementation: Not all desirable responses are possible, either due to the institutional complexity involved in implementing them or their cost. In the case of the City of Cape Town, it is particularly important to identify who is responsible for the intervention and who will pay for the intervention. Options should be selected commensurate with capacity to deliver them effectively.
- Positive externalities: The extent of positive externalities associated with the option. Does the implementation yield, or make more likely, benefits that are not related to sea-level rise.
- Scope for mal-adaptation: Some options, and particularly infrastructural options, are more difficult to do well. Options should be selected cognisant of the need to avoid unintended negative consequences. This should include mal-adaptation arising uncoordinated private efforts.
- Cost: Budget constraints inform decisions and the extent of reduced impact per unit investment over the long term remains crucial.
- Greenhouse gas emissions: Options that involve large volumes of additional greenhouse gas emissions (beach pumping, cement structures) should be considered less suitable that those that do not.

- Reversibility and flexibility: Given that the precise extent and nature of sea-level rise impacts is not known, those options that can be reversed or altered as more information becomes available should be considered preferable.

- Retention of complementary options: Combinations of options tend to be more effective than single approaches but not all options permit complementary solutions. Those options that permit complementarily are favourable.

- Equality implications: Poor people tend to be more risk averse than affluent people. Cape Town remains a highly unequal society. The default when climate change interventions are not planned is for risk to be transferred to poor people who are least able to afford it or insure themselves against it. This will exacerbate Cape Town's inequality and underdevelopment. Effective adaptation options should be socio-economically progressive and where necessary transfer risk away from poor people.

MCAs are necessarily participatory activities, but by way of example a hypothetical application on the Milnerton Golf Course decision is conducted below.

Table 3: Multi-criteria assessment of sea-level rise options to support the Milnerton Golf Club.

	Risk reduction	Positive externalities	Institutional complexity	Scope for maladaptation	Cost	Contribution to GHG mitigation	Reversibility and flexibility	Retention of complementary options	Equality implications	SUM
Sea walls	2	1	1	1	1	1	1	1	1	10
Groynes	1	2	1	1	2	2	1	2	2	14
Barrage to lagoon	2	1	1	1	1	1	1	1	1	10
Raising infrastructure	1	1	2	1	2	1	1	1	1	11
Dolosse	3	1	2	2	2	1	1	1	2	15
Off shore reef	3	2	1	1	2	2	1	2	2	16
Beach nourishment	2	2	2	2	2	3	2	3	2	20
Dune cordons and vegetation	2	3	2	3	2	3	3	3	3	24
Estuary and wetland rehabilitation	1	3	2	3	2	2	3	3	3	22
Kelp beds	2	2	2	1	2	3	2	3	2	19
Vulnerability mapping	1	3	2	2	2	3	3	3	3	22
Apply coastal	3	3	1	3	1	2	3	1	3	20

buffer zone										
Early warning	2	3	3	2	3	2	3	3	3	24
Insurance market correction	2	2	2	2		2	3	3	2	18
Risk communication	1	3	3	2	3	2	2	3	3	22
Disaster management focus	2	1	3	3	2	2	2	3	3	21
Managed retreat	3	3	1	3	1	2	1	3	3	20

1= poor, 2= neutral / moderate, 3= excellent

MCAs are capable of producing more balanced and considered decisions than CBA, but like CBA they represent a decision support tool and should not be applied expediently. Certainly multi-criteria assessments do not provide a surrogate for good decision making. By applying quantitative scores to the options it is possible to get a sense of the relative merits of different options. The quantification should not, however, be exploited for inference purposes. In drawing inference, however, the distinction between a cumulative score of 18 and 19 should not be seen as the basis for decision making. MCAs are useful in identifying generally better options, and screening the options confronting decision makers. It is possible to refine the screen, scrutinise options under new criteria and even re-weight specific criteria that are deemed more important than others.

In the Milnerton example it becomes clear that infrastructural responses present problems on certain accounts: they tend to promote lock-in and hinder reversibility and flexibility, they present scope for mal-adaptation, they do not promote the use of complementary options, they protect only those that can afford to pay for the considerable cost and where infrastructure involves cement, it releases greenhouse gases. This finding concurs with the literature (Van Ierland et al., 2007; Hallegatte, 2008; SwissRe 2009b). There are specific instances – immovable assets such as harbours, or strategic infrastructure such as electricity substations - in which the use of infrastructure is essential and does represent the best option, but this tends to represent the last resort once other options have been exhausted. The MCA suggests that where infrastructure or engineering solutions are deemed necessary at Milnerton, beach nourishment, off shore reefs and possibly dolosse appear to be the most favourable options. Dune cordons with vegetation (if these can be adequately re-established and stabilised at this site) and an early warning system that triggers the placing of sandbags or simple evacuation and removal of valuable property are identifies as being suitable against a wide range of criteria. Where these options are shown to provide inadequate cover they can be easily complemented or enhanced. The same is not typically true of infrastructure approaches.

5. Conclusion

The City of Cape Town is at the forefront of developing country responses to climate change. Collectively, these responses involve an experiment as countries and cities grapple to establish workable solutions and guiding principles. In spite of the innovative nature of Cape Town's work, it is not the only country or institution to research or respond to sea-level rise risks: NASA's Goddard Institute[5], The United Nation's Environment Programme (UNEP), Climate Action Network International (CANI), Stockholm Environment Institute (SEI), the WeAdapt Partnership and eThekwini Municipality are among the other leaders in this field and there is some merit in exploring solution collectively.

This Phase 5 of the City of Cape Town's Sea-level Rise Risk Assessment study advanced the work undertaken in Phases 1-4 by exploring the detailed nature sea-level rise risks along the City's 307 kilometre coastline (including conservation areas).

The study highlights the location specific nature of sea-level rise events and distinguishes areas in terms of their exposure to mean sea-level, wave set-up and wave run-up, respectively whilst also including the "hardness" and "softness" of the coastline and the extent and nature of coastal development . Given that the phrase "sea-level rise" is used to describe an increasing variety of events, this distinction is central to gaining a better understanding of the nature of sea-level rise threats and allows monitoring and early warning systems to be tailored for specific locations.

The study supports the notion that the level of certainty that has been applied in the past with regards to sea-levels, no longer applies. Whilst sea-levels at Cape Town appear to be rising in line with the global mean, and the IPCC expects this mean to have increased by 0.18 – 0.59 metres by the end of the 21st Century, inherent uncertainty still defines projections and the evidence in support of far greater and more rapid increases appears to be mounting. Even small increases will cause disproportionately large impacts, especially where they are compounded by more intense (and possibly more frequent) storm events, as is expected.

A great deal of sea-level rise risk can be removed by timely interventions, but deciding exactly how to respond and who should take responsibility and pay for responses is complex. The nature of sea-level rise risks is subjective. The same risks affect different people in different ways and there is no single "socially acceptable" level of risk or loss, particularly where loss of life and private property is involved. The complex nature of sea-level rise risks make it inappropriate to leave the defining pronouncements and selection of adaptation measures on this matter, to either economists using CBA or actuaries applying risk calculation instruments. The need is for what SwissRe (2009b) term a "risk consensus"; a general agreement on the

[5] National Aeronautical Space Administration.

nature of sea-level rise risks and how this risk should be most appropriately shared in the context of other development goals.

This study applied a illustrative CBA and MCA to the adaptation options available to protect a known City of Cape Town sea-level rise hotspot, the Milnerton Golf Course. It is proposed that a multi-criteria assessment, provided the selection of criteria and assessment can be performed in a participatory manner, represents a more appropriate means of ensuring consistent and effective sea-level rise adaptation decisions in the long term.

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Appendix A: Terms of Reference for Phase 5 study

The primary objective of this study is to improve understanding of the extent and manner in which City of Cape Town's coastline is likely to be impacted by sea level rise.

It is propose to achieve this by adding the influence of local factors such as offshore bathymetry, storm direction and coastal geography to the sea level rise model developed in Phases 1-4, and by including an understanding of how the various influences on sa-level rise interact with each other at a specific locations and over time.

Realising this primary objective rests on the incorporation of data pertaining to:

- Knowledge of the offshore wave climatology.
- The detail of the coastal bathymetry and its influence on wave run up.

Both these data are limited by the resolution of available observations. This appears to be recognised in the Terms of Reference by the restriction of the wave directions to the coarse compass directions NW, W, SW, S and SE. The course resolution will place constraints on the type of model and the accuracy of the results that can be expected from such models. Nevertheless, it should be possible in this Phase 5 to achieve the outcomes asked for in the Terms of Reference, namely:

- Develop a finer scaled and more accurate approach to the existing GIS model by identifying areas at risk due to a uniquely varying shoreline, bathymetry and coastal geography;
- Apply five storm direction scenario's to the City's coastline (NW, W, SW, S and SE);
- Identify key risk areas for each storm direction scenario based on swell direction, bathymetry, shoreline, swell shadows and coastal geography, and
- Improve the level of accuracy in the predictions for sea level rise events

Once these key risk areas have been identified, further observation programmes at a greater resolution can be contemplated, with a view to obtaining more predictive capability from the use of sophisticated inshore wave models.

The approach proposed for this study is to add to the factors in the existing GIS to enable impact variability along the coast to be assessed and predictability improved. The following aspects will be investigated:

- Swell dynamics i.e. characteristics of swell direction;

- Correlations that may exist between the various swell characteristics i.e. average wave height and wave length may be associated to a particular swell direction, time of year, wind direction, weather pattern etc;
- Coastal areas that will receive specific swell head-on, and those that will be sheltered from swell based on the five different storm direction scenarios;
- Critical coastal bathymetry. Shallow offshore banks will play a significant role in reducing swell energy reaching the coast whereas deeper near-shore bathymetry will result in increased wave energy reaching the coast;
- The effect of coastal geology and topography on hinterland vulnerability (sandy shore vs rocky shore)
- The direction and dynamics of longshore drift;
- The presence, state and influence of other natural barriers i.e. kelp forests in terms of reducing the impacts of storm swell and in which areas;
- The physical composition of the beach: A combination of rocks and sand tends to be more susceptible to erosion, and
- Vulnerable areas as a result of human development and activity.

Global Climate Change and Adaptation:

City of Cape Town

Sea-level Rise Risk Assessment

Phase 5: Addendum

Wave run-up estimations from the application of Mather's extreme wave run-up model to 19 sites on the coast of the City of Cape Town, identified as vulnerable to sea level rise and storm surge, and a comparison with the actual wave run-up levels experienced in the 2008 storm.

Erich Koch

City of Cape Town

December 2010

The contributions of Andrew Mather and Geoff Brundrit to this Addendum are acknowledged with thanks.

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1. INTRODUCTION

The City of Cape Town (CoCT) is currently busy developing proactive management strategies to account for the increased environmental risks associated with increases in current mean sea levels due to climate change. Research has been undertaken to complete a full assessment on the risks of Sea Level Rise (SLR) around CoCT. Various vulnerable sites around CoCT's coastline have been identified (Figure 1), mitigation costs and possible management strategies have been proposed and a detailed GIS model has already been developed (Brundrit 2009).

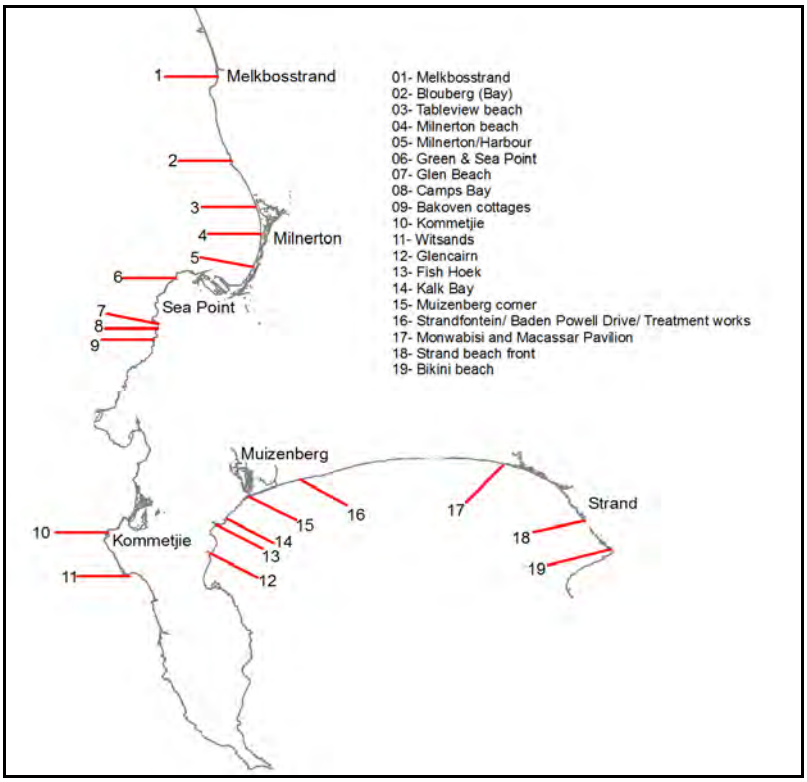


Figure1. The position of each of the 19 vulnerable sites identified in the fifth phase of the Global Climate Change and Adaptation – A sea level rise risk Assessment (ANON – City of Cape Town)

The SLR risk assessment study has identified three main factors which impact the coastline from the ocean: 1) mean sea level rise; 2) wave set-up and 3) wave run-up. Mean sea level is expected to influence every coastal site independently of exposure. Wave set-up is mainly a factor affecting beaches and wave-run is an additional factor which is only expected to bring increased flooding into very exposed sites as described in the Phase 5 of the SLR assessment (ANON – City of Cape Town).

This SLR assessment has completed required research to better understand expected effects of mean SLR and wave set up at each of the identified vulnerable sites around the CoCT. This study is aimed at getting a better understanding on wave run-up values expected at these sites.

Extreme wave run-up levels are important in many coastal planning processes but especially for providing a basis in which to identify the positions of appropriate coastal development set back lines. According to Mather *et al.* (*in press*), extreme wave run-up is defined as the maximum level, relative to the still water level reached by a wave (or group of waves) as they break and run up a beach profile. Accurately predicting expected wave run-ups on permeable beaches is essential if coastal development is to be planned sensibly and with due consideration of the risks associated with wave damage. The latest model described in Mather et al. (*in press*) has been shown in various independent tests to be the most robust wave run-up model available to coastal engineers for natural sandy beaches (Roberts et al. 2010).

Statistical measurements are used to characterize extreme wave events, using significant wave height return periods to calculate the probability and height of such extreme run-up events. Most of the numerous extreme wave run-up models developed over the years require input parameters which are often difficult and expensive to obtain (Roberts et al. 2010 and Mather et al. *in press*). For a more detailed description regarding various models, the components of wave run up and its respective interactions and the model used in this paper please refer Stockdon et al. (2006), Roberts et al. (2010) and Mather et al. (*in press*).

The purpose of this Addendum is too establish run-up estimates for each of the 19 vulnerable locations, which could possibly result in hazardous conditions for infrastructure and people or risks to economic stability in the vulnerable locations identified. This is aimed to provide additional information to risk rating for the 19 vulnerable locations identified by the previous SLR studies (ANON - City of Cape Town). City of Cape Town has tentatively identified a 6.5 m wave run-up level

above MSL for all the vulnerable location; this study will provide insight to identify which locations are at highest risk to wave run-up events, and to which extent wave run up events may impact the vulnerable locations.

2. METHOD

2.1 Mather et al. model

The model described by Mather et al. (*in press*) has been developed and been verified using the South African coastline, and has been developed to be affordable and easily applied to natural sandy beaches. The model departs from more traditional approaches that use the slope of the beach face, or the surf similarity parameter (also known as the *Iribarren* number) to predict run up, and instead uses the distances offshore to the -15m isobath as a proxy for the near-shore profile (figure 2). The model proposes a relatively simple formula to predict wave run-up:

$$R_x = C \times S^{2/3} \times H_0 \qquad (1)$$

where R_x is the predicted wave run-up above Still Water Level (SWL), C is the selected Coastline coefficient (table 1) and S represents the Shoaling effect of the slope to the profile [S = water depth (h) / distance offshore (x)]. (using a water depth h = 15m below mean sea level). H_0 is the deep water significant wave height. The sensitivity of selecting values for each parameter for the resulting wave run-up is shown in table 6 (Appendix 1).

It should be noted that the actual (land survey) level, reached by the sea, will also depend upon the state of the tide. A correction for the height of the Still Water Level above Mean Sea Level (Land Levelling Datum) needs to be applied. The calculation of this correction can be made with the use of the Tide Tables produced by the South African Naval Hydrographic Office.

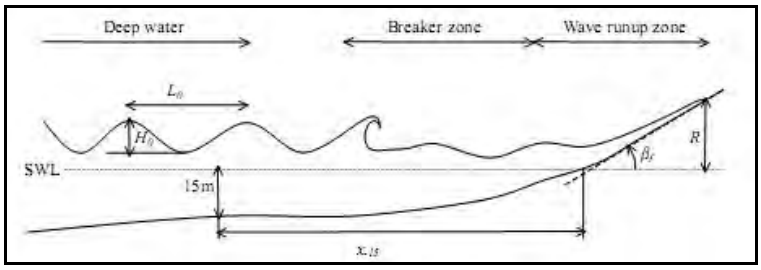


Figure 2. Showing parameters used in the model. R is the run-up value, x_{15} is the chart distance from the shoreline to the 15m isobath, H_0 is deep water significant wave height (taken from Mather et al. *in press*).

Table 1. Coastline Coefficients C for various types of coastline (taken from Mather et al. *in press)*.

Type of Coastline	Coefficient C		
	Upper bound of wave run up	Median of wave run up	Lower bound of wave run up
Open	C=10	C=7.5	C=3
Large embayment (~40 kms between headlands)	C=10	C=5	C=3
Small embayment (~3 kms between headlands)	C=10	C=4	C=3

2.2 Bathymetry

The distance between the 15m isobath and the mean sea level (MSL) on shore at each vulnerable site was calculated using bathymetrical contours obtained from the South African Naval Hydrographic Office. Using the City of Cape Town Geographic Information System database, the minimum distance from several transects at each identified vulnerable site (Table 2) was used to calculate the Shoaling Slope S at each vulnerable site.

Table 2. Nearest distance (m) from each vulnerable location to the 15m isobath as estimated from the CoCT GIS database.

Location	Nearest distance to 15m isobath (m)
Melkbosstrand	1850
Blouberg	1100
Tableview	1300
Milnerton	1100
Milnerton- Harbour	3700
Green & Sea Point	380
Glen Beach	940
Camps Bay	750
Bakoven	440
Kommetjie	1350
Witsand	700
Glencairn	480
Fish Hoek	990
Kalk Bay	660
Muizenberg	1820
Strandfontien	2270
Maccassar	1750
Strand	2470
Bikini Beach	2530

2.3 Coefficient selection

The coefficients used in the model were selected in accordance to the median values suggested by Mather et al. (*in press*) for each site listed as a vulnerable location. When the model is used for planning purposes rather than validation with observations, it may be better to use the maximum value rather than the median value of C.

Table 3: Co-efficient used in run-up calculations for each of the vulnerable sites, taken from Mather et al. *(in press)*

Area	Co-efficient
Melkbosstrand	7.5
Blouberg	7.5
Tableview	7.5
Milnerton	7.5
Milnerton- Harbour	7.5
Green & Sea Point	7.5
Glen Beach	7.5
Camps Bay	7.5
Bakoven	7.5
Kommetjie	7.5
Witsand	7.5
Glencairn	5
Fish Hoek	5
Kalk Bay	5
Muizenberg	5
Strandfontien	5
Maccassar	5
Strand	5
Bikini Beach	5

2.4 Significant wave heights

The extreme significant wave heights used in this study were collected from a number of various sources and are shown in Table 4. Significant wave height data around the CoCT coastline was difficult to obtain, mainly because of a lack of research undertaken on the topic.

Significant wave height data along much of the Atlantic coast were calculated from South Africa's longest-existing wave-height buoy record off Slangkop (figure 2), which has been collecting wave height data since 1976 (Rossouw et al. *in press*). The wave height data collected at the Slangkop data buoy is directly used as the deep water wave height for all the sites between Sea Point and Witsand.



Figure 2. Position of Slangkop Buoy, the longest wave record South Africa has along the coast, was used to calculate the significant wave heights for the various return periods used in this study (data supplied from CSIR, M. Rossouw).

The vector data collected off the Slangkop buoy is used as an input parameter to a wave height and refraction prediction model (figure 3), the online Virtual Buoy system. It was developed and is maintained by the CSIR for the Cape Town harbour (Rossouw et al. *in press*). The return periods and significant wave height data calculated at a Virtual Buoy point (Anchor 4) (figure 4) in Table Bay was used for the sites from the harbour to Blouberg. The data from the Slangkop wave buoy and the Table Bay Virtual Buoy was made available by M. Rossouw from CSIR Stellenbosch (all data is based on 3hourly readings, and was made available as first estimate data).

The return periods and heights calculated at more exposed site at Melkbos were obtained from short term (< 4 year) wave studies conducted in the 1980s around the Koeberg area (Rossouw 1989).

Since there was no significant wave height data or estimates available within the False Bay area, deepwater values obtained from Slangkop wave buoy were used for the analysis within False Bay.

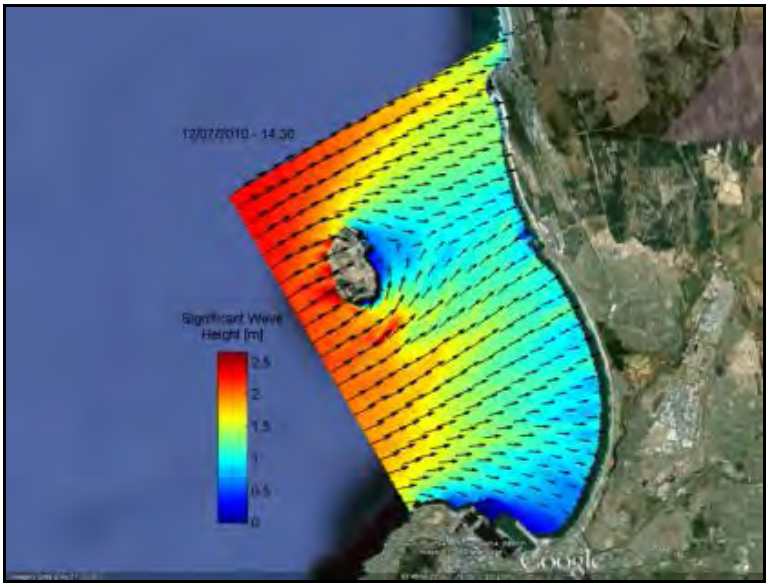


Figure 3. Resulting wave height and refraction predictions in Table Bay using real time data from the deep water Slangkop buoy off Cape Point. Taken from the wave net website with permission from CSIR (http://wavenet.csir.co.za/OnlineData/TableBay/TableBaywaveD.htm on the 12/07/2010). At the time of this image, the significant wave height at Slangkop ranged between 3-4m.

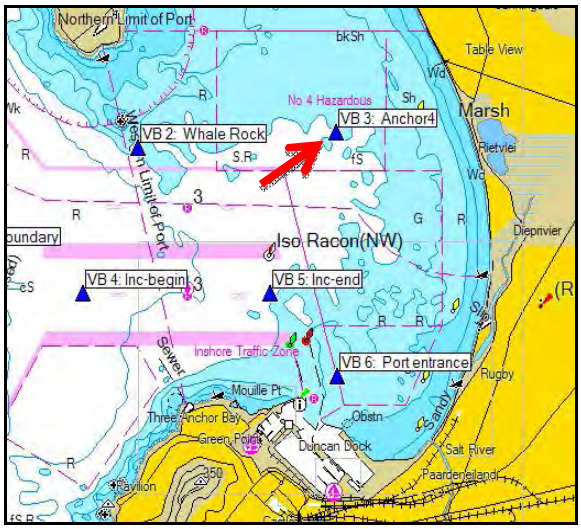


Figure 4. Position of the Virtual Buoy 3, Anchor 4 was used to calculate the return periods for the significant wave heights used in the study for the locations in the Table Bay area (image from M. Rossouw, CSIR Stellenbosch).

Table 4: Significant wave-heights used in wave run-up calculations for each of the vulnerable sites.

Area	**H_1**	**H_{10}**	**H_{50}**	**H_{100}**	**Data Source**
Melkbosstrand	7.5	8.4	9	10.3	Rossouw (1989)
Blouberg	4.1	5.1	5.7	6	VB CSIR (2010)
Tableview	4.1	5.1	5.7	6	VB CSIR (2010)
Milnerton	4.1	5.1	5.7	6	VB CSIR (2010)
Milnerton- Harbour	4.1	5.1	5.7	6	VB CSIR (2010)
Green & Sea Point	8.3	10.2	11.6	12.2	CSIR (2010)
Glen Beach	8.3	10.2	11.6	12.2	CSIR (2010)
Camps Bay	8.3	10.2	11.6	12.2	CSIR (2010)
Bakoven	8.3	10.2	11.6	12.2	CSIR (2010)
Kommetjie	8.3	10.2	11.6	12.2	CSIR (2010)
Witsand	8.3	10.2	11.6	12.2	CSIR (2010)
Glencairn	8.3	10.2	11.6	12.2	CSIR (2010)
Fish Hoek	8.3	10.2	11.6	12.2	CSIR (2010)
Kalk Bay	8.3	10.2	11.6	12.2	CSIR (2010)
Muizenberg	8.3	10.2	11.6	12.2	CSIR (2010)
Strandfontien	8.3	10.2	11.6	12.2	CSIR (2010)
Maccassar	8.3	10.2	11.6	12.2	CSIR (2010)
Strand	8.3	10.2	11.6	12.2	CSIR (2010)
Bikini Beach	8.3	10.2	11.6	12.2	CSIR (2010)

2.5 Actual extreme event comparison

An extreme storm event occurred around the coast of the CoCT during the period following 31st August 2008, which then affected most of the southern coastal area of the Western Cape Province. A frontal weather system developed approximately 600km south west of Cape Town as a secondary severe low pressure zone also developed, a case of explosive cyclogenesis. The combined effect of both extreme low pressure systems brought significant damage to harbours and coastal infrastructure (Mather et al. *in press*). The swell direction of this low pressure event resulted in southerly swell running parallel to the Atlantic sea board, and greater damage could have been expected if the swell direction had come from the West.

Mather et al. *(in press*) describe how storm surveyors recorded wave run-up heights above Still Water Level at beaches around CoCT. The values in Table 2 of Mather et al (*in press)* are compared to the results obtained by using the Mather model to calculate extreme run-ups

Table 5. Highest expected wave run-ups above Still Water Level for each of the vulnerable sites identified in the previous SLR studies around Cape Town (ANON – City of Cape Town), using the Mather *et al. (in press)* model.

	Highest expected run-up (m) in :			
Location	**1 year**	**10 years**	**50 years**	**100 years**
Melkbosstrand	2.1	2.6	2.8	3.2
Blouberg	1.8	2.2	2.5	2.6
Tableview	1.6	2.0	2.2	2.4
Milnerton	1.8	2.2	2.5	2.6
Milnerton- Harbour	0.8	1.0	1.1	1.2
Green & Sea Point	7.4	9.1	10.3	10.8
Glen Beach	4.1	5.0	5.7	6.0
Camps Bay	4.7	5.8	6.6	6.9
Bakoven	6.7	8.2	9.4	9.8
Kommetjie	3.2	3.9	4.5	4.7
Witsand	4.9	6.1	6.9	7.2
Glencairn	4.2	5.2	5.9	6.2
Fish Hoek	2.6	3.2	3.7	3.8
Kalk Bay	3.4	4.2	4.8	5.0
Muizenberg	1.7	2.1	2.4	2.6
Strandfontien	1.5	1.9	2.1	2.2
Maccassar	1.8	2.2	2.5	2.6
Strand	1.4	1.8	2.0	2.1
Bikini Beach	1.4	1.7	2.0	2.1

3. RESULTS

3.1 Table Bay

3.1.1 Melkbosstrand

Melkbosstrand is known for a beach which has relatively tame waves, but the open coastline can at times be exposed to big swell, and much larger significant wave heights are expected in Melkbos than in the area between Blouberg and the harbour (figure 3). Melkbos is just outside of the wave shadow zone created behind Robben Island and Sea Point. There is some shelter due to offshore reefs, and even though a significant wave height of ~10m is expected with a 100 year return period, the very shallow slope off Melkbos reduces the wave run up calculated by Mather's model to a maximum of ~3.2 m.

This expected run up value predicted by the model is very similar to the 2008 storm, where values along Melkbos ranged between 2.1 and 3.5m.



Figure 5. The location of transects along Melkbosstrand used in calculating the distances between MSL and the -15m isobath to be used in the Mather run up mode. The average distance is approximately 2.2km (table 2). The superimposed light yellow marking represent new MSL following a 2m increase in sea level.

3.1.2 Blouberg

Blouberg is well sheltered behind Robben Island, and the -15m isobath is located offshore of Robben Island, with it being further than 1100m from the shore (figure 6). Due to the shallow slope of the ocean floor in the Table Bay area and the smaller significant wave height of ~6m with a 100 year return period, results in a wave run-up estimate of <2.6m for all sites between Blouberg and Milnerton, and is expected to be <1.7m directly behind the Robben Island wave shadow zone.

The area around Blouberg experienced a wave run-up of between 2 and 2.8m in the 2008 storm, thereby confirming predictions made the model in that extreme event.



Figure 6. The location of transects along Blouberg used in calculating the distances between MSL and the -15m isobath to be used in the Mather run up mode. The average distance is approximately 1.5km (table 2). The superimposed light yellow marking represent new MSL following a 2m increase in sea level.

3.1.3 Tableview and Milnerton

Tableview and Milnerton are sites of open coastline, and are often exposed to large waves. For Tableview, due to the gentle beach slope, Mather's model predicts run-up values of 2.4 m with a 100 year return period (figure 7). The dumping waves experienced along this section of coast makes it very unpopular for swimming, and certain areas can be exposed to surging breakers during high

tide, resulting in a very high risk of eroding the base of Beach Road and the dune protection system that buffers Otto du Plessis Drive.



Figure 7. The locations of transects along Tableview used in calculating the distances between MSL and the -15m isobath to be used in the Mather run up mode. The average distance is approximately 1.5km (Table 2). The superimposed light yellow marking represent new MSL following a 2m increase in sea level.

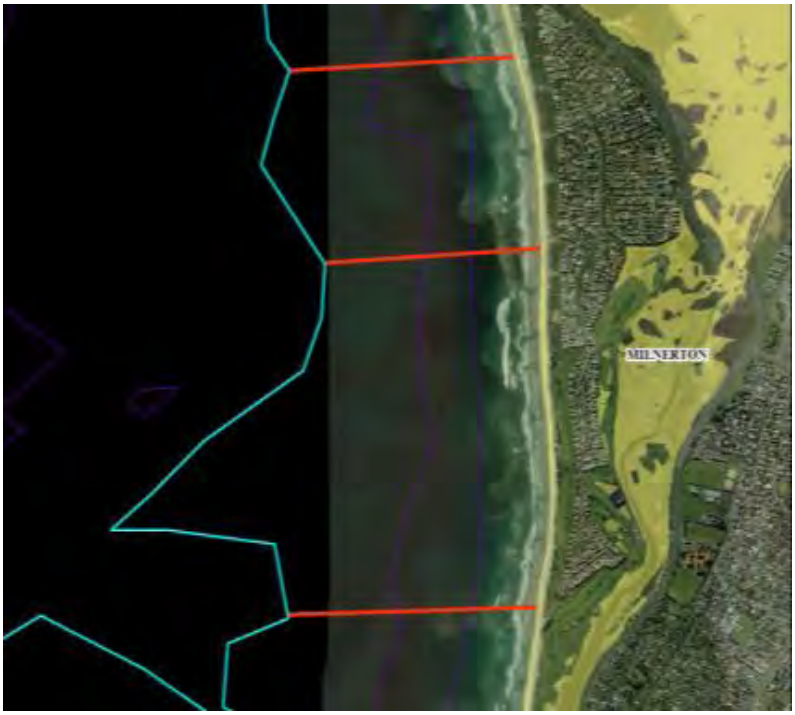


Figure 8. The location of transects along Milnerton used in calculating the distances between MSL and the -15m isobath to be used in the Mather run up mode. The average distance is approximately 1.1km (table 2). The superimposed light yellow marking represent new MSL following a 2m increase in sea level.

The recorded run-up experienced in these areas following the 2008 storm exceeded wave run-up values predicted by the model by 1.5m. Assuming that the compensation for the state of the tide has been correctly carried out, this discrepancy is possibly due to offshore and refraction dynamics occurring within the Table Bay area. The highest run-up experienced in the 2008 storm along this more exposed section of coast was at 4.8m just south of Milnerton, whereas the model predicted a 2.6m run up with a 100 year return period.

3.1.4 Milnerton to Harbour

The shoreline between Milnerton and the harbour is directly in the shadow zone created by Sea Point with very small waves in this area, even at times of strong winds. The nearest -15m isobath is more than 3500m away from this shoreline (figure 9). Even if a large westerly wave field were to enter into Table Bay, creating an unlikely wave height of ~6m (100 year return period) , the Mather model, wave run up is expected to be 1.2m

There were no records available to indicate the run-up values experienced by the 2008 storm for this area.



Figure 9. The location of transects along Milnerton to the Harbour used in calculating the distances between MSL and the -15m isobath to be used in the Mather run up mode. The average distance is approximately 3.5km (table 2). The superimposed light yellow marking represent new MSL following a 2m increase in sea level.

3.2 Atlantic Coast

3.2.1 Green Point

Green Point and Sea Point are often exposed to very large waves, with the -15m isobath being closest to the shoreline when compared to all the other vulnerable sites around CoCT (figure 10). The steep slope and large significant wave results in wave run up expected to be ~7.4 m at least once a year, and 10.8 m run-up with a 100 year return period. Green Point and Sea Point are both sites on a wave cut platform, with rocky shores and small isolated pocket beaches with offshore rocky reefs. The Mather model was not developed for such a beach type, but can be used as a crude estimate for the potential wave energy for the shoreline and sea wall protecting the infrastructure around this location (Brundrit *pers comm*). The estimated run-up in the current CoCT vulnerability GIS model can likely be increased to more than the current ~6.5m estimate. Due to the height of the Sea Point sea wall, Sea Point is well protected The area of high risk would be towards Mouille point at time of perpendicular swell, and it can be expected that the wave set-up and run-up to come past the Mouille Point Beach Road and cover the Metropolitan Golf club (figure 11).

The available records for the 2008 were only available towards the back end of Mouille point towards the V&A Waterfront development in the wave shadow zone, where wave run up exceeded 3m, but it is likely that greater values than that could be expected over Mouille point. Following large storm events, the Sea Point main road has often been flooded even with the protection offered from the high sea wall.



Figure 10. The location of transects along Sea Point and Green Point used in calculating the distances between MSL and the -15m isobath to be used in the Mather run up mode. The average distance is approximately 390m (Table 2). The superimposed light yellow marking represent new MSL following a 2m increase in sea level.



Figure 11: Sea Point and Green Point showing expected flood levels to due to run-up in extreme wave events. Main areas of risk are the Beach Road and infrastructure off Mouille Point.

3.2.2 Glen Beach

Glen Beach is a small pocket beach with most houses built high on the rocks in the northern corner of Camps Bay beach (figure 12). The expected wave run up for both Camps Bay and Glen Beach are similar at ~6 m.

3.2.3 Camps Bay

Camps Bay is about 700m long and very exposed to the open ocean (figure 12). The beach is exposed to large waves and it is quite common that with high sea levels the waves reach the road, with a predicted 6,9m wave run up expected with a 100 year return period.

The 2008 storm seems to have focussed a lot of energy in this location, with run-up values being the highest in this region when compared to the rest of Cape Town, with run-up exceeding 7.5m. This is an area where Mather's model slightly underpredicts recorded storm values.

3.2.4 Bakoven

The rocky shores of Bakoven cottages are not intended to be studied using the sandy beach model of Mather et al. (*in press*), but once again the predicted wave run ups can be used as crude estimates of the risk of run up in such an area. The steep rock face on which most of the infrastructure is built lowers the risk of sea Level rise, but Bakoven's proximity to the -15m isobath (only about 500m) makes it a high risk location due to set-up and run-up (figure 12). According to the Mather model, if Bakoven were a natural sandy beach, wave run up could exceed ~6m about once a year and between 9-10m every 50years (Table 2).

This makes Bakoven and Sea Point the two sites at which potential run-up could have the most significant effects if the the tide is such that the Still Water Level is high enough to allow for overtopping to occur over the natural rocky barrier (or sea wall in the Sea Point).



Figure 12. The location of transects along the Camps Bay area. The top two transects are for Glen Beach, the following two for Camps Bay, and the bottom three transects for Bakoven which were used to calculate the distances between MSL and the -15m isobath to be used in the Mather run up mode. The average distance to the -15m isobath from Camps Bay and Glen Beach is approximately 850m and Bakoven is approximately 500m (table 2). The superimposed light yellow marking represent new MSL following a 2m increase in sea level.

3.2.5 Kommetjie

Kommetjie is known for its large waves and its full exposure to the South Westerly waves. Its shoreline (Figure 13) is situated >1400m from the -15m isobath (Figure 13). The gentle slope of the ocean floor results in wave run-ups expected to be around 4.5 m for the 100 year return period.

These values are slightly higher than the effects of the 2008 storm, where wave run up levels were just below the 3.5m mark.



Figure 13. The location of transects along Kommetjie used in calculating the distances between MSL and the -15m isobath to be used in the Mather run up model. The average distance is approximately 1.5km (table 2). The superimposed light yellow marking represent new MSL following a 2m increase in sea level.

3.2.6 Witsands

The beaches in this area are known for strong rips and powerful waves. Witsands is within 750m of the -15m isobath (figure 14), and resulted in a maximum run-up value of 7.2 m for a 100 year return period, with values between 4.5-5 m expected every year.

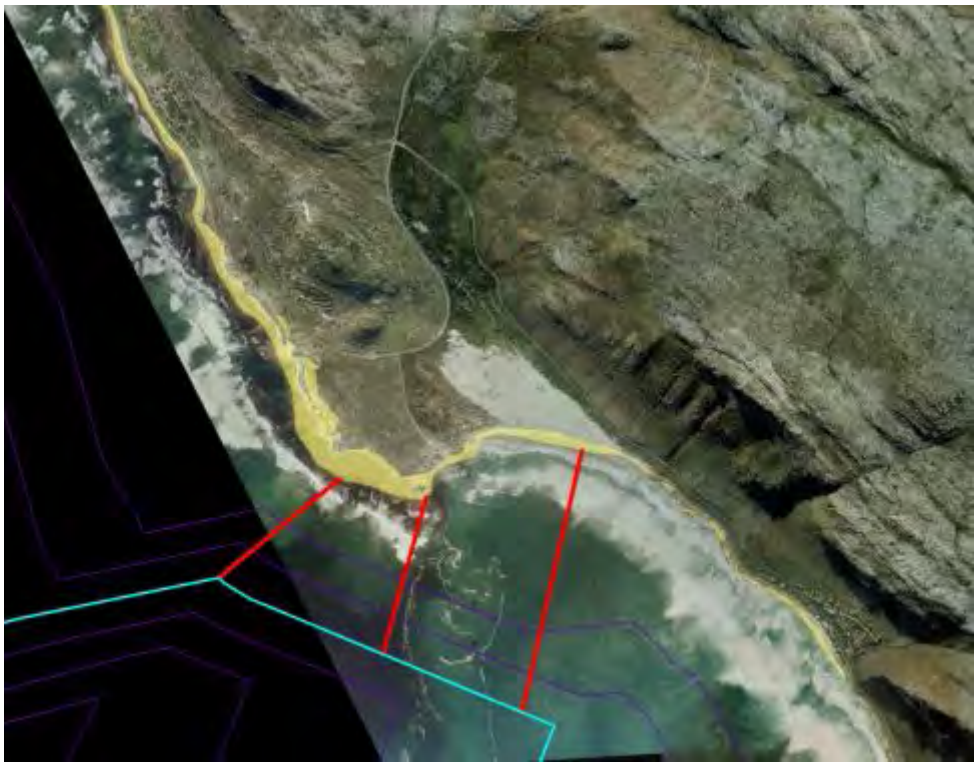


Figure 13. The location of transects along Witsands used in calculating the distances between MSL and the -15m isobath to be used in the Mather run up mode. The average distance is approximately 1km (table 2). The superimposed light yellow marking represent new MSL following a 2m increase in sea level.

3.3 False Bay

Significant wave height data for the following few sites were unavailable for the study. Wave heights were based on deepwater values obtained from Slangkop and it is acknowledged that these are not appropriate for such an empirical study, but are currently the only available estimates. False Bay lacks wave height studies, and it is suggested that projects in the future will need to be undertaken to verify the estimates used in this model. It is known that during times of strong winds known as the "Black Southeaster" wave heights can get very large in this region, and very large "death waves" refracted in from rocky bank are also known to occur in the Kalk Bay area, but no significant wave height measurements have been recorded to accurately describe these events.

3.3.1 Glencairn

Glencairn is sheltered in the wave refraction zone, but is potentially the site at highest risk to wave run-up in False Bay due to its close proximity to the -15m isobath, approximately 700m offshore

(Figure 14). Using the Mather model, with a significant offshore wave height from Slangkop, run up values are expected to reach 6 m every 100 years.



Figure14. The location of transects used in calculating the distances between MSL and the -15m isobath to be used in the Mather run up mode for Glencairn. Distances used are recorded in table 2. The superimposed light yellow marking represent new MSL following a 2m increase in sea level.

3.3.2 Fish Hoek

Fish Hoek and Kalk Bay also lie in the wave shadow zone from the southwest, but are exposed to the focussing of the waves from the south east and can experience very large waves at times between Fish Hoek and especially at Kalk Bay. Both sites have gentle sloping beaches, with the -15m isobath about 1km away from shore (Figure 15). The Mather model predictions for Fish Hoek give a 100 year return period for wave run up of 3.9 m.

3.3.3 Kalk Bay

Kalk Bay is known as a place where freak large waves occur, and with the -15m isobath only about 600m from the harbour, results in a high predicted wave run up in the harbour area of approximately 5m in a 1:100 year event. Further east of the harbour the -15m isobath moves further offshore to

about 1km and around this area near the railway line (Figure 15), where an expected wave run up of approximately 4.3 m is estimated every 100 years.

The area between Glencairn and Kalk Bay would have originally been situated in the shadow zone of the South-western low pressure system during the 2008 storm, but the low pressure cell moved eastwards, causing damage to Port Elizabeth later, resulting in swell and wave energy to be directed into the North-western corner of False Bay during its movement. This resulted in a wave run up of approximately 2m.



Figure 15. The location of transects along between Fish Hoek and the Kalk Bay used in calculating the distances between MSL and the -15m isobath to be used in the Mather run up mode. The average distance is approximately 1km, with it closest nearest at the harbour at about 660m (table 2). The superimposed light yellow marking represent new MSL following a 2m increase in sea level.

3.3.4 Muizenberg

From Muizenberg moving towards Gordons Bay, the bottom contours remain relatively consistent, with the -15m isobath approximately 2km offshore, and increasing close to 3km offshore at the Strand. Even though large waves can be expected in these locations, run-up values exceeding 2.6 m

are not expected even in a 100 year return period when using the significant wave heights for Slangkop. Even though there is also unfortunately no information of the significant wave heights in False Bay, it was found that in the time of the 2008 storm that wave run-up ranged between ~2.3-3.5m between Muizenberg and the Strandfontein treatment works (Figure 16).



Figure16. The location of the transects used in calculating the distances between MSL and the -15m isobath to be used in the Mather run up mode for Muizenberg (table 2). The superimposed light yellow marking represent new MSL following a 2m increase in sea level.

3.3.5 Strandfontein

Significant wave heights off Macassar are also applied to Strandfontein (table 3), and using the distance to the -15m isobath from the shore (~2.3km) Mather's model predicts run up values of about 2.2m for Strandfontein even in a 100 year return period event. Larger run-ups of about 2.4-3m were experienced during the 2008 storm between Strandfontein and Macassar (Figures 17 and 18).



Figure 17. The location of the transects used in calculating the distances between MSL and the -15m isobath to be used in the Mather run up mode for Strandfontein (table 2). The superimposed light yellow marking represent new MSL following a 2m increase in sea level.

3.3.6 Macassar

The average distance between the -15m and the shorelines is at approximately 2km (figure 18), but it is still exposed to large surging breakers at high tide and during storm events which moves inshore far enough to erode the dune fields. According to the Mather model, the extreme wave run up for this area with a 50year return period is at ~2.5m and 2.6 m every 100years, but during the 2008 storm run-ups of about 3.4m were experienced between Strandfontein and Macassar.

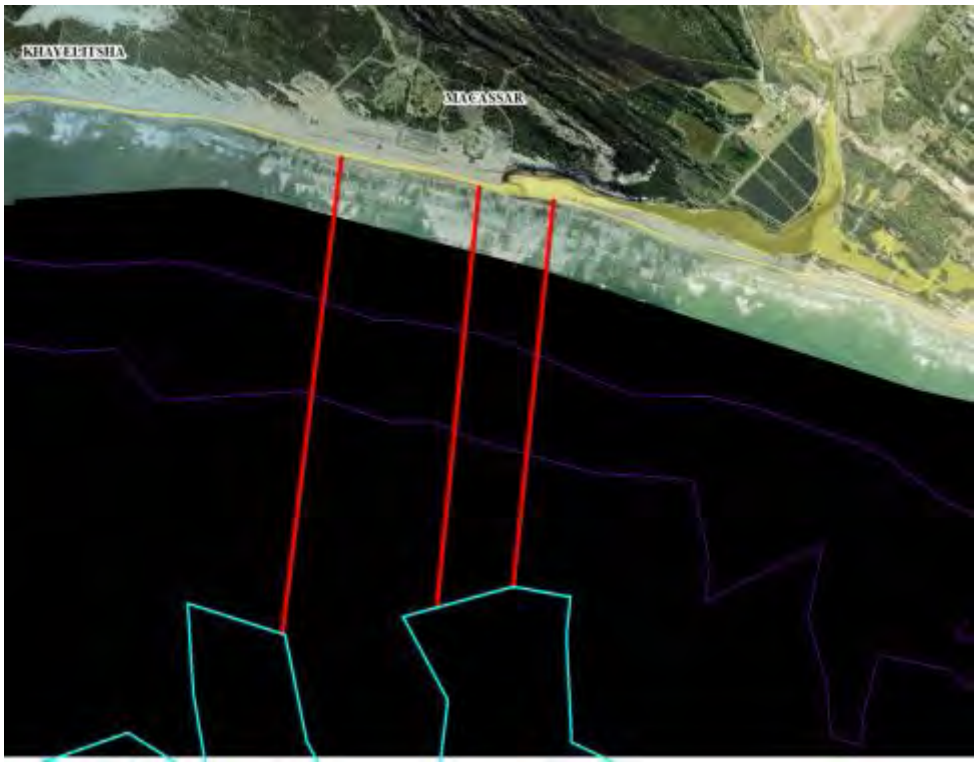


Figure 18. The locations of the transects used in calculating the distances between MSL and the -15m isobath to be used in the Mather run up mode for the Macassar area and pavilion (table 2). The superimposed light yellow marking represent new MSL following a 2m increase in sea level.

3.3.7 Strand

Strand and Bikini beach have very gently sloping beaches, with the -15m isobath ~3km offshore (figure 19), this results in a very low empirical estimate by the Mather *et al* (*in press*) model of ~2.1m in a 100 year event. The actual wave run-ups experienced along the section of coastline near the Strand coast in the 2008 storm reached 1.3-2.3m.

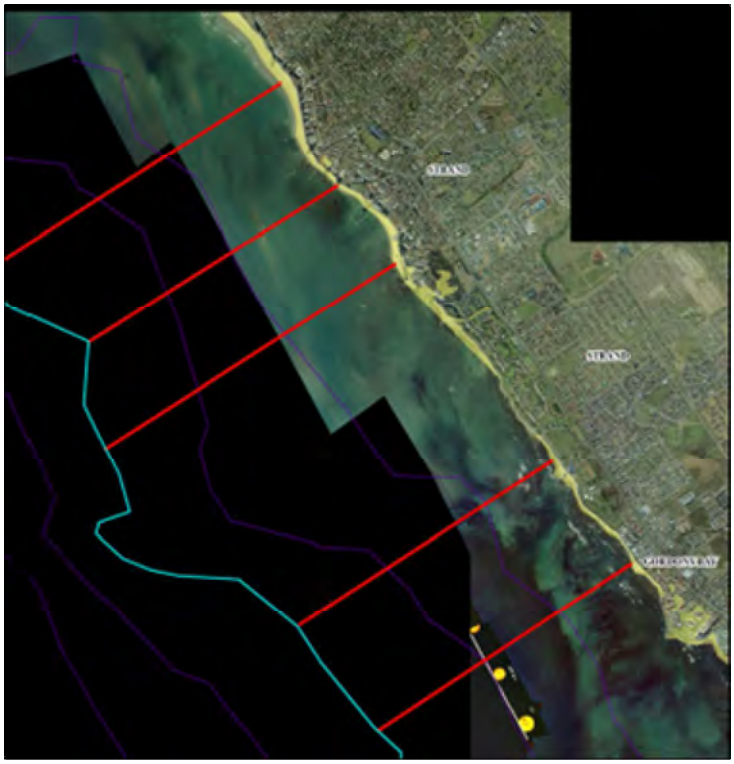


Figure 19. The location of the transects used in calculating the distances between MSL and the -15m isobath to be used in the Mather run up mode for the Strand (table 2). The superimposed light yellow marking represent new MSL following a 2m increase in sea level.

3.3.8 Bikini Beach

This small beach is approximately 2.5km from the -15m isobath, with a maximum of ~2.1 m wave run-up expected at this location using the Mather model (Figure 20) for the 1:100 year event. No 2008 wave run-up data was available at the time of this study.



Figure 20. The location of the transects used in calculating the distances between MSL and the -15m isobath to be used in the Mather run up mode for the Bikini Beach (table 2). The superimposed light yellow marking represent new MSL following a 2m increase in sea level.

4. DISCUSSION

The purpose of this study was to calculate extreme wave-run ups above still water level at the vulnerable locations identified in the Phase 5 SLR study (ANON – City of Cape Town) using the model described by Mather et al. (*in press)* and to give comparisons to 2008 records of wave run-up above still water level.

It is important to understand that the model is based solely on empirical information, and was originally designed for natural sandy beaches without offshore sand bars, reefs or the ability to account for wave focusing effects according to various bathymetrical features. The model has been shown to currently be the most robust wave run up model available, and was designed using the South African coastline for base data in the model construction.

Some differences have been found between the results of the model and recorded wave run-up events of the 2008 storm. The 2008 storm was a very large storm. The differences may be due to various oceanographic features unique to each listed site. A few of these features are mentioned above, but a full description lies outside of the scope of this Addendum. Clearly these features will contribute to a full assessment of sea-level rise risk at a specific location. It is important to note that variations in storm surge, tidal fluctuation and wave set up play a role in the determination of overall wave run-up experienced in the 2008 storm, and may result in discrepancies from the values predicted by the Mather model.

The values estimated by the Mather model have not been corrected to account for eroding beaches during the extreme events, but only give expected wave run-up heights. On the other hand, the 2008 wave run up values result from observations of beaches which were actively eroding during the storm.

Finally, the choice of the coastal coefficient in the model can influence the predicted value of the wave run up. Values near to the reported median (Table 3) for each type of coast were used in the study. However, it may be more appropriate to use the maximum value of the coastal coefficient as recommended by Mather et al (*in press*), when the model is being used for planning coastal defences.

5. REFERENCES

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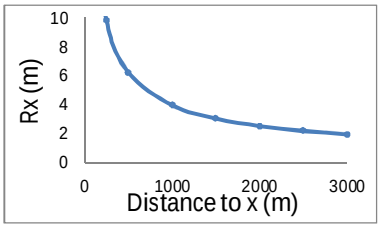
6. APPENDIX 1

Sensitivity analysis

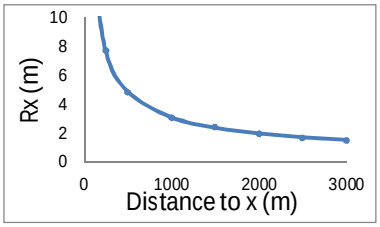
Table 6. Showing the effect changes in Coefficient (C), distance x (m) from the shore to the -15m isobath has on wave-run up (m) predictions and significant wave run-ups of Mathers model. The figures represent wave run-ups at various C values and x values at a H_0 of 7m

$$Rx = H_0 \times \left(\frac{h}{x}\right)^{2/3} \times C$$

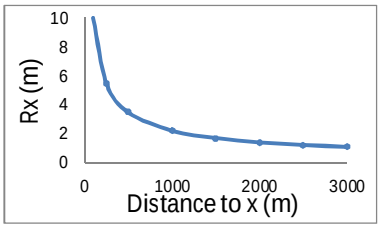
h=	15		H0 (m)		
x (m)	C	1	3	5	7
3000	9	0.3	0.8	1.4	1.9
2500	9	0.3	0.9	1.5	2.2
2000	9	0.4	1.1	1.8	2.5
1500	9	0.4	1.3	2.2	3.0
1000	9	0.6	1.7	2.8	**3.9**
500	9	0.9	2.7	4.4	6.2
250	9	1.4	4.2	7.0	9.8
100	9	2.6	7.7	12.9	18.0



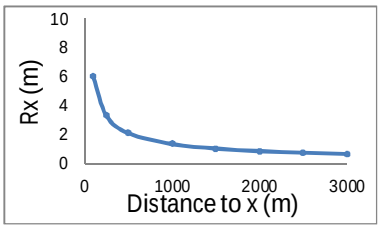
3000	7	0.2	0.6	1.1	1.5
2500	7	0.2	0.7	1.2	1.7
2000	7	0.3	0.8	1.4	1.9
1500	7	0.3	1.0	1.7	2.3
1000	7	0.4	1.3	2.2	**3.1**
500	7	0.7	2.1	3.5	4.8
250	7	1.1	3.3	5.5	7.7
100	7	2.0	6.0	10.0	14.0



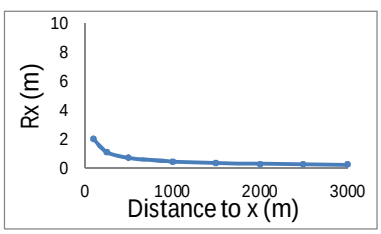
3000	5	0.2	0.5	0.8	1.1
2500	5	0.2	0.5	0.9	1.2
2000	5	0.2	0.6	1.0	1.4
1500	5	0.2	0.7	1.2	1.7
1000	5	0.3	0.9	1.6	**2.2**
500	5	0.5	1.5	2.5	3.5
250	5	0.8	2.3	3.9	5.5
100	5	1.4	4.3	7.1	10.0



3000	3	0.1	0.3	0.5	0.6
2500	3	0.1	0.3	0.5	0.7
2000	3	0.1	0.4	0.6	0.8
1500	3	0.1	0.4	0.7	1.0
1000	3	0.2	0.6	0.9	**1.3**
500	3	0.3	0.9	1.5	2.1
250	3	0.5	1.4	2.3	3.3
100	3	0.9	2.6	4.3	6.0



3000	1	0.0	0.1	0.2	0.2
2500	1	0.0	0.1	0.2	0.2
2000	1	0.0	0.1	0.2	0.3
1500	1	0.0	0.1	0.2	0.3
1000	1	0.1	0.2	0.3	**0.4**
500	1	0.1	0.3	0.5	0.7
250	1	0.2	0.5	0.8	1.1
100	1	0.3	0.9	1.4	2.0



7. HANDOVER NOTES

This is a short summary of important contacts and information to be aware of as this paper is further developed.

Individual contributions to the project from people such as Professor Geoff Brundrit (oceangeoff@iafrica.com) are invaluable to projects such as these, and have the ability to motivate and put projects into motions which relates to gathering specifically desired oceanographic data. Currently there is an urgent need for wave data and research to be conducted within False Bay on the return period of large wave and storm events.

M. Rossouw (mrossouw@csir.co.za) from the CSIR Stellenbosch was head of the project which developed the Virtual Buoy system used in Table Bay and various ports for wave predictions within the boating lanes used by port authorities around South Africa (Rossouw et al. *in press*). He has been collecting and updating the data recorded from the Slangkop wave buoy and is the key person to contact in regards to obtaining statistics on significant offshore wave height data for most areas around CoCT. He is also currently working on a project to extend the predictive ability of the SWAN model, which is used to generate the Virtual Buoy information in Table Bay, into the False Bay area. Please see http://wavenet.csir.co.za for more information.

A. Mather (mathera@durban.gov.za) from the Durban municipality was the engineer who developed the wave run-up model and A. Theron (atheron@csir.co.za) from the CSIR, Stellenbosch, are currently working specifically on wave run-up around the coast of South Africa, and could be consulted as the current local experts on the topic.

There are also various students in the UCT Oceanography department who are currently also working on modelling wave and currents within False Bay by extending the SWAN model into False Bay. A few

students are looking at the effect refraction due to bathymetry and funnelling effects has on the waves within False Bay and on its coast. The information from such research projects may prove invaluable to understand variations experienced between historical events and predicted events of the Mather run-up model. Such work extending the SWAN model from Table Bay into False Bay requires wave recorders around the False Bay coast to verify predictions.

The significant wave height data used for Melkbosstrand (Koeberg) and the north-eastern corner of False Bay is approximately 20-25years old, and only a short observational period of about 4years for Koeberg, and only about 1year for False was used to calculate expected wave heights for 10, 50 and 100 year return periods by extrapolation. This makes the estimates used in this study less credible and it is suggested that verification studies should be conducted in these areas.

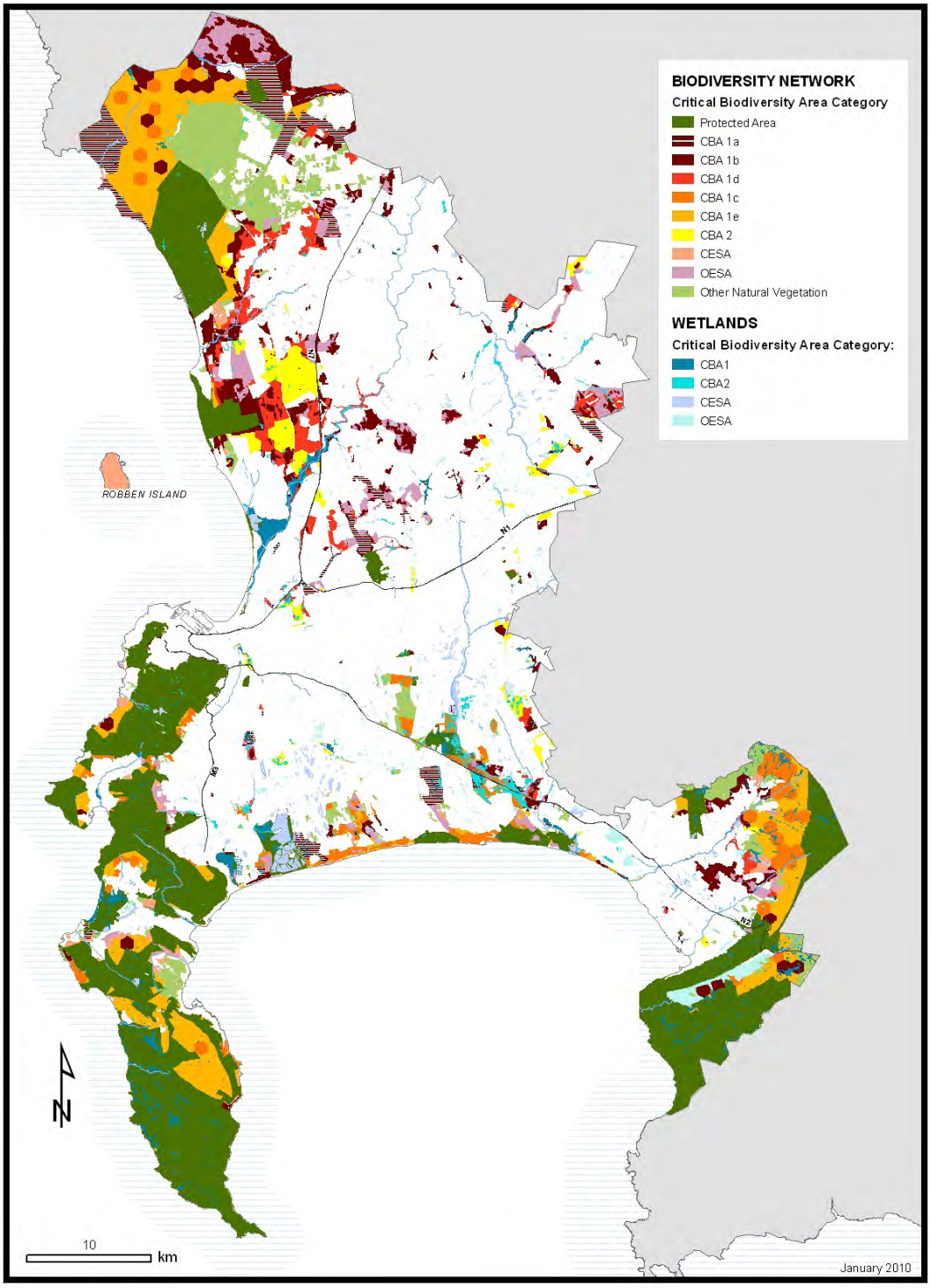
There are a few more documents which might also prove helpful in understanding wave dynamics within False Bay. The C/SEA 8046/1 and 8046/2 reports which are held at the CSIR offices in Stellenbosch are available to the CoCT, but written authorization from the contract holder is firstly required to obtain these documents. For further details please contact Annette Joubert (ajouber1@csir.co.za).

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City of Cape Town's Biodiversity Network

C-PLAN & MARXAN ANALYSIS: 2009 METHODS & RESULTS



Amalia Stipinovich & Patricia Holmes, Environmental Resource Management Department (ERMD), City of Cape Town, December 2009

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Acronyms

BioNet	Biodiversity Network
BLM	Boundary Length Modifier
CBA	Critical Biodiversity Area
CCT	City of Cape Town
CLUZ	Conservation Land Use Zoning
CR	Critically Endangered (IUCN Red List)
CREW	Custodians of Rare & Endangered Wildlife
EN	Endangered (IUCN Red List)
ERMD	Environmental Resource Management Department
ESRI	Environmental Systems Research Institute
GIS	Geographic Information System/s
LT	Least Threatened (IUCN Red List)
NSBA	National Spatial Biodiversity Assessment
Red Data	Plant taxa that have been assessed according to their risk of extinction in the near future (See www.redlist.org)
SANBI	South African National Biodiversity Institute
SPF	Species Penalty Factor
VU	Vulnerable (IUCN Red List)

Acknowledgement

The 2008 unpublished report by Grant Benn of GeoCline Consulting CC entitled “City of Cape Town’s BioNet: Terrestrial Systematic Conservation Plan Re-Analysis: Methods and Results” formed the basis for this 2009 report (www.capetown.gov.za – follow links to ERMD, reports).

INTRODUCTION

The City of Cape Town (CCT) has used a systematic conservation planning approach to prioritise its remnant indigenous vegetation based on factors such as connectivity, habitat condition and location of rare and endangered flora. Systematic conservation planning generally involves the following steps:

- Subdividing a region into a series of planning units
- Gathering data describing the distribution of biodiversity features within this region
- Calculating the amount of each biodiversity feature found in each planning unit
- Setting targets for each biodiversity feature in order to ensure their adequate conservation
- Using software to select a set of planning units which meets these targets in an efficient manner

The primary product of this approach is the CCT's Biodiversity Network (BioNet), which exists in the form of a GIS shapefile, with associated tabular information. The shapefile can be mapped and analysed and statistics can be derived, giving users a picture of not only the situation on the ground but most importantly, where to focus their conservation efforts in light of limitations in staff, budget and available open space. This report gives an overview of the methodology used but the technical process using GIS technology and the conservation planning software packages of C-Plan and MARXAN/CLUZ is described in a separate manual for internal use only.

History of Systematic Conservation Planning In the City

In 2002, the first systematic conservation planning study to identify the minimum set of conservation areas required in the CCT was initiated using the conservation planning software "C-plan". This study pre-dated the National Environmental Management: Biodiversity Act (2004), the new National Vegetation Map (SANBI 2005) and the National Spatial Biodiversity Assessment (2004). The study built on earlier work done in partnership with the Botanical Society which resulted in a report entitled: "Core Flora Conservation Areas on the Cape Flats" report (Maze & Rebelo 1999[1]). In the

[1] *Maze K E & Rebelo A G 1999. Core flora conservation areas on the Cape Flats. FCC Report 99/1. Botanical Society of South Africa.*

latter report 38 sites were identified as critically important contributors to Cape Town's biodiversity and have since been known as the "Core Flora Sites". Data informants for the 2002 study included a remnant layer based on 1998 aerial photography, available plant species information and a local vegetation map drawn up by botanical consultant B. Low. The study culminated in the Biodiversity Network Prioritization Report (2004[2]).

In 2005 a revised desktop systematic conservation planning study was initiated to update the Biodiversity Network using the latest: 1) remnant layer from 2005 aerial photography, 2) species information and 2) vegetation map

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[2] Note: all City biodiversity reports are available on the ERMD website: http://www.capetown.gov.za/en/environmentalresourcemanagement/Pages/default.aspx; "publications > reports"

City of Cape Town. 2004. Biodiversity Network Prioritisation Project, Final Draft Report prepared by MLA-Sustainability Matters, in association with GISCOE, Biodiversity & Conservation Biology Department UWC, Settlement Planning Services & Freshwater Consulting Group.

aligned to the new national vegetation map (Mucina et al. 2005[3]). Results from this re-analysis may be found in the 2007 report[4]. This version of the Biodiversity Network was approved by council (PEPCO, November 2006) subject to continuing collaborations with Spatial Planning and Urban Development.

In 2008, after extensive ground-truthing of vegetation remnants during 2007-8, the remnant layer was again updated and C-plan was re-run using habitat condition as an additional informant. The programme "Marxan" was next applied, using a "Boundary Length Modifier" tool, to select additional remnants needed to improve connectivity among selected remnants. This, together with expert corridor sites, replaced the friction analysis used in the first analysis to identify corridors on the Biodiversity Network. Corridors help to conserve ecological processes, which include the dispersal and migration of plants and animals, necessary to conserve healthy populations in the long-term. All wetlands and rivers in this and earlier versions are considered part of the Biodiversity Network. In this analysis, the national ecosystem targets were used for the first time in setting the targets for conservation. Methods and results of this third run of the Biodiversity Network are reported in Benn (2008[5]).

DATA PREPARATION

Software

The data was prepared using ESRI's GIS software versions ArcGIS 9.3 and ArcView 3.3 and Microsoft's Excel and Access.

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[3] *Mucina L, Rutherford M L & Powrie L W (editors) 2005. Vegetation Map of South Africa, Lesotho and Swaziland. SANBI, Pretoria.*

[4] *City of Cape Town. 2007. The Identification and Prioritisation of a Biodiversity Network for the City of Cape Town, Final Report prepared by MLA-Sustainability Matters, in association with GISCOE (Pty) Ltd.*

[5] *Benn G. 2008. City of Cape Town BioNet: Terrestrial Systematic Conservation Plan Re-Analysis: Methods & Results.* (Available for download from ERMD website)

Analysis Data Inputs

See Table 1: Analysis Data Inputs

Formation of the Planning Units

The planning domain was the area enclosed by the administrative boundary of the CCT. The basis for the formation of the planning units within the planning domain was the CCT indigenous vegetation remnants coverage. The remnants had been ground-truthed in 2008 for the third C-plan analysis and creation of the BioNet of 2008. Each remnant's habitat condition was evaluated as being high, medium or low. Over the subsequent months, the status of some of these remnants was updated by the Environmental Resource Management Department (ERMD) so the information was as current as possible, habitat condition being a key factor in the analysis.

Each high, medium or low fragment of a remnant formed a planning unit. Any remnants over 100 hectares in size that were not classified as Protected Areas were further subdivided into hexagon grid cells of 100 hectares in area. Existing protected area boundaries were integrated into the remnant layer before this process was carried out. "Protected Areas" included those that were not yet proclaimed but that were managed by City of Cape Town.

Only features that were located on the existing BioNet, the current mapped extent of indigenous vegetation, within this planning domain were considered.

Table 1: Analysis Data Inputs

DATA	CONTENT	SOURCE	VERSION	FORMAT
Biodiversity Network (used to create Planning Units and to bring in habitat condition information)	Remnants of indigenous vegetation remnants classified as being of high, medium or low condition	City of Cape Town	August 2008	Polygon shapefile mapped at varying scales but constantly being refined to a scale of 1:2000; ground-truthed in 2008
Indigenous vegetation	Historic Indigenous vegetation cover of City of Cape Town	City of Cape Town (based on national SANBI version of 2005)	July 2009	Polygon shapefile originally mapped at National scale 1:50 000 but refined at a scale of 1:2000 in areas by City of Cape Town
CREW Red Data species	Indigenous floral species locations	CREW, SANBI	July 2009	Point shapefile (accurate to within 10m)
Protea Atlas Project Red Data species	Indigenous floral species locations	Protea Atlas Project	July 2009	Centroid coordinates (point taken to be accurate within a radius of 250m)
SaSflora Red Data species	Indigenous floral species locations	Barrie Low - Coastec	July 2009	Centroid coordinates (point taken to be accurate within a radius of 250m)
CCT Red Data species (added to the CREW data during the analysis)	Indigenous floral species locations	CCT staff & BioNet groundtruthing team. Also Nick Helme (consultant)	July 2009	Point shapefile (accurate to within 10m)
Wetlands (used for comparison purposes only)	Natural and artificial wetlands	City of Cape Town	July 2009	Polygon shapefile digitized at 1:10 000 from orthophotos and sample groundtruthed
Threats to Biodiversity Network	Agricultural, urban, mining and development threats	City of Cape Town	July 2009	Polygon shapefile created from best available CCT shapefile inputs

Threats to the Biodiversity Network

The threat level of each planning unit was used in the analysis of the BioNet as a cost surface, which influenced the potential selection of sites. Dr Tony Rebelo of SANBI had generated a combined threat layer for the 2008 analysis, which included the following threats:

- Human settlement
- Potential agriculture
- Potential mining areas

These were updated to reflect the situation in August 2009 and the cost surface revised to include:

- New Development Areas

The factors were then assessed as being of either high, medium or low threat. The relative area of each threat level per planning unit was calculated.

Biodiversity Features Incorporated

The indigenous flora of a planning unit was used to indicate biodiversity as the coverage of the available GIS data was far greater than that available for indigenous fauna. Existence of the flora is also a reliable indicator of existence of the fauna which depend on it. "Flora" includes the various national vegetation types and subtypes as well as the individual Red List threatened species: the variety, numbers or area, and rarity of each are considered by the conservation planning software. The biodiversity features brought into the analysis as factors were as follows:

- Current indigenous vegetation extent with remnants classified as being of high, medium or low condition
- Revised CCT indigenous vegetation: This uses SANBI's National Vegetation types but classes them at a finer scale per local subtype
- CREW's indigenous flora species data
- CCT's indigenous flora species data
- Protea Atlas Project's indigenous flora species data
- SaSflora's indigenous flora species data
- CCT wetlands (for post-analysis incorporation only: wetland prioritization was analyzed separately and then priority wetlands occurring on natural remnants were included in the BioNet).

Excluded Biodiversity Features

- The dunes at Atlantis were extracted from the vegetation coverage as they extend over an area of 270 hectares. Areas identified as "Beach" or "Reclaimed" areas in the Vegetation coverage were also excluded. The bare sand would have affected the vegetation target statistics if included.
- Subtypes of Southern Afrotemperate Forest vegetation were combined and brought in as one "Southern Afrotemperate Forest" unit as this

type covers a very small area and is formally conserved in the Table Mountain National Park.
- Any exotic flora species found in the CREW, CCT, SaSflora or Protea Atlas Project data were excluded.
- Large artificial water bodies and waste water treatment works (e.g. dams such as Steenbras and Kleinplasie) were extracted from the vegetation coverage so as not to bias vegetation statistics. The large natural and semi-natural water bodies (e.g. Rondevlei) fall into the Cape Lowland Freshwater Wetland vegetation type.

Allowing for Biodiversity Processes: Connectivity

Potential corridors to ensure connectivity through the fragmented landscapes of the City of Cape Town were mapped by Biodiversity Management Branch's experienced staff in 2008 and included in the analysis as a factor:
- Blaauwberg Conservation Area to Koeberg
- Diep River Fynbos Corridor (Rietvlei to Blaauwberg Conservation Area)
- Kuils River Corridor (Driftsands to Coast)
- False Bay Coastline

Assessment of Vegetation Type, Ecosystem & Conservation Status

Ecosystem status and conservation status were calculated using the status categories developed by SANBI. The assessment of the status can be done at either the National vegetation type or the CCT vegetation subtype level. This analysis operated at the subtype level. The SANBI categories are as follows:

SANBI ecosystem status categories and thresholds
- Critically endangered (CR): current area less than target area
- Endangered (EN): current area less than target + 15% of historical distribution
- Vulnerable (VU): current area < 60% of historic distribution
- Least threatened (LT): current area > 60% of historic distribution

SANBI conservation status categories
- Not protected: 0% of target conserved
- Hardly protected: 0 - <=5% of target conserved
- Poorly protected: 5> - <=50% of target conserved
- Moderately protected:>50 - <100% of target conserved
- Well protected: 100% of target conserved

Please see Table 2: Vegetation Statistics for the results of these calculations.

Calculation of Biodiversity Feature per Planning Unit

The planning unit and biodiversity feature datasets were then brought together in GIS to summarise the features per planning unit. The inputs required for the C-plan and Marxan software were tables. Population figures for each recorded location of a species were rare. The species input tables were instead records of the number of times a data point indicating the location of a particular species intersected with a planning unit. Available information on the IUCN Red Data status of each species e.g. CR, EN, was included.

The same was done for the planning units and vegetation datasets and the planning units and threats datasets. However, these recorded the areas in hectares of each vegetation type and each level of threat as opposed to number of locations. If wetlands had been incorporated into the C-plan/ Marxan analysis, the same would have been done for them too.

Setting Conservation Targets

Indigenous Vegetation

Targets were based on National Vegetation Type target percentages as determined for the 2004 National Spatial Biodiversity Assessment (NSBA) but were applied at the level of the City vegetation subtypes. Actual target values were calculated from the historic area for each type (Please refer to Table 2: General Vegetation Statistics).

Indigenous Flora Species Locations

For CREW, Protea Atlas Project, SaSflora and CCT's recorded floral species, targets were based on the number of known species locations. For species described in the datasets, a simple sliding scale target was used for each species on the basis of the number of locations.

- 100% of all locations for Critically Endangered (CR) species
- >=10 locations for Endangered (EN) species
- >=5 locations for any other Red Data species (including those with no status listed)

In other words, every known location of a CR species is targeted and rarer species are assigned relatively higher targets than more common species.

Wetlands

Targets for the City wetland types were based on the percentage target applied to all wetland types by the NSBA. A standard target of 24% was used by the NSBA, with actual target values based on the percentage of mapped wetland area for each type. However, wetlands data were not brought into

this C-plan/Marxan run directly. Wetland prioritization was analyzed separately by expert consultants (Snaddon et al. 2009; www.capetown.gov.za – follow links to ERMD/ Publications/ Reports).

Priority wetlands occurring on natural remnants were included post-hoc into the BioNet. Wetland ground-truthing indicated that priority wetlands located in transformed land were degraded and in practice would be difficult to restore and conserve. Such wetlands were only prioritized in the wetlands study owing to a lack of alternative natural sites supporting these wetland types.

ANALYSIS

Software

The ArcView 3.3 extension C-Plan was used to calculate the irreplaceability of a planning unit and to select an optimal and efficient set of remnants to meet the conservation targets. C-Plan is a conservation-planning tool that provides the tools for the application of a logical and sequential planning process. To assist in ensuring connectivity within the conservation network, MARXAN[6] was used to select additional planning units aimed at ensuring connectivity across the BioNet. MARXAN has the ability to consider spatial pattern in selecting reserve networks through the use of its Boundary Length Modifier (BLM). The BLM allows the selection process to consider landscape connectivity in the selection process. CLUZ[7] is an extension to ArcView3.3 and was used to provide a user-friendly interface to MARXAN.

C-Plan Analysis

Selection from High & Medium Habitat Condition Sites

To ensure that high and medium condition planning units were selected preferentially over low condition planning units, the latter were initially excluded from the analysis. Irreplaceability was then calculated, and those planning units with 100% irreplaceability scores selected. Irreplaceable planning units are those for which no alternatives exist if targets are to be met.

The Minset Algorithm

Outstanding target values were then met by running C-Plan's Minset algorithm that uses a series of rules. Successive rules in the Minset algorithm are only used when a tie occurs. The expert mapped corridors were used in the Minset to ensure that where possible, and if the preceding rules are tied,

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[6] Possingham et al. 2000, Ball and Possingham, 2000, http://www.ecology.uq.edu.au/index.html

[7] Smith 2004, http://www.mosaic-conservation.org/cluz

planning units within these corridors were preferentially selected. The Minset algorithm rules are as follows:

1. Highest Irreplaceability score
2. Habitat condition = High
3. High or medium threat lowest
3. Location of planning unit in one of the expert mapped corridors
4. Highest percentage contribution to meeting targets
5. Feature rarity
6. Summed rarity
7. Richness
8. Site Area Highest
9. Select first site in list

Selection from Low Habitat Condition Sites

The low condition planning units were then brought into the analysis and irreplaceability recalculated to try to meet any targets that had not yet been met when only high and medium condition planning units were considered. Any low condition planning units given a status of 100% irreplaceability were included in the set of selected planning units. At this point, all achievable targets were attained.

Checking of SaSflora Data Influences

Each change in status of a planning unit due to the addition of the SaSflora species and subspecies data into the C-plan analysis of 2009 was manually checked by Dr Patricia Holmes against a C-plan 2009 run that excluded this data. This was to ascertain the extent to which the SaSflora data influenced the results as this data had not been included in recent BioNet runs. All sites that were only included due to their containment of SaSflora species were found to have species required to meet minimum targets. The C-plan output with SaSflora data included was therefore considered to be the best result and was used as the input into Marxan.

MARXAN Analysis

The SaSflora biodiversity features were not included in the MARXAN analysis as they caused the software to freeze. This was not considered to be of concern as the required SaSflora sites had already been selected by C-Plan.

Boundary Length Modifier

The protected areas and the high and medium condition sites selected during the C-Plan analysis were set aside as having already been identified as essential to conserve. MARXAN was then run to select further sites that would allow for connectivity between these conserved areas. The sites would therefore be selected by Marxan even if they were not required to directly meet conservation targets. Considering the fragmented nature of the natural habitats of the CCT, it is important for connectivity to be considered in identifying critical areas for conservation.

A BLM of 0.5 was used, based on the findings of Grant Benn[8] in the 2008 BioNet run: the value 0.5 proved to be the least land-hungry, important in the case of the CCT where open land is at a premium. The higher you make the BLM, the more land hungry a run will be with the selection being more biased towards reducing boundary length and less towards meeting feature targets.

External edges were included in the determination of boundary length, although certain edges could be excluded in future where they make up a natural boundary, such as a coastline.

Species Penalty Factor

The Species Penalty Factor (SPF) is the cost associated with not meeting the target for a specific biodiversity feature. Setting a high cost value for a particular feature will increase the likelihood of that feature's target being met, as MARXAN acts to minimise the cost of the final portfolio that it identifies. 100 000, a very high value, was set for all features in the MARXAN analysis to ensure that all targets were met.
The number of iterations was set at 1,000,000 and the number of runs at 10. Increasing the number of iterations and runs would generally improve the efficiency of the portfolio that MARXAN identifies but also increase the processing time. [1]

CLASSIFICATION OF CRITICAL BIODIVERSITY AREAS

[8] Benn, Grant. 2008. City of Cape Town's BioNet: Terrestrial Systematic Conservation Plan Re-Analysis: Methods and Results. GeoCline Consulting CC (www.capetown.gov.za – follow links to ERMD/ Reports).

The selected planning units were given attributes by both the C-Plan and the MARXAN software. These attributes were combined and used to identify a range of different Critical Biodiversity Area (CBA) categories is presented in Table 3.

CBA 2 areas that had additional importance in that they served to consolidate CBA 1b remnants were manually upgraded to CBA 1d status. In most cases, remnants that were selected as CBA 2 in 2009 but were CBA 1d in 2008 could have this status transferred across but this was checked and corrected where necessary and where the remnant no longer demonstrated this additional value to the network it remained CBA 2.

IN FUTURE ANALYSES

- Prior to the next run, the SaSflora database should be checked and decisions made as to how to deal with the different species and subspecies and varieties and as to whether to treat them all as different taxa.
- The available fauna data needs to be assessed to see whether it could be incorporated in the future
- A check needs to be made of the appropriate categories for sites selected for species. Species targets have been set, and sites selected for a species should either qualify as MinSet or Irreplaceable categorization. Consideration should be given as to whether sites required to protect Red List threatened and least threatened species, respectively, require different categories, or whether Critical Biodiversity Area is appropriate to both.

Table 2: Results: General Vegetation Statistics

Units are in hectares unless otherwise specified.

National Vegetation Type	Historic extent *	Current extent	% Remaining from historic extent	National Ecosystem Target %	Target	Selected in BioNet	% Selected in Bionet from current extent	Target met in selected BioNet	Extent in proclaimed Protected Areas	% Target met in proclaimed Protected Areas	Ecosystem Status (calculated*)	SANBI conservation statistic for "protected"
Atlantis Sand Fynbos	25235	15712	62	30	7570	12696	81	Yes	0	0	LT	Not
Boland Granite Fynbos	9575	6064	63	30	2873	4807	79	Yes	355	12	LT	Poorly
Cape Estuarine Salt Marshes	40	26	65	24	10	26	99	Yes	26	268	LT	Well
Cape Flats Dune Strandveld: False Bay	27260	8468	31	24	6542	7273	86	Yes	1856	28	EN	Poorly
Cape Flats Dune Strandveld: West Coast	12700	10604	83	24	3048	6893	65	Yes	965	32	LT	Poorly
Cape Flats Sand Fynbos	54410	8467	16	30	16323	8465	100	No	464	3	CR	Hardly
Cape Lowland Freshwater Wetlands	1464	1095	75	24	351	1069	98	Yes	787	224	LT	Well
Cape Winelands Shale Fynbos	2667	1706	64	30	800	1389	81	Yes	218	27	LT	Poorly

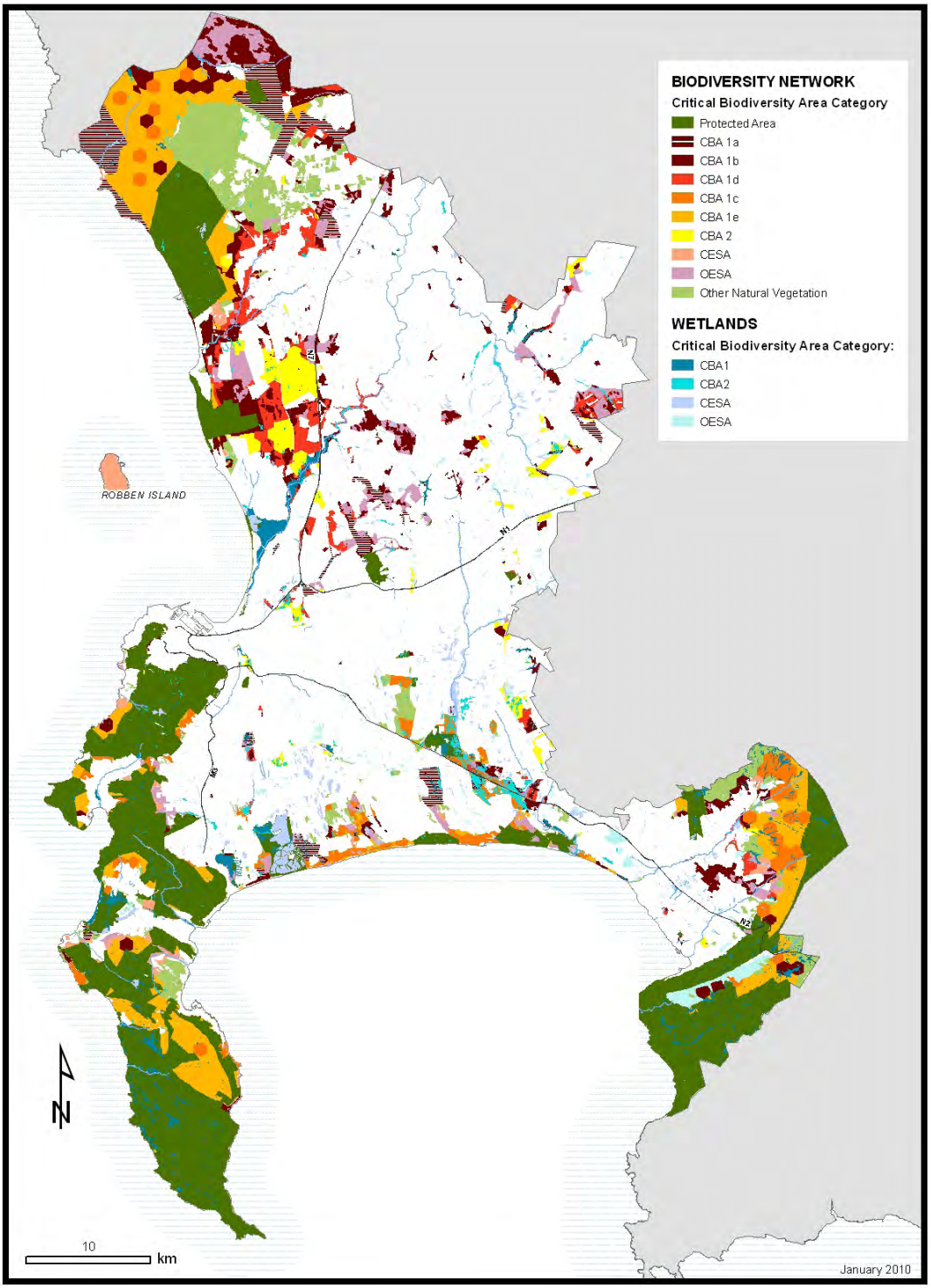
Elgin Shale Fynbos	841	321	38	30	252	283	88	Yes	5	2	EN	Hardly
Hangklip Sand Fynbos	3302	1910	58	30	990	1490	78	Yes	1364	138	VU	Well
Kogelberg Sandstone Fynbos	9500	9261	97	30	2850	8814	95	Yes	1944	68	LT	Moderately
Lourensford Alluvium Fynbos	4819	410	9	30	1446	410	100	No	190	13	CR	Poorly
Peninsula Granite Fynbos: North	1997	1439	72	30	599	1344	93	Yes	986	165	LT	Well
Peninsula Granite Fynbos: South	7149	2482	35	30	2145	2291	92	Yes	1770	83	EN	Moderately
Peninsula Sandstone Fynbos	21896	21349	98	30	6569	20762	97	Yes	17307	263	LT	Well
Peninsula Shale Fynbos	1263	690	55	30	379	689	100	Yes	687	181	VU	Well
Peninsula Shale Renosterveld	2375	317	13	26	617	317	100	No	262	42	CR	Poorly
Southern Afrotemperate Forest	348	347	100	34	118	347	100	Yes	277	234	LT	Well
Swartland Alluvium Fynbos	1742	76	4	30	523	76	100	No	0	0	CR	Not

Swartland Granite Renosterveld	8059	1952	24	26	2095	1952	100	No	36	2	CR	Hardly
Swartland Shale Renosterveld	46712	4019	9	26	12145	4019	100	No	408	3	CR	Hardly
Swartland Silcrete Renosterveld	1067	188	18	26	277	188	100	No	0	0	CR	Not
Western Shaleband Vegetation	329	329	100	30	99	329	100	Yes	31	32	LT	Poorly

* for City portion of vegetation type only

RESULTS

Figure 1: October 2009 Biodiversity Network of the City of Cape Town



National Vegetation Types

The results for 18 national terrestrial and two national wetland vegetation types are presented in Table 2. Three of the national types have been divided into two subtypes of regional importance, namely: Cape Flats Dune Strandveld into False Bay and West Coast subtypes, and Peninsula Granite Fynbos into North and South subtypes, the latter usually being located on wetter aspects and slopes. In addition, Peninsula Shale Fynbos may be considered a subtype of Cape Winelands Shale Fynbos.

Six national vegetation types are endemic (i.e. largely confined to the City). These are: Cape Flats Dune Strandveld, Cape Flats Sand Fynbos, Lourensford Alluvium Fynbos, Peninsula Granite Fynbos, Peninsula Sandstone Fynbos and Peninsula Shale Renosterveld.

The national targets were calculated from species-area curves as the minimum area required to conserve 70% of the plant species in a vegetation type. Note that this is the minimum requirement and that additional areas are needed for maintaining ecosystem processes and to provide habitat for certain threatened plant and animal species and migration corridors for conserving animal species. The areas required to meet vegetation and species targets are indicated on the map (Figure 1) as CBA1a-d and CBA2; and those areas required for connectivity as CBA1e. The ecological support areas required for ecosystem processes are indicated on the map as CESA.

In 2009, seven of the national vegetation types in the City have insufficient habitat remaining to conserve the minimum target. These are Cape Flats Sand Fynbos, Lourensford Alluvium Fynbos, Peninsula Shale Renosterveld, Swartland Alluvium Fynbos, and Swartland Granite, Shale and Silcrete Renosterveld vegetation types. Three of these are endemic to the City and thus cannot be conserved elsewhere: Cape Flats Sand Fynbos with 16% habitat remaining, Lourensford Alluvium Fynbos with 9% and Peninsula Shale Renosterveld with 13% remaining. The latter already is mainly conserved in the Table Mountain National Park, but the other two are an urgent priority for conserving remaining habitat. The four non-endemic types have traditionally been exploited for commercial agriculture (cereal & fruit crops) and little natural habitat remains either inside or outside the City.

Although sufficient remnant habitat remains to meet targets for the other 13 ecosystems, there is a very long way to go in attaining adequate protection for these types in protected areas. The best conserved types (i.e. proportion in proclaimed protected areas in the City relative to targets) are Cape Estuarine Salt Marsh, Cape Lowland Freshwater Wetlands, Hangklip Sand Fynbos, North Peninsula Granite Fynbos, Peninsula Shale Fynbos, Peninsula Sandstone Fynbos and Southern Afrotemperate Forest (Table 2). These are mainly conserved in the Table Mountain National Park.

It is important to note that Elgin Shale Fynbos – a vegetation type occurring mainly outside the City – largely has been exploited for agriculture and is nationally Critically Endangered. However, within the City, a lower proportion

has been transformed and there is an opportunity to secure as much of this ecosystem as possible to improve its national conservation status.

Wetlands

The City's wetlands were studied at a much finer scale than the vegetation units and to a large extent are seasonal wetlands nested within the national vegetation units (Table 5). City wetland extent thus exceeds that recognized at the national scale as Cape Lowland Freshwater Wetland and Cape Estuarine Salt Marsh. 48 wetland types out of 54 identified types have natural or semi-natural wetlands remaining, but in some cases these are degraded by surrounding land use and are classed as "Ecological Support Areas" rather than "Critical Biodiversity Areas". This is true for Alluvium Fynbos, Renosterveld and some Granite Fynbos wetland types.

Eighty percent (38) of wetland types have the minimum target (by area) selected in the Biodiversity Network and the remainder (10) do not. Of the latter, six have no selected wetlands, as the remaining sites are all in a transformed landscape (Table 5: Alluvium Fynbos isolated depression, Alluvium Renosterveld valley bottom, Granite Fynbos depression, Granite Renosterveld isolated depression, Silcrete Renosterveld seep and valley bottom). In general, these wetlands have a lower habitat condition and will be difficult to restore given current land-use. However, they still serve important ecosystem functions.

Twelve wetland types have the minimum target conserved within protected areas. These comprise mainly the strandveld and sandstone fynbos wetland types. However, Sand Fynbos depression is also well conserved owing to waterbodies such as Princessvlei, Rondevlei and Zeekoevlei being included in this type (Table 5).

City Vegetation Types

A more detailed break-down of the conservation planning analysis results by the 59 City vegetation types is presented in Table 6. 17 types have insufficient remnant remaining to meet minimum targets. Of these, four are very small types that historically covered <100ha. The general patterns remain the same as for national vegetation types, with lowland vegetation types and those on richer soils having the lowest proportion of natural habitat remaining.

Table 3: Calculation of Critical Biodiversity Area Categories

CRITICAL BIODIVERSITY AREA CATEGORY		Habitat condition		C-plan Result		Marxan Result
Protected unless Core Flora Site only (CBA 1a)	=	High	+	Res	+	Conserved
		Medium		Res		Conserved
		Low		Res		Conserved
CBA 1a (where Core Flora Site only)		High		Res		Conserved
		Medium		Res		Conserved
		Low		Res		Conserved
CBA 1b		High		R 2		Conserved
		Medium		R 2		Conserved
CBA 1d (selection from CBA 2 sites based on expert opinion)		Low		R1_low/ R2_low		Available/ Earmarked
CBA 1c		High		R 1		Conserved
		Medium		R 1		Conserved
CBA 1e		High		0Co		Earmarked
		Medium		0Co		Earmarked
		Low		Exc		Earmarked
CBA 2		Low		R1_low		Available
		Low		R2_low		Available
		Low		R2_low		Earmarked
CESA 1a (selection from Other Natural Vegetation or Transformed areas based on expert opinion)		High		0Co/ Exc/<NULL>		Available/ Excluded/ <NULL>
		Medium		0Co/ Exc/<NULL>		Available/ Excluded/ <NULL>
		Low		0Co/ Exc/<NULL>		Available/ Excluded/ <NULL>
		Transformed		0Co/ Exc/<NULL>		Available/ Excluded/ <NULL>
Other Natural Vegetation unless CESA 1a		High				Available
		Low				Available
		High		0Co		Available
		Medium		0Co		Available
		Low		Exc		Available
Transformed unless CESA 1a		Transformed				Excluded
		Transformed		Exc		Excluded

C-Plan Outputs	
Res	Sites that are set as reserved in analysis as they have a Protected status
R 2	Mandatory sites (Irreplaceability =1) selected by C-plan when low habitat condition sites excluded from analysis
R2_low	Mandatory sites (Irreplaceability =1) selected by Minset algorithm when low habitat condition sites brought into analysis
R 1	Negotiable sites selected by C-plan
R1_low	Negotiable sites selected by Minset algorithm when low habitat condition sites brought into analysis
0Co	Sites that are not selected by C-plan
Exc	Sites that are excluded in C-plan initially due to having either Low habitat condition or having been transformed so that better condition sites are considered first

Marxan Outputs	
Conserved	Sites that are set as reserved in analysis as they have a Protected status or were selected in C-plan as R2 or R1 sites
Earmarked	Sites that were earmarked by Marxan
Available	Sites that were available for Marxan to choose from but were not earmarked by Marxan
Excluded	Sites that were excluded from the analysis as they are transformed

Table 4: CBA: Significance & Descriptions of Permissible Activities

SDF Cat	CBA Cat	CBA name	Subtype	Description	Significance of Habitat	Objective	Action	Compatible Activities
Protected	Protected	Conservation sites	National, Provincial, Local	Protected Areas (National, Provincial, Local & Contractual Nature Reserves)	Local, National & International significance: Loss of habitat will probably result in extinction of some species & inability to attain conservation targets.	Maintain natural ecosystems, restore degraded land to natural & manage for no further degradation. Ensure site is an asset to the surrounding communities.	Statutory conservation Areas. Ensure management plans are in place & implemented.	Conservation, low impact recreation & environmental education as outlined in the management plan for the site; hard infrastructure should not be situated in critical biodiversity areas, but outside & adjacent to these, or in existing highly degraded areas only.
Protected	Protected	Sites with Conservation Management	National, Provincial or Local government land managed but with no status	These areas are currently being managed as part of existing reserves or core flora sites, but have no legal status as yet.	Local, National & International significance: Loss of habitat will probably result in extinction of some species & inability to attain conservation targets.	Maintain natural ecosystems, restore degraded land to natural & manage for no further degradation.	Secure legal conservation status under the Protected Areas Act. Consolidate into existing provincial or local authority reserves where they lie adjacent. Ensure management plans are in place & implemented.	Conservation, low impact recreation & environmental education as outlined in the management plan for the site; hard infrastructure should not be situated in critical biodiversity areas, but outside & adjacent to these, or in existing highly degraded areas only.
Protected	Protected	Conservation Areas	Private	Private Nature Reserves, some of which have been secured under the CapeNature Stewardship programme	Local, National & International significance: Loss of habitat will probably result in extinction of some species & inability to attain conservation targets.	Maintain natural ecosystems, restore degraded land to natural and manage for no further degradation.	Pursue appropriate stewardship conservation status (contractual or biodiversity agreement). Ensure management plans are in place & implemented.	Conservation, low impact recreation & environmental education as outlined in the management plan for the site; hard infrastructure should not be situated in critical biodiversity areas, but outside & adjacent to these, or in existing highly degraded areas only.

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Critical Biodiversity Area 1	CBA 1a	Irreplaceable Core Flora sites	Non-protected core flora sites	Core Flora Sites: Irreplaceable sites of historical significance & very high priority	Local, National & International significance: Loss of habitat will probably result in extinction of some species & inability to attain conservation targets.	Obtain appropriate legal conservation status. Maintain natural ecosystems, restore degraded land to natural & manage for no further degradation.	Core Flora sites to be gazetted ASAP - we need action. High priority, very high urgency (immediate). Land owner negotiations. Invasive aliens to be controlled.	Conservation, low impact recreation & environmental education as outlined in the management plan for the site; hard infrastructure should not be situated in critical biodiversity areas, but outside & adjacent to these, or in existing highly degraded areas only.
Critical Biodiversity Area 1	CBA 1b	Irreplaceable High & Medium Condition sites	Irreplaceable sites	Critically Endangered vegetation of High & Medium quality. Needed for national targets. Any loss is a permanent & irrevocable loss.	Local, National & International significance: Loss of habitat will probably result in extinction of some species & inability to attain conservation targets.	Obtain appropriate legal conservation status. Maintain natural ecosystems, restore degraded land to natural & manage for no further degradation.	Needed for national targets. High priority, very high urgency (immediate). Invasive aliens to be controlled.	Conservation, low impact recreation & environmental education as outlined in the management plan for the site; hard infrastructure should not be situated in critical biodiversity areas, but outside & adjacent to these, or in existing highly degraded areas only.
Critical Biodiversity Area 1	CBA 1c	Minset High & Medium Condition sites	Minset Targets	High & Medium condition vegetation that is endangered or vulnerable & selected on the Biodiversity Network for meeting national targets (C Plan). Loss can be replaced by obtaining specific Unselected Natural Vegetation sites.	Local, National & International significance: Any loss will require specific alternative areas to be targeted for conservation, but these areas have been set as not negotiable so that the alternative sites can be freed up for development. Consequently these are not negotiable unless alternative, equivalent sites not on the Biodiversity Network are secured first.	Obtain appropriate legal conservation status. Maintain natural ecosystems, restore degraded land to natural & manage for no further degradation.	Needed for national targets. High priority, high urgency (5-10 year horizon). Invasive aliens to be controlled.	Conservation, low impact recreation & environmental education as outlined in the management plan for the site; hard infrastructure should not be situated in critical biodiversity areas, but outside & adjacent to these, or in existing highly degraded areas only.
Critical Biodiversity Area 1	CBA 1d	Irreplaceable Consolidation sites	Minset Targets	Critically Endangered vegetation of restorable condition. Essential for management consolidation & viability of CBA1a, CBA1b & protected sites.	Local, National & International significance: These areas are required to make existing remnants ecologically viable. Loss would result in higher condition remnants being lost through degradation of ecological processes & exhorbitant interventionary ecosystem management costs.	Obtain appropriate legal conservation status. Maintain natural ecosystems, restore degraded land to natural & manage for no further degradation.	Needed for national targets. High priority, high urgency (10 year horizon). Invasive aliens to be controlled.	As above, but higher impact activities (picnic sites, conservation offices, restaurants, EE centres etc) may be situated on highly degraded areas on existing development footprints where this does not impact negatively on ecological processes.

Critical Biodiversity Area 1	CBA1e	Connectivity sites	Marxan & expert corridor	High, Medium & Low condition vegetation that is endangered or vulnerable & selected on the Biodiversity Network for connectivity (Marxan)	Local, National & International significance: required to maintain large-scale ecosystem processes, climate change mitigation, animal migration & other long term, large scale effects.	As above but with a focus on the maintenance of ecological processes.	Consideration can only be given if suitable alternatives exist. High priority, medium urgency (10-20 year horizon). Invasive aliens to be controlled.	Low impact recreation (hiking, environmental education, bird watching etc); higher impact activities only where environment is suitable (e.g. mountain biking; horse riding on existing roads; boating on vleis etc); hard infrastructure should not be situated in critical biodiversity areas, but outside & adjacent to these, or in existing highly degraded areas on existing development footprints only.
Critical Biodiversity Area 2	CBA 2	Restorable Irreplaceable sites	Minset Targets	Critically Endangered vegetation of restorable condition. Needed for national targets but not for management consolidation, connectivity or viability of priority Biodiversity Network sites.	Although irreplaceable these are degraded. Their loss will have Local, National & International significance but low impact on high quality remnants.	Obtain appropriate conservation status. Maintain natural ecosystems, restore degraded land to natural & manage for no further degradation.	Conserve & restore. Alternatives can be negotiated with the use of compensation for the securing of priority sites. Medium priority, low urgency. Will require a bylaw: High priority, immediate urgency. Invasive aliens to be controlled.	Some higher impact activities (playparks, braai areas, picnic sites, conservation offices, restaurants, EE centres etc) may be situated on the edges of these sites or where the activity does not impact negatively on ecological processes, provided the remainder is restored; resource harvesting may be considered in accordance with the management plan for the site, but under strictly controlled conditions only.
Critical Biodiversity Area 1	CESA 1a	Transformed/ Unselected Natural Vegetation Sites of Conservation Significance	Additional consolidation & ecological support areas	Unselected Natural Vegetation or sites transformed by agriculture or other activities. Essential for management consolidation, connectivity & viability of biodiversity elements in CBA1a, CBA1b & protected sites.	Local, National & International significance: These areas are required to make existing remnants ecologically viable & for movement of larger fauna. Loss would result in the remnants or faunal species being lost through degradation of ecological processes & exhorbitant interventionary ecosystem management costs.	Obtain appropriate legal status, such as open space zoning. Maintain as open space & where appropriate restore degraded land to natural or near-natural for consolidation of other remnants.	Map areas & check zoning is agricultural or rural. Ensure agricultural activity is compatable with ecosystem processes. Where possible, acquire, rezone & rehabilitate. High priority, but low urgency (15 year horizon).	Generally areas outside the urban edge: existing agriculture practices may continue or other compatible farming may occur but the long-term vision is to restore natural ecosystem structure to some of the area to improve ecological processes.

Critical Biodiversity Area 1	CESA 1b	Additional Wetlands, Rivers & Groundwater Recharge areas	Ecological support areas	Areas not selected on Biodiversity Network that are in natural vegetation or areas transformed by agriculture or other activities. Essential ecological support for CBA1, CBA2 & protected sites.	Local significance: These areas may be required for long-term ecological functioning of natural ecosystems. Loss would result in degradation of ecological processes & potential loss of biodiversity elements.	Maintain as open space & where appropriate restore degraded land to natural or near-natural for improved ecological functioning.	Map areas & check zoning is appropriate. Where possible rehabilitate to enhance ecosystem functioning, including invasive alien control.	Activities that do not impinge on wetland functioning & water quality are permissable; ground-water recharge areas should retain sufficient infiltration areas.
Other Natural Vegetation	Other Natural Vegetation	Unselected natural vegetation in high, medium or restorable condition	Not selected	Natural vegetation in Endangered, Vulnerable & Least Concern in high, medium or restorable condition.	Local significance. Will result in impaired ability to meet targets, given that Higher categories will not always be achievable.	Sustainable management within general rural land-use principles	Negotiable. Low priority, no urgency. Invasive alien control	Until Biodiversit Network is secured elsewhere, these areas may become important if required as biodiversity offset sites. Some higher impact activities could be considered on degraded portions, but vegetation in good condition should be subject to low impact activities only.
Transformed	Transformed	Unselected Transformed Sites	Not selected	Transformed land of no currently known conservation significance	No significance.	Sustainable management applying accepted land-use principles	In terms of biodiversity conservation, no action is required.	Agriculture & urban development

Table 5: Wetland Prioritisation Study Statistics

General statistics from the wetland prioritization study, including only the natural and semi-natural wetlands, where prioritization ranking was performed within each wetland type. Six of the 54 wetland types had no natural or semi-natural wetlands remaining. CBA = Critical Biodiversity Area; CESA = Critical Ecological Support Area; OESA = Other Ecological Support Area (updated from Snaddon & Day 2009).

Wetland type	Current Extent (ha)*	Target (24%) (ha)	Extent in proclaimed Protected Areas	Target met in selected BioNet	CBA1		CBA2		CESA		OESA		Total	
					Area (ha)	Number	Area (ha)	Number	Area (ha)	Number	Area (ha)	Number	Area (ha)	Number
alluvium fynbos floodplain	4.2	1.0	0.0	2.4	3.0	4	0.0	0	1.2	2	0.0	0	4.2	6
alluvium fynbos isolated depression	1.8	0.4	0.0	0.0	0.0	0	0.9	2	0.9	2	0.0	0	1.8	4
alluvium fynbos isolated seep	15.0	3.6	2.0	2.0	2.0	1	0.0	0	13.0	16	0.0	0	15.0	17
alluvium fynbos seep	88.6	21.3	19.4	46.5	15.2	7	0.2	1	73.2	32	0.0	0	88.6	40
alluvium fynbos valley bottom	43.6	10.5	0.0	42.6	38.7	3	2.2	1	2.8	3	0.0	0	43.6	7
alluvium renosterveld valley bottom	0.7	0.2	0.0	0.0	0.0	0	0.0	0	0.7	1	0.0	0	0.7	1
cape estuarine channel	103.2	24.8	100.1	100.1	100.0	9	3.2	2	0.0	0	0.0	0	103.2	11
cape estuarine depression	133.6	32.1	131.0	131.0	131.0	14	2.7	4	0.0	0	0.0	0	133.6	18
cape river mouth	23.2	5.6	0.0	20.4	18.4	5	4.8	4	0.0	0	0.0	0	23.2	9
dune strandveld depression	74.0	17.8	35.2	53.9	35.2	6	25.7	5	13.2	7	0.0	0	74.0	18
dune strandveld floodplain	748.3	179.6	279.4	744.3	194.4	26	494.4	102	54.7	32	4.7	1	748.3	161
dune strandveld isolated depression	716.7	172.0	77.6	443.7	171.2	127	278.6	271	239.0	197	27.9	50	716.7	645
dune strandveld isolated seep	313.8	75.3	65.8	99.2	81.3	25	23.7	23	200.8	72	8.0	13	313.8	133
dune strandveld seep	84.8	20.3	74.9	83.2	81.9	23	0.7	1	0.6	1	1.6	1	84.8	26
dune strandveld valley bottom	60.8	14.6	45.3	58.7	45.1	12	12.9	3	2.0	9	0.8	2	60.8	26
granite fynbos depression	0.6	0.1	0.0	0.0	0.0	0	0.0	0	0.6	2	0.0	0	0.6	2
granite fynbos floodplain	216.0	51.8	0.0	21.0	54.8	4	25.3	11	14.5	13	121.4	1	216.0	29
granite fynbos isolated depression	1.1	0.3	0.3	0.3	0.3	2	6.5	4	0.6	2	0.3	5	7.6	13
granite fynbos isolated seep	63.5	15.2	6.9	31.0	34.0	43	0.0	0	18.4	23	4.7	7	57.1	73
granite fynbos seep	375.9	90.2	49.7	281.3	274.6	119	40.2	49	60.9	26	0.2	1	375.9	195
granite fynbos valley bottom	148.5	35.6	23.4	84.2	96.7	21	1.0	3	49.1	49	1.5	1	148.5	74
granite renosterveld depression	1.1	0.3	0.0	1.1	0.0	0	1.1	1	0.0	0	0.0	0	1.1	1
granite renosterveld floodplain	2.4	0.6	0.0	0.0	2.4	1	0.0	0	0.0	0	0.0	0	2.4	1
granite renosterveld isolated depression	0.5	0.1	0.0	0.2	0.2	1	0.0	0	0.3	1	0.0	0	0.5	2

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Wetland type	Current Extent (ha)*	Target (24%) (ha)	Extent in proclaimed Protected Areas	Target met in selected BioNet	CBA1		CBA2		CESA		OESA		Total	
					Area (ha)	Number	Area (ha)	Number	Area (ha)	Number	Area (ha)	Number	Area (ha)	Number
granite renosterveld isolated seep	6.2	1.5	0.0	1.7	4.8	2	0.4	1	1.0	4	0.0	0	6.2	7
granite renosterveld seep	51.8	12.4	0.0	15.1	0.7	1	8.8	4	42.3	18	0.0	0	51.8	23
granite renosterveld valley bottom	78.5	18.8	0.0	66.8	37.2	3	26.3	2	15.0	13	0.0	0	78.5	18
sand fynbos depression	561.5	134.8	515.0	542.3	159.7	13	48.2	11	347.3	12	6.3	8	561.5	44
sand fynbos floodplain	800.6	192.1	249.6	694.3	494.3	34	44.3	10	253.5	58	8.6	11	800.6	113
sand fynbos isolated depression	454.7	109.1	10.8	213.3	55.8	35	187.4	128	122.5	132	89.0	145	454.7	440
sand fynbos isolated seep	665.3	159.7	57.2	213.9	76.7	36	141.8	73	383.6	171	54.7	47	656.8	327
sand fynbos seep	210.9	50.6	1.2	107.4	15.2	9	86.9	34	89.1	51	19.7	17	210.9	111
sand fynbos valley bottom	319.9	76.8	107.2	221.1	153.2	8	14.7	12	77.9	30	74.0	33	319.9	83
sandstone fynbos isolated depression	20.7	5.0	7.5	15.6	20.4	35	0.1	2	0.2	1	0.0	0	20.7	38
sandstone fynbos isolated seep	230.3	55.3	165.3	214.9	210.5	377	16.6	36	3.3	3	0.0	0	230.3	416
sandstone fynbos seep	485.9	116.6	275.6	477.4	453.8	371	26.3	46	5.1	6	0.7	1	485.9	424
sandstone fynbos valley bottom	330.4	79.3	180.3	326.8	312.4	94	13.0	7	4.8	2	0.2	1	330.4	104
shale band seep	17.1	4.1	0.0	17.1	17.1	5	0.0	0	0.0	0	0.0	0	17.1	5
shale fynbos valley bottom	21.2	5.1	1.6	16.2	12.0	4	4.2	4	4.2	1	0.8	2	21.2	11
shale renosterveld depression	18.0	4.3	0.0	12.6	0.0	0	6.0	9	12.0	6	0.0	0	18.0	15
shale renosterveld floodplain	161.6	38.8	0.0	15.4	3.0	1	140.8	22	17.8	9	0.0	0	161.6	32
shale renosterveld isolated depression	21.6	5.2	0.0	6.0	4.2	3	1.8	1	15.6	22	0.0	0	21.6	26
shale renosterveld isolated seep	128.3	30.8	0.3	52.4	16.8	1	18.2	11	93.3	74	0.0	0	128.3	86
shale renosterveld seep	226.2	54.3	0.4	59.4	12.7	8	38.8	15	164.5	89	4.4	2	220.3	114
shale renosterveld valley bottom	319.6	76.7	0.0	157.5	102.5	5	72.1	13	145.0	52	0.0	0	319.6	70
silcrete renosterveld isolated seep	1.8	0.4	0.0	0.4	0.1	1	0.3	1	1.5	1	0.0	0	1.8	3
silcrete renosterveld seep	1.0	0.2	0.0	0.0	0.0	0	0.0	0	1.0	2	0.0	0	1.0	2
silcrete renosterveld valley bottom	2.7	0.7	0.0	0.0	2.3	1	0.0	0	0.5	1	0.0	0	2.7	2
Total	8599.5	2063.9	2482.9	5694.6	3545.8	1500	1820.8	929	2546.2	1246	424.6	348	8337.4	4023

* Note: historical extent for wetlands is unknown, therefore targets are based on current extent. For highly transformed environments, such as the Cape Flats, the target should be set higher

Table 6: Statistics from Conservation Planning Analysis for City vegetation types

Units are hectares unless specified.

City Vegetation Type	Historic extent	Current extent	% Remaining from historic extent	National Ecosystem Target %	Target	Selected in BioNet	% Selected in BioNet from current extent	Target met in selected BioNet	Extent in proclaimed Protected Areas	% Target met in proclaimed Protected Areas	Ecosystem Status (calculated)
Atlantis Sand Fynbos: Strandveld/Fynbos transition (on calcareous/acidic/neutral sands)	8930	7612	85	30	2679	6918	91	Yes	0	0	LT
Atlantis Sand Fynbos: on marine-derived acid sands	10799	6668	62	30	3240	4562	68	Yes	0	0	LT
Atlantis Sand Fynbos: on older non-aeolian colluvium	2817	1096	39	30	845	878	80	Yes	0	0	EN
Atlantis Sand Fynbos: on recent non-aeolian colluvium	2688	338	13	30	806	338	100	No	0	0	CR
Boland Granite Fynbos: on Granite	3542	2626	74	30	1063	2102	80	Yes	165	16	LT
Boland Granite Fynbos: on older non-aeolian colluvium	180	58	32	30	54	57	97	Yes	0	0	EN
Boland Granite Fynbos: on recent non-aeolian colluvium	5853	3382	58	30	1756	2649	78	Yes	189	11	VU
Cape Estuarine Salt Marshes: Wetlands	40	26	65	24	10	26	99	Yes	26	268	LT
Cape Flats Dune Strandveld: False Bay: on Granite	14	7	50	24	3	6	88	Yes	6	184	VU
Cape Flats Dune Strandveld: False Bay: on Mudstone	9	8	80	24	2	6	79	Yes	0	0	LT
Cape Flats Dune Strandveld: False Bay: on Sandstone	320	289	90	24	77	274	95	Yes	204	266	LT
Cape Flats Dune Strandveld: False Bay: on sands	24948	7605	30	24	5987	6269	82	Yes	1522	25	EN
Cape Flats Dune Strandveld: False Bay: on sands over or on limestone	1970	815	41	24	473	718	88	Yes	124	26	VU
Cape Flats Dune Strandveld: West Coast: on Shale	296	184	62	24	71	72	39	Yes	13	18	LT
Cape Flats Dune Strandveld: West Coast: on recent non-aeolian colluvium	80	7	9	24	19	7	100	No	0	0	CR
Cape Flats Dune Strandveld: West Coast: on sands	10093	8474	84	24	2422	5135	61	Yes	0	0	LT
Cape Flats Dune Strandveld: West Coast: on sands over or on limestone	2230	1938	87	24	535	1678	87	Yes	54	10	LT
Cape Flats Sand Fynbos: Strandveld/Fynbos transition (on	267	8	3	30	80	8	100	No	0	1	CR

City Vegetation Type	Historic extent	Current extent	% Remaining from historic extent	National Ecosystem Target %	Target	Selected in BioNet	% Selected in BioNet from current extent	Target met in selected BioNet	Extent in proclaimed Protected Areas	% Target met in proclaimed Protected Areas	Ecosystem Status (calculated)
calcareous/acidic/neutral sands)											
Cape Flats Sand Fynbos: on marine-derived acid sands	49601	7284	15	30	14880	7280	100	No	460	3	CR
Cape Flats Sand Fynbos: on older non-aeolian colluvium	4108	1038	25	30	1232	1038	100	No	3	0	CR
Cape Flats Sand Fynbos: on recent non-aeolian colluvium	435	139	32	30	130	139	100	Yes	0	0	EN
Cape Lowland Freshwater Wetlands: Wetlands	1464	1095	75	24	351	1069	98	Yes	787	224	LT
Cape Winelands Shale Fynbos: on Scree	698	697	100	30	209	697	100	Yes	0	0	LT
Cape Winelands Shale Fynbos: on Shale	1962	1011	52	30	589	692	68	Yes	218	37	VU
Cape Winelands Shale Fynbos: on recent non-aeolian colluvium	8	0	0	30	2	0	100	No	0	0	CR
Elgin Shale Fynbos: on Shale	841	310	37	30	252	283	91	Yes	5	2	EN
Hangklip Sand Fynbos: on marine-derived acid sands	2261	1138	50	30	678	942	83	Yes	929	137	VU
Hangklip Sand Fynbos: on sands	1041	773	74	30	312	548	71	Yes	434	139	LT
Kogelberg Sandstone Fynbos: on Sandstone	9500	9261	97	30	2850	8814	95	Yes	1944	68	LT
Lourensford Alluvium Fynbos: on recent non-aeolian colluvium	4819	410	9	30	1446	410	100	No	190	13	CR
North Peninsula Granite Fynbos: on Granite	1140	783	69	30	342	748	95	Yes	617	180	LT
North Peninsula Granite Fynbos: on recent non-aeolian colluvium	857	656	77	30	257	596	91	Yes	370	144	LT
Peninsula Sandstone Fynbos: on Mudstone	868	778	90	30	260	766	98	Yes	684	262	LT
Peninsula Sandstone Fynbos: on Sandstone	20455	20011	98	30	6137	19439	97	Yes	16098	262	LT
Peninsula Sandstone Fynbos: on marine-derived acid sands	31	31	100	30	9	31	100	Yes	0	0	LT
Peninsula Sandstone Fynbos: on sands	542	526	97	30	163	526	100	Yes	525	323	LT
Peninsula Shale Fynbos: on Shale	457	316	69	30	137	315	100	Yes	314	228	LT
Peninsula Shale Fynbos: on recent non-aeolian colluvium	805	374	46	30	242	374	100	Yes	373	155	VU
Peninsula Shale Renosterveld: on Shale	1883	305	16	26	490	305	100	No	253	52	CR
Peninsula Shale Renosterveld: on recent	492	12	2	26	128	12	100	No	8	6	CR

City Vegetation Type	Historic extent	Current extent	% Remaining from historic extent	National Ecosystem Target %	Target	Selected in BioNet	% Selected in BioNet from current extent	Target met in selected BioNet	Extent in proclaimed Protected Areas	% Target met in proclaimed Protected Areas	Ecosystem Status (calculated)
non-aeolian colluvium											
South Peninsula Granite Fynbos: on Granite	3258	1046	32	30	977	998	95	Yes	842	86	EN
South Peninsula Granite Fynbos: on marine-derived acid sands	233	114	49	30	70	106	93	Yes	90	129	VU
South Peninsula Granite Fynbos: on recent non-aeolian colluvium	3658	1303	36	30	1097	1187	91	Yes	838	76	EN
Southern Afrotemperate Forest: on Granite	31	31	100	34	10	31	100	Yes	27	254	LT
Southern Afrotemperate Forest: on Mudstone	31	31	100	34	10	31	100	Yes	24	229	LT
Southern Afrotemperate Forest: on Sandstone	44	44	100	34	15	44	100	Yes	38	259	LT
Southern Afrotemperate Forest: on Shale	13	13	100	34	4	13	100	Yes	13	294	LT
Southern Afrotemperate Forest: on marine-derived acid sands	2	2	100	34	1	2	100	Yes	2	294	LT
Southern Afrotemperate Forest: on recent non-aeolian colluvium	228	227	100	34	78	227	100	Yes	174	224	LT
Swartland Alluvium Fynbos: on Malmesbury Sandstone	1742	76	4	30	523	76	100	No	0	0	CR
Swartland Alluvium Renosterveld: on recent non-aeolian colluvium	62	0	0	26	2	0	0	No	0	0	CR
Swartland Granite Renosterveld: on Granite	5757	1491	26	26	1497	1491	100	No	36	2	CR
Swartland Granite Renosterveld: on older non-aeolian colluvium	2148	417	19	26	558	417	100	No	0	0	CR
Swartland Granite Renosterveld: on recent non-aeolian colluvium	154	44	29	26	40	44	100	Yes	0	0	EN
Swartland Shale Renosterveld: on Shale	41492	3746	9	26	10788	3746	100	No	381	4	CR
Swartland Shale Renosterveld: on older non-aeolian colluvium	21	0	0	26	5	0	0	No	0	0	CR
Swartland Shale Renosterveld: on recent non-aeolian colluvium	5200	273	5	26	1352	273	100	No	27	2	CR
Swartland Silcrete Renosterveld: on recent non-aeolian colluvium	1067	188	18	26	277	188	100	No	0	0	CR
Western Shaleband Vegetation: on Cedarberg Shale Band	329	329	100	30	99	329	100	Yes	31	32	LT

Note 1: Reclaimed areas & beach were excluded as little to no vegetation exists there; Note 2: Selected in BioNet: excludes Other Natural Vegetation & CESA 1a areas



ROADS & STORMWATER DEPARTMENT

Catchment, Stormwater and River Management Branch



Floodplain and River Corridor Management Policy



Balancing flood risk, ecological and socio-economic considerations in developments near watercourses and wetlands



Version 2.1

Approved by Council
27 May 2009
C 58/05/09

CITY OF CAPE TOWN | ISIXEKO SASEKAPA | STAD KAAPSTAD

(Previously entitled: Floodplain Management Guidelines)

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1 Preamble

There is a developing worldwide view in many cities that watercourses and wetlands, whether natural or constructed, form an integral component of urban stormwater management systems, are important for sustaining the aquatic ecology of the city, and are an essential element in restoring the urban fabric of the city by providing both recreational and socio-economic opportunities to all citizens.

A well managed watercourse / wetland is a valuable resource for improving the quality of life and aesthetic nature of an urban area and provides benefits for public health, recreation and economic growth. This is particularly important in the context of changing weather patterns and the associated local, national and international strategies targeting sustainability issues.

This policy document is an enhancement of the former Floodplain Management Guidelines (Version 1.0) published in September 2003. Various improvements have been effected to align the policy principles to corporate strategic objectives. It outlines the procedure for managing development adjacent to watercourses and wetlands taking cognisance of the flood regime, aquatic and riparian ecology as well as socio-economic factors.

2 Definitions

In this policy, unless inconsistent with the context:–

"Council" means the City of Cape Town;

“development” means any man-made change to property, including but not limited to construction or upgrading of buildings or other structures, filling, paving, municipal services, or the associated preparation of land;

“ecological buffer” means a strip of land adjacent to a watercourse, wetland or vlei required for the protection and enhancement of these ecosystems;

"fill" means the placement of fill material such as natural sands, dirt, soil or rock and may include concrete, cement or other waste materials at a specified location to bring the ground surface up to a desired elevation;

“floodlines” mean lines on a map or drawing depicting water levels likely to be reached by a flood having a specified recurrence interval;

“floodplain” means the land adjoining a watercourse which is susceptible to inundation by floods up to the one hundred year recurrence interval;

“floor” means the inner, lower surface of a room, garage or basement to which the occupants of a building have access;

“recurrence interval” means the average interval between rainfall or flood events equaling or exceeding a specified severity;

“river corridor” means a mixed-use corridor comprising a watercourse and/or associated wetlands, the floodplain, the ecological buffer and the area required for specific aesthetic, recreational and/or socio-economic needs. This combined area must be managed in an integrated manner which balances the flooding, environmental, social and economic issues;

“stormwater” means water resulting from natural precipitation and/or the accumulation thereof and includes groundwater and spring water ordinarily conveyed by the stormwater system, as well as sea water within estuaries, but excludes water in a drinking water or waste water reticulation system;

“stormwater system” means both the constructed and natural facilities, including pipes, culverts, watercourses and their associated floodplains, whether over or under public or privately owned land, used or required for the management, collection, conveyance, temporary storage, control, monitoring, treatment, use and disposal of stormwater;

"structure" means any man-made feature affixed to the ground or attached to something located on the ground, including but not limited to fences, walls, berms, levees, fill, storage tanks, shelters or buildings;

“top of bank” of a watercourse means a position identifiable by scour lines, vegetation limits, changes in bed and bank materials, the presence of flood deposited silt, or abrupt changes in slope;

“water sensitive urban design” is an approach which seeks to ensure that development in urban areas is holistically planned, designed, constructed and maintained so as to reduce negative impacts on the natural water cycle and protect aquatic ecosystems.

“watercourse” means a river, stream, channel, canal, vlei, wetland, dam or lake in or into which water flows regularly or intermittently. Reference to a watercourse includes, where relevant, its bed and banks;

“wetland” means land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil. This definition thus includes, but is not necessarily limited to, water bodies such as lakes, salt marshes, coastal lakes, estuaries, marshes, swamps, vleis, pools, ponds, pans and artificial impoundments.

“wetland delineation” means the determination and marking of the boundary of a wetland using nationally accepted guidelines / methodologies.

3 Introduction

Watercourses and wetlands are integral to the stormwater management system, are an important component of the City’s biodiversity network, and represent an essential element in restoring the urban fabric of the City by providing both recreational and economic opportunities.

This policy supports the Roads and Stormwater Department objectives incorporated in the Integrated Development Plan for the City of Cape Town, namely to;

- Reduce the impact of flooding on community livelihoods and regional economies
- Safeguard human health, protect natural aquatic environments, and improve and maintain recreational water quality

The management of land use, development or activity adjacent to watercourses and wetlands is important for the following reasons:

- It is far more cost effective, in the long term, to develop in areas where the threat of flooding is infrequent and the severity of flooding is minimal as opposed to the retrospective

implementation of flood mitigation works which would generally be extremely costly and sometimes prone to catastrophic failure when flood flows exceed the design capacity of infrastructure

- Climate change predictions indicate greater variability in the intensity and magnitude of storm events coupled with accelerated sea level rise. These uncertainties pose significant challenges for the management of major drainage systems.

- Encroachments result in ecological degradation, often reducing water quality and precipitating loss of ecological resources irreversibly.

- Since modifications to natural systems may disrupt natural aquatic and geomorphological processes they require a long term maintenance commitment. Therefore urban activity must be managed in such a way that maintenance activities can be adequately conducted.

- To promote a sense of place and recreational enjoyment for communities.

This policy describes a merit based approach for dealing with land use, development or activity proposals near watercourses and wetlands.

4 Legislative Context and Legal Mandate

Land use, development and associated activities influenced by this policy are dealt with in terms of the statutes and planning frameworks highlighted in the following sections.

4.1 National

- National Building Regulations & Building Standards Act, 1997 (Act 103 of 1977)
- Conservation of Agricultural Resources Act (Act 43 of 1983)
- National Water Act (Act 36 of 1998)
- National Environmental Management Act (Act 107 of 1998)
- Disaster Management Act (Act 57 of 2002)
- National Environmental Management: Biodiversity Act (Act 10 of 2004)
- National Environmental Management: Protected Areas Act (Act 57 of 2004)

4.2 Provincial

- Western Cape Planning & Development Act (Act 7 of 1999) (This Act will apply upon its coming into operation).
- Land Use Planning Ordinance, 1985 (Ordinance 15 of 1985)

4.3 City of Cape Town

- Integrated Development Plan (2007/8 to 2011/12)

  The Roads and Stormwater Department objectives are incorporated in the Integrated Development Plan for the City of Cape Town:

  - Reduce the impact of flooding on community livelihoods and regional economies

  - Safeguard human health, protect natural aquatic environments, and improve and maintain recreational water quality

- By-law relating to Stormwater Management (Promulgated September 2005 – PG 6300) together with which this policy is to be read and interpreted.

The City's By-law relating to Stormwater Management defines the stormwater system to mean "both the constructed and natural facilities, including pipes, culverts, watercourses and their associated floodplains, whether over or under public or privately owned land, used or required for the management, collection, conveyance, temporary storage, control, monitoring, treatment, use and disposal of stormwater".

Clauses 4 and 5 of the By-law deal with the protection of the stormwater system (which includes the natural and built systems and associated floodplain) and the prevention of flood risk.

It is in terms of this By-law therefore that Council may prohibit or conditionally permit development in areas adjacent to watercourses and wetlands.

In addition, a number of other documents have been produced over the years which have referred to the management of development adjacent to watercourses and wetlands, either directly or by implication, and considered how these areas should be managed. Some of the more pertinent are listed below.

- Greening the City: Open Space and Recreation Plan for Cape Town (1982)
- Roads and Stormwater Department: Catchment, Stormwater and River Management Strategy (2002)
- Biodiversity Strategy (2003) and Biodiversity Report (2008)
- Coastal Zone Strategy (2003) and Coastal Zone Management Review and State of the Coast Report Year 3 (2006)
- CMOSS – An Open Space Strategy (2005)
- Planning for Future Cape Town (2006)

5 Policy Rationale

Within the confines of the Cape Town Metropolitan Area the pressure to develop is significant and requires careful management to avoid developing in high flood risk areas, to protect the environmental integrity of aquatic resources and to ensure that permitted development enhances the aesthetics and character of the adjacent watercourses / wetlands.

In order to achieve this, a new approach is required where engineering, environmental and socio-economic elements are assessed and integrated as the vision for a particular watercourse / wetland system.

In this Policy a merit based approach is advocated for dealing with proposals within and adjacent to floodprone areas and environmental buffers. In addition, socio-economic considerations are also introduced whereby any permitted development will take cognizance of the presence of the watercourse / wetland and thereby holistically enhance the urban fabric of the area.

This Policy is important in achieving the service outcomes (refer to Section 3) namely; reducing the impact of flooding on people and properties, and of safeguarding human health, aquatic environments and improving and maintaining recreational water quality.

6 Policy Statement

"In order to ensure sustainable development and associated activities within or adjacent to natural and built stormwater systems, and that there is a balanced consideration of potential flood risk, environmental impacts and socio-economic needs, all developments within these areas shall be planned and designed in accordance with best practice and the requirements and conditions laid down in this policy."

This policy supports the service outcomes as highlighted in Section 3 above. It furthermore ensures administrative actions with respect to land use planning applications that are lawful, reasonable and procedurally fair.

7 Scope and Application

This policy is applicable to land use, development or building or activity proposals adjacent to watercourses or wetlands. The principles regarding flood management can also be applied to development in the vicinity of formal stormwater management systems.

8 Objectives

The objectives of this policy are to manage development in a manner that;

- Limits or reduces exposure to flood risk by avoiding hazardous, uneconomic or unwise use of floodplains, thereby protecting life, property and community infrastructure.
- Protects the natural flood carrying capacity of watercourses and wetlands.
- Protects and enhances the intrinsic value and the environmental goods and services provided by watercourses, wetlands and associated riparian areas and floodplains.
- Facilitates the beneficial integration of watercourses into the urban landscape by creating an aesthetically pleasing public resource which will ultimately allow for the social and economic up-liftment of communities adjacent to watercourses and wetlands.
- Provides an effective decision making tool for officials, developers and consultants by introducing an element of predictability with regard to applications for development along watercourses / river corridors and adjacent to wetlands.
- Promotes sustainable development from engineering, environmental and socio-economic perspectives.

9 Planning, Safety, Environmental and Socio-economic Considerations

Land use, development or activities near watercourses and wetlands must be appropriate for the anticipated degree of flood risk whilst minimising concomitant environmental impacts and sustaining a sense of place and urban form. The following sections outline the planning, safety, environmental and socio-economic aspects to be considered when evaluating applications as envisaged in Section 7 above.

9.1 Plans / Sectoral plans

Cognisance must be taken of applicable requirements and recommendations contained in various plans / related documents. Various categories of plans that should be consulted where

available are listed below. Sound engineering and environmental judgment should be applied in the absence of these guide plans.

- Roads and Stormwater Department: Catchment, Stormwater and River Management Strategy 2002 – 2007
- Catchment & River Management Plan
- Stormwater Master Plan

9.2 Flood Management and Public Safety

Watercourses and their associated floodplains can convey significant volumes of water under flood conditions. For the purposes of this policy, a floodplain is defined as the area susceptible to inundation by the 100-year flood, as indicated in Figure 1 below.

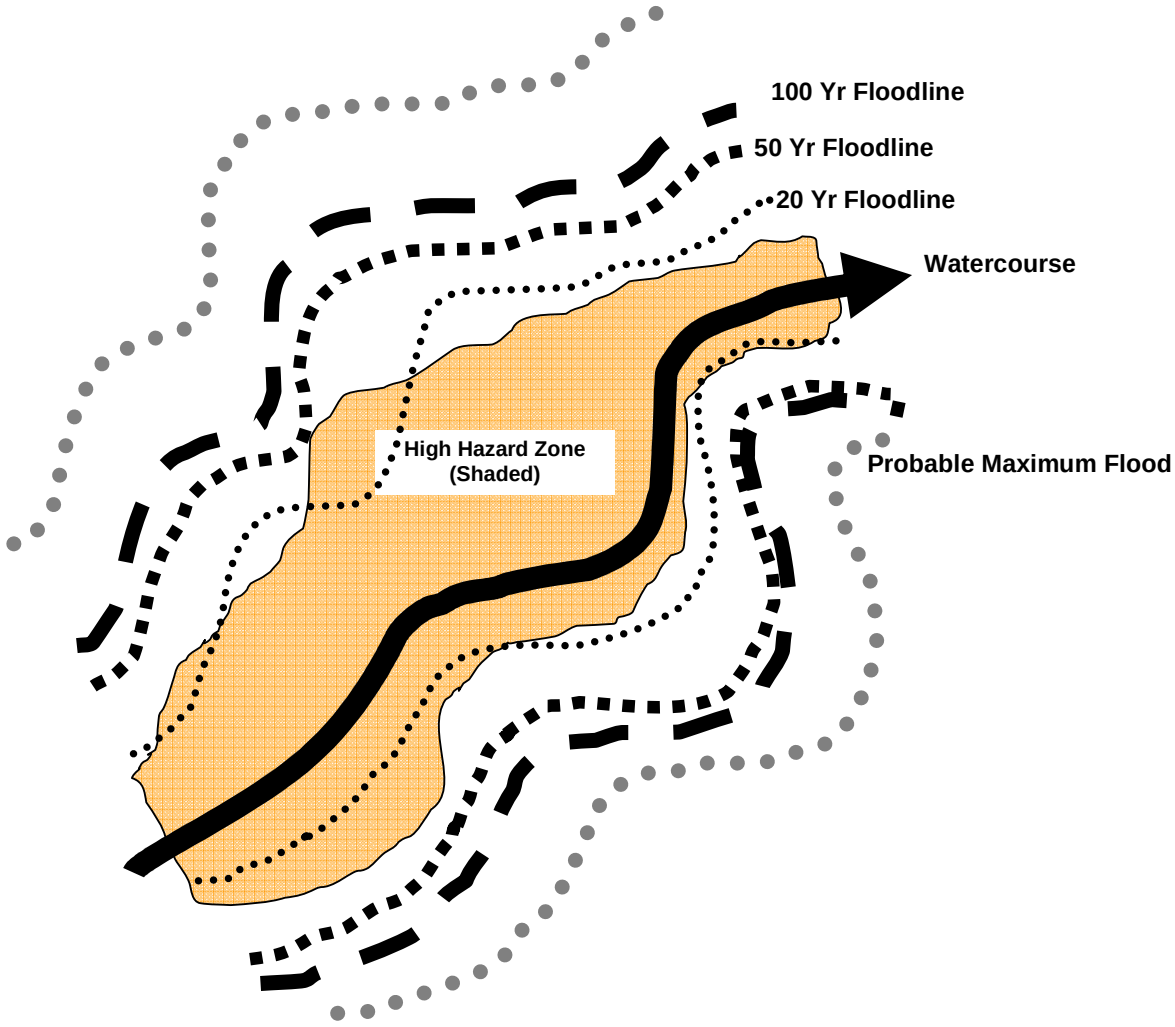


Figure 1: Schematic representation of floodplain depicting watercourse and significant floodlines

The high hazard zone within a floodplain, based on an analysis of the expected flow characteristics of the 100-year flood, is graphically indicated in Figure 2 below. The ability to wade or gain vehicular access as well as the stability of structures such as dwellings or boundary walls are deemed seriously compromised under these conditions. No new or additional rights or the exercising of existing development rights will be granted to properties located within the high hazard zone.

The permissible extent and nature of land use, development or activities within floodplains must be subject to stringent evaluation and control in the interests of public safety. In particular, obstruction to the free flow of water within the 20-year floodline area shall not be permitted. However, between the 50 and 100-year floodlines, some developments or activities may be permitted, subject to such conditions as the City may in its discretion impose, while developments with particular evacuation or emergency response issues and high risk developments will only be permitted above the 100-year floodline (refer to Table 1).

Any proposed development or redevelopment within the floodplain must be supported by a report by a registered professional engineer to ensure that any new or existing structure can withstand the forces and effects of floodwaters (refer to requirement R1 in Table 1). If building plans are submitted in respect of proposed buildings within the floodplain and such a report has not previously been submitted, it must be included with the building plans.

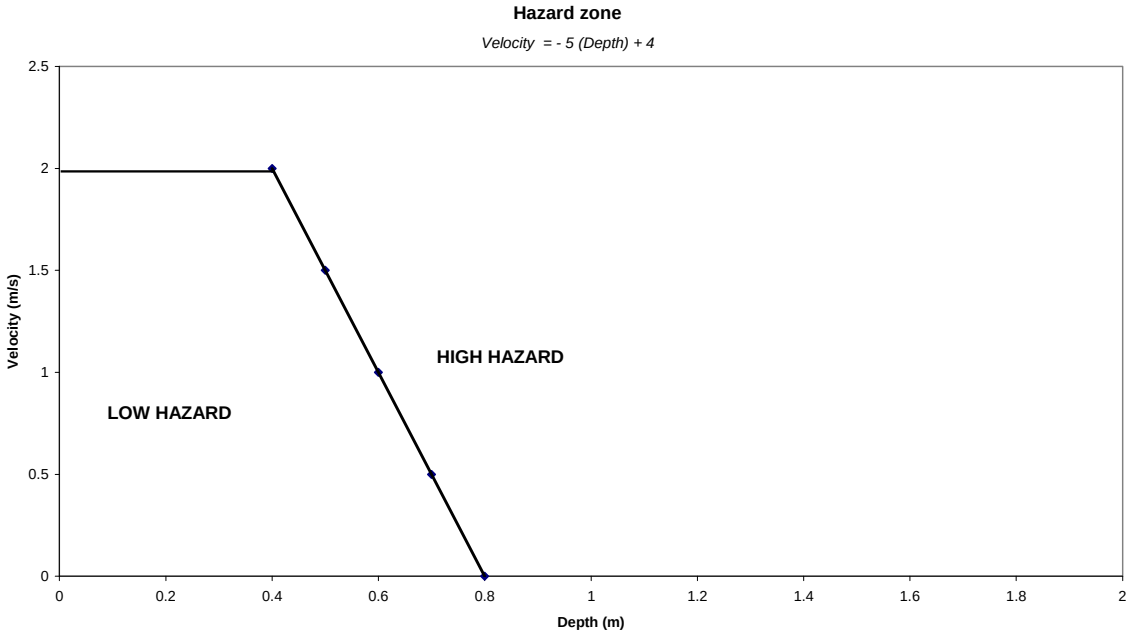


Figure 2: Flood hazard zones

9.2.1 Floodline Determination

Where floodlines have not previously been determined for a particular location, the developer will be required to procure the services of a suitably qualified registered engineering professional to undertake such determinations at own cost and to submit a report in connection therewith together with such planning or building plan approval applications he or she may lodge with the City. This should take place prior to any detailed planning being undertaken and must be in accordance with generally accepted practice.

In determining catchment runoff, the foreseeable ultimate development scenario for the catchment must be considered. All floodlines must be based on the theoretical energy level as opposed to the water surface level.

Permissible landuse / development / activity and applicable conditions within the floodplain are indicated in Table 1: Framework for the assessment of proposals (section 10). Depending on the type of application a range of floodlines must be determined as indicated below:

Floodline (Annual Probability)	Rationale
2 year (50%)	Determine if required (see Table 1)

Floodline (Annual Probability)	Rationale
20 Year (5 %)	Required for parking and other activities
50 Year (2%)	Controls a number of development activities
100 Year (1%)	Controls floor levels and high risk development activities

Note: Other legislation (e.g. NEMA) may require additional floodline determinations and therefore further restrictions may apply.

9.3 Ecological Buffers

Watercourses and wetlands with their adjacent riparian areas and associated fauna and flora must be protected or "buffered" from the impacts of adjacent development or activity. Often referred to as ecological buffers, these protected zones / set backs provide continuous corridors and habitat for flora and fauna. Buffers also provide other benefits such as water quality improvement of point or diffuse sources of pollution, stream bank and erosion protection from the hydrological impacts associated with hardened catchments in urban areas, and space for implementation of appropriate water sensitive urban design elements. In addition buffer areas can provide socio-economic benefits in the form public open space, opportunities for recreation and environmental education / awareness, and enhancement of waterway, visual and property values. In instances where watercourses have been canalized, buffers are still required to aid maintenance and, in some instances, to allow adequate space for possible future restoration activities.

Determination of ecological buffer widths is based on classification of the watercourse or wetland in terms of a recognized national classification system followed by an assessment of the ecological condition and importance of the system (using nationally recognized methods). Watercourses and wetlands with high ecological condition and importance require a wider buffer than those which have been exposed to considerable modification. For watercourses, buffer width may also be adjusted on the basis of the width of the active channel. The buffer is measured from watercourse "top of bank" or outer edge of the wetland (which must be delineated according to nationally accepted guidelines / methodologies e.g. DWAF 1999 and 2005). They have been determined for several of the significant watercourses and certain wetlands within the metropolitan area and vary in width between 10 m and 40 m for watercourses, and up to 75 m for wetlands. A minimum buffer of 10 m is required for concrete canals. Buffers must be adjusted to accommodate wetlands in close association with a watercourse as indicated schematically in Figure 3.

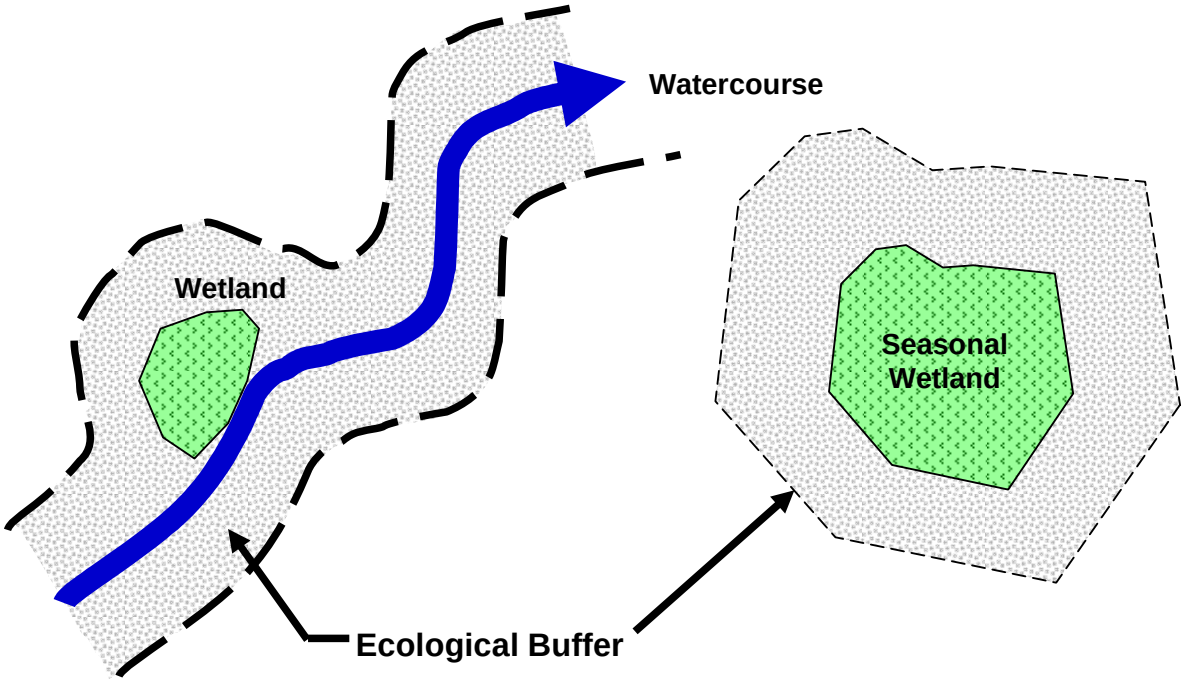


Figure 3: Schematic representation of ecological buffers

Where ecological buffers have not yet been determined for a particular watercourse or wetland, either the City may determine a buffer width by extrapolation if calculated buffer widths are available for similar situations elsewhere, or the developer is required to procure the services of a suitably qualified freshwater ecologist to recommend buffer widths in terms of Council guidelines or approved best practice at own cost and to submit a report in connection therewith together with such planning and building plan approval applications as he or she may submit to the City. This must take place prior to any detailed planning being undertaken.

Site / case specific adjustment of the recommended minimum buffer width may be necessary to allow for exceptional circumstances such as the presence of sensitive habitats, fauna or flora which may require wider buffers for adequate protection; the intensity of adjacent landuse and the nature of anticipated impacts; and the physico-chemical and/or botanical characteristics of the buffer area which may alter the efficacy of the buffer to mitigate against identified impacts.

Permissible landuse / development / activity and applicable conditions within the ecological buffer are indicated in Table 1: Framework for the assessment of proposals (section 10).

9.4 Geomorphological Processes

Cognisance must also be taken of the fact that the beds of many watercourses, particularly on the Cape Flats, are dynamic and prone to erosion, sedimentation and meandering. Where the ecological buffer width and/or floodplain setback requirement is considered an inadequate allowance for these natural processes, additional site-specific studies and setback width may be required in the discretion of the City prior to planning and building plan approval. In these instances, the developer will be required to procure the services of a suitably qualified geomorphologist to determine setback widths at own cost and to submit a report in connection therewith upon request.

9.5 Socio-economic Considerations

Watercourses and wetlands are public resources which have the remarkable potential to stimulate local economies and to break down political, social and economic barriers if managed

and used with this goal in mind. Assessment of developments adjacent to watercourses and wetlands must therefore take cognizance of this potential and promote developments which actively incorporate these systems into the urban fabric of the area.

Without derogating from the general nature of what is stated in this clause, the following specific issues must be considered:

- Water Sensitive Urban Design principles
- Layout / configuration and nature of adjacent development and/or associated activities
- Watercourse / wetland frontage with adjacent development
- Areas of passive and active open space
- Areas for walkways, cycle tracks, picnic facilities
- Aesthetic improvement of degraded systems with appropriate indigenous landscaping
- Public access
- Safety and security
- Economic upliftment
- Environmental education and awareness
- Environmental standards and best practice

Socio-economic considerations such as those listed may be taken into consideration by the City when evaluating planning and building plan approval applications, in its discretion.

9.6 River Corridor

The “River Corridor” comprises the watercourse and/or associated wetlands (as applicable), the floodplain, the ecological buffer and the area required for specific aesthetic, recreational and/or socio-economic needs. This combined area must be managed in an integrated manner which balances the flooding, environmental, social and economic issues (as outlined in the preceding sections 9.2 to 9.5) . The City shall strive to develop river corridor plans for all river corridor areas within its jurisdiction, in order to give effect ultimately to this holisitic vision.

An allowance of up to 10 m (measured from the top of bank or outer edge of the wetland) dependent on the current or future maintenance strategy for the watercourse / wetland must be made for maintenance access.

10 Assessment of Proposals and Applications

This policy advocates a merit-based approach to the assessment of proposals and applications pertaining to property near watercourses and wetlands. Any new land use, development, activity or building must be appropriate for the anticipated flood risk and geomorphological process requirements and compatible with the ecological buffer and socio-economic requirements, whilst allowing access for maintenance. Table 1 provides acceptable land use for the various floodplain zones and buffer, as well as specific requirements in instances where conditional approval is considered.

Proposed land-use / development / activities / buildings must be set back beyond the greater of the applicable floodplain, geomorphological and ecological buffer requirements.

Typical proposals requiring input and approval may be divided into three broad categories as described in the following sections.

10.1 Zoning Schemes, Structure Plans and Related Policies

Only land uses considered appropriate within the applicable floodplain and ecological buffer (Refer Table 1) can be contemplated. In addition geomorphological, maintenance as well as social and economic aspects must be considered.

10.2 Land Use Planning Applications

10.2.1 New Development Rights

Developments or activities falling within this category typically require additional and/or amended land use rights to proceed, such as:

- Rezoning
- Sub-division
- Land use departures
- Consent use
- Amendment of plans or conditions of approval

Only land uses, developments or activities considered appropriate within the applicable floodplain and ecological buffer (Refer to Table 1) can be contemplated. In addition geomorphological, maintenance, social and economic aspects must be considered where appropriate.

10.2.2 New Development Rights on Existing Building Footprint

Where no increase in existing building footprint or usage is proposed, as in the case of the redevelopment of an existing building, deviation from this could be considered, where the development or activity is located outside the high hazard zone, subject to compliance with the following:

- Fulfillment of requirements R1 and R2 on Table 1.
- Implementation of appropriate flood protection and mitigation works, including but not limited to the flood proofing of buildings and flood evacuation plans if appropriate. The developer must make adequate provision for future maintenance or operation.
- The registration of a Notarial Deed of Restraint against alienation, which provides that the registered owner shall not be entitled to alienate his/her property without the consent of the City. Such consent shall be withheld until such time as the new owner/purchaser signs an indemnity on terms and conditions acceptable to council. The issuing of a clearance certificate in terms of section 118(1) of the Municipal Systems Act No. 32 of 2000 shall not constitute consent for the abovementioned purpose.
- Endorsement of all Building Plans to the effect that the owner is aware of the consequences of developing within a floodplain and floodlines to be depicted on all applicable building plans.

10.3 Building Plan Applications (Exercising of Existing Development Rights)

Consideration of building plans for structures, submitted in terms of existing development rights, will be conditional on the following:

- Location of buildings on the higher lying portions of the property with floors above the 100-year flood level where practically possible, the flood proofing of buildings and flood evacuation plans where necessary.
- No buildings will be permitted within the high hazard zone.
- Limitation of all construction / development activity within the ecological buffer.
- Consideration of measures to mitigate potential maintenance impacts as appropriate.
- The registration of a Notarial Deed of Restraint against alienation, which provides that the registered owner shall not be entitled to alienate his/her property without the consent of the

City. Such consent shall be withheld until such time as the new owner/purchaser signs an indemnity on terms and conditions acceptable to council. The issuing of a clearance certificate in terms of section 118(1) of the Municipal Systems Act No. 32 of 2000 shall not constitute consent for the abovementioned purpose.

- Endorsement of all Building Plans to the effect that the owner is aware of the consequences of developing within a floodplain and floodlines to be depicted on all applicable building plans.

10.4 Development Layouts

In preparing development layouts cognisance must be taken of the various considerations outlined in the previous sections (10.2 and 10.3) as well as Council's Stormwater Management Planning and Design Guidelines for New Developments. Where appropriate, a servitude protecting the floodplain and / or ecological buffer from alteration or obstruction on completion of the development must be registered in favour of Council by the developer at own cost. Where maintenance access is required, this must also be incorporated in the conditions of servitude.

Buildings must be located above the appropriate flood level or buffer zone, or on the upper extremities of the property if the site is entirely located within the relevant floodline, and must front or provide views onto the watercourse or wetland to ensure adequate visual surveillance and integration of the system into the fabric of the development and the City as a whole. Perimeter fencing below the 50-year floodline must be visually permeable from ground level and not adversely affect the free flow of water and movement of aquatic fauna (e.g. palisade fencing).

10.5 Table 1: Framework for the Assessment of Proposals

Table Shading Key	
Colour Coding	**Description**
Clear	Permitted
	Conditionally Permitted
	Not Permitted

Additional Requirement Key	
Code	**Requirement**
R1	A registered Engineering Professional must be engaged by the developer to satisfactorily demonstrate and certify that: ▪ The activity / development will not materially increase flood hazards for other property owners or adversely affect flood behavior or the stability of river channels. ▪ Any structure can withstand the forces and effects of flowing floodwaters, including scour of foundations, debris forces and buoyancy forces.
R2	Floors above 1:100 year flood level. Basements (non-habitable purposes) to be flood-proofed to 1:50-year flood level.
R3	Floors above 1:50 year flood level.
R4	A registered Environmental Professional (Aquatic Ecologist) must be engaged by the developer to determine the ecological buffer (if not available) and to satisfactorily demonstrate and certify that: • The activity / development will not negatively impact on the present condition of the watercourse or wetland OR • The activity or development will improve the condition of the watercourse or wetland from its present state

The land use / development / activity must be set back beyond the *greater* of the applicable floodplain zone / geomorphological or ecological buffer requirements

Land use / Development / Activity		**Requirements and Conditions**							
		Floodplain Zone (Flood Recurrence Interval in Years)						**Ecological Buffer (Width in meters)**	
Category	**Typical Examples**	**< 2**	**2–20**	**20–50**	**50-100**	**>100 (Note 1)**	***Explanatory Notes***	**Up to 75m (Note 2,3)**	***Explanatory Notes***
Industrial Development	Light, General, High Risk								
	Extractive (Mining)		R1	R1	R1				
Business Development	General				R2				
	Commercial (CBD)								
	Service Stations								
Residential Development	Formal				R2				
	Informal								
Community & Public Facilities	Hospitals, Clinics, Nursing Homes, Old Age Home								

Land use / Development / Activity		Requirements and Conditions							
		Floodplain Zone (Flood Recurrence Interval in Years)						Ecological Buffer (Width in meters)	
Category	**Typical Examples**	**< 2**	**2–20**	**20–50**	**50-100**	**>100 (Note 1)**	***Explanatory Notes***	**Up to 75m (Note 2,3)**	***Explanatory Notes***
	Prisons, Military Bases, Police Stations, Fire Stations								
	Cemeteries								
	Educational Facilities								
	Public Halls, Places of Worship								
Utility / Infrastructure Services (incl. Private)	Stormwater Management Facilities	R1	R1					R4	
	Underground Sewers, Services						Manhole cover levels above 1:50 year flood level. Structure to be suitably protected and integrated into surrounds		
	On Site Sewage Treatment								
	Water & Wastewater Works, Pump Stations								
	Solid Waste Disposal Sites								
	Power Generation, Electrical Substations								
	Telecommunication Exchanges & Transmitters.								
Environment, Open Space & Recreation	Nature Reserves and Conservancies						All structures/earthworks to be subject to conditional approval		All structures/earthworks to be subject to conditional approval
	Sports Fields, Golf Courses, Picnic Areas		R1	R3			All club houses and similar structures to be above the 50 year floodline	R4	
	Public & Private Open Space						All structures/earthworks to be subject to conditional approval		All structures/earthworks to be subject to conditional approval
Agriculture	Cultivation, Free-range animal husbandry		R1	R1			Subject to Conservation of Agricultural Resources Act (CARA) Regulations		

Land use / Development / Activity		Requirements and Conditions							
		Floodplain Zone (Flood Recurrence Interval in Years)						Ecological Buffer (Width in meters)	
Category	**Typical Examples**	**< 2**	**2–20**	**20–50**	**50-100**	**>100 (Note 1)**	***Explanatory Notes***	**Up to 75m (Note 2,3)**	***Explanatory Notes***
	Agricultural Processing / Industry				R1,R2				
	Feedlots, Piggeries and Battery Farming			R1	R1		Subject to Conservation of Agricultural Resources Act (CARA) Regulations		
Resorts	Hotels, Holiday Resorts and Bungalows,				R2				
	Caravan and Camping Sites		R1	R3			All ablution facilities to be located above the 20 year floodline	R4	
Transport Systems	Roads and Railways elevated above NGL		R1	R1	R1				
	Modal Interchanges, Bus Depots, Railway Stations								
	Parking Areas			R1					
Bank Protection Works, Flow Diversion Structures, & Earthworks	Revetments, Training Walls, Levees	R1	R1	R1				R4	
	Dams, Weirs, Bridges	R1	R1	R1	R1	R1	Dam-break analysis to be performed where required in terms of National Water Act	R4	
	Filling				R1	R1	In exceptional circumstances minor "smoothing" of the 50 / 100 year floodline may be considered, provided equivalent compensatory stage storage volume is provided within the development precinct		

Note 1: The effects of the 100-year storm event on all developments and infrastructure, including adjacent and downstream properties, must be evaluated to comply with the above requirements.

Note 2: Watercourses: 10 to 40 m; Wetlands: up to 75 m

Note 3: Conditional approval may be granted for certain low impact social needs / activities, appropriate landscaping, indigenous planting, pathways

11 Commencement and Implementation

11.1 Commencement Date

Unless otherwise specified, the commencement date for this policy will be the date of adoption by Council

11.2 Existing Policies / Guidelines Repealed

The following existing policies / guidelines are repealed:

Title	Commencement Date	Resolution
Floodplain Management Guidelines: Version 1.0	September 2003	MC37/11/03

12 General

12.1 Statutory Permits and Approvals

Certain developments or activities may be subject to approvals in terms of national legislation by Provincial and National Government Departments.

Examples include, but are not limited to:

- Storing water
- Impeding or diverting the flow of water in a watercourse
- Altering the bed, banks, course or characteristics of a watercourse
- Using water for recreational purposes
- Abstraction
- Land reclamation
- Agricultural cultivation in close proximity to watercourses.

12.2 Indemnity

The degree of flood and/or environmental protection recommended by this policy is considered reasonable for regulatory purposes and is based on engineering and scientific methods of study. Mere compliance with its provisions cannot ensure complete protection from flooding particularly from high order events or reduced environmental impact and must therefore not be construed as a warranty.

This policy shall not create liability on the part of the City of Cape Town or any officer thereof, for any damage that may result from reliance thereon.

12.3 Copyright

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12.4 References

Flood Risk Reduction Measures, Alexander WJR, Department of Civil Engineering, University of Pretoria, April 2000

Development Control Guidelines in Floodprone Areas (Prepared for the former Cape Metropolitan Council), VKE Consulting Engineers (Pty) Ltd in association with Barker and Louw Town and Regional Planners, Dr J. Neethling (Environmental Specialist), Prof A. Rooseboom (Hydraulics and Hydrology Specialist) Du Plessis and Hofmeyer Attorneys, Dr C. Brown (Freshwater Ecologist), June 2000

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STORMWATER MANAGEMENT BY-LAW

APPROVED BY COUNCIL : 30 AUGUST 2005
C 35/08/05

PROMULGATED 23 SEPTEMBER 2005
PG 6300; LA 31420

CITY OF CAPE TOWN

BY-LAW RELATING TO STORMWATER MANAGEMENT

(Approved by Council on 30 August 2005—C35/08/05)

To provide for the regulation of stormwater management in the area of the City of Cape Town, and to regulate activities which may have a detrimental effect on the development, operation or maintenance of the stormwater system.

1. Definitions

In this by-law, unless inconsistent with the context:—

"Council" means the municipal council of the City of Cape Town, or any political structure, political office-bearer, committee, councillor, or official of the Council, delegated to exercise powers or perform duties in terms of this by-law;

"floodplain" means the land adjoining a watercourse which, in the opinion of the Council, is susceptible to inundation by floods up to the one hundred year recurrence interval;

"private stormwater system" means a stormwater system owned, operated or maintained by a person other than the Council;

"stormwater" means water resulting from natural precipitation and/or the accumulation thereof and includes groundwater and spring water ordinarily conveyed by the stormwater system, as well as sea water within estuaries, but excludes water in a drinking water or waste water reticulation system;

"stormwater system" means both the constructed and natural facilities, including pipes, culverts, watercourses and their associated floodplains, whether over or under public or privately owned land, used or required for the management, collection, conveyance, temporary storage, control, monitoring, treatment, use and disposal of stormwater;

"water pollution incident" means an incident or occurrence which has a detrimental impact or a potential detrimental impact on the quality of the water in the stormwater system to such an extent that public health or the health of natural ecosystems may be threatened, and

"watercourse" means:—

(a) a river, spring, stream, channel or canal in which water flows regularly or intermittently, and

(b) a vlei, wetland, dam or lake into which or from which water flows,

and includes, where relevant, the bed and the banks of such watercourse.

2. Application

(1) This by-law binds any organ of state.

(2) Any provision in any other by-law dealing specifically with stormwater, is subject to the provisions of this by-law.

3. Prohibited discharges

No person may, except with the written consent of the Council and subject to any conditions it may impose, discharge, permit to enter or place anything other than stormwater into the stormwater system.

4. Protection of stormwater system

No person may, except with the written consent of the Council and subject to any conditions it may impose—

(a) damage, endanger, destroy or undertake any action likely to damage, endanger or destroy, the stormwater system or the operation thereof;

(b) discharge from any place, or place onto any surface, any substance other than stormwater, where that substance could reasonably be expected to find its way into the stormwater system;

(c) discharge, permit to enter or place anything likely to damage the stormwater system or interfere with the operation thereof or contaminate or pollute the water therein;

(d) construct or erect any structure or thing over or in such a position or in such a manner so as to interfere with or endanger the stormwater system or the operation thereof; or

(e) make an opening into a stormwater pipe, canal or culvert; or

(f) drain, abstract or divert any water directly from the stormwater system, or

(g) fill, excavate, shape, landscape, open up or remove the ground above, within, under or immediately next to any part of the stormwater system.

5. Prevention of flood risk

No person may, except with the written consent of the Council and subject to any conditions it may impose—

(a) obstruct or reduce the capacity of the stormwater system;

(b) change the design or the use of, or otherwise modify any aspect of the stormwater system which, alone or in combination with other existing or potential land uses, may cause an increase in flood levels or create a potential flood risk; or

(c) undertake any activity which, alone or in combination with other existing or future activities, may cause an increase in flood levels or create a potential flood risk.

6. Studies and assessments

(1) The conditions which the Council may impose in terms of Sections 3, 4, and 5, may include, but are not limited to—

(a) the establishment of flood lines;

(b) the undertaking of impact assessments, and

(c) environmental impact studies or investigations which may be required by any applicable environmental legislation.

(2) The costs of any study undertaken in terms of the provisions of subsection (1), will be for the account of the applicant.

7. Water pollution incidents

In the event of an incident contemplated in Section 3 or Section 4(b) and (c)—

(a) the owner of the property on which the incident took place, or is still in the process of taking place, or

(b) the person responsible for the incident, if the incident is not the result of natural causes,

shall immediately report the incident to the council, and at own cost, take all reasonable measures which, in the opinion of the Council, will contain and minimise the effects of the pollution, by undertaking cleaning up procedures, including the rehabilitation of the environment, as required by the Council.

8. Stormwater systems on private land

(1) Every owner of property on which private stormwater systems are located, shall—

(a) not carry out any activity which will or which, in the opinion of the Council, could reasonably be expected to impair the effective functioning of the stormwater system, and

(b) at own cost, keep such stormwater systems functioning effectively, including undertaking the refurbishment and reconstruction thereof if, in the opinion of the Council, it should be reconstructed or refurbished.

(2) The provisions of subsection (1) do not apply to the extent that the Council has accepted responsibility for any of the duties contained therein, either in a formal maintenance agreement or in terms of a condition of a servitude.

9. Provision of Infrastructure

(1) The Council may—

(a) construct, expand, alter, maintain or lay any drains, pipes or other structures related to the stormwater system on or under any immovable property, and ownership of these drains, pipes or structures shall vest in the municipality;

(b) drain stormwater or discharge water from any municipal service works into any natural watercourse, and

(c) do any other thing necessary or desirable for or incidental, supplementary or ancillary to any matter contemplated by subsection (a).

(2) When the Council exercises its powers in terms of subsection (1)(a) in regard to immovable property not owned by the municipality, it shall comply with the provisions of the By-law Relating to the Management and Administration of the City of Cape Town's immovable Property.

10. Powers of the Council

(1) The Council may—

(a) demolish, alter or otherwise deal with any building, structure or other thing constructed, erected or laid in contravention of the provisions of this by-law;

(b) fill in, remove and make good any ground excavated, removed or placed in contravention with the provisions of this by-law;

(c) repair and make good any damage done in contravention of the provisions of this by-law or resulting from a contravention;

(d) remove anything discharged, permitted to enter into the stormwater system or natural watercourse in contravention of the provisions of this by-law;

(e) remove anything damaging, obstructing or endangering or likely to obstruct, endanger or destroy any part of the stormwater system;

(f) seal off or block any point of discharge from any premises if such discharge point is in contravention of the provisions of this by-law, irrespective of whether the point is used for lawful purposes;

(g) cancel any permission granted in terms of this by-law if the conditions under which the permission was granted are not complied with;

(h) by written notice, direct any owner of property to allow the owner of a higher lying property to lay a stormwater drain pipe or gutter over his or her property for the draining of concentrated stormwater;

(i) by written notice, direct any owner of property to retain stormwater on such property or, at the cost of such owner, to lay a stormwater drain pipe or gutter to a suitable place indicated by the Council, irrespective of whether the course of the pipe or gutter will run over private property or not, and

(j) discharge stormwater into any watercourse, whether on private land or not.

(2) The Council may, in any case where it seems that any action or neglect by any person or owner of property may lead to a contravention of the provisions of this by-law, give notice in writing to such person or owner of property to comply to such requirements as the Council may deem necessary to prevent the occurrence of such contravention.

(3) The Council may recover all reasonable costs incurred as a result of action taken in terms of subsection (1) from a person who was responsible for a contravention of the provisions of this by-law or the owner of the property on which a contravention occurred.

11. Offences and penalties

(1) Any person who—

(a) contravenes any provision of this by-law;

(b) fails to comply with the terms of any notice issued in terms of this by-law;

(c) threatens, resists, hinders or obstructs or uses foul, abusive or insulting language towards or at a councillor or an employee or contractor of the Council in the exercise of any powers or performance of any duties or function in terms of this by-law, or falsely holds himself or herself to be a councillor or an employee or a contractor of the Council,

shall be guilty of an offence and be liable, on conviction, to the payment of a fine. 31420

STAD KAAPSTAD

VERORDENING OP VLOEDWATERBESTUUR

(Deur die Raad op 30 Augustus 2005 goedgekeur—C35/08/05)

Om voorsiening te maak vir die regulering van vloedwaterbestuur in die gebied van die Stad Kaapstad, en om die aktiwiteite te reguleer wat 'n nadelige uitwerking op die ontwikkeling, werking of instandhouding van die vloedwaterstelsel kan hê.

1. Woordomskrywings

In hierdie verordening, tensy uit die samehang anders blyk, beteken—

"private vloedwaterstelsel" 'n vloedwaterstelsel wat deur 'n persoon buiten die Raad besit, bedryf of in stand gehou word;

"Raad" die munisipale raad van die Stad Kaapstad, of enige politieke struktuur, politieke ampsdraer, komitee, raadslid, of amptenaar van die Raad wat gemagtig is om ingevolge ierdie verordening bevoegdhede uit te oefen of pligte uit te voer;

"vloedplein" die grond wat aan 'n waterloop grens en wat volgens die Raad se mening nie bestand is teen oorstroming tot by die honderdjaar-herhalingsinterval nie;

"vloedwater" water afkomstig van natuurlike neerslag en/of die opgaring daarvan en behels grondwater en bronwater wat gewoonlik deur die vloedwaterstelsel vervoer word, asook seewater in riviermondings, maar sluit water in 'n drinkwater- of afvalwaterretikulasiestelsel uit;

"vloedwaterstelsel" die opgerigte en natuurlike geriewe waaronder pype, duikslote, waterlope en hulle meegaande vloedpleine, hetsy oor of onder grond in openbare of private besit, wat vir die bestuur, versameling, vervoer, tydelike berging, beheer, monitor, behandeling, gebruik en wegvoer van vloedwater gebruik of vereis word;

"waterbesoedelingsvoorval" 'n voorval of gebeurtenis wat 'n nadelige uitwerking of 'n moontlike nadelige uitwerking op die gehalte van die water in die vloedwaterstelsel het tot so 'n mate dat openbare gesondheid of die gesondheid van natuurlike ekostelsels bedreig mag word, en

"waterloop"

(a) 'n rivier, bron, stroom, sloot of kanaal waarin water gereeld of met tussenposes vloei, en

(b) 'n vlei, moeras, dam of meer waarin of waaruit water vloei,

en behels, waar tersaaklik, die bedding en oewers van sodanige waterlope.

2. Toepassing

(1) Hierdie verordening bind enige staatsorgaan.

(2) Enige bepaling in enige ander verordening spesifiek ten opsigte van vloedwater, is onderworpe aan die bepalings van hierdie verordening.

3. Verbode afvoer

Geen persoon mag, behalwe met die geskrewe vergunning van die Raad en behoudens enige voorwaardes wat dit mag oplê, enigiets anders as vloedwater in die vloedwaterstelsel afvoer, daarin toelaat of daarin plaas nie.

4. Beskerming van vloedwaterstelsel

Geen persoon mag, behalwe met geskrewe vergunning van die Raad en behoudens enige voorwaardes wat dit mag oplê—

(a) die vloedwaterstelsel of die werking daarvan beskadig, bedreig, vernietig of op enige wyse optree wat die vloedwaterstelsel of die werking daarvan waarskynlik sal beskadig, bedreig of vernietig nie;

(b) enige ander materie behalwe vloedwater van enige plek afvoer of op enige oppervlakte plaas as daar redelikerwys verwag kan word dat daardie materie daarin sal slaag om in die vloedwaterstelsel te beland nie;

(c) enigiets wat waarskynlik die vloedwaterstelsel kan beskadig of inmeng met die werking daarvan of die water daarin besmet of besoedel, afvoer of daarin toelaat of daarin plaas nie;

(d) enige struktuur of ding oor of in so 'n posisie of op so 'n manier bou of oprig dat dit inmeng met of die vloedwaterstelsel of die werking daarvan bedreig nie; of

(e) 'n opening in 'n vloedwaterpyp, kanaal of duiksloot maak nie; of

(f) enige water regstreeks uit die vloedwaterstelsel afvoer, onttrek of aflei nie, of

(g) die grond bokant, binne-in, onder of onmiddellik langsaan enige deel van die vloedwaterstelsel vul, uitgrawe, vorm, tuinuitleg doen of die grond bo-op oopmaak of verwyder nie.

5. Voorkoming van vloedgevaar

Geen persoon mag, behalwe met geskrewe vergunning van die Raad en behoudens enige voorwaardes wat dit mag oplê—

(a) die kapasiteit van die vloedwaterstelsel versper of verminder nie;

(b) die ontwerp of die gebruik van enige aspek van die vloedwaterstelsel wat op sigself of tesame met ander bestaande of moontlike grondgebruik aanleiding gee tot 'n toename in vloedvlakke of 'n moontlike vloedgevaar skep, verander of andersins wysig nie; of

(c) enigiets doen wat op sigself of tesame met ander bestaande of toekomstige aktiwiteite 'n toename in vloedvlakke kan veroorsaak of 'n moontlike vloedgevaar kan skep nie.

6. Studies en beoordelings

(1) Die voorwaardes wat die Raad ingevolge artikels 3, 4 en 5 mag oplê, mag behels, maar is nie beperk tot—

(a) die vasstelling van vloedlyne;

(b) die doen van impakbeoordelings, en

(c) omgewingsimpakstudies of ondersoeke wat deur enige toepaslike omgewingswetgewing vereis mag word.

(2) Die koste van enige studie wat ingevolge die bepalings van subartikel (1) gedoen word, is vir die rekening van die aansoeker.

7. Waterbesoedelingsvoorvalle

In die geval van 'n voorval beoog in artikel 3 of artikel 4(b) en (c) moet—

(a) die eienaar van die eiendom waarop die voorval gebeur het, of nog aan die gang is, of

(b) die persoon wat vir die voorval verantwoordelik is indien die voorval nie die gevolg van natuurlike oorsake is nie,

die voorval onmiddellik by die Raad aanmeld en op eie koste alle redelike maatreëls tref om, volgens die Raad se mening, die uitwerking van die besoedeling in bedwang te hou en te verminder deur skoonmaakprosesse in werking te stel, waaronder die rehabilitasie van die omgewing, soos deur die Raad vereis.

8. Vloedwaterstelsels op private grond

(1) Elke eienaar van eiendom waarop private vloedwaterstelsels geleë is, moet—

(a) niks doen wat die doeltreffende funksionering van die vloedwaterstelsel benadeel of wat, volgens die Raad se mening, redelikerwys van verwag kan word om dit te benadeel nie, en

(b) op eie koste sodanige vloedwaterstelsels doeltreffend laat werk en om dit onder meer op te knap en te rekonstrueer indien dit volgens die Raad se mening gerekonstrueer en opgeknap moet word.

(2) Die bepalings van subartikel (1) is nie van toepassing in die mate dat die Raad enige verantwoordelikheid aanvaar vir enige van die pligte daarin vervat nie, hetsy in 'n formele instandhoudingsooreenkoms of ingevolge 'n voorwaarde van 'n serwituut nie.

9. Voorsiening van infrastruktuur

(1) Die Raad mag—

(a) enige dreine, pype of ander strukture ten opsigte van die vloedwaterstelsel op of onder enige onroerende eiendom uitbrei, verander of lê nie en die eienaarskap van hierdie dreine, pype en strukture berus by die munisipaliteit;

(b) vloedwater afvoer of water uit enige munisipale diensaanlegte in enige natuurlike waterloop afvoer nie, en

(c) niks anders doen wat nodig of wenslik is vir, of toevallig, aanvullend of bykomend is tot enige ander saak beoog in subartikel (a) nie.

(2) Wanneer die Raad sy bevoegdhede betreffende onroerende eiendom wat nie deur die munisipaliteit besit word nie, ingevolge subartikel (1)(a) uitoefen, moet dit voldoen aan die bepalings van die Verordening op die Bestuur en Administrasie van die Stad Kaapstad se Onroerende Eiendom.

10. Bevoegdhede van die Raad

(1) Die Raad mag—

(a) enige gebou, struktuur of enige ander ding wat is strydig met die bepalings van hierdie verordening gebou, opgerig of gelê is, afbreek, verander of andersins daaraan aandag skenk;

(b) enige grond wat strydig met die bepalings van hierdie verordening uitgegrawe, verwyder of geplaas is, opvul, verwyder en die skade vergoed;

(c) enige skade wat strydig met die bepalings van hierdie verordening aangerig is of wat spruit uit sodanige oortreding, herstel en die skade vergoed;

(d) enigiets verwyder wat strydig met die bepalings van hierdie verordening afgevoer is of toegelaat is om in die vloedwaterstelsel of natuurlike waterloop te beland;

(e) enigiets verwyder wat skade aan enige deel van die vloedwaterstelsel kan berokken of dit versper of bedreig of dit waarskynlik kan versper, bedreig of vernietig;

(f) enige afvoerpunt uit enige perseel afdig of afsluit indien sodanige afvoerpunt strydig is met die bepalings van hierdie verordening ongeag of die afvoerpunt vir wettige doeleindes gebruik word;

(g) enige toestemming wat ingevolge hierdie verordening verleen is, kanselleer indien die voorwaardes ingevolge waarvan die toestemming verleen is, nie nagekom word nie;

(h) enige eienaar van 'n eiendom skriftelik opdrag gee om die eienaar van 'n hoërliggende eiendom toe te laat om 'n vloedwaterafvoerpyp of afloopsloot oor sy of haar eiendom aan te lê vir die afvloei van gekonsentreerde vloedwater;

(i) enige eienaar van 'n eiendom skriftelik opdrag gee om vloedwater op sodanige eiendom terug te hou op koste van die eienaar of om 'n vloedwaterafvoerpyp of afloopsloot aan te lê na 'n geskikte plek deur die Raad aangedui, ongeag of die pyp of afloopsloot oor private grond loop al dan nie, en

(j) vloedwater in enige waterloop afvoer hetsy private grond al dan nie.

(2) Die Raad mag in elke geval waar dit skyn asof enige doen of late deur enige persoon of eienaar van 'n eiendom tot 'n oortreding van die bepalings van hierdie verordening mag lei, skriftelik kennis gee aan sodanige persoon of eienaar van 'n eiendom om aan sodanige vereistes te voldoen as wat die Raad as noodsaaklik beskou om 'n herhaling van sodanige oortreding te verhoed.

(3) Die Raad mag alle redelike koste wat opgeloop is as gevolg van optrede ingevolge subartikel (1), verhaal van 'n persoon wat verantwoordelik was vir 'n oortreding van die bepalings van hierdie verordening of van die eienaar van die eiendom waarop die oortreding begaan is.

11. Misdrywe en strawwe

(1) Enige persoon wat—

(a) enige bepaling van hierdie verordening oortree;

(b) versuim om te voldoen aan die voorwaardes van enige kennisgewing uitgereik ingevolge hierdie verordening;

(c) 'n raadslid of 'n werknemer of 'n kontrakteur van die Raad in die uitoefening van enige bevoegdhede of uitvoering van enige pligte of funksie ingevolge hierdie verordening dreig, verset teen, hinder of dwarsboom of vuil of skeltaal of beledigende taal gebruik teen of met hulle gebruik, of hom of haar valslik as 'n raadslid of werknemer of kontrakteur van die Raad voordoen,

is aan 'n misdryf skuldig en is by skuldigbevinding strafbaar met 'n boete.

31420

ISIXEKO SASEKAPA

UMTHETHO KAMASIPALA OPHATHELELE KULAWULO LWAMANZI ESITSHI

(Owamkelwa liBhunga ngomhla wama-30 Agasti 2005—C35/08/05)

Ukubonelela ngomthetho olawula amanzi esitshi kummandla weSixeko saseKapa, nokulawula imisebenzi enokuba nempembelelo eyonakalisayo kuphuhliso, ekusebenzeni okanye kulondolozo lwemijelo yamanzi esitshi.

1. Iinkcazelo

Kulo mthetho kamasipala, ngaphandle kokuba ayingqinelani nomxholo:—

"IBhunga" kubhekiselelwe kwibhunga lomasipala weSixeko saseKapa, okanye nawuphi na umbutho wezopolitiko, igosa le-ofisi yezopolitiko, ikomiti, uceba, okanye igosa leBhunga, eligunyaziselwe ukusebenzisa ulawulo okanye ukwenza imisebenzi ngokwemigaqo yalo mthetho kamasipala;

"ithafa elinamanzi" kubhekiselelwe kumhlaba owayame emlanjeni nothi, ngokwembono yeBhunga, uvumele ukuzaliswa ngamanzi eempuphuma kwisithuba esifikelela kwiminyaka elikhulu ilandelelana;

"umjelo wamanzi esitshi wabucala" kubhekiselelwe kumjelo wamanzi esitshi olawulwa, osetyenziswa okanye olondolozwa ngumntu ozimeleyo ingelilo iBhunga;

"amanzi esitshi" kubhekiselelwe kumanzi athi ngenxa yokuwa kwemvula ngokwendalo kunye/okanye ngenxa yokonyuka kwamanzi yaye oku kuquka namanzi aphantsi komhlaba namanzi atsaza kumaqula naveliswa ngumjelo wamanzi esitshi, ngokunjalo namanzi olwandle akumachweba emilambo, kodwa akuqukwa amanzi akwimijelo yamanzi aselwayo okanye kwimijelo eyahlulelwe amanzi amdaka;

"umjelo wamanzi esitshi" kubhekiselelwe kumijelo eyokhiweyo naleyo yendalo, kuqukwa imibhobho, imijelo enqumla phantsi kweendlela, imilanjana namathafa anamanzi akufuphi nawo, nokuba akumhlaba ophantsi kolawulo loluntu okanye kulawulo lwabucala, osetyenziselwa okanye oyimfuneko ukuze kulawulwe, kuqokelelwe, kuhanjiswe, kugcinwe okwethutyana, kulawulwe, kukhangelwe, kucocwe, kusetyenziswe kunye nokulahlwa kwamanzi esitshi;

"isehlo sokungcoliseka kwamanzi" kubhekiselelwe kwisehlo okanye kwimeko enempembelelo eyonakalisayo kumgangatho wamanzi akwimijelo yamanzi esitshi kangangokuba impilo yoluntu okanye impilo yezinto eziphilileyo nendawo eziphila kuyo ngokwendalo zibe sengozini, yaye

"indawo enamanzi" kubhekiselelwe:—

(a) Kumlambo, kwiqula, umsinga, umjelokazi nalapho amanzi ahamba rhoqo okanye ngokweziqabu, kunye

(b) Umgxobhozo, indawo emanzi, idama okanye ichibi apho kuhamba khona amanzi,

yaye kuqukwa, xa kufanelekile, iintsele neendonga zeendawo ezinamanzi/ zemilambo.

2. Ukusetyenziswa

(1) Lo mthetho kamasipala ubophelela nawuphi na umbutho karhulumente.

(2) Naluphi na ubonelelo komnye umthetho kamasipala ojongene ngokukodwa namanzi esitshi, uxhomekeke kwimiqathango yalo mthetho kamasipala.

3. Iimvume ezithintelweyo

Akukho mntu uvumelekileyo, ngaphandle kokuba unemvume ebhaliweyo yeBhunga nangokuxhomekeke kwimiqathango emiselwe lilo, unemvume yokungena okanye yokufaka nantoni na ngaphandle kwamanzi esitshi kumjelo wamanzi esitshi.

4. Ukhuseleko lwemijelo yamanzi esitshi

Akukho mntu, ngaphandle kokuba unemvume ebhaliweyo yeBhunga nangokuxhomekeke kwimiqathango emiselwe lilo—

(a) unokonakalisa, abeke engozini, atshabalalise okanye enze nasiphi na isenzo esinokonakalisa, esinokubeka engozini okanye esinokutshabalalisa, umjelo wamanzi esitshi okanye isimo sokusebenza kwawo;

(b) unokukhulula kuyo nayiphi na indawo, okanye abeke nakuwuphi na umgangatho, nantoni na ngaphandle kwamanzi esitshi, nalapho kulindelekileyo ukuba lo nto inokuqengqelekela kumjelo wamanzi esitshi;

(c) unokukhulula, avumele ukungena okanye ukubeka nantoni na enokonakalisa umjelo wamanzi esitshi okanye iphazamise ukusebenza kwawo okanye idyobhe okanye ingcolise amanzi kuyo;

(d) unokwakha okanye amise nasiphi na isakheko okanye nantoni na ngaphezu komjelo okanye ngendlela enokuphazamisa okanye enokubeka engozini umjelo wamanzi esitshi okanye imeko yokusebenza kwawo emva koko; okanye

(e) unokuvula intunja kumbhobho wamanzi esitshi, kumjelo okanye kumjelo onqumla phantsi kweendlela; okanye

(f) unokufunxa, ukukhupha okanye ukujika indlela yawo nawaphi na amanzi ukususka ngqo kumjelo wamanzi esitshi; okanye

(g) unokuzalisa, ukugromba, ukwenza milo yimbi, ukwenza imbonakalo-mhlaba, ukuvula okanye ukususa umhlaba ongaphezulu, omelene, ongaphantsi okanye okufuphi kanye nayo nayiphi na inxalenye yomjelo wamanzi esitshi.

5. Ukuthintelwa kwengozi yeempuphuma

Akukho mntu, ngaphandle kokuba unemvume ebhaliweyo yeBhunga nangokuxhomekeke kwimiqathango enokumiselwa lilo—

(a) unokuthintela okanye unokunciphisa umthamo womjelo wamanzi esitshi;

(b) unokutshintsha imilo okanye ukusetyenziswa, okanye unokulungisa nayiphi na inkangeleko yomjelo wamanzi esitshi, nenokuthi iyodwa okanye idibene neminye imisebenzi yomhlaba ekhoyo, ibangele ukwanda kwamaqondo eempuphuma okanye enokubangela ingozi yeempuphuma; okanye

(c) unokwenza nawuphi na umsebenzi, onokuthi uwodwa okanye udibene neminye wandise amaqondo eempuphuma okanye udale ingozi yeempuphuma.

6. Imisebenzi yophando nohlolo

(1) Imiqathango enokumiselwa liBhunga ngokwemigaqo yeCandelo 3, 4, neCandelo le-5, inokuquka, kodwa ingalinganiselwanga kule—

(a) ukumiselwa kwemida/kwemilinganiselo yamanzi;

(b) ukwenziwa kohlolo lwempembelelo, kunye

(c) nophando lwempembelelo kokusingqongileyo okanye uphando olunokuba yimfuneko ngenxa yomthetho wokusingqongileyo osebenzayo.

(2) Iindleko zalo naluphi na uphando olwenziweyo ngokwemigaqo yemiqathango yecandelwana (1), ziza kuhlawulwa ngumfaki-sicelo.

7. Izehlo zokungcoliseka kwamanzi

Kwimeko yesehlo esichazwe kwiCandelo 3 okanye kwiCandelo 4(b) no-(c)—

(a) umnini wepropati apho eso sehlo senzeke khona, okanye esisenzekayo, okanye

(b) umntu obangele ukwenzeka kweso sehlo, ukuba eso sehlo asibangelwanga ziimeko zendalo,

kuyimfuneko ukuba axele kwangoko eso sehlo kwiBhunga, ngezakhe iindleko, athabathe onke amanyathelo afanelekileyo nathi, ngokoluvo lweBhunga, abe aza kubandakanya aze anciphise iziphumo zongcoliseko, ngokwenza amanyathelo okucoca, kuqukwa nokubuyiselwa kwimeko yesiqhelo kwendawo esingqongileyo, njengoko kuyimfuneko ngokomthetho weBhunga.

8. Imijelo yamanzi esitshi kumhlaba wabucala

(1) Umnini wepropati ngamnye apho kumiswe khona imijelo yamanzi esitshi—

(a) akavumelekanga ukuba enze nawuphi na umsebenzi, ngokoluvo lweBhunga, ekuza kulindeleka ukuba wonakalise indlela efanelekileyo yokusebenza komjelo wamanzi esitshi, yaye

(b) ngezakhe iindleko, uza kugcina lo mijelo yamanzi esitshi isebenza ngokukuko, kuqukwa nokwenza umsebenzi wokuhlaziya nokwakha ngokutsha lo mijelo, ukuba ngokoluvo lweBhunga, kuyimfuneko ukuba yakhiwe ngokutsha okanye ihlaziywe.

(2) Izibonelelo zecandelwana (1) azibhekiselelanga kuluvo lokuba iBhunga lamkele uxanduva layo nayiphi na imisebenzi ebandakanywe kulo, nokuba kukwisivumelwano solondolozo olumiselekileyo okanye ngokwemigaqo yomqathango yokunikezelwa kwepropati.

9. Ubonelelo ngezixhobo zokusebenza

(1) IBhunga linakho—

(a) ukwakha, ukongeza, ukulungisa, ukulondoloza okanye ukufakela imibhobho yemisele, iimpompo okanye ezinye izakheko ezinento yokwenza nomjelo wamanzi esitshi phezu okanye ngaphantsi kwayo nayiphi na ipropati engenakususwa, yaye ulawulo lwale mibhobho, lwezi mpompo okanye lwezi zakheko kuphantsi kwegunya likamasipala;

(b) amanzi esitshi kwimisele okanye amanzi aphuma kuyo nayiphi imisebenzi yeenkonzo zikamasipala ukuya kuyo nayiphi na indawo enamanzi ngokwendalo/umlambo, kunye

(c) ukwenza nayiphi na enye into eyimfuneko okanye enqwenelekayo ngokwesehlo, eyongeza okanye encedisa nawuphi na umbandela ochazwe kwicandelwana (a).

(2) Kwimeko apho iBhunga lisebenzisa amagunya alo ngokwemigaqo yecandelwana (1)(a) ngokuphathelele kwipropati engenakususwa engekho phantsi kolawulo lukamasipala, umnini-propati kuyimfuneko ukuba athobele imiqathango yoMthetho kaMasipala oPhathelele kuLawulo lwePropati ezingenakususwa kwiSixeko saseKapa.

10. Amagunya eBhunga

(1) IBhunga linakho-

(a) ukuchitha, ukulungisa okanye ukwenza ngolunye uhlobo nasiphi na isakhiwo, isakheko okanye nantoni eyokhiweyo, emisiweyo okanye eyenziwe ngokuchasene nemiqathango yalo mthetho kamasipala;

(b) ukuzalisa, ukususa nokubuyisela kwimeko entle nawuphi na umhlaba ogrunjiweyo, osusiweyo okanye obekwe ngokuchasene nemiqathango yalo mthetho kamasipala;

(c) ukulungisa nokwenza ibe nenkangeleko entle nawuphi na umonakalo owenziwe ngokuchasene nezibonelelo zalo mthetho kamasipala okanye umonakalo obangelwe kukuchasa le miqathango;

(d) ukususa nantoni na ekhululweyo, evunyelwe ukungena kumjelo wamanzi esitshi okanye kwindawo enamanzi ngokwendalo/umlambo ngokuchasene nezibonelelo zalo mthetho kamasipala;

(e) ukususa nantoni na eyonakalisa, enqanda okanye ebeka engozini okanye enokunqanda, enokubeka engozini okanye enokutshabalalisa nayiphi na inxalenye yomjelo wamanzi esitshi;

(f) ukutywina okanye ukuvingca nayiphi na indawo yokuphuma kuwo nawaphi na amasango ukuba lo ndawo yokuphuma ichasene nezibonelelo zalo mthetho kamasipala, nokuba lo ndawo isetyenziselwa iinjongo ezisemthethweni kusini na;

(g) ukunqumamisa nayiphi na imvume enikiweyo ngokwemigaqo yalo mthetho kamasipala ukuba imiqathango ekwanikwa imvume phantsi kwayo ayithotyelwa;

(h) ngesaziso esibhaliweyo, iBhunga linakho ukuyalela nawuphi na umnini-propati ukuba avumele umnini wepropati emi ngasentla kweyakhe ukuba afakele umbhobho ofunxa amanzi esitshi okanye igatha okanye enze umjelo kwipropati yakhe ukuze kufunxwe amanzi esitshi azalise lo ndawo;

(i) ngesaziso esibhaliweyo, iBhunga linakho ukuyalela nawuphi na umnini-propati ukuba agcine amanzi esitshi kulo propati okanye, ngeendleko zalo mnini-propati, afakele umbhobho ofunxa amanzi esitshi okanye igatha okanye enze umjelo kwindawo efanelekileyo neyalathwe liBhunga, nokuba indlela yalo mbhobho okanye yalo mjelo/igatha iza kuhamba phezu kwepropati yabucala okanye akuzi kuba njalo, yaye

(j) linakho ukukhuphela amanzi esitshi aye nakuyiphi na indawo enamanzi/kumlambo, nokuba ukumhlaba wabucala okanye akunjalo.

(2) IBhunga, nangayiphi na indlela xa kubonakala ukuba isenzo okanye ukungakhathali kwako nawuphi na umntu okanye komnini-propati kunokusingisela ekuchasweni kwezibonelelo zalo mthetho kamasipala, linakho ukukhupha isaziso ngembalelwano esiya kulo mntu okanye kumnini-propati lowo esaziswa ukuba athobele iimfuno zalo mthetho kamasipala njengoko iBhunga linokubona kuyimfuneko ukuthintela ukuqhubeka kwale nkcaso yomthetho.

(3) IBhunga linakho ukufumana kwakhona intlawulo yazo zonke iindleko ezenziweyo ngenxa yamanyathelo eliwathabathileyo ngokwemigaqo yecandelwana (1) kumntu obenoxanduva lokuchasa izibonelelo zalo mthetho kamasipala okanye kumnini-propati ekwenzeke kuyo isenzo senkcaso yomthetho.

11. Amatyala nezohlwayo

(1) Nawuphi na umntu—

(a) ochasa nawuphi na umqathango walo mthetho kamasipala;

(b) ongaphumeleliyo ukuthobela imigaqo yaso nasiphi na isaziso esikhutshwe ngokwemigaqo yalo mthetho kamasipala;

(c) owenza intsongelo, oxhathisa, othintela okanye onqanda okanye osebenzisa ulwimi olungcolileyo, olunukunezayo okanye oluthukayo olusingiswe kuceba okanye kumsebenzi okanye kunokontraka weBhunga xa esenza ngokusemthethweni okanye enza nayiphi na imisebenzi ngokwemigaqo yalo mthetho kamasipala, okanye ozibiza ngokungeyonyaniso ngokuba unguceba okanye umsebenzi okanye unokontraka weBhunga,

uya kuba netyala lolwaphulo-mthetho yaye uya kujongana, ngokwesigwebo, nentlawulo yesohlwayo.

NATIONAL BIODIVERSITY ASSESSMENT 2011

Volume 3: Estuary Component

Technical Report



























This report was edited by:

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This report forms part of a set of six reports on South Africa's National Spatial Biodiversity Assessment 2011. The full set is as follows:

Synthesis Report

Driver, A., Sink, K.J., Nel, J.L., Holness, S., Van Niekerk, L., Daniels, F., Jonas, Z., Majiedt, P.A., Harris, L. & Maze, K. 2012. *National Biodiversity Assessment 2011: An assessment of South Africa's biodiversity and ecosystems. Synthesis Report.* South African National Biodiversity Institute and Department of Environmental Affairs, Pretoria.

Technical Reports

Volume 1: Terrestrial Component

Jonas, Z., Daniels, F., Driver, A., Malatji, K.N., Dlamini, M., Malebu, T., April, V. and Holness, S. 2012. *National Biodiversity Assessment 2011: Technical Report. Volume 1: Terrestrial Component*. South African National Biodiversity Institute, Pretoria.

Volume 2: Freshwater Component

Nel, J.L. and Driver, A. 2012. *National Biodiversity Assessment 2011: Technical Report. Volume 2: Freshwater Component*. CSIR Report Number CSIR/NRE/ECO/IR/2012/0022/A. Council for Scientific and Industrial Research, Stellenbosch.

Volume 3: Estuary Component

Van Niekerk, L. & Turpie, J.K. (eds). 2012. *National Biodiversity Assessment 2011: Technical Report. Volume 3: Estuary Component*. CSIR Report Number CSIR/NRE/ECOS/ER/2011/0045/B. Council for Scientific and Industrial Research, Stellenbosch.

Turpie, J.K., Wilson, G. and Van Niekerk, L. 2012. *National Biodiversity Assessment 2011: National Estuary Biodiversity Plan for South Africa*. Anchor Environmental Consulting, Cape Town. Report produced for the Council for Scientific and Industrial Research and the South African National Biodiversity Institute.

Volume 4: Marine Component

Sink, K.J, Holness, S., Harris, L., Majiedt, P.A., Atkinson, L., Robinson, T., Kirkman, S., Hutchings, L., Leslie, R., Lamberth, S., Kerwath, S., von der Heyden, S., Lombard, A.T., Attwood, C., Branch, G., Fairweather, T., Taljaard, S., Weerts, S., Cowley, P., Awad, A., Halpern, B., Grantham, H. and Wolf, T. 2012. *National Biodiversity Assessment 2011: Technical Report. Volume 4: Marine and Coastal Component*. South African National Biodiversity Institute, Pretoria.

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The NBA 2011 Estuary Component project benefited considerably from the guidance and oversight provided by the NBA project team. The overarching coherence and integration between components achieved in the 2011 round of the NBA represents the collective vision and insights of the NBA project team:

Individual	Role	Institute
A Driver	Project leader	South African National Biodiversity Institute (SANBI)
Dr K Sink	Marine and Coastal	South African National Biodiversity Institute (SANBI)
Dr S Holness	Coastal and Climate Change	SANParks/Nelson Mandela Metropolitan University (NMMU)
Dr J Nel	River and Wetlands	Council for Scientific and Industrial Research (CSIR)
L van Niekerk	Estuaries	Council for Scientific and Industrial Research (CSIR)

The core NBA 2011 Estuaries Component project team comprised:

Individual	Role	Institute
L van Niekerk	Project leader, estuary health, processes and policy	Council for Scientific and Industrial Research (CSIR)
Dr JK Turpie	Estuary conservation planning	Anchor Environmental Consultants
C Petersen	Spatial Analysis	Council for Scientific and Industrial Research (CSIR)
Dr J Nel	River conservation planning	Council for Scientific and Industrial Research (CSIR)

The following group of estuarine scientists served as members of the Estuary Reference Group and generously contributed of their time and knowledge to the project:

Individual	Role	Institute
Prof JB Adams	Estuarine vegetation and health	Nelson Mandela Metropolitan University (NMMU)
N Forbes	Invertebrates	Marine and Estuarine Research (MER)
Dr SJ Lamberth	Fish, nursery function and fisheries management	Fisheries Research, Department of Agriculture, Forestry and Fisheries (DAFF)
F MacKay	Invertebrates	Oceanographic Research Institute (ORI)
Dr S Taljaard	Water Quality and pollution	Council for Scientific and Industrial Research (CSIR)
Prof AK Whitfield	Fish	South African Institute for Aquatic Biodiversity

Individual	Role	Institute
Prof TH Wooldridge	Invertebrates	Nelson Mandela Metropolitan University

In addition to the Estuary Reference Group the input of the following specialists was essential for an integrative and accurate assessment of the estuarine biophysical processes, health and biodiversity conservation requirements:

Individual	Role	Institute
Prof G Bate	Nutrients, microalgae	Diatom and Environmental Management (DEM)
Dr T Bornman	Vegetation and floods	Sout African Earth Observation Network (SAEON)
A Childs	Nursery function	South African Institute of Aquatic Biodiversity (SAIAB)
Dr BM Clark	Conservation planning	Anchor Environmental Consultants
Dr P Cowley	Fish	South African Institute of Aquatic Biodiversity (SAIAB)
Prof D Cyrus	Fish	University of Zululand
B Escott	Spatial delination and naming	Ezemvelo KZN Wildlife
Dr F Engelbrecht	Climate change	Council for Scientific and Industrial Research (CSIR)
Prof A Forbes	Invertebrates	Marine and Estuarine Research (MER)
P Huizinga	Physical processes	Private
Dr K Hutchings	Fish exploitation and desalination	Anchor Environmental Consultants
B James	St Lucia health and managment	iSimangaliso Wetland Park Authority
Dr N James	Climate change	South African Institute of Aquatic Biodiversity (SAIAB)
B Mann	Fish exploitation	Oceanographic Research Institute (ORI)
M McCord	Nursery function, Zambezi sharks	South African Shark Conservancy (SASC)
Dr A Meyer	Climate change	Council for Scientific and Industrial Research (CSIR)
P Morant	Estuarine ecology	Council for Scientific and Industrial Research (CSIR)
Dr A Paterson	Fish and monitoring	South African Institute of Aquatic Biodiversity (SAIAB)
Dr A Rajkaran	Mangroves	Nelson Mandela Metropolitan University (NMMU)
Dr T Riddin	Vegetation	Nelson Mandela Metropolitan University (NMMU)
S Pillay	Vegetation	Council for Scientific and Industrial Research (CSIR)
Dr G Snow	Habitat mapping	Nelson Mandela Metropolitan University (NMMU)
A Theron	Coastal processes & climate change	Council for Scientific and Industrial Research (CSIR)
R van Ballegooyen	Coastal processes	Council for Scientific and Industrial Research (CSIR)
DA Veldkornet	Habitat mapping	Nelson Mandela Metropolitan University (NMMU)
S Weerts	Fish	Council for Scientific and Industrial Research (CSIR)
G Wilson	Conservation planning	Anchor Environmental Consultants

The following spatial analists contributed to this report:

Individual	Role	Institute
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F Daniels	Estuarine functional zone	South African National Biodiversity Institute (SANBI)
A Maherry	Estuarine functional zone	Council for Scientific and Industrial Research (CSIR)
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Executive Summary

The National Biodiversity Assessment (NBA) 2011 follows the first National Spatial Biodiversity Assessment (NSBA) in 2004. The primary purpose of the NBA is to provide a regular high-level summary of the state of South Africa's biodiversity, with a strong focus on spatial assessment. It covers terrestrial, freshwater, estuarine and marine environments, and reports on two headline indicators for assessing the state of South Africa's biodiversity: ecosystem threat status and ecosystem protection level. Ecosystem threat status tells us how threatened our ecosystems or habitats are, and ecosystem protection level indicates how well- or under-protected our ecosystems or habitats are.

The NBA is intended for decision makers both inside and outside the biodiversity sector. Technical component reports were compiled for terrestrial, freshwater, estuarine and marine ecosystems, as listed at the beginning of this report on page ii. Technical component reports target a specialist audience, whilst the NBA 2011 summary report (Driver et al. 2012) summarises the results across all components and targets a wider audience.

A key starting point for a meaningful assessment of estuarine ecosystems was to delineate the estuarine functional zone for every estuary, which had not previously been done in South Africa. In addition national-scale pressure data were collated on freshwater inflow modification, water quality (effluent discharges, agricultural activities), artificial breaching, habitat modification and living resources exploitation.

A desktop national health assessment was concluded for nearly 300 estuaries in South Africa to address shortcomings in previous country-wide biodiversity assessments. The health assessment was based on the Estuarine Health Index developed for South African ecological water requirement studies that has been applied systematically to over 30 estuaries at various levels of data richness and confidence. National experts, all familiar with the index, were used to evaluate the systems in their region. The individual estuarine health assessment scores were then translated into health categories and aggregated for the various estuarine ecosystem types to reflect the overall ecosystem status of South Africa's estuaries. One of the major findings of the study was that while a large number of South Africa's estuaries were still in an "excellent" to "good" condition, they represented very small systems, while the larger, important nursery systems were predominantly of "fair" to "poor" quality, indicating a general decline in the health of these larger systems.

The NBA uses two headline indicators for assessing the state of South Africa's biodiversity: "ecosystem threat status" and "ecosystem protection level". Ecosystem threat status gives an indication of how threatened ecosystems are, and ecosystem protection level informs on how well- or under-protected ecosystems are. Key findings of the 2011 NBA were that about 43% of estuary types (20 types out of 46 types) are threatened, representing 79% of SA estuarine area, while 59% (27 out of 46 types) of South Africa's estuarine ecosystem types are not protected. If protection levels are evaluated as a percentage of the area protected the picture becomes even more serious, with 83% of the area of ecosystem types not protected.

The 2011 NBA also developed the National Estuary Biodiversity Plan which identifies which South African estuaries require full or partial protection. This plan represented a significant milestone in that it is the first biodiversity planning study to include all the estuaries of South Africa. Nearly 300 estuaries from the Cool Temperate, Warm Temperate and Subtropical regions were included.

The report also provides a collation of information on harvested, exploited or Red Data estuarine species. It mainly looks at plants, invertebrates and fish. The assessment highlights the loss of mangroves from a number of estuaries along the South African coast as a result of harvesting and mouth closure. It also highlights the fact that a number of overexploited fish species should be listed as Red Data Species. Many of the fish species caught in South Africa coastal waters are estuary-dependent in that they have to use estuaries to complete all, or part, of their lifecycle where they are vulnerable to intense exploitation by recreational, subsistence and commercial fishers as well as being subject to other anthropogenic and environmental pressures. In general, fish species with both an estuarine and marine phase to their lifecycle tend to be severely depleted (e.g white steenbras), while those with freshwater, estuarine and marine components to their lifecycle (e.g. eels), being exposed to cumulative pressures in these different environments, tend to be the worst off.

The NBA 2011 provides a collated species list of invasive aliens in estuaries as part of this assessment. It also highlights invasive aliens as an emerging concern, especially for plants, invertebrates and fish communities.

A review of how climate change will affect the process drivers in estuaries identified some of the vulnerabilities of South African estuaries on a regional scale. Climate change pressures on estuaries include flow modification, sea-level rise and increased temperatures and coastal storminess, leading to changes in physical processes and biological responses with an ultimate

impact on ecosystem services. The review indicate that the Subtropical and Cool Temperate estuaries will be the most effected by climate change from a structural and functional perspective, while the Warm Temperate estuaries will be most vulnerable to temperature regime shifts and the associated species range extensions/contractions and community composition changes.

A number of management processes have been developed in terms of national legislation to manage pressures on estuaries and assist with biodiversity conservation, e.g. ecological flow requirements under the National Water Act (Act 36 of 1998) and Estuary Management Plans under the Integrated Coastal Management (Act 24 of 2008). The assessment discusses South Africa's legislative framework with regards to estuaries, highlights some of the key legal instruments and reports on the limited status of their implementation. Estuaries play a critical role in linking terrestrial, freshwater and marine ecosystems. The multiple pressures of flow reduction, development and overfishing call for integrated estuarine management and strong collaboration between key government departments from local to national level that deal with water, coastal development and fisheries management. The current roll out of Estuary Management Plans according to the Estuary Management Framework and National Estuarine Management Protocol has the potential to achieve this.

Key findings

1. There are nearly 300 functional estuaries in South Africa.

- In South African an estuary is considered a partially enclosed, permanent water body, either continuously or periodically open to the sea on decadal time scales, extending as far as the upper limit of tidal action or salinity penetration. During floods an estuary can become a river mouth with no seawater entering the formerly estuarine area, or, when there is little or no fluvial input, an estuary can be isolated from the sea by a sandbar and become a lagoon or lake which may become fresh or hypersaline.

2. The Lake St Lucia system represents over 55% of the estuarine area of South Africa, but is in a very poor condition.

- Although situated within the iSimangaliso Wetland Park protected area, a World Heritage Site, St Lucia is impacted upon by activities in its catchment and reduction in freshwater flows from the rivers feeding the lake.

- The most significant impact has been the artificial separation of the uMfolozi river mouth from Lake St Lucia, dating from the 1950s, reducing freshwater inflow to the lake by more than half in low flow periods.
- Combined with drought conditions, this has resulted in St Lucia being closed to the sea for much of the last decade, unable to fulfil its role as the most important nursery area for marine fish along the south-east African coastline, among other impacts.

3. Based on the proportion of estuaries in good ecological condition, 43% of estuary ecosystem types (20 types out of 46 types) are classified as threatened, representing 79% of SA estuarine area.

About 39% of South Africa's 46 estuarine types (18 types) are classified as critically endangered, 2% as endangered (1 type), 2 % as vulnerable (1 type) and 57% as least threatened (26 types). If this is considered in terms of estuarine area the situation is even more dire as 79% of South Africa's estuarine area falls within estuary types classified as critically endangered, compared with less than 1% in types that are endangered or vulnerable and 21% in types that are least threatened.

- A very small percentage (1%) of the total estuarine habitat area in South Africa is in an excellent condition. About 14% is in good condition, 31% is in a fair condition, and 54% is in a poor condition.
- About 83% of the estuarine area that falls within Ramsar sites (57 000 ha) is in a poor state, while none is in an excellent condition. Similarly, none of the 70 400 ha that falls within Important Bird Areas is in an excellent condition and 67% is in a poor condition. Collectively 72% of estuaries in Marine or other Protected Areas (65 900 ha) are in a poor condition.

4. 59% (27 out of 46 types) of South Africa's estuary ecosystem types are not protected. These unprotected types make up 83% of the total estuarine area.

- 69 estuaries in South Africa enjoy some form of formal protection, accounting for 60% (56 000 ha) of the estuarine area within South Africa. Only 14 estuaries have full no-take protection.
- The Lake St Lucia system contributes 90% of the protected estuarine area, and covers about 51 000 ha. The other protected estuaries cover a total area of just under 10 000 ha.

- Nearly 59% (27 out of 46 types) of South Africa's estuary ecosystem types are not protected. About 33% of estuary ecosystem types are considered to be well protected (15 types), while 4% are moderately protected (2 types) and 4% are poorly protected (2 types).
- If protection levels are evaluated in terms of percentage area, the unprotected types make up 83% of total area, while the estuary types that are poorly protected, moderately protected and well protected make up 2%, 14% and 2% of area, respectively.
- The National Estuary Biodiversity Plan identified 58 estuaries (20%) that require full protection and 62 (22%) estuaries that require partial protection (this includes those that already have partial protection).

5. The total freshwater inflow of the 20 largest catchments in South Africa has been reduced by nearly 40% from the pristine condition, and freshwater flow requirements have been determined for only 12% of all estuaries.

- The larger catchments tend to be subjected to significant water resources development, such as large dam developments and inter/intra-basin transfer schemes. These catchments often exhibit a significant decrease in resetting floods with a related significant decrease in mean annual runoff. Related ecosystem responses include increased sedimentation as a result of reduced flushing, loss of queuing effect to the marine environment and reduced nursery function.
- Smaller catchments are most often subjected to more localised water resource development such as run-of-river abstraction and forestation, leading to loss, or reduction of, base flows in summer. While the net reduction in mean annual runoff is less severe than for larger catchments, related ecosystem responses include increased mouth closure, reduced connectivity with the marine environment, reduced nursery function, and reduced production.

6. Flow reduction, habitat modification, fishing and pollution are cumulative pressures in need of management interventions. Invasive alien species (plants, invertebrates and fish), mariculture and desalination are emerging pressures that could pose a significant risk to estuarine biodiversity.

- Nearly 4% of all estuaries are under significant flow modification pressure, with most of these being large permanently open estuaries. An additional 18% of estuaries have experienced a moderate degree of flow modification. Flow modification is causing ecosystem type changes, for example, the Kobonqaba in the Eastern Cape and Uilkraals in the Western Cape closed for the first time in recorded history in 2010.

- 13% of South Africa's estuaries are under significant habitat modification or development pressure.
- The mouths (outlets) of about 16% of estuaries are artificially managed, but these estuaries (which include the Lake St Lucia system) account for 62% of the total estuarine habitat. Inappropriate low-lying developments are necessitating artificial mouth manipulations (e.g. breaching), of particular concern in the large lake systems like Verlorenvlei, Bot/Kleinmond, Klein, Wilderness (Touws), Swartvlei and Lake St Lucia system.
- 1% of South Africa's estuaries are under tremendous fishing pressure (Olifants, Berg, Bot and Kosi) such that fish stocks have declined significantly in these systems. Another 13% are under major fishing pressure. Fishing effort is relatively evenly distributed around the coast, but proportionately (in terms of tonnes per ha removed) much higher in the Cool Temperate estuaries.
- Approximately 2 000 tonnes of fish, comprising 80 species, are caught in South African estuaries each year.
- 84% of all estuaries are influenced by bait collection activities.
- Mangroves have been completely lost from 14 estuaries in South Africa due to excessive harvesting or ecosystem changes. In the smaller estuaries, where mangrove strands consist of one to three rows of trees, harvesting can result in complete removal of mangroves. Developmental pressures have also caused the loss of mangroves, e.g. from the Mhlanga, Little Manzimtoti, Lovu, Msimbazi, Mgababa, Ngane, Mahlongwa, Kongweni, Bilanhlolo, Mhlangankulu and Khandandlovu.
- 15% of estuaries are under significant pollution pressure and 40% under a moderate degree of pollution pressure. Fewer than 1% of all estuaries have no pollution pressures on them.

7. Freshwater (surface and groundwater) flowing into the sea is not wasted and is vital to the productivity of the nearshore coastal environment.

- Changes in freshwater flow and associated variations in turbidity, nutrients and sediment supply can impact on important ecological processes such as nursery functions, environmental cues, productivity and food web processes.
- Fisheries resources in South Africa that have, or may have been, compromised by reduced freshwater input include linefish, prawns, and filter feeding invertebrates in the intertidal and shallow subtidal zones.

- The reduction of river flow leads to a reduced sediment supply to the coast with implications for beach and subtidal habitats. Many of these habitats are also important for ecological processes.

8. While there are a range of invasive alien species (e.g. 13 plants, 11 invasive alien and 7 extra-limital fish species) in South Africa's estuaries, they do not represent a significant overall pressure as yet.

- Thirteen invasive alien plant species, ranging from trees to water weeds, have been identified in South Africa's estuaries.
- There are at present 11 invasive alien fish species and 7 extra-limital fish species identified in the 130 estuaries for which there were data. The spreading of especially invasive predatory fish acts as a barrier to migratory species (e.g. eels and freshwater mullet) and influences the species composition and abundance of species, many of which are commercially important, in the river-estuary interface zone.
- There is a significant and growing threat to the estuarine subtidal benthic environment through the invasion and proliferation of the mollusc *Tarebia granifera* in at least 30% of KwaZulu-Natal estuaries.

9. Climate change can have serious ecological, resource and social implications

Climate change pressures include flow modification, sea-level rise and increased temperatures and coastal storminess, leading to changes in physical processes (e.g. modification in mouth conditions, salinity regimes, nutrient pulses, sediment regimes) and biological responses (e.g. production, species composition) with an impact ultimately on ecosystem services.

- The KwaZulu-Natal and West Coast estuaries will be the most affected by climate change from a structural and functional perspective, e.g. mouth state, nutrient supply, salinity distribution and ultimately production (e.g. fisheries).
- The Wild Coast, Eastern and Southern Cape estuaries will be most vulnerable to temperature regime shifts (both nearshore and land) and the associated range extensions/contractions of species and community composition changes.
- Climate change is one of many pressures acting on estuaries and should be viewed as an additional form of anthropogenic alteration (rather than a separate pressure) in an already stressed ecosystem type, i.e. climate change acts as an accelerator of ecosystem change.

10. Estuary Management Plans are developed, or in progress, for 9% of South Africa's estuaries

Over the past decade legislative responses have increased, but flow-related measures are starting to lag behind other planning processes.

- The finalisation of the National Estuarine Management Protocol, the roll out of the Estuary Management Planning Framework and the provision of resources, both human and funding, is needed to sustain this effort. At present there are 26 Estuary Management Plans in the process of being developed as part of the implementation of the Integrated Coastal Management Act (Act 24 of 2008). This includes the establishment of 12 Estuary Forums which form the vital communication platform between coastal communities and the various government departments that play a role in estuary management.
- Key legal instruments, such as the determination of the ecological water requirements of individual estuaries, provide the scientific basis for local and regional water resources planning and implementation frameworks and assist with identifying critical over-allocations of resources.
- Unfortunately, ecological water requirement studies have been undertaken for only about 12 % of all estuaries over the last decade.

Key Messages

1. Estuaries, unlike many other ecosystems, can be restored to a well-functioning, productive state.

- Estuaries are by nature resilient systems, because their fauna and flora are adapted to living in conditions of extreme change.

2. Recovery of South Africa's iconic estuary, the Lake St Lucia system, is possible.

The very poor condition of the Lake St Lucia system, which represents over half the estuarine area in South Africa, is reversible and ecosystem recovery is possible. Due to Lake St Lucia's international and national significance, the iSimangaliso Wetland Park Authority has raised funding from the Global Environment Facility (GEF) to investigate and implement a long-term solution to the

hydrological issues facing the Lake St Lucia system. In parallel to this investigation the management strategy for 2011/2012 will result in the reversal of the 60 year old approach to managing Lake St Lucia; that is, allowing the uMfolozi and Lake St Lucia estuary mouths to join to form a combined mouth, and thereby allowing it to function as naturally as possible. In keeping with adaptive management, an ongoing review and evaluation based on monitoring of salinity, lake levels and ecosystem health will continue as these interventions are implemented. Ongoing national government support for the rehabilitation of the Lake St Lucia system is important.

Other specific management recommendations include:

- reducing the fishing effort within the system;
- resolving the issue related to the backflooding of the low-lying sugar cane farms so that conflict over breaching of the combined mouth does not occur (e.g. securing or protecting the properties along the lower uMfolozi);
- improving farming practices in the uMfolozi catchment and floodplain to improve water quality and limit sediment input to St Lucia.

3. Increase protection levels through the implementation of the National Estuary Biodiversity Plan

- DEA, in collaboration with SANBI, DWA and DAFF, should lead the process of endorsing and implementing the National Estuary Biodiversity Plan.

4. To adequately protect an estuary, it needs to be in a formal protected area with effective no-take zonation, and its freshwater requirements must be guaranteed.

- The Lake St Lucia system is an example of a system which is poorly protected. While being fully protected on paper, St Lucia's current ecological condition is poor (Category E) and uMfolozi is only in fair condition (Category D).

5. Estuaries provide a focal point for co-ordinated and integrated natural resource management.

- Estuaries form the link between the land and the sea and are therefore the receivers of most resource-use pressures from the surrounding land- and seascape. Estuaries should be the focal point for natural resource management and planning in the coastal domain, e.g. in the

classification of water resources in terms of the National Water Act, the class of a river should be influenced by the class assigned to the estuary.

6. Estuaries are valuable national assets providing essential ecosystem services, such as nursery functions to coastal fisheries, freshwater flows to the marine environment, replenishment of nutrients and organic material to coastal habitats, flood and sea storm protection, carbon sequestration, safe bathing areas and cultivation of plants for biofuels without freshwater.

- Estuaries provide an important nursery function for fish, with some of the more muddy Temperate estuaries such as the Mbashe, Umtata, Keiskamma and Great Kei being particularly important for supporting collapsed marine fish resources such as white steenbras and dusky kob.
- Estuaries provide freshwater (both surface and groundwater), nutrients, detritus and sediments to the coastal environment, thereby supporting important ecological processes and the productivity of some fisheries (e.g. prawns and line fishery).
- Estuaries offer easy access, warmer waters, shallow depths, shelter and weak currents that make them very attractive to bathers.
- Estuaries contribute to the regulation of greenhouse gases and provide opportunities for carbon trading.
- South Africa's estuaries provide a significant buffer against floods with a total open water area of 61 000 ha and flood plain storage, as represented by the estuarine functional zone, of nearly 171 000 ha, of which 60% is in the Subtropical biogeographic region.
- Halophytes (salt tolerant plants such as *Sarcocornia*) can be used as an alternative energy or food source due to their high oil and protein content. By far the greatest benefits of halophyte culture is that, unlike much current biofuel production, it does not displace food crop production or use excessive quantities of fresh water.

7. Future introduction and spread of invasive species in estuaries can be prevented.

- While invasive alien species do not represent a significant overall pressure as yet, it is critically important that there is timeous intervention to ensure that the situation remains under control (e.g. control invasive predatory fish that act as a barrier to migratory species, and the total eradication of the alien invasive grass *Spartina alterniflora,* which is currently known to be present in only the Groot Brak estuary but which may otherwise spread).

8. Healthy estuaries support ecosystem resilience and adaption to climate change.

- Stressed ecosystems have a lower resilience to change. By increasing or maintaining the resilience of estuaries, the ability of a system to recover, for example after a flood or drought, is enhanced.
- The resilience of an estuary is influenced by the intactness of its catchment and estuarine habitats. A way to ensure resilience is the determination and implementation of estuarine ecological water requirements and the protection/rehabilitation of the estuarine functional zone.
- The processes underpinning the ecosystem services provided by estuaries, such as the assimilation and cycling of nutrients, also need to be protected if resilience is to be maintained.

Priority actions for estuarine biodiversity management and conservation

- **Restore the health of St Lucia and conserve the other estuarine lake systems.** South Africa's estuarine lake systems (St Lucia, Verlorenvlei, Bot, Klein, Wilderness, Swartvlei, Kosi) are all under tremendous pressure, and need to be managed in a more holistic manner. They are important national biodiversity assets, which often pay the price for inappropriate short-term local-level decision-making. In particular, the St Lucia system holds a major share of South Africa's estuarine biodiversity. As discussed above, the iSimangaliso Wetland Park Authority has initiated measures to combine the uMfolozi with Lake St Lucia with funding support from the Global Environment Facility (GEF) in order to restore the health of the greater ecosystem.
- **Increase protection levels through the implementation of the National Estuary Biodiversity Plan.** The development of the National Estuary Biodiversity Plan was the first step in the planning process. DEA, in collaboration with SANBI, DWA and DAFF, should lead the implementation of the National Estuary Biodiversity Plan. This should include the setting of protected area targets for Estuarine Protected Areas in the short- to medium-term, e.g. 5% of all ecosystem types will be formally protected by 2020 and 20% of all ecosystem types will have Estuary Management Plans by 2020. This also requires the integration of the National Estuary Biodiversity Plan in strategic processes such as the classification of water resources led by the DWA and the upcoming revision of the National Protected Area Expansion Strategy led by DEA.

- **Respond rapidly to emerging invasive species.** Develop protocols and procedures for the early detection, risk assessment and management of invasive alien species. For example, certain invasive alien fish species can act as a barrier to migratory species (eels and fresh water mullet) and influence the species composition and abundance of species, many of which are commercially important, in the river-estuarine interface.
- **Develop a National Coastal Biodiversity Plan.** Estuaries are not separate from the coast. To ensure their long-term functioning also requires the development of a National Coastal Biodiversity Plan that integrates marine, estuarine, freshwater and terrestrial aspects. Such a plan should be conducted at a fine enough scale to support integrated coastal development at the municipal level.
- **Ensure the total eradication of the alien invasive *Spartina alterniflora* from the Groot Brak estuary before it spreads to other estuaries.** Progress has been made, since early 2011, but it is very important that the initial field tests for chemical and mechanical control be followed up with full eradication and continuous follow up removal to ensure that this highly invasive and damaging plant species does not spread to adjacent systems along the coast.
- **Ensure that the legal definition of estuaries in South Africa includes the estuarine functional zone.** The GNR 546 Listing Notice 3 under the NEMA EIA Regulations (2010) identifies the estuarine functional zone as a sensitive area that requires environmental authorisation before a development may proceed. It is important that this consideration is also taken up by the Integrated Coastal Management Act and the National Water Act, both of which need to recognise the value of the estuarine floodplain and the threat of (back) flooding within this zone.
- **Determine ecological water requirements for all estuaries within 10 years and implement flow requirements within 5 years of their classification.** This process is likely to require a two-tiered approach in which the findings of the NBA 2011 form the basis for allocation on a national level in the classification of water resources in terms of the National Water Act. While more detailed ecological water requirement studies will be needed for water-stressed catchments or biodiversity priority areas, there is also an urgent need for strategic assessments (such as the National Water Resources Strategy) to take cognisance of estuarine flow requirements which are often substantially higher than the flow requirements of the river entering the estuary. This little-recognised fact leads to national and catchment scale water resource plans that over-estimate the water resources available for development, thus compromising the ecosystem processes that coastal communities depend upon.

- **Ensure resilience to climate change and other global change pressure through the appropriate management of the estuarine functional zone. Finalise the National Estuary Management Protocol** to ensure cooperative governance between the lead authorities that manage estuaries and roll out the development and implementation of Estuary Management Plans in terms of the Integrated Coastal Management Act.
- **Finalise and implement the National Estuary Monitoring Programme** currently being developed by DWA. This multi-tier, multi-parameter (include biotic and abiotic components) programme is based on current best practice and with sufficient funding, and support from other organs of state, could go a long way in addressing data deficiencies in future NBA assessments.
- **Development of a National Sustainability Plan for Estuarine Resources** that will ensure alignment between sectoral objectives for estuaries on a national scale. The plan should be developed in consultation with lead authorities (DEA, SANBI, DWA and DAFF) and assist with facilitating the co-operative governance between the lead agents. Once in place, it should serve as the "blue print" for a number of key sectoral resource plans and processes at various levels of governance, e.g. allocation of water resources or Total Allowable Catch in coastal fisheries.

Knowledge gaps

- **Refine estuary ecosystem types:** The NBA 2011 has started the process of refining the typing of South Africa's estuaries at a more detailed level than has previously been available. However, higher resolution input data on catchment hydrology, bathymetry, sediment structure and water quality (turbidity and salinity) is required to address the needs articulated by specialists in the execution of this study.
- **Quantification of the modification in freshwater flow to the coast on a watershed scale.** There is an urgent need for a quantification of the modification in freshwater flow to the all estuaries of South Africa. This analysis should include all current land-use, transfer schemes, discharges, dam developments and be based on the true catchment area of each individual system. These data will also form the basis of an analysis of the degree to which freshwater flow to the coast has been modified.
- **Taxonomic surveys of the invertebrates in all South African estuaries:** There is no up-to-date national dataset for South African estuarine invertebrates. Invertebrate data were last collated at a national scale more than a decade ago but little effort has been made to

address this. Future assessments and biodiversity plans cannot be refined without filling this gap in a systematic manner.

- **Taxonomic surveys of the plants in all South African estuaries:** Taxonomic revision of salt marsh species should be supported and funded so that macrophyte species lists can be updated for all estuaries. From these data, sites of rare and threatened species can be identified. Updated GIS spatial data of the habitat areas data for all estuaries is needed. This is especially important where data are older than 10 years. This would include field surveys to ground truth the data. For example detailed habitat maps for the Rietvlei/Diep system and Richards Bay Harbour are urgently required for planning proposes and to address deficiencies in the current databases. This should include the development of a database with information presented in this study plus GIS maps of all South African estuaries. This spatial data could also feed into the estuary management planning processes.
- **Invasive Species:** With the exception of plants, very little is known about invasive species in South Africa's estuaries. There is an urgent need to have a census on the occurrence of invasive alien species in different estuaries and the potential environmental impact of these on both the ecosystem function and the value derived from the estuary in question. All invasive species (freshwater, marine and estuarine) should be included in the census.
- **Nursery function for exploited and collapsed fish species.** Recent work has indicated that while most estuaries serve as nurseries, some of the more sediment rich systems are associated with "sediment deltas" in the nearshore environment which serve as nurseries for some species which represent collapsed stocks. It is of the utmost importance that these systems are identified and their nursery function quantified to ensure sustainable resource utilisation into the future. Future biodiversity plans should also include these systems explicitly to align management and conservation priorities.
- **Pollution data:** There is no systematic record of the discharges into estuaries. There is also a need to evaluate the monitoring stations above the estuaries to develop a clear perspective on what is flowing into estuaries and coastal waters.
- **The value of estuaries in South Africa:** There is very little national scale data available on the value of estuaries. As this is one of the key requirements for communicating the relevance of estuaries to coastal communities, and the country as a whole, this lack of data hinders the ability to motivate for rational decision-making.
- **Climate change:** Climate change has the potential to change the processes and functioning of South Africa's estuaries dramatically. Large and local scale climate models are becoming better at accurately predicting the drivers of change in the future. The estuarine research

community needs to make this one of their research priorities over the next decade to facilitate better adaptation strategies and ensure ecosystem resilience.

- **Sediment data:** Very little information is available on the sediment structure of South Africa's estuaries. This is a significant data gap as grain size distribution and the mud:sand ratios influence biodiversity patterns. The lack of sediment information also makes it very difficult to assess environmental change in relation to some of the major pressures such as dam development and sand mining.
- **Mapping the 3-dimensional nature of South Africa's estuaries:** Detailed systematic topographical and bathymetrical surveys are needed for all South Africa's estuaries. Cross-sectional survey data are available for less than a third of the estuaries in the country. In most cases these data are over 20 years old. Most planning processes (e.g. ecological water requirement studies, Estuary Management Plans, setback lines, spatial development plans) are of low confidence as they lack this basic information. Assessment of change (sedimentation, erosion sensitivity to flow modifications, structural developments) is therefore mostly inferred from pressure data. Improved planning and assessments urgently require a significant effort to address these basic data requirements.
- **Up-to-date surveys of the fish and bird fauna of estuaries:** National scale surveys on fish and birds in all South African estuaries were last carried out in the early 1980s. These surveys urgently need to be repeated in a once-off effort that is comparable with the earlier surveys.

Acronyms Symbols, Abbreviations and Notations

~	Approximately
< / ≤	less than / less than or equal to
> /≥	greater than / greater than or equal to
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DWA	Department of Water Affairs
ha	Hectare
m	Metre
MAR	Mean annual run-off
MSL	Mean sea level
$x10^6m^3$	Million cubic metres

Glossary of Terms

Anthropogenic	Having to do with man, or caused by humans
Aquifer	Underground layer of permeable rock, sand or gravel that conveys water
Baseflow	Baseflow consists of water derived from the intermediate and groundwater catchment/subcatchment. Baseflows constitute "dry weather" flows and are hydrologically significant in that they sustain flows into the non-rainy seasons, are important for ecological flows and also have a different water chemistry to that of stormflows.
Benthic invertebrates	Organisms living in or on sediments of aquatic habitats
Biodiversity	The variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part. This includes diversity within species, between species and of ecosystems
Catchment	In relation to a watercourse or watercourses or part of a watercourse, this term means the area from which any rainfall will drain into the watercourse or watercourses or part of a watercourse, through surface flow to a common point or common points
Community	Assemblage of organisms characterised by a distinctive combination of species that occupy a common environment and interact with one another
Community composition	All taxa present in a community
Cumulative impact (or effect)	Cumulative impact is the impact on the environment which results from the incremental or combined effects of one or more developmental activities in a specified area over a particular time period, which may occur simultaneously, sequentially, or in an interactive manner.
Dilution	The reduction in concentration of a substance due to mixing with water
Dry and Wet years	"Dry" years are generally represented by the 10th percentile of a distribution, i.e. the "driest" year in 10 or the lowest flows in 10 years. Conversely, "wet" years are represented by the 90th percentile, i.e. the "wettest" year in 10 or the highest flows in 10 years.
Ecological integrity	Maintaining a diverse, healthy and productive natural system

Ecological water requirements (also called the Reserve)	The quantity and quality of water required: • to satisfy basic human needs by securing a basic water supply, as prescribed under the Water Services Act, 1997 (Act No. 108 of 1997), for people who are now or who will, in the reasonably near future, be relying upon, taking water from, or being supplied from the relevant water resource, and • to protect aquatic ecosystems in order to secure ecologically sustainable development and use of the relevant water resource.
Ecosystem	A community of plants, animals and organisms interacting with each other and with the non-living (physical and chemical) components of their environment
Ecosystem protection level	Indicates the extent to which ecosystems are protected, based on the proportion of each ecosystem's biodiversity target that is met in formal protected areas recognised by the Protected Areas Act.
Ecosystem threat status	Ecosystem threat status tells us how threatened South Africa's ecosystems are. Ecosystems are assessed as critically endangered, endangered, vulnerable or least threatened. Ecosystem threat status is a key headline indicator of the state of biodiversity
Effluent	Liquid fraction after a treatment process (i.e. preliminary, primary, secondary or tertiary) in a wastewater treatment works
Habitat	The natural home of an organism or community of organisms (this also includes the surrounding area)
Macroinvertebrates	Animals that have no backbone and are visible without magnification
Macrophytes	Macrophytes are (aquatic) plants that are large enough to be apparent to the unaided eye
Pollution	The direct or indirect alteration of the physical, chemical or biological properties of the natural environment, including the marine environment, so as to make it less fit for any beneficial purpose for which it may reasonably be expected to be used, or to make it harmful or potentially harmful to the welfare, health or safety of human beings or to any aquatic or non-aquatic organisms
Resource quality objectives (RQOs)	Management Objectives for a resource relating to quality of all the aspects of a water resource including: • the quantity, pattern, timing, water-level and assurance of instream flow; • the water quality, including the physical, chemical and biological characteristics of the water;

	• the character and condition of the instream and riparian habitat; and • the characteristics, condition and distribution of the aquatic biota. These objectives are set by the Department of Water Affairs and Forestry in terms of the NWA
Runoff	Runoff is the water yield from an individual catchment – the subcatchment plus the runoff from all upstream subcatchments. Runoff includes any seepage, environmental flow releases and overflows from the reservoirs in a catchment, if they are present - which is not the case in any of the simulations in this project in which baseline catchment conditions are assumed.
Temporal Terms	Inter- : between, e.g. inter-annual variability denotes variability between one year and the next. Intra- : within, e.g. intra-seasonal differences are differences within a season, i.e. from one month to the next.
Stormwater run-off	Stormwater run-off from paved areas, including parking lots, streets, residential subdivisions, of buildings, roofs, highways, etc.
Sustainability	In terms of water quality management (DWAF), this means: 'Fitness for use by other users and future generations' and the ability to assimilate waste means the ability to receive and process waste to such an extent that the water remains fit for use by its other intended users.
Waste	Any solid material or material that is suspended, dissolved or transported in water (including sediment) in such volumes, composition or manner that, if spilled or deposited in the natural environment, will cause, or is reasonably likely to cause, a negative impact
Wastewater	Water containing solid, suspended or dissolved material (including sediment) in such volumes, composition or manner that, if spilled or deposited in the natural environment, will cause, or is reasonably likely to cause, a negative impact

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1. INTRODUCTION

1.1 What is the National Biodiversity Assessment?

The National Biodiversity Assessment (NBA) 2011 follows the first National Spatial Biodiversity Assessment (NSBA) that was led by the South African National Biodiversity Institute (SANBI). The NSBA 2004 was the first comprehensive national spatial assessment of the state of biodiversity, covering terrestrial, freshwater, estuarine and marine environments. It introduced two new headline indicators for assessing the state of South Africa's biodiversity: ecosystem threat status (referred to as ecosystem status in 2004), and ecosystem protection level. Ecosystem threat status tells us how threatened ecosystems or habitats are, and ecosystem protection level indicates how well- or under-protected ecosystems or habitats are. For the first time, these indicators were comparable across aquatic and terrestrial environments.

SANBI's mandate includes reporting on the state of biodiversity in South Africa. For this reason, the decision was made to broaden the National Spatial Biodiversity Assessment to incorporate non-spatial or thematic elements, and to produce a National Biodiversity Assessment. The intention is to review the National Biodiversity Assessment at five to seven year intervals.

The primary purpose of the NBA is to provide a regular high-level summary of the state of South Africa's biodiversity, with a strong focus on spatial assessment. The NBA is intended for decision-makers both inside and outside the biodiversity sector. It feeds into and links with other policy-related processes such as state of environment reports, identification of threatened ecosystems for listing in terms of the Biodiversity Act, the National Protected Area Expansion Strategy, and the National Biodiversity Strategy and Action Plan.

The NBA 2011, like the NSBA 2004, was led by SANBI in partnership with a range of organisations. The overall results are summarised in the report: *National Biodiversity Assessment 2011: A report on the state of South Africa's biodiversity* (Driver et al. 2012).

A technical reference group was convened by SANBI in April 2009 to guide the approach taken for the NBA 2011. This group was reconvened in January 2011 to review outputs and provide guidance on key messages that should be highlighted in the NBA summary report.

The marine and coastal component is one of four components of NBA 2011. A technical report is available for each component, as listed at the front of this report. While the NBA 2011 summary report is intended for a wide audience, this technical report is intended for a more specialist audience. It explains the data used and the analysis undertaken in the 2011 assessment, highlighting advances made since 2004, and discusses the results.

Common features across the components of the NSBA 2004 and the NBA 2011 are the use of the systematic approach to biodiversity assessment and planning, and the focus on the two headline indicators of ecosystem threat status and ecosystem protection level. Each of these is discussed briefly below.

Working in an integrated and aligned way across aquatic and terrestrial environments can be challenging, as disciplines in these environments have historically developed separately, with separate sets of terminology, methods and approaches. Insisting on compatible approaches can be seen as a constraint on conventional approaches. However, the benefits are numerous, including enabling comparison across environments as well as providing a stimulus for interdisciplinary learning and innovation.

1.2 Biodiversity planning[1] in South Africa

There are several possible approaches to biodiversity assessment and planning. The approach used most often in South Africa, including in the NBA, is systematic biodiversity planning. It is based on three key principles:

- The need to conserve a **representative sample** of biodiversity pattern (the principle of representation);
- The need to conserve the **ecological and evolutionary processes** that allow biodiversity to persist over time (the principle of persistence);
- The need to set quantitative **biodiversity targets** that inform us how much of each biodiversity feature should be kept in a natural condition in order to maintain functioning landscapes and seascapes.

South Africa is at the forefront of biodiversity planning internationally, and the methods and techniques used in this assessment are at the cutting edge of the discipline. The NBA rests

on over 30 years of research, development and practice by South African scientists, often in collaboration with colleagues from other countries.

1.3 Headline indicators: ecosystem threat status and ecosystem protection level

As explained above, the NSBA 2004 introduced two new headline indicators for assessing the state of South Africa's biodiversity: ecosystem threat status and ecosystem protection level. Ecosystem threat status gives an indication of how threatened ecosystems are, and ecosystem protection level informs on how well- or under-protected ecosystems are.

These two headline indicators have been carried forward in the NBA 2011, and will be updated again in future revisions of the NBA in order to provide a time series comparison of the state of ecosystems in South Africa. Between 2004 and 2011, methods for assessing ecosystem threat status have been refined, meaning that the results are not strictly comparable over this time period. The implications of this are discussed in greater detail in Section **Error! Reference source not found.**.

These headline indicators provide not only a way of comparing results meaningfully across the different aquatic and marine environments, but also a standardised framework which links with policy and legislation in South Africa, facilitating the interface between science and policy. There is growing recognition within government and other institutions of this framework and the need to respond to these headline indicators in planning and decision-making.

The assessment of ecosystem threat status is **completely independent** of the assessment of ecosystem protection level. As shown in Figure 1.1, ecosystem threat status is based on the condition of an ecosystem type, while ecosystem protection level is based on the extent to which an ecosystem type is formally protected. A well protected ecosystem type may thus be in poor condition, and equally an ecosystem in good condition may not be formally protected.[2]

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[1] Biodiversity planning is sometimes referred to as conservation planning. We prefer to use biodiversity planning because many people associate the term conservation planning purely with planning for the establishment and

[2] In practice, highly threatened ecosystems are often poorly protected. However, this correlation emerges not from the nature of the analysis itself but because ecosystems in which large amounts of natural habitat have

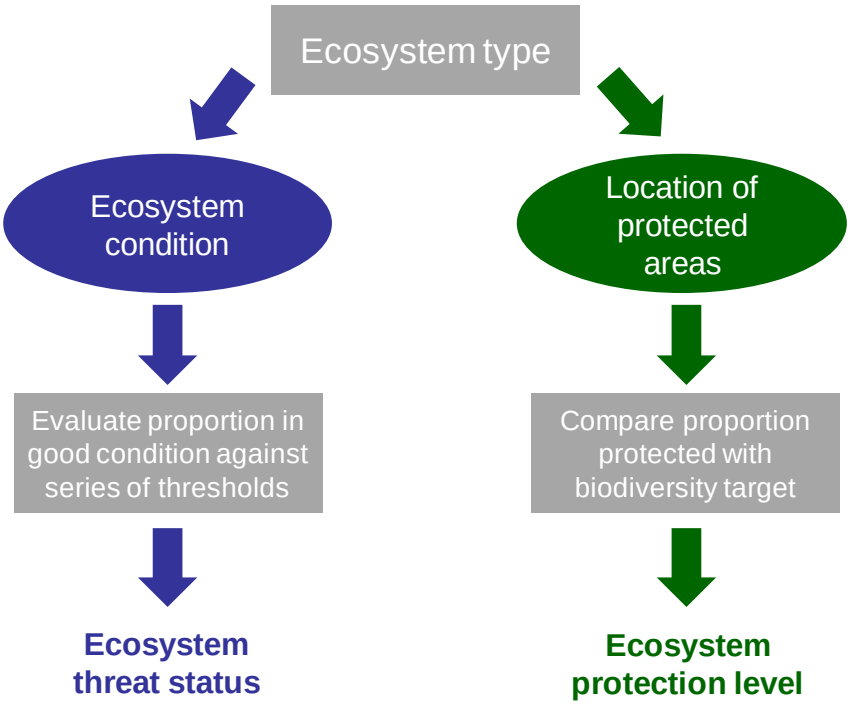


Figure 1.1 The headline indicators, ecosystem threat status and ecosystem protection level, are assessed independently of one another. Ecosystem threat status is based on the proportion of an ecosystem type in good condition, while ecosystem protection level is based on the proportion of an ecosystem type that is formally protected.

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been lost, or which have become severely degraded, tend to be those under pressure from a range of socio-economic activities that are incompatible with maintaining a well functioning ecosystem and that raise the opportunity costs of establishing protected areas.

2. STRUCTURE OF THIS DOCUMENT

An overview of the tasks undertaken as part of the NBA 2011: Estuaries Component is outlined here:

- Ecosystem services
- Estuarine functional zone
- Physical characteristics of South Africa's estuaries
- Estuarine habitat
- NBA 2011 Estuarine Typing
- Key pressures on estuaries
- Health status of estuaries
- Ecosystem threat status
- Estuary protection levels
- National Estuaries Biodiversity Plan
- Species of special concern
- Invasive alien species
- Climate change
- Legislative responses

Ecosystem services: Estuaries provide a host of ecosystem services at local, regional, national and global scales. This report briefly touches on a few important services to highlight the benefits society derive from this aquatic ecosystem type: nursery function, freshwater flows to the marine environment, carbon sequestration, flood regulation, storm protection, safe bathing areas, and estuarine plants as food, fuel and building resources.

Estuarine functional zone: This task required the delineation and mapping of South Africa's estuaries based on their physical features or processes to allow for spatial interrogation of the pressure and health data. All open water and flood plain areas were delineated using Google Earth and Spot5 imagery for 291 estuaries. The spatial delineation also provided the basis for the predicting the present ecological health status and in adding resolution to the conservation planning.

Physical characteristics of South Africa's estuaries: This section sets out to define some of the key physical characteristics of South Africa's estuaries. Important features are highlighted, and in some cases categorized to provide a more detailed perspective on

estuarine biodiversity distribution and the forces that drive it. Categorization was done to reflect the dominant condition of an estuary.

Estuarine habitat: The objectives of this task were to determine the habitat surface areas of South Africa's estuaries (with a particular focus on Temperate salt marshes); provide a species list of dominant estuarine macrophytes; and identify the sites of rare and endangered species. The emphasis during this task was on those estuaries where no data are available or where the data was older than 10 years.

NBA 2011 Estuarine Typing: The current South African Estuarine Classification system (Whitfield 1992) is very broad and a more detailed analysis is required to provide more in-depth insights into the sensitivity of the individual systems to change (i.e. system resilience) and the physico-chemical drivers for species occurring in them.

Key pressures on estuaries: The Estuaries NBA 2011 made a special effort to provide a spatial indication of the current and potential future pressures (and severity) on South Africa's estuaries. Where data were available, the information was captured in an Excel spreadsheet, otherwise expert judgment (high, medium, low) was used to indicate the level of pressure. The following pressures were evaluated on a national scale:

- Flow modification;
- Pollution;
- Fishing effort; and
- Habitat destruction.

Health status of South Africa's estuaries: A key step in biodiversity management planning is the development of an understanding of the health, or condition, of an ecosystem. This aspect was not addressed as part of estuarine component of NSBA 2004 (Turpie 2004) due to a lack of funding. A 3-day national health assessment workshop was held to determine the current health status of South Africa's estuaries based on expert opinion. The estuaries of South Africa was be divided into three sections: West and South Coast (including Transkei) and KwaZulu-Natal and evaluated by regional experts.

Ecosystem Threat Status: Ecosystem threat status is one of the two headline indicators reported on in the NBA. It informs us about the degree to which our ecosystems are still intact, or alternatively losing vital aspects of their structure and functioning. Ecosystem types

are categorised as critically endangered (CR), endangered (EN), vulnerable (VU) or least threatened (LT), with CR, EN and VU ecosystem types collectively referred to as threatened.

Estuary Protection Levels: Ecosystem protection level indicates the extent to which ecosystems are protected, based on the proportion of each ecosystem's biodiversity target that is met in formal protected areas recognised by the Protected Areas Act or Marine Living Resources Act. For these calculations, targets for protection were set at 20% of the estuarine habitat area of each ecosystem type. Ecosystem protection level is divided into four categories: well protected, moderately protected, poorly protected and not protected.

National Estuary Biodiversity Plan: This section presents the findings of the national biodiversity plan for the estuaries of South Africa. This assessment represented a significant milestone in that it is the first biodiversity planning study to include all the estuaries of South Africa. Nearly 300 estuaries from the Cool Temperate, Warm Temperate and Sub-tropical regions were included (Appendix A). The main objective was to identify which South African estuaries should be assigned protected area status.

Species of special concern: The report provides a collation of information on harvested, exploited or Red Data species. It mainly looks at plants, invertebrates and fish. It also highlights the fact that a number of overexploited fish species should be listed as Red Data Species.

Invasive alien species: As part of South Africa's international biodiversity obligations, it needs to report on the status of invasive aliens species every five years. The NBA 2011 provides a collated species list of invasive aliens in estuaries as part of this assessment.

How vulnerable are South Africa's estuaries to Climate Change: This section offers an overview of how climate change will affect the process drivers in estuaries and highlights some of the vulnerabilities South African estuaries display on a regional scale.

Legislative responses: A number of management processes have been developed under key legislation to manage pressures on estuaries and assist with biodiversity conservation. This final section discusses South Africa's legislative framework with regards to estuaries, highlights some of the key legal instruments and reports on the status of their implementation.

The NBA 2011 report concludes with:

- A summary of key findings and recommendations,
- Identification of the information gaps, research priorities and future assessments; and
- Recommendation for the next NBA.

Further to the above mentioned tasks, this project set out to integrate the findings of the Estuaries NBA 2011 with the recommendation and findings of the other components, especially the rivers and marine component. An essential part of this integration process is the iterative interaction throughout the life of the project between the terrestrial, freshwater and marine components. The project aimed to leave SANBI and the broader conservation planning community with a much deeper understanding of the pressures and issues related to estuary management and biodiversity conservation. This will facilitate improved integrated planning across terrestrial and aquatic ecosystems in the future.

3. ECOSYSTEM SERVICES

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3.1 What are ecosystem services?

The natural environment provides a range of valuable ecosystems services (also termed goods and services) to society, including provisioning services (such as food, water and other resources), regulating services (e.g. climate regulation, as well as air and water purification), cultural services (e.g. aesthetic, spiritual, recreational, educational and cultural benefits), and life-support services (such as nutrient cycling and soil formation) (Millennium Ecosystem Assessment 2005).

The terms “goods” and “services” originate in the field of Ecological Economics. Daily (1997) defines an ecosystem service as the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfil human life. Ecosystem goods (provisioning services), on the other hand, represent the material products that are obtained from natural systems for human use (DeGroot *et al.* 2002). Ecosystem services occur at multiple scales, from climate regulation at the global scale, to water supply at the local and regional scales (DeGroot et al. 2002). They also contribute direct or indirectly to human welfare, with those listed above being less directly connected, while food, raw materials, recreational opportunities, and aesthetic and cultural values are more directly connected.

Estuaries, in particular, are recognised as being among the most productive types of ecosystems worldwide. They are focal points for community and business activities along the coast, as they provide a wide range of opportunities and benefits. For example, Costanza et al. (1997) estimated that estuaries provide US$22,832 worth of goods and services per hectare per annum (in 1997 values), more than any other ecosystem. In South Africa, a number of studies have shown that estuaries contribute significantly to the local and national economy (Cooper et al. 2003; Lamberth and Turpie 2003; Turpie and Hosking 2005; Turpie and Clark 2007).

Local governments benefit by generating substantial revenue from higher rates that result from elevated property values along estuary shores and related economic activities, such as estuary tourism (Mander 2001). As a consequence of these benefits, coastal communities, tourists and local governments along the coast depend on estuaries as an important source

of revenue. Because estuaries are natural features, the opportunities that they provide are free. Estuary services are just like any other that may be bought, except that these are generated through the functioning of the estuary ecosystem. These services can be used directly or indirectly, or they can be left as an option for future use. However, estuaries are seldom considered a local government asset, even though they generate considerable revenue for local government and communities. Because of the failure to appreciate their value, little is spent on their management. Estuaries should be regarded as an asset and managed to maintain their value. Failure to do so can have major cost implications for local governments (Mander 2001; Lamberth & Turpie 2003).

The use of estuaries should be balanced with the ability of estuaries to deliver services. There is a need to manage the demands placed on estuaries to ensure that they do not exceed the natural ability of the ecosystem. If demand exceeds supply, future well-being is reduced. If demand equals or is less than supply, the estuary will continue to supply services sustainably. This should not be seen as a constraint to economic development but should rather be seen as an opportunity to diversify the local economy. By focusing on a wide range of complementary and sustainable uses, the greatest benefits can be generated for the greatest number of people by an estuary at minimised cost to society (Mander 2001; Turpie & Lamberth 2003).

3.2 Key ecosystem services provided by estuaries

Estuarine habitats and the species they contain provide a host of important ecosystem services as summarized in Table 3.1. This section briefly touch on a few of the more important services to highlight the benefits society derive from this aquatic ecosystem type, e.g. nursery function, freshwater flows to the marine environment, carbon sequestration, flood regulation, storm protection, safe bathing areas, and estuarine plants as food, fuel and building resources.

3.2.1 Nursery Function

Lamberth and Turpie (2003) estimate that about 50% of the 160 species of fish that occur in South Africa estuaries are utilised in fisheries (subsistence, recreational and commercial). At least 60% of these species are considered entirely or partially dependent on estuaries, and are thus likely to be affected by changes in runoff.

Table 3.1 Ecosystem services of aquatic and water-dependent ecosystems, adapted from Costanza et al. (1997) and Turpie and Clark (2007), and their importance in South African estuaries.

Ecosystem services		Description	Importance in estuaries
Provisioning services (goods)	**Water**	Provision of water for subsistence and agricultural use (only applicable in fresher upper reaches)	Low
	Food, medicines	Production of fish and food plants; medicinal plants	High
	Raw materials	Production of craftwork materials, construction materials, fodder and biofuel (especially important in rural and arid areas)	Medium to high
Regulating services	**Climate regulation**	Carbon sequestration, oxygen and ozone production, urban heat amelioration	High
	Disturbance regulation	Flood control, drought recovery, refuges from pollution events	High
	Water regulation	Provision of dry season flows for agricultural, industrial and household use (only applicable in fresher upper reaches)	Low
	Erosion control and sediment retention	Prevention of soil loss by vegetation cover and capture of soil, e.g. reeds and sedges preventing bank erosion	High
	Ecological regulation	Regulation of malaria, bilharzia, liver fluke, black fly, invasive plants as salinity assist with pest control.	High
Supporting services	**Waste treatment**	High retention makes is effective in breaking down waste and detoxifying pollution. Tidal and fluvial flushing assist with dilution and transport of pollutants	Medium to high
	Refugia/ Nursery areas	Critical habitat for migratory fish and birds, important habitats or nursery areas for species	High
	Export of materials and nutrients	Export of nutrients and sediments to marine ecosystems	High
	Genetic resources	Medicine, products for materials science, genes for resistance to plant pathogens and crop pests, ornamental species	Low
Cultural services (attribute)	**Structure and composition of biological communities**	The characteristics, including rarity and beauty, that lend an area its aesthetic qualities or make it attractive for recreational, religious or cultural activities	High

The total landed catch of fish taken directly from estuaries (2 480 tons per annum) is considerably lower than the total estimated catch of inshore marine fisheries (28 000 tons per annum). However, depending on bioregion and fishery sector, up to 83 % of the catch by inshore fisheries may comprise estuary-associated species. These authors estimate that the

total value of estuary fisheries and the contribution of estuary fish to the inshore marine fisheries, is about R1.2 billion per annum in 2011 Rands.

The life-history characteristics of most of South Africa's coastal fish species are fairly well known allowing them to be categorised into the various levels of estuary-association developed by Whitfield (1994). Less well known is the degree of intra-specific variation in estuary-dependence between the different biogeographical regions or whether suitable nursery or spawning areas are limited due to the narrow or critical habitat requirements of some species.

For some species, the level of estuary-association appears to vary across biogeographical regions. This may have been selected for at the population level and/or a result of the behavioural and physiological plasticity of the species concerned. Knysna sandgoby *Psammogobius knysnaensis* range from having mostly estuary-resident populations on the subtropical and warm Temperate east coast to equivalent estuary and surf-zone populations on the cool Temperate west coast. On the east and south coast, dusky kob *Argyrosomus japonicus* are obligate estuary-dependent species whereas silver kob *Argyrosomus inodorus* are not and never enter estuaries there. On the cool west coast where the warm-Temperate *A. japonicus* do not occur, *A. inodorus* utilize the Orange and other estuaries, probably for feeding or as a warm-water refuge. The Angolan dusky kob *A. coronus* occurs in the sea on the cool-Temperate west coast, until the warm-Temperate Cunene, where it is dominant in estuaries and *A. inodorus* no longer occur (Lamberth et al. 2008).

Although there are close to 300 estuaries along South Africa's coast, the specific habitat requirements of some fish at certain stages of their life may make the choice of juvenile nursery habitat or spawning ground extremely limited. Small juvenile dusky kob *A. japonicus* less than 1-year old prefer the fine sediments of highly turbid estuaries being adapted to find refuge in a "viscous" environment from which other predatory fish are physiologically excluded. This type of habitat comprises less than 5 % of the total estuarine area in South Africa. Of the 20 largest catchments in the country, only four, the Mbashe, Great Kei, Mzimvubu and Mtata have estuaries with the suitable sediment and turbidity characteristics as do an undetermined number of smaller systems such as the Kwelera and Nahoon. For adolescents, the habitat requirements appear to be broader with at least 50% of large and medium size estuaries being suitable nursery environments.

White steenbras *Lithognathus lithognathus* occur from the Orange River to the warm-Temperate / subtropical transition zone on the east coast. There is an annual spawning migration to this bioregion transition zone, spawning occurring late July to September on the fluvial fans off selected estuary mouths. These fluvial fans appear to be limited with the Mbashe as the only confirmed spawning area and the Mtata, Mzimvubu and Great Kei as the only other systems having similar catchment and sediment characteristics. If *L. Lithognathus* are restricted to spawning on these few fluvial fans, the entire South African spawning habitat may be less than 50 hectares. Historically, there may have also been a west coast spawning population with the Orange having a suitable fluvial fan. Intensive beach-seine and gillnet fishing over the last 100 years may have seen this population become extinct or indiscernible.

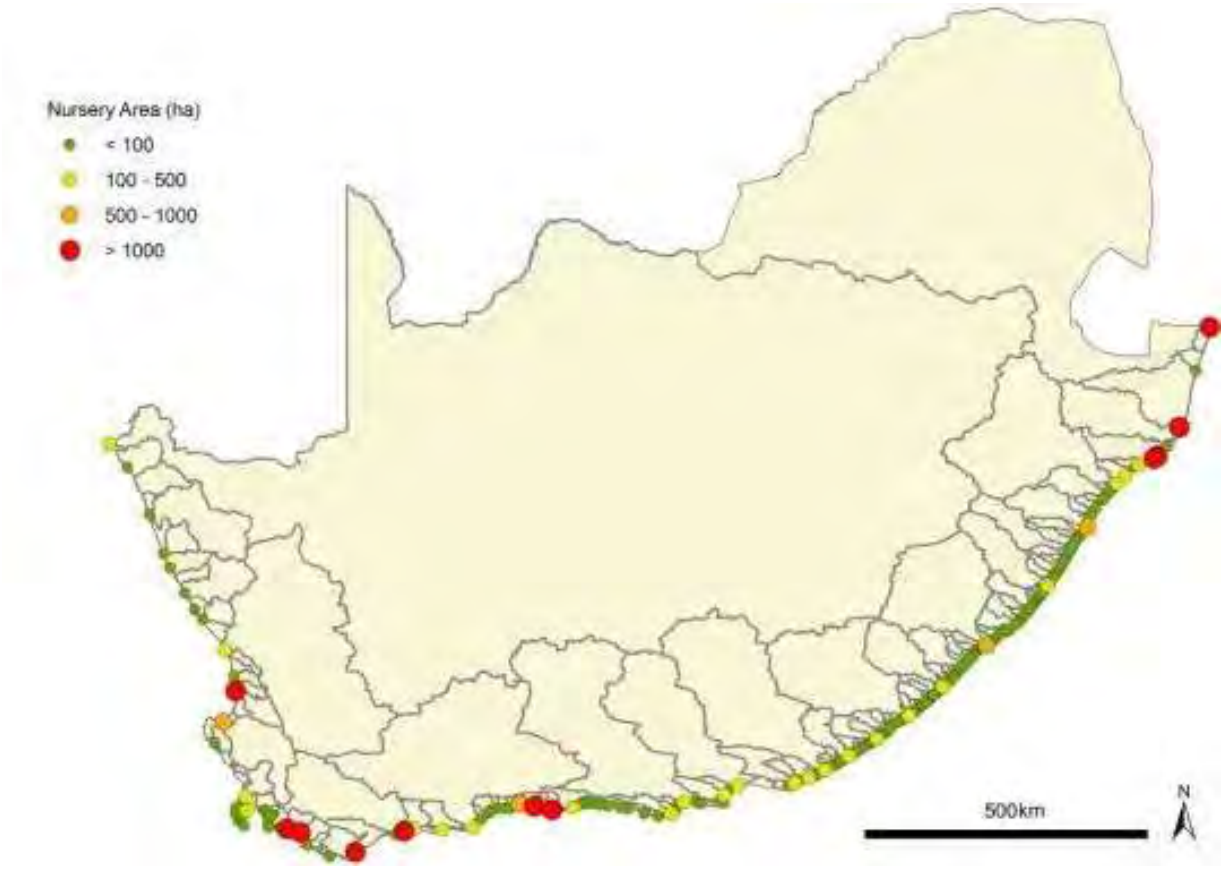


Figure 3.1 Important estuaries for nursery function

Zambezi (bull) sharks, *Carcharhinus leucas*, are a large predatory shark species commonly occurring in coastal waters of warm-Temperate, tropical and subtropical seas. It is one of few shark species physiologically capable of inhabiting salt- and freshwater systems, and is thought to utilize estuarine systems and freshwater rivers as pupping and nursery grounds. As such, estuaries are considered critical habitat for Zambezi sharks. Recent evidence suggests that, in certain parts of their distribution, Zambezi sharks exhibit philopatry to estuarine and river systems although the degree and nature of philopatry remain unknown. Studies utilizing satellite technology and acoustic telemetry have also demonstrated this species can undertake large-scale migrations, moving several thousand kilometres in a relatively short timeframe.

Zambezi sharks are taken as bycatch in fisheries throughout their range, and are increasingly targeted for the shark fin market and trophy fishing industry. Combined with increasing human-induced degradation of critical habitats Zambezi shark populations are becoming locally depleted in many areas. The species is currently listed as Near Threatened by the IUCN Red List.

In South Africa, Zambezi sharks occur from the Mozambican border to the Breede River on the southwest coast. Their occurrence in estuarine systems in South Africa is well-documented, although there is limited data available on pupping and nursery grounds. To date, the St Lucia Estuary remains the only known pupping ground for Zambezi sharks; however human activities in the estuary have likely compromised the reproductive capacity of this species.

In South Africa no studies have examined habitat requirements for neonatal, juvenile and adult Zambezi sharks. It is likely, however, that physico-chemical factors – as well as the physical characteristics of an estuary (e.g. depth, prey availability) – determine the suitability of a system for reproductive purposes. Based on these characteristics, several other estuaries have been identified as possible pupping and nursery grounds, including the Umzimvubu and Breede River systems. A rapid assessment of the physico-chemical and physical characteristics of South Africa's rivers – and therefore suitability for Zambezi sharks – indicates several of major river systems may be suitable habitat. These include (from West to East) the: Breede, Gouritz, Gamtoos, Sundays, Great Fish, Great Kei, Umtata, Umzimvubu, Mngazana, Thukela and Lake St Lucia systems. Although several of these systems may not be used for reproductive purposes, they should be considered critical

habitat for ensuring the health of Zambezi shark populations in South Africa. Table 3.2 provides a summary of South Africa's important nursery areas. All estuaries larger than a 100 ha in total habitat were included in the list. In addition some smaller estuaries with known endemic fish or invertebrate species, e.g. East Kleinmonde that is the prime nursery for the Estuarine Pipefish, were also incorporated. Confirmed importance is indicated by a X, while a X? indicates unconfirmed status (but likely) as estuary and catchment characteristics indicate suitable habitat.

Table 3.2 Summary of South Africa's very important nursery estuaries

	Biodiversity	Kob species		Steenbras spawning grounds	Zambezi sharks	
		Juveniles	Sub-adults		Pupping	Juveniles
Orange (Gariep)	X		X			
Buffels	X					
Olifants	X		X			
Groot Berg	X		X			
Rietvlei/Diep	X					
Wildevoëlvlei	X					
Sand	X					
Bot/Kleinmond	X		X			
Klein	X		X			
Uilkraals	X					
Heuningnes	X		X			
Breëde	X		X		X?	X?
Duiwenhoks	X		X			
Goukou (Kaffirkui	X		X			
Gouritz	X		X			X?
Klein Brak	X		X			
Groot Brak	X		X			
Swartvlei	X					
Knysna	X	X	X			X?
Keurbooms	X		X			
Kromme	X		X			
Seekoei	X					
Kabeljous	X	X?	X			
Gamtoos	X	X?	X			X?
Swartkops	X		X			
Sundays	X		X			X?
Bushmans	X		X			
Kariega	X		X			X?
Kowie	X		X			
East Kleinemonde	X		X			
Great Fish	X		X		X?	X?

	Biodiversity	Kob species		Steenbras spawning grounds	Zambezi sharks	
		Juveniles	Sub-adults		Pupping	Juveniles
Mpekweni	X		X			
Mtati	X					
Mgwalana	X					
Bira	X					
Keiskamma	X		X	X?		X?
Tyolomnqa	X		X	X?		
Nahoon		X?	X			
Kwelera		X?	X			
Great Kei	X	X?	X	X?		X?
Nxaxo/Ngqusi	X					
Nqabara/Nqabarana	X					
Mbashe	X	X	X	X		X?
Xora	X					
Mtata	X	X?	X	X?	X?	X?
Mtakatye	X					
Mngazana	X		X		X?	X?
Mzimvubu	X	X?	X	X?	X?	X?
Mzimkulu	X		X			X?
Durban Bay	X		X		X?	
Thukela						X
Matigulu/Nyoni	X					
Mlalazi	X					
Mhlathuze	X		X		X?	X?
Richards Bay	X	X	X		X?	
uMfolozi	X	X	X		X?	X?
St Lucia	X	X	X		X	X
Kosi	X					

3.2.2 Freshwater flows to the marine environment

Freshwater flow reduction has severe consequences for marine biodiversity and resources through impacts on physical habitat, reduced nutrient inputs and alterations to important ecological processes (Gillanders and Kingford 2002, Lamberth and Turpie 2003, van Ballegooyen et al. 2007, Lamberth et al. 2009, Porter 2009). In South Africa, reduced river inputs have a significant impact on coastal and marine ecosystems around the entire South African coastline although impacts are expected to be more severe in the more nutrient poor marine environment of the east coast (van Ballegooyen et al. 2007). The impacts of altered fresh water flow reduction extend offshore with correlations between flow reduction and patterns in catches of commercial linefish documented more than 40 km offshore on the Thukela Banks (Lamberth et al. 2009).

Based on reductions in the 20 largest catchments in South Africa (those that contribute approximately1% or more of total MAR in the region), the total freshwater flow to the marine environment has been reduced by about 40% (more than 11 000 million m^3/year) (see Table 3.3). The greatest reduction is on the west coast (approximately 6 900 million m^3/year) but there are significant reductions along both the south (1 100 million m^3/year) and east coasts (2 900 million m^3/year). The larger river systems have experienced the greatest flow reduction and are therefore expected to have driven the most change in marine ecosystems. These include the Orange River on the west coast, the Thukela and Mzimvubu rivers in KwaZulu-Natal and the Breëde River in the Agulhas Bioregion.

Table 3.3 Summary of the flow modification for the 20 major cathment in South Africa

Catchment	MAR (Mill m^3/a)	% Change	% of SA Runoff
Orange/Gariep	10 833.0	56	28.6
Thukela	3 753.6	27	9.9
Mzimvubu	2 893.8	10	7.7
Breëde	1 785.0	42	4.7
Mzimkulu	1 478.2	25	3.9
Olifants	1 070.1	34	2.8
Great Kei*	1 064.1	15	2.8
Mkomazi*	1034	15	2.7
Groot Berg	916.0	46	2.4
uMfolozi	885.0	19	2.3
Mbashe*	836.0	10	2.2
Mgeni	682.9	61	1.8
Mhlathuze	645.0	20	1.7
Gouritz*	539.1	40	1.4
Great Fish**	525.4	30	1.4
Gamtoos*	500.6	35	1.3
Mvoti*	482.0	25	1.3
St Lucia	417.9	30	1.1
Mtata	377.8	54	1.0
Mtamvuna*	303.8	15	0.8

**Flow estimates provided by WSAM model and modified by expert opinion*
*** Great Fish Estuary receives additional flow through the Orange-Fish River Tunnel Transfer Scheme, but no detail is available on exactly how much (pers. comm. Prof Denis Hughes)*

The reduction of river flow leads to a reduced sediment supply to the coast with implications for beach and subtidal habitats. Reduced sediment input can change beach morphodynamic state, altering the beach biodiversity, accelerating beach erosion and can even lead to the

loss of beach habitat (Harris et al. 2010). In the subtidal environment, riverine inputs provide important sediment inputs for the maintenance of unconsolidated sediment habitats. Reduced river inputs reduce the spatial extent of such habitats (van Ballegooyen et al. 2007).

Many of these habitats are also important for ecological processes. For example the endemic and imperiled white steenbras *Lithognathus lithognathus* spawns on submarine fluvial fans, a localised habitat of limited extent, associated with mixed mud and sand banks deposited by rivers in the southeast Cape coast (Bennett 1993). Changes in salinity and water temperature linked to flow alteration also impact thermohaline fronts which affects plankton feeding communities and the fish, birds and mammals that feed on the concentrated food associated with these habitats (van Ballegooyen et al. 2007).

Important processes that can be compromised through altered fresh water flow include nursery functions, environmental cues, productivity and food web processes. Increased frequency of estuary mouth closures and associated conditions due to reduced freshwater flow can also disrupt lifecycles and connectivity, and deprive fish and invertebrates of the important nursary function of estuaries (Whitfield 1998). Sediment input leads to turbidity providing an important refuge for fish which is a key component of estuarine, coastal and offshore nursary areas (Whitfield 1998, Lamberth et al. 2009). Reduced turbidity can alter predation pressure and the catchability of fisheries resources (van Ballegooyen et al. 2007). Altered freshwater flow leads to changes in important environmental cues such as those relevant for spawning, recruitment and migration (Lamberth et al. 2009). Changes in spawning intensity have been correlated with altered fresh water flow (QuiÑores and Montes 2001, Demetriades et al. 2000).

Catchment derived nutrients are an important component of coastal and marine foodwebs stimulating phytoplankton production. The impacts of reduced nutrient supplies will travel through coastal and marine ecosystems via foodwebs (van Ballegooyen et al. 2007). Reduced detritus may also impact on coastal and marine foodwebs as river-associated detritus and associated epiphytes are believed to be an important food source for microorganisms, filter feeders, detritivorous fish and invertebrates (Berry et al. 1979, Schleyer 1981, Berry and Schleyer 1983, Whitfield 1998, Porter 2009). In KwaZulu-Natal, an isotope study showed that suspended riverine particulate organic matter (terrestrial, aquatic plant material and plankton) plays an important role in supporting inshore filter-feeder

communities, i.e intertidal and subtidal assemblages dominated by the sea-squirt known as red bait *Pyura stolonifera*, mussels *Perna perna*, and oysters *Striostrea margaritacea* and *Saccostrea cucullata* (Porter 2009). Porter (2009) found that between 8 and 33% of filter-feeder diets consisted of material introduced to the sea by rivers and concluded that rivers play an important trophic role in promoting filter-feeder biomass in the Natal Bioregion. He also demonstrated the links between river, inshore and pelagic ecosystems, highlighting the need for adequate freshwater supplies for the maintenance of the integrity of coastal and marine ecosystems.

Changes in freshwater flow and associated variations in turbidity, nutrients and sediment supply can impact fisheries resources, alter catch composition and reduce the economic returns of fisheries (Lamberth and Turpie 2003, Lamberth et al. 2009). Fisheries resources in South Africa that have, or may have been compromised by reduced fresh water input include linefish (Lamberth et al. 2009), prawns (Demetriades et al. 2000), and filter feeding invertebrates in the intertidal and shallow subtidal (Porter 2009).

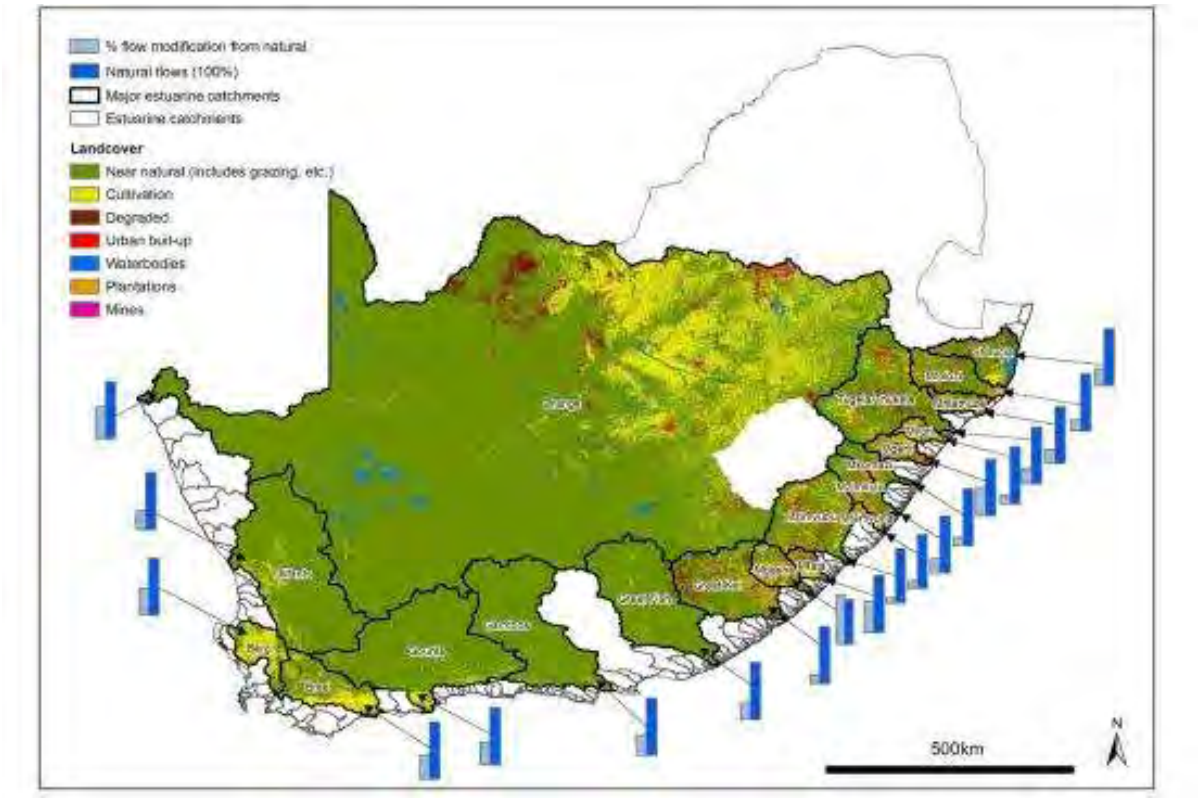


Figure 3.2 Freshwater flow modification of the 20 largest catchments of South Africa

Lamberth et al. (2009) identified significant relationships between flow and the catches of 14 linefish species (more than 90% of the total catch) on the Thukela Banks in KwaZulu-Natal. Most fish responded negatively, with reduced catches correlating with reduced flow (after a lag phase), slinger *Chrysoblephus puniceus* and squaretail kob *Argyrosomus thorpei,* the most important species in the fishery, showing the most marked response.

The ecological needs of the coastal and marine environment must be considered in the allocation of fresh water resources to ensure healthy functioning marine ecosystems that support productive and sustainable fisheries.

3.2.3 Carbon sequestration

Coastal wetlands and marine ecosystems are gaining increased attention for the carbon they store in biomass and especially sediments (Crooks et al 2011). These ecosystems sequester carbon within standing biomass, but even more within soils. Soil organic matter contains more than three times as much carbon as either the atmosphere or terrestrial vegetation (Schmidt et al. 2011). Wetlands in saline environments have the added advantage of emitting negligible quantities of methane, a powerful greenhouse gas, whereas methane production in freshwater systems partially or wholly negates short-term carbon sequestration benefits. This makes them potential sources of significant greenhouse gas (GHG) emissions if disturbed, but also valuable for nature-based approaches to climate change mitigation.

Table 3.4 Summary of potential greenhouse gas (GHG) reductions due to soil building in coastal wetlands (Source: Crooks et al 2011)

Wetland Type	Carbon Sequestration	Methane Production	Net GHG Sink
Mudflat (saline)	Low	Very Low	Low to Medium
Salt Marsh	High	Very Low	High
Freshwater Tidal Marsh	Very High	High to Very High	Neutral or variable
Estuarine Forest	High	Low	High
Mangrove	High	Low to High*	Low to High*
Sea grass	High	Low	High

**salinity dependent*

Mangroves, marshes and submerged macrophytes remove carbon from the atmosphere and lock it into the soil, where it can stay for millennia. Unlike terrestrial forests, estuarine ecosystems are continuously building carbon pools, storing significant amounts of carbon in the sediment below them. When these systems are degraded due to drainage or conversion

for agriculture and mariculture, they emit large and continuous amounts of CO_2 to the atmosphere.

The most effective way to maintain wetland carbon pools and prevent emissions to the atmosphere is avoiding degradation through protection and sustainable management. Restoration of degraded estuarine ecosystems has a twofold benefit: reducing ongoing losses and rebuilding carbon stores.

Globally the current rates of degradation and loss of coastal wetlands are up to four times those of tropical forests (Crooks et al. 2011). Salt marshes and freshwater tidal marshes have lost more than 50% of their historical global coverage. Destruction of about 20% of the world's mangroves, has led to the release of centuries of accumulated carbon. This has also disturbed natural protection against storm surges and other weather events.

Protecting these estuarine ecosystems, and the carbon they store, can be of significant benefit to coastal communities, with shoreline protection and increased fisheries productivity among the co-benefits provided by healthy estuaries. Thus estuaries contribute to the resilience of coastal community while sequestering CO_2. If wetlands conservation can be linked to carbon markets, communities will have a way to pay for conservation which will generate local and global benefits (Crooks et al. 2011).

South Africa have about 11 400 ha of salt marsh, 4 300 ha of mangroves, 1 300 ha of submerged macrophytes, 6 300 ha of swamp forest, and 4 000 ha of sand and mud banks. South Africa's current climate policies, unfortunately, contain few incentives for the protection and/or restoration of degrade coastal wetlands and estuaries. These ecosystems need to be protected and incentives provided to avoid their degradation and improve their condition in order to be included into carbon emission reduction strategies and in climate negotiations.

3.2.4 Flood regulation

South Africa's estuaries provide a significant buffer against floods with a total open water area of 61 000 ha and flood plain storage, as represented by the estuarine functional zone, of nearly 171 000 ha, of which 60% is in the Subtropical biogeographic region.

The different types of estuaries in the different rainfall zones vary in how much flood regulation (attenuation) they can provide. Large, permanently open systems, such as the Knysna Estuary, can have such a significant storage to runoff relationship that a 1:50 year flood event will only raise the water level in the estuary by a few centimeters. In contrast, the relatively small, incised temporarily open estuaries of the KZN region provides substantially less flood regulation as a result of much lower storage to runoff relationships. Nevertheless, the estuarine functional zone still tends to provide more storage than that of most rivers channels.

Unfortunately, inappropriate development in the estuarine space is hindering the ability of estuaries to buffer the surrounding landscape against floods. Flow reduction is increasing mouth closure and thereby increasing the risk of flooding. Artificial breaching at low water levels is reducing the flushing of sediments during breachings and causing cumulative sediment buildup, thereby creating constricted outflow channels and increasing the risk of high flood levels.

An example of the unintended consequences of the disruption of these ecosystem services are the recent floods occurring at the Slang Estuary near Oesterbaai (Figure 3.3). The Slang is a very small, temporarily open/closed estuary along the south coast. The estuary runs through a dune belt and is fed by a very small catchment. Water resources development in the catchment removed the baseflows that ensured the sustained erosion of the dunes encroaching on it, and caused dune formation in the estuarine functional zone. During the floods of August 2011 the system created a new outlet channel that cut through some low lying adjacent developments.

Wetland destruction in estuary catchments is also increasing the magnitude of floods. A case in point is the destruction, through poor agricultural practices, of the peat wetlands in the Goukou and Duiwenhoks catchments. The loss of these wetlands upstream of the estuaries has changed the magnitude and duration of floods and reduced/removed baseflows during the low flow period (pers. comm. Jean Du Plessis, CapeNature).

Preventing development in the estuarine functional zone and ensuring the baseflows required to maintain open mouth conditions will ensure the continuous provision of this ecosystem service.

3.2.5 Storm protection

The sand berms that develop in front of more than 75% of South Africa's estuaries during low-flow periods, provide significant protection against elevated water levels and wave action generated by coastal storms. With the exception of the winter rain fall zone, most South African estuaries are closed during the winter, which is generally when the highest risk of severe sea storms occur. The higher the sand berm at the mouth, the greater the protection from the wave action generated by storms.



(a) Oesterbaai 1 hour before the flood



(b) New mouth being scoured



(c) Flood damage

Figure 3.3 Collage of images illustrating the power of water under flood conditions at the Slang Estuary, August 2002 (Source: T Bornmann)

For example, the second and fourth highest water levels ever recorded at the Groot Brak Estuary, 2.4 m MSL on 1 September 2008 and 2.24 m MSL on 25 May 2002 respectively, was the result of sea storms. Over-wash from the sea side caused a breaching that left the system unprotected from coastal waves. Low lying properties sustained substantial damages due to this event. Artificial breaching, development in the coastal zone, stabilization of

windblown sand, sand mining and sediment trapping by dams can all reduce the ability of estuaries to provide this service.



Figure 3.4 Coastal storm overtopping sand berm at mouth and causing flooding at Groot Brak, 1 September 2008 (Source: J Kriel, DWA)

3.2.6 Safe bathing areas

South Africa's very exposed, high energy coastline has few sheltered beaches that are safe for bathing. High wave action and strong currents are more the norm than the exception.

In contrast, South Africa's nearly 300 estuaries offer easy access, warmer waters, shallow depths and weak currents that make them very attractive to bathers. These natural assets have, regrettably, been largely compromised in most urban areas (e.g. City of Cape Town and eThekwini) through poorly planned storm water runoff systems and Waste Water Treatment Works discharges.

Significant bacteriological contamination of water resources requires that local authorities prohibit access and prevent certain recreational activities to ensure human well being. The loss of safe estuary bathing areas directly impacts children and weak swimmers who are forced to use the more exposed marine environment.

3.2.7 Estuarine plants as food, fuel and building resources

Elsewhere in the world, halophytes (salt tolerant plants) are used as an alternative energy or food source due to their high oil and protein content. Oil yield of these species may be up to 30% more than conventional vegetable-oil crops such as canola and sunflowers. *Salicornia* and *Sarcocornia* are salt marsh species used as a source of oil. These and similar plants

are also used as a food source, both as a staple diet and sought after culinary delight. The leaves of *Sarcocornia* species (samphires) are used in some parts of the world (e.g. USA and England) and either eaten in salads or pickled with oil and vinegar. They are also traditionally used as ingredients in soap and glass, hence the other common name, glassworts.

Traditional use of *Sarcocornia* and *Salicornia* in South Africa (see Figure 3.5) is limited, but the aquaculture industry has expressed an interest and begun exploring their potential culture. In particular there are a number of examples from around the world where halophytes have been successfully used as biofilters to remove nutrients and salts from effluent water from land based mariculture activities such as shrimp farming. Most harvesting takes place from the wild but with increased salinisation of agricultural lands halophytes are a possible future food source.



Figure 3.5 *Sarcocornia tegetaria* in Groot Brak Estuary (Source: T Riddin)

Because halophytes display rapid growth, they can be valuable in the biofuel industry, as they are a productive source of good quality ligno-cellulosic biomass, which is used to produce ethanol. An added benefit is that they are a persistent crop, not needing to be resown each growing season, nor do they require fertilizers or pesticides. By far the greatest

benefits of halophyte culture are that, unlike current biofuel production, it doesn't displace food crop production nor use excessive quantities of freshwater. In many instances, halophytes are been cultured in nutrient farms to reduce elevated nutrient levels in estuary waters before these reach the sea. The resultant crops are harvested for biofuel.

Two other species from the reed and sedge community, *Juncus kraussii* and *Phragmites australis*, are commonly used in KwaZulu-Natal by the local community for mat and basketry. In the St Lucia Estuary and Umlalazi Estuary near Mtunzini, Ezemvelo KwaZulu-Natal Wildlife in collaboration with the iSiMmangaliso Wetland Park Authority, have implemented a harvesting license programmes to collect material from these systems as part of a sustainable development initiative are implemented. These and similar plants are also used in the thatching industry.

Mangroves are intensively harvested (mostly illegally) for firewood (the white mangrove *Avicennia marina*) and for building purposes (the red and black mangrove). See Section 14.1 Species of special concern for more detail on the harvesting of estuary plants.

3.3 Summary

Estuaries provide a host of ecosystem services upon which local and coastal communities depend, including:

- Nursery function for estuarine and marine fish, with some of the more muddy Temperate estuaries such as the Mbashe, Umtata, Keiskamma and Great Kei being highlighted for collapse resources such as the White Steenbras and Dusky Kob.
- Provision of freshwater (both surface and groundwater), nutrients, detritus and sediments to the coastal environment that is linked to fisheries (e.g. prawns and line fishery) and important ecological processes. Freshwater flow reduction has severe consequences for marine biodiversity and resources through impacts on physical habitat, reduced nutrient inputs and alterations to ecological processes.
- Estuaries offer easy access, warmer waters, shallow depths and weak currents that make them very attractive to bathers. These natural assets have, regrettably, been largely compromised in most urban areas through poorly planned storm water runoff systems and Waste Water Treatment Works discharges.
- Coastal wetlands and marine ecosystems are gaining increased attention for the carbon they store in biomass and especially sediments. Healthy estuaries contribute to the regulation of greenhouse gasses and provide opportunities for carbon trading.

- South Africa's estuaries provide a significant buffer against floods with a total open water area of 61 000 ha and flood plain storage, as represented by the estuarine functional zone, of nearly 171 000 ha, of which 60% is in the Subtropical biogeographic region.
- The sand berms that develop in front of more than 75% of South Africa's estuaries during low-flow periods, provide significant protection against coastal storms.
- Halophytes (salt tolerant plants such as *Sarcocornia*) can be used as an alternative energy or food source due to their high oil and protein content. By far the greatest benefits of halophyte culture are that, unlike current biofuel production, it doesn't displace food crop production nor use excessive quantities of freshwater.
- Mangroves, reeds and sedges are also used as building material and basketry.

4. THE ESTUARINE FUNCTIONAL ZONE

L van Niekerk, C Petersen, V April, F Daniels, A Maherry & T Malebu

In 2010, the estuarine functional zone – encapsulating not only the estuary water body but also supporting physical and biological processes and habitats necessary for that estuarine function and health – was listed as Notice 3 (GN R 546) under the National Environmental Management Act (NEMA), Environmental Impact Assessment (EIA) Regulations (2010). This notice stipulates that estuaries (defined by the spatial delineation of the estuarine functional zone) are "sensitive areas" that require environmental authorisation before developments within this zone may proceed. These regulations are not backdated but are meant to curb inappropriate future development in the estuarine functional zone.

The spatial demarcation of the estuarine functional zones will enable, for the first time, their explicit incorporation into planning and approval processes, such as Provincial conservation plans and municipal Integrated Development Plans. Importantly the estuarine functional zone increases the "traditional estuary" considerably, now including habitats such as floodplain areas, previously not considered essential for estuary functioning. A summary of the extent of the estuarine functional zone in South Africa is provided in Table 4.1 and Figure 4.1.

Table 4.1 Extent of the Estuarine Functional Zone per biogeographically region

Biogeographically region	Proportional Estuarine functional zone (ha)	Percentage of Total Estuarine functional zone
Cool Temperate	26 516	16
Warm Temperate	41 785	24
Subtropical	102 746	60
Total	**171 046**	**100**

This chapter details the approach and methods that were adopted in the delineation of the estuarine functional zone for South African estuaries, as well as the advantages thereof.

4.1 Approach and method

Estuaries have little permanent habitat structure; unlike for example a rainforest, as estuarine habitats are constantly forming and eroding at various temporal and spatial scales. Over longer time scales the total habitat area occupied by the various estuarine habitat types tend to remain more or less constant, while the actual spatial location of the various

estuarine habitats is highly likely to change between resetting events (e.g. larger floods). This relative ephemeral nature of estuarine habitat presents an assessment and planning challenge. Biodiversity protection requires the protection of habitat and ecological and evolutionary processes. In order to do this it is important to define the space within which estuaries function to ensure their present and future health. In international literature, an estuary is defined as a semi-enclosed coastal body of water which has a free connection with the open sea and within which sea water is measurably diluted with freshwater derived from land drainage (Elliott and McLusky 2002; Cameron & Pritchard 1963; Pritchard 1967). Most South African estuaries are relatively small in comparison with those of the northern hemisphere.

The mean annual runoff of most South African rivers is very variable, fluctuating between floods and extremely low to zero flow; which has led to a number of different definitions for South African estuaries that recognise that these systems may not necessarily have a 'free connection with the sea' but are 'either permanently or periodically open to the sea' (Day 1980; Day 1981; Heydorn 1989, CSIR 1992). While Fairbridge (1980) proposed setting the upstream extent of an estuary as the limit of tidal rise, in some instances in South Africa, e.g. the Bot and Klein estuarine lakes, salinity penetration can be detected further upstream than tidal variation. This phenomenon stems from the fact that South African estuaries are microtidal (< 2 m tidal range) and in large systems the tidal rise can be barely discernible (< 5 cm) and easily masked by wind action, while more subtle hydrodynamic processes, such as diffusion, drive salinity penetration further upstream. In such cases the inland limit of salinity penetration represents the upstream boundary of an estuarine system. Back flooding under closed mouth conditions also increase the upstream penetration of salinity beyond that of the open (tidal) state.

In this assessment an estuary is defined as ''a partially enclosed permanent water body, either continuously or periodically open to the sea on decadal time scales, extending as far as the upper limit of tidal action or salinity penetration. During floods an estuary can become a river mouth with no seawater entering the formerly estuarine area or when there is little or no fluvial input an estuary can be isolated from the sea by a sandbar and become a lagoon or lake which may become fresh or hypersaline".

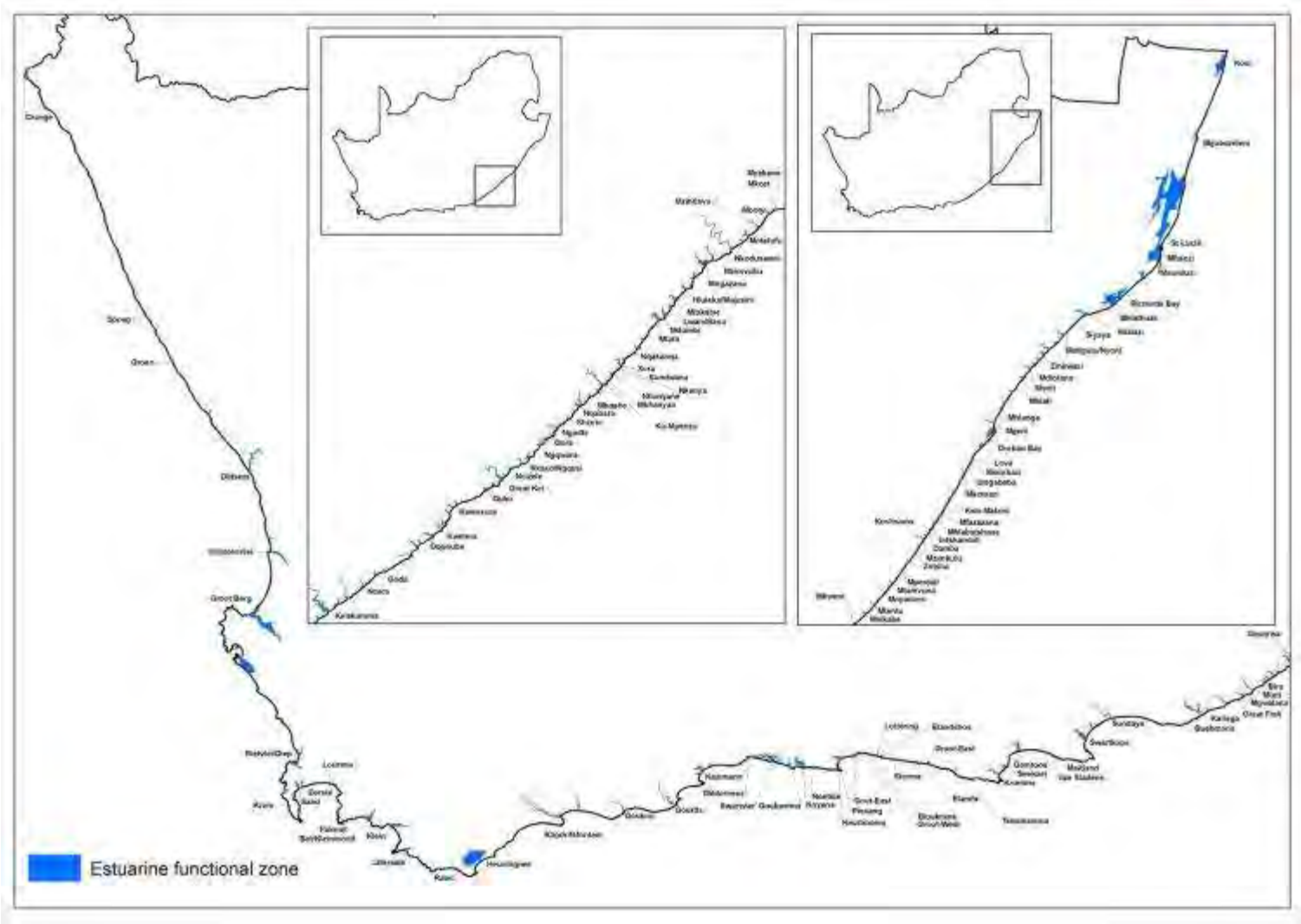


Figure 4.1 Estuarine Functional Zone for South Africa's estuaries

There are over 371 river outlets along the SA coast (see Appendix A for full list), but not all of these are deemed functional estuarine systems, i.e. representative of significant biological activity (Harrison et al. 2000). Since South Africa has a very variable climate and high energy coastal conditions, even systems that only open sporadically to the sea (e.g. every 4 – 10 years) are utilised by estuarine associated or dependent biota, e.g. by fish as nursery areas. The assessment therefore considered all permanent coastal water bodies (i.e. water bodies that do not dry out) that are sporadically or permanently linked to the sea as potentially estuarine systems, e.g. the Groen and Spoeg estuaries along the arid West coast were included, while ephemeral systems such as the Holgat, which dries out, were excluded from the assessment. In addition, using existing information and data sets (vegetation and fish) and anecdotal information, all systems were evaluated by a panel of national experts and listed as functional or not (Harrison et al. 2000). Some very small (< 500 m in length) permanent coastal water bodies that link rivers or streams to the sea were excluded from this assessment until such time as field studies have indicated that they should be considered as functional estuaries, i.e. only small systems that had data indicating they were biologically significant were included. Rivers entering the sea as waterfalls, e.g. those along the Tsitsikamma coast, were also excluded. In addition, a few small highly modified systems in urban areas were also excluded from the assessment on the basis that they were not functional systems.

In total 71 coastal inlets were not assessed, 20 in the Cool Temperate, 33 in the Warm Temperate and 28 in the Subtropical biogeographical region. It is important to note that not including these systems in the NBA assessment means that they lack adequate protection from future developments. It is therefore recommended that a separate study be under taken to demarcate these smaller and/or more ephemeral outlets and integrate them into current planning frameworks.

Mapping was undertaken for nearly 300 functional estuarine systems along the South African coastline. For each estuary the estuarine functional zone (estuarine ecosystem area) and open water areas were digitized using Spot 5 imagery (2008) and Google Earth. For the most part the images were relatively cloud free, but where cloudy conditions occurred on SPOT 5 images, Google images were used. The lateral boundaries included all the associated wetlands, intertidal mud and sand flats, beaches and foreshore environments that are affected by riverine or tidal flood events (Edgar 2000).The 5 m topographical contour (obtained from Chief Directorate Surveys and Mapping) was used as the boundary to

delineate the estuarine functional zone. Where the 5 m contour was not available in digital format, orthophotos (1:10 000) were scanned, georeferenced and the 5 m contour was digitized. Where no orthophotos were available (13 systems), floodplains were mapped from Spot 5 imagery using changes in topography and vegetation types as indicators. From the estuarine functional zone delineation, spatial data such as area, length and perimeter (estuary coastline) and distance to the next system could be inferred.

The 13 estuaries for which there were no topographical data available were:

- Mngazana
- Mngazi
- Mntafufu
- Mzimvubu
- Mzintlava
- Nkodusweni
- Spoeg
- Ntlupeni
- Sinangwana
- Steenbras
- Buffels (Oos)
- Rooiels
- Groen

The estuary mouth was taken as the downstream boundary of an estuary or, where the mouth was closed, the middle of the sand berm between the open water and the sea. The upstream boundary was determined as the limits of tidal variation or salinity penetration, whichever penetrates furthest. This is in line with recent scientific studies and the administrative definition of a South African estuary (see Figure 4.4) (Van Niekerk and Taljaard 2007, DWAF 2008).

Wherever possible the upstream boundary was derived from the literature, expert judgment or field observations. In a number of systems no data were available and the upper boundary was taken as the 5 m topographical contour (bearing in mind that the tidal range in South Africa is microtidal (< 2 m) and sand bars at closed estuary mouths can sometimes build up as high as + 4.5 m MSL). The upper boundaries were also screened against other existing spatial delineations, e.g. the KwaZulu-Natal Estuaries database (Version 1.00.02) and the delineation developed for Durban estuaries (Forbes and Demetriades 2008) with preference given to data from the larger scale studies. Spatially files were converted to GoogleEarth (KMZ formats) and mailed for review to members of the Consortium for Estuarine Research and Management (CERM) for comment.



Figure 4.2 Example of spatial delineation using Google Earth. Light blue areas delineate the estuarine floodplain <5 m above msl.



Figure 4.3 Example of spatial delineation using Spot 5 (note the presence of cloud cover in the southwestern portion of the image).



Figure 4.4. Example of openwater and estuarine functional zone delineation.

4.2 Advantages of the delineation of the Estuarine Functional Zone

South African estuaries have long suffered a lack of national scale spatial data for planning purposes. Using the 5 m topographical contour as a delineation boundary holds the following biodiversity and planning advantages:

a) The 5 m contour encapsulates most dynamic areas influenced by long-term estuarine sedimentary processes, i.e. sediment stored or eroded during floods, changes in channel configuration, aeolian transport processes, and changes due to coastal storms. Allowing for natural variability is important as these are some of the key physical processes that drive biodiversity along the South African coastline;
b) The 5 m contour encompasses the floodplain and estuarine vegetation that contribute detritus (food) and provide refuge during high flow events from strong currents. Salt-marsh vegetation can occur at distances greater than 500 m away from the surface water at a number of the larger estuaries, e.g. Olifants, Berg, Goukou and Klein Brak. Most estuarine-associated biota occurs under the 5 m contour, as this is as far as the influence of the ocean can be detected on land, even during storm conditions.

c) Temporarily open/closed estuaries (75% of South African systems) can close at water levels of between 2.5 and 4.5 m above msl. The 5 m contour allows for water-level increases due to backflooding under closed mouth conditions or wave action from high winds or exceptionally high tides;
d) In most cases, the 5 m contour allows for the inclusion of a buffer zone of terrestrial vegetation that represents the transition between terrestrial and coastal ecosystems;
e) The 5 m contour should provide a buffer zone that can allow an estuary to retreat in the event of sea-level rise due to climate change. It also allows for the inclusion of some terrestrial fringe vegetation that contribute detritus to the system and refuge areas for many animal species during floods;
f) An accurate delineation of the high-water mark is not available for the entire South African coastline;
g) Flood lines (1:50/1:100) for estuaries are often inaccurately determined under open mouth conditions, which leads to underestimation of flood heights. In the absence of long-term berm height data (which can vary substantially under different climatic conditions) the 5 m contour provides the best protection against natural hazards such as floods and storms;
h) The 5 m contour minimizes the risk of pollution to estuaries. Septic tanks are sunk about 2 m into the ground. During closed mouth conditions (and very high tides) density differences between fresh and salt water causes drainage problems or infrastructure damages if tanks are not situated not above 5 m;
i) Water resources development and land-use change in the catchment can lead to changes in mouth behaviour (e.g. change in Uilkraals Estuary type from permanently open to temporarily open/closed);
j) The 5 m contour data is available from the Chief Directorate: Surveys & Mapping, Mowbray, as a GIS layer or on black-and-white 1:10 000 orthographic maps. More detailed topographical data are not available on a national scale.

For all the above mentioned reasons it should be clear that, in some cases, the estuarine functional zone goes beyond the 5 m contour for one or more of the following reasons. In deeply incised floodplains, where the river/estuary bed may be meters below the mapped floodplain area, tidal action and/or backflooding may be detected further upstream than indicated by the 5 m contour on the topographical map. This is an artefact of the mapping process and may need site-specific data to correct.

For some narrow, deeply-incised estuaries with very large catchments the 1:20 year flood lines may be above the 5 m contour (i.e. limited floodplain area in relation to significant flood volume), e.g. Mzimkulu. In such cases it is recommended that a detailed topographical survey be conducted and the flood line estimated following engineering principles to demarcate more dynamic areas and indicate flood risk on a more local scale. The littoral active zones adjacent to an estuary can stretch beyond the 5 m contour, e.g. dune fields next to the Duiwenhoks and Sundays estuaries, and should be incorporated in the estuarine functional zone in site specific cases.

In summary, the delineation of the estuarine functional zones for South African estuaries elevated the status of estuaries from merely a points layer (X,Y data set) to spatially demarcating the space where most functions occur. While the incorporation of the estuarine functional zone under the NEMA Regulations is a major achievement, it is important that the estuarine functional zones are also recognised and incorporated into regulations to be drafted under the ICM Act (specifically Chapter 4 of the Act).

5. PHYSICAL CHARACTERISTICS

L van Niekerk, C Petersen & A Maherry

This section sets out to define some of the key physical characteristics of South Africa's estuaries. Important features are highlighted, and in some cases categorized to provide a more detailed perspective on estuarine biodiversity distribution and the forces that drive it. Categorization was done to reflect the dominant condition of an estuary. For example, categorising an estuary as a marine dominated system does not imply that it never has mixed or freshwater characteristics, but rather that it is predominantly in a saline state and that its biota should reflect that.

The project was initiated with a literature review of all the physical information available on South African estuaries. Special attention was given to grey literature as most large- scale data sets were generated as part of engineering studies to various government departments and authorities (Noble and Hemens 1978; Jezewski, Pyke and Roberts 1984, Jezewski and Roberts 1986; Allansonet al. 1990; CSIR 1986; 1987a, 1987b, 1987c; 1988). Few of these datasets were ever published. The project therefore set out to tabulate available information and update these with more recent studies, especially the more detailed ecological water requirements studies (referred to as Resource Directed Methods or Reserve studies) conducted for the Department of Water Affairs (DWA).

5.1 Rainfall Patterns

According to Brown and Jarman (1978) the South African coast spans three biogeographical regions (or climatic zones), namely the cool Temperate west coast, warm Temperate south coast and subtropical east coast. Rainfall patterns in the different regions vary greatly as a result of South Africa's highly variable climate. River inflow to the estuaries is determined by these climatic conditions, as well as the size and shape of the catchment, the latter controlling the magnitude and flow distribution of runoff (Reddering and Rust 1990). Catchment size varies significantly, ranging from very small (less than 1 km^2) to very large (greater than 10 000 km^2), with those in the cool Temperate region tending to be larger than those in the warm Temperate and subtropical regions.

The overall feature of the Mean Annual Precipitation (MAP) distribution over South Africa is that it decreases fairly uniformly westwards from the Drakensberg escarpment across the interior plateau, with rainfall patterns strongly affected by irregularities of terrain between the

escarpment and the ocean along the southern and the eastern coastal margins. According to Lynch (2004), approximately 20% of South Africa receives less than 200 mm MAP, and 47% receives less than 400 mm per annum (Figure 5.1), the result of the presence of subtropical high pressure cells which inhibit rainfall generation because of predominantly subsiding air. Only about 9% of South Africa receives a MAP in excess of 800 mm. KwaZulu-Natal is the wettest region of South Africa while the Western Cape has the highest range of MAP, and the highest individual point rainfall at an estimated 3 198 mm per annum (Lynch 2004). Because rainfall-runoff processes are nonlinear, with a larger proportion of rainfall being converted to runoff as a catchment becomes wetter, it should be clear that the rainfall to runoff relationship is much higher in the Subtropical regions than in the Temperate regions. This, in turn, also suggests that on average the smaller, temporarily open/closed estuaries of the Subtropical region should be open to the sea significantly more than similar sized estuaries (fed by similar size catchments) in the Temperate coastal areas (in areas of similar wave exposure and sediment availability).

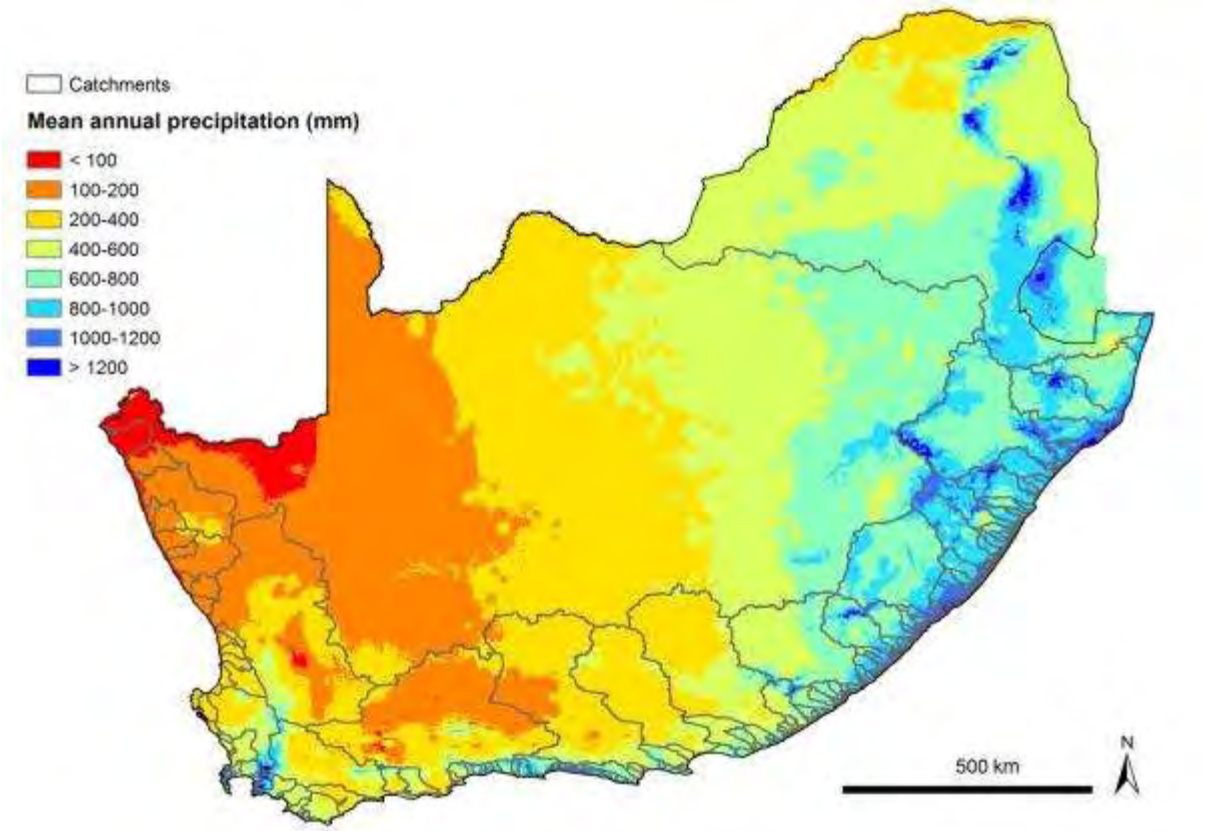


Figure 5.1 Mean Annual Precipitation of South Africa (Source: Schulze and Lynch 2007).

An area may have high or low average rainfall, a high or relatively low variability in rainfall from one year to the next, or its rainfall may be concentrated over a short rainy season or spread over a longer period. That does not, however, indicate anything about the season in which the rain falls - be it predominantly in winter, throughout the year or in summer; and if in summer whether it be in early, late or very late summer. Rainfall seasonality is an important hydrological consideration (Schulze and Maharaj 2007), particularly when viewed in light of estuarine ecological functioning and recruitment processes which predominantly occur in spring and early summer (Lamberth et al. 2008).

Rainfall seasonality, by primary catchment, is shown on the accompanying map (Figure 5.2). The winter rainfall regions have peak runoff during the winter months June, July and August. The early summer regions have rainfall concentration in December or earlier, the mid-summer rainfall region peaks in January, late summer peaks in February, and the very late summer regions rainfall peaks from March to May (Schulze and Maharaj 2007, Davies and Day 1998). The winter rainfall region in the west and the all year rainfall region in the south are seasonally clearly defined, while over the summer rainfall region the general trend is for rains to fall later as one moves towards the west (Schulze and Maharaj 2007).

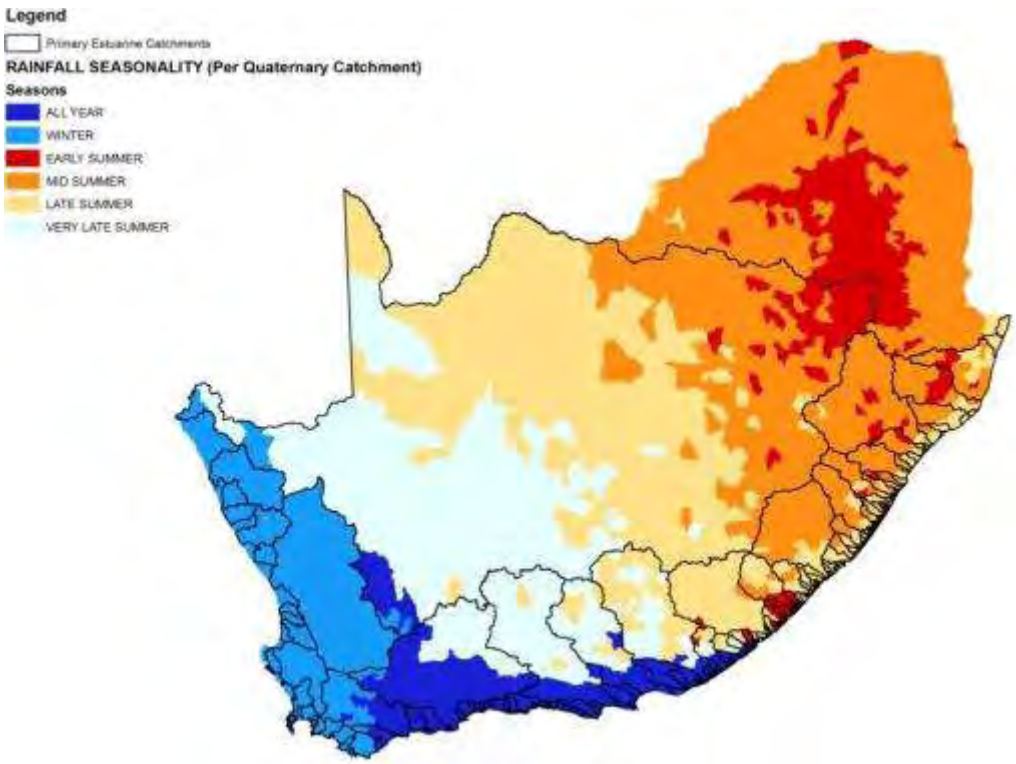


Figure 5.2 Rainfall regions in South Africa (Source: Schulze and Lynch 2007).

From the seasonality in rainfall it becomes clear that connectivity between rivers, estuaries and the sea is more established in the Subtropical region during the biological active period of spring and summer, than for the Temperate west coast and south coast regions. Estuaries fed by larger catchments spanning more than one rainfall zone represent anomalies from a coastal connectivity perspective, often sending recruitment signals when their adjacent neighbours are in low flow. For example, the Orange Estuary's peak flow is during the summer on a winter rainfall coast, the Breede is bimodal with both all year round and winter runoff peaks, the larger south coast system (Gouritz, Gamtoos, Sundays, Great Fish and Keiskamma) receive mainly late summer runoff in addition to all year round runoff, while the larger subtropical catchments deviate away from the coastal signal of late summer to mid- or early summer peaks in runoff.

5.2 Dominant catchment characteristics

The dominant catchment characteristics determining the character of river inflow to estuaries was derived from spatial data. Quaternary catchments were subdivided on a national scale into smaller primary catchments and overlaid by Super Group surficial geology[3] to determine the dominant geology type influencing water quality, e.g. Basement Complex, Carbonate Terrains, Extrusives, Fractured Metasedimentry, Karoo Dykes and Silts, Natal Group Sandstones, Surficial Deposits, Table Mountain Group Sandstone, Unclassified. Some descriptive statistics were then applied on a catchment scale to highlight physical differences along the coastline (Figure 5.3).

Following the example of Nobel and Hemens (1978), the inflowing river types were recognised: clear water, turbid water and black water (tannin rich, nutrient poor rivers) systems. The analyses showed that using absolute percentage of the geological layer coverage in a catchment could be misleading, as it is often the relative position of a feature that matters (i.e. not the percentage of runoff correlated with the feature) that ultimately drives the inflowing waters characteristics. For example, while the Duiwenhoks catchment has very little Sandstone (14%), the lower river reach and estuary is predominantly flanked by this geological formation/vegetation type and therefore displays a very clear black water signal during most of the year.

[3] Surficial geology, also referred to as Quaternary geology, refers to those unconsolidated geologic materials overlaying the bedrock.

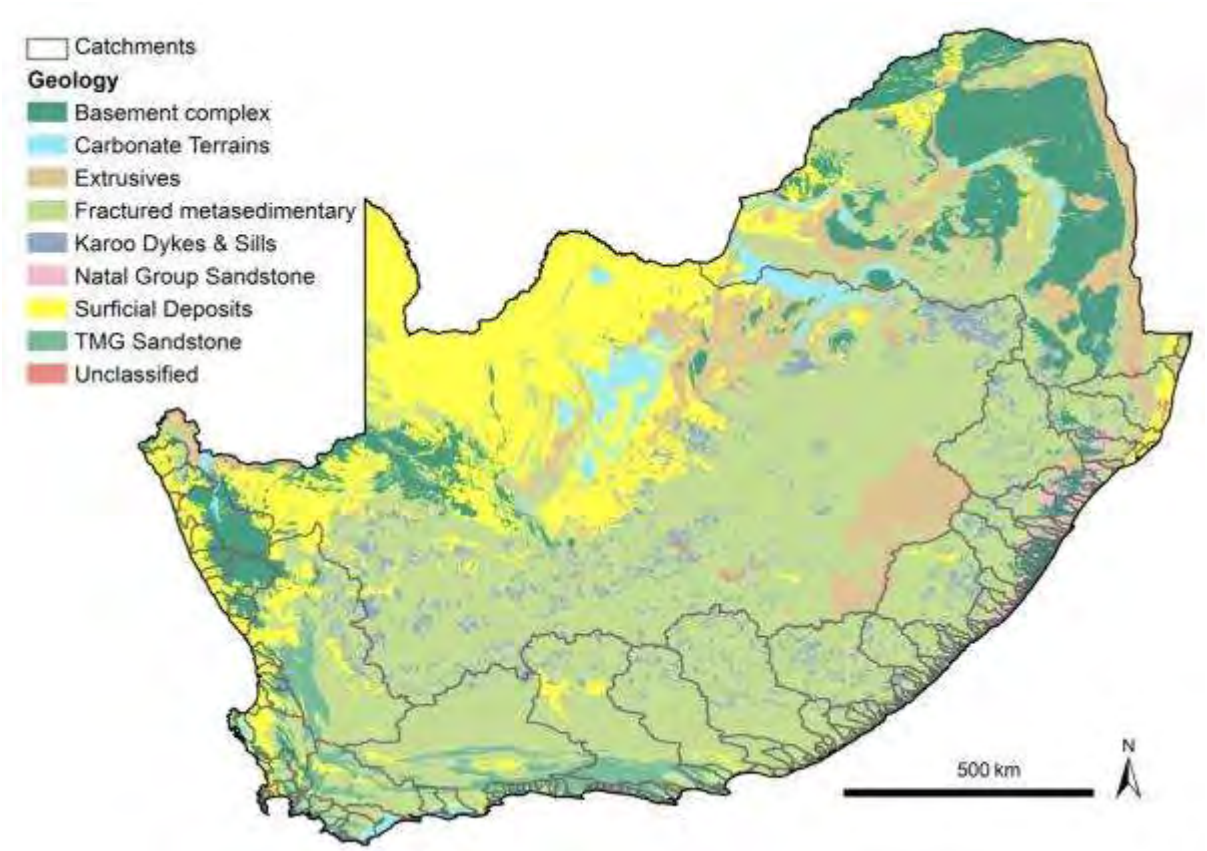


Figure 5.3 The geology of South Africa categorised according to the Super Group formations.

Only during high river flows does it exhibit the more turbid characteristics of its upper catchment. Therefore the catchments with sandstone geology (generally occurring along the coast) of more than 10% were considered black water systems unless field data or specialist opinion indicated otherwise.

After evaluating the spatial data in consultation with estuarine specialists and a terrestrial vegetation specialist (pers. comm., D Le Maitre, CSIR) it became apparent that the Pondoland estuaries were very similar in water quality and terrestrial vegetation type characteristics (CB4 Pondoland-Ugu Sandstone Coastal Sourveld) to the Cape black water systems (Mucina and Rutherford 2006). Therefore the Natal Group Aronites of the Wild coast area were classified and evaluated at a finer scale to accommodate the identified anomaly, especially since most specialists felt they represented a unique feature on that coast line and that the small Pondoland estuaries were very different from the small KwaZulu-Natal estuaries in terms of biota and water type.

Turbid estuaries were typed on the basis of their MAR, where larger catchments would cut back into the more erodible formations (e.g. Karoo formations) and flow velocities would

generally be higher throughout the year than for small coastal systems. While geology was the key feature under consideration, assumptions around erodiblity were informed by the sediment yield atlas for the various regions (1 to 10) (Rooseboom et al. 1992, Le Roux et a.l 2008, updated in Msadala et al. 2010).

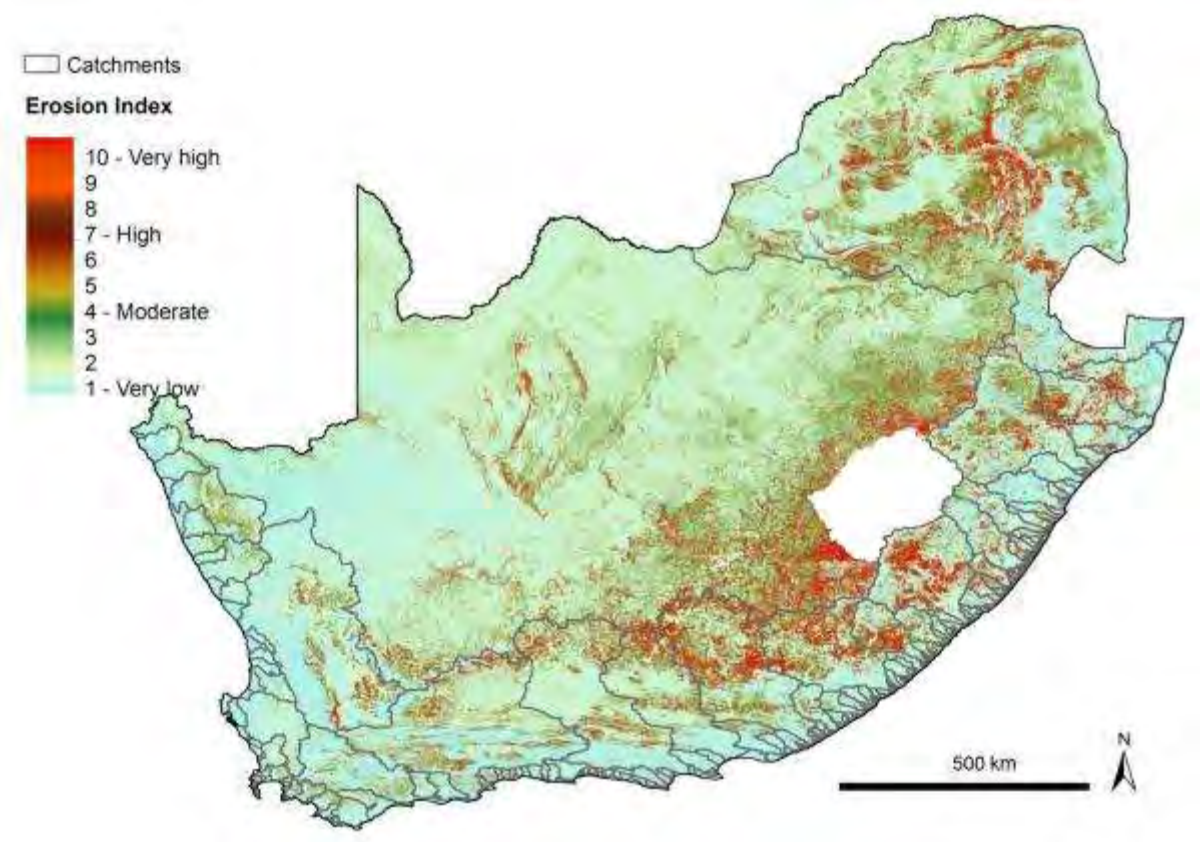


Figure 5.4 Updated sediment yield regions showing erodibility (Modified: Le Roux et al 2008).

Systems with a MAR >30 x10^6 tend to be permanently turbid, while the smaller catchments tend to have lower flow velocities in the dry season, which facilitates the development of clear water for much of the year (Figure 5.5). In some estuaries, large amounts of mud and silt are deposited by floods into estuaries, where tide and wind action causes resuspension for a significant period after the event. These more ephemeral conditions were not seen as representative of the majority state. This did raise the question whether the Wild Coast systems which drain some of the county's most erodible soils, in combination with current poor land-use practises, should be classified as turbid or clear water types. Presently floods deposit significantly more sediment in these systems leading to the perception that some of these estuaries are turbid throughout the year. In the absence of data, the classification kept

to the general rule that while the estuaries might act as a sediment sink (delivered in pulses during floods), the rivers were in general running clear.

While there is value in identifying the catchment water type, it is very important that *in situ* water clarity and Secchi disk readings be done on a national scale at regular intervals to facilitate the refinement of this catchment derived classification.

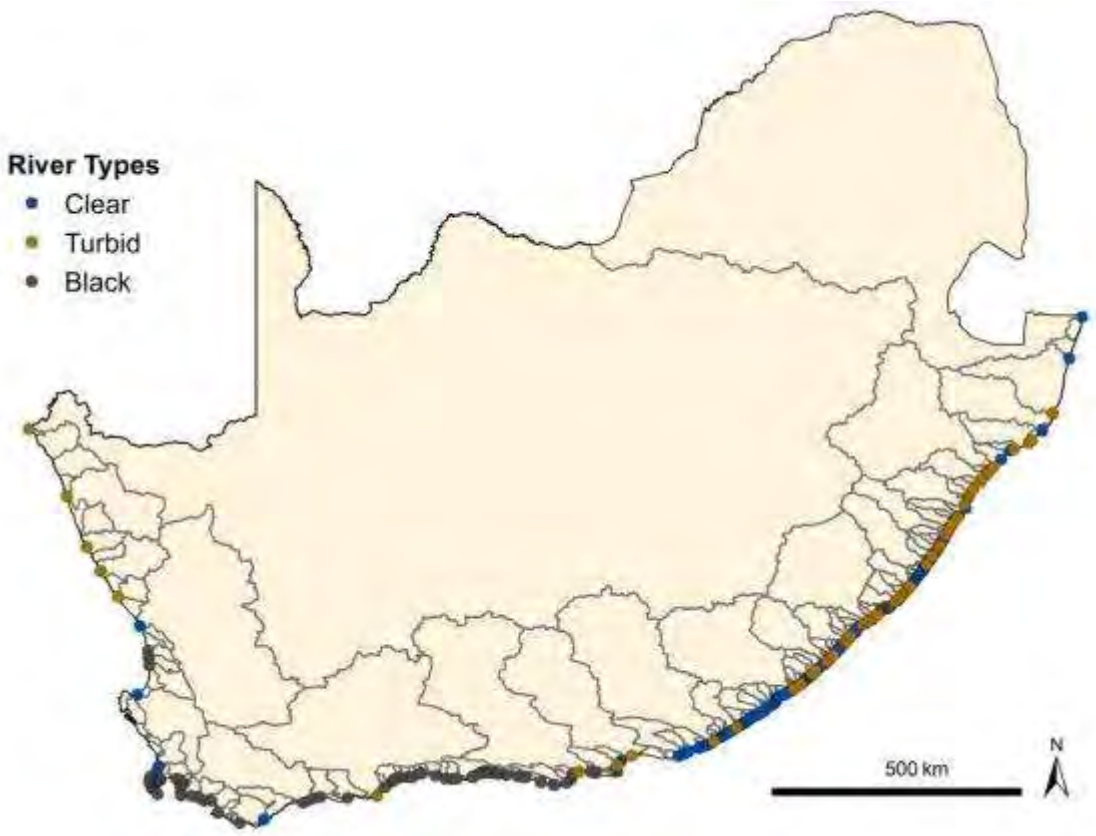


Figure 5.5 Dominant catchment type flowing into South Africa's estuaries.

5.3 Topography and size

Most estuaries in South Africa are located in incised bedrock valleys and thus are laterally confined (Cooper 2001). Some estuary channels fill their entire bedrock valley while others have a substantial floodplain, but most are confined by their bedrock valley. Only a few examples of coastal plain estuaries (i.e. estuaries formed in semi-consolidated alluvium on coastal plains) are present on the South African coast. These are mainly confined to northern KwaZulu-Natal, the Southern Cape coastal lakes area, and parts of the Cape West coast. Coastal plain estuaries are generally associated with substantial water bodies (i.e. estuarine lakes and large permanently open estuaries; Figure 5.6).

Size influences a number of estuarine characteristics, including being a predictor of community composition and abundance, with smaller systems having fewer species and lower absolute abundance. Larger estuaries also tend to have a higher diversity of habitat types than smaller systems. Estuary size can be loosely correlated with Mean Annual Runoff and catchment size but this is not always the case, e.g. Orange (Gariep) has a large catchment but relatively small estuary whereas the Kosi has a large estuarine area but small catchment.

From a process perspective large and small estuaries tend to respond differently to resetting event, i.e. major floods. Large estuaries are generally more buffered against flood scouring as they have more storage, which translates into less loss of substrate and habitat. Larger estuaries also tend to have more refugae within them (in the form of main channel areas, slack water areas and floodplains) which act as refugae during flood events. Therefore large systems can normally recruit/restock individuals from within the system after a flood (e.g. Gamtoos) while smaller estuaries tend to need recruitment from the marine environment after a major resetting event. Large systems, excluding estuarine lakes, tend to be permanently connected to the sea, while smaller systems tend to close during low seasonal flows (dry season) and drought cycles. Along the Subtropical coast, large systems are often associated with high runoff, i.e. high current velocities and resetting floods, which tend to negate the benefits larger estuaries tend to provide in the more Temperate regions.

These differences in the functioning between large and small systems are seen as more important for the less mobile species (invertebrates and plants) that recruit and establish at a slower rate after a resetting event. More mobile species such as fish and birds seem to be responding to these differences on a continuum (Turpie and Clark 2007). For example, using the data set from Harrison et al. (2000), Turpie and Clark (2007) estimated the total populations of fish for each species for each estuary and found that while larger estuaries contain more fish there was no significant difference in fish density between small and large estuaries from a total fish abundance perspective. A SIMPER analysis of this estimated total fish abundance demonstrated that, within each biogeographical zone, fish communities of smaller systems are subsets of larger systems, rather than certain types of systems having distinct types of fish communities (Turpie and Clark 2007). Their analysis suggested that the principle determinant of fish community characteristics, apart from geographic location, was estuary size.

For the NBA 2011 size was initially classified exponentially on the basis of the primary physical processes in estuaries (Large >1000ha, Medium 1000 - 100ha, Small 100-10ha, Very Small <10 ha), but this typology was further aggregated for the NBA 2011 in order to reduce the number of overall number of ecosystem features (see Chapter 7 on NBA 2011 typology for more detail).

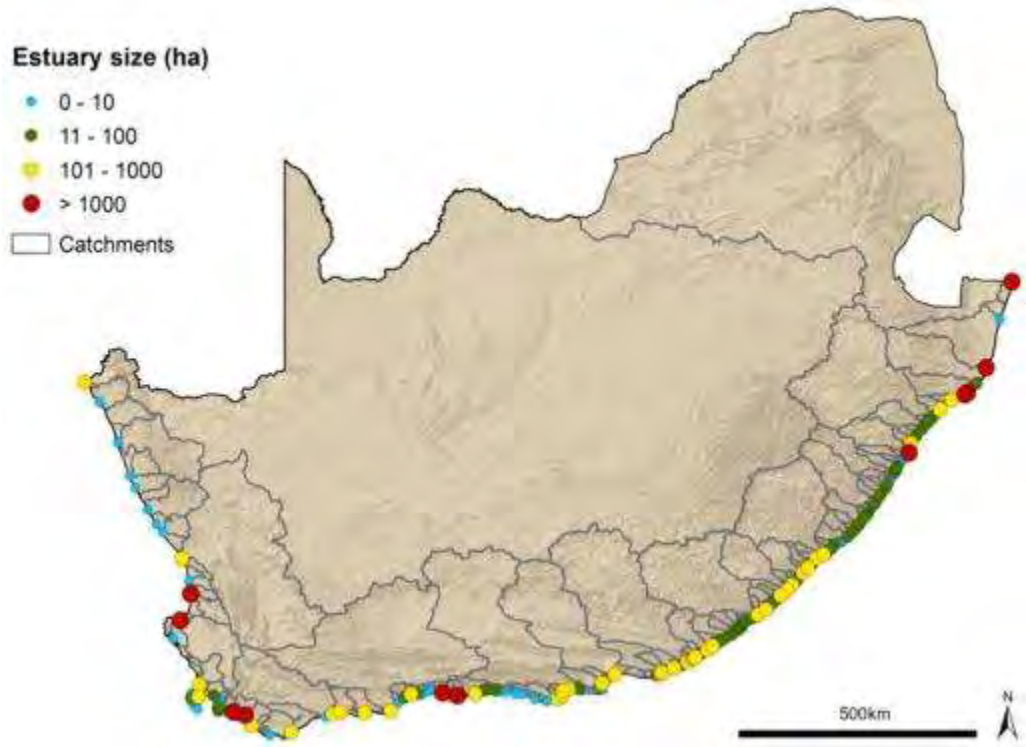


Figure 5.6 Topography of South Africa in relation to estaury size.

5.4 Physical dynamics

5.4.1 Tidal variation

South Africa's coast is generally characterised by low tidal ranges and high wave energy, making it a wave-dominated coast (Cooper 2001). Therefore the approximately 300 functional estuaries are predominantly microtidal systems (tidal range < 2 m) that are highly dynamic and shallow (average depth of 2–3 m). Owing to strong wave action and high sediment availability, more than 90% of the estuaries have restricted inlets, with more than 75% closing for varying periods of time when a sand bar forms across the mouth (Whitfield 1992). Perched estuaries tend to have more restricted mouths with limited tidal range due to their elevation relative to sea level (Figure 5.7). An additional feature is that small perched estuaries tend to drain between 30 – 70 % of their water under open mouth conditions, i.e.

they have more water column habitat when closed than open. These types of estuaries also tend to be more productive (and better nurseries) during the closed phase.

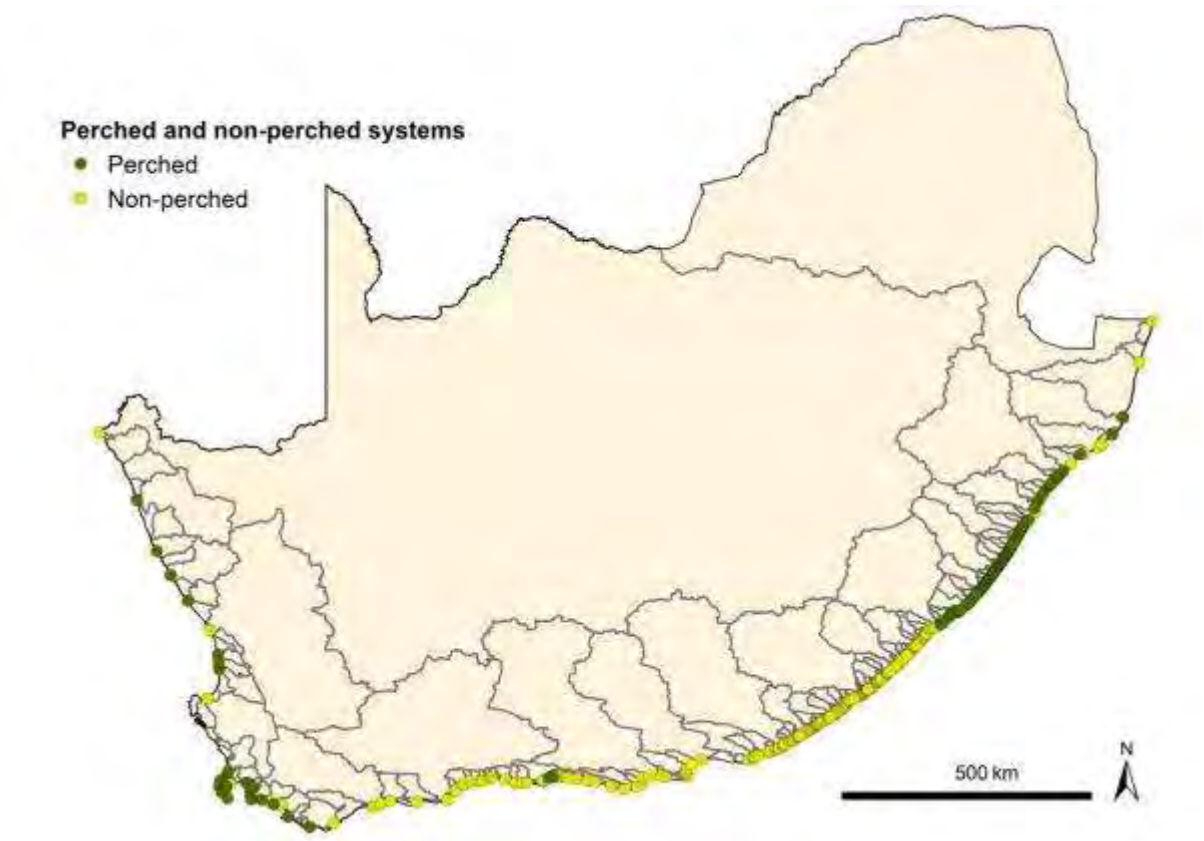


Figure 5.7 Mouth position on berm (perched, non-perched) in South Africa's estuaries.

Cooper (2001) generalized the wave energy and sediment availability along the coast of South Africa, indicating that most of the estuaries along the west coast and KZN coastline are perched. More information is required to disaggregate these general features in a meaningfully manner. Nevertheless the following generalization can be made from measured data along the coast: in permanently open estuaries the tidal range is normally greater than 1.5 m (e.g. Berg, Olifants, Sundays), between 1.5 – 0.5 m for a large temporarily open estuary (Groot Brak, Seekoei); and between 0.5 to 0.2 m for a perched or small temporarily open estuary (e.g. Buffels, Lourens, East Kleinemonde, Little Amanzimtoti). All estuaries become more constricted during the low flow season (the exceptions are Knysna and Mhtlathuze) and tend to be more open to the sea during the rainy season.

5.4.2 Mouth states

The major forces that maintain open mouth conditions are river inflow and tidal flows, while the major closing forces are wave energy and sediment availability (both marine and fluvial).

South Africa's estuaries are sensitive to changes in river runoff, the reason being that they generally discharge into a coastline with comparatively high energy, where the relatively low runoff produces rather limited scouring forces. Only about 25% of South Africa's estuaries are permanently connected to the sea (Whitfield 1992) and these systems normally have relatively high runoff throughout the year. The area covered by these estuaries is normally large enough for the tidal prism to play a significant role in maintaining open mouth conditions. In some cases the mouths are protected from high wave energy or little sediment is available to promote mouth closure (e.g. Mgazana Estuary). The majority (~75%) of South Africa's estuaries are not permanently open to the marine environment (Whitfield 1992). These types of systems are isolated from the sea by the formation of a sand berm across the mouth during periods of low river inflow or when river inflow has stopped altogether. Such estuaries stay closed until their basins fill up and the berm is breached, either as a result of high water levels in the estuary or following increased river flow. Mouth breaching may result in the removal of significant amounts of sediment. However, as soon as river flows decrease again, infilling from marine and fluvial sediment can be rapid. The Whitfield classification (1992), augmented by field observations, estuary size data (this study) and MAR was used as a basis for categorising estuaries into either open (permanently open) of closed systems (can close from time to time) (see Figure 5.8).

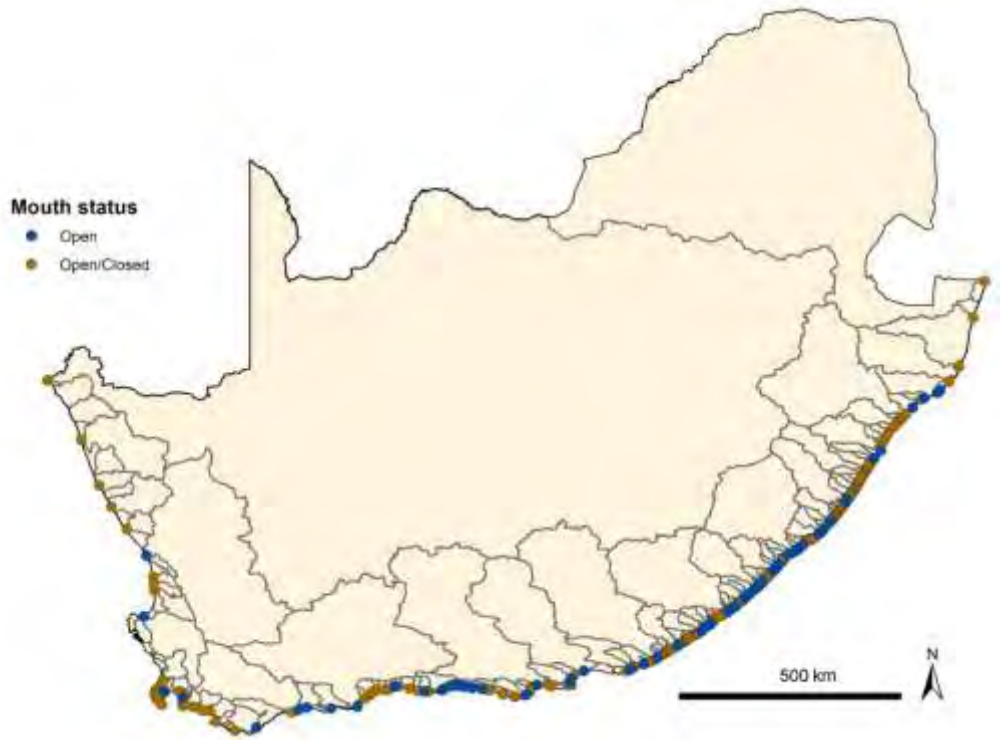


Figure 5.8 Location of permanently open (indicated in blue) versus temporarily open/closed (indicated in brown) estuaries.

5.4.3 Dominant salinity structures

The dominant salinity structure was determined by dividing the MAR by the volume of the estuary. Volume was calculated on the open water area multiplied by an average depth. Average depth in itself was problematic as most research papers report “average channel depth” and not “average estuary depth”.

For most small systems an average depth was assumed of 1.5 m and for larger estuaries 2 – 3 m depending on information and observations. While accurate bathymetry data is not available (available for less than 10% of SA estuaries) the project team had visited most of the larger systems in the course of their careers and this anecdotal information was used in the absence of data.

A major effort was made to refine the MAR. Ideally one would need to know the seasonal distribution of runoff to calculate the salinity structure of an estuary, but in the absence of that if the *MAR/Volume > 365* the estuary was considered as fresh water dominated, while *MAR/Volume < 10* was considered as marine dominated. The remaining estuaries were classified as mixed. In all cases, known systems were used to test assumptions, e.g. Breede (mixed), Kromme (marine dominated), Thukela (fresh water dominated) and anomalies were interrogated to evaluate if the findings were an artifact of the coarseness of the data or possibly real.

Some adjustments were made, in consultation with specialists, based on field experience and the bathymetry of each estuary, e.g. long shallow estuaries flush more readily than deep basin shaped estuaries.

It was felt that the methods had merit but that a higher resolution was still needed to truly inform biodiversity studies, for example defining the “% mixed state” versus “% fresh water dominated state”. As this information is dependent on seasonal inflow ranges and more accurate depth data, this request could not be addresses as part of the NBA 2011.

5.5 Future research requirements

This section provided an overview of key catchment characteristics (i.e. flow volume, seasonality of flow, and river type) and estuarine features (size, mouth state, salinity structure, tidal variation).

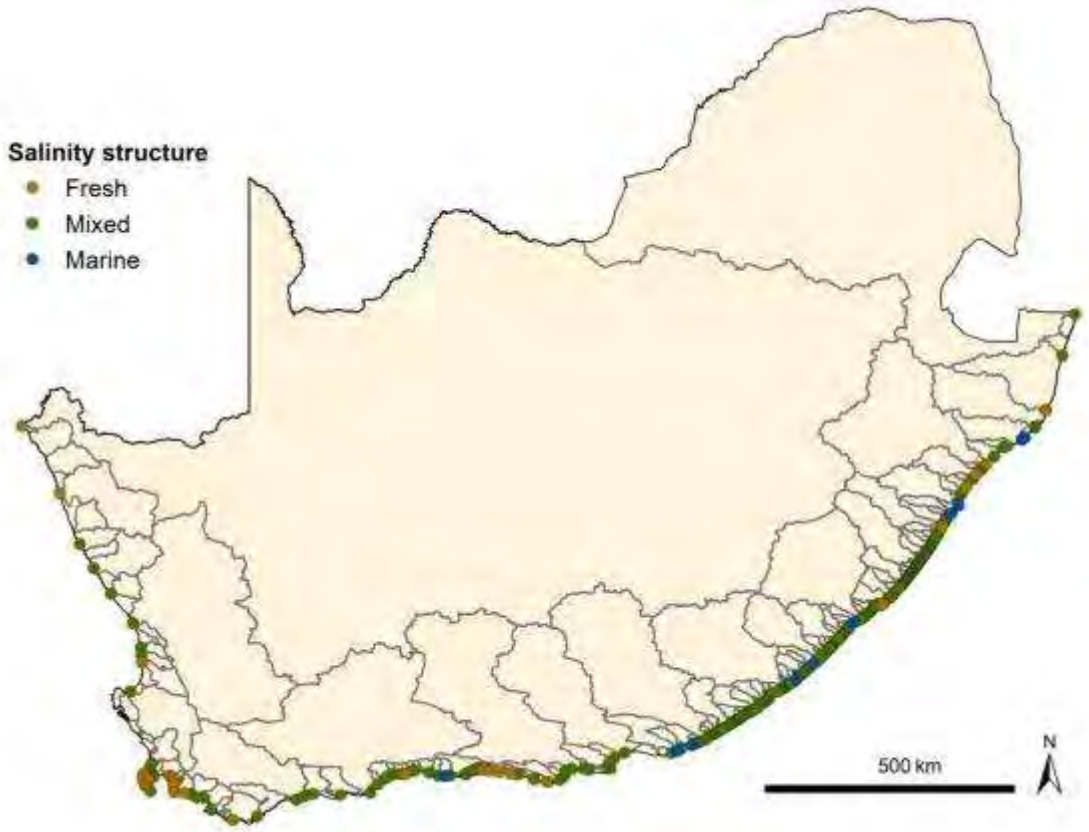


Figure 5.9 Dominant salinity structure (i.e. freshwater dominated, mixed, marine dominated) in South Africa's estuaries.

To assist with refining the key physical processes and feature of South Africa's estuaries the following high resolution input data is required:

- Catchment hydrology (Monthly flow data for natural and present conditions),
- Bathymetry (estuary volume and depth),
- Sediment structure (mud, sand and organic content), and
- Water column geochemistry (salinity structure and turbidity).

6. ESTUARINE HABITAT

JB Adams, GC Snow and DA Veldkornet

Estuaries are generally made up of a high diversity of habitat types, which include openwater area, sand and mudflats, rock and plant communities. Plant community types can be subdivided into salt marsh, mangroves, submerged macrophytes, reeds and sedges. A habitat rarity score (HR) was designed to take into consideration the number of habitats in an estuary, and the extent to which rare communities occur. This score, based on habitat area, is an essential component when determining the Estuary Importance Score, a score used to rank estuaries in terms of their conservation importance.

Panel 1: Description of estuary habitat types

Water surface area (estuary channel): This represents the habitat associated with the water column of an estuary and is measured as the water surface area. The primary producers are the phytoplankton consisting of flagellates, dinoflagellates, diatoms and blue-green algae which occur in a wide range of salinity from freshwater to marine conditions.

Sand / mudflats / rock: Habitat mapping from aerial photographs cannot distinguish between sand and mud habitats and therefore this is presented as a single area in the Botanical Database. However rock can be mapped as a separate habitat. The dominant primary producers of these habitats are the benthic microalgae.

Macroalgae: Macroalgae may be intertidal (intermittently exposed) or subtidal (submerged at all times), they may be attached or free floating (Adams et al. 1999). Filamentous macroalgae often form algal mats and increase in response to nutrient enrichment or calm sheltered conditions when the mouth of an estuary is closed. Typical genera include *Enteromorpha* and *Cladophora*. Many marine species can get washed into an estuary and providing the salinity is high enough, can proliferate. These include *Codium*, *Caulerpa*, *Gracilaria* and *Polysiphonia*.

Submerged macrophytes: Submerged macrophytes are those plants that are rooted in the bottom substrate with their leaves and stems completely submersed (e.g. *Stukenia pectinata* and *Ruppia cirrhosa*) or exposed on each low tide (e.g. the seagrass *Zostera capensis*). Zostera capensis occupies the intertidal zone of most permanently open Cape estuaries whereas *Ruppia cirrhosa* is common in temporarily open/closed estuaries. *Stukenia pectinata* occurs in closed systems or in the upper reaches of open estuaries where the salinity is less than 10 ppt.

Salt marsh: Salt marsh plants show distinct zonation patterns along tidal inundation and salinity gradients. Zonation is well developed in estuaries with a large tidal range e.g. Berg, Knysna and Swartkops estuaries. Common genera are *Sarcocornia*, *Salicornia*, *Triglochin*, *Limonium* and *Juncus*. Halophytic grasses such as *Sporobolus virginicus* and *Paspalum* spp. are also present. Intertidal salt marsh occurs below mean high water spring and supratidal salt marsh above this. *Sarcocornia pillansii* is common in the supratidal zone and large stands can occur in estuaries such as the Olifants.



***Spartina maritima* in the Swartkops estuary and intertidal salt marsh in the East Kleinemonde Estuary (Source: T Riddin)**

Reeds and sedges: Reeds, sedges and rushes are important in the freshwater and brackish zones of estuaries. Because they are often associated with freshwater input they can be used to identify freshwater seepage sites along estuaries. The dominant species are the common reed *Phragmites australis*, *Schoenoplectus scirpoides* and *Bolboschoenus maritimus* (sea club-rush).



Reeds in the upper reaches of the Bushmans Estuary (Source: G Snow) and *Bolboschoenus maritimus* in the East Kleinemonde Estuary (Source: T Riddin)

Mangroves: Mangroves are trees that establish in the intertidal zone in permanently open estuaries along the east coast of South Africa north of East London where water temperature is usually above 20°C. The white mangrove *Avicennia marina* is the most widespread, followed by *Bruguiera gymnorrhiza* and then *Rhizophora mucronata*. *Lumnitzera racemosa*, *Ceriops tagal* and *Xylocarpus granatum* only occur in the Kosi Estuary.



Mangroves in the Mngazana Estuary (Source: T Riddin)

Swamp forest: Swamp forests, unlike mangroves are freshwater habitats associated with estuaries in KwaZulu-Natal. Common species include *Syzygium cordatum*, *Barringtonia racemosa* and *Ficus trichopoda*. It is often difficult to distinguish this habitat from coastal forest in aerial photographs.

(Source: T Riddin & JB Adams)

Estuarine importance indices require data on most estuaries. The available dataset for the macrophytes and habitat was in most cases taken from the old “Green book” reports of CSIR for the CAPE estuaries. These data are in most cases 30 years old, there have been substantial changes in estuaries since then, and the habitat types have been reclassified. There is therefore an urgent need for the real data for those estuaries that were included in the Green series, in addition to the other estuaries where no data are available.

This project task set out to update the Estuary Botanical Database. The habitat data provided input to the National Health Assessment, Ecosystem Threat Status, Protection Level assessment and National Biodiversity Plan.

6.1 Method

Images of the estuaries were downloaded from Google Earth and the different habitat types (intertidal salt marsh, supratidal salt marsh, reeds and sedges, channel (water surface area, sand & mud banks) were identified, using information from field trips or available photographs (see Figure 6.1). These were highlighted as polygons, saved as *.kml files and then the areas calculated using the Program GE Path 1.4.4.

The Bokramspruit, Schuster, Krom (west), Maalgate, Kaaimans, Blinde, Gwaing, Klein Brak, Rufane and Klein Palmiet estuaries were visited in 2009 to ground truth the areas covered by the different habitat types. No site visits took place for the following estuaries mainly because of inaccessibility; Ratel, Klipsdrifsfontein, Bloukrans, Lottering, Elandsbos, Elands, Groot (east), Klipdrif, Slang.

Recently completed Department of Water Affairs Resource Directed Measures (RDM) reports were checked and the areas covered by the different habitat types were updated in the Botanical Database using this new information. For most Intermediate and Comprehensive ecological water requirement studies the vegetation would have been mapped using GIS to indicate changes in the habitat types over time.

The area covered by mangroves in the Wild Coast and KwaZulu-Natal estuaries was updated from recent mapping and research studies of Pillay (CSIR) and Rajkaran (NMMU).



Figure 6.1 Example of habitat mapping using Google Earth.

Data for the Eastern Cape estuaries; Blinde, Cunge, Hlozi, Ross's and Shelbertstroom estuaries (Table 6.1) were obtained from Walker (2003). He completed a PhD study on estuaries in the East London region i.e. that area occurring between the Ciskei and Transkei coast. The study included details on the physical characteristics of the estuaries, areas for different habitat types and the areas covered by the dominant macrophytes species.

Table 6.1 Data sources for estuaries where no data were previously available.

Estuary	Reference	Estuary	Reference
Rietvlei/Diep	Management plan	Lottering	NBA 2011
Bokramspruit	NBA 2011	Elandsbos	NBA 2011
Schuster	NBA 2011	Elands	NBA 2011
Krom	NBA 2011	Groot (East)	NBA 2011
Ratel	NBA 2011	Klipdrif	NBA 2011
Klipdrifsfontein	NBA 2011	Slang	NBA 2011
Blinde	NBA 2011	Rufane	NBA 2011
Klein Brak	NBA 2011	Klein Palmiet	NBA 2011
Maalgate	NBA 2011	Shelbertstroom	Walker 2003
Gwaing	NBA 2011	Ross's Creek	Walker 2003
Kaaimans	NBA 2011	Hlozi	Walker 2003
Matjies	RDM study	Blind	Walker 2003
Bloukrans	NBA 2011	Cunge	Walker 2003

6.2 Update of the plant species list and taxonomy

Species were collected for identification in five estuaries in August 2009. These data were used to update the Botanical Database which includes species lists for the plants found in all estuaries and the area covered by the different habitat types. Macroalgae were not collected. In the Groot Brak Estuary only the salt marsh in the lower reaches was investigated. In the Kaaimans Estuary species were collected from a small intertidal patch of salt marsh accessible from the N2 road. Species were also recorded along the banks of the estuary. The Blinde Estuary was largely inaccessible and plants were only collected near the mouth. Due to greater accessibility the Klein Brak and Gwaing estuaries were sampled along the entire length.

The species data in the Botanical Database were also updated using available literature. Species were added for the Berg River Estuary (Boucher and Jones 2007), Uilkraals Estuary (Mucina et al. 2003), and the Olifants Estuary (Bornman 2002). Recent data of Prinsloo (2009) (unpublished data) was used to update the macroalgae in terms of occurrence and species name changes. For all plants taxonomic names were checked using Germishuizen and Meyer (2004). The following websites were used in conjunction with the above literature: Plantzafrica (www.plantzafrica.com); zipcodezoo (www.zipcode.com); Algaebase (www.algaebase.org).

Prof L Mucina, Curtin University, Western Australia was consulted to determine which macrophyte genera were currently undergoing taxonomic revision. Mucina also provided input on the estuaries which have important plant populations, i.e. rare, endangered, endemic, newly identified.

6.3 Results

6.3.1 Habitat Areas

Habitat area data is now available for nearly all of South Africa's estuaries. The list of estuaries included in the Botanical Database are those that were included in the National Estuary Health Assessment. Figure 4.2 provides an overview of the dominant vegetation types along the coast. While a summary of the distribution per biogeographic region is provided in Table 6.2.

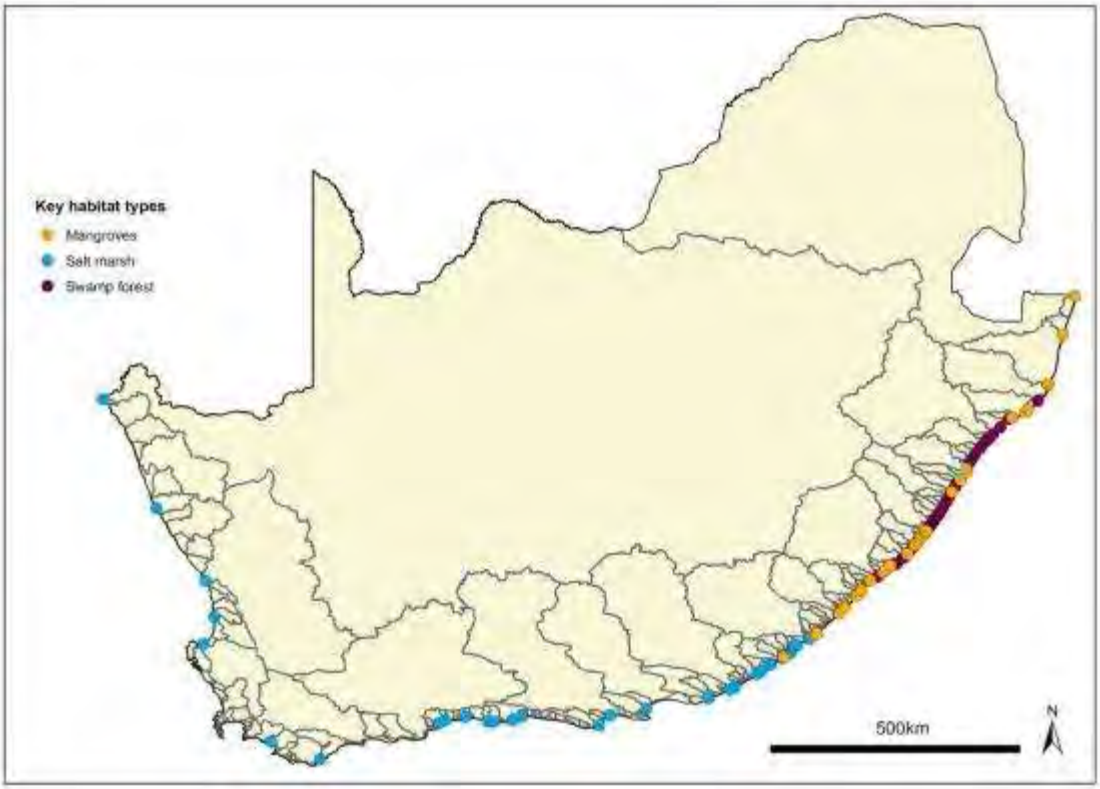


Figure 6.2 Dominant habitat types in South Africa's estuaries.

The following estuaries were added to the original estuary list and now have no area cover data: Mendwana, Kwa-Suka, Sundwana (all Transkei), Nkomba, Rocky Bay, Umlazi (canal), Bob's stream (all KwaZulu-Natal). The Baakens and Papenkuils were also added. An analysis of historical photographs would be necessary to establish whether these systems had estuarine habitat in the past as both systems are severely degraded at present as a result of canalisation and diversion and have no functional habitat. These two estuaries fall within the metropolitan area of Nelson Mandela Bay (Port Elizabeth). Habitat area data are still missing for Sout (Wes). Data for Rietvlei / Diep were obtained from a recent report on the estuary management plan. Julian Conrad provided data from a recently completed GIS map. Large supratidal salt marsh areas and reed and sedge habitats occur at Rietvlei.

Table 6.2 Summary of the total estuarine habitat in South Africa.

Habitat	Total Habitat (ha)			
	Cool Temperate	Warm Temperate	Subtropical	Total
Supratidal salt marsh	3 805	1 427	1 818	7 051
Intertidal salt marsh	1 903	1 774	634	4 310
Mangroves	0	26	2085	2111

Habitat	Total Habitat (ha)			
	Cool Temperate	Warm Temperate	Subtropical	Total
Swamp forest	0	1	4841	4841
Submerged macrophytes	495	615	217	1 327
Sand/mud banks	1 039	1 692	1286	4017
Channel	4 306	6 149	44828	55284
Rocks	6	74	16	96
Reeds and sedges	2 165	1 091	8550	11806
Total Habitat	**13 720**	**12 849**	**64275**	**90844**

Data for Richards Bay Harbour were obtained from a 1996 report "An environmental review of the Master Plan for the Port of Richards Bay" (EAS 1996). The present 1996 area cover data have been used in the Botanical Database. However it is important to note that this report indicates major loss of estuary habitat due to port expansion. Richards Bay Harbour is known to have the oldest area of mangroves in the country.

The area cover data for mangroves in KwaZulu-Natal was updated in the Botanical Database using new data from Pillay (CSIR, Table 6.3). Mangroves have been completely lost from a number of estuaries, including the Mhlanga, Little Manzimtoti, Lovu, Msimbazi, Mgababa, Ngane, Mahlongwa, Kongweni, Bilanhlolo, Mhlangankulu and Khandandlovu. These revised data may influence the national prioritization of South African estuaries in future.

Table 6.3 Updated mangrove area data for KwaZulu-Natal estuaries (Pillay unpublished).

	Area (ha)	
Name of estuary (north to south)	Ward and Steinke (1982)	Pillay (CSIR)
Kosi Bay	59	60.7
Mgobezeleni	2.5	4.5
St Lucia	160	571.0
uMfolozi**	26	-
Richards Bay/ Mhlathuze	427.5	652.1
Mlalazi	30	60.7
Mhlanga	0.5	0
Mgeni	44*	20.3
Durban Bay	15	16.0
Sipingo	12.5	3.8
Little Manzimtoti	0.5	0
Lovu	2	0
Msimbazi	0.5	0
Mgababa	0.5	0

	Area (ha)	
Name of estuary (north to south)	**Ward and Steinke (1982)**	**Pillay (CSIR)**
Ngane	0.5	0
Mkomazi	2	2.0
Mahlongwa	1	0
Kongweni	0.5	0
Bilanhlolo	0.5	0
Mhlangankulu	0.5	0
Khandandlovu	0.5	0
Mtamvuna	0.25	0.3

**Mgeni EWR (2011) study indicate that this might be mapping error*
***uMfolozi separated to indicate complete loss of mangroves from that estuary.*

The habitat areas that were calculated from Google Earth images using GE Path 1.4.4., from estuary site visits, Walker (2004), and from recent Resource Directed Measures reports (Table 6.4). These data were used to update the Botanical Excel Database (including the metadata indicating the source of the data).

Table 6.4 Revised habitat area data for South African estuaries.

Estuaries (west to east)	**Length (km)**	**Water area**	**Submerged Macrophytes**	**Intertidal salt marsh**	**Supratidal salt marsh**	**Reeds & sedge**	**Sand / mud bank**	**Mangrove**	**Swamp forest**
Bokramspruit	0.24	0.60				0.60			
Schuster	0.43	0.46				0.14			
Krom	0.90	7.28				1.42			
Ratel	0.97	0.94					0.39		
Klipdrifsfontein	0.49	0.60							
Blinde	0.73	1.66				0.04	0.05		
Klein Brak		77		17	278	2	10		
Maalgate	1.40	14.96					1.00		
Gwaing	1.05	3.65		1.58		0.14	2.13		
Kaaimans	2.82	15.54		0.02		0.60	5.36		
Bloukrans	0.57	2.88					0.63		
Lottering	0.32	1.66					0.38		
Elandsbos	0.64	2.09					3.04		
Elands	1.28	5.79					1.70		
Groot (East)	3.10	8.70					0.92		
Klipdrif	0.53	0.53				0.04	0.01		
Slang	0.50	0.04				0.01			
Rufane	0.30	0.01				0.80			
Klein Palmiet	0.30	0.29	0.02						
Blind	0.40	0.40		0.10	0.10	0.22			
Cunge	0.20	0.30		0.20		0.30			
Hlozi	0.20	0.40		0.30		0.20			
Ross's	0.10	1.00	0.20	0.40		0.10			
Shelbertstroom	0.05	0.30	0.10	0.14					
Updated as part of Ecological water requirement studies									
Olifants	36		47.72	91.94	143.00	60.05			
Knysna		945.52	65.94	551		38.00	265.49		
Matjies	0.6	0.51				0.19			

Estuaries (west to east)	Length (km)	Water area	Submerged Macrophytes	Intertidal salt marsh	Supratidal salt marsh	Reeds & sedge	Sand / mud bank	Mangrove	Swamp forest
Palmiet		21.4		0.1			11		
Sout	1.10	2.36		0.37	2.13				
Sundays	23	314		21.8		31.5	118.4		
Mtata	8.5				21.03	6.23		33.5	
Mhlanga	2.5	12.0					0.68		0.2
Mhlathuze	12.3	679	5	60		205	90	652	29
St Lucia		31610		516	1706	3789		279	
Thukela		55				12	11		1
In addition Mhlathuze had 103 ha of hygrophilous grasses and sedges									

6.3.2 Update of species list and taxonomy

The species list in the Botanical Database was updated after identification of the plants collected in the Blinde, Gwaing, Klein Brak, Groot Brak and Kaaimans estuaries. In most cases the number of species compared to that contained in the Botanical Database doubled or even trebled indicating the importance of taxonomic surveys.

The species list in the Botanical Database had 84 species occurring in 256 estuaries. Results from the recent update shows the total number of species, including intraspecific taxa is now 228 (including macroalgae). The large increase in the number of species in some estuaries may be due to the inclusion of terrestrial fringe species. The dependency of these species on the estuary requires further investigation. Of the 228 macrophyte species in the Botanical Database, 11 species had outdated names. Most of the name changes occurred for the reeds and sedges (*Cyperaceae*) (six species). It is important that estuary researchers and managers take note of these changes to ensure accurate communication.

Mucina has started to revise the taxonomy of South African salt marsh species. Work has been completed on the *Salicornia*, *Sarcocornia* and *Triglochin* genera. Research on the genus *Limonium* will commence soon. This is research in progress and therefore the macrophyte species list for South African estuaries was not used for conservation planning and prioritisation of estuaries. Mucina has identified Langebaan Lagoon, Uilskraals, Heuningnes, Gouritz, Knysna and Kromme as estuaries that have important macrophyte populations. In addition to the above mentioned a saline *Felicia* species was also found in the Heuningnes Estuary (De Mond).

Taxonomic surveys should be conducted of the plants in all South African estuaries. Taxonomic revision of salt marsh species must be supported and funded so that macrophyte

species lists can be updated for all estuaries. From these data, sites of rare and endangered species can be identified.

6.4 Key Findings and Future Research requirements

South Africa's estuarine habitat comprises about 90 800ha in total. Figure 6.3 provides an overview of the size distribution of the "core" estuarine habitat in South Africa. This area data do not include the estuarine functional zone, e.g. extended flood plain areas. To allow for consistency across all evaluation and planning processes in the NBA 2011, the habitat data were used as input to the National Health Assessment, Ecosystem Threat Status, Protection Level assessment and National Biodiversity Plan.

It is strongly recommended that habitat area data should be revised for all estuaries where data are older than 10 years. This would include GIS mapping and field surveys of the identified estuaries. A database should be developed comprising the data presented in this study, including all present and future GIS maps depicting the habitats found in all South African estuaries.

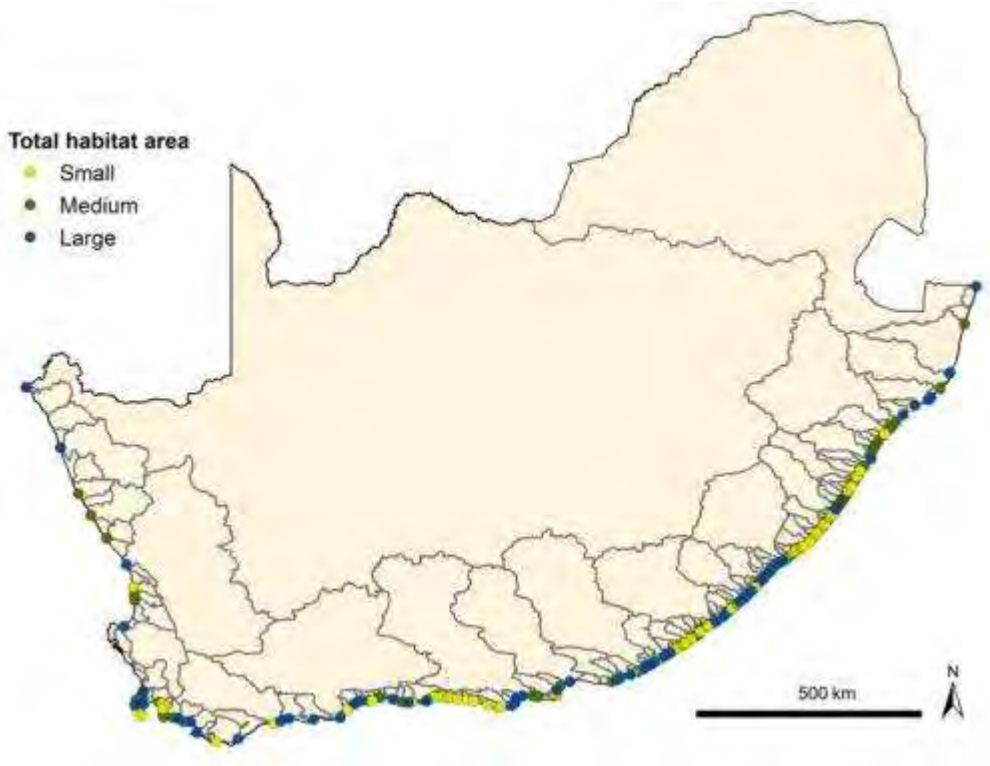


Figure 6.3 Size distribution of estuarine habitat along the South Africa coast.

7. NBA 2011 ECOSYSTEM TYPING

L van Niekerk

To allow for a comparison between estuaries and to set a framework within which it would be possible to predict the possible characteristics and biota of an estuary, a typology or classification system is required.

Estuary ecosystem types serve as surrogates for ecosystem processes and the biodiversity associated with them. In turn, the understanding of estuary ecosystem type processes facilitates the broad scale assessment of estuary resilience to anthropogenic pressures. The typing of estuaries also strives to identify which systems are similar to provide a proxy for the lack of species and abundance data for some components of the ecosystem biodiversity, e.g. meiofauna. Typing or classification schemes also assist with the identification of monitoring requirements for management purposes.

7.1 Typing or classification of estuaries

Estuaries have traditionally been traditional typed by key processes or features, or a combination thereof, eg tidal patterns, topographical, geomorphological or salinity characteristics or ecosystem energetics (Kennish 1986). Davies (1964) classified estuaries by tidal range (Microtidal (<2 m), Mesotidal (2 – 4 m), Macrotidal (6 – 4 m) and Hyper tidal (> 6m)). Nichols and Biggs (1985) focused on the tidal prism (volume of water between high and low tide) with Hypersynchronous estuaries showing an increase in tidal amplitude towards the head, Synchronous estuaries displaying and equal tidal range along their length and Hyposynchronous estuaries having a diminishing tidal range along their lengths.

A number of topographical classifications have been proposed, typing estuaries in to Drowned river valleys, Fjords, Bar build estuaries and others (Prichard 1952b and Dyer 1997). Morphological classifications in turn are generally based on the physical features resulting from the interplay between catchment runoff and sediment loads; and tides, waves and other coastal processes. These include the Dalrympie et al (1992) evolutional classification of Wave dominated or Tide dominated estuaries.

Pritchard (1955) and Cameron and Prichard (1963) classifications based on salinity structure are also very useful focussing on Highly stratified (salt wedge and Fjord types), Partially Mixed and vertically homogenous estuaries. While Hansen and Rattray (1966) proposed a

stratification–circulation classification based on the densimetric Froude number. Fischer (1972) categorised estuary stratification by the estuarine Richardson number, which evaluates the ratio of the gain of potential energy due to the runoff discharge to the mixing power of the tide. In contrast, Simpson et al 1990 categorised the degree of stratification in an estuary by the amount of energy input needed to break down the stratification.

Unfortunately most of the typologies describe above are data intensive and require extensive field collection and monitoring to determine accurately in what category or type a specific estuary falls.

7.2 Applicable international regional scale classifications

National or regional level geomorphic classification schemes also need to recognise environmental parameters that are not strongly reflected in physical processes and morphology alone, such as variations in climate, vegetation, and other biological aspects. Two national classification systems that explicitly incorporate the temporarily open/closed estuary type that dominate the South African coastline are that of Australia and California.

The Australian estuaries typology are based on geomorphology as determined by the relative influence of wave, tide, and river energy (Boyd et al. 1992, Dalrymple et al. 1992, Kench 1999), with each type containing a distinctive suite of geomorphic and sedimentary features (Ozcoasts, 2012). Seven key types were identified using a systematic and quantitative geomorphological approach. These seven types were in turn inbedded in five major coastal regions that conforms to the general distribution of wave- and tide-dominated shelf environments (Harris et al. 2002).

The Australian typology links geomorphic types (Harris et al. 2002) and climate and rainfall characteristics (Heggie et al. 1999) to account for a range of coastal depositional environments. The Australian estuarine typology account for seasonality and climatic variation by identifying both positive (freshwater-dominated) and negative (evaporation-dominated) hydrodynamic examples of tide-and wave-dominated estuaries. In strongly seasonal areas that alternate between relatively high runoff and arid conditions (e.g. the wet/dry tropical climatic zone), the typology varies between the two climatic extremes. For example, in the moist tropical climatic region, an estuary that exhibits the hydrodynamic function of a tide-dominated estuary during the wet season, may exhibit the hydrodynamic function of a tidal creek (no freshwater runoff) during the dry season. Alternatively, during the

dry season, the estuary may function as a 'negative' tide-dominated estuary, due to higher rates of evaporation (Heggie et al. 1999). Kench (1999) advocated a similar but parallel typology for Australian estuaries based on a morphodynamic approach that evaluates morphology-process responses such as estuarine geomorphic development, hydrodynamic processes and sedimentation. Characteristics such as climate and hydrology, wave energy, tidal energy, sediment availability, and biological processes were deemed defining features.

Jacobs et al. (2010) propose a typology for California estuaries based on their geomorphic history and the dominant physical features and processes that define it. This typology used geological origin, exposure to littoral process, and catchment size and runoff characteristics to model the likely frequency and duration of closure of the estuary mouth. Eight close mouth condition states, based on the elevation of barriers (or berms) to tidal exchange, were defined. These states were determined from historic, maps descriptions and photography.

The typology indicate that under natural conditions, the vast majority of California estuaries experienced some degree of closure, and concluded that river inflow rather than tidal influence is the most critical variable controlling mouth opening. This classification system also recognised that estuaries exist in a variety of closure states over multiyear to multi-decadal time frames and that an estuary may exist in a given closure state for periods of time ranging from days to years.

7.3 South African typologies or classification systems

At present, there are two classification systems recognised for estuaries in South Africa. The geomorphological classification used by Harrison et al. (2000) and the Whitfield (1992) classification based on physical characteristics. The geomorphological classification used by Harrison et al. (2000) recognises six main types based on mouth condition (open or closed), size and the presence of a bar.

Whitfield (1992) classified South Africa's estuaries based on their physiographic (tidal prism, size), hydrographic (mouth state and mixing process) and salinity characteristics. Whitfield's (1992) classification recognises five types: estuarine bay, permanently open, river mouth, estuarine lake, and temporarily open/closed estuaries.

Panel 2: Langebaan Lagoon – an estuarine bay, lagoon or coastal embayment?

Langebaan Lagoon has many of the characteristics of an estuary, including calm coastal waters that are protected from marine wave action (see photograph) and a biota that reflects many of the species usually found in estuaries. However, the system lacks a conventional estuarine salinity gradient due to the absence of any inflowing river, although there is groundwater that feeds into certain sections of the 'lagoon'. Lagoon is a poor description for the system since Langebaan (16 km long, 2-4 km wide and up to 5 m deep) is much larger and deeper than conventional coastal lagoons which are usually small and shallow.

Because Langebaan does receive a freshwater inflow from land drainage (aquifer input), and also has typical estuarine biota, Whitfield (2005) suggested that the term "coastal embayment" type of estuary be used to describe the system. Such a term would separate it from "estuarine bays" along the South African coast, all of which are fed by rivers.

Whether viewed as an estuary or as a marine ecosystem, Langebaan Lagoon, separates out as a unique coastal ecosystem type. The 2011 NBA recognised the "transitional" nature of Langebaan Lagoon and assessed it as part of the Marine Component for consistency reasons.



Source: AK Whitfield

7.4 NBA 2011 Typology

Four physical features (see Section 5 for more detail), i.e. size, mouth state, salinity structure and catchment type, of South African estuaries were combined into 46 ecosystem types comprising permutations of the features for each of the biogeographical regions (listed in Table 5.1).

Size was initially classified exponentially on the basis of the primary physical processes in estuaries (Large >1000ha, Medium 1000 - 100ha, Small 100 -10ha, Very Small <10 ha), but

this typology was further aggregated for the NBA 2011 in order to reduce the number of overall number of ecosystem features. For the NBA 2011, estuary size classes were: Large >100ha, Medium 100 - 10ha, and Small <10 ha.

To further reduce the number of overall ecosystem types, features with a low occurrence (i.e. only one or two estuaries representative of a that combined ecosystem type) and had features that were straddling category boundaries, or were of a low confidence, were forced into nearby categories (e.g. Storms Estuary (12 ha) was forced into the Small category and the Spoeg (9ha) into the Medium category).

Under *catchment type* the Bushmans and Mngazana estuaries was changed from *Turbid* to *Clear*, as they were not that dissimilar from the Kariega to warrant their own type. It should also be noted that the typing focuses on natural inflow patterns and therefore from a salinity structure perspective types both the Kromme and Great Fish as *Mixed* while at present they are *Marine dominated* and *Freshwater dominated* respectively due to modified inflow regimes.

It should be clear from the discussions in Section 5 that the ecosystem typing developed for the NBA 2011 can be further refined by addressing some of the underlying drivers, namely hydrology, sedimentology and bathymetry. Nevertheless, the typing still provides a useful framework for evaluating the ecosystem threat status, condition and protection levels. The higher resolution afforded by this classification system versus the Whitfield classification allows for a more detailed assessment of the very large temporarily open/closed systems category. It is hoped that this could be refined and validated in the near future.

Table 7.1 Refined ecosystem types based on key physical features

Cool Temperate Types (12)	Warm Temperate Types (18)	Subtropical Types (16)
LargeClosedFreshTurbid	LargeClosedMarineClear	LargeClosedFreshTurbid
LargeClosedMixedBlack	LargeClosedMixedBlack	LargeClosedMixedClear
LargeClosedMixedClear	LargeClosedMixedClear	LargeClosedMixedTurbid
LargeOpenMixedClear	LargeOpenMarineBlack	LargeOpenMarineClear
MediumClosedFreshBlack	LargeOpenMarineClear	LargeOpenMarineTurbid
MediumClosedMixedBlack	LargeOpenMixedBlack	LargeOpenMixedClear
MediumClosedMixedClear	LargeOpenMixedClear	LargeOpenMixedTurbid
MediumClosedMixedTurbid	LargeOpenMixedTurbid	MediumClosedFreshTurbid
SmallClosedFreshBlack	MediumClosedMixedBlack	MediumClosedMixedBlack
SmallClosedMixedBlack	MediumClosedMixedClear	MediumClosedMixedClear

Cool Temperate Types (12)	Warm Temperate Types (18)	Subtropical Types (16)
SmallOpenFreshBlack	MediumOpenMixedBlack	MediumClosedMixedTurbid
SmallOpenMixedBlack	MediumOpenMixedClear	MediumOpenMarineClear
	MediumOpenMixedTurbid	MediumOpenMixedTurbid
	SmallClosedFreshBlack	SmallClosedFreshBlack
	SmallClosedMixedBlack	SmallClosedMixedBlack
	SmallClosedMixedClear	SmallClosedMixedClear
	SmallOpenFreshBlack	
	SmallOpenMixedBlack	

8. KEY PRESSURES ON ESTUARIES

L van Niekerk, S Lamberth, P Cowley, P Huizinga, K Hutchings, B Mann, C Petersen & S Taljaard

The threats to estuarine health and biodiversity can ultimately be grouped as follows:

- Flow modification;
- Pollution (e.g. agriculture, waste water treatment works (WWTW), industrial, sediment);
- Exploitation of living resources (fish and invertebrates);
- Habitat destruction (within estuarine functional zone); and
- Climate change (dealt with in more detail in Section 12).

The desktop assessment of the pressures that estuaries in South Africa are facing were based on readily available data and expert opinion. The estuarine functional zones of all estuaries were visually inspected on Google Earth for noticeable signs of pressures (e.g. canalisation, development, infilling, discharges). The national data sets, namely NMMU (Botanical Database; Colloty 2000, Adams et al. 2010) and CSIR (Harrison fish surveys; 2000, Harrison 2004, 2005) and unpublished reports (CSIR Series III Green reports), were used to ground truth and supplement visual observations where possible. Critical pressures were also identified during the National Health Assessment workshop (2009). Pressure data were collated, rated and captured in a spreadsheet for each estuary. This information, in combination with the estuary typing (type is indicative of resilience and sensitivity to change), were used for the National Health Assessment (Section 9).

8.1 Flow modification

Flow modification refers to both increases and decreases in freshwater inputs to an estuary. A decrease in freshwater flow results from direct abstraction (e.g. Keurbooms), dam development (e.g. Orange, Palmiet, Kromme), and the accumulative effects of small farm dams (e.g. Bushmans). While an increase in inflow results from inter-basin transfer schemes (e.g. Sundays, Great Fish), Waste Water Treatment Works (e.g. Mhlanga), and hardening of a catchment (e.g. Kuils/Eerste). Changes in Mean Annual Runoff (MAR) often hide the degree to which flows are modified, while the MAR may only be reduced by 10%, the seasonal baseflows (low flows) may be reduced by as much as 50% (due to baseflow abstraction) or elevated by 50% (e.g. by agricultural return flow).

There are no good data available on the degree to which freshwater flow to the estuaries of South Africa has been modified (i.e. increased or decreased) on a national scale. The last study of this nature was done in 1986 (DWA 1986). For the NBA, two primary sources were used to quality flow modification, i.e. recent estuary ecological water requirement studies (also known as Reserve studies) and the Water Situation Assessment Model (WSAM) (using WR2005 data).

The most accurate data available were from recent (past 10 years) ecological water requirements studies (completed for about 25 systems). Where available, this information was the preferred source for the NBA. If not, the output of the WSAM hydrological model was used. The Department of Water Affairs (DWA) developed the WSAM as a macro-scale water resource planning tool. The model provides users with a systematic approach for reconnaissance-level planning and scenario testing, while efficiently managing large volumes of information. The purpose of WSAM is to summarise information, on the availability, supply and utilisation of water resources at a national, regional and catchment level for both current and projected future situations. While considerable testing and validation of various WSAM sub-models and algorithms was undertaken as part of the model development process, this study found that the models were relatively accurate (within about 10%) in catchments where water resources were primarily developed through small farm dams, direct abstraction and land-use change. Unfortunately, the WSAM significantly under reported flow reduction in catchments where large dam development occur, and if no alternative information source was available, expert judgment was used to reflect the estimated reductions or increases (see Figure 8.1 for spatial distribution of flow modifications).

Increasing populations and a rapidly growing demand for freshwater supplies is a major threat to South African estuaries. Freshwater abstraction can result in the closure of the mouth of an estuary that is normally permanently open to the sea. The Kobonqaba Estuary in the Eastern Cape and Uilkraals in the Western Cape were recorded closing for the first time ever in 2010, with the closure of the Kobonqaba causing a major die-back of of mangrove trees *Aviciennia marina* in this system. High water level due to mouth closure resulted in flooding of the pneumatophores and drowning of the trees. Extended mouth closure is generaly associated with reduced freshwater inflow to an estuary. Baseflows are

important in raising water level and keeping the mouth open and these have probably been reduced due to drought conditions and freshwater abstraction in the catchment.

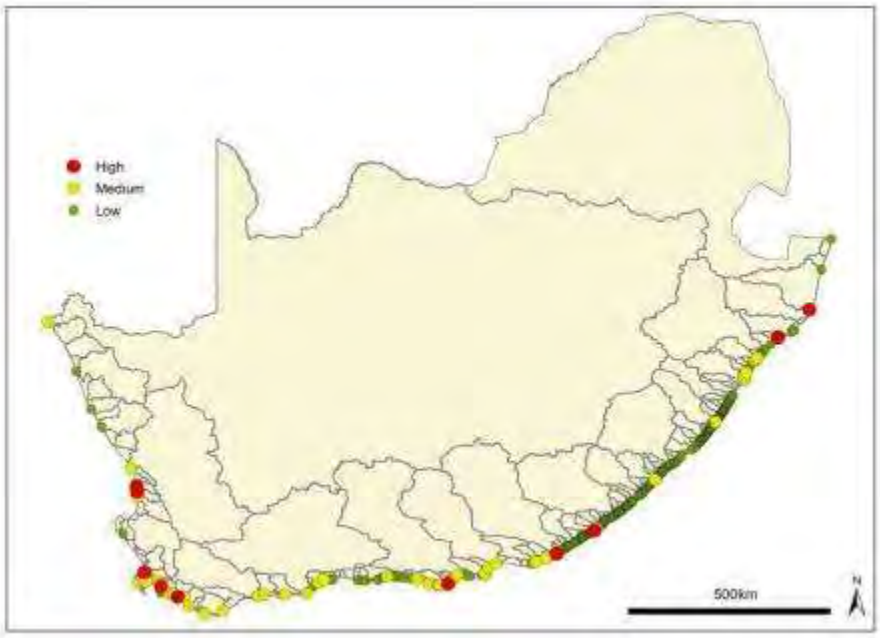


Figure 8.1 Locality map showing the degree to which freshwater inflow has been modified to the estuaries of South Africa.

Alternatively, an increase in freshwater input (e.g. waste water treatment works) can prevent the occurrence of regular mouth closure and prevent the related back-flooding and increase in estuarine habitat. An example of this is the Eerste Estuary that discharges into False Bay. This aspect was not captured by the WSAM and was therefore incorporated into the NBA assessment based on expert opinion.

The results (Figure 8.2) of the assessment indicate that 4 % of South Africa's estuaries are under significant flow modification pressure, with the 15 % of the estuaries in the Cool Temperate region under severe pressure, comprising mostly the large permanently open estuaries such as the Orange, Groot Berg and Olifants. An additional 18 % of estuaries in South Africa is under a moderate degree of flow modification pressure with the Cool Temperate (47% of estuaries in that region) and the Warm Temperate (19 % of estuaries in that region) being the most affected. Less than 5% of all estuaries in South Africa have no flow modification pressures on them – most of these are systems fed by small catchments with limited developments in their immediate environments, and are confined to either the Warm Temperate or southern Subtropical biogeographically region.

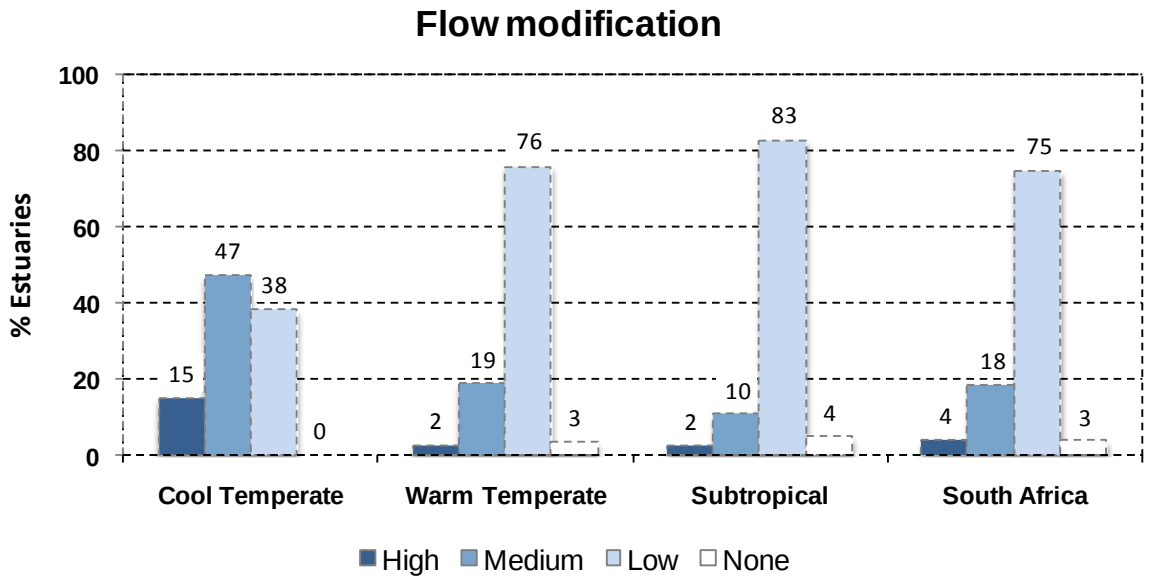


Figure 8.2 Quantification of flow modification pressures for the three biogeographical regions in South Africa.

There is an urgent need for a quantification of the modification in freshwater flow to the estuaries (all 291) of South Africa. This analysis should include all current land-use, transfer schemes, discharges, dam developments and be based on the true catchment area of each of the individual systems.

8.2 Pollution

South Africa's *National Programme of Action for Protection of the Marine Environment from Land-based Activities* list a number of key sources of pollution in estuaries (DEAT 2008), namely:

- Municipal wastewater;
- Industrial wastewater;
- Stormwater runoff (including solid waste); and
- Agricultural runoff (increased nutrients, suspended solids, herbicides and pesticides).

Numerous **municipal wastewater treatment works** (WWTW) discharge effluent into estuaries (Table 8.1). A comparison between data from 1991 and 2004 indicates that WWTW discharge volumes to estuaries have almost doubled over this period, reflecting the rapid population growth in coastal areas (DEAT 2008). While most of these discharges are subject to treatment (sometimes secondary or even tertiary), many of the WWTWs are malfunctioning thus causing pollution in estuaries (e.g. Eerste Estuary). The larger urban

centres along the coast have collecting systems for municipal wastewater although problems are being encountered where deterioration of older structures result in regular spillage and seepage. Overflowing sewage pumpstations are a specific concern and regular pump failures have been recorded in systems such as the Lourens, Onrus, Klein, Bilanhlolo, Uvuzana and Mbango. Sewage pump stations are usually located close to the shore, usually the lowest point from where wastewater is pumped to WWTWs.

Smaller coastal communities often do not have reticulated sewage systems and non-sewered systems such as septic tanks and French drains are typically used for the treatment of sewage. A concern with non-reticulated systems used in these communities situated next to sensitive areas such as estuaries, is the potential impact that spillage or seepage from these systems could have on the aquatic ecosystem and other users (e.g. recreation) of the estuary. The risk of impact often increases markedly with an increase in number and density of non-sewered systems in a particular area. Where reticulated systems have been installed in some smaller coastal communities, the large seasonal fluctuation in the population (i.e. population increasing markedly during holiday seasons) is often problematic.

In addition to WWTWs discharging directly into estuaries (Table 8.1) there are also a number of WWTWs discharging into rivers just upstream from estuaries but close enough to influence estuarine health, e.g. Olifants (Lutzville), Breede (Swellendam), Gwaing (George), Qinira, Kandandhlovu, Zotsha, Mahlongwa, Mahlongwane, Msimbazi, Little Manzimtoti, Mgeni, Thukela and Mlalazi rivers. Untreated municipal wastewater also enters estuaries through stormwater runoff from informal settlement areas (e.g. Swartkops) (DEAT 2008). The installation of effective collecting systems in rapidly expanding informal settlements is also difficult to implement and results in estuarine pollution following rainfall events. Untreated municipal wastewater also enters estuaries through diffuse stormwater runoff from informal settlement areas (e.g. Swartkops) (DEAT 2008).

Table 8.1 Direct wastewater discharges into estuaries along the South African coast (updated from DEAT, 2008)

Estuary (location)	Effluent type	Estimated flow (m^3/day)
Berg (Marine Product, Laaiplek)	Industrial (Fish)	130 000
Diep (Milnerton, Cape Town)	WWTW	44 126
Wildevoëlvlei (Kommetjie, Cape Town)	WWTW	11 577
Eerste (Macassar, Cape Town)	WWTW	54 494
Hartenbos (Mossel Bay)	WWTW	6 471
Knysna (Knysna)	WWTW	3 955

Estuary (location)	Effluent type	Estimated flow (m^3/day)
Piesang	Industrial (Brine)	50*
Bushmans (Albany Water Supply, Easten Cape)	Industrial (Brine)	50
Papenkuils (Fish Water Flats, Eastern Cape**)	Industrial (General)	35000
Mvutshini (Ramsgate Kwazulu Natal)	WWTW	100
Kongweni (Margate Kwazulu Natal)	WWTW	1 900
Vungu (Uvongo Kwazulu Natal)	WWTW	100
Mpambanyoni (Park Rynie Kwazulu Natal)	WWTW	1 000
Umkomaas (Umkomaas Kwazulu Natal)	WWTW	500
Mhlanga (Mhlanga Rocks Kwazulu Natal)	WWTW	25 000
Mdloti (Mdloti Kwazulu Natal)	WWTW	400
Mvoti (Stanger Kwazulu Natal)	WWTW	1 800
Tongaati (Tongaat Kwazulu Natal)	WWTW	200
Mhlali (Ballitoville, Kwazulu Natal)	WWTW	500

**Currently discontinued*
***Generally viewed as a marine outfall*

Stormwater runoff is a major concern specifically in estuaries situated within urban areas. Contaminated stormwater runoff originates from built-up area, gardens, golf courses, parks, roads, and commercial and industrial areas. Stormwater runoff contains an array of pollutants ranging from microbial contaminants, excessive nutrients and organic matter (e.g. linked to sewage from informal settlement areas) to high suspended solid loads and toxic chemicals such as trace metals and hydrocarbons (e.g. originating from runoff draining roads, and industrial and commercial areas). Solid waste or litter is also a major pollutant component in stormwater. Other diffuse sources of litter include solid waste disposal facilities that are managed inadequately or that are illegal. Examples of estuaries where this is a problem range from larger estuaries such as Swartkops to smaller systems such as Groot Brak.

While **industrial wastewater** discharges into South African estuaries are limited (Table 8.1), there are concerns in terms of discharging such effluent into less physically dynamic and ecologically sensitive areas such as estuaries. An emerging concern is the disposal of brine (e.g. Piesang, Knysna, Bushmans estuaries) that can have detrimental impacts on these sheltered and sensitive coastal environments. Concerns with brine effluents arise form an increased demand for desalination plants (discharging brine wastewater) to provide freshwater in areas either not serviced by piped water, or to supplement limited supplies. In addition to industrial wastewater discharging directly into estuaries (Table 8.1), there are also a number of industries discharging into rivers just upstream from estuaries close

enough to influence estuarine health, such as discharges into the Mzimkulu (sugar mill) and Thukela (paper mill) rivers.

Panel 3: Quantification of toxic pollutants in South African estuaries

Despite the potential ecological and human health risks posed by toxic substances such as trace metals and persistent organic pollutants (e.g. herbicides and pesticides), very little research and monitoring are being conducted on the distribution and accumulation of these compounds in South Africa estuaries.

For example, recent research detected substantial and concerning increases in the concentrations of many trace metals in some Eastern Cape estuaries (e.g. Binning & Baird 2001, Orr 2007). Jackson et al. (2009) noted that both water column and sediment concentrations of most metals in the Diep Estuary exceeded recommended local and international guidelines. Hutchings and Clark (2010) confirmed this and identified trace metal concentrations in estuarine fish from both the Berg and Diep estuaries as being in excess of South African food quality standards, thus indicating that there may be existing ecotoxic impacts and human health risks associated with consuming fish caught in these estuaries.

In general very few studies have measured toxic contamination in South African estuarine biota. For example, Watling and Watling (1982) reported on levels in some bivalve and gastropod molluscs from the Knysna Estuary, and more recently Vermeulen and Wepener (1999) and Mzimela et al (2003) reported on trace metal concentrations in mussels and fish (*Liza dumerili*) from Richards Bay harbor and the Mhlathuze Estuary respectively. Jackson et al. (2005) conducted laboratory experiments to assess the ecotoxicity of lead and zinc on the estuarine invertebrate *Callianassa kraussi* (sand prawns) and found that elevated levels of these metals, particularly at low salinities exhibited a significant detrimental influence on the brood and larval development of sand prawns. This species is ecologically (major component of benthic invertebrate biomass, important link in estuarine food webs, bio-turbator etc) and economically (sought after bait item) important.

The lack of baseline data on toxic pollutants in the sediments and biota of many South African estuaries in the face of increasing urban development and estuary utilization makes the undertaking of such studies a matter of priority. This aspect was not dealt with in a systematic manner in the NBA 2011 study, but highlighted where identified as possible pressure.

Source: Dr K Hutchings

Inappropriate agricultural practices in catchments result in contaminated agricultural runoff draining into estuaries introducing toxic substances (e.g. inappropriate use of herbicides and pesticides), excessive nutrients (e.g. inappropriate use of fertilizers), and increased suspended solid loads as a result of soil erosion. There are no data or comprehensive studies available on pollutants loads introduced to estuaries through agricultural sources. However, specific studies have shown that runoff from catchments used extensively for agriculture can contribute significantly to pollutant loading in estuaries, e.g. Olifants, Breede, Sundays. Poor agricultural practices can also contribute to increased sediment loading to the estuaries, e.g. ploughing activities on the flood plains, over grazing and trampling of riparian vegetation by livestock. An example of harmful agricultural practises is sugar cane farming along the KwaZulu-Natal coast that encroaches onto river banks and results in excessive sedimentation of estuaries, as well as the pollution of coastal aquatic systems.

Inappropriate planting in flood plains also leads to demands for the artificial breaching of estuaries when these fields become flooded. The former homelands (Transkei and Ciskei) have significant land transformation (e.g. forests to grass lands, grasslands to bare soil) leading to increase turbidity and sedimentation in these otherwise relatively pristine estuaries.

The Department of Water Affairs' operational policy for the disposal of land-derived waste water to the marine environment aims to prohibit (new) wastewater discharges into sensitive coastal areas such as estuaries (DWAF 2004). However, it will require a serious commitment from the department to enforce this policy in the light of the ever-increasing demand for municipal services (e.g. wastewater facilities) and fresh water (e.g. desalination plants) in coastal areas.

The pressure assessment attempted to derive a measure of catchment transformation by using the 2006 SA land-cover layer. Unfortunately, the data was found to be of a poor quality, with highly degraded or transformed land often classified as natural or near natural. The project therefore had to abandon this more rigorous approach for a visual evaluation of the catchment status for each estuary. It would add significant value if the national land cover map were more accurate in this regard and form the basis for future assessments.

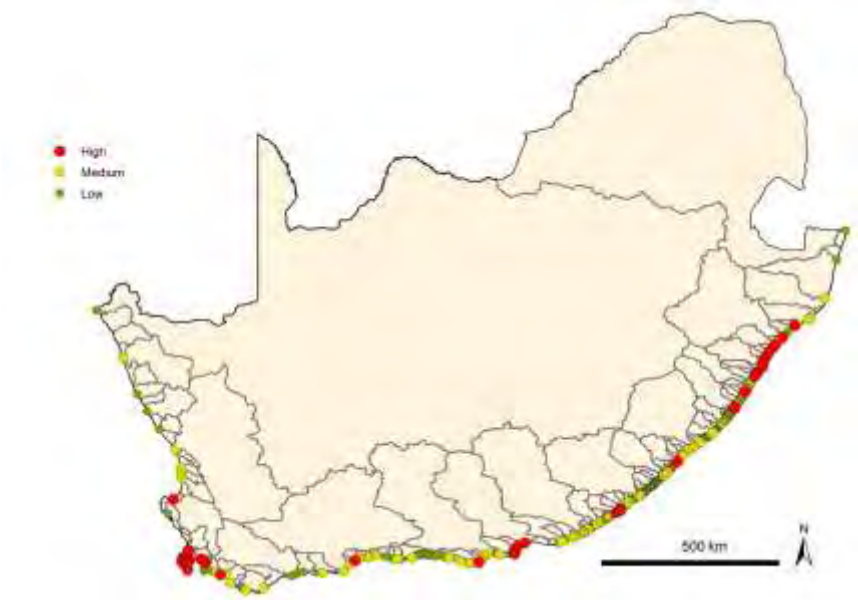


Figure 8.3 Locality map indicating the level of pollution pressure on individual estuaries

The results of the assessment indicate that 15 % of South Africa's estuaries are under significant pollution pressure, with 44% of the estuaries in the Cool Temperate region, 13% in the Subtropical region and 9% in the Warm Temperate region under severe pressure. An additional 40% of estuaries in South Africa are under a moderate degree of pollution pressure with the Subtropical (46% of estuaries in that region) and the Warm Temperate (37% of estuaries in that region) being the most affected. Less than 1% of all estuaries in South Africa have no pollution pressures on them – most of these are estuaries fed by small catchments confined to national or provincial protected areas.

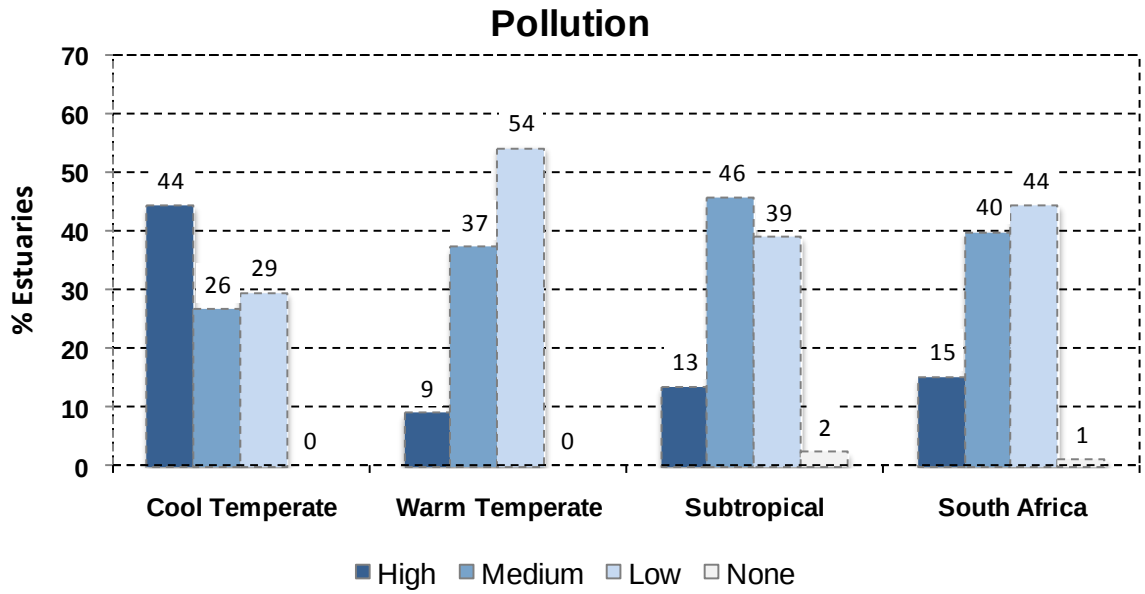


Figure 8.4 Quantification of the level of pollution pressures for the three biogeographically regions.

8.3 Exploitation of living resources

Overexploitation of living resources, predominantly fish and invertebrates in South African estuaries, influences changes in population size, biomass, sex-ratios, size/age distributions, community composition and trophic structure. In extreme cases, overexploitation can lead to recruitment failure whereby recruiting fish are systematically "mined out" after entering the estuarine nursery environment and there is no return migration to the sea or recruitment into the fisheries that depend upon them. Depending on the complexity of life-history strategies and the level of "natal" homing, recruitment back into the parental estuary may be reduced to such an extent that local extinction may occur.

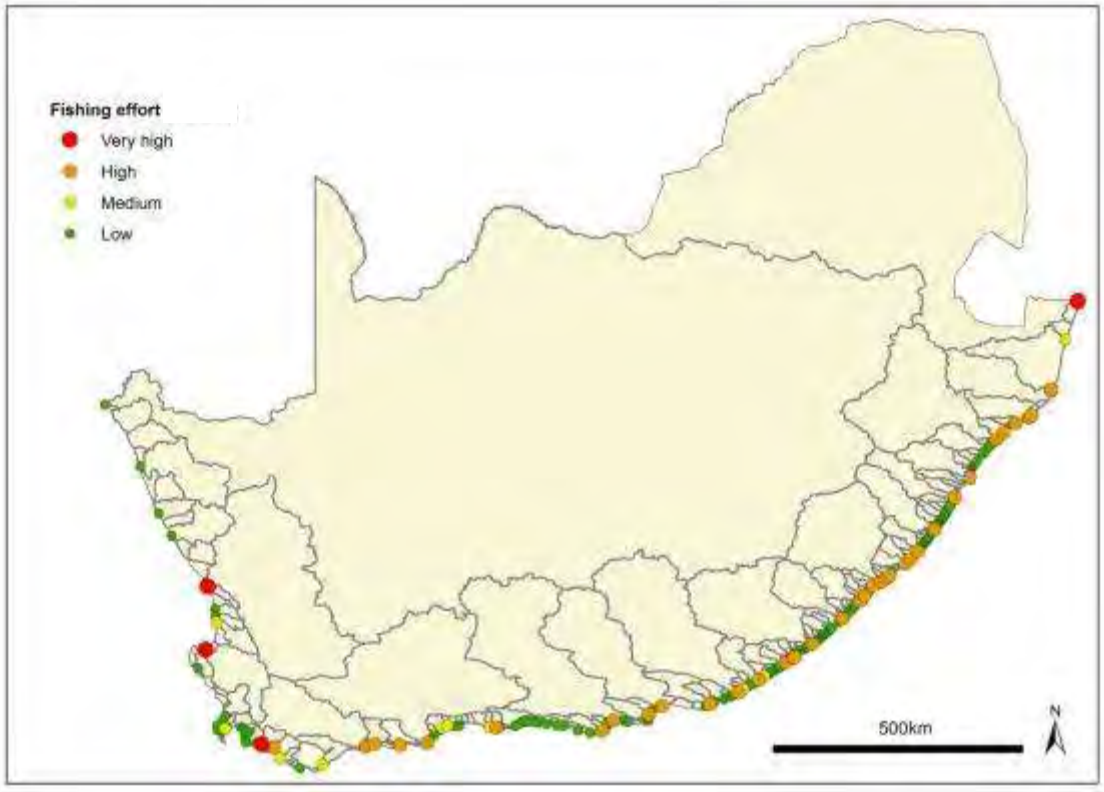


Figure 8.5 Locality map indicating fishing effort on South African estuaries.

All the large estuarine systems in South Africa are heavily overexploited, especially in terms of their linefish. Fishing effort in the Olifants, Berg, Bot and Kosi systems is extremely high and requires urgent management interventions to reduce the pressure on key nursery areas and collapsed stocks of estuary-associated species (see
Figure 8.5). Most of the catches are illicit and could be significantly reduced by dedicated compliance initiatives. Both legal and illegal effort is dominated by the use of gillnets which are cheaply available and efficient but also the most damaging in terms of selectivity and very high mortality of both juveniles and adults of prohibited bycatch species.

The results (Figure 8.6) of the assessment indicate that 1% of South Africa's estuaries are under excessive fishing pressure; especially alarming is that 9% of all Cool Temperate estuaries fall within this category. Another 13% of South Africa's estuaries are under significant fishing pressure, with 13% of estuaries in the Subtropical, 13% in the Warm Temperate and 3% in the Cool Temperate region under significant pressure. An additional 4% of South African estuaries are under a moderate degree of fishing pressure. Only about 14% of all estuaries in South Africa have no fishing pressures on them – most of these are located in national, provincial or municipal protected areas.

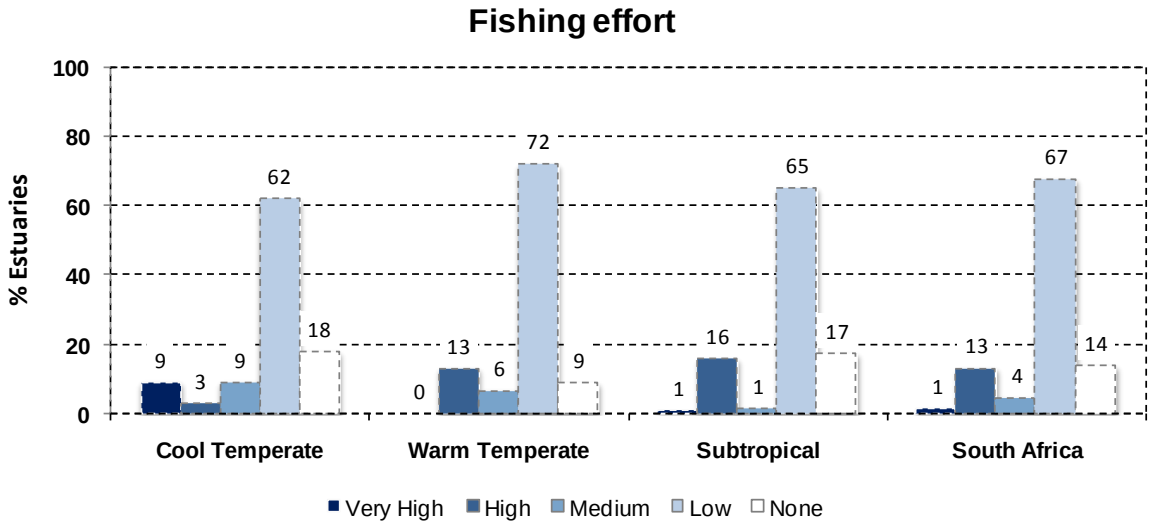


Figure 8.6 Quantification of the level of fishing pressures for the three biogeographically regions.

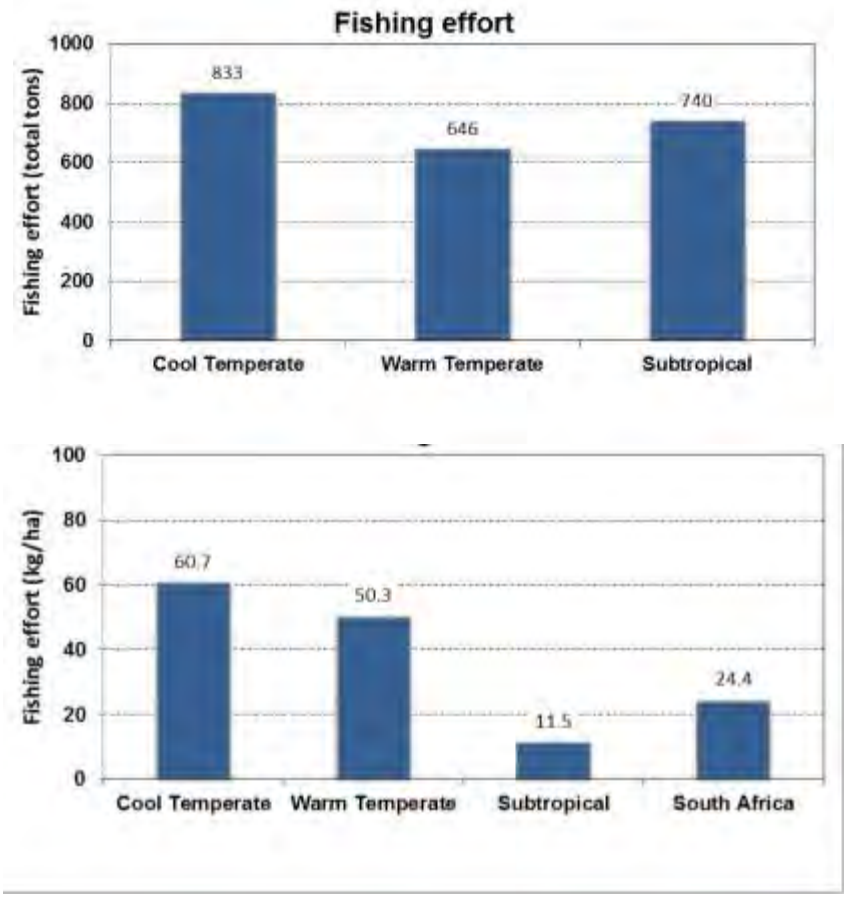


Figure 8.7 Fishing effort for the three biogeographically regions as Total annual catch (tonnes per region) and kilogram per hectare of estuarine area in each bioregion.

Figure 8.7 clearly indicates that while fishing effort is relatively equally distributed around the coast in the three biogeographical regions at 833 t, 646 t and 748 t for the Cool Temperate, Warm Temperate and Subtropical biogeographical regions respectively, the fishing pressure is significantly more in the Cool Temperate region where more than 60 t/ha in comparison with the national average of 24 t/ha is harvested annually.

Exploitation of invertebrates used as bait by recreational and subsistence anglers is a focal activity in most estuaries around the South African coast. Utilization of these living resources and the impact on other organisms and associated habitats may be persistent (e.g. close to urban environments) or more seasonal in nature (e.g. holiday resorts). In some estuaries, the impact of bait collection is considered to be very severe. Patterns of bait usage are obviously dependent on the estuary and fish species being targeted, but mud- and sand-prawns (*Upogebia africana* and *Callianassa kraussi* respectively) often emerge as the most sought after organisms (Wooldridge 2007). Pencil bait (*Solen* spp.) and bloodworm *Arenicola loveni* are also popular bait organisms.

Bait collection pressure was evaluated during the National Health Assessment on an estuary-by-estuary basis. About 84% of all South African estuaries have bait collection pressure on them but bait species are not considered overexploited in most systems as bait populations are quite resilient (Figure 8.8).



Figure 8.8 Locality map indicating estuaries that have some form of bait collection.

What is of concern is the related destruction and loss of habitat cause by inappropriate gear (e.g. bait-digging with spades). Bait collection also reduced biomass in both targeted and non-targeted invertebrate species. Small temporary open estuaries are seen as more sensitive to overexploitation than large permanently open systems and in some systems it may be appropriate to restrict bait collection, especially if water levels remain low for significant periods before breaching.

8.4 Land-use and development

Inappropriate land-use and development in and around an estuary, i.e. in the estuarine functional zone, can lead to habitat degradation, or loss, within an estuary. Low-lying developments, land reclamation, mining, infrastructure developments such as roads, bridges and jetties; or the remodelling of part of an estuary for harbour or marina construction, all create pressures (see Figure 8.9 for spatial distribution). Harbours and marinas usually involve major alteration of estuarine habitats and tidal flows. Land-use changes within the catchment and surrounding floodplain areas of the estuary are also of importance and can alter the sediment load to the coast. In addition, reduction of freshwater inflows to an estuary can also lead to alteration or loss of habitat, e.g. changing the sediment composition from sandy to muddy. Ultimately change in the structural habitat of an estuary can result in local extinctions, change in population size or biomass, change in community composition and structure, change in the ratios of generalist to specialist biota, and change in life-history strategies. It can also reduce the carrying capacity of an estuary for species higher up the food chain. Habitat degradation can also render an estuary more prone to alien invasions.

Habitat degradation or loss is above all a serious threat because of the risk of irreversible change. The degree to which each estuary's functional zones were modified were largely visually determined (Google Earth, Spot 5) and augmented where possible by national data sets, flow requirements studies and field observations from specialists.

Some of the activities listed above are discussed in more detail as they represent ubiquitous pressures or a significant emerging pressure. One such pressure is road infrastructure, specifically bridges. There are a large number of case studies in South Africa where **bridges** across rivers and estuaries were built with little consideration of the environmental consequences (Morant and Quinn 1999).

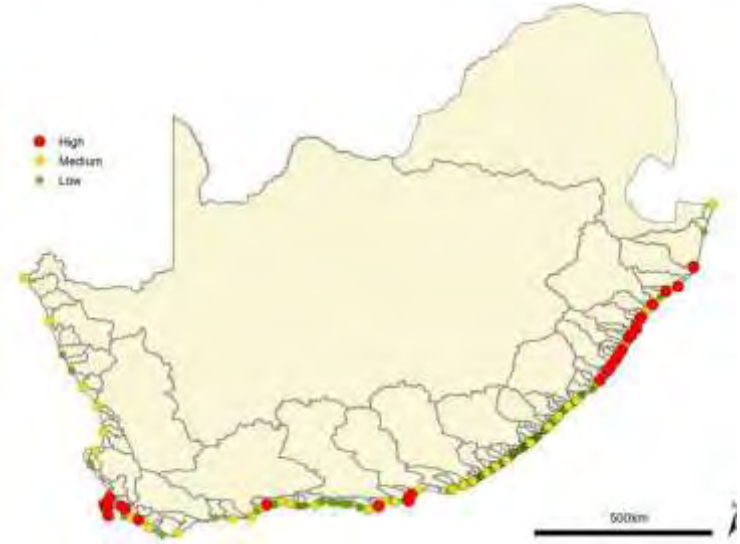


Figure 8.9 Locality map indicating habitat degradation within the estuarine functional zone.

The minimum and cheapest structure to convey a road or railway over a river or estuary, while still meeting safety requirements (e.g. 1:50 year flood), usually results in a comparatively narrow multi-span bridge with long-approach embankments. One of the obvious impacts of such bridges on estuaries is that in most cases it stabilises dynamic estuarine channels. In turn, the combination of stabilised channels and heavy floods being forced through constricted areas, leads to the extensive erosion of sediments underneath the bridge. Erosion beneath the bridge can also occur in conjunction with extensive deposition downstream from the bridge. The changes in flow velocity, and related sediment distribution, can lead to changes in habitat and biota. A typical example is the bridge spanning the Uilkraals Estuary. The 220 m long bridge compromises a 120 m causeway and a 100 m multi-span concrete bridge. It is notable that since the construction of the bridge over the Uilkraals Estuary the bloodworm *Arenicola loveni* has disappeared from the estuary upstream of the bridge (Heydorn and Bickerton 1982).

The approaches to a multi-span bridge are typically built over the floodplain vegetation (e.g. salt marshes), which are filled in with rubble and the road contructed on top (Day and Grindley 1981). Solid fill acts as an obstruction to tidal flows and an area of dead water can develop either side of the bridge span. Such dead water areas act as silt traps. In time, sandbanks and muddy shoals grow, which can reduce the tidal prism or volume of tidal water in and out of an estuary mouth. The changes in substrate can, in some instances cause the higher levels of marsh above a bridge to dry out and their production be lost to the estuary, e.g. Kromme. If tidal flows are impaired through the build-up of sediment, or bad bridge construction, this can lead to premature mouth closure in smaller temporarily open

and closed estuaries, e.g. Seekoei. The most extensive series of bridges over estuaries in South Africa are those spanning systems on the KwaZulu-Natal South Coast. The South Coast railway spans every estuary, usually very close to the sea, for the entire distance from Durban to the Zothsa Estaury some 150 km to the south (Begg 1978). In addition, the N2 arterial highway and ancillary roads span the same rivers or estuaries.

The extensive and sometimes large scale physical alteration of estuarine habitat as a result of **mining** is also an important consideration as the long-term impacts on the environment have not been fully quantified and verified. The impacts of mining include: smothering by sediment deposition, increased turbidity causing reduced sunlight penetration of the water column and consequent possible reduced primary production; increased sediment concentrations resulting in decreased efficiency of filter feeders, clogging of fish gills, and other effects. There is a concern that the cumulative effect (spatially and temporally) of discharges from several mining operations may be severe.



Figure 8.10 Locality map indicating estuaries that have infrastructure development (roads and bridges) within the estuarine functional zone.

The problems resulting from **sand mining** activities include aesthetic and ecological impacts (Figure 8.11) but also the long-term sustainability of the sand resource and potential implications for coastal stability (i.e. over time these cause erosion of the coastline). Of the 64 systems surveyed along the KwaZulu-Natal coast in 2007, 18 supported sand-winning operations (Demetriades 2007). These activities modify flows, produce high suspended solid loading in rivers and estuaries, as well as cause destruction of riparian and instream habitat.



Figure 8.11 Example of estuarine sand mining operations in the Mzimkulu Estuary - note the sediment plumes (Source: Google Earth).

The construction of **ports and marinas** may not be as prevalent in terms of infrastructure development but a number of large commercial ports are situated in or near estuaries, i.e. Port Elizabeth, Ngqura, East London, Durban and Richards Bay. All of these developments coincided with significant habitat destruction and/or modification. Major upgrades are currently under way to increase handling capacity and to absorb the rapid increase in commercial traffic (DEAT 2008). In addition, there are 12 proclaimed fishing harbours located mainly along the southern and western Cape coast, one of which is in an estuary, the Groot Berg. Several dedicated yacht harbours and marinas have also been built along the South African coastline from the Berg River in the west towards Port Alfred in the east. .

Dredging is vital for harbour and marina construction/expansion and maintenance of the channel and basin depths required for shipping and sailing. Potential dredging impacts include increased turbidity, smothering, changes in mouth stability, contaminated sediment (e.g. trace metals and hydrocartbons) released into the environment (DEAT 2008). Harbours and marinas, particularly those situated adjacent to cities and larger towns, are also vulnerable to pollution. Structures (e.g. quays) create areas of poor water circulation and as a result pollutants entering the sheltered areas, either from the land (e.g. contaminated stormwater runoff) or from activities in the harbour or marina (e.g. dredging), often accumulate with detrimental consequences to marine and estuarine life (e.g. causing fish kills).

The results (Figure 8.12) of the assessment indicate that 13% of South Africa's estuaries are under significant habitat modification or development pressure, with 32% of the estuaries in the Cool Temperate region, 16% in the Subtropical and 5% in the Warm Temperate region under significant pressure. An additional 33% of estuaries in South Africa are under a moderate degree of habitat modification pressure with the Subtopical (43% of estuaries in that region) and the Warm Temperate (38% of estuaries in that region) being the most significant.

Less than 10% of all estuaries in South Africa have no development pressures – most of these are estuaries confined to national, provincial or municipal protected areas.

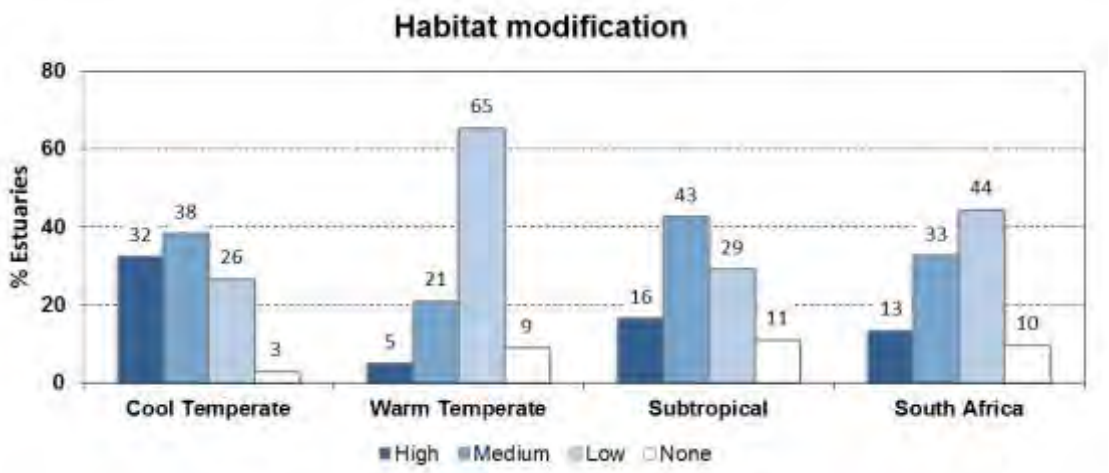


Figure 8.12 Quantification of the level of habitat modification pressures for the three biogeographical regions.

8.5 Estuary mouth manipulation

Estuary mouth manipulation can take a number of forms: artificial breaching (e.g. Bot, Swartvlei), channelisation (e.g. Seekoei, Zandvlei, Berg), or redirecting/diversion of the outlet (e.g. combined St Lucia/uMfolozi mouth). Estuary mouth manipulation may change the type of estuary, e.g. from temporarily open to permanently open. In most cases the need for mouth manipulation stems from inappropriate development in the estuarine functional zone.

The most pervasive of these manipulations is artificial breaching. Mouth manipulations are often also driven by an increase in closed mouth conditions, which in turn is linked to water resources development. For example, reduction in freshwater flow could lead to an estuary mouth being closed more frequently and for longer periods, leading to increased back-flooding of adjacent low-lying developments. This, in turn, will increase the pressure on

authorities to artificially breach the mouth. A change in mouth dynamics usually results in an increase sedimentation and premature closure. This results in changes in salinity and other water quality factors. In addition, increased mouth closure can result in changes in productivity and recruitment of fish and invertebrates, impeded migration and genetic exchange and changes in the distribution of organisms (loss from certain estuaries).

Expert opinion and the KwaZulu-Natal Estuaries database were used to identify estuaries where some form of mouth manipulation was practiced. The mouths (outlets) of about 16% of South Africa's estuaries are artificially managed, but these account for 62% of the total estuarine habitat. It is apparent that inappropriate low-lying developments are forcing artificial mouth manipulations (e.g. breaching). This is partly because the backflooding area (encapsulated in the estuarine functional zone) under closed mouth conditions is not recognized explicitly by any South Africa legislation. Nearly 75% of all estuaries in South Africa close. When an estuary is closed, the water level in the estuary rises above sea level; but legally only the high water mark is recognized, not the backflooding mark. The result is pressure to artificially breach the estuary (because of inundation of housing, infrastructure, golf courses, or agricultural land that is inundated). **It is thus of the utmost importance that the ICM Act recognize backflooding explicitly i.e. the area above the high water mark up to the natural breaching level.**

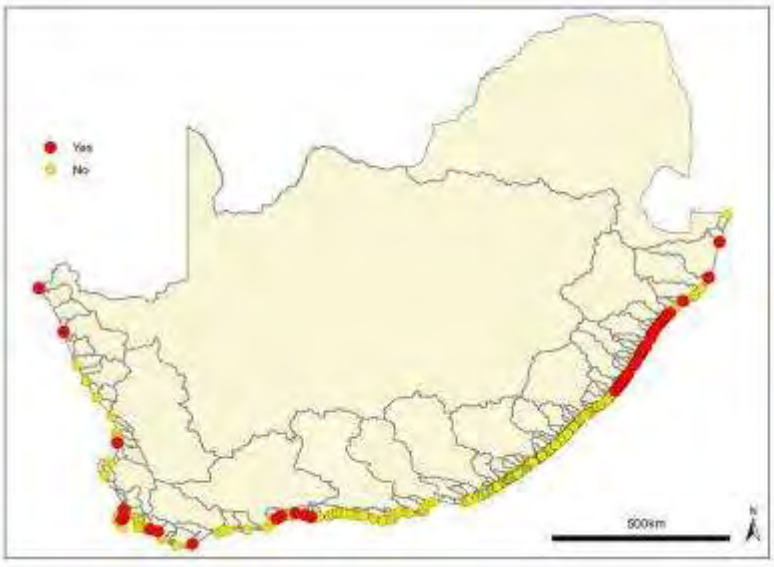


Figure 8.13 Locality map indicating estuaries known to be subjected to mouth manipulations.

Panel 4: Emerging pressure… Desalination plants

South African coastal municipalities are increasingly turning to reverse osmosis (RO) desalination technology to meet bulk water demands. RO desalination plants can be turned off during periods of low demand and are therefore particularly appealing to municipal managers of coastal resort towns where extensive, seasonal water requirement fluctuations are the norm. Recent technological advancements (improved pre-treatment, membrane material, plant design and energy recapture) have made RO technology more affordable and it is possible to commission a plant in a relatively short time period, particularly when compared to accessing other traditional bulk water supplies. Recent drought and a lack of traditional water sources in arid coastal regions (e.g. the Western Cape) have resulted in a proliferation of RO desalination plants in recent years. Conceptually, the process of RO is straightforward: high pressure pumps are used to force saline water through a semi-permeable membrane, dissolved salts and other impurities are retained and discharged as a brine waste stream and fresh product water is produced. Typical efficiency of modern RO plants utilizing sea water results in about half the volume of intake being produced as fresh water.

In reality, plants design can be complex, with extensive pre-treatment of source water required to prevent clogging and biofouling of plant infrastructure and the RO membranes. Pre-treatment typically includes filtration (aided by the addition of coagulants), pH control, the addition of anti-scalents, biocide, cleaning chemicals (weak acids and detergents) and neutralizer (if an oxidizing biocide is used). Any residual chemicals or other additives used in pre-treatment are frequently co-discharged after dilution with the brine into the receiving environment (usually the sea). Provided the brine is discharged into a suitable area with adequate mixing and offshore dilution, and a sufficient distance from sensitive habitats (reefs, estuaries, surf zones etc), impacts on the marine environment should be spatially limited and can be mitigated to some extent by discharge design. Data on the monitoring of the impacts of RO plants on the South African marine environment is however, almost nonexistent. International studies report impacts of varying significance, largely dependent on the plant size and characteristics of the receiving environment.

In terms of estuarine impacts, the development of RO desalination plants to purify sea water is preferable to extracting river or ground water and further reducing freshwater flow to estuaries. Poorly designed or situated RO desalinization plants may, however, have significant negative impacts on estuaries. The sheltered nature of many estuary mouths makes these areas appealing to marine engineers for the placement of plant infrastructure. Reducing the height of the plant above mean sea level can reduce pumping costs and avoiding the exposed shore can help protect pipelines, intake wells and discharge structures from waves and storm surges. Direct or beach well abstraction of source water from an estuary, and/or RO plant waste discharged directly into an estuary (or the adjacent nearshore from where it may enter the estuary prior to sufficient dilution), may have severe negative impacts on estuarine functioning.

To date three RO plants are known to have impacted on South African estuaries. A relatively small RO plant (0.2 million liters per day) extracts water from beach wells near the mouth of the Bushmans Estuary in the Eastern Cape and discharges brine via a pipeline directly into the estuary. Monitoring the impacts detected no elevation in salinity above background within ten meters of the discharge pipeline (Bornman & Klages 2004). This was attributed to low volumes of brine discharged relative to the total volume of the estuary water and good dispersion due to turbulent tidal mixing. The Bushmans River Estuary is also permanently open and frequently hypersaline, somewhat reducing the impacts of brine discharge.

A larger (1.5 million liters per day) RO plant was recently commissioned in Plettenberg Bay near the mouth of the temporary open Piesang Estuary in the Western Cape. Contrary to recommendations from the EIA process, extraction wells were sunk in the mouth of the estuary as sufficient depth of sand was not found on the adjacent Robberg Beach. Over a two-month trial period during the summer holiday period, the salinity of water extracted from the wells dropped from 22 PSU to 12 PSU and a substantial drop in the estuary water level took place. The estuary mouth was closed at this time and very little freshwater was entering the system. Partly out of concern about the impacts on the estuary, the plant was shut down and the municipality is currently seeking funds for an alternative marine water intake.

At Mossel Bay, pumping water from the construction site of the relatively large RO plant (15 million liters per day) drastically reduced water levels in the small temporary open Tweekuilen inlet (not assesses as part of this study). This impact was significant, but temporary in nature as operational impacts of this RO plant that has both marine pipeline intake and discharges are not expected to adversely impact the estuary.

These examples show that RO desalination plants can have impacts of varying significance on estuaries. Increasing demand for limited bulk water supplies will cause and increase in the number of desalination plants along the South African coast and involvement of estuarine scientists during the planning and construction phases and monitoring of the operational impacts will be required to mitigate against potential negative impacts on estuaries.

Source: Dr K Hutchings

Panel 5: Emerging pressure… Aquaculture and Mariculture

Aquaculture can be divided into freshwater aquaculture and marine aquaculture or mariculture (DEAT 2008). Freshwater aquaculture potentially can have an impact on the coastal marine environment when such activities lead to the pollution of river water that ultimately enters estuaries and the sea. As far as could be established, detrimental impacts of freshwater aquaculture are currently not evident in estuaries. Of greater concern is mariculture, especially land-based marine aquaculture which is growing in South Africa and includes intensive farming practices involving re-circulation and flow-through systems which include the use of ponds and brackish water environments, e.g. linked to estuarine environments.

Finfish culture, in particular, is moving towards land-based grow-out operations because of the high risk and cost of installing cages in rough seas typical of the South African coast (DEAT 2008). Inappropriate mariculture activities can contribute to the destruction of estuarine habitats, as well as to the pollution of coastal waters. For example, the construction of inlet and effluent pipelines can result in the excavation or disturbance of sensitive dunes and sandy shores. Large areas containing coastal indigenous vegetation may also be removed to make way for infrastructure. Waste from the marine aquaculture operations can also contribute to pollution of estuarine and coastal marine waters. For example, nutrient enrichment associated with the disposal of faecal matter can contribute to eutrophication, particularly in sheltered environments.

If not managed effectively, marine aquaculture operations can promote the spread of microbial contaminants, thus introducing disease to wild populations. Genetic contamination has become a major problem in the Norwegian fjords where escaped farmed salmon have interbred with, and consequently affected, the survival of wild salmon populations. This mixing of stocks has mostly been associated with sea cages but there is also the possibility that flow-through systems can have the same impact through juvenile fish escaping into the near shore environment.

9. HEALTH STATUS OF ESTUARIES

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The National Estuarine Health Assessment was a desktop procedure during which a national team of 13 regional specialists, covering the full suite of disciplines, evaluated estuary health based on the general (desktop-derived) characteristics of the estuaries. The method used was a standardized approach developed for determining the ecological water requirements of South Africa's estuaries which has been applied to about 30 systems along the coast. All the specialists that contributed to the assessment were familiar with the Estuarine Health Index from previous DWA studies.

For the National Health Assessment, the Lake St Lucia system was disaggregated into two sections (see text box below), the Lake St Lucia and the uMfolozi Estuary respectively. This was done to develop a clearer understanding of their relative contribution to the total health status of South Africa's estuaries. For a similar reason, Mhlathuze and Richards Bay Harbour were evaluated as separate estuaries, though they used to be a single system. While this is a somewhat artificial division, it was deemed necessary as collectively these systems provide for more than half of South Africa's estuarine area and could distort the results significantly. The national health assessment was therefore conducted on 291 systems in total.

Note:
The technical separation of the St Lucia and uMfolozi estuaries in this assessment was done to assist with gaining a deeper understanding of a very complex estuarine system that comprises a multitude of ecosystem processes and a range of habitat types. Throughout the assessment, the underlying assumption was that under natural conditions the two systems would have been connected, with the uMfolozi flowing into St Lucia during periods of mouth closure, i.e. St Lucia would have been more open and uMfolozi at times closed for longer periods. This technical approach should not been misconstrued as an argument for managing them as separate systems. At all times the interactions and dependencies between these two estuary mouths should be recognized and the Lake St Lucia system management as one. In other words, all management plans, ecological water requirements studies and Health Assessments should be done within the context of the high degree of connectivitly between these two estuaries - what is done to the one is done to the other - it is just the degree of resilience to a specific pressures that could differ between the two estuaries.

9.1 The estuarine health determination process

The health condition (also called the Present Ecological State) of an estuary is typically defined on the basis of current condition (i.e., the extent to which it differs from its reference or natural condition). Based on the above, estuary condition is described using six "Present Ecological State (PES)" categories, ranging from natural (A) to critically modified (F) (Table 9.1). The fact that the physical conditions in estuarine systems are more dynamic than those of other aquatic ecosystems means that severe degradation of an estuary may involve a shift from a dynamic to a more stable, or unidirectional, system. This means that the loss of dynamic function *per se* is an important indication of declining estuarine health (DWAF 2008). Thus, in an estuarine health assessment, measures of these different states need to be sufficiently robust so that different practitioners/disciplines will arrive at the same categorisation.

Table 9.1 Ecological Management Categories (DWAF 2008).

Health Condition	Description
A	Unmodified, natural.
B	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions and processes are essentially unchanged.
C	Moderately modified. A loss and change of natural habitat and biota have occurred but the basic ecosystem functions and processes are still predominantly unchanged.
D	Largely modified. A large loss of natural habitat, biota and basic ecosystem functions and processes have occurred.
E	Seriously modified. The loss of natural habitat, biota and basic ecosystem functions and processes are extensive.
F	Critically/Extremely modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions and processes have been destroyed and the changes are irreversible.

The Estuarine Health Index was calculated through consideration of the following components (DWAF 2008):

A. Abiotic
- Hydrology (% change in MAR)
- Hydrodynamics and mouth condition
- Water chemistry (salinity and combined score for other variables)
- Sediment processes

B. Biotic
- Microalgae
- Macrophytes
- Invertebrates
- Fish
- Birds

The assessment was undertaken by a multidisciplinary group of estuarine scientists (the chapter authors) in a workshop setting, based on their collective understanding of the likely impacts affecting each system. Expert knowledge and available information were all used to build up a “picture” of the probable pristine state of each estuary and the changes under current conditions. The Estuarine Health Index is applied to all levels of ecological water requirement studies (comprehensive, intermediate or rapid), with only the level of information supporting the study and level of confidence varying. For each variable the conditions are estimated as a percentage (0 – 100%) of the pristine health. Scores are then weighted and aggregated (the rules are provided in Table 9.1 and Table 9.2) so that the final score reflects the present health of the estuary as a percentage of the pristine state. Both abiotic and biotic variables are included as the relationships between the abiotic and biotic variables are often not well understood and because the biotic response to certain abiotic variables can be lagging.

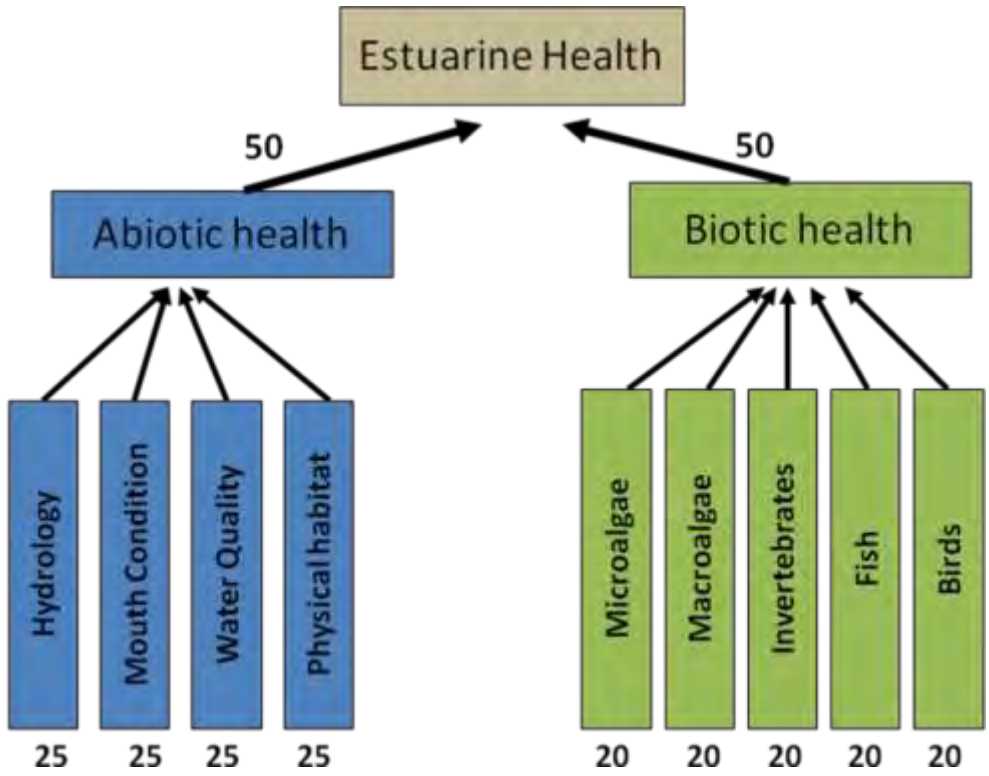


Figure 9.1 Components and weightings of the Estuarine Health Index (DWAF 2008).

Table 9.2 Calculation of the Estuarine Health Score (DWAF 2008).

No.	Variable	Example Score	Weight
Abiotic (habitat) variables			
1	Hydrology	41	25
2	Hydrodynamics and mouth condition	80	25
3	Water quality	59	25
4	Physical habitat	80	25
A. Habitat health score = weighted mean		**65**	**50**
Biotic variables			
1	Macrophytes	60	20
2	Microalgae	60	20
3	Invertebrates	70	20
4	Fish	60	20
5	Birds	90	20
B. Biological health score = weighted mean		**70**	**50**
ESTUARINE HEALTH SCORE = weighted mean of A & B		**67.5**	

For comparative reasons (with previous assessments) the individual health scores were aggregated as illustrated in Table 9.3. In estuaries, unlike in the terrestrial environment, degradation or loss of habitat seldom means a complete loss of an estuary. This can only happen if an estuary becomes completely degraded, e.g. changed into a parking lot or golf course. In most cases, degradation means loss of processes or loss of biological functionality, e.g. the estuarine space is filled with a different salinity condition or different species composition. This loss of functionally happens on a continuum, with estuaries which retain more than 90% of their natural processes and pattern being rated as Excellent and estuaries degraded to less of 40% of natural functionality rated as Poor.

Table 9.3 Schematic illustration of the relationship between loss of ecosystem condition and functionality.

Condition	≥91%	90-75	75 - 61	60 - 41	40-21	≤20
Category	A Natural	B Largely natural with few changes	C Moderately modified	D Largely modified	E Highly degraded	F Extremely degraded
State	Excellent	Good	Fair		Poor	
Functionality	Retain Process & Pattern (representation)		Loss of Process or Pattern		No Process & Pattern	

9.2 Health status of estuaries per biogeographical region

To allow for comparison with previous health assessments, the number of estuaries in different health states were aggregated for each biogeographical region (see Table 9.4).

Using "*number of estuaries"* as a measure, the NSBA 2004 analyzed the condition of South Africa's estuaries as a percentage of the total number of systems (259) (Turpie 2004). The general conclusion drawn was that the overall health of South African estuaries was considered to be relatively good. A total of 28% of estuaries were considered to be in excellent state and another 31% were in a good state. About 25% were in a fair state and only 15% were in a poor state.

Table 9.4 Summary of Estuarine health status as percentage of estuaries in the three biogeograpical regions for the NSBA 2004 (adapted from Whitfield 2000).

Biogeographical region	Condition				Total Number
	Excellent	Good	Fair	Poor	
Cool Temperate	9	9	36	45	11
Warm Temperate	27	43	18	12	127
Subtropical	31	21	32	16	121
Total	**28**	**31**	**25**	**15**	**259**

The NBA 2011, using "*number of estuaries"* as a measure (see Table 9.5 for detail), similarly found that a total of 17% of estuaries were considered to be in excellent state and another 41% were in a good state. About 35% were in a fair state and 7% were in a poor state, with this analyses being very sensitive to the condition of the large number of temporarily open/closed estuaries.

Table 9.5 Summary of the Estuarine health status as a percentage of estuaries in the three biogeograpical regions (NBA 2011).

Biogeographical region	Condition				Total
	Excellent	Good	Fair	Poor	
Cool Temperate	6	15	50	29	34
Warm Temperate	19	50	28	2	124
Subtropical	17	39	38	5	133
Total	**17**	**41**	**35**	**7**	**291**

A comparison between the 2004 and 2011 studies shows about a 10% reduction in the number of estuaries in excellent state, but also that there were fewer estuaries in a really poor state. While the decline in excellent condition estuaries can be contributed to increase

pressure and degradation, some of these shifts can be contributed to the more systematic approach followed during the NBA 2011 national health assessment.

This relative optimistic picture changes dramatically if "total estuarine area" (expressed as hectares habitat) is used as the measure. Table 8.6 provides a summary of the state of South Africa's estuaries expressed as a percentage of the total habitat (ha). From this analysis it is very clear that only a very small percentage of estuarine habitats are in an excellent condition, with most of this area being located in the Warm Temperate region, i.e. the numerous small Wild Coast estuaries. Only about 1% of estuarine area is in an excellent state and only 14% of the total estuarine habitat is in a good state, once gain mostly represented by systems in the Warm Temperate biogeographical region. The NBA 2011 determined that most – 85% - of the estuarine habitat in South Africa is in a poor to fair state as illustrated in Figures 8.3 to 8.6.

Table 9.6 Summary of Estuarine health status as a percentage of total estuarine habitat in the three biogeograpical regions (number of estuaries in brackets).

Biogeographical region	Condition				Total area (ha)
	Excellent	Good	Fair	Poor	
Cool Temperate (34)	0	1	96	3	13 720
Warm Temperate (124)	7	49	45	0	12 849
Subtropical (133)	0	10	14	75	64 275
Total area (ha)	**1**	**14**	**31**	**54**	**90 844**

As the Lake St Lucia system (St Lucia and uMfolozi combined) represents more than 56% of South Africa's estuarine habitat (51 0000 ha), its poor condition significantly influences this assessment. St Lucia's condition is a result of the artificial diversion of the uMfolozi River from St Lucia since 1952 and an extended drought in the region with the resultant reduction in freshwater inflow. As this is a reversible state of affairs, the iSimangaliso Authority is currently implementing a strategy to join the uMfolozi and St Lucia mouths, and has also raised funding from the Global Environment Facility to investigate and implement long-term solutions. Continued national support to restore this national asset with international status will be required. (see Panel 6 for more detail).

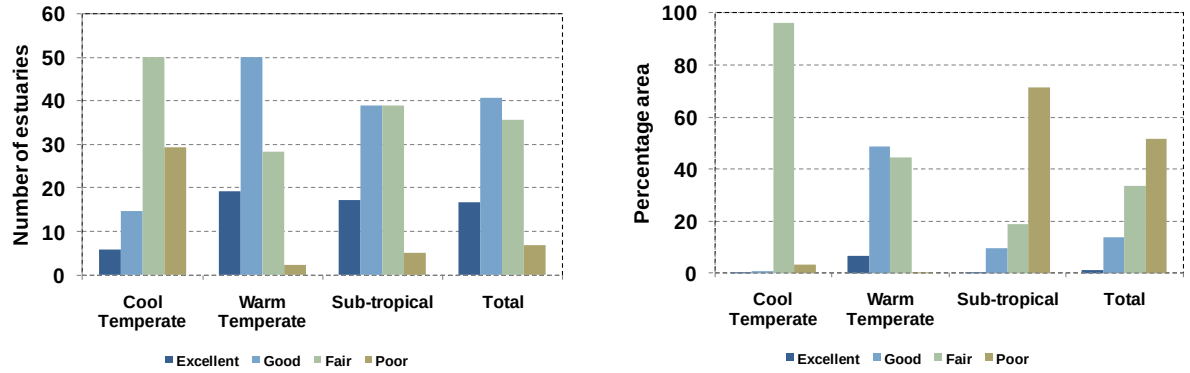


Figure 9.2 A graphic illustration of the different perspectives arising when the National Health Assessment is presented as "Number of estuaries" or "Percentage Area". The latter analysis highlights the fact that the majority of South Africa's estuarine area is in a poor to fair state.

Panel 6: Lake St Lucia system: An estuary in crisis!

Lake St Lucia is the largest estuarine system in Africa, it forms part of a World Heritage Site and is a Ramsar Site of international importance. The ecological importance of the system is well documented with its major role being that of a nursery ground for marine fish species which spawn at sea and whose juveniles are either wholly or partially dependant on St Lucia to complete their life cycles. The system is the most important juvenile fish nursery on the south-east African coastline, contributing to the fish populations over a large area of the offshore continental shelf, particularly adjacent to the Thukela Bank and Richards Bay area. In addition, it is an important nursery ground for penaeid prawns that come from South Africa's only breeding population on the Thukela Banks.

While changes in the catchments of the rivers feeding the Lake St Lucia system have affected the amount and quality of water entering the lake, the major impacts on the system have arisen through human intervention in the uMfolozi catchment. In 1911 the uMfolozi floodplain began to be converted into agricultural land for sugarcane farming. In the late 1920s, a system of drainage canals was built. By the 1940s concern was being expressed about sedimentation in the mouth region, which was attributed to the canalization of the uMfolozi River. In the early 1950s the combined mouth closed and there was extensive backflooding. This was dealt with by artificially breaching the mouth. From 1956 a separate mouth was opened for St Lucia, and since then the separation of the uMfolozi and St Lucia estuary mouths has been actively maintained. This separation was considered necessary to prevent the threat of sediment accumulation in the lake. Due to the separate mouth policy, the benefits of the uMfolozi water were lost to the estuary system. The inflow from the uMfolozi river is the driver of the combined system as it plays an important role in maintain open mouth conditions and preventing/reducing the occurrence of lethal hypersalinty levels in the Lake St Lucia system. Extensive dredging in the Narrows took place in an attempt to increase exchange with the Lake and keep the mouth open. Dredging operations lasted for over 40 years.

In June 2002 the St Lucia Estuary mouth closed as a result of drought conditions and lack of freshwater inflow from the uMfolozi River, and remained so for four years and nine months. During this period salinities throughout the system increased dramatically, with False Bay and North Lake reaching beyond 200 (seawater = 35) and Charters Creek in the South Lake going beyond 120. Such high salinity levels have never before been recorded in the system. At the same time, as the salinities were increasing due to evaporation, the water level decreased rapidly and by December 2003 the

lake had separated into four compartments with only 25% of the surface area being covered by water. Due to the ongoing drought, by July 2006 only 10% of the lake's entire 350 km^2 was covered by water.

At the beginning of March 2007 cyclonic activity off the southern tip of Madagascar in the form of Cyclone Gamede resulted in a major storm surge along the entire KwaZulu-Natal Coastline. The effect on St Lucia was that the storm surge breached the estuary mouth and with levels at the time being in excess of half a meter below mean sea level, seawater poured into the system. It continued to do so for six months before finally closing again during August 2007, with the lake some 75% full and salinities throughout the system being close to that of seawater. The system remains closed to the sea with the water level only covering <50% of the lake's 350 km^2 surface area (November 2011).



During the period since closure there have been major mortalities of invertebrates, a number of fish kills, as well as a large algal bloom in the north of the system. Research results indicate that there has been a substantial decrease in the diversity of the zooplankton community, whilst benthic invertebrates showed a decline in the number of taxa, with the community composition also having changed over time. The fish fauna has shown a significant decrease in both species and numbers. In addition, the prolonged closure of the link to the sea has resulted in the nursery function for marine fish and prawn species, whose life cycle requires that their juveniles enter the estuary, being totally unavailable. Results from research in the nearshore marine environment have now linked population decreases in some adult breeding stocks to the closure of the St Lucia estuary.

Fish populations in the St Lucia system have long been subject to intensive exploitation by recreational, subsistence and commercial fishers. Prior to the extended closure, the subsistence gillnet fishery had developed to an unsustainable commercial-scale and was in the process of being phased out. This was expedited by most of the fishing area drying up. However, fishing pressure remained high and overexploitation exacerbated by fish becoming concentrated and more easily caught in some areas. This lead to an emergency closure of the lower reaches to fishing to protect some species in the early 2000s. This protection came from a ministerial level. Consequently, It is felt that although the response was quick, it could have been even more so had the iSimangeliso Authority the power to implement local fishery control measures at their discretion.

Due to Lake St Lucia's international and national significance, the iSimangaliso Authority has raised funding from the Global Environment Facility (GEF) to investigate and implement a long-term solution to the hydrological issues facing the Lake St Lucia system. In parallel to this investigation the management strategy for 2011/2012 will result in the reversal of the 56 year old approach to managing Lake St Lucia; that is, allowing the uMfolozi and Lake St Lucia estuary mouths to join to form a combined mouth, and thereby allowing it to function as naturally as possible. In keeping with adaptive management, an ongoing review and evaluation based on monitoring of salinity, lake levels and ecosystem health will be continue as these interventions are implemented.

This management strategy has been based on the review of current scientific knowledge, particularly the recent research on sources and dispersal of sediments. The proceedings of the 2010 Consortium for Estuarine Research and Management (CERM) workshop endorsed the relinkage of the uMfolozi and St Lucia estuaries and the implementation of measures that will reduce any excessive input of sediment from the former into the latter system (Bate et al. 2010). This endorsement states that: ***"Historical evidence from early maps and anecdotal evidence indicate that changes in the uMfolozi/Msunduzi floodplain have had profound impacts on the uMfolozi Estuary and indeed on the whole St Lucia lake system. The separation of the uMfolozi from St Lucia in the early 1950s resulted in a major change in the way that St Lucia functioned. Only now are we beginning to see and experience the full implications of that separation for the well-being of the ecosystem, with the lake virtually drying out completely for the first time in living memory."***

A major concern in the short- and even medium-term is that the mouth of the Lake St Lucia will remain closed for a number of years to come unless a major rain/cyclonic event delivers sufficient water to the lake for it to fill to above its normal mean lake level. This may not be the case as since 30 July 2011 the uMfolozi mouth has moved about 370 meters north towards Lake St Lucia and the park are investigating ways of expediting the joining of the systems.

Source: Prof D Cyrus (with input from B James and SJ Lamberth)

Along the West Coast the predominantly closed estuaries tend to be in a good state while the large permanently open estuaries on average were in a fair state. The numerous small temporarily open/closed estuaries around Cape Town were generally in a poor state. The National Health Assessment once again confirmed that estuaries along the south and south-east coast tend to be healthier than those in the rest of the country. The numerous small estuaries along the former Transkei/Ciskei coastal area have the best overall health. The KwaZulu-Natal south coast had the highest number of estuaries in a poor state. This was largely due to direct habitat loss and artificial breaching related to development pressures in the estuarine functional zone, as well as intensive sugar cane farming in most of the catchments. In general, urban estuaries tend to be in fair to poor health along the intensively developed areas of the Cape south-west coast, around Port Elizabeth, and along almost the entire KwaZulu-Natal coast.

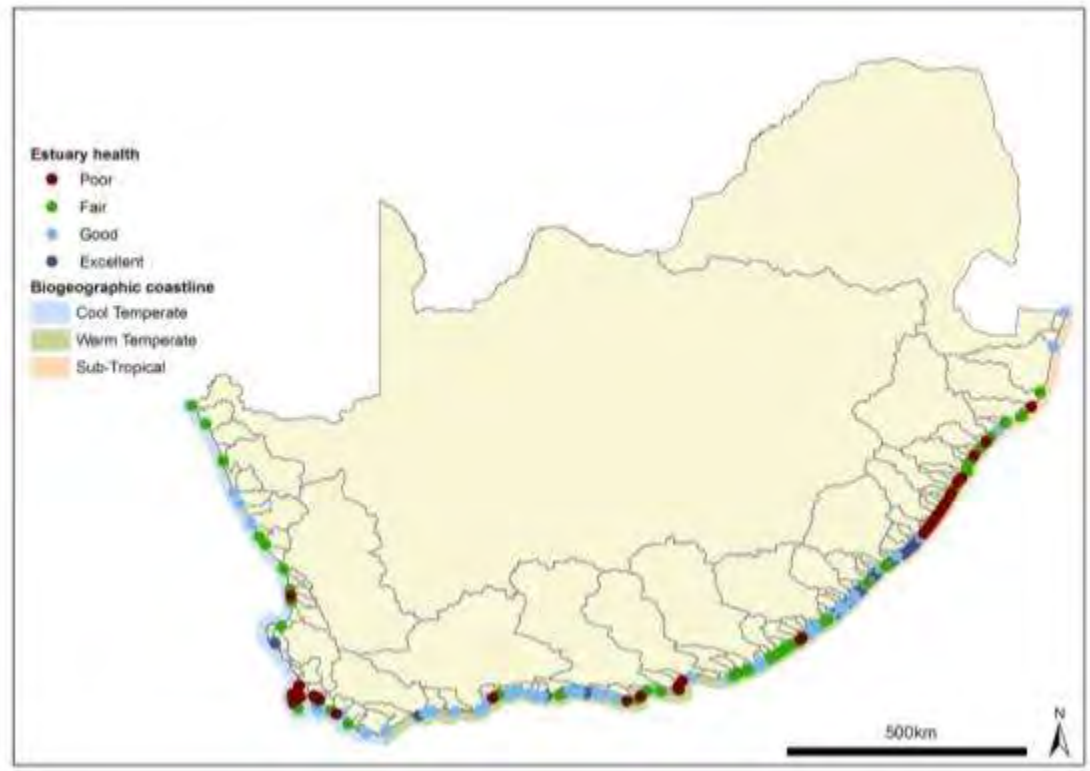


Figure 9.3 Health status of South Africa's estuaries.

The temporarily open/closed estuarine habitat types were predominantly in a good (28%) to fair (65%) state. Smaller estuaries (and their related smaller catchments) generally tend to be subjected to fewer pressures. If there were no direct development pressures (i.e. urban development), these systems tend to be healthier than larger estuaries. Large estuaries (both permanently and temporarily open) tend to have more catchment and direct development pressures and are therefore predominantly in a fair to poor state (>80%). Freshwater dominated estuaries (river mouths) tend to have the most natural resilience, but also have significantly more catchment and development pressures, with the majority (99%) of the habitat being in a fair state. The very large permanently open estuaries (estuarine bays) faired the best as they are buffered against development through strong tidal exchange, tending towards a good (38%) to fair state (40%).

The large temporarily open/closed systems (estuarine lakes) were in the worst state, with 84% of their habitat being in a poor condition. As stated above, this was largely the result of the poor condition of the St Lucia system, but it should be noted that only 10% of the estuarine lake habitat in South Africa is in a good condition. As estuarine lakes represent about 60% of South Africa's total estuarine habitat, and are very vulnerable to catchment

and development pressures, it is strongly recommended that they be more effectively management and protected.

Panel 7: Verification of National Health Assessment

The findings of previous health assessments (about 30), conducted as part of ecological water requirement studies or estuary management plans (e.g. Verlorenvlei), are listed in blue in the summary table of the desktop National Health Assessment (Appendix C). Workshop participants used these more in-depth studies to bench mark their scoring under the more streamlined method of the National Health Assessment. In general, workshop participants felt that they were scoring conservatively and overestimating the condition, or current health state, of estuaries by about 5 to 10 percent. This was seen as a positive outcome, as the results of the National Health Assessment are to be used for biodiversity planning, the ecosystem threat status Assessments and the Protection Levels determinations. In this context, estuaries should not be discounted or ignored if they could contribute to biodiversity targets or headline indicators. Reasons for the elevated health scores were: lack of good hydrology (inflow data) as the WSAM did not incorporate dam developments and discharges accurately; lack of good water quality data; and the large spatial scale at which the study was conducted (i.e. estuaries were evaluated on Google Earth/Spot 5 images versus field visits).

In addition, the results of the National Health Assessment were further affirmed against a number of more detailed EWR studies conducted subsequent to this initial assessment. The results show that the National Health Assessment estimates deviated by between 1 and 14 percent from the more in-depth assessments. The desktop assessments were more accurate if the flow data was accurate, with the degree of deviation being lower in categories Excellent and Good, but less accurate in the case of highly modified systems (i.e. categories Poor and Heavily degraded).

Table 9.7 A comparison between the National Health Assesment and more detailed ecological water requirement studies.

EWR Study	Level	NBA Score	EWR Score	Score difference
Sundays (2010)	Intermediate	C (68)	C (67)	-1
Groot Berg (2010)	Intermediate	C (62)	D (59)	+3
Bushmans (2010)	Rapid	C (73)	C (72)	-1
Bot (2011)	Rapid	C (62)	C (71)	-9
Little aManzimtoti (2011)	Rapid	D (43)	E (38)	+5
Mbokodweni (2011)	Rapid	E (35)	E (33)	+2
Umzimkulu (2011)	Rapid	C (70)	B (79)	-9
Mgeni (uMngeni) (2011)	Rapid	D (47)	E (33)	+14

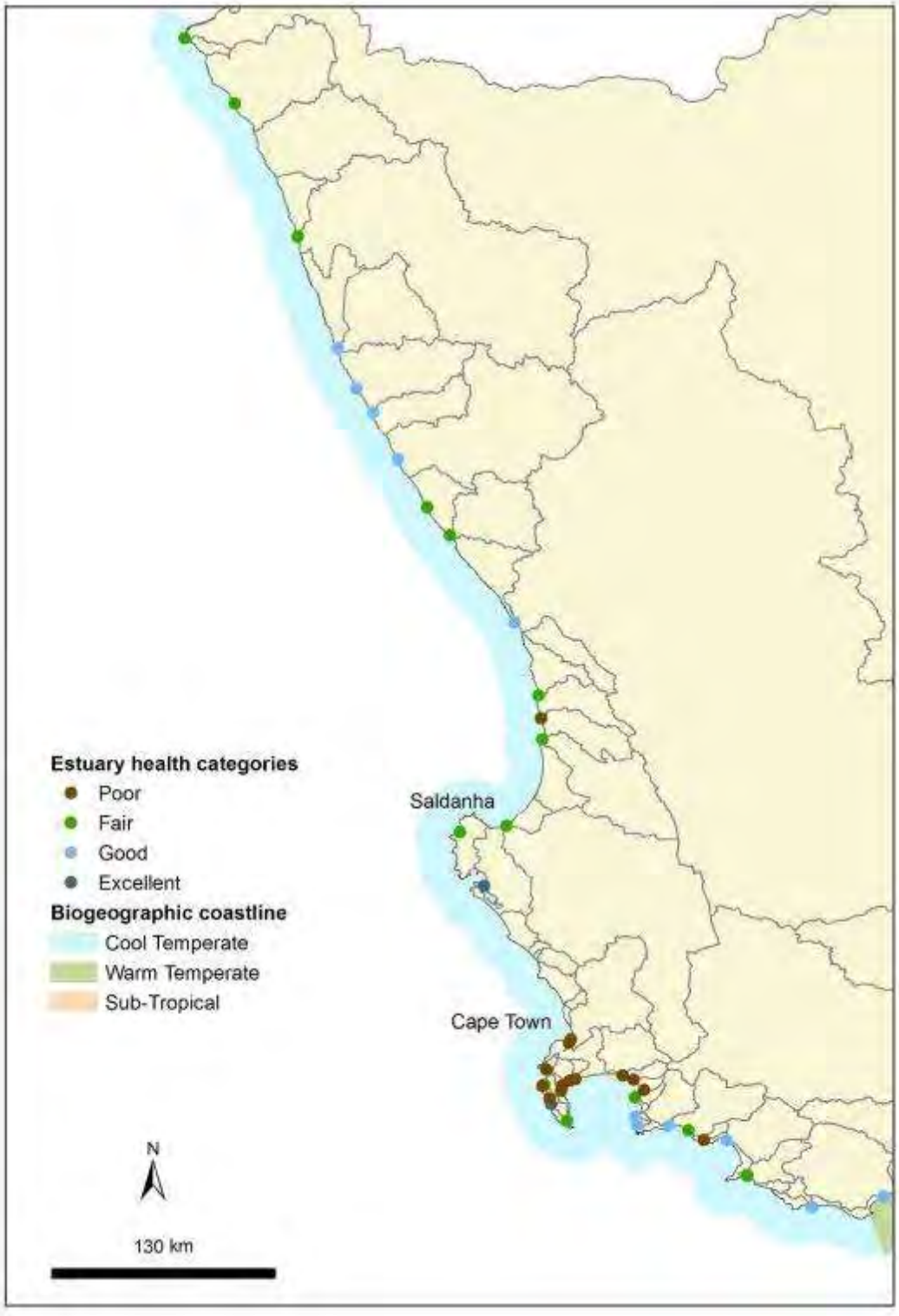


Figure 9.4 Health status of estuaries in the Cool Temperate biogeographical region.

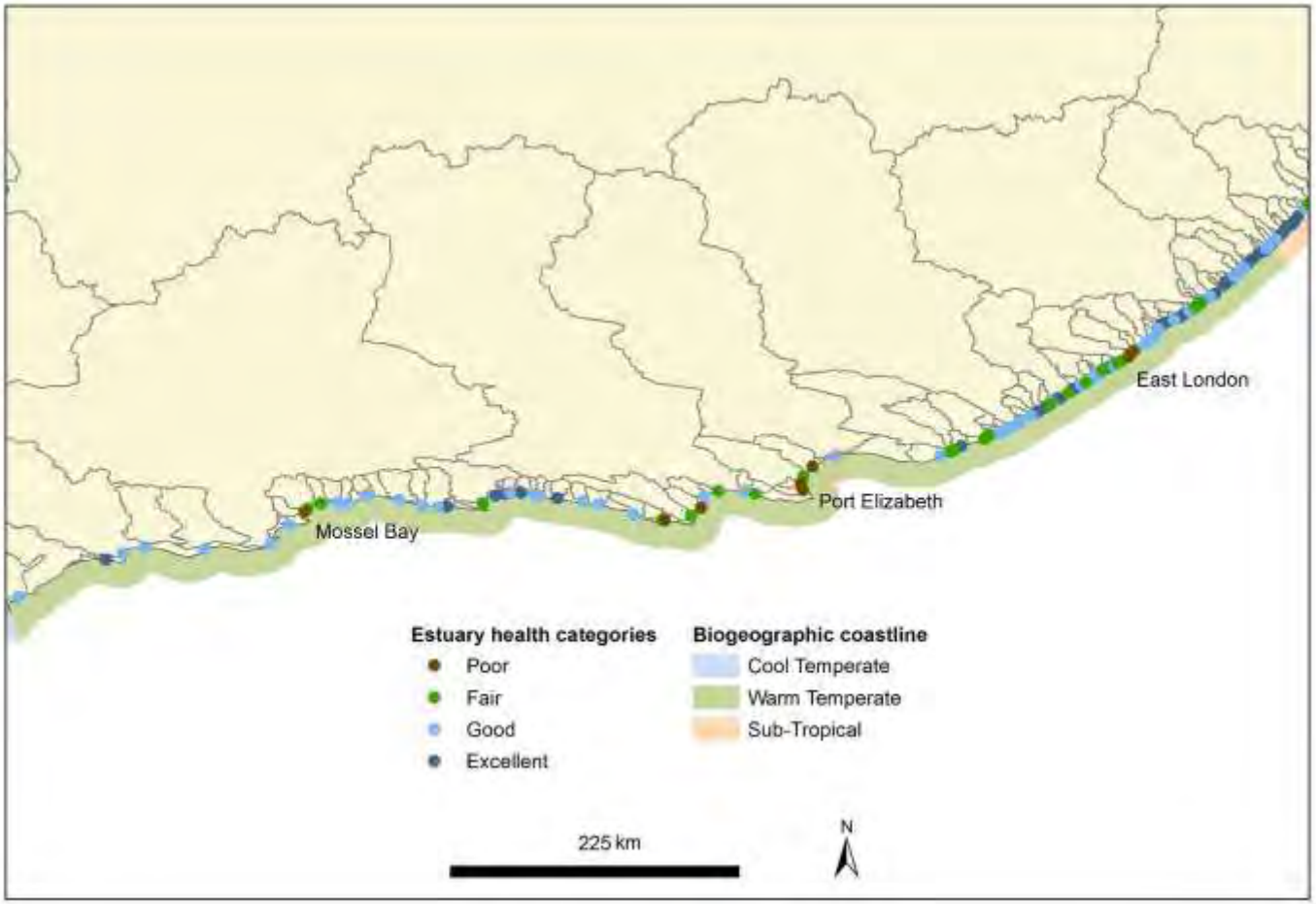


Figure 9.5 Health status of estuaries in the Warm Temperate biogeographical region.

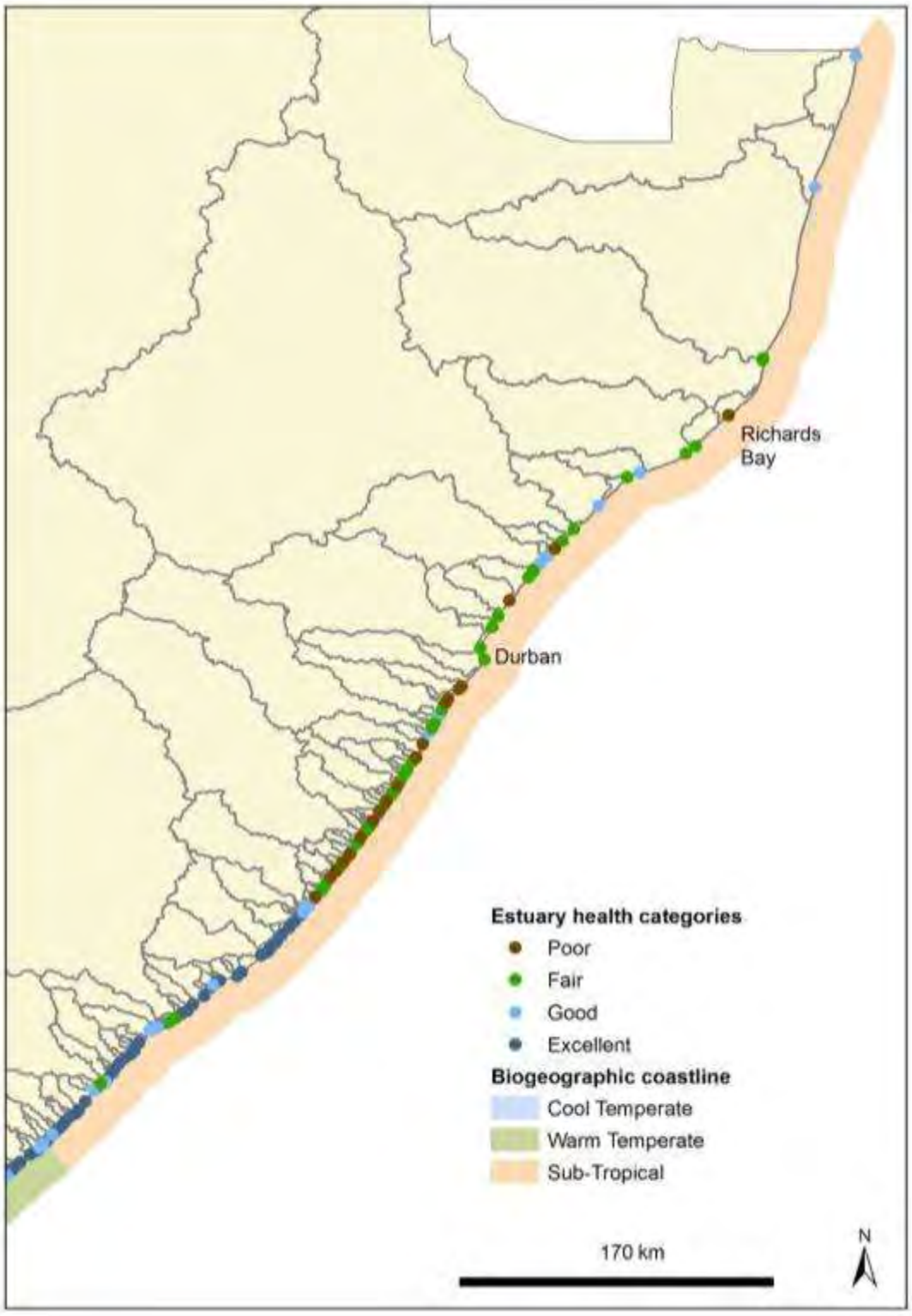


Figure 9.6 Health status of estuaries in the Subtropical biogeographical region.

9.3 Health status of Estuaries within various Coastal District Municipality

To develop a better understanding of where the most urgent need for intervention on the local authority level is required, the National Health Assessment data was also aggregated at the District / Metropolitan Municipality level (see Table 9.8 and Figure 9.7).

The Eden District Municipality has the most excellent and good condition estuarine habitat at 13% and 69% respectively. The O.R.Tambo District Municipality also comprises of a high percentage excellent (13%) and good (62%) state estuarine area. The Amatole District Municipality comprise 5% excellent and 60% good state estuarine habitat. In contrast, the Umkhanyakude, eThekwini and City of Cape Town are the three municipalities with the most estuarine habitat in a poor condition, at 85%, 72% and 44 % respectively. The Nelson Mandela Bay Metro, Ugu, Overberg and West Coast Municipalities also manage some poor condition estuaries, representing between 1 and 3% of the total estuarine area in South Africa. In addition it should be noted that the West Coast and Nelson Mandela Bay Metro had no excellent or good estuarine habitat within their municipal areas.

Table 9.8 Summary of Estuarine Health as a percentage of total estuarine habitat in the coastal District / Metropolitan Municipalities (number of estuaries in brackets).

District municipality	% of SA estuarine area	Health Condition			
		Excellent	Good	Fair	Poor
Amatole (83)	4	5	60	36	0
Cacadu (26)	3	1	8	91	0
City of Cape Town (16)	1	1	0	55	44
Eden (20)	6	13	69	17	0
eThekwini (16)	2	0	6	22	72
iLembe (9)	0	0	45	55	0
Namakwa (4)	1	0	4	96	0
Nelson Mandela Bay Metro (5)	1	0	0	97	3
O.R.Tambo (45)	2	13	62	25	0
Overberg (11)	5	0	11	88	1
Ugu (41)	1	0	26	72	2
Umkhanyakude (4)	61	0	8	7	85
Uthungulu (5)	4	0	6	94	0
West Coast (6)	9	0	0	99	1
% of total SA estuarine habitat	**100**	**1**	**14**	**31**	**54**

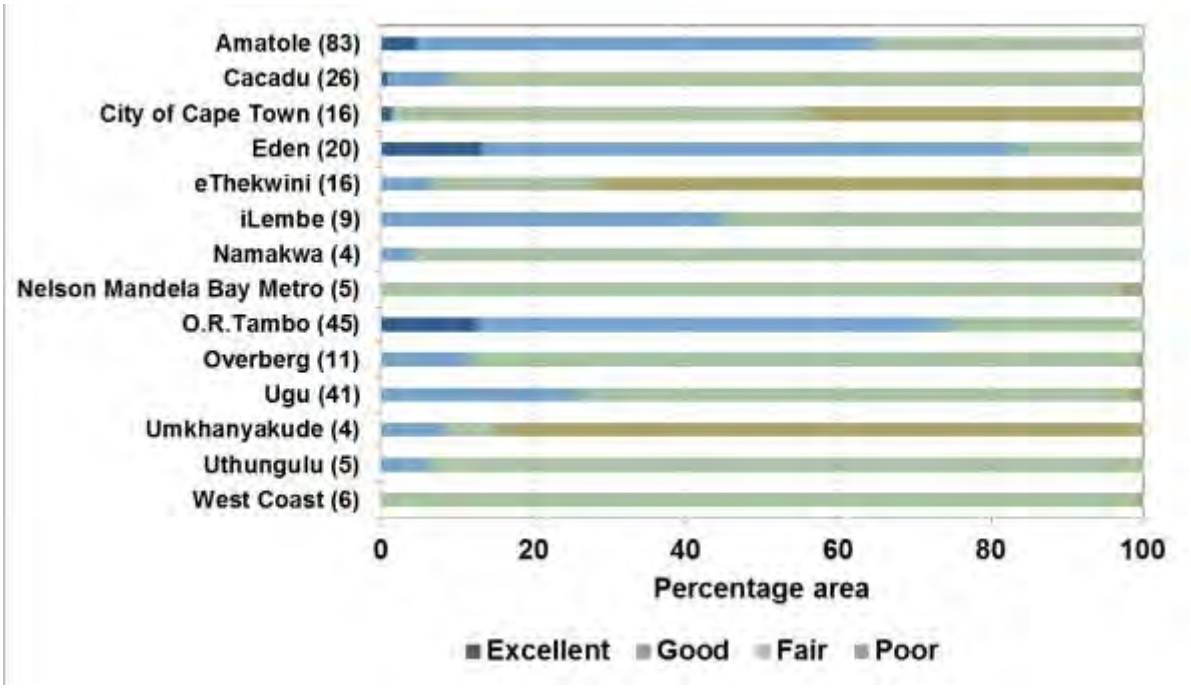


Figure 9.7 A graphic illustration of the percentage estuarine area in the coastal District / Metropolitan Municipalities in an excellent, good, fair or poor condition.

9.4 Health status of Estuaries per Catchment Management Agency

To highlight areas where flow interventions may be required, the estuary health assessment analysis was also conducted from a Catchment Management Agency perspective (see Table 9.9 and Figure 9.8). The Gouritz Catchment Management Agency had the most excellent and good condition estuarine habitat at 13% and 69 % respectively. The Mzimvubu to Kieskamma Catchment Management Agency also comprise a high percentage excellent (7%) and good (60%) state estuarine area.

Usutu to Mhlathuze and Mvoti to Umzimkulu are the two Catchment Management Agencies with the most estuarine habitat in a poor condition, at 79% and 45% respectively. The Berg, Olifants/Doorn and Breede Catchment Management Agencies also manage some poor state estuaries, representing between 1 and 4% of the total estuarine area in South Africa. It is strongly recommended that ecological water requirement studies be undertaken in the Catchment Management Agencies with a high percentage of fair to poor condition estuarine area in an attempt to halt the overall slide in condition currently being observed.

Table 9.9 Summary of Estuarine Health as a percentage of total estaurine habitat in the coastal Catchment Management Agencies.

Catchment Management Agencies	% of SA estuarine area	Health Condition			
		Excellent	Good	Fair	Poor
Berg (17)	9	0	0	96	4
Breede (11)	5	0	11	88	1
Fish to Tsitsikamma (30)	4	1	7	92	0
Gouritz (21)	6	13	69	17	0
Lower Orange (4)	1	0	4	96	0
Mvoti to Umzimkulu (64)	3	0	14	41	45
Mzimvubu to Kieskamma (128)	6	7	60	33	0
Olifants/Doorn (5)	2	0	0	96	4
Thukela (1)	0	0	0	100	0
Usutu to Mhlathuze (10)	66	0	8	13	79
% of total SA estuarine habitat	**100**	**1**	**14**	**31**	**54**

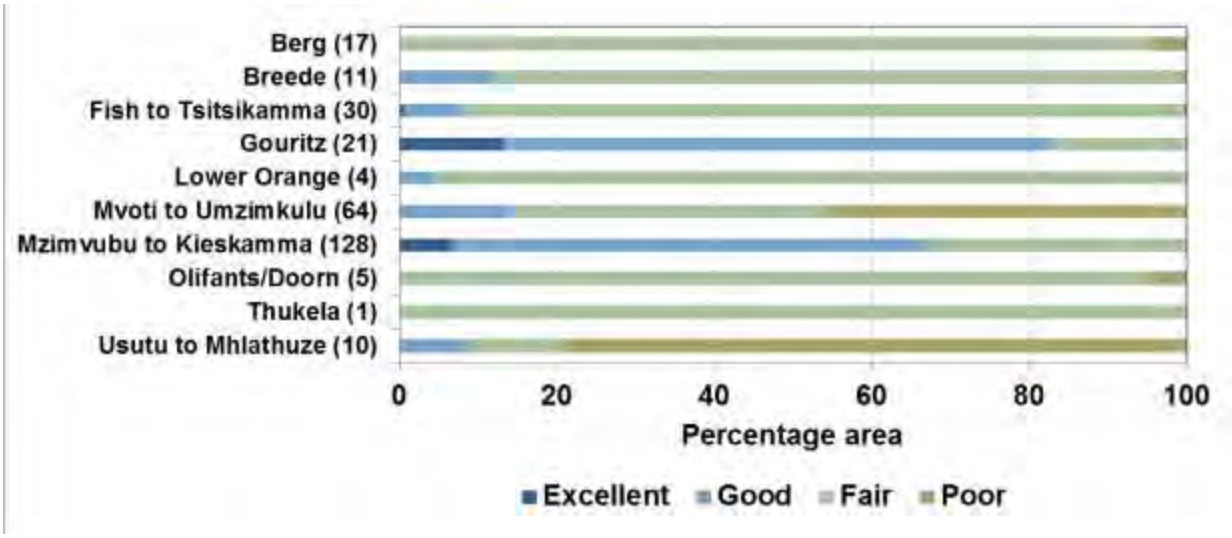


Figure 9.8 A graphic illustration of the percentage area per coastal Catchment Management Agency in an excellent, good, fair or poor condition.

9.5 Health status of Estuaries in areas of Conservation Importance

Finally, to provide an overview of the health status of estuaries in areas of conservation importance – protected areas, marine protected areas, Ramsar sites and Important Bird Areas (IBA) the percentage area in each health category was calculated. Sixty-nine estuaries form part of national, provincial or municipal protected areas or marine protected areas (refer to Section 11.1 for more details on these estuaries)

The following estuaries are listed Ramsar sites under the Ramsar convection:

- Heuningnes
- Kosi
- Orange (Gariep)
- St Lucia (including a part of uMfolozi)
- Verlorenvlei
- Wilderness

The following estuaries form part of Important Bird Areas (IBA) sites:

- Bot/Kleinmond
- Cebe
- Gamtoos
- Groot Berg
- Heuningnes
- Kosi
- Maitland
- uMfolozi
- Mhlathuze
- Mlalazi
- Msunduzi
- Mtamvuna
- Olifants
- Orange (Gariep)
- Rietvlei/Diep
- St Lucia
- Swartkops
- Van Stadens
- Verlorenvlei
- Wilderness

Of deep concern is the lack of sufficient estuarine habitat in excellent and good condition. Estuaries that fall within Ramsar sites represent 57 000 ha, of which none is in excellent condition, 8% in good condition, 9% in a fair state and the majority at 83% are in a poor state. Similarly estuaries that form part of Important Bird Areas represent about 70 400 ha, of which none are in an excellent condition, 7% in a good state, 26% in a fair state and 67% in a poor state. Collectively marine/protected areas represent about 65 900 ha, of which only 1% are in excellent health, 13% in good condition, 14% are in a fair state and 72% in a poor state.

It should once again be noted that the “St Lucia effect” is pronounced as the lake system represents a significant portion of the estuarine habitat in Ramsar sites, IBAs and marine/protected areas within South Africa. An improvement in the health of the Lake St Lucia system will result in a significantly more positive outlook as it is quite feasible to restore St Lucia to a fair or even good condition through a re-linking with the uMfolozi River.



Figure 9.9 A graphic illustration of the percentage estuarine habitat in areas of conservation concern in an excellent, good, fair or poor state.

10. ECOSYSTEM THREAT STATUS

L van Niekerk and J Nel

Ecosystem threat status is one of the two headline indicators reported on in the NBA. It informs us about the degree to which our ecosystems are still intact, or alternatively losing vital aspects of their structure and functioning. Ecosystem types are categorised as critically endangered (CR), endangered (EN), vulnerable (VU) or least threatened (LT), with CR, EN and VU ecosystem types collectively referred to as threatened. For definitions of the ecosystem threat status categories, see Panel 8.

Panel 8: Definitions of ecosystem threat categories (CR, EN, VU, LT)

Critically endangered ecosystems are ecosystem types that have very little of their original extent (measured as area, length or volume) left in natural or near-natural condition. Most of the ecosystem type has been severely or moderately modified from its natural state. These ecosystem types are likely to have lost much of their natural structure and functioning, and species associated with the ecosystem may have been lost. We are in danger of losing the last remaining natural examples of these ecosystem types. Any further loss of natural habitat or deterioration in condition of the remaining healthy examples of these ecosystem types must be avoided, and the remaining healthy examples should be the focus of urgent conservation action.

Endangered ecosystems are ecosystem types that are close to becoming critically endangered. Any further loss of natural habitat or deterioration of condition in these ecosystem types should be avoided, and the remaining healthy examples should be the focus of conservation action.

Vulnerable ecosystems are ecosystem types that still have the majority of their original extent (measured as area, length or volume) left in natural or near-natural condition, but have experienced some loss of habitat or deterioration in condition. These ecosystem types are likely to have lost some of their structure and functioning, and will be further compromised if they continue to lose natural habitat or deteriorate in condition. Identified biodiversity priority areas should guide planning, resource management and decision-making in these ecosystems types.

Least threatened ecosystems are ecosystem types that have experienced little or no loss of natural habitat or deterioration in condition. Identified biodiversity priority areas should guide planning, resource management and decision-making in these ecosystems types.

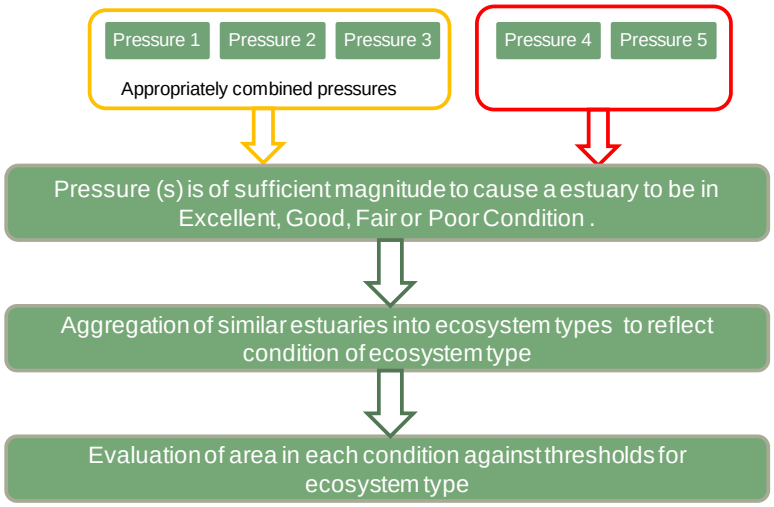
Threat status has been traditionally assessed for species, in the form of national or global Red Lists that draw attention to species threatened with extinction. It is more unusual for threat status to be assessed at the ecosystem level. Initial attempts to assess ecosystem threat status in the NSBA 2004 have been built on and refined in the NBA 2011, which provides a baseline for comparisons going forward.

A group of similar-type estuaries within a biogeographical zone, herein referred to as an ecosystem type, is implicitly assumed to represent a single 'ecoregional' type, supporting a characteristic suite of processes and biodiversity. The NBA 2011 identifies the status of ecosystems on the basis of their current ecological condition (Section 9). In the case of estuaries, the ecosystem threat status does not relate to the complete loss of an ecosystem type (i.e. loss due to development or infilling of the entire estuarine area) but rather to the loss or degradation of ecosystem processes and the abundance, community composition or species richness of associated biota (i.e. pattern). Critically endangered and endangered refer to a significant loss of process and pattern, while vulnerable indicate some loss of ecosystem processes and/ or abundance and distribution of biota. As a result of direct harvesting of living resources, ecosystem processes may still be intact, while the biota associated with that ecosystem type are severely degraded so the two aspects are not necessary related.

How is ecosystem threat status assessed? Figure 10.1 provides a diagram of the processes followed to aggregate condition status to ecosystem threat status. Once ecosystem types have been identified and pressures assessed, the condition or ecological integrity of ecosystems can be established. The proportion of each ecosystem type that remains in good condition is then evaluated against a series of thresholds to determine ecosystem threat status.

The first of these thresholds (often set at 20%) defines the cut-off for critically endangered ecosystems. The threshold for CR ecosystems is also known as the biodiversity target, and is the proportion of each ecosystem type that should ideally be formally protected in the long term. The second threshold (set at the biodiversity target plus 15%) defines the cut-off for endangered ecosystems, and indicates ecosystems that are close to becoming critically endangered. It acts as a warning bell. The third threshold (set at 60%) defines the cut-off point for vulnerable ecosystems. Ecosystem types that have reached this point are likely to

have lost some of their structure and functioning, and will be further compromised if they continue to lose natural habitat or deteriorate in condition.



Status	Critically endangered	Endangered	Vulnerable	Least threatened
Pattern	Largely lost	Heavy impacted	Mostly intact	Intact
Process	Heavily modified	Largely modified	Moderately modified	Largely natural
Condition vs thresholds	A+B < Biodiversity Threshold*	A+B < Biodiversity Threshold plus 15%**	A+B+C < 60%***	A+B+C >= 60%

*Biodiversity pattern target (representation threshold) – 20% for estuary types
**Biodiversity target plus 15% - a warning bell that one is approaching the Biodiversity Threshold
***Ecological Function Threshold (persistence threshold) beyond which function is lost – currently set at 60%

Figure 10.1 Process and criteria by which ecosystem threat status is determined.

The assessment of ecosystem threat status links directly to the Biodiversity Act. Chapter 4 of the Act allows the Minister or an MEC to list threatened or protected ecosystems, thus providing a powerful mechanism to address biodiversity conservation effectively at an ecosystem scale. The ecosystem threat status categories used in the NBA (CR, EN and VU) have been deliberately aligned with the terms and definitions used in the Biodiversity Act.

10.1 Ecosystem threat status based on the Whitfield classification

Two estuarine classification systems for estuaries are generally recognised in South Africa. The geomorphological classification used by Harrison et al. (2000) which comprise six main types based on mouth condition (open or closed), size and the presence of a bar. The Whitfield (1992) classification is also based on physical characteristics (mainly mouth

condition and size of tidal prism), and has become the more widely used classification system.

Whitfield's (1992) classification recognises five types: Estuarine Bays, Permanently Open Estuaries, River Mouths, Estuarine Lakes, and Temporarily Open/Closed Estuaries. The Whitfield (1992) classification was used in the 2004 National Spatial Biodiversity Assessment and is therefore presented here for comparative purposes. The ecosystem threat status is, however, derived from the "percentage area" and not "number of estuaries" as done in the earlier study (Turpie 2004).

Based on data and information provided in Table 10.1 it appears that most of the zonal types in the Cool Temperate and Subtropical biogeographical region are critically endangered, with only the permanently open and temporarily closed types in the Subtropical biogeographical area being least threatened. In the Warm Temperate biogeographical zone, permanently open estuaries are endangered but other estuary types are in a better position (Table 10.2). From an estuarine area perspective, 80% (7 types) are critically endangered, 7% are endangered (1 type) and 13% least threatened (6 types) (Figure 10.2).

Table 10.1 Summary of ecosystem threat status based on the Whitfield classification (percentage habitat in A, B and C categories are indicated).

Zonal Type		Total Area (ha)	A+B	A+B+C	Ecosystem Threat Status
Cool Temperate	Estuarine lake	3072	0	99	Critically endangered
	Permanently open	8351	0	16	Critically endangered
	River mouth	975	0	0	Critically endangered
	Temporarily closed	1323	7	28	Critically endangered
Warm Temperate	Estuarine bay	1926	100	100	Least threatened
	Estuarine lake	1339	100	100	Least threatened
	Permanently open	6425	27	84	Endangered
	River mouth	40	100	100	Least threatened
	Temporarily closed	3120	67	90	Least threatened
Subtropical	Estuarine bay	3192	0	0	Critically endangered
	Estuarine lake	51794	9	9	Critically endangered
	Permanently open	3168	35	94	Least threatened
	River mouth	3932	0	6	Critically endangered
	Temporarily closed	2188	44	77	Least threatened

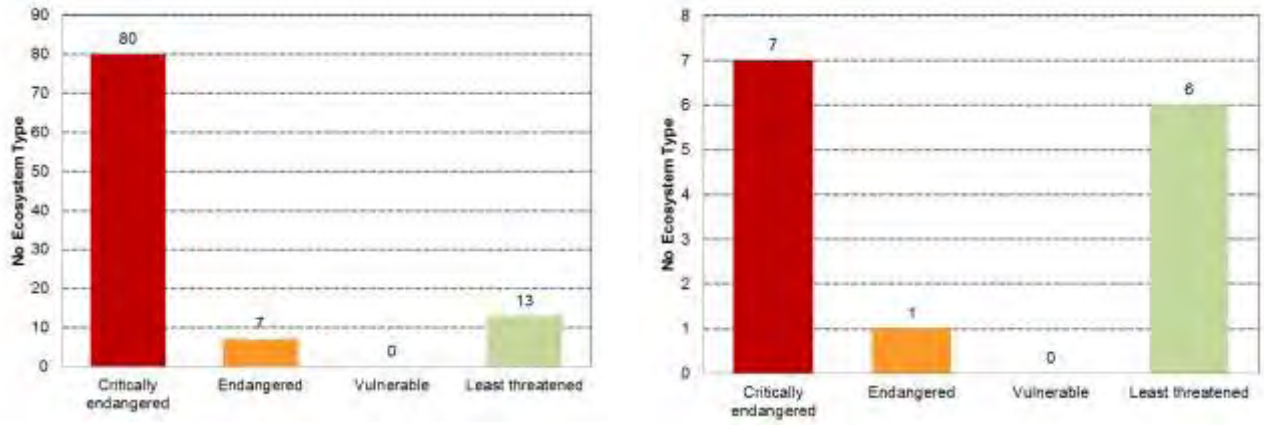


Figure 10.2 Graphic illustration of ecosystem threat status based on the Whitfield classification using percentage area and number of ecosystems types.

10.2 Ecosystem threat status based on NBA 2011 Estuarine Typing

While the Whitfield's (1992) typology was used in the 2004 NSBA, the 2004 assessment also highlighted that some estuarine researchers struggle to work within the Whitfield classification. It stressed the need to devise a more robust system of classification that will also be useful in applied conservation research. This view point was supported by the C.A.P.E. Estuaries conservation plan in which Turpie and Clark (2007) found that while the Whitfield's (1992) estuary typology is widely used, it does not necessarily explain finer nuances of the similarities and differences between different types.

The NBA 2011 therefore set out to refine the existing typology based on the characteristics described in Section 5, thus adding resolution and increasing biodiversity representation. The four main subdivisions were based on estuary size, mouth status, salinity structure and river type. While the consensus was that both "mouth condition" and "salinity structure" should be further subdivided to be truly predictive of biodiversity distribution, this was not possible within the constraints of this project. It was nevertheless felt that the higher resolution provided by the disaggregation of the Whitfield classification would allow for a more refined analyses of the ecosystem threat status and could therefore form the basis for further analyses (Table 10.2).

About 39% of South Africa's 46 estuarine types (18 types) are critically endangered, 2% are endangered (1 type), 2% are vulnerable (1 type) and 57% are least threatened (26 types). If analysed by estuarine area the situation is even more dire, with 79% of South Africa's

estuarine area being critically endangered, less than 1% endangered and vulnerable and 21% least threatened (Figure 10.3 and 10.4).

Table 10.2 Summary of ecosystem threat status based on the NBA 2011 classification (percentage habitat in A, B and C categories indicated)

	Ecosystem Type	% habitat in A + B	% habitat in A+B+C	Ecosystem Threat Status
Cool Temperate	Large ClosedFreshTurbid	0	20	Critically endangered
	Large ClosedMixedBlack	0	86	Critically endangered
	Large ClosedMixedClear	0	0	Critically endangered
	Large OpenMixedClear	0	16	Critically endangered
	Medium ClosedFreshBlack	15	43	Critically endangered
	Medium ClosedMixedBlack	8	8	Critically endangered
	Medium ClosedMixedClear	0	0	Critically endangered
	Medium ClosedMixedTurbid	65	65	Least threatened
	Small ClosedFreshBlack	3	52	Critically endangered
	Small ClosedMixedBlack	56	56	Vulnerable
	Small OpenFreshBlack	100	100	Least threatened
	Small OpenMixedBlack	0	0	Critically endangered
Warm Temperate	Large ClosedMarineClear	100	100	Least threatened
	Large ClosedMixedBlack	63	88	Least threatened
	Large ClosedMixedClear	100	100	Least threatened
	Large OpenMarineBlack	100	100	Least threatened
	Large OpenMarineClear	17	100	Critically endangered
	Large OpenMixedBlack	70	78	Least threatened
	Large OpenMixedClear	0	0	Critically endangered
	Large OpenMixedTurbid	0	100	Critically endangered
	Medium ClosedMixedBlack	50	87	Least threatened
	Medium ClosedMixedClear	89	99	Least threatened
	Medium OpenMixedBlack	100	100	Least threatened
	Medium OpenMixedClear	40	62	Least threatened
	Medium OpenMixedTurbid	100	100	Least threatened
	Small ClosedFreshBlack	93	93	Least threatened
	Small ClosedMixedBlack	94	94	Least threatened
	Small ClosedMixedClear	76	99	Least threatened
	Small OpenFreshBlack	100	100	Least threatened
	Small OpenMixedBlack	70	70	Least threatened
Subtropical	Large ClosedFreshTurbid	0	0	Critically endangered
	Large ClosedMixedClear	100	100	Least threatened
	Large ClosedMixedTurbid	0	0	Critically endangered
	Large OpenMarineClear	16	16	Critically endangered
	Large OpenMarineTurbid	0	46	Critically endangered
	Large OpenMixedClear	100	100	Least threatened
	Large OpenMixedTurbid	47	84	Least threatened
	Medium ClosedFreshTurbid	0	72	Critically endangered
	Medium ClosedMixedBlack	81	100	Least threatened
	Medium ClosedMixedClear	54	86	Least threatened
	Medium ClosedMixedTurbid	23	45	Endangered
	Medium OpenMarineClear	0	0	Critically endangered

	Ecosystem Type	% habitat in A + B	% habitat in A+B+C	Ecosystem Threat Status
	Medium OpenMixedTurbid	100	100	Least threatened
	Small ClosedFreshBlack	100	100	Least threatened
	Small ClosedMixedBlack	100	100	Least threatened
	Small ClosedMixedClear	60	84	Least threatened

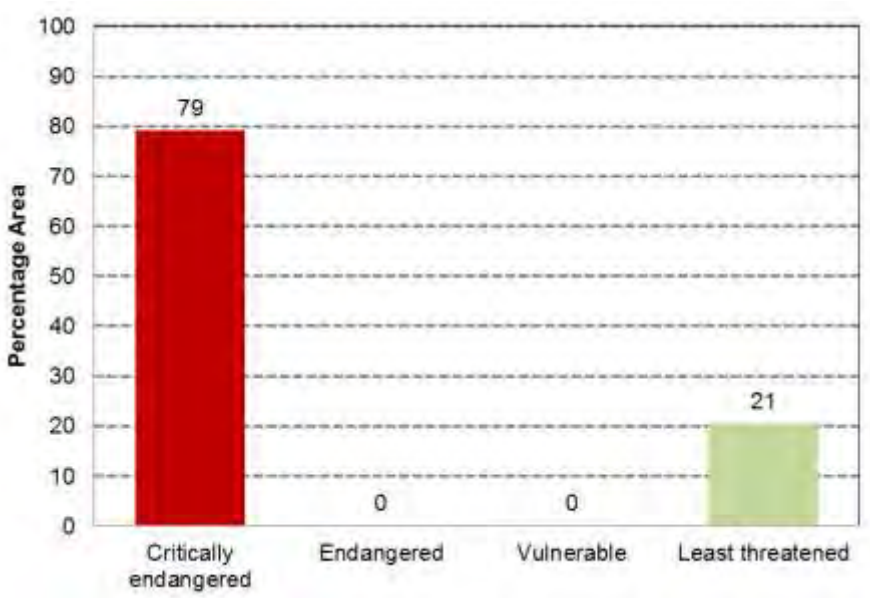


Figure 10.3 Graphic illustration of ecosystem threat status based on the NBA 2011 classification presented as percentage area of ecosystems types.

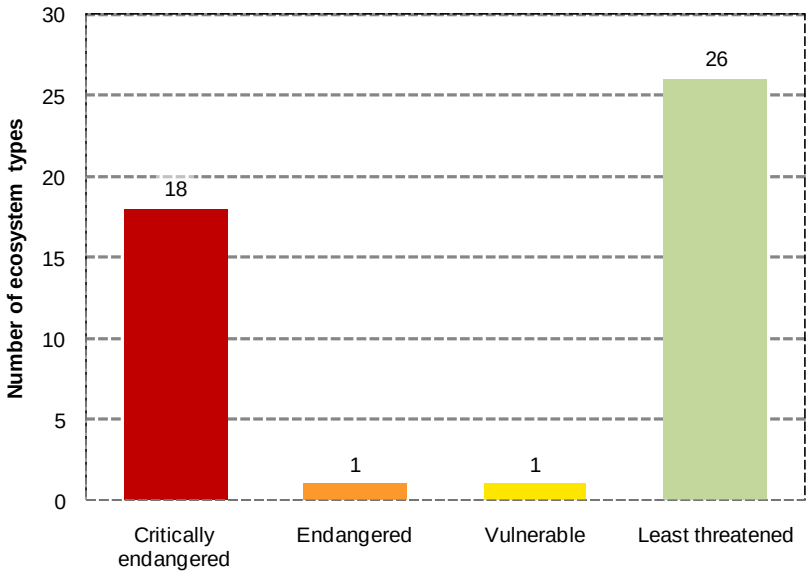


Figure 10.4 Graphic illustration of ecosystem threat status based on the NBA 2011 classification presented as number of ecosystems types.

10.3 Summary of ecosystem threat status by biogeographical region

Nearly 100% of the Cool Temperate biogeographical region habitat (represented by 12 ecosystem types) is critically endangered, while less than 1% is vulnerable and least threatened respectively. In contrast most of the ecosystem types in the Warm Temperate (18 types) are least threatened, representing 68% of the habitat in this zone, while 32% of the habitat is critically endangered. About 87% of the Subtropical estuarine habitat (16 ecosystem types) is critically endangered, while only 12% is least threatened (Table 10.3 and Figure 10.5 to Figure 10.10).

Table 10.3 Ecosystem threat status for the three biogeographical regions of South Africa estimated as a percentage of the total habitat (number of estuaries are indicated in brackets).

Biogeographical region	No of ecosystem types	Ecosystem threat status				
		CR	EN	VU	LT	Total area (ha)
Cool Temperate (34)	12	99.3 (27)	0.0	0.1 (3)	0.6 (4)	13 720
Warm Temperate (124)	18	31.9 (12)	0.0	0.0	68.1(122)	12 849
Subtropical (133)	16	87.42 (11)	0.8 (13)	0.0	11.8 (109)	64 274
Percentage area (291)	46	79.2 (54)	0.1 (13)	0.2 (3)	20.5 (225)	100
Area (ha)		71 932	81	186	18 645	90 844

10.4 Summary of ecosystem threat status by Water Management Agencies Area

To provide an indication of how effective the various Water Management Area (WMAs) are in promoting wise use of their water resources and protecting estuaries, the ecosystem threat status was calculated per individual WMA. Note that some estuaries fall on the boundaries of WMAs, in this case the estuary was allocated to the WMA within which the river catchment falls. This is especially pertinent in the case of the Gouritz WMA as the mouth and lower third of the Duiwenhoks Estuary falls within the Breede WMA, while the river and upper reaches of the estuary are within the Gouritz WMA. It is strongly recommended that DWA address this discrepancy within the delineation of the WMA boundaries on the coast.

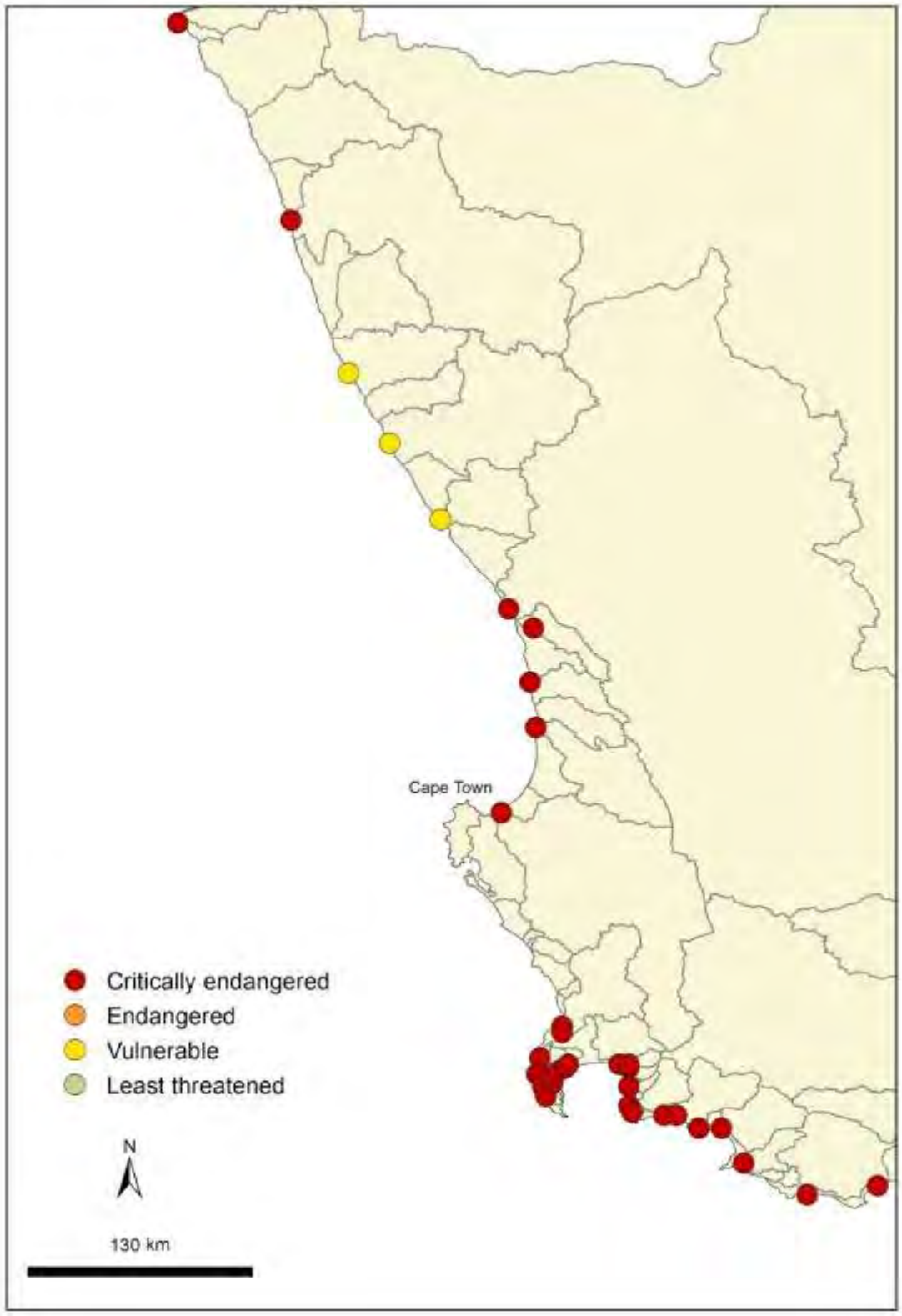


Figure 10.5 Ecosystem threat status of estuaries in the Cool Temperate biogeographical region.

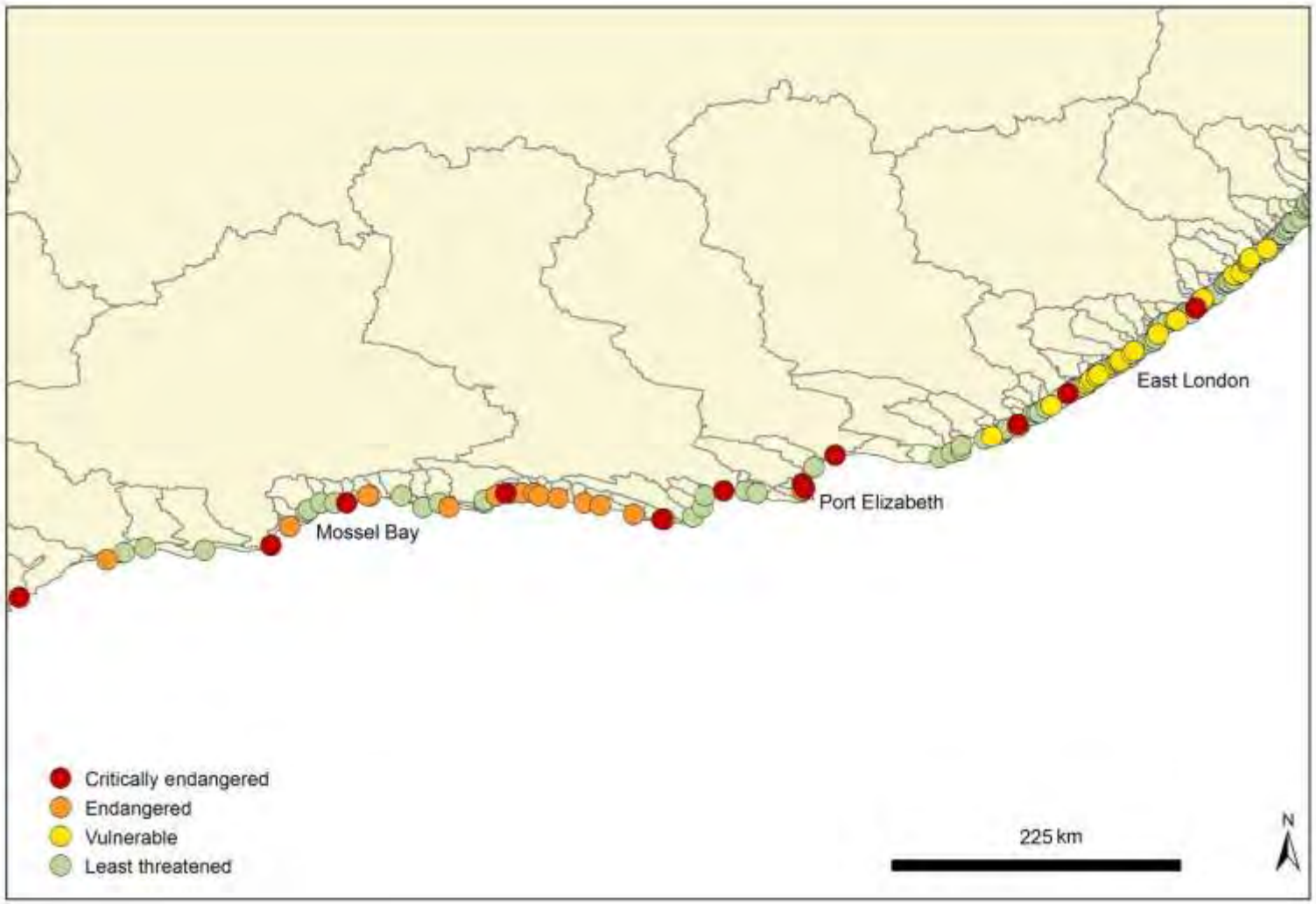


Figure 10.6 Ecosystem threat status of estuaries in the Warm Temperate biogeographical region.

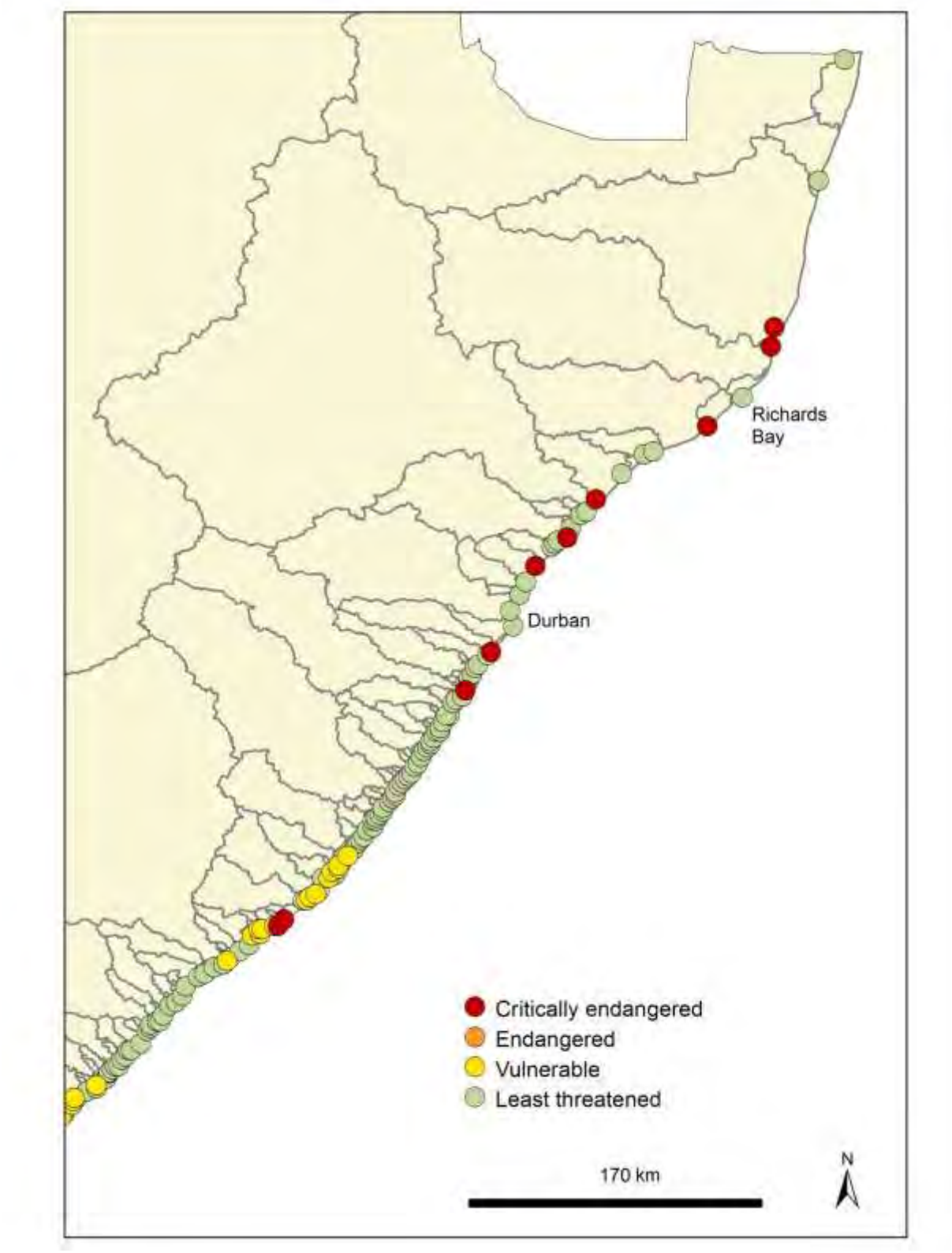


Figure 10.7 Ecosystem threat status of estuaries in the Subtropical biogeographical region.

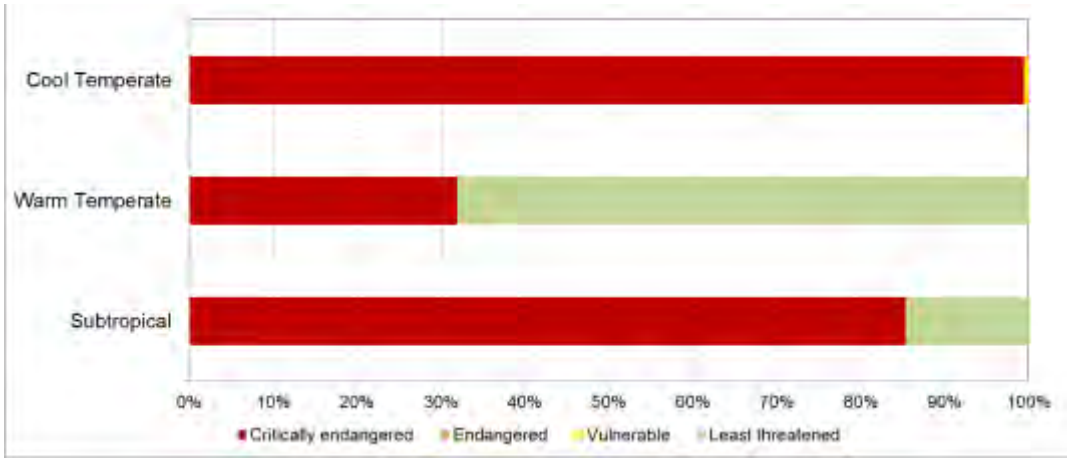


Figure 10.8 Ecosystem threat status for the three biogeograpichal regions, illustrated as a percentage of the total habitat within a region.

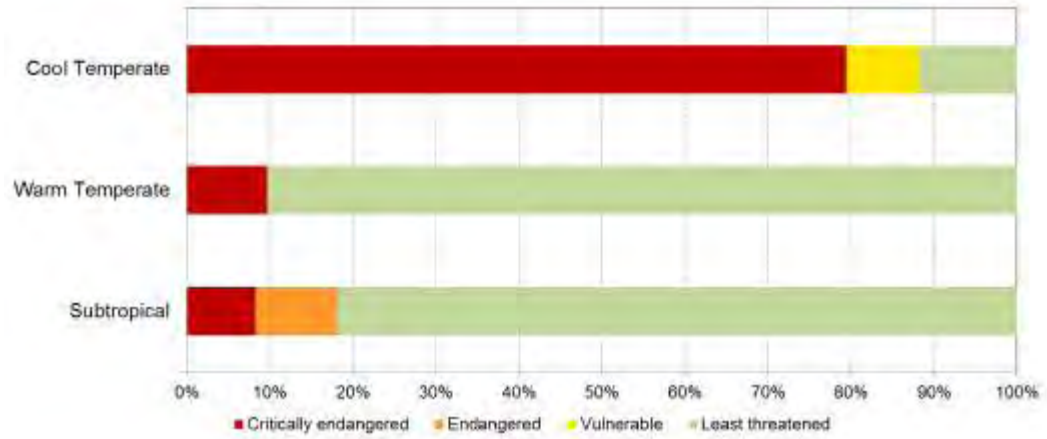


Figure 10.9 Ecosystem threat status for the three biogeograpichal regions, summarized as percentage of the total number of estuaries occurring within a region.

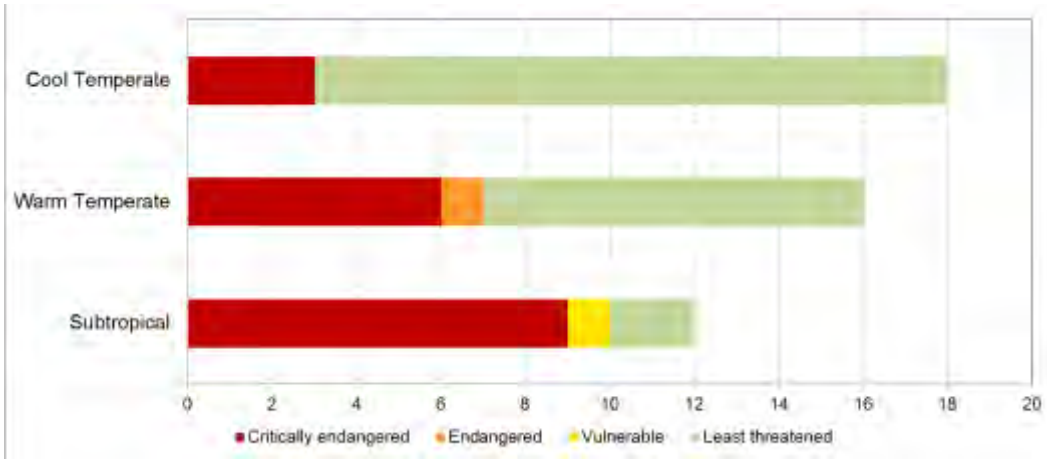


Figure 10.10 Ecosystem threat status of ecosystems types, based on the NBA 2011 classification.

The Berg, Olifants/Doring, Lower Orange, Usutu to Mhlathuze and Thukela WMAs had the greatest percentage estuarine area in the Critically endangered category, while the Gouritz and Mzimvubu to Kieskamma WMAs had the largest percentage least threatened habitats in their management domains.

The poor condition of the Lake St Lucia system is largely responsible for the Usutu to Mhlathuze's high percentage habitat in the critical endangered category. The Thukela WMA comprises only one estuary. The overall high percentage of critically endangered habitat reflects the predominantly fair to poor status of South Africa's large estuaries and the need to utilise, and protect, them more effectively.

Table 10.4 Ecosystem threat status for the 10 coastal Catchment Management Agencies, presented as percentage habitat (number of estuaries are indicated in brackets).

Catchment Management Agency	No of ecosystem types	CR	EN	VU	LT	Total area (ha)
Berg (17)	10	99.8 (14)		0.2 (2)	0.0 (1)	7 725
Breede (11)	7	89.2 (9)			10.8 (2)	4 219
Fish to Tsitsikamma (30)	11	71.1 (7)			28.9 (23)	3 370
Gouritz (21)	10	2.2 (1)			97.8 (20)	5 162
Lower Orange (4)	2	95.8 (2)			4.2 (2)	1 267
Mvoti to Umzimkulu (64)	9	47.8 (5)	17.2 (11)		35.0 (48)	2 736
Mzimvubu to Kieskamma (128)	12	25.1 (4)	0.9 (2)		74.0 (122)	5 176
Olifants/Doorn (5)	5	97.9 (3)		0.2 (1)	1.9 (1)	1 483
Thukela (1)	1	100.0 (1)				79
Usutu to Mhlathuze (10)	8	91.5 (4)			8.5 (6)	59 626
Total in SA	**46**	**81.4 (50)**	**0.6 (13)**	**0.0 (3)**	**18.1 (225)**	**90 844**

An evaluation of the percentage estuaries in the critical endangered category shows that Breede, Thukela, Usutu to Mhlathuze and Fish to Tsitsikamma have the greatest number in that catogory. While the Gouritz, Lower Orange, Mzimvubu to Kieskamma and Olifants/Doorn have the greatest percentage estuaries in the least threatened category.

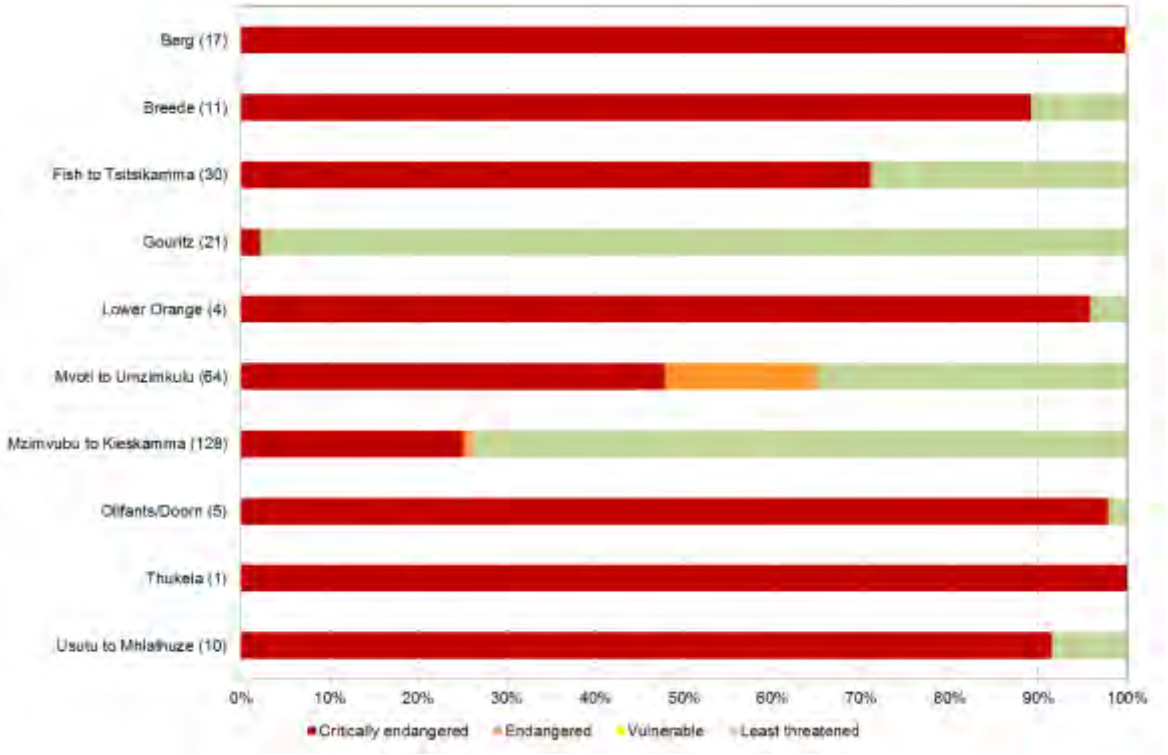


Figure 10.11 Ecosystem threat status for the 10 coastal Catchment Management Agencies, illustrated as a percentage of the total estuarine habitat in the CMA.

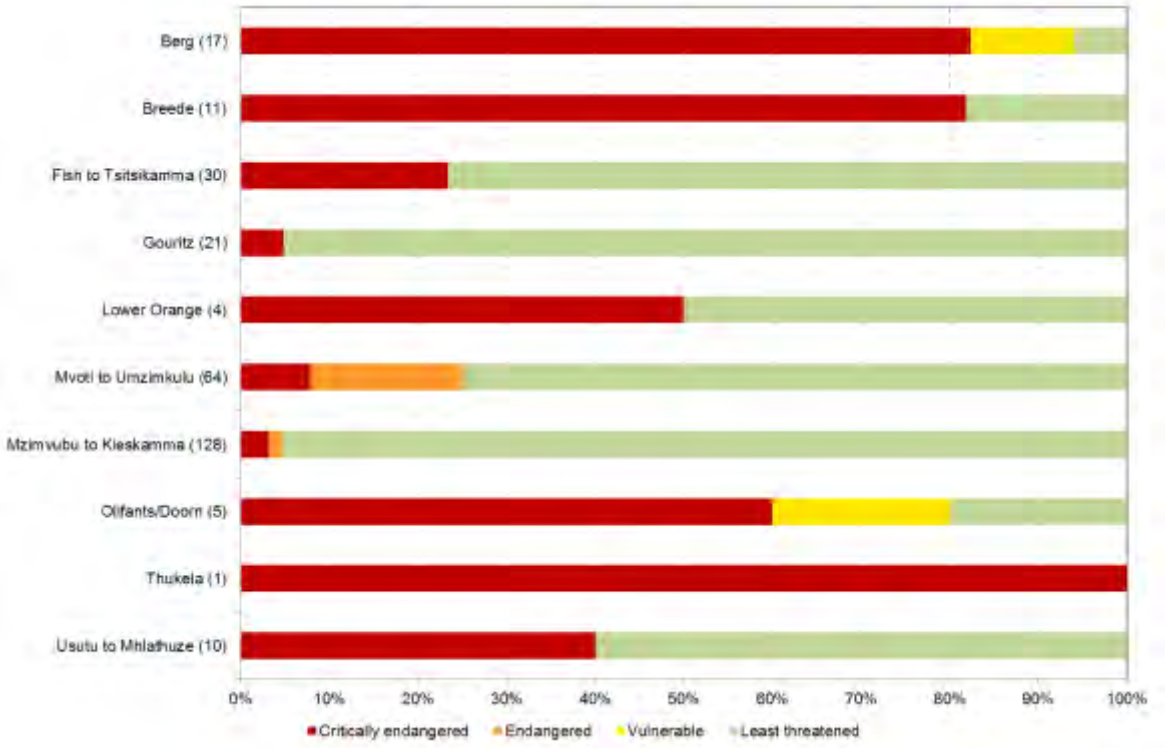


Figure 10.12 Ecosystem threat status for the 10 coastal Water Management Areas, summarized as a percentage of the total number of estuaries occurring within the WMA.

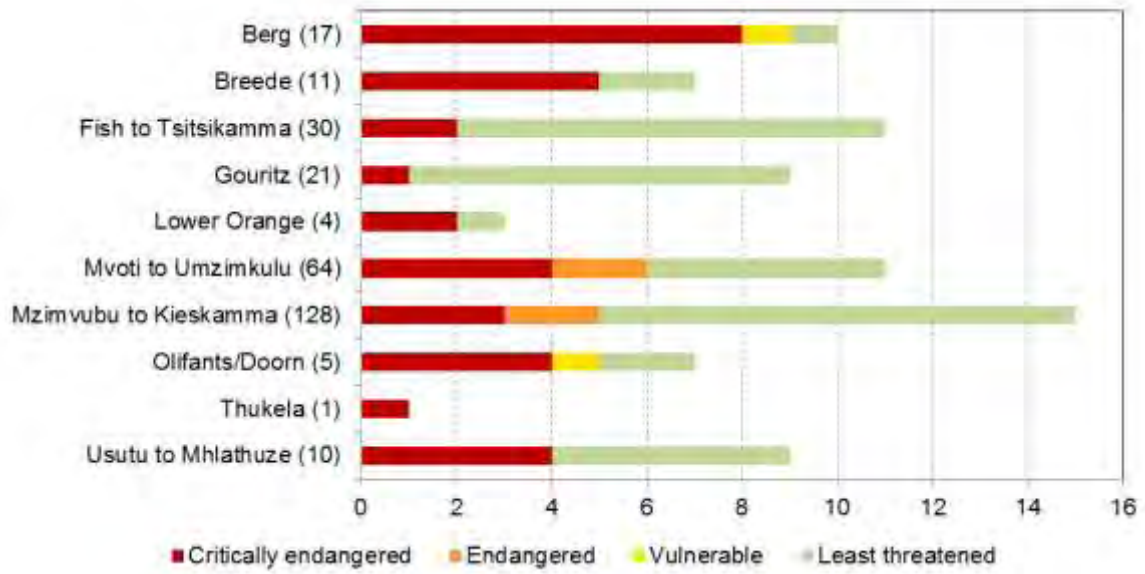


Figure 10.13 Ecosystem threat status of ecosystems types based on the NBA 2011 classification for the 10 coastal Water Management Areas.

10.5 Summary of ecosystem threat status by District/ Metropolitan Municipality

The Berg, Olifants/Doring, Lower Orange, Usutu to Mhlathuze and Thukela WMAs have the greatest percentage ecosystem area in the critical endangered category, while the Gouritz and Mzimvubu to Kieskamma WMAs have the largest percentage of least threatened habitats in their managed areas (see Table 10.5 and Figures 10.11 to 10.13 for more detail) . The poor condition of the Lake St Lucia Sytem is largely responsible for the Usutu to Mhlathuze WMA's high level of critically endangered areas. This high percentage of critically endangered habitat areas reflects the fair to poor status of South Africa's large estuaries and the need to utilise, and protect, them better. The Gouritz, Lower Orange, Mzimvubu to Kieskamma and Olifants/Doorn have the greatest percentage estuaries in least threatened category.

Table 10.5 Ecosystem threat status for the 15 Coastal District/ Metropolitan Municipalities (percentage habitat). The number of estuaries is indicated in brackets.

District Municipality	No of types	CR	EN	VU	LT	Total area (ha)
Amatole (83)	9	28.5.0 (3)			71.5 (80)	3 769
Cacadu (26)	10	66.8 (6)			33.2 (20)	2 842
City of Cape Town (16)	9	98.0 (13)		1.7 (2)	0.3 (1)	732

District Municipality	No of types	CR	EN	VU	LT	Total area (ha)
Eden (20)	9	2.2 (1)			97.8 (19)	5 159
eThekwini (16)	6	74.9 (4)	11.6 (4)		13.5 (8)	1 718
iLembe (9)	5	25.2 (2)	17.2 (2)		57.6(5)	402
Namakwa (4)	2	95.8 (2)			4.2 (2)	1 267
Nelson Mandela Metro (5)	5	93.9 (1)			6.1 (4)	532
O.R.Tambo (45)	9	16.0 (1)	3.2 (2)		80.8 (42)	1 407
Overberg (11)	7	89.2 (9)			10.8 (2)	4 219
Ugu (41)	6		24.5 (5)		75.5 (36)	822
Umkhanyakude (4)	4	91.6 (2)			8.4 (2)	55 474
Uthungulu (5)	4	93.5 (2)			6.5 (3)	4 025
West Coast (6)	5	99.6 (4)		0.0 (1)	0.3 (1)	8 476
Total for SA	**46**	**81.4 (50)**	**0.6 (13)**	**0.0 (3)**	**18.1 (225)**	90 844

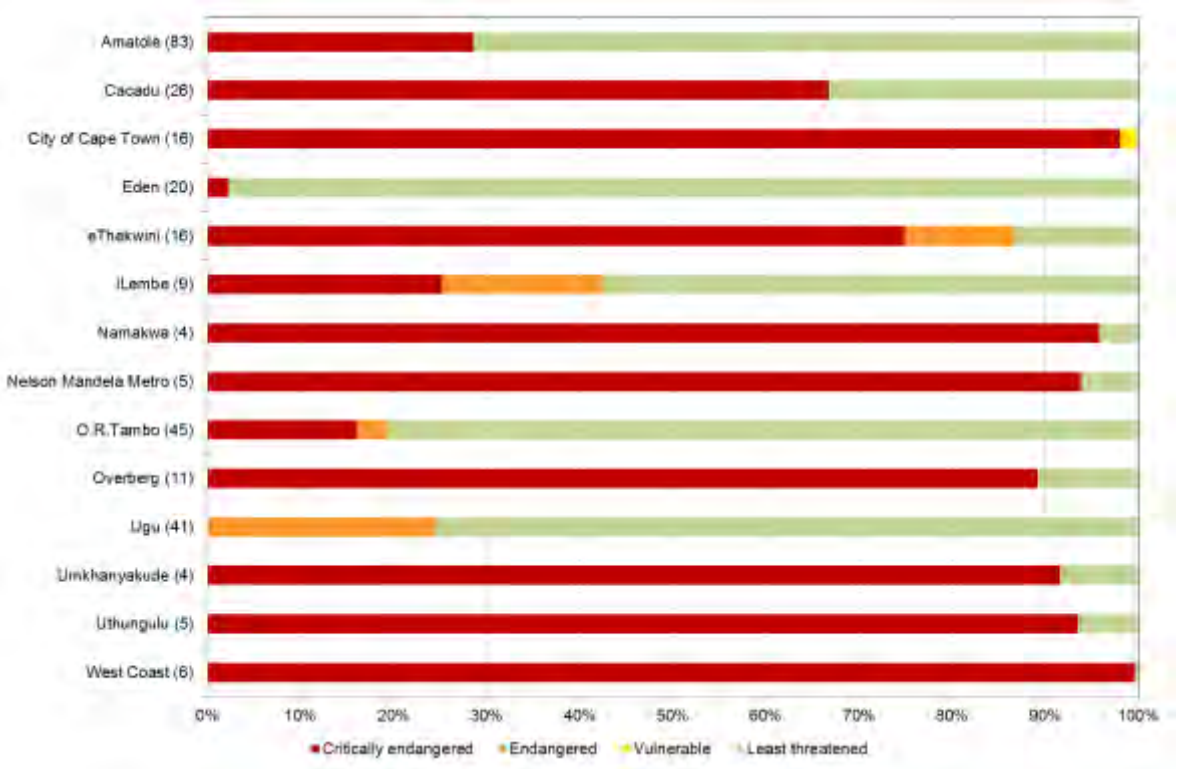


Figure 10.14 Ecosystem threat status for the Coastal District/Metropolitan Municipalities, illustrated as a percentage of the total habitat within the municipality.

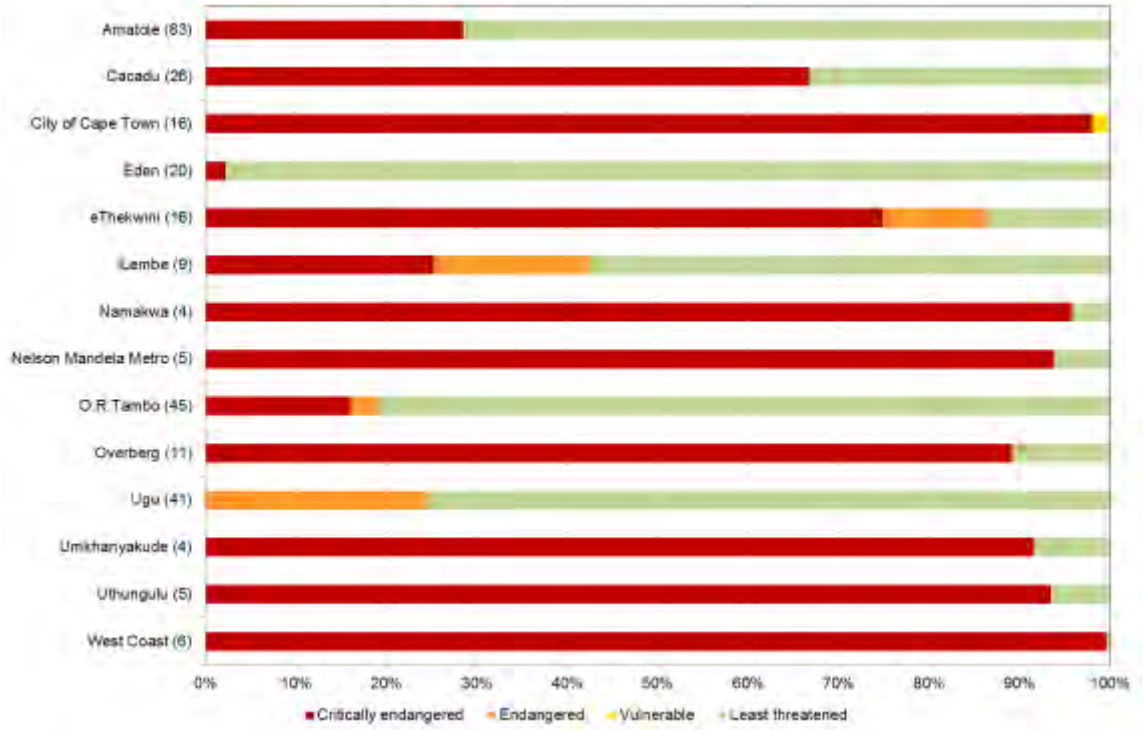


Figure 10.15 Ecosystem threat status for the Coastal District/Metropolitan Municipaliies summarized as percentage estuaries of the total number of estuaries occurring in the municipality.

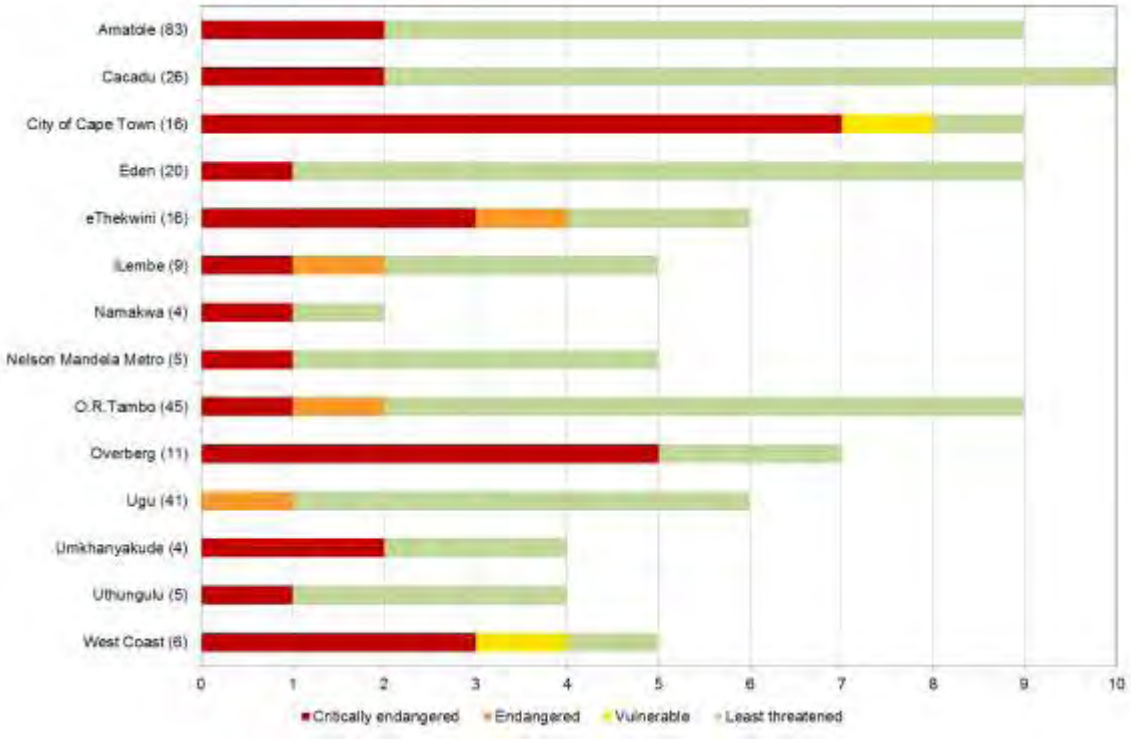


Figure 10.16 Ecosystem threat status summarised as number of ecosystems types based on the NBA 2011 classification for the Coastal District/Metropolitan municipalities.

11. ECOSYSTEM PROTECTION LEVELS

L van Niekerk and JK Turpie

11.1 Degree of protection

A total of 70 estuaries in South Africa already have some level of protection (Figure 11.1 and Table 10.1). However, only the Krom in the Western Cape, the 7 small estuaries within Tsitsikamma National Park/Marine Protected Area, Mbashe (under dispute and currently only partly protected in practice), Msikaba and Mtentu in the Eastern Cape, and Mhlanga, Mlalazi and Kosi in KwaZulu-Natal have full no-take protection. It should also be noted that although the Lake St Lucia system is listed as being fully protected in law, fishing is permitted and St Lucia Estuary's current health status is an E and that of uMfolozi Estuary is a D, thus indicating that the system is in fact poorly protected. The above-mentioned estuaries were the only estuaries considered to be fully protected by formal legislation.

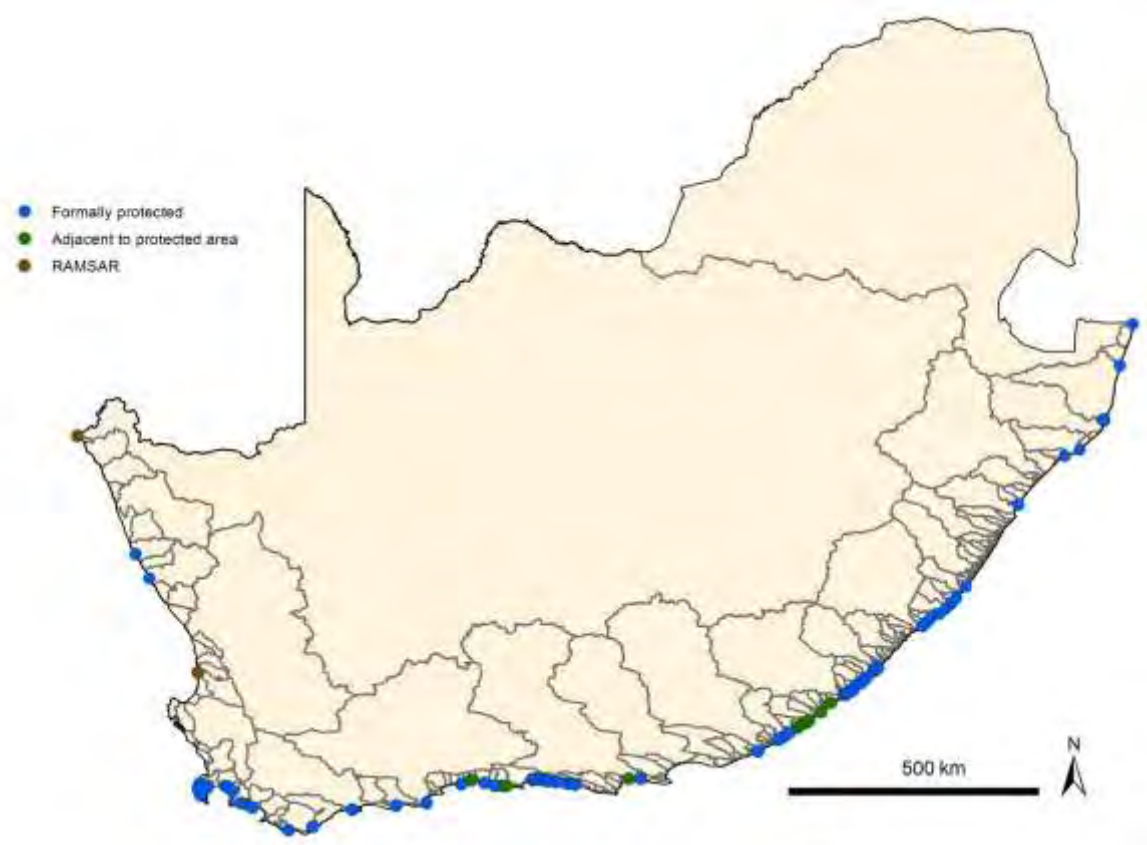


Figure 11.1 Location of formally protected and partially protected estuaries in South Africa.

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Table 11.1 Estuaries within South Africa that have some level of protection, giving the amount in a protected area, the extent of no-take protection, whether ecological water requirements have been secured, whether an estuary management plan is in place, the condition of the estuary, and the effective level of protection of the estuary (Turpie et al. 2012).

#	Estuary	Protected area	Agency	Amount of estuary in protected area	No Take Restrictions	Ecological water requirement	Estuary Management Plan	Condition	Level of protection*
1	Orange	Planned	Provincial	Part	Boat restriction	Yes		D	Medium
2	Spoeg	Namaqualand NP	SANParks	All				B	Medium
3	Groen	Namaqualand NP	SANParks	All				B	Medium
4	Diep	Rietvlei NR	Municipal	Part	Part			E	Low
5	Krom	Table Mountain NP	SANParks	Entirely				A	High
6	Wildevoëlvlei	Table Mountain NP	SANParks	Part				D	Low
7	Sand	Sandvlei NR	Municipal	<10% of estuary (Top)				D	Low
8	Heuningnes	De Mond NR	CapeNature	Part			Yes	D	Medium
9	Goukou	Stilbaai MPA	CapeNature	Part	Part		Yes	C	Medium
10	Wilderness	Wilderness Lakes NP	SANParks	Part				B	Low
11	Swartvlei	Wilderness Lakes NP	SANParks	Part		Yes		B	Low
12	Goukamma	Goukamma NR	CapeNature	Most		Yes (to A/B)		B	Medium
13	Knysna	Knysna NP	SANParks	Part		Yes	Yes	B	Low
14	Keurbooms	Keurbooms River NR	CapeNature	Part (upper reaches)		Yes	Yes	A	Low
15	Sout	De Vasselot NP	SANParks	All				A	Medium
16	Groot (W)	Tsitsikamma NP	SANParks	All	Yes			B	High
17	Bloukrans	Tsitsikamma NP	SANParks	All	Yes			A	High
18	Lottering	Tsitsikamma NP	SANParks	All	Yes			A	High
19	Elandsbos	Tsitsikamma NP	SANParks	All	Yes			A	High
20	Storms	Tsitsikamma NP	SANParks	All	Yes			A	High
21	Elands	Tsitsikamma NP	SANParks	All	Yes			B	High
22	Groot (E)	Tsitsikamma NP	SANParks	All	Yes			B	High

#	Estuary	Protected area	Agency	Amount of estuary in protected area	No Take Restrictions	Ecological water requirement	Estuary Management Plan	Condition	Level of protection*
23	Tsitsikamma	Huisklip NR	ECParks	Lower reaches		Yes		B	Low
24	Seekoei	Seekoei River NR	Municipal	Part (upper)		Yes		D	Low
25	Gamtoos	Gamtoos R. Mouth NR	Municipal	Part			Yes	C	Low
26	Van Stadens	Van Stadens NR	Municipal	All				B	Low
27	Sundays	Addo Elephant NR	Municipal	Part		Yes	Yes	C	Medium
28	Nahoon	Nahoon Estuary NR	Municipal	Very small part		Yes	Planned	C	Low
29	Mendu[#]	Dwesa-Cwebe MPA	DEA/DAFF	Undefined as yet	Yes			A	Medium
30	Mendwana[#]	Dwesa-Cwebe MPA	DEA/DAFF	Undefined as yet	Yes			A	Medium
31	Mbashe	Dwesa-Cwebe MPA	DEA/DAFF	All, but half in practice	Yes		Yes	C	High
32	Ku-Mpenzu	Dwesa-Cwebe NR	ECParks	Undefined as yet	Yes			B	Medium
33	Ku-Bhula Mbhanyana	Dwesa-Cwebe NR	ECParks	Undefined as yet	Yes			A	Medium
34	Kwa-Suka[#]	Dwesa-Cwebe NR	ECParks	Undefined as yet	Yes			B	Medium
35	Ntlonyane	Dwesa-Cwebe NR	ECParks	Undefined as yet	Yes			B	Medium
36	Nkanya	Dwesa-Cwebe NR	ECParks	Undefined as yet	Yes			B	Medium
37	Hluleka	Hluleka Nature Reserve	ECParks	All				A	Low
38	Nkodosweni	Pondoland MPA	DEA	Part				B	Low
39	Mtafufu	Pondoland MPA	DEA	Part				B	Low
40	Mzintlava	Pondoland MPA	DEA	Part				B	Low
41	Mzimpunzi[#]	Pondoland MPA	DEA	Part				B	Low
42	Kwa-Nyambalala[#]	Pondoland MPA	DEA	Part				B	Low
43	Mbotyi	Pondoland MPA	DEA	Part				B	Low
44	Mkozi[#]	Pondoland MPA	DEA	Part				A	Low
45	Myekane[#]	Pondoland MPA	DEA	Part				A	Low
46	Sitatsha[#]	Pondoland MPA	DEA	Part				A	Low

#	Estuary	Protected area	Agency	Amount of estuary in protected area	No Take Restrictions	Ecological water requirement	Estuary Management Plan	Condition	Level of protection*
47	Lupatana#	Pondoland MPA	DEA	Part				A	Low
48	Mkweni	Pondoland MPA	DEA	Part				A	Low
49	Msikaba	Mkambati Nature Reserve	ECParks	All				A	High
50	Butsha#	Mkambati Nature Reserve	ECParks	All	Yes			A	High
51	Mgwegwe#	Mkambati Nature Reserve	ECParks	All	Yes			A	High
52	Mgwetyana#	Mkambati Nature Reserve	ECParks	All	Yes			A	High
53	Mtentu	Mkambati Nature Reserve	ECParks	All	Yes		Yes	A	High
54	Sikombe#	Pondoland MPA	DEA	Part				A	Low
55	Kwanyana#	Pondoland MPA	DEA	Part				B	Low
56	Mtolane#	Pondoland MPA	DEA	Part				A	Low
57	Mnyameni	Pondoland MPA	DEA	Part				B	Low
58	Mpahlanyana#	Pondoland MPA	DEA	Part				A	Low
59	Mpahlane#	Pondoland MPA	DEA	Part				A	Low
60	Mzamba#	Pondoland MPA	DEA	Part				B	Low
61	Mtentwana#	Pondoland MPA	DEA	Part				C	Low
62	Mtamvuna	Pondoland MPA	DEA	Part				B	Low
63	Mpenjati	Mpenjati Nature Reserve	EKZNW	Part				B	Medium
64	Mgeni	Beechwood Nature Reserve	EKZNW	Part				D	Medium
65	Mhlanga	-	EKZNW	All	Yes	Yes		D	High
66	Mlalazi	Mlalazi Nature Reserve	EKZNW	All	Yes			B	High
67	Mhlathuze	-	EKZNW	Part				C	Medium
68	St Lucia/uMfolozi	iSimangaliso Wetland Park	ISWP Authority	90%		Yes		E/D	High/Medium
69	Mgobozeleni	iSimangaliso Wetland Park	ISWP Authority	All				B	Low
70	Kosi	iSimangaliso Wetland Park	ISWP Authority	All				B	Medium

*High = no-take for fish and invertebrates, medium = contains invertebrate no-take area

estuaries not named in the official gazette notices, but which occur within the protected area and are being managed as such.

The above-mentioned protected areas account for 65 900 ha[4] or 73% of the estuarine area within South Africa, and represent all of the eight targeted habitat types (Table 11.2). However, the St Lucia system contributes 90% towards the protected estuarine area or 56% of the total estuarine area, and covers a total of about 51 000 ha. The other fully protected estuaries cover a total area of just under 15 000 ha or only 16 % of the remaining estuarine area in South Africa. Turpie et al. (2012) found that protected areas met less than 5% of all habitat targets for Temperate estuaries. Estuaries that fall within Ramsar sites encompass about 57 000 ha, but not all Ramsar sites are formally protected in law. For example, the Orange and Verlorenvlei currently have no formal protection, although the plan for the Orange River Mouth Protected Area is in an advanced stage, with the potential of expanding it into a transfrontier park in the near future. It is hoped that Verlorenvlei would be granted similar legal protection in the near future to arrest the decline in its health and ensure an adequate supply of good quality water.

Table 11.2 Representation of habitats within fully protected estuaries and percentage of total area met (adapted from Turpie et al. 2012).

Habitat type	Total SA Habitat	Total area in fully protected estuaries (ha)	% of total SA habitat	Total fully protected estuaries minus St Lucia (ha)	% minus St Lucia	Total area in all protected & Ramsar estuaries (ha)	% of total habitat
Intertidal salt marsh	4 310	531	12	15	3	1 633	38
Supratidal salt marsh	7 051	1 757	25	51	3	2 356	33
Mangroves	2 111	898	43	393	44	1 591	75
Reeds and sedges	11 806	7 333	62	383	5	8 265	70
Channel	55 284	40 662	74	4 329	11	45 155	82
Swamp forest	4 843	4 577	95	180	4	4 619	95
Sand/mud banks	4 017	329	8	103	31	1 651	41
Submerged macrophytes	1 327	185	14	4	2	617	47
Rocks	96.2	16.1	17	16	100	16	17
Total	90 844	56 287	62	5 473	10	65 904	73

[4] This estimate was not based on a spatial analysis as the boundaries of some of the protected areas were not available for this assessment. This study therefore treated an estuary as either fully included or excluded in the protected area, while in some cases only some of the estuarine area may be formally protected.

11.2 Ecosystem Protection Levels

Ecosystem protection level indicates the extent to which ecosystems are protected, based on the proportion of each ecosystem's biodiversity target that is met in formal protected areas recognised by the Protected Areas Act or Marine Living Resources Act. For these calculations, targets for protection were set at 20% of the estuarine habitat area of each ecosystem type. Only optimum functional estuaries (not in health categories C, D, E and F) that are in formally protected areas (i.e. in national, provincial or municipal marine/protected areas) were considered as protected (i.e. contributing to biodiversity targets). Ecosystem protection level is divided into four categories: well protected, moderately protected, poorly protected and not protected (according to Table 11.3).

Table 11.3 Categories of ecosystem protection levels with all targets at 20% of area based on estuarine habitat.

Protection levels	Description
Well protected	≥100% of target in an MPA or PA
Moderately protected	50 to 99.99% of target in an MPA or PA
Poorly protected	5 to 49.99% of target in an MPA or PA
Not protected	0 to 4.99% of target in an MPA or PA

Ecosystem protection levels for the 46 NBA ecosystem types calculated according to the above-mentioned criteria are listed in Tale 11.3. Table 11.4 provides a summary of the degree of formal protection (excluding degraded estuaries, i.e. those systems not in an A or B category) and protection levels per ecosystem type for each of the three biogeographical regions.

Table 11.4 Ecosystem protection levels per ecosystem type.

Ecosystem Type	Total area (ha)	Degree of protection				% Protected	Protection level
		High	Low	Medium	None		
Cool Temperate	**13 720**	**9**		**53**	**13659**	**0.4**	
LargeClosedFreshTurbid	1 215				1215	0.0	**Not protected**
LargeClosedMixedBlack	3 528				3528	0.0	**Not protected**
LargeClosedMixedClear	224				224	0.0	**Not protected**
LargeOpenMixedClear	8 346				8346	0.0	**Not protected**
MediumClosedFreshBlack	116				116	0.0	**Not protected**
MediumClosedMixedBlack	134				134	0.0	**Not protected**
MediumClosedMixedClear	36				36	0.0	**Not protected**
MediumClosedMixedTurbid	81			53	28	65.2	**Well**
SmallClosedFreshBlack	20				20	0.0	**Not protected**
SmallClosedMixedBlack	15	9			7	56.3	**Well**

Ecosystem Type	Total area (ha)	Degree of protection				% Protected	Protection level
		High	Low	Medium	None		
SmallOpenFreshBlack	2				2	0.0	**Not protected**
SmallOpenMixedBlack	3				3	0.0	**Not protected**
Warm Temperate	**12 849**	**79**	**3970**	**47**	**8753**	**31.9**	
LargeClosedMarineClear	159				159	0.0	**Not protected**
LargeClosedMixedBlack	2 034		1286		748	63.2	**Well**
LargeClosedMixedClear	925				925	0.0	**Not protected**
LargeOpenMarineBlack	1 926		1926			100.0	**Well**
LargeOpenMarineClear	654				654	0.0	**Not protected**
LargeOpenMixedBlack	1 896		675		1221	35.6	**Well**
LargeOpenMixedClear	518				518	0.0	**Not protected**
LargeOpenMixedTurbid	2 930				2930	0.0	**Not protected**
MediumClosedMixedBlack	302	39	77	18	167	44.5	**Well**
MediumClosedMixedClear	954			24	930	2.5	**Poorly**
MediumOpenMixedBlack	22				22	0.0	**Not protected**
MediumOpenMixedClear	259				259	0.0	**Not protected**
MediumOpenMixedTurbid	138				138	0.0	**Not protected**
SmallClosedFreshBlack	8				8	0.0	**Not protected**
SmallClosedMixedBlack	29	10	7		13	56.0	**Well**
SmallClosedMixedClear	56			0	56	0.0	**Not protected**
SmallOpenFreshBlack	30	30				100.0	**Well**
SmallOpenMixedBlack	7			5	2	69.8	**Well**
Subtropical	**64 275**	**322**	**373**	**4774**	**58806**	**8.5**	
LargeClosedFreshTurbid	3 680				3680	0.0	**Not protected**
LargeClosedMixedClear	4 645			4645		100.0	**Well**
LargeClosedMixedTurbid	47134				47134	0.0	**Not protected**
LargeOpenMarineClear	1 373				1373	0.0	**Not protected**
LargeOpenMarineTurbid	3 764				3764	0.0	**Not protected**
LargeOpenMixedClear	127				127	0.0	**Not protected**
LargeOpenMixedTurbid	1 076	239			837	22.2	**Well**
MediumClosedFreshTurbid	213				213	0.0	**Not protected**
MediumClosedMixedBlack	116		94		22	81.2	**Well**
MediumClosedMixedClear	1 169		30	121	1017	13.0	**Moderately**
MediumClosedMixedTurbid	514		92		423	17.8	**Moderately**
MediumOpenMarineClear	27				27	0.0	**Not protected**
MediumOpenMixedTurbid	262	68	118		76	71.0	**Well**
SmallClosedFreshBlack	11		11			100.0	**Well**
SmallClosedMixedBlack	49	15	28		7	86.5	**Well**
SmallClosedMixedClear	114			8	107	6.7	**Poorly**
Total	90 844	410	4343	4874	81218	10.6	

Based on the criteria listed in Table 11.3, nearly 59% (27 out of 46 types) of South Africa's estuarine ecosystem types are not protected. About 33% of estuarine ecosystem types are well protected (15 types), while about 4% are moderately protected (2 types) and 13% are 4% is poorly protected (2 types) (Figure 10.3).

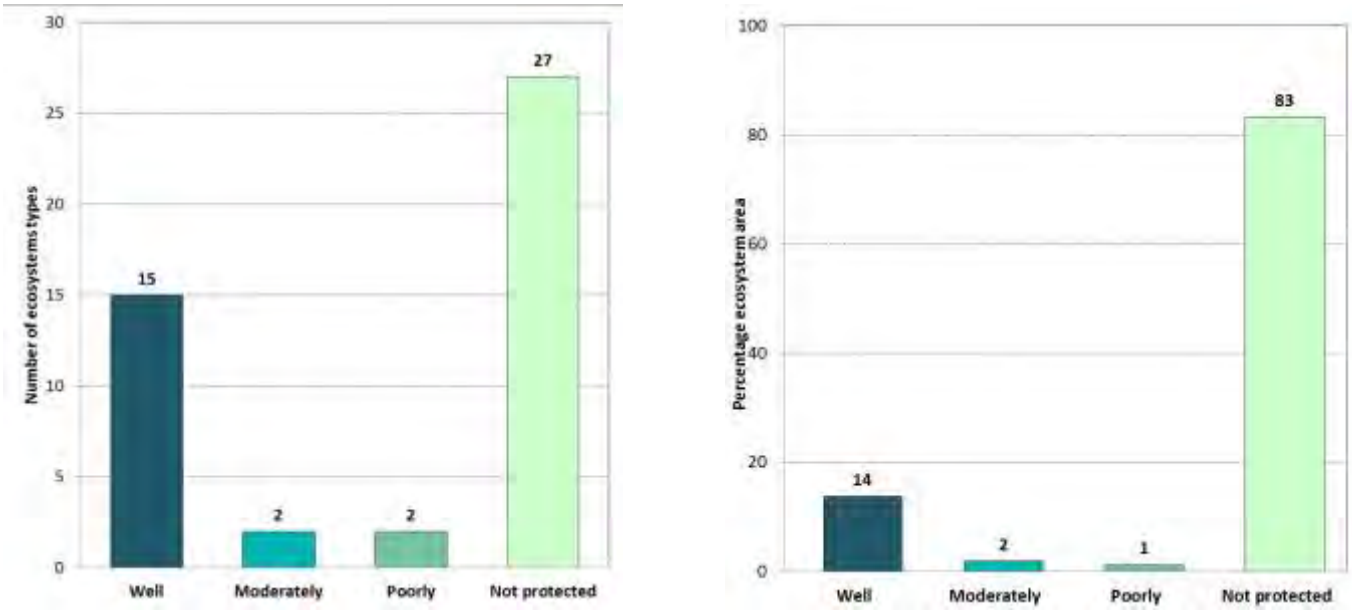


Figure 11.2 Protection levels of estuarine ecosystem types by percentage types and by percentage area in well, moderately, poorly or not protected category.

If protection levels are evaluated as the percentage area protected then the outcome becomes even more serious, with 83% of ecosystem types not protected, 1% poorly protected, 2% moderately protected and only 14% well protected.

Table 11.5 Protection levels of estuarine ecosystem types by biogeograpihical region.

Bioregion	Well	Moderately	Poorly	Not protected	Total
Cool Temperate	2	0	0	10	12
Warm Temperate	7	0	1	10	18
Subtropical	6	2	1	7	16
Total Number	**15**	**2**	**2**	**27**	**46**
SA %	**32.6**	**4.3**	**4.3**	**58.7**	**100**
Total area	**12 480**	**1 683**	**1 068**	**75 613**	**90 844**
SA %	**14**	**2**	**1**	**83**	**100**

If protection levels are evaluated as the percentage area protected, then the Cool Temperate biogeographical region has 99% of its ecosystem types not protected, followed by the Subtropical region at 88%, while the Warm Temperate region has about 44% of ecosystem types not protected. The Warm Temperate region has 48% of its ecosystem types as well protected, while the Subtropical region has only 10% it becomes clear that the Cool Temperate biogeographical region has the highest percentage, at 83%, of ecosystem types not protected (Figure 11.4), followed by the Warm Temperate region at 56% of types (see

Figure 11.5). At 44% the Subtropical region has the lowest number of ecosystem types not protected (Figure 11.6). The Subtropical region and the Warm Temperate region both have the highest number of well protected ecosystem types at 39% and 38% receptively, while the Cool Temperate on features 17% well protected ecosystem types. If protection levels are evaluated as the percentage area protected, then the Cool Temperate biogeographical region has 99% of its ecosystem types not protected, followed by the Subtropical region at 88%, while the Warm Temperate region has about 44% of ecosystem types not protected. The Warm Temperate region has 48% of its ecosystem types as well protected, while the Subtropical region has only 10% well protected. No ecosystem types are well protected in the Cool Temperate biogeographically region.

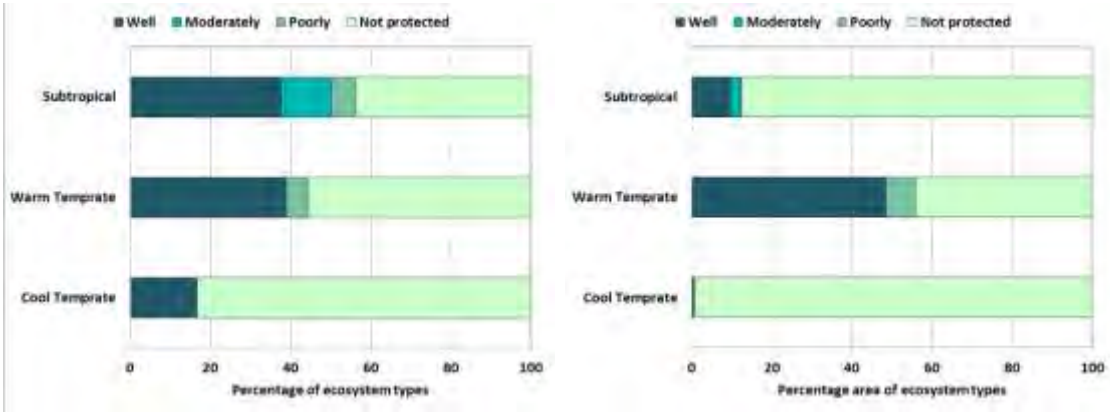


Figure 11.3 Protection levels of estuarine ecosystems by percentage types and by percentage area in well, moderately, poorly or not protected category for the three biogeographical regions.

An interesting and important finding was that if the health condition of the current degraded PA and MPA (i.e. estuaries in a C to F category) were to improve, the current protection levels of the well protected category would increase dramatically from 33% (15 types) to 46% (21 types). In terms of percentage ecosystem area, the well protected category would increase from 14% to 72%!!!! This finding indicates that a number of the current protected areas are in the correct location and, with the sound management interventions, significant progress can be achieved in the short term. It is therefore strongly recommended that degraded estuaries currently enjoying some form of formal protection (Lake St Lucia system, uMfolozi, Mgeni, Mhlanga, Seekoei, Heuningnes, Sand, Wildevoëlvlei, Diep, Orange) be restored to a functional status that allows them to fulfill their role in contributing to biodiversity targets.



Figure 11.4 Ecosystem protection Levels in the Cool Temperate biogeographical region.



Figure 11.5 Ecosystem protection levels in the Warm Temperate biogeographical region.



Figure 11.6 Ecosystem protection levels of the Subtropical biogeographical region.

12. NATIONAL ESTUARIES BIODIVERSITY PLAN

JK Turpie, G Wilson & L van Niekerk

The main objective of this assessment was to develop a biodiversity plan for the estuaries of South Africa by prioritising and establishing which of them should be assigned partial or full Estuarine Protected Area (EPA) status. This assessment represents a significant milestone in that it is the first conservation planning exercise to include all South African estuaries. This chapter summarises the main report (Turpie et al. 2012).

12.1 Overall approach

Biodiversity planning is an evolving field that has allowed a move from *ad hoc* protection to systematic planning that takes pattern, process and biodiversity persistence into account. More recently, attention has been focused on incorporating socio-economic realities into conservation planning, particularly in terms of minimising the management and opportunity costs of protection. While we have not explicitly taken social and economic costs and benefits into consideration, we have taken ecosystem health into account, which provides a surrogate for the former to some extent. This is because estuaries where the opportunity costs of protection are likely to be high are also likely to be heavily-utilised systems that are in a lower state of health.

Biodiversity planning typically involves the following steps (expanded from Pressey & Cowling 2001):

1. Define the planning domain: This involves defining the region within which the conservation sites will be chosen, and may have a biogeographical or political basis.
2. Define the planning units: These are the sites that may be selected for conservation. In many cases these are defined by grid squares, hexagons or cadastral units (properties).
3. Set targets: Identify conservation goals for the region and set quantitative biodiversity targets for the biodiversity features (e.g. species, macrophyte communities and ecosystem types), and quantitative targets for minimum size, connectivity or other design criteria.
4. Gap analysis: Review existing protected areas, assessing the extent to which quantitative targets have already been achieved.

5. Select new sites: Select additional areas using algorithms to identify preliminary sets of new conservation areas for consideration by managers as additions to established areas.

Having initially concentrated on the representation of species, biodiversity planning has generally evolved to incorporate ecosystem processes and now gives greater emphasis to biodiversity persistence (e.g. Cabeza & Moilanen 2001). One of the biggest challenges is setting spatially-explicit targets for the maintenance of ecological and evolutionary processes. This involves identifying the processes, finding spatial surrogates for them and then setting targets (Pressey et al. 2003). Another key challenge is delivering a plan that not only achieves representativeness but which also ensures the persistence of targeted populations and maintenance of biodiversity (Reyers et al. 2002).

The overall goals of the core Estuarine Protected Area network to be developed here were as follows (Turpie & Clark 2007):

- Representativeness: all estuary-dependent species should be represented in viable numbers in the protected areas network;
- Maintenance of ecological processes: the protected area network should allow for connectivity and interaction with other adjoining ecosystems;
- Maintenance of fishery stocks: the protected area network should provide enough protection to exploited species that they are able to act as source areas for surrounding exploited areas; and
- Feasibility of implementation: consideration should be given to the practicalities of protection in each estuary. In this assessment we considered this through decisions about whether the estuary was able to achieve full or partial protection and by favouring, where possible, healthier estuaries that offer a lower rehabilitation and opportunity cost of protection.

Conservation planning involves defining the planning domain and units, then setting targets, assessing how well the current protected areas meet those targets and selecting new planning units to meet the targets subject to some constraint such as minimising the number of sites or the costs. A variety of sophisticated algorithms have been developed for this purpose. We made use of MARXAN (operated via CLUZ).

This assessment builds largely upon the C.A.P.E. Estuaries Conservation Plan that covered the Temperate regions of South Africa only.

12.2 Planning units

A total of 289[5] estuaries from the cool Temperate, warm Temperate and sub-tropical regions were included. The main objective was to identify which South African estuaries should be assigned protected area status. Where feasible, estuaries were divided into two (non-spatially-explicit) planning units, each theoretically representing 50% of the biodiversity features of an estuary. This allowed for the possibility of partial protection, as opposed to only having the option of conserving whole estuaries.

12.3 Biodiversity targets

Targets are often defined in terms of achieving representivity in ecosystem types, habitats and species, as well as meeting population targets that ensure their viability. The overall target was to conserve a minimum of 20% of total estuarine area. Targets for ecosystem type are sometimes used as a surrogate for biodiversity for which data are lacking. In the case of estuaries, ecosystem type is generally defined using Whitfield's (1992) five estuary types (bay, river mouth, permanently open, temporarily open and lake). In this assessment estuary type was redefined on the basis of mouth state, salinity structure and freshwater type, with a total of 25 types. A target of 20% was set for the total area of each type. Sensitivity analyses were conducted by excluding type and by expanding the number of types to 46 by including size.

Habitat targets were set at 20% of the total area of each type, except for mangroves and swamp forest habitats. Nationally, mangrove and swamp forest utilisation is regulated under the National Forests Act and destruction or harvesting of indigenous trees is prohibited. While the mangrove trees and swamp forest are protected, the area under the forests and the associated estuarine habitat in many cases is not. Because of this, targets were not set for mangroves or swamp forest per se, but instead protection was given to all estuaries that contained >5 ha of these habitats by automatically including them into the core set of estuaries, thereby offering formal protection to estuaries where swamp forest or mangroves occur. Population targets, based on numbers of individuals per species, were set for estuary dependent fish and bird species (84 and 35 species, respectively) as follows: 50% of the population for red data species, 40% for exploited species and 30% for the rest. Ecosystem and landscape level processes were accommodated by ensuring that the protected area set

[5] For practical planning purposes the St Lucia/UMfolozi and Mhlathuze/Richards Bay estuaries were treated as single systems, like all other joint systems, reducing 291 to 289 systems.

had a good geographic spread, included large as well as small estuaries, and favoured healthier estuaries. Alignment with existing and/or proposed terrestrial and marine protected areas was also taken into consideration.

12.4 Site selection procedure

Biodiversity planning algorithms are used to find the most efficient, or lowest cost, solution required to meet defined biodiversity targets. We used the MARXAN site optimisation algorithm, run through a GIS interface programme called CLUZ. MARXAN starts by selecting a random set of planning units, and then makes iterative changes to the set of sites by randomly adding or subtracting planning units. At each iteration within a run, the new set is compared with the previous set, and the better one is selected. Up to 50 runs of the MARXAN application were conducted at 1 million iterations per run. The programme then selected the best output from of the 50 runs.

While socio-economic costs and benefits were not included into the analysis, estuary health was incorporated as a cost, in that more degraded estuaries were assigned exponentially increasing cost values. Highly impacted estuaries probably also have relatively high costs in terms of conservation – both rehabilitation costs as well as forgone opportunity costs.

To account for data limitations, the opinions of the scientific and management community were also taken into account. Estuary scientists and managers participated in a workshop to finalise the definition of the planning units and their feasibility for protection, and to agree on which planning units should be automatically included into the final set, giving reasons. Finally, sensitivity analyses were conducted, in which the inclusion or definition of targets for estuary types was varied.

12.5 Results and recommendations

The primary analysis, which included targets for estuary type and size, suggested that 121 planning units in 116 estuaries would be required to meet the defined targets (see Figure 12.1 and Appendix C for more detail). This amounts to about 40% of estuaries and 80% of estuarine area. Variation of targets for estuary types did not have a significant impact on the result, and thus the results from the primary analysis were used. In total 58 estuaries require full protection (20%) while 63 estuaries require partial protection (22%). Fully-protected estuaries are taken to be full no-take areas. Partial protection might involve zonation that includes a no-take area, or it might address other pressures with other types of action. In both these cases, the management objective would be to protect 50% of the biodiversity

features of the partially protected estuary. Fully protected and partially protected estuaries can be considered Estuarine Protected Areas, whereas all other estuaries should be designated Estuarine Management Areas. All estuaries require a Management Plan, and these plans should be guided by the results of this assessment.

Based on the list of estuaries generated in this analysis, plus preliminary estimates of their present ecological status (health; this analysis) and their importance rating (Turpie & Clark 2007), the national and regional priorities for conservation can be determined. National priorities provide recommendations regarding the extent of protection required for each estuary, the recommended extent of the estuary perimeter that should be free from development to an appropriate setback line, and the preliminary Recommended Ecological Category (or recommended future health class) as required under the National Water Act.

Estuaries that require full protection include:

Orange	Lottering	Ku-Mpenzu	Mtamvuna
Spoeg	Elandsbos	Ku-Bhula/	Umgababa
Groen	Storms	Mbhanyana	Msimbazi
Krom	Elands	Ntlonyane	Mhlanga
Eerste	Groot (Oos)	Nkanya	Mvoti
Lourens	Tsitsikamma	Sundwana	Mdlotane
Palmiet	Maitland	Ngakanqa	Siyaya
Ratel	Gqutywa	Lwandilana	Mlalazi
Heuningnes	Ncera	Hluleka	St Lucia/ uMfolozi
Klipdrifsfontein	Kwenxura	Mntafufu	Mgobezeleni
Kaaimans	Quko	Mzintlava	Kosi
Goukamma	Ncizele	Mkozi	
Sout (Oos)	Nxaxo/ Ngqusi	Myekane	
Groot (Wes)	Ngqwara	Msikaba	
Bloukrans	Ngadla	Mtentu	

Estuaries that require partial protection include:

Olifants	Bot / Kleinmond	Gouritz	Keurbooms
Verlorenvlei	Klein	Wilderness	Kromme
Berg	Uilkraals	Swartvlei	Seekoei
Rietvlei/ Diep	Breede	Knysna	Gamtoos
Sand	Goukou	Piesang	Van Stadens

Swartkops	Qora	Mnyameni	Lovu
Sundays	Nqabara	Mpenjati	Durban Bay
Bushman's	Mbashe	Zotsha	Mgeni
Kariega	Xora	Mzimkulu	Mhlali
Great Fish	Mtata	Damba	Zinkwasi
Mgwalana	Mtakatye	Koshwana	Matigulu/ Nyoni
Bira	Mngazana	Intshambili	Mhlathuze/
Keiskamma	Mzimvubu	Mhlabatshane	RichardsBay
Gqunube	Nkodusweni	Mfazazana	
Kwelera	Mbotyi	Kwa-Makosi	
Great Kei	Mkweni	Mkomazi	

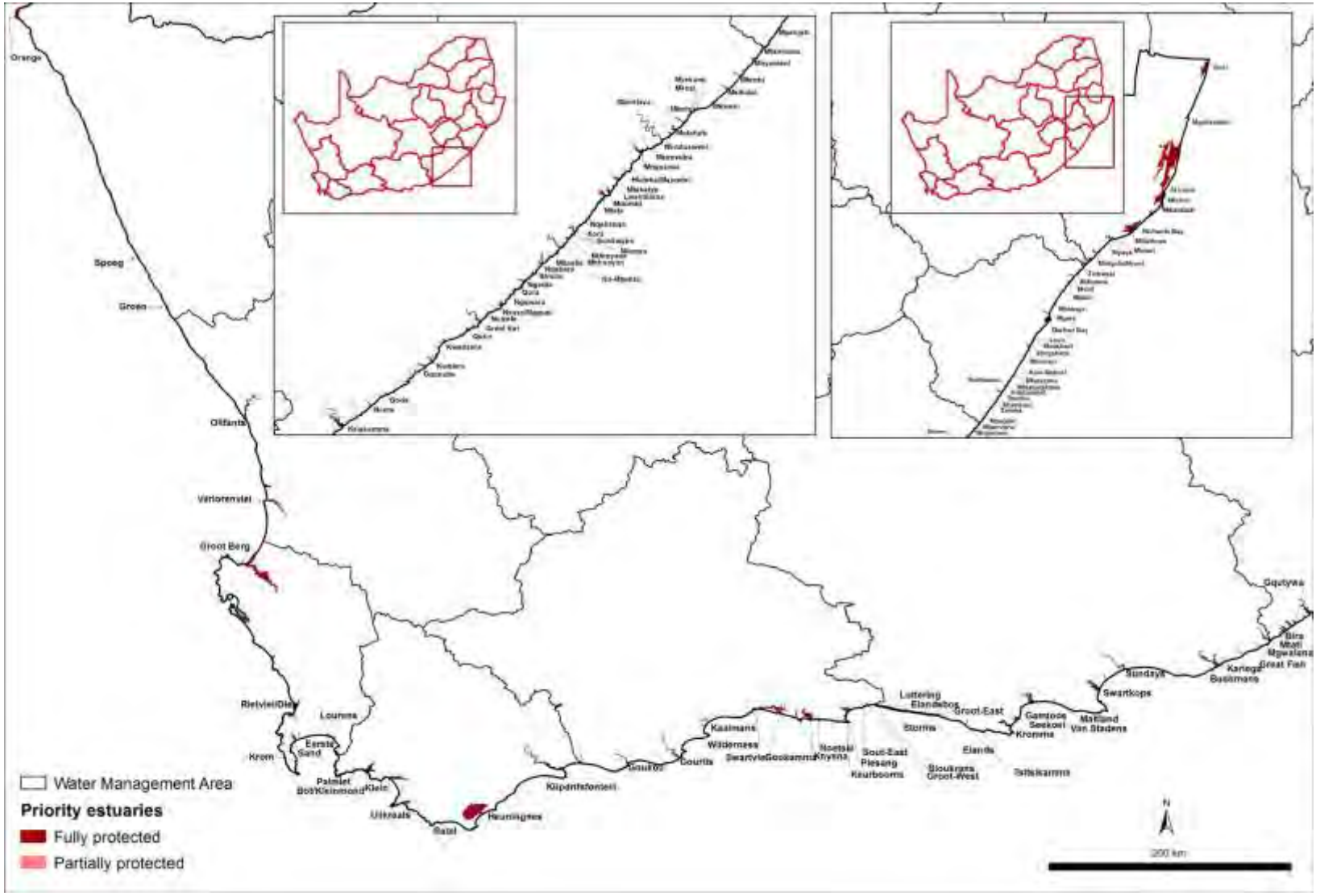


Figure 12.1 National priority estuaries for biodiversity conservation.

13. HOW VULNERABLE ARE SOUTH AFRICA'S ESTUARIES TO CLIMATE CHANGE ?

L van Niekerk, F Engelbrecht, N James, A Meyer & A Theron

Estuaries form an interface between the land and sea and are strongly influenced by runoff, wind, wave action, air and water temperatures from the land and sea. Consequently, climate change is likely to have a profound effect to the structure and functioning of estuaries, and may have a range of implications for estuarine biota (Kennedy, 1990).

13.1 Processes by which climate change may alter South Africa's estuaries

13.1.1 Ocean processes

Large scale coastal currents determine, to a large degree, coastal climate which in turn will impact on estuarine dynamics. The physical properties and circulation features of South Africa's coastal zone are determined by the two large scale ocean currents which are located very close to the South African coast, i.e. the Agulhas Current along the east and south coasts and the Benguela Current along the west coast. Any change in both currents' average positions will impact not only on the properties and circulation of the coastal zone, but will also impact on the coastal flora and fauna (including estuarine species),

It was recently demonstrated using hydrographical and satellite observations, as well as state of the art climate models, that both green house gas (GHG) induced global warming and the anthropogenic induced ozone hole have caused an intensification and southwards shift of the Southern Hemisphere Sub-tropical gyres over the last 40 years (Cai et al. 2006, and references therein). Modern global climate models based on present day atmospheric CO_2 levels and projected levels of increasing CO_2 levels, motivated by the IPCCs estimates of a 1% increase in CO_2 per year up to the year 2100, show that the above trend in the ocean circulation will continue (Saenko et al. 2005). These global predictions for oceanic climate change will have a definite impact on the coastal-open ocean circulation around South Africa.

Lutjeharms and de Ruijter (1996) argue that with global warming the Agulhas Current will exhibit increased meso-scale meandering which will force the current on average further offshore from its mean position. In the present global climate regime the Agulhas Current is located within 15 km from the shore 77% of the time. However, perturbations in the form of large-amplitude intermittent meanders (Natal Pulses) can force the current's core up to

300 km offshore. The meander modes of the Agulhas Current occur between 4 to 6 times per year. Lutjeharms and de Ruijter (1996) suggest that the meander modes will increase in frequency due to global warming and that the current will be located on average further from the coast line. This will lead to cascading impacts on the coastal climate and dynamics, e. g. rainfall and the movement of marine flora and fauna along the coast and into/out of estuaries.

The exchange of large quantities of warm water from the Indian to the Atlantic Ocean (Agulhas Leakage) via the Agulhas Retroflection influences the south and west coasts of South Africa (Figure 13.1). Agulhas Leakage occurs via the intermittent occlusion of the Agulhas Retroflection loop to form the world's largest anti-cyclonic vortices, called Agulhas Rings. Each year between 4 to 8 rings of varying sizes (200 to 400 km in diameter) are pinched off and advected north-westward into the south eastern Atlantic Ocean along the west coast of South Africa.

Two modes of the Agulhas Retroflection exist, a downstream (normal) mode (Figure 13.1a) and an upstream mode (Figure 13.1b). During the upstream mode the Agulhas Leakage is markedly reduced, which leads to cooler sea surface temperatures for the southern and western oceanic and coastal regimes, compared to during the normal Agulhas Retroflection mode. An increase occurrence in the average upstream mode will lead to drier coastal climates along the west and south of South Africa, thus impacting on river run-off and estuarine dynamics.

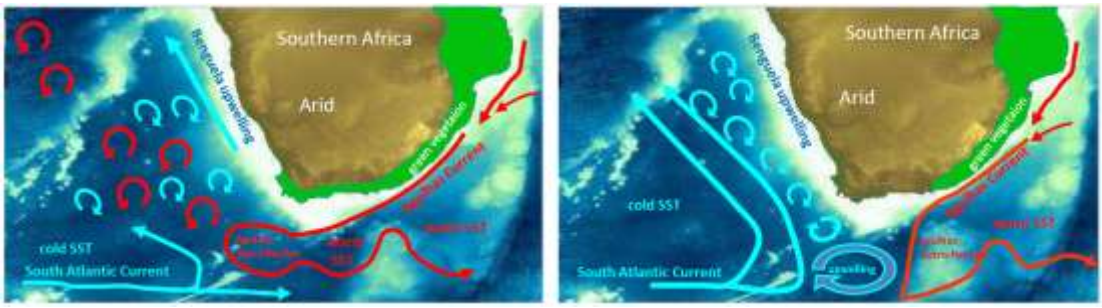


Figure 13.1 Current regimes around South Africa; (a) normal downstream mode of the Agulhas Retroflection, leading to Agulhas Leakages via warm core Agulhas Rings, (b) Upstream Retroflection mode leading to a reduction in Agulhas Leakage and cooler temperatures.

Stronger Agulhas Current transport has been predicted due to global warming. The impact of a stronger Agulhas Current on the retroflection mode is still unclear. Cai et al. (2007) and Rouault et al. (2009) indicate that the increase in Agulhas Current transport will lead to an associated stronger Agulhas Leakage with more warm Indian Ocean water passing the southern and western coasts of South Africa. The model study of Van Sebille et al. (2009)

show the opposite - that an increase in Agulhas Current transport will lead to a higher frequency of Upstream Retroflections, with a concomitant decrease in Agulhas Leakage. Either way, the impact of a stronger Agulhas Current will have definite effects on the coastal climate of South Africa.

On the western coast of South Africa the Benguela Current (or drift) will intensify and lead to more intense upwelling due to the spinning up of the Supergyre (Roemich 2007; Saenko et al. 2005). This will induce much cooler sea surface temperatures along the west coasts of South Africa than present. However, the intensification of the South Atlantic Sub-tropical gyre may also lead to increase atmospheric subsidence, less clouds, increase insolation and higher air temperature over the Benguela Upwelling System (Lutjeharms et al. 2001). The latter will result in warming of the surface water which may negate the increase upwelling of cooler waters. Another mechanism that may influence the Benguela coastal region are Agulhas Rings and filaments which drift sometimes very close up the west coast, raising the temperature of the nearshore waters and occasionally interacting with upwelling plumes, both of which have important consequences for fish recruitment (Duncombe Rae et al. 1992).

13.1.2 Rainfall and Runoff

Climate change will alter precipitation patterns which will affect the quality, rate, magnitude and timing of freshwater runoff to estuaries and will exacerbate existing human modifications of river inflows (Alber 2002; USEPA 2009). Estuarine functioning is strongly influenced by the magnitude and timing of freshwater runoff (Meynecke et al. 2006). Downscaled regional climate models (RCMs) derived from global climate models (GCMs) indicate the likelihood of increased summer rainfall over the eastern part of South Africa, the interior and the Drakensberg Mountains. The greater rainfall projected for the east would be in the form of more rain days and more days with bigger rainfalls. If these scenarios are correct, the combination of wetter antecedent conditions and larger rainfall events would result in more runoff being generated. Less rainfall is projected along the west coast and the adjacent interior, with the possibility of a slight increase in inter-annual variability. If correct, this would result in a decrease in flows and an increase in flow variability, since changes in precipitation are amplified in the hydrological cycle (Lumsden et al. 2009. Hewitson & Crane, 2006). The models also show an increase in heavy / extreme precipitation events in the summer over the east coast of KwaZulu-Natal along with an increase in rain days for much of the country, excepting possibly the extreme west / southwest (Hewitson et al. 2005). Schultze et el. (2005) predict that climate change may cause hydrological “hotspots” of change, one being

the present winter rainfall region in the Western Cape. Changes in precipitation and runoff ultimately also drive changes in nutrient and sediment supply to estuaries and the coast. It will also affect related human adaptation strategies to reduce risk, e.g. increase impoundment and land use change, which will increase the rate of change in primary inputs (flow, sediment and nutrients) to estuaries and the coast.

13.1.3 Increase in the frequency and intensity of sea storms

The Fourth Assessment Report of the Intergovernmental Panel on Climate Change predicts, an increasing frequency and intensity of extreme weather events in the 21st Century (IPCC 2007). The frequency and magnitude of severe weather events such as tropical cyclones, hailstorms, droughts and floods appears to be on the increase globally and possibly in South Africa (IPCC 2007). In South Africa, increases in either intensity or frequency, or changes in seasonal storm intensity have been recorded at a local scale albeit on a very short time-scale (Guastella and Rossouw 2009, Harris et al. 2010).

Preliminary findings indicate that there may be long-term trends in regional metocean climates, while sea level rise alone will greatly increase the impacts associated with extreme sea-storm events (Theron 2007). The regional variation in the global wave climate was demonstrated by Mori et al. (2010), who, in simulating future trends, predicted that the mean wave height might generally increase in the regions of the mid latitudes (both hemispheres) and the Antarctic ocean, while decreasing at the equator. Wang et al. (2004), Komar and Allan (2008) and Ruggerio et al. (2010) provide further evidence of a general wave height increase and increasing storm intensities in the Northern hemisphere. Such changes in the regional metocean climates are expected to have significant impacts on local coastal areas. It is therefore important to also investigate possible future climatic changes off the southern African coastline as well as the expected associated impacts. As can be anticipated, a more severe wave climate (or related oceanic wind climate) will result in more storm erosion, potentially more coastal sediment transport, and greater coastal impacts.

Preliminary analyses conducted by Rossouw and Theron (2009) found that the annual mean significant wave height (Hm_0) for the wave data collected off Richards Bay and Cape Town indicate no real progressive increase. This may appear to contradict the findings of the IPCC, as presented in PIANC (2008), but the South African results may reflect a regional aspect of the impact of climate change. Although the averages appear to remain constant, there seems to be some change in the individual storms. For example, considering the peaks of individual storms off Cape Town during the more extreme winter period (June to August), an increase of about 0.5 m over 14 years is observed. This result may be indicative

of a significant increase in the “storminess” over the next few decades. It is also worth noting that the opposite occurs during summer: there has been a general decrease over the last 14 years with regard to individual storms off Cape Town. However, it must be noted that the South African wave record is too short to make any firm conclusions at present. To some extent it could be said that the preliminary “trend” indicated by the South African wave data is supported by the model predictions of Mori et al. (2010), which appear to show an increase in wave height for the South African coast of roughly 6% for extreme events (Theron et al. 2010, submitted).

Wave climate and conditions are determined by ocean winds (velocity, duration, fetch, occurrence, decay, depth, etc.). Predicted values for potential changes in oceanic wind regimes off southern African are lacking. In view of this shortcoming and to enable an assessment of the potential impacts of stronger winds, a relatively modest increase of 10% could be assumed. Thus, a modest 10% increase in wind speed, means a 12% increase in wind stress, a 26% increase in wave height, and as much as an 80% increase in wave power (Theron 2007). This means that a modest 10% increase in wind speed could also result in a potentially significant increase in coastal sediment transport rates and consequently impact on estuarine mouth regimes.

13.1.4 Sea level rise

Recent calibrated observations from satellites, are that global sea level rise over approximately the last decade has been 3.3+/- 0.4 $mm.yr^{-1}$ (Rahmstorf et al. 2007). The IPCC AR4 Report (IPCC 2007) concludes that anthropogenic warming and sea level rise will continue for centuries due to the timescales associated with climate processes and feedbacks, even if greenhouse gas concentrations are stabilised. Comparisons between approximately 30 years of South African tide gauge records and the longer term records elsewhere, show substantial agreement with global trends (Theron 2007). A recent analysis of sea water levels recorded at Durban confirms that the local rate of sea level rise falls within the range of global trends (Mather 2008). Present South African SLR rates are: west coast +1.87 $mm.yr^{-1}$, south coast +1.47 $mm.yr^{-1}$, and east coast +2.74 $mm.yr^{-1}$ (Mather et al. 2009).

The probability of sudden large rises in sea level (possibly several metres) due to catastrophic failure of large ice-shelves (e.g. Church and White 2006) is still considered unlikely this century, but events in Greenland (e.g. Gregory 2004) and Antarctica (e.g. Thomas et al. 2004) may soon force a re-evaluation of this assessment. In the longer term

the large-scale melting of large ice masses is inevitable. Recent literature (subsequent to IPCC 2007) give a wide range of SLR scenarios, but most "physics/process based" projections for 2100 are in the 0.5 m to 2 m range (Rossouw and Theron 2009; Shore & Beach Special Review Issue, November 2009).

13.2 Quantification and mapping of risks

13.2.1 Changes in precipitation and runoff

In principle, all estuaries are sensitive to changes in river inflow. The four major consequences of modifications in river inflow are: changes in the extent of seawater intrusion; changes in the frequency and duration of mouth closure, decrease/increase in nutrients fluxes, and changes in the sediment deposition/erosion cycles.

i) Changes in the extent of seawater intrusion

Reduction of fluvial flow into estuaries may have a range of effects on the salinity regime. The degree to which seawater will enter an estuary is dependent on river inflow and the bathymetry of the system, i.e. seawater penetration into the more constricted upper reaches is often constrained by river inflow, with relative easy penetration into the deeper middle reaches; and with the lower reaches generally dominated by tidal flows. Often it is thus the middle reaches of an estuary that shows the most sensitivity to changes in flow (river and tidal).

For example, in large systems flow reduction may initially result in a reduction in the extent of the estuarine mixed zone i.e. that section of an estuary with salinity between 20 and 10. Further reduction in stream flow can result in the complete elimination of this mixed zone so that, effectively, the system functionally becomes an arm of the sea e.g. the Kromme Estuary (Scharler and Baird 2000; Snow, Bate and Adams 2000; Wooldridge and Callahan 2000; Strydom and Whitfield 2000; Bate and Adams 2000). If there is no inflow at all a reverse salinity gradient may develop, where the salinity at the head of the estuary may exceed that of seawater e.g. the Kariega Estuary (Bate et al. 2002; Whitfield and Paterson 2003).

In addition to supporting a resident estuarine fish assemblage, estuaries are important nursery, refuge and feeding areas for numerous marine fish species (Elliot et al. 2007). Reduced freshwater inflow may reduce the (primary) productivity of an estuary, thereby reducing the food available to juvenile fishes (Strydom and Whitfield 2000). This will have an adverse effect on fish recruitment, growth, survival and production or recruitment into the

adult population (Dolbeth et al. 2010). Reduction in stream flow in temporarily open/closed systems may lead, paradoxically, to a reduction in salinity in many small systems. Reduction in inflow can lead to mouth closure and, provided that the river inflow still exceeds evaporation and seepage losses, a progressive freshening of the estuary until such time as rising water levels lead to a breaching of the berm closing the mouth, e.g. Groot Brak. The impact is an almost complete loss of the marine species with only a few estuarine and freshwater species remaining (Whitfield 2005). Mass mortalities of marine fish species have been recorded in the Bot when salinities declined to 2-3 and temperature was less than 18°C (Bennett 1985).

Increased stream flow will also reduce, or prevent salinity penetration into an estuary, i.e. increase the estuarine mixed zone. In a very small system, or if there is a significant increase in river flow, an estuary with a full salinity gradient may be turned into a fresh water dominated system, with a related reduction in water residence times and associated primary production.

ii) Changes in the frequency and duration of mouth closure

Temporarily open/closed estuaries (TOCEs) become isolated from the sea by the formation of a sand berm across the mouth during periods of low or no river inflow. Such estuaries stay closed until their basins fill up and their berms are breached by increased river flow. A major consequence of stream flow reduction is, therefore, a change in the frequency and duration of estuary mouth closure in TOCEs. In extreme cases fresh water reduction can cause permanent mouth closure.

The consequences of these physical changes for the biota can be severe. For example the mudprawn *Upogebia africana* has an obligatory marine phase of development during the larval stages. Estuary mouth closure, particularly for extended periods (e.g. >1 year), disrupts the life cycle and can result in local extinction of the mudprawn (Wooldridge and Loubser 1996). Some demersal zooplankton species exhibit tidally-phased migratory behaviour (Schlacher and Wooldridge 1995). Mouth closure removes the tidal signal and thereby disrupts the life cycles of these organisms.

Prolonged closed phases in TOCEs result in a low recruitment potential for juvenile marine fish and effectively prevent the emigration of adults back to sea (Vorwerk et al. 2003). During extended closed phases, fish populations may also decrease considerably due to predation (by other fishes, birds and mammals). For example, predation by piscivorous birds

(cormorants, darter and heron) reduced the size of the Cape stumpnose *Rhabdosargus holubi* population in the West Kleinemonde Estuary by 80% (1971) and 20% (1972) respectively over a six to seven month period (Blaber 1973). In severe cases the number of fish will be so greatly reduced by predation that, should the mouth eventually open, their numbers will be so low as to make an insignificant addition to the adult population in the open sea. Alternatively the fishes may simply die in the estuary without ever having had the opportunity to breed.

In the case of birds, mouth closure will lead to a loss of tidal action which, in turn, will adversely affect the quantity and availability of intertidal benthic organisms to waders that forage mainly on intertidal mudflats. Many of these waders are Palaearctic migrants; therefore mouth closure can have an international impact on the populations of such birds. Other effects of reduced stream flow include the loss of shallow water habitats, favoured by herons, flamingos and other wading birds, and the loss of islands, which provide roosts and breeding sites safe from terrestrial predators.

iii) Changes in nutrients

Changes in river flow regimes also affect the nutrient loads entering estuaries. Freshwater flowing into estuaries is an important source of nutrients, both dissolved and particulate. Dissolved nutrients include nitrates, phosphates, silica and trace metals essential for primary production. Particulates such as organic detritus derived from riparian vegetation may, in some systems, be an important source of carbon for the estuarine food web.

Reduction in freshwater inflow (as a consequence of dam development or climate change) will reduce the quantity of nutrients entering the estuary, with the resultant impoverishment of the biota. In particular primary producers such as phytoplankton and benthic diatoms, will be adversely affected with a consequent “knock-on” effect through the entire food chain (Allanson and Read 1987). Increased freshwater inflow will likewise increase the quantity of nutrients entering the estuary, but the biological response will depend on retention. In the shallow perched estuaries of KwaZulu-Natal increased inflow goes hand in hand with, decreased retention time and therefore often results in decreased production.

iv) Decrease in the dilution and or flushing of pollutants

A decrease in river flow into some of the urban systems could extend the closed mouth conditions in some of the temporarily open/closed estuaries, where the combination of high

water retention time and warmer water would provide the ideal breeding ground for some disease-causing bacteria.

An increase in inflow from rural areas, associated with higher nutrient loads from fertilizers, will increase nutrient loads to estuaries with a related increase in eutrofication. Similarly, an increase in storm runoff from urban catchments would lead to an increase in fertilisers, herbicides, pesticides, hydrocarbons and solid litter to estuaries.

v) Changes in sediment processes

Floods in estuaries scour sediment deposited during periods of low flow. This accumulated sediment is both catchment derived and brought in from the sea by flood tides. Soil erosion in catchments poses a major threat to estuaries, particularly those in KwaZulu-Natal and those in the former Ciskei and Transkei regions of the Eastern Cape Province (Morant and Quinn 1999). The potential denuding of vegetation in arid catchments (i.e. increasing the erodibility of soils) coupled with an increase in the frequency of high intensity rain events due to climate change would lead to a significant increase in the deposition of sediment in estuaries.

It is also foreseen that the potential water shortage, especially in the Western Cape, would lead to the need to build more dams to secure water supplies to urban areas and agriculture. Major dams may have the effect of capturing minor (annual) flood peaks entirely and attenuating major flood peaks. The degree to which this will occur depends on the ratio of dam volume to the MAR, the level in the dam preceding the flood, and the size of the flood. Therefore, if floods are reduced in intensity and frequency, sediment deposition and accumulation occurs and the estuaries are reduced in water volume and surface area.

Numerous small farm dams, as well as barrages and weirs, collectively may also have a major impact on the variability and duration of stream flow and consequently on estuaries. Instead of being available as stream flow the water is stored and subjected to consumption and losses, including evaporation and seepage. It is estimated that as little as 8% of the total annual runoff reaches the coastal zone (Department of Water Affairs 1986). Higher temperatures, with the related increase in evaporation due to climate change, will not only increase the need to build more farm dams but also will exacerbate the impact of existing dams on the aquatic environment.

13.2.2 Rising temperatures

Projected temperature increases in the average global surface atmosphere range from a low scenario of 1ºC to 3ºC with a potential upper rage of 6ºC by 2100 (IPCC 2007). Shallow water, such as estuaries, will exhibit greater increases in temperature than deeper waters (Rijinsdorp et al. 2009, James et al. 2008a).

Temperature influences the biology of organisms (mortality, reproduction, growth, and behaviour). Temperature can also influence interactions among organisms (e.g. predator prey, parasite-host, competition for resources)). Species are adapted to, and distributed within, specific ranges of environmental temperatures (Harrison and Whitfield 2006, Maree et al. 2000, Elliot 2002). Many organisms are more stressed near their species range boundaries (Sorte and Hoffman 2004). As temperature changes, the geographical distribution of species, depending on their tolerances or preferences, may contract or expand, leading to new and unpredictable species interactions (Murawski 1993, Harley et al. 2006, Clark 2006, Perry et al. 2005, USEPA 2009). Areas of cooling may, however, limit the ability of species to shift their distribution resulting in a decrease in the range of certain species in South Africa. Ultimately, the present species, community and assemblage composition of many South African estuaries may change.

In recent years a number of subtropical species such as the coachman *Heniochus acuminatus*, checked goby *Redigobius dewaali* and blacktip kingfish *Caranx heberi* have extended their range 200 to 1000 km south to the Breede Estuary (Lamberth, unpublished data). James et al. (2008b) and Mbande et al. (2005) highlight the increased occurrence of tropical fish species in estuaries along the East Coast of South Africa (e.g. East Kleinemonde and Mngazana). Of the six tropical species recorded in the East Kleinemonde Estuary, longarm mullet *Valamugil cunnesius* and robust mullet *Valamugil robustus*, have been recorded consistently in the estuary every year after 2002, and are found in both summer and winter indicating that water temperatures are continually within the tolerance range of these species (James et al. 2008b). In the Mngazana Estuary the proportion of tropical species recorded in winter increased from 1975 to 2002. Higher average temperatures would favour tropical species during winter, while limiting the northward penetration of certain Temperate species (Mbande et al. 2005).

Species that are unable to migrate, or compete with other species for resources, may face local or global extinction. Although higher temperatures might not result in the extinction of a species throughout its range, the species may be eliminated from part of its range.

Communities do not shift their distribution as a unit. Movement into newly suitable habitats depends on: 1) the number of adults available in the original habitat and their ability to bear young; 2) an adequate number of potential colonisers; 3) the ability of potential colonizers to move into new habitats; 4) the survival of an adequate number of individuals in the new habitat to ensure genetic diversity to meet challenges and to produce succeeding generations (Kennedy et al. 2002). Thus the loss of species from an estuary that has become too warm may reduce species diversity in that estuary in the short term, depending on the mobility of new colonizers, their ability to tolerate higher temperatures and their tolerance for the higher salinities of the marine environment. Warming is likely to result in new mixes of foundation species, predators, prey and competitors (USEPA 2009, James and Hermes 2011). For example, fishes with the most temperature sensitive distributions include many key prey species of non-shifting predators (Perry et al. 2005).

Mobile organisms such as fish, swimming crabs, and shrimp can quickly colonise new habitats, while immobile or relatively immobile invertebrates such as oysters will disperse more slowly. Changes in temperature will also affect coastal vegetation with more subtropical species moving further south, i.e. the invasion of salt marsh habitats by mangrove species (Steinke 1999, Adam 2002, Gilman et al. 2008).

Temperature also influences the amount of oxygen that water can hold, warmer water holds less oxygen than cooler water. Most aquatic organisms extract oxygen from the waterbody they live in. The effect of higher temperatures and less oxygen could be to constrict the available habitat for certain species. Temperature changes can even influence water circulation patterns within an estuary (Kennedy et al. 2002).

13.2.3 pH change

The reduction in pH that accompanies elevated CO_2 concentrations may have profound implications for coastal and marine ecosystems (Harley et al., 2006, James and Hermes 2011). The pH of surface waters may decrease by 0.3-0.4 units by 2100 under the influence of rising atmospheric CO_2 levels (Caldeira and Wickett 2003). The resulting decrease in pH will affect all calcifying organisms, as structures made of calcium carbonate would start to dissolve requiring more metabolic energy for an organism to maintain its exoskeleton. Estuarine organisms that may be affected include coralline algae, echinoderms, crustaceans and molluscs (USEPA 2009, James 2010).

13.2.4 Increase in the frequency and intensity of sea storms

A number of small to medium sized estuaries (e.g. Groot Brak) show great sensitivity to increased wave action. In general, large storms at sea create the wave conditions that will close such estuaries, unless there is significant river flow to maintain the open mouth condition. An increase in storminess due to climate change would, therefore, increase the occurrence of mouth closure and generally transport more marine sediment into an estuary than at present. Estuaries along an exposed, sediment rich coastline (e.g. parts of KwaZulu-Natal) would be more likely to close than estuaries that are fairly protected, or those located on sediment starved coastlines (e.g. the Transkei and Tsitsikamma coastlines).

13.2.5 Sea level rise

Sea level rise can either counteract the reduction in runoff to an estuary or exacerbate the effect depending on the size of the estuary, the sediment availability, and the wave energy near or at its mouth. In the case of small, temporarily open/closed estuaries sea level rise could assist in maintaining open mouth condition through increasing the tidal prism, if the system is sheltered from wave action and/or little sediment is available near its mouth. Alternatively, sea level rise could merely reset the level at which an estuary closes to the same relative height above mean sea-level, without significantly affecting the amount or duration of mouth closures. Alternatively, an increase in storminess might actually increase the frequency and or duration of the mouth closure due to increased marine sediment transport into the mouth area during sea storms. In the case of permanently open estuaries, sea level rise may lead to an increase in the saline penetration (especially in the middle reaches) and require additional freshwater to maintain the same salinity gradient as at present, i.e. it may be necessary to increase the ecological flow requirement to maintain present ecological production levels.

Climate change and sea level rise will increase the pressures on management agencies to implement assisted (and often premature) breaching as increasingly properties will be below the level of the sand berm near the mouth. The response of humans to sea-level rise may take the form of actions destructive to estuaries, such as armouring the coastline with berms or dykes that will prevent biological systems from adjusting naturally (e.g. by inland retreat of wetland). An example of an impact on the biophysical processes is the loss of salt marsh and mangroves leading to a decrease in estuarine habitat and food supply. An indirect impact is an increase in turbidity as sediment is no longer trapped by the fringing vegetation around an estuary. This, in turn, reduces light penetration thus causing a decrease in primary production by microalgae, while “tactile” feeders will benefit at the expense of

"visual" feeders (e.g. estuarine round herring *Gilchristella aestuaria* vs Cape silverside *Atherina breviceps*). Furthermore, some mangrove and salt marsh systems may not be able to keep pace with more rapid levels of sea-level rise. Mangroves may out compete saltmashes in the subtropical areas in response to rising sea level (Adam 2002).

13.3 Key findings

In summary, the impacts of climate change on estuaries include:

- Changes in precipitation and runoff with the following consequences for estuaries:
    - Modifications in the extent of saline water intrusion;
    - Changes in the frequency and duration of mouth closure;
    - Decrease or increase in nutrients fluxes; and
    - Changes in the magnitude and frequency of floods and related sediment deposition/erosion cycles.
- Changes in the dilution and or flushing of pollutants;
- Rising temperatures from both the land and sea;
- Sea level rise;
- Changes in ocean circulation patterns; and
- Increase in frequency and intensity of coastal storms.

The details of this assessment are presented in **Error! Reference source not found.**. The esultant analysis shows that the KwaZulu-Natal and West Coast estuaries will be the most effected by climate change from a structural and functional perspective. In the case of KwaZulu-Natal the major driver of change is increased runoff into the numerous small, perched (estuary volume decrease by 50 to 90% when open to sea) temporarily open/closed estuaries, which will result in more open mouth conditions, a decrease in retention time and a related decrease in primary productivity and nursery function.

Table 13.1 Summary of the responses of the South African estuaries to climate change drivers

Drivers	Response	Sub-Tropical		Warm Temperate		Cool Temperate
		KwaZulu Natal	Transkei	Eastern Cape	Southern Cape	Western Cape
Changes in ocean circulation patterns	Current speed	Intensification of the Agulhas Current	Intensification of the Agulhas Current	Intensification of the Agulhas Current	Possible increase in divergence of the Agulhas Current from the coast due to Upstream Retroflection, or increase in warm saline water leakage from the Indian to the Atlantic via the Agulhas retroflection. Unclear which process will dominate.	Benguela Current (Drift) will increase with global warming due to the spin up of Southern Hemisphere Subtropical Gyres, which will lead to intensification of eastern boundary upwelling. However, this may be counteracted by increase insolation due to clear skies over the upwelling region, or the leakage of warm Agulhas waters due to rings and filaments.
	Current position	Intensification of Agulhas Current may lead to increase meso-scale meandering in this very stable current due to Natal Pulses. This will force the current on average futher off-shore	Intensification of Agulhas Current may lead to increase meso-scale meandering in this very stable current due to Natal Pulses. This will force the current on average futher off-shore	Intensification of Agulhas Current may lead to increase meso-scale meandering in this very stable current due to Natal Pulses. This will force the current on average futher off-shore	Still unclear whether upstream or down stream mode of the Southern Agulhas Current will dominate. An upstream mode will lead to an absence of the Agulhas Curent along the south western coast of south Africa.	Unknown, assume similar to present
	Upwelling	Increase shelf upwelling - due to increase pulses, topographic upwelling and Ekman veering. Increasing nutrient input and related primary production in the nearshore and lower reaches of open estuaries	Increase shelf upwelling. Increasing nutrient input and related primary production in the nearshore and lower reaches of open estuaries	Increase shelf upwelling but the coastal shelf is very wide so the effect of increased nutrient input and production on the nearshore and lower reaches of open estuaries is less apparent	Increase upwelling downstream from prominent capes due to local wind regimes. Increasing nutrient input and related primary production in the nearshore and lower reaches of open estuaries	More upwelling due to a increased wind stress, causing increase nutrient input and related primary production in nearshore and estuaries. Also a related decrease in black tide events (i.e. Berg Estuary)
Changes in precipitation	Changes in runoff	Significant increase in runoff, both in base flow and in flood events.	An increase in runoff both in base flow and in flood events.	Similar to present, with a slight increase in runoff (base flow and floods)	Similar to present, with a slight decrease in runoff with especially baseflows reduced	Significant decrease in runoff, with especially baseflows severely reduced.
	Changes in the frequency and duration of mouth closure	Temporarily open systems close less often in decreasing periods of high productivity. These system most productive when closed.	Increased flow causing a slight decrease in closed mouth conditions in temporarily open systems is expected. This could be offset by increased sedimentation.	Similar to present, but some decrease in closed conditions in temporarily open systems depending on the size of the system and the inflow regime.	Similar to present, with a some increase in closed conditions in temporarily open systems depending on the size of the system and the inflow regime.	Decrease in runoff causing a significant increase in closed conditions in temporarily open systems
	Modifications in the salinity regime	Less salinity penetration in large permanently open and smaller temporarily open systems. (KZN characterise by limited saltwater penetration under open mouth conditions resulting in fresh closed conditions.)	Some decrease in salinity penetration of permanently open systems. An increase in open mouth conditions for some smaller temporarily open systems depending on the size of the system and the inflow	Similar to present, but could have a slight decrease in salinity penetration in some large open estuaries. A slight increase in open mouth conditions for some smaller temporarily open systems depending on the size	Similar to present, but limited increase in salinity penetration in some large permanently open estuaries. Some freshening (decline in average salinity) under increased closed mouth conditions in some smaller	Significant increase salinity penetration in large permanently open estuaries, but some freshening (decline in average salinity) under increased closed mouth conditions in smaller temporarily open systems

Drivers	Response	Sub-Tropical		Warm Temperate		Cool Temperate
		KwaZulu Natal	Transkei	Eastern Cape	Southern Cape	Western Cape
			regime	of the system and the inflow regime	temporarily open systems.	
	Decrease/ increase in nutrients fluxes	Increased nutrient supply, but less retention in the large number of smaller perched systems that drain > 50 % of volume when open. Decrease in primary production. The exceptions are the estuarine lakes and bays which have higher retention and will likely have an increase in production.	Some increase in nutrient supply, more retention as systems are less perched, increased primary production	Very similar to present, but with some increase in nutrient supply, more retention as systems are less perched, increased primary production	Very similar to present, but with some decrease in nutrient supply which is not likely to be offset by increased retention. Resulting in a some loss of primary production	Decrease in nutrient supply which is not likely to be offset by increased retention. Resulting in a significant loss in primary production
	Changes in floods (magnitude, duration and frequency) and sediment deposition/erosion cycles	Increase in flooding with related increased erosion in catchments will lead to more infilling and decreased substrate stability – resulting in depauperate biotic communities as there is little floodplain habitat available on the KZN coast – floodplains mostly confined to estuarine lakes and bays.	Some increase in flooding with related increased erosion in catchments (exacerbated by current land use). This will lead to more infilling, changes of sandy habitats to muddy habitats and a decrease in substrate stability – resulting in changes in the biotic community composition	Very similar to present, with some increase in flooding and related erosion in catchment. This will lead to some infilling, changes of sandy habitats to muddy habitats and a decrease substrate stability – resulting in some changes in the biotic community composition	Very similar to present, with slight increase in flooding with a related increased erosion in catchments. This will lead to some infilling, changes of sandy habitats to muddy habitats and a decrease in substrate stability – resulting in some changes in the biotic community composition	Slight increase in flooding with some increased in erosion (exacerbated by land use changes under climate change). This will lead to some infilling, changes of sandy habitats to muddy habitats and a decrease in substrate stability – resulting in some changes in the biotic community composition
	Changes in the dilution and or flushing of pollutants	Increased flushing of pollutants from the water column and sediment. Urban nodes: Durban, Richards bay.	Increased flushing of pollutants from the water column and sediment	Very similar to present, with slight increase in flushing of pollutants from the water column and sediment. Urban nodes: East London, Port Elizabeth.	Very similar to present, with slight decrease in flushing of pollutants from the water column. Increased flooding might still assist with flushing of pollutants from sediment. Urban nodes: Cape Town.	Significant decrease in flushing of pollutants from the water column. Increased flooding might still assist with flushing of pollutants from sediment. Urban nodes: Cape Town.
Sea level rise (+0.5 – +1.0 m MSL)	Increase salinity penetration	Effect of sea level rise is offset by increased runoff.	Increased salinity penetration in the middle and lower reaches. In the upper reaches salinity penetration will be mostly similar to present, or slightly less, as runoff is generally the major driver especially if steep topography dominates.	Increased salinity penetration in the middle and lower reaches. In the upper reaches salinity penetration will be mostly similar to present mostly similar to present, or slightly less, as runoff is generally the major driver where steep topography dominates.	Increased salinity penetration in the middle and lower reaches. In the upper reaches salinity penetration will be mostly similar to present - or slightly more- as runoff is generally the major driver in the upper reaches where steep topography dominates.	Significant increase in salinity penetration in the lower, middle and upper reaches. (The topography is less steep and runoff is also likely to decrease overall in the region, the saline water could therefore penetrate significantly further upstream.)
	Increased tidal flushing/prism	Very similar to present as the region has predominantly small systems with steep topography. The exception to the rule is the large estuarine lakes and bays which have extensive flood	Very similar to present as the regional has predominantly small systems with steep topography. The exception to the rule is the larger permanently open systems that	Significant increase as the topography is less steep, especially in the case of the larger permanently open systems. The smaller systems with steep topography will be	Significant increase as the topography is less steep, especially in the case of the large estuarine lakes, bay and permanently open systems. A few small systems with steep	Significant increase as the topography is less steep, especially in the case of the large permanently open systems.

Drivers	Response	Sub-Tropical		Warm Temperate		Cool Temperate
		KwaZulu Natal	Transkei	Eastern Cape	Southern Cape	Western Cape
		plains.	have some flood plains.	similar to present.	topography will be similar to present.	
	Changes in the frequency and duration of mouth closure	Increased tidal prisms in the estuarine lakes will together with increased runoff lead to an increase in open mouth conditions.	Increase in open mouth conditions will mostly be driven by increased runoff as tidal prisms will only increase marginally. Benefits of increased sea level rise in some cases may also be offset by changes in the degree to which mouths are protected from wave action by submerged coastal features.	Increased tidal prisms in medium to larger temporarily open stems will assist with maintaining open mouth conditions. Benefits of increased sea level rise in some cases may be offset by changes in the degree to which mouths are protected from wave action by submerged coastal features.	Increased tidal prisms in medium to larger temporarily open stems and estuarine lakes will assist with maintaining open mouth conditions. Benefits of increased sea level rise in some cases may be offset by changes the degree to which mouths are protected from wave action by submerged coastal features.	Increased tidal prisms in medium to larger temporarily open stems will assist with maintaining open mouth conditions in the face of lfow reductions, but the benefits of increased sea level rise may be offset by changes in mouth protection.
Rising temperatures	Species range extensions	Slight increase in temperature from present	Significant increase in the temperature of the nearshore environment is causing a significant increase in subtropical species and a related loss of Temperate habitat	Significant increase in the temperature of the nearshore environment is causing a significant increase in subtropical species and a related loss of Temperate habitat	An increase in the temperature of the nearshore environment is causing a significant increase in subtropical species and a related loss of Temperate habitat	Slight decrease in temperature from present due to increase upwelling, Species distribution likely to remain the same.
	Changes in community composition along land – sea gradients	Similar to present	Subtropical species dominate fresh and brackish communities in the upper reaches, while Temperate species dominate lower reaches in invertebrates.	Subtropical species dominate fresh and brackish communities in the upper reaches, while Temperate species dominate lower reaches in invertebrates.	Similar to present	Similar to present
Decrease pH	Calcifying organisms require more energy to maintain dissolving exoskeleton	Reduce production in calcifying organisms	Reduce production in calcifying organisms	Reduce production in calcifying organisms	Reduce production in calcifying organisms	Reduce production in calcifying organisms
Increase in frequency and intensity of coastal storms	Changes in the frequency and duration of mouth closure	Similar to present, as KZN is largely wave dominated and increased storminess is likely to be offset by increased runoff.	Similar to present, as the estuaries in the region are generally very sheltered and increased storminess is likely to be offset by increased runoff.	Increased closure as sediment is readily available and there are less changes in runoff.	Increased closure as sediment is readily available. The exception is the Tsitsikamma coast which is generally protected and with limited sediment.	Similar to present, as smaller systems is predominantly closed due to a lack of runoff. Larger systems should remain open. The Diep which close more often.
	Changes in the frequency and duration of overwash	Increase overwash. Berm height presently 3 – 3.5 m MSL. Can increase by 0.5 – 1.0 m if sediment is available .	Increase overwash. Berm height presently 2.5– 3.0 m MSL. Can increase by 0.5 – 1.0 m if sediment is available.	Increase overwash. Berm height presently 2.5– 3.0 m MSL. Can increase by 0.5 – 1.0 m if sediment is available.	Increase overwash. Berm height presently 2.5– 3.0 m MSL. Can increase by 0.5 – 1.0 m if sediment is available.	Increase overwash. Berm height presently 2.5– 3.5 m MSL. Can increase by 0.5 – 1.0 m if sediment is available.
	Marine sediment	Increased sediment transport potential; actual increase where sufficient sediment is available.	Increased sediment transport potential; actual increase where sufficient sediment is available.	Increased sediment transport potential; actual increase where sufficient sediment is available.	Increased sediment transport potential; actual increase where sufficient sediment is available.	Increased sediment transport potential; actual increase where sufficient sediment is available.

In contrast, the West Coast estuaries will be negatively affected as a result of reduction in runoff (with a related decrease in nutrient supply) and an increase in sea level rise. This in turn will increase salinity penetration in the permanently open systems and increase mouth closure in the temporarily open estuaries. Similar to KwaZulu-Natal, the West Coast estuaries will display a decrease in primary production and a loss of nursery function.

Although the Wild Coast, Eastern and Southern Cape estuaries will also show some shifts in mouth states, nutrient supply, salinity distribution and ultimately production (e.g. fisheries), the most obvious impacts of climate change along these coastal regions will be the change in temperature (nearshore and land) and the associated range extensions of species and community composition changes. The effect of sea level rise, and related increase in tidal prism, will be less apparent along the KwaZulu-Natal coastline, where the majority of the estuaries are perched (the exception here are the estuarine lakes and bays), while it will be more apparent along the Southern and Western Cape coast with their more extended coastal floodplains.

In summary, contrary to the current monitoring programmes which are focusing on biotic responses in the biogeographic transition zones (e.g. Transkei and western Southern Cape) the most significant structural and functional changes will be in the estuaries of KwaZulu-Natal (subtropical) and the Western Cape (cool-Temperate). These changes are likely to advantage generalist species over specialist and may lead to localised extinctions.

13.4 Key climate change messages

Some of the key climate change messages for estuaries are that:

- Climate change is one of many pressures acting on estuaries and should be viewed as an additional form of anthropogenic alteration (and not a separate pressure) in an already stressed ecosystem type, i.e. climate change acts as an accelerator of ecosystem change in estuaries. It is necessary to understand the potential amplification of variability that climate change may have on the existing freshwater resource (and its use), together with the potential impact on estuarine and marine production, as well as the harvesting of resources in the marine and estuarine environments. It is thus necessary to integrate climate change and non-climate change threats. Climate change should be seen as a catalyst to fast track freshwater resource issues that need addressing, e.g. ecological water allocations (Day and Moore 2009).

- The ability to predict the response of estuaries to climate change, and to plan for how to assist estuaries to adapt to these changes is still hindered by a lack of good prediction tools and the lack of a fundamental understanding of many of the effects of climate variability on the physical, chemical and biological characteristics of the aquatic domain (Meyer, Sale Mulholland and Poff 1999). We are limited by the availability of both data (e.g. long term flow data, temperature data, mouth conditions, wave height, species data) and models (e.g. flow changes, linking hydrological regimes to ecosystem processes, large scale ocean current changes). At the same time, this uncertainty around forecasting change should not be seen as an impossible obstacle to understanding and developing adaptive mechanisms to reduce the effects of climate change on estuarine resources. Accurate forecasting is not obligatory to begin the process of adapting to climate change, as major trends are often obvious and meaningful actions can be instigated based observed trends.

- Stressed ecosystems have a lower resilience to change. By increasing or maintaining the resilience of estuaries, the ability of a system to recover after, for example an exceptional flood or drought, is enhanced. The resilience of an estuary is influenced by the intactness of its catchment and estuarine functional zone. The processes underpinning the goods and services, such as the assimilation and cycling of nutrients in estuaries, also needs to be protected if resilience is to be maintained. For example, developments within the estuarine functional zone will reduce the resilience of the system to extreme flooding, as little lateral movement would be possible. A way to ensure resilience is the determination and implementation of the Estuarine ecological water requirements (Reserves) and the protection/rehabilitation of the estuarine functional zone. Healthy estuaries equate to estuaries resilient to change.

- It is essential that climate change, and the projected effects thereof, be integrated into current plans and policies dealing with management and governance of estuaries, e.g. the water and coastal management sector. Current planning tools need to focus on integration of the synergistic effects of global change. In addition, adaptation includes adjusting to situations, developing coping strategies and impact responses. Adaptation may be behavioural or involve mitigation such as engineering solutions. This requires an adaptive management approach which is supported by monitoring and frequent review..

14. SPECIES OF SPECIAL CONCERN

J Adams, S Lambeth, J Turpie and L van Niekerk

This section provides a summary of estuarine species of special concern (i.e. species that are being harvested, exploited or Red data species).

14.1 Plants

The South African National Estuary Biodiversity Plan (Section 12, Turpie et al. 2012) sets national conservation targets for supra- and intertidal salt marsh at 20% of each estuarine habitat type at the national level. So far only 25% of the supratidal and 12% of the intertidal salt marsh is formally protected within estuaries.

The use of mangrove and swamp forest is regulated under the National Forests Act No. 84 of 1998 (RSA 1998) and destruction or harvesting of indigenous trees requires a licence. The mangrove trees and swamp forest are protected under this act but the sediment environment under the forests and the associated estuarine habitat is not designated as a nature reserve or protected area (Traynor and Hill 2008).

The taxonomy of some salt marsh species is under currently under review; this makes it difficult to determine their population sizes, report on their threat status or set targets for protection. However according to the Coastal Act 2008 all coastal wetlands, which include salt marshes and mangroves, form part of the coastal protection zone. The purpose of establishing this zone is to restrict and regulate activities in order to achieve the aims as set out in the Act. Other laws pertaining to species in these areas:

- National Environmental Management Act 1998
- Marine and Living Resources Act 1998
- The National Environmental Management: Biodiversity Act 2004
- National Forestry Act 1998

14.1.1 Status of salt marsh species

Threats to salt marsh habitats include modified river flow, grazing, invasive aliens, sea level rise, inappropriate coastal development, poor catchment practices (e.g. agricultural), trampling, mouth manipulations and pollution.

Mucina et al. (2003) noted that salt marshes, where a variety of macrophytes are found, are important in the overall functioning of estuaries. These areas are extremely stressful habitats that results in distinct zonation patterns along a tidal inundation gradient. Characteristic of a stressful environment is a low species richness and diversity and coarse vegetation patterns where only a few or single species are dominant. Some salt marsh species have been place on the National Red Data List by SANBI and these are described in the table below (Table 14.1). Mucina (Table 14.2) provided a preliminary indication of those estuaries where endemic salt marsh species may occur.

Table 14.1 Salt Marsh species that were considered important for protection due to their status on the National Red Data List.

Species	2009 National Red Data list categories**	Family	Description	limited of distribution
Cotula filifolia Thunb.	CR	Asteraceae	Intertidal salt marsh	17 estuaries
Limonium scabrum (L.f.) Kuntze	DDT	Plumbaginaceae	Supratidal salt marsh	33 estuaries
Prionium serratum (L.f.) Drége ex E.Mey.	Declining	Prionaceae		6 estuaries
Limonium depauperatum (Boiss) R.A. Dyer	EN	Plumbaginaceae	Supratidal salt marsh	1 estuary

CR=Critically endangered; EN=Endangered; DDT=(Data deficient-Insufficient information; Declining=Taxon declining but does not meet any of the five IUCN criteria but threatening processes are causing a decline; LC=Least concerned.

14.1.2 Status of mangrove species

Potential threats to mangroves in South Africa include: wood harvesting, modified freshwater flows, prolonged mouth closure (and subsequent changes to the intertidal habitat), inappropriate coastal development and poor catchment practises. An assessment of mangroves in the estuaries of KwaZulu-Natal showed that mangroves only occurred in those estuaries where the mouth was open for more than 56% of the time, with the exception of St Lucia where the mouth has been closed for longer durations but the mangrove communities have persisted because the roots of the trees were not submerged (Rajkaran et al. 2009). This study also showed that natural recruitment is taking place for all mangrove species except *Xylocarpus granatum* which consists of a few individuals in the Kosi Estuary.

Table 14.2 Preliminary identification of estuaries (west to east) where important populations of macrophytes occur (Mucina pers. comm.) The genera present and the reason for the importance are indicated.

Estuary	*Limonium*	*Plantago*	*Poecilolepis ficoidea*	*Salicornia*	*Sarcocornia*	*Spergularia*	*Triglochin*
Langebaan	-	New species	-	2 lineages	Highest diversity on west coast	New species	-
Uilskraals	1 species	New species	-	2 lineages	High no. of spp.	New species	-
Heuningnes	1 species	New species	Present	1 lineage	5 spp.	New species	2 spp.
Gouritz	1 new endemic sp. found	-	-	-	-	-	-
Knysna	1 new endemic sp. found	New species	-	Endemic lineage *S. knysnaensis*	-	New species	-
Kromme	-	New species	-	Endemic lineage *S. macrocarpa*	3 spp.	New species	2 spp

The greatest threat to the survival of mangroves is removal through harvesting. Kosi Bay and Mhlathuze Estuary were two of the larger forests that showed signs of harvesting (for example the presence of tree or branch stumps in Figure 14.1).



Figure 14.1 Stumps of harvested mangroves at Wavecrest.

In the smaller Wild Coast estuaries where mangrove strands consists of one to three rows of trees, harvesting can have a serious impact and in severe cases completely remove the mangrove habitat resulting in erosion of estuary banks. An assessment of mangroves in the Eastern Cape estuaries showed that there was complete loss of mangroves in the Mnyameni, Mzimvubu and Bulungula estuaries, while at the Mdumbi, Mzamba and Kobonqaba estuaries harvesting had resulted in more than 50% of the trees being removed (Adams et al. 2004).

However, the greatest threat to smaller estuaries seems to be altered water flow due to freshwater abstraction and the change in land use from estuarine vegetation to sugar-cane plantations. These threats affect the hydrology of estuaries and the sediment characteristics (particle size, redox, pH, salinity, temperature) of the mangrove forests, which in turn influence plant recruitment and survival rates. Flow modification can cause ecosystem type changes, e.g. the permanently open Kobonqaba Estuary closed for the first time in recorded history in 2010 causing die-back of mangroves (Figure 14.2). In KwaZulu-Natal development pressures have resulted in the complete loss of mangroves from the Mhlanga, Little Manzimtoti, Lovu, Msimbazi, Mgababa, Ngane, Mahlongwa, Kongweni, Bilanhlolo, Mhlangankulu and Khandandlovu estuaries (Rajkaran and Adams 2011). A loss of mangrove habitat has potentially decreased the diversity of organisms found in estuaries, the nursery function of the forests has been reduced and there has been a loss of protection value given by the mangroves (Gilbert and Janssen, 1998; Fondo and Martens, 1998; Laegdsgaard and Johnson, 2001; Mumby *et al.* 2003).



Figure 14.2 Dead mangroves at the Kobonqaba Estuary due to mouth closure in 2010.

Table 13.3 summarises the information on the mangrove species found in South Africa. All mangrove species, except *Avicennia marina*, occur on the DWA Protected Tree list (Gazette 835 (2010) Notice of the list of protected tree species under the National Forests Act (Act No. 84 of 1998).

Table 14.3 The status of mangrove species in South Africa.

Species	Family	No of estuaries	Max density (no of individuals per ha).	Estuary with highest density.	Average density (no of individuals / ha)*	Red Data categories
Avicennia marina (Forsk. Vierh.)	Avicenniaceae	24	37 933	Echwebeni – Richards Bay	19 839	Least Concerned
Bruguiera gymnorrhiza (L.) Lam	Rhizophoraceae	33	22 119	Kosi Bay	16 533	Least Concerned
Ceriops tagal Perr. C.B.Robinson	Rhizophoraceae	1	28 800	Kosi Bay	-	Least Concerned
Lumnitzera racemosa Willd.	Combretaceae	1	2 866	Kosi Bay	-	Least Concerned
Rhizophora mucronata (Lam).	Rhizophoraceae	12	78 000	Echwebeni – Richards Bay	34 967	Least Concerned
Xylocarpus granatum König 1784	Meliaceae	1	Only 1 individual found	Kosi Bay	Only 1 individual found.	Least Concerned

* These values are taken from data collected at Kosi Bay, St Lucia, Echwebeni and Mhlathuze Estuary (Rajkaran and Adams, *in press*).
**http://www.sanbi.org/index.php?option=com_content&view=article&id=250:red-data-lists-project&catid=125:part-of-biodiversity-topics&Itemid=793

14.2 Invertebrates

Exploitation of invertebrates used as bait by recreational and subsistence anglers is a focal activity in most estuaries around the South African coast. The burrowing prawns *Callianassa kraussi* and *Upogebia africana* are the most common bait organisms targeted by collectors (Wooldridge 2007), although pencil bait (Solen spp.) and bloodworm *Arenicola loveni* are also popular bait organisms. Sand and mud prawns are particularly abundant in warm and cool Temperate estuaries. *C. kraussi* generally occurs in sand and *U. africana* in more muddy sediments. The sand prawn is found in both permanently open and temporary open estuaries, while the mudprawn is only abundant in permanently open estuaries. Mud prawns are generally absent from estuaries that close for 'extended' periods.

Bivalve molluscs are relatively scarce in South African estuaries and they do not reach the high densities recorded in Europe. Pencil bait species such as *Solen capensis* and *S. cylindraceus* may be locally common in some estuaries (Hodgson 1987), with the former species present in sandy substrata and *S. cylindraceus* occurring in more muddy areas. Both Solen species concentrate around the inter- and sub-tidal interface. The bloodworm *Arenicola loveni loveni* is also a popular bait organism, although distribution is not restricted to estuaries. Estuarine abundance levels are highly variable and the species is easily over-exploited in some estuaries where it occurs. Bloodworms prefer sandy substrata and relatively high salinities and are therefore found on sandbanks near the mouth of open estuaries.

The Marine Living Resources Act (No. 18 of 1998) provides for the sustainable use of our marine living resources to ensure that estuaries in South Africa remain productive and biologically diverse. Bait collection is seen as an integral part of resource management and focuses on the way in which bait is collected and the maximum number of organisms that may be removed per day by collectors. The most common legal method used by invertebrate bait collectors is the prawn or suction pump. Pencil bait is more commonly collected using a length of hooked wire. In both these methods, sediment core disturbance is minimal when compared to the amount of sediment turnover using a spade or forked shovel. However, it is important to distinguish between the number of bait organisms removed and the longer term effects on the target species, associated benthic communities and birds utilizing the former undisturbed habitat.

Although a relatively small proportion of the targeted species is removed annually, bait collecting inflicts serious damage on other components of the macrofaunal assemblage (Wooldridge 2007). Those species not utilized by fishermen were negatively impacted through avian or fish predation and physical injury caused by harvesting activities. Long-term effects of bait-collecting on biota inhabiting the sediment are also apparent. The impact of bait pumping and trampling of mudflats may affect the sediment down to at least 20 cm. The impact of illegal bait collecting using a spade and overturning large volumes of sediment will also have severe negative consequences for many benthic species.

14.3 Fish

Approximately 2 000 tonnes of fish, comprising 80 species, are caught in South African estuaries each year. The harder *Liza richardsonii* (32%), spotted grunter *Pomadasys commersonnii* (20%), dusky kob *Argyrosomus japonicus* (18%) and mixed mullet

(predominantly *Mugil cephalus*, *Liza dumerili* and *L. tricuspidens* 10%) provide the bulk of this catch. Most (540 t) of the harder catch is from west coast estuaries, of which more than 80% is due to illicit gillnetting. All dusky kob and spotted grunter catches are from the warm Temperate and subtropical east coast. Historically, white steenbras *Lithognathus lithognathus* contributed significantly (>20%) to estuary (and surf-zone) catches on the west and east coasts but stock collapse has since seen this drop to <3%. Harder and spotted grunter are also overexploited.

Although fishing is the predominant cause of population decline of most exploited species, other anthropogenic influences such as altered freshwater flows, aquaculture and loss of estuary habitat through development, may play an equal or greater role. The current status of the harder stock on the west coast is almost entirely a result of illegal gillnetting in the Berg Estuary where approximately 400 t of mostly small immature fish are landed annually. This has resulted in a 500-600 t drop (or halving) of catches and a substantial loss of livelihood by the legitimate commercial harder fishery in the sea.

Altered freshwater flows have influenced the recruitment success of most estuary-associated species but one of the best examples is the Natal stumpnose *Rhabdosargus sarba*. Already overexploited, prolonged drought and persistent closure of the St Lucia Estuary over the last 10 years has prevented juveniles of these estuary-dependent fish from recruiting into the system, resulting in population collapse (Mann et al. 2007, James et al. 2004),

Marine and freshwater aquaculture have the potential to directly and indirectly impact the wild populations of estuary-associated species through genetic, pathogen and parasite contamination, to the overexploitation of fry and larvae for ranching purposes. Continent-wide collapse of European and Asian anguillid eel populations has been directly attributed to a combination of all these factors. Since then, industry attention has shifted to the southern hemisphere, especially South Africa where eel populations are deemed healthier than elsewhere. Despite strict control and an embargo on imports from across this country's borders, some east coast river systems have become contaminated by parasites and other pathogens that have been traced back to illegally imported Madagascan eels **(**Weyl et al. 2010).

It is internationally acknowledged that there is difficulty in categorizing exploited fish species according to IUCN criteria, as well-managed stocks are kept at levels that automatically relegate them into the vulnerable category. An attempt to overcome this problem for fish caught by the inshore fisheries in South Africa was made in a prioritization exercise that

used both fisheries and conservation criteria ranging from fishery participation and economic value to vulnerable life-history characteristics (Lamberth and Joubert 1998). Eleven of the top 30 fish species countrywide in terms of vulnerability, conservation and fisheries importance, and needing management attention, were estuary-associated. Seven of these; dusky kob *Argyrosomus japonicus*, white steenbras *Lithognathus lithognathus*, harder *Liza richardsonii*, spotted grunter *Pomadasys commerrsonii*, Natal stumpnose *Rhabdosargus sarba*, Cape stumpnose *Rhabdosargus holubi* and leervis *Lichia amia* are obligate estuary-dependent fish whose juveniles have to spend their first year or two in estuaries to complete their lifecycle.

Table 14.4 The stock status (% of reference or near pristine breeding potential, catch-per-unit-effort or catch composition) of important utilized estuarine-associated species in South Africa.

Species	Common Name	% Pristine	Stock Status
Argyrosomus japonicus	Dusky kob	4	Collapsed
Lithognathus lithognathus	White steenbras	6	Collapsed
Rhabdosargus globiceps	White stumpnose	20	Collapsed
Lutjanus argentimaculatus	River snapper	30	Overexploited
Pomatomus saltatrix	Elf	34	Overexploited
Diplodus capensis	Dassie/blacktail	35	Overexploited
Rhabdosargus sarba	Natal stumpnose	34 *	Overexploited
Acanthopagrus vagus	Perch/riverbream	24**	Overexploited
Anguilla spp.	Anguillid eels (4 species)	<40	Overexploited/vulnerable
Rhabdosargus holubi	Cape stumpnose	40	Optimally exploited
Myxus capensis	Freshwater mullet	<40	Overexploited/vulnerable
Liza richardsonii	Harder	<40	Overexploited
Pomadasys commersonnii	Spotted grunter	<40	Overexploited/ Optimally
Carcharhinus leucas	Zambezi shark	<40	Overexploited/vulnerable

*(James et al. 2004), ** (James et al 2008)

Given the difficulties outlined above, as well as those arising from uncertain taxonomic status, few South African estuary-associated species (especially those exploited) have been evaluated for inclusion on the IUCN Red List. The only exploited species to have made it on to the list is the white steenbras *Lithognathus lithognathus* but in the lower risk category. The Knysna seahorse *Hippocampus capensis* is endangered whereas the river pipefish *Syngnathus watermeyeri*, largetooth sawfish *Pristis microdon*, smalltooth sawfish *Pristis pectinata* and green sawfish *Pristis zijsron* are critically so. Currently the entire families of pipefish and seahorses Syngnathidae and sawfish Pristidae are on the South African Prohibited List (MLRA 1998).

Once given attention, it is likely that many more South African estuary-associated fish will find their way on to the IUCN Red List. Amongst these, are four species of the genus

Argyrosomus, all having experienced population collapse and all four local eel species of the Anguillidae which, similar to their Northern Hemisphere counterparts, are declining due to overexploitation, aquaculture related issues and changes in the quantity and quality of freshwater flow.

14.4 Birds

Turpie and Clark (2007) indicate that 107 non-passerine waterbird species have been counted in South African estuaries. Although estuary dependence is not defined for estuarine bird species listed by Hockey & Turpie (1999), bird species were considered dependent on estuaries if more than 15% of their regional population (as per Hockey et al. 2005) was found in coastal lagoons and estuaries (Turpie et al. 2012).

Thirty-five bird species were therefore considered to be estuary dependant, with eight of them listed as threatened (Table 13.4). Of the latter, the Great White and Pinkbacked Pelican are particularly dependent on the St Lucia estuary within South Africa, the former for breeding, and the latter during the non-breeding period (Turpie et al. 2012). Greater and Lesser Flamingos, while present in many wetlands throughout southern Africa, are particularly abundant at a small number of estuaries, such as the Berg and St Lucia estuaries. The African Black Oystercatcher is predominantly coastal in distribution, but many estuaries support one or more pairs of this species, and estuaries such as the Olifants estuary are frequently utilised by nonbreeding flocks of oystercatchers during winter. Caspian Terns occur at the coast and interior, but along the coast they are found mostly in estuaries, with important breeding colonies in estuaries such as the Berg and St Lucia. Damara Terns breed mainly in Namibia, and their South African population numbers only about 125 pairs. While these are mainly along the coast, some make use of the Heuningness Estuary in the Cape.

Table14.5 Threatened estuary-dependent bird species (Source: Turpie et al. 2012).

Bird species	Scientific name	Red Data Status
Pink backed Pelican	*Pelecanus rufescens*	Vulnerable
Great White Pelican	*Pelecanus onocrotalus*	Near-threatened
Greater Flamingo	*Phoenicopterus roseus*	Near -threatened
Lesser Flamingo	*Phoeniconaias minor*	Near-threatened
African Black Oystercatcher	*Haematopus moquini*	Near-threatened
Caspian Tern	*Sterna caspia*	Near-threatened
Damara Tern	*Sterna balaenarum*	Endangered
Mangrove Kingfisher	*Halcyon senegaloides*	Vulnerable

14.5 Summary

Mangroves have been completely lost from 14 estuaries in South Africa.

- In smaller Eastern Cape estuaries, where mangrove strands consist of one to three rows of trees, harvesting can have a serious impact and in severe case completely depopulate an estuary of mangroves. Complete loss of mangroves is evident in the Mnyameni, Mzimvubu and Bulungula estuaries, while at the Mdumbi,Mzamba and Kobonqaba harvesting has resulted in more than 50% of the trees being removed (Adams et al. 2004).
- In KwaZulu-Natal development pressures, changes in mouth state and water quality have resulted in the complete loss of mangroves from the Mhlanga, Little Manzimtoti, Lovu, Msimbazi, Mgababa, Ngane, Mahlongwa, Kongweni, Bilanhlolo, Mhlangankulu and Khandandlovu (unpublished data).

A total of 18 iconic estuarine associated or dependant fish species (17%) are under severe pressure.

- The stock status of important utilized estuarine-associated species in South Africa list 4 collapsed species, 13 overexploited species, and 1 optimally exploited species.
- Approximately 2 000 tons of fish, comprising 80 species, are caught in South African estuaries each year.The Natal stumpnose *Rhabdosargus sarba* population collapsed as a result of overexploitation and the persistent closure of the St Lucia Estuary.
- While few South African estuary-associated species are listed on IUCN Red List and South African Prohibited List (MLRA 1998), it is likely that many more will find their way on to the lists once attention is given, e.g. four species of the genus *Argyrosomus* and all four local eel species of the Anguillidae.

15. INVASIVE ALIEN SPECIES

L van Niekerk, S Lambeth, J Adams, and F MacKay

Invasive alien species pose a significant threat to estuaries where they cause both ecological and economic damage. Alien species can exert a significant impact upon community structure and functions, by modifying spatial and food chain resources, with direct or indirect effects on the occurrence of indigenous species (Drake et al. 1989; Leppa¨ Koski et al. 2002, Elton 1958). Economic concerns include, for example, burrowing activities that can result in damage to banks and dykes (causing embankment erosion), clogging of water intake filters of industrial cooling water and drinking water plants (during mass occurrences), and alien species preying heavily upon native species of commercial importance. . In recent years, national and international environmental policy and legislation has begun to reflect these threats and respond accordingly (e.g. CBD 1992; IMO 2004, European Commission 2008).

There are four main arguments for explaining observed settlement characteristics in estuaries (Nehring 2006), namely:

(1) Estuaries have a higher potential infection rate than other aquatic zones as a result of their high degree of exposure to direct vectors e.g. proximity to international shipping lanes and ports (ballast water and invasive species attached to the ship hulls); aqua and mariculture industries, the aquarium trade and live bait associated with fishing activities.

(2) Estuarine species have, due to their physiological characteristics, a better chance of being transported alive than marine or freshwater species and they also probably have a higher penetration and establishment potential after release.

(3) Estuaries have the greatest natural 'indigenous species minimum' or lowest number of indigenous species of all aquatic domains so that more alien species can potentially establish in this domain. This may be especially true in South Africa due the sporadic flushing (resetting) of system by relatively large floods. Allowing for potentially unsaturated ecological niches at times.

(4) Salt-tolerant freshwater alien species, introduced into inland waters, reach the coast in the estuaries.

The combination of brackish waters colonised by physiologically generalist species, potentially unsaturated ecological niches, and high exposure to international ship traffic in some of the larger estuaries, leads to the highest potential infection rate for any aquatic

system. In addition, estuaries are also subjected to a two-sided invasion pressure by alien species, via the ocean and via inland waters. The identification of such patterns is an important prerequisite for the development of a forward-looking alien monitoring and management strategy. Terms and definitions used in this section are based on the Convention on Biological Diversity (CBD 1992, 2000): an “Alien species” is defined as a species, subspecies, or lower taxon introduced outside its normal past or present distribution. An “Established alien species” is an alien species that is reproducing in the wild and has established a durable population in an area. An “Invasive alien species” is an alien species whose establishment and spread threaten ecosystems, habitats or species with economic or environmental harm. “Introduction” is defined as the movement, by human agency, of a species, subspecies, or lower taxon outside its natural range (past or present). “Cryptogenic species” may be either a native species or an introduced species, with clear evidence for either origin being absent.

15.1 Alien Plants

Alien plants in South African estuaries can range from aquatic plants e.g. water hyacinth, water fern, parrot’s feather to terrestrial examples such as *Sesbania* and Australian *Acacia* species (Adams et al. 1999). Estuary habitats are stressful environments where plants need to be adapted to high salinity and waterlogged conditions. This limits the extent of invasive plants, particularly in the intertidal zone. The status of invasive plants in South African estuaries has received little attention in recent years. Coetzee et al. (1997) assessed the condition of estuarine macrophyte habitats in Cape estuaries. The most common impact in supratidal salt marshes was encroachment by invasive plants, followed by trampling. Invasive plants were present in 75% of the 33 Cape estuaries investigated. In a study of the False Bay estuaries, O’Callaghan (1990) showed that alien vegetation encroachment was a major factor causing changes in the estuarine vegetation. This occurred in response to disturbance, particularly when there was a restriction in tidal exchange. The Conservation of Agricultural Resources Act 43 of 1983 (CARA) classifies invasive plant species into three categories; Category 1 are prohibited weeds that must be controlled by all means; Category 2 includes plants with commercial value that may be planted in demarcated areas subject to a permit and providing that steps are in place to control them and Category 3 are ornamental plants that may no longer be planted or traded but may remain in place provided a permit is obtained and steps are taken to control their spread. The CARA status of plants found in estuaries is indicated in Table 15.5 as summarised in Richardson and van Wilgen 2004, Coetzee 1995; van Wyk and van Wilgen 2002; Zimmermann et. al.2004; Henderson et al. 2006.

Table 15.1 Invasive, alien or non-endemic species in South African estaurine habitats (modified from Coetzee 1995).

Botanical name	Common name	Estuarine plant community impacted	CARA
Acacia cyclops A.Cunn. ex G.Don	Rooikrans, Red-eye	Invades upper reaches of estuaries and rivers	1
Acacia longifolia (Andr.) Willd.	Long - leaved wattle	Invades upper reaches of estuaries and rivers	1
Acacia mearnsii De Wild.	Black wattle	Invades upper reaches of estuaries and rivers	1
Acacia saligna (Labill.) H.L.Wendl.	Port Jackson willow	Invades upper reaches of estuaries and rivers	2
Eichhornia crassipes (C.Mart.) Solms	Water hyacinth	Water column/ submerged macrophyte habitat	1
Salvinia molesta D.S.Mitch.	Kariba weed	Water column/ submerged macrophyte habitat	1
Myriophyllum aquaticum (Vell.) Verdc.	Parrot's feather	Water column/ submerged macrophyte habitat, intertidal salt marsh	1
Pennisetum clandestinum Hochst. Ex Chiov.	Kikuyu grass	Invades supratidal salt marsh	-
Pereskia aculeata Mill.	Barbados gooseberry	Supratidal salt marsh Invades riparian habitats	1
Spartina alterniflora	Smooth cord grass	Intertidal and supratidal salt marsh	?
Psidium guajava L.	Guava	Supratidal salt marsh Invades riparian habitats	2
Ricinus communis L	Castor-oil plant	Supratidal salt marsh Invades riparian habitats	2
Sesbania punicea (Cav.) Benth.	Red sesbania	Supratidal salt marsh Invades riparian habitats	1

15.2 Fish

All of the introduced or translocated fish in South African estuaries are freshwater species (Table 15.2 and Table 15.3). Most of these, e.g. smallmouth bass *Micropterus dolomieu* and carp *Cyprinus carpio*, were introduced from the northern hemisphere in the late 1800s until the 1970s to enhance freshwater angling, as indigenous fish were regarded as unsuitable. Smaller species such as bluegill sunfish *Lepomis macrochirus* and mosquitofish *Gambusia affinis* were imported either as fodder fish to feed the larger introduced species or as mosquito control. Some, e.g. guppy *Poecilia reticulata*, are home aquaria escapees that established wild populations. A similar philosophy was followed with regards to southern African species, which were translocated either as angling fish or in the hope of establishing an aquaculture industry. Range expansion of both introduced and translocated species throughout South Africa was further facilitated by interbasin transfer schemes, irrigation and stormwater networks as well as intentionally or inadvertently by recreational anglers and other water users as they moved between water bodies.

Panel 8: Emerging Pressures….. First record of the intertidal invasive plant Spartina alterniflora

In 2004, the intertidal invasive salt marsh grass, *Spartina alterniflora*, was observed for the first time in a temporarily open/closed system in South Africa, at the Groot Brak Estuary. It is a perennial, deciduous, salt tolerant grass that can grow up to 2 m tall and is found in the intertidal areas of estuaries. Its leaves are bright green to grey-green, up to 60 cm long, pointed and protrude from the stem at an angle. The plant is wind pollinated with large amounts of seed produced, sometimes in the first year. However the main form of spread is vegetative, i.e. through rhizomes/underground stems. The deep roots are capable of growth if broken off. The root system biomass is as much as five times that of the above ground biomass. *Spartina alterniflora* has spread at an alarming rate of 0.15 ha yr-1 since 2004 to occupy a present cover of 0.87 ha (2010), spreading laterally at a rate of 1.1 m yr-1 (unpublished data). If left uncontrolled, *Spartina alterniflora* has the potential to replace 42.9 ha of habitat, or 41% of the total estuarine vegetation. When the grass first establishes in an estuary, it forms monospecific circular stands. These later coalesce to form larger stands until entire open mudflats are transformed to closed habitats. It is an aggressive invader due to its ability to accrete sediment and its fast lateral expansion rates. Expansion is currently taking place in habitats in the lower to upper intertidal marsh area, displacing salt marsh species. Changes in the benthic community abundance and composition can be expected. *Spartina alterniflora* invasions also cause a trophic shift from an algal- to a detritus-based food web resulting in a loss of species richness and diversity of fish, as well as a reduction in shore and wading birds. The movement of seeds and vegetative material by tides and currents to other estuaries when the mouth is open is a significant future threat to the biodiversity of South Africa's estuaries.

It is of concern that it has taken more than 6 years to mobilize action to eradicate this highly invasive species. After much deliberation between the different management authorities, the Working for Water programme in 2011 initiated 3 trial approaches investigating eradication through hand removal and digging at some sites and chemical treatment with the non-selective systemic herbicide, glyphosate, at other sites. This is the best suited herbicide for the aquatic environment. A 0.5% foliar application was used and initial findings indicate that foliar application of herbicides is a good option for control. At the mechanical control sites which involved physical removal of Spartina there is some salt marsh growth already in cleared areas which is very encouraging. Unfortunately, there is also quite a lot of regrowth of the Spartina. At the chemical control sites there is still a lot of dead biomass which should be removed.



Tall *Spartina alterniflora* adjacent to native salt marsh in the Groot Brak Estuary.

Ongoing follow-up monitoring and control will still be required over the following years to ensure its total eradication from the Groot Brak Estuary, and the country as a whole. Working for Water will be responsible for ongoing operational aspects, such as chemical treatment. While SANBI and MNNU have entered into a five year Memorandum of Understanding (MoU) under which SANBI will support the ongoing annual monitoring and research (e.g. rate of regrowth and extend of infestation) of the Spartina to ensure the success of the eradication programme.

Source: T Riddin & JB Adams

Table 15.2 List of introduced fish species in the estuaries of South Africa

Species name	Common name	% occurrence (130 estuaries)	SA range
Micropterus salmoides	Largemouth bass	31	Olifants -Mhlathuze
Micropterus dolomieu	Smallmouth bass	24	Olifants - Thukela
Cyprinus carpio	Carp	23	Orange - Thukela
Lepomis macrochirus	Bluegill sunfish	14	Olifants - Thukela
Micropterus punctulatus	Spotted bass	14	Olifants - Thukela
Oncorhynchus mykiss	Rainbow trout	10	Sand - Thukela
Gambusia affinis	Mosquitofish	9	Berg - Knysna
Salmo trutta	Brown trout	3	Olifants - Thukela
Tinca tinca	Tench	2	Lourens - Breede
Poecilia reticulata	Guppy	2	Mgeni - Tongati
Ctenopharyngodon idella	Grass carp	2	Zeekoei - Thukela

Table 15.3 List of Extra-limital (translocated) fish species in the estuaries of South Africa

Species name	Common name	% occurrence (130 estuaries)	SA range (estuary northwards)
Tilapia sparrmanii	Banded tilapia	28	Orange - Mtamvuna
Oreochromis mossambicus	Mozambique tilapia	17	Bushmans
Clarias gariepinus	Sharptooth catfish	11	Orange - Mtamvuna
Tilapia rendalli	Redbreast tilapia	3	Sibaya, KZN estuaries?
Labeobarbus aeneus	Smallmouth yellowfish	3	Orange
Tilapia zillii	Redbelly tilapia	1	?
Oreochromis niloticus	Nile tilapia	1	Not from SA, Rift Valley

Given their freshwater origin, most of the impact of introduced and translocated fish occurs within the river estuary interface or the freshwater reaches of estuaries. In some systems, the suite of introduced species forms an effective barrier against the upstream migration of the young elvers of catadromous eels or facultative catadromous mullet. Recruitment of the larvae and juveniles of estuary-dependent marine species, and the survival of the eggs and young of estuary residents, may be severely compromised through predation by introduced species in estuarine headwaters. Introduced species may also have a competitive advantage but this is likely to be of minor consequence compared to predation. The exception is the Mozambique tilapia *Oreochromis mossambicus* which is tolerant of hypersalinity and is known to opportunistically invade river and estuary reaches from which other species have been excluded by adverse conditions (Lamberth et al. 2010). Territorial and aggressive reproductively active males may also exclude any fish of similar shape and size (Lamberth 2008).

Apart from facilitating the import and establishment of alien invasive species, marine and freshwater aquaculture have the potential to directly and indirectly impact the wild populations of estuary-associated species through genetic, pathogenic and parasitic

contamination, to the overexploitation of indigenous fry and larvae for ranching purposes. Continent-wide collapse of European and Asian anguillid eel populations has been directly attributed to a combination of all these factors. Since then, industry attention has shifted to the southern hemisphere, especially South Africa, where eel populations are deemed healthier than elsewhere. Despite strict control and an embargo on imports from across this country's borders, some east coast river systems have become contaminated by parasites and other pathogens that have been traced back to illegally imported Madagascan eels (Weyl et al. 2010).

15.3 Invertebrates

Until 2004 approximately 20 alien marine species were reported for South Africa, primarily restricted to the Western Cape region (Griffiths and Day 2004). By 2011, a far wider diversity of marine and estuarine introductions was documented. To date a total of 86 introduced and 39 cryptogenic species are stated (Table 15.5) with the highest numbers of species within the Ascidiacea (18), Amphipoda (17) and Cnidaria (15). Not all alien marine species have been found in estuaries in the different biogeographic regions, Mead et al. (2011) stress that even this latest number is an initial estimate of the potential species that have become established in estuarine/marine habitats. The majority of alien species are restricted to harbours (e.g. Ciona intestinalis, Carcinus maenas, Metridium senile) and sheltered estuaries (Robinson et al. 2005). Two main issues have been identified as impeding the identification of the likely, true number of alien invertebrates 1) A small number of taxonomic experts exist in the country, in the eastern subtropics in particular where relatively fewer numbers of non-indigenous species have been reported and 2) Fewer surveys have taken place on the east coast (Griffiths et al. 2009).Table 15.4. List of introduced fish species in the estuaries of South Africa.

Although Griffiths et al. (2009) also contend that much of the shipping traffic, the most likely transport mechanism of the majority of species, has originated in Temperate regions and therefore species were readily established in the Temperate areas of South Africa.

Table 15.4 Numbers of known or suspected introduced marine invertebrates through time and by major group. (After Griffiths et al. 2009). I – Introduced; C - Cryptogenic

Taxonomic group	Griffiths et al. 1992	Griffiths 2000	Robinson et al. 2005	Griffiths et al. 2009	Mead et al. 2011,
Porifera	0	0	1	1	1 (I1)
Cnidaria	0	1	4	4	15 (I13, C2)
Polychaeta	0	1	0	0	10 (I8, C2)

Taxonomic group	Griffiths et al. 1992	Griffiths 2000	Robinson et al. 2005	Griffiths et al. 2009	Mead et al. 2011,
Cirripedia	0	0	1	2	2 (I2)
Copepoda	0	0	0	0	1 (I1)
Isopoda	0	0	2	3	11 (I6, I5)
Amphipoda	0	0	11	11	17 (I11, C6)
Decapoda	3	2	1	1	2 (I2)
Pycnogonida	0	0	0	0	1 (I1)
Gastropoda	7	7	1	1	8 (I5, C3)
Bivalvia	5	5	3	4	12 (I6, C6)
Brachiopoda	0	0	0	0	1 (I1)
Bryozoa	0	0	2	2	6 (I6)
Echinodermata	0	0	1	2	2 (I2)
Ascidiacea	0	6	3	5	18 (I9, C9)

Panel 9: Emerging Pressures….. Spread of the quilted melania – Tarebia granifera

The quilted melania *Tarebia granifera* (Lamarck 1822) is an Asian mollusc species that is both parthenogenetic and ovovoviparious in reproduction nature and together with a long lifespan and slow intrinsic growth rate permits this species to be a successful invader. Being able to reproduce parthenogenetically allows this mollusc to colonise water bodies quickly where high densities form extensive mats in a variety of habitats, on both natural and artificial substrata (Appleton et al. 2009).

There has been an observable and serious invasion by the snail in coastal water bodies, including the estuaries of KwaZulu-Natal. This gastropod has a natural range from Madagascar to India, including countries in Southeast Asia, Japan and through to Hawaii. This species has been transported across the globe via the aquarium trade and is now widely distributed across the world. The appearance of *T. granifera* was first reported in South Africa in 1999 in northern KwaZulu-Natal (Appleton et al. 2009), and was most probably introduced several years earlier via the aquarium trade which receives supplies from Hong Kong and Singapore (Appleton 2003). Since then *T. granifera* has spread rapidly, occurring as far south as Port Shepstone and is spreading northwards into the Mpumalanga Province and the Kruger National Park (Appleton 2003, Wolmarans and de Kock 2006), via passive transportation by waterbirds, waterweeds on boats and trailers and through inland waterbodies (Appleton et al. 2009). *Tarebia granifera*, has been collected from 13 rivers, four lakes and two dams (Appleton et al. 2009). Moreover, this species has now been found in at least 25 estuaries within KwaZulu-Natal, including both estuarine lake systems in the iSimangaliso World Heritage Site, starting with St Lucia in 2005 (Miranda et al 2010). This rapid spread along the east coast and into the hinterland is an indication of the success of this species in being able to colonise freshwater, brack and considerably saline environments under wide ranging temperature conditions (Appleton et al. 2009, Miranda et al. 2010).

The two main concerns associated with the proliferation of *T. granifera* include firstly the changes to the lake ecology through competitive exclusion of native snail and other invertebrate populations (Chaniotis et al. 1980a; 1980b; Pointier 2001, Appleton and Nadasan 2002; Hyslop 2002; Wolmarans and de Kock 2006; Tolley-Jordan and Owen 2008). Depending on the invading environment, the full spectrum of benthic estuarine infauna and epifauna could be affected by the intense competition for space and resources inflicted by the high population densities of *T. granifera* (Appleton et al. 2009).

Other indigenous molluscs at the southern limit of their distribution may be displaced by *T. granifera* (Appleton et al. 2009). Secondly, effects on ecosystem function and processes are an issue given that *T. granifera* is not an exclusive feeder on detritus, but can use large amounts of microphytobenthos, theoretically initiating a cascade effect on the estuarine trophic environment (Miranda et al. 2011).

There are no known control measures for *T. granifera* and that the invasive process is irreversible (Pointier 2001; Appleton 2003). Molluscicides are costly and require repeated application, and are not a wise option in that they are toxic to other aquatic fauna including crustaceans and fish (Pointier 2001). While the desiccation tolerances, thermal and salinity limits, and humidity responses of *T. granifera* are known (Chaniotis et al, 1980a, Miranda et al 2010), the direct control of snails is highly unlikely because of far-reaching environmental implications (Morgan et al. 2001). There are also no known competitors or predators of *T. granifera* because it is itself a strong competitor (Cañete et al. 2004). Currently, the key suggestions for controlling the spread of *T. granifera* are methods of prevention (Appleton 2003) and making the public aware of the potential dangers of inadvertent spread of invasive molluscs (de Kock and Wolmarans 2007).



The scale of typical infestation of *Tarebia granifera* infestation in the estuarine subtidal environment

(Source: F MacKay)

16. LEGISLATIVE RESPONSES

Lara van Niekerk and Susan Taljaard

A major constraint in the effective management and wise use of South Africa's estuarine biodiversity is the fragmentation and overlap in the legislative framework. Most of current environmental legislation is aimed at providing guidance in the management and control of specific activities posing threats to the ecosystems services provided by the natural environment (including estuaries). The legislation is focuses on key sectors, rather than providing a more holistic framework within which to manage estuaries.

The large number of overlapping laws (e.g. 16 international conventions, 10 white papers, over 40 national acts (Van Niekerk and Taljaard 2003)) that define and regulate estuaries makes it difficult to conserve and manage these systems effectively. The key to resolving the legal and administrative confusion lies in aligning the institutional arrangements so that their areas of jurisdiction correspond more closely with those of the ecosystem. DEA is currently in the process of drafting the regulations to be promulgated under the Integrated Coastal Management Act. This presents an excellent opportunity to realign existing legislation and institutional arrangements and to influence pending legislation accordingly. Guiding all future management recommendations should be the fact that estuarine ecosystems are not isolated and that they function in an integrated manner at a local, regional and global scale.

16.1 National legislative framework

National legislation that is especially relevant to estuaries includes:

- National Environmental Management Act (Act 107 of 1998);
- Marine Living Resources Act (Act 18 of 1998);
- National Environmental Management: Integrated Coastal Management (Act 24 of 2008);
- National Water Act (Act 36 of 1998);
- National Environmental Management: Biodiversity Act (Act 10 of 2004);
- Local Government: Municipal Systems Act (Act 32 of 2000); and
- Conservation of Agricultural Resources Act (No. 43 of 1983).

A short summary on each of these are provided below.

16.1.1 National Environmental Management Act (Act 107 of 1998) (NEMA)

DEA is the lead agent for NEMA. NEMA provides for co-operative environmental governance through the establishment of national environmental management principles and procedures, and for their incorporation into decisions affecting the environment. NEMA emphasizes co-operative governance and assists in ensuring that the environmental and related rights in the Constitution are protected. NEMA requires the Department of Environmental Affairs to be the lead agent in ensuring the effective custodianship of the environment. In particular the Act provides that sensitive, vulnerable, highly dynamic or stressed ecosystems (such as estuaries) require specific attention in management and planning procedures, especially where subjected to significant human resource usage and development.

Various activities listed in the NEMA Environmental Impact Assessment ("EIA") Regulations (which came into effect on 2 August 2010) have a bearing on activities within the coastal zone and require environmental authorisation before they can proceed. The Regulations are especially pertinent to estuaries as many estuaries are situated within rapidly expanding development nodes along the South African coast and are under tremendous pressure from human activities. In terms of GN R 544 (listing notice 1), a Basic Assessment must be conducted and in terms of GN R 545 (listing notice 2), an EIA must be conducted. Listing notice 3 identifies activities in sensitive areas (including the estuarine functional zone) that also require environmental authorisation before they may proceed. Some waste disposal activities are also scheduled activities under these regulations.

16.1.2 Marine Living Resources Act (Act 18 of 1998) amended 2000 (MLRA)

The Department of Agriculture, Forestry and Fisheries (DAFF) is currently the lead agent for the MLRA. The objectives and principles of the MLRA deal with the utilization, conservation and management of marine living resources (including estuarine resources), the need to protect whole ecosystems, preserve marine biodiversity and minimize marine pollution, as well as to comply with international law and agreements and to restructure the fishing industry. Marine living resources includes any aquatic plant or animal, whether piscine or not, and any mollusc, crustacean, coral, sponge, holothurian or other echinoderm, reptile and marine mammals and includes their eggs, larvae and all juvenile stages, but does not include sea birds and seals.

Chapter 4 of the MLRA deals with the declaration of Marine Protected Areas (MPAs). This function is currently delegated to DEA. The Act empowers the Minister (DEA) to declare an area to be a Marine Protected Area where various activities are prohibited. These are

stipulated in the Declaration of Areas as Marine Protected Areas (No R.1429, 29 December 2000) promulgated under the Act (www.info.gov.za/documents/regulations/2000.htm).
The Goukou Estuary that forms part of the Stillbay MPA represents the only estuary that has been explicitly promulgated under this act. The LMRA also provides an avenue for special management measures such as the ban on dusky kob nigh fishing in the Breede Estuary.

16.1.3 National Environmental Management: Integrated Coastal Management Act (Act 24 of 2008)

DEA: Chief Directorate: Oceans and Coast is the lead agent for the ICM Act. In relation to the establishment of resource objectives, the Act aims to establish a system of integrated coastal and estuarine management in South Africa. This includes setting the norms, standards and policies for management, promote the conservation of the coastal environment and ensuring the ecologically sustainable development of the coastal zone. The Act also determine the responsible organs of state in relation to coastal areas and to give effect to South Africa's international obligations in relation to coastal matters and to provide for related matters. Chapter 4 in the Act deals with estuaries. Section 33 provides for the National estuarine management protocol and Section 34 stipulates the need for individual Estuarine Management Plans under the Act.

At present there are 26 Estuary Management Plans, in various stages of completion, being developed as part of the implementation of the ICM Act (Table 16.1). This process also includes the establishment of 12 Estuary Forums which form the vital communication platform between coastal communities and the various government departments that play a role in estuarine management. It is strongly recommended that this best practice process be formalised as part of the regulation being drafted under the ICM Act.

Table 16.1. List of Estuary Management Plans currently in varouis stages of development (Source: Pierre De Villiers, CapeNature).

Estuary	Status
Orange	Ramsar plan linked to EMP process - roll out planned for 2011/12
Olifants	Plan and forum establish, but negotiating fishing community inputs
Groot Berg	Plan and forum establish
Verloren	Plan and forum establish
Diep	Plan and forum established
Zandvlei	Plan and forum to be established in 2011
Bot	Plan and forum establish
Klein	Plan and forum establish
Uilkraals	Plan and forum will be established in 2011
Heuningnes	Plan and forum established
Breede	Plan and forum establish
Goukou	Plan and forum will be completed in 2011
Gouritz	Plan still needs to be finalized by farmers and forum will be establsihed in 2011
Knysna	Plan incorporated in PA plan and PA forum exists, but not fully integrated into

Estuary	Status
	government departments
Groot Brak	Have manangnemt plan, but needs to be broadened to EMP framework. Roll out planned for 2011/12.
Klein Brak	Plan and forum will be established in 2011
Keurbooms	Plan and forum will be established in 2011
Gamtoos	Plan and forum established
Sundays	Plan to be finalised with stakeholders and forum will be established in 2011 - emp facilitation phase
Swartkops	Plan and forum established
Nahoon	Planning process initiated
Mtentu	Plan and protected area forum to be established to lead process - 2011
Msikaba	Plan and protected area forum to be established to lead process - 2011
Mbashe	Plan still needs to bedeveloped to include local fishers
Durban Bay	Plan still needs to be developed
Isipingo	Plan still needs to be developed

Chapter 8 of the Coastal Act contains exclusive provisions dealing with Marine and Coastal Pollution Control, specifically addressing 'Discharge of Effluent into coastal waters' (administered in collaboration with DWA) and 'Incineration and Dumping at sea' (e.g. dredge spoil dumping).

16.1.4 National Water Act (Act 36 of 1998) (Water Act)

DWA is the lead agent for the National Water Act. One the important objectives of the Act is to ensure protection of the aquatic ecosystems of South Africa's water resources. Estuaries are classified as a water resource under the Water Act. The Water Resource Protection Policy (under this Act) provides detailed guidelines and procedures for the classification (i.e. predefined health status) and the setting of Resource Quality Objectives for the protection of aquatic ecosystems (including objectives for water quantity, water quality, habitat integrity and biotic integrity). Section 21 of the Water Act classifies a number of activities related to water supply/demand and waste disposal (from land-based activities) as 'water uses' that require authorisation (licensing) by DWA. The Act also identifies certain land use (e.g. activities resulting in stream-flow reduction such as afforestation and cultivation of crops) and infrastructural developments (e.g. altering the bed, banks, course or characteristics of a watercourse) as 'water uses' that require authorisation by DWA.

The determination of the ecological water requirement of individual estuaries provides the scientific basis for local and regional water resources planning and implementation, and assists with identifying critical over-allocations of water resources. Unfortunately, ecological water requirement studies have only been completed on about 12 % of all estuaries (35 systems) over the last decade.

Table 16.2 Summary of Estuarine Ecological Water Requirment studies conducted under the NWA since 2000.

Estuary	Date	EWR Level
Mata	2000	Intermediate
Nahoon	2000	Intermediate
Mdloti (03)	2003	Rapid
Mhlanga	2003	Rapid
Orange	2003	Rapid
Tsitsikamma	2003	Rapid
Breede	2004	Intermediate
St Lucia	2004	Rapid
Thukela	2004	Intermediate
Kromme	2006	Comprehensive
Olifants	2006	Comprehensive
Seekoei	2006	Rapid
Tongati	2006	Rapid
Matjies	2007	Intermediate
Mdloti (07)	2007	Intermediate
Siyaya	2007	Rapid
Sout	2007	Intermediate
Tongati	2007	Intermediate
Goukamma	2008	Rapid

Estuary	Date	EWR Level
Groot Brak	2008	Intermediate
Keurbooms	2008	Rapid
Kleinemonde	2008	Intermediate
Knysna	2008	Intermediate
Noetsie, Gwaing Maalgate and Kaaimans	2008	Unofficial pilot test desktop
Swartvlei	2008	Rapid
Groot Berg	2010	Comprehensive
Bushmans	2010	Rapid
Palmiet	2010	Rapid
Sundays	2010	Intermediate
Bot	2011	Rapid
Little Amazintoti	2011	Rapid
Mbokedeweni	2011	Rapid
Mzimkulu	2011	Intermediate
Mgeni (uMgeni)	2011	Rapid
EZotha	2011	Rapid

16.1.5 National Environmental Management: Biodiversity Act (Act 10 of 2004)

DEA is the lead agent for the Biodiversity Act. The objective of the Biodiversity Act is to provide for the conservation of biological diversity, regulate the sustainable use of biological resources and to ensure a fair and equitable sharing of the benefits arising from the use of genetic resources. The Act states that the state is the custodian of South Africa's biological diversity and is committed to respect, protect, promote and fulfill the constitutional rights of its citizens. It also recognizes that South Africa is party to, amongst others, the Convention on Biological Diversity, the Convention on Wetlands of International Importance, especially Waterfowl Habitat (Ramsar Convention) and the Convention on Migratory Species (Bonn Convention).

16.1.6 Local Government: Municipal Systems Act (Act 32 of 2000)

Department of Provincial and Local Government is the lead agent for the Municipal Systems Act. The Act deals with Integrated Development Planning (IDPs) (municipalities are obliged to prepare and to update IDPs regularly). An IDP is intended to encompass and harmonise planning over a range of sectors such as water, transport, land use and environmental management. It requires each local authority to adopt a single, inclusive plan for the development of the municipality. Chapter 5 of the Act deals with integrated development planning that sets the social and economic objectives for a particular area. The Municipal Planning and Performance Management Regulations (Government Notice R.796, 24 August

2001) promulgated in terms of this Act describe the content requirements of IDPs. The regulations, for example state that the Spatial Development Framework (SDFs), reflected in the municipality's IDP, must 'contain a strategic assessment of the environmental impact of the spatial development framework'.

It is envisage that all Estuary Management Plans be nested into local IDPs to ensure wise use and biodiversity protection. Estuary Zonation plans should also be incorporated into the SDFs of local or district municipalities.

16.1.7 Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA)

Department of Agriculture, Forestry and Fisheries (DAFF) is the lead agent for CARA. The objectives of CARA is to provide for the conservation of the natural agricultural resources of South Africa by: the maintenance of the production potential of land; the combating and prevention of erosion and weakening or destruction of the water sources (including estuaries); and the protection of the vegetation and the combating of weeds and invader plants.

16.2 Key recommendations

National legislation on estuarine management is carried out largely at a local level by state bodies such as the South African National Parks Board (SANParks), provincial departments (responsible for nature conservation and environmental impact assessment) and local authorities. This approach has resulted in fragmented and inefficient estuarine management. At present, there are uncertainties as to which laws are applicable and to which areas they apply. In addition, there are uncertainties over which government departments or agencies are mandated to enforce the various laws and, finally, there is limited enforcement capacity to enforce these laws and regulations (Van Niekerk and Taljaard 2003).

A key recommendation, therefore, is the finalization of the National Estuarine Management Protocol, the roll out of the Estuary Management Planning framework and the provision of resources, both human and funding, to sustain this effort. The framework should also address the rationalisation of the planning processes, in which one plan is developed, that encompasses the requirements of protected area legislation, Ramsar, MLRA and the ICM Act.

Key legal instruments, such as the determination of the ecological flow requirement of individual estuaries, provide the scientific basis for such local and regional planning and implementations frameworks, and assist with identifying critical over-allocations of natural resources (e.g. water or living resources). The National Estuary Biodiversity Plan provides the lens through which all present, and future, resource allocations should be evaluated to ensure that national and international biodiversity targets are achieved.

17. KEY FINDINGS AND RECOMMENDATIONS

17.1 Key findings

1. There are nearly 300 functional estuaries in South Africa.

In South African an estuary is considered a partially enclosed, permanent water body, either continuously or periodically open to the sea on decadal time scales, extending as far as the upper limit of tidal action or salinity penetration. During floods an estuary can become a river mouth with no seawater entering the formerly estuarine area, or, when there is little or no fluvial input, an estuary can be isolated from the sea by a sandbar and become a lagoon or lake which may become fresh or hypersaline.

2. The Lake St Lucia system represents over 55% of the estuarine area of South Africa, but is in a very poor condition.

Although situated within the iSimangaliso Wetland Park protected area, a World Heritage Site, St Lucia is impacted upon by activities in its catchment and reduction in freshwater flows from the rivers feeding the lake.

- The most significant impact has been the artificial separation of the uMfolozi river mouth from Lake St Lucia, dating from the 1950s, reducing freshwater inflow to the lake by more than half in low flow periods.
- Combined with drought conditions, this has resulted in St Lucia being closed to the sea for much of the last decade, unable to fulfil its role as the most important nursery area for marine fish along the south-east African coastline, among other impacts.

3. Based on the proportion of estuaries in good ecological condition, 43% of estuary ecosystem types (20 types out of 46 types) are classified as threatened, representing 79% of SA estuarine area.

About 39% of South Africa's 46 estuarine types (18 types) are classified as critically endangered, 2% as endangered (1 type), 2 % as vulnerable (1 type) and 57% as least threatened (26 types). If this is considered in terms of estuarine area the situation is even more dire as 79% of South Africa's estuarine area falls within estuary types classified as

critically endangered, compared with less than 1% in types that are endangered or vulnerable and 21% in types that are least threatened.

- A very small percentage (1%) of the total estuarine habitat area in South Africa is in an excellent condition. About 14% is in good condition, 31% is in a fair condition, and 54% is in a poor condition.
- About 83% of the estuarine area that falls within Ramsar sites (57 000 ha) is in a poor state, while none is in an excellent condition. Similarly, none of the 70 400 ha that falls within Important Bird Areas is in an excellent condition and 67% is in a poor condition. Collectively 72% of estuaries in Marine or other Protected Areas (65 900 ha) are in a poor condition.

4. 59% (27 out of 46 types) of South Africa's estuary ecosystem types are not protected. These unprotected types make up 83% of the total estuarine area.

- 70 estuaries in South Africa enjoy some form of formal protection, accounting for 60% (56 000 ha) of the estuarine area within South Africa. Only 14 estuaries have full no-take protection.
- The Lake St Lucia system contributes 90% of the protected estuarine area, and covers about 51 000 ha. The other protected estuaries cover a total area of just under 10 000 ha.
- Nearly 59% (27 out of 46 types) of South Africa's estuary ecosystem types are not protected. About 33% of estuary ecosystem types are considered to be well protected (15 types), while 4% are moderately protected (2 types) and 4% are poorly protected (2 types).
- If protection levels are evaluated in terms of percentage area, the unprotected types make up 83% of total area, while the estuary types that are poorly protected, moderately protected and well protected make up 2%, 14% and 2% of area, respectively.
- The National Estuary Biodiversity Plan identified 58 estuaries (20%) that require full protection and 62 (22%) estuaries that require partial protection (this includes those that already have partial protection).

5. The total freshwater inflow of the 20 largest catchments in South Africa has been reduced by nearly 40% from the pristine condition, and freshwater flow requirements have been determined for only 12% of all estuaries.

- The larger catchments tend to be subjected to significant water resources development, such as large dam developments and inter/intra-basin transfer schemes. These catchments often exhibit a significant decrease in resetting floods with a related significant decrease in mean annual runoff. Related ecosystem responses include increased sedimentation as a result of reduced flushing, loss of queuing effect to the marine environment and reduced nursery function.
- Smaller catchments are most often subjected to more localised water resource development such as run-of-river abstraction and forestation, leading to loss, or reduction of, base flows in summer. While the net reduction in mean annual runoff is less severe than for larger catchments, related ecosystem responses include increased mouth closure, reduced connectivity with the marine environment, reduced nursery function, and reduced production.

6. Flow reduction, habitat modification, fishing and pollution are cumulative pressures in need of management interventions. Invasive alien species (plants, invertebrates and fish), mariculture and desalination are emerging pressures that could pose a significant risk to estuarine biodiversity.

- Nearly 4% of all estuaries are under significant flow modification pressure, with most of these being large permanently open estuaries. An additional 18% of estuaries have experienced a moderate degree of flow modification. Flow modification is causing ecosystem type changes, for example, the Kobonqaba in the Eastern Cape and Uilkraals in the Western Cape closed for the first time in recorded history in 2010.
- 13% of South Africa's estuaries are under significant habitat modification or development pressure.
- The mouths (outlets) of about 16% of estuaries are artificially managed, but these estuaries (which include the Lake St Lucia system) account for 62% of the total estuarine habitat. Inappropriate low-lying developments are necessitating artificial mouth manipulations (e.g. breaching), of particular concern in the large lake systems like Verlorenvlei, Bot/Kleinmond, Klein, Wilderness (Touws), Swartvlei and Lake St Lucia system.
- 1% of South Africa's estuaries are under tremendous fishing pressure (Olifants, Berg, Bot and Kosi) such that fish stocks have declined significantly in these systems. Another 13% are under major fishing pressure. Fishing effort is relatively evenly

distributed around the coast, but proportionately (in terms of tonnes per ha removed) much higher in the Cool Temperate estuaries.

- Approximately 2 000 tonnes of fish, comprising 80 species, are caught in South African estuaries each year.
- 84% of all estuaries are influenced by bait collection activities.
- Mangroves have been completely lost from 14 estuaries in South Africa due to excessive harvesting or ecosystem changes. In the smaller estuaries, where mangrove strands consist of one to three rows of trees, harvesting can result in complete removal of mangroves. Developmental pressures have also caused the loss of mangroves, e.g. from the Mhlanga, Little Manzimtoti, Lovu, Msimbazi, Mgababa, Ngane, Mahlongwa, Kongweni, Bilanhlolo, Mhlangankulu and Khandandlovu.
- 15% of estuaries are under significant pollution pressure and 40% under a moderate degree of pollution pressure. Fewer than 1% of all estuaries have no pollution pressures on them.

7. Freshwater (surface and groundwater) flowing into the sea is not wasted and is vital to the productivity of the nearshore coastal environment.

- Changes in freshwater flow and associated variations in turbidity, nutrients and sediment supply can impact on important ecological processes such as nursery functions, environmental cues, productivity and food web processes.
- Fisheries resources in South Africa that have, or may have been, compromised by reduced freshwater input include linefish, prawns, and filter feeding invertebrates in the intertidal and shallow subtidal zones.
- The reduction of river flow leads to a reduced sediment supply to the coast with implications for beach and subtidal habitats. Many of these habitats are also important for ecological processes.

8. While there are a range of invasive alien species (e.g. 13 plants, 11 invasive alien and 7 extra-limital fish species) in South Africa's estuaries, they do not represent a significant overall pressure as yet.

- Thirteen invasive alien plant species, ranging from trees to water weeds, have been identified in South Africa's estuaries.

- There are at present 11 invasive alien fish species and 7 extra-limital fish species identified in the 130 estuaries for which there were data. The spreading of especially invasive predatory fish acts as a barrier to migratory species (e.g. eels and freshwater mullet) and influences the species composition and abundance of species, many of which are commercially important, in the river-estuary interface zone.
- There is a significant and growing threat to the estuarine subtidal benthic environment through the invasion and proliferation of the mollusc *Tarebia granifera* in at least 30% of KwaZulu-Natal estuaries.

9. Climate change can have serious ecological, resource and social implications

Climate change pressures include flow modification, sea-level rise and increased temperatures and coastal storminess, leading to changes in physical processes (e.g. modification in mouth conditions, salinity regimes, nutrient pulses, sediment regimes) and biological responses (e.g. production, species composition) with an impact ultimately on ecosystem services.

- The KwaZulu-Natal and West Coast estuaries will be the most affected by climate change from a structural and functional perspective, e.g. mouth state, nutrient supply, salinity distribution and ultimately production (e.g. fisheries).
- The Wild Coast, Eastern and Southern Cape estuaries will be most vulnerable to temperature regime shifts (both nearshore and land) and the associated range extensions/contractions of species and community composition changes.
- Climate change is one of many pressures acting on estuaries and should be viewed as an additional form of anthropogenic alteration (rather than a separate pressure) in an already stressed ecosystem type, i.e. climate change acts as an accelerator of ecosystem change.

10. Estuary Management Plans are developed, or in progress, for 9% of South Africa's estuaries

Over the past decade legislative responses have increased, but flow-related measures are starting to lag behind other planning processes.

- The finalisation of the National Estuarine Management Protocol, the roll out of the Estuary Management Planning Framework and the provision of resources, both human and funding, is needed to sustain this effort. At present there are 26 Estuary Management Plans in the process of being developed as part of the implementation of the Integrated Coastal Management Act (Act 24 of 2008). This includes the establishment of 12 Estuary Forums which form the vital communication platform between coastal communities and the various government departments that play a role in estuary management.
- Key legal instruments, such as the determination of the ecological water requirements of individual estuaries, provide the scientific basis for local and regional water resources planning and implementation frameworks and assist with identifying critical over-allocations of resources.
- Unfortunately, ecological water requirement studies have been undertaken for only about 12 % of all estuaries over the last decade.

17.2 Key Messages

1. Estuaries, unlike many other ecosystems, can be restored to a well-functioning, productive state.

- Estuaries are by nature resilient systems, because their fauna and flora are adapted to living in conditions of extreme change.

2. Recovery of South Africa's iconic estuary, the Lake St Lucia system, is possible.

- The very poor condition of the Lake St Lucia system, which represents over half the estuarine area in South Africa, is reversible and ecosystem recovery is possible. Due to Lake St Lucia's international and national significance, the iSimangaliso Wetland Park Authority has raised funding from the Global Environment Facility (GEF) to investigate and implement a long-term solution to the hydrological issues facing the Lake St Lucia system. In parallel to this investigation the management strategy for 2011/2012 will result in the reversal of the 60 year old approach to managing Lake St Lucia; that is, allowing the uMfolozi and Lake St Lucia estuary mouths to join to form a combined mouth, and thereby allowing it to function as naturally as possible. In keeping with adaptive management, an ongoing review and evaluation based on

monitoring of salinity, lake levels and ecosystem health will continue as these interventions are implemented. Ongoing national government support for the rehabilitation of the Lake St Lucia system is important.

Other specific management recommendations include:

- reducing the fishing effort within the system;
- resolving the issue related to the backflooding of the low-lying sugar cane farms so that conflict over breaching of the combined mouth does not occur (e.g. securing or protecting the properties along the lower uMfolozi);
- improving farming practices in the uMfolozi catchment and floodplain to improve water quality and limit sediment input to St Lucia.

3. Increase protection levels through the implementation of the National Estuary Biodiversity Plan

- DEA, in collaboration with SANBI, DWA and DAFF, should lead the process of endorsing and implementing the National Estuary Biodiversity Plan.

4. To adequately protect an estuary, it needs to be in a formal protected area with effective no-take zonation, and its freshwater requirements must be guaranteed.

- The Lake St Lucia system is an example of a system which is poorly protected. While being fully protected on paper, St Lucia's current ecological condition is poor (Category E) and uMfolozi is only in fair condition (Category D).

5. Estuaries provide a focal point for co-ordinated and integrated natural resource management.

- Estuaries form the link between the land and the sea and are therefore the receivers of most resource-use pressures from the surrounding land- and seascape. Estuaries should be the focal point for natural resource management and planning in the coastal domain, e.g. in the classification of water resources in terms of the National Water Act, the class of a river should be influenced by the class assigned to the estuary.

6. Estuaries are valuable national assets providing essential ecosystem services, such as nursery functions to coastal fisheries, freshwater flows to the marine

environment, replenishment of nutrients and organic material to coastal habitats, flood and sea storm protection, carbon sequestration, safe bathing areas and cultivation of plants for biofuels without freshwater.

- Estuaries provide an important nursery function for fish, with some of the more muddy Temperate estuaries such as the Mbashe, Umtata, Keiskamma and Great Kei being particularly important for supporting collapsed marine fish resources such as white steenbras and dusky kob.
- Estuaries provide freshwater (both surface and groundwater), nutrients, detritus and sediments to the coastal environment, thereby supporting important ecological processes and the productivity of some fisheries (e.g. prawns and line fishery).
- Estuaries offer easy access, warmer waters, shallow depths, shelter and weak currents that make them very attractive to bathers.
- Estuaries contribute to the regulation of greenhouse gases and provide opportunities for carbon trading.
- South Africa's estuaries provide a significant buffer against floods with a total open water area of 61 000 ha and flood plain storage, as represented by the estuarine functional zone, of nearly 171 000 ha, of which 60% is in the Subtropical biogeographic region.
- Halophytes (salt tolerant plants such as *Sarcocornia*) can be used as an alternative energy or food source due to their high oil and protein content. By far the greatest benefits of halophyte culture is that, unlike much current biofuel production, it does not displace food crop production or use excessive quantities of fresh water.

7. Future introduction and spread of invasive species in estuaries can be prevented.

- While invasive alien species do not represent a significant overall pressure as yet, it is critically important that there is timeous intervention to ensure that the situation remains under control (e.g. control invasive predatory fish that act as a barrier to migratory species, and the total eradication of the alien invasive grass *Spartina alterniflora,* which is currently known to be present in only the Groot Brak estuary but which may otherwise spread).

8. Healthy estuaries support ecosystem resilience and adaption to climate change.

- Stressed ecosystems have a lower resilience to change. By increasing or maintaining the resilience of estuaries, the ability of a system to recover, for example after a flood or drought, is enhanced.
- The resilience of an estuary is influenced by the intactness of its catchment and estuarine habitats. A way to ensure resilience is the determination and implementation of estuarine ecological water requirements and the protection/rehabilitation of the estuarine functional zone.
- The processes underpinning the ecosystem services provided by estuaries, such as the assimilation and cycling of nutrients, also need to be protected if resilience is to be maintained.

18. INFORMATION GAPS, RESEARCH PRIORITIES AND FUTURE ASSESSMENTS

18.1 Information gaps

- **Refine estuary ecosystem types:** The NBA 2011 has started the process of refining the typing of South Africa's estuaries at a more detailed level than has previously been available. However, higher resolution input data on catchment hydrology, bathymetry, sediment structure and water quality (turbidity and salinity) is required to address the needs articulated by specialists in the execution of this study.
- **Quantification of the modification in freshwater flow to the coast on a watershed scale:** There is an urgent need for a quantification of the modification in freshwater flow to the all estuaries of South Africa. This analysis should include all current land-use, transfer schemes, discharges, dam developments and be based on the true catchment area of each individual system. These data will also form the basis of an analysis of the degree to which freshwater flow to the coast has been modified.
- **Taxonomic surveys of the invertebrates in all South African estuaries:** There is no up-to-date national dataset for South African estuarine invertebrates. Invertebrate data were last collated at a national scale more than a decade ago but little effort has been made to address this. Future assessments and biodiversity plans cannot be refined without filling this gap in a systematic manner.
- **Taxonomic surveys of the plants in all South African estuaries:** Taxonomic revision of salt marsh species should be supported and funded so that macrophyte species lists can be updated for all estuaries. From these data, sites of rare and threatened species can be identified. Updated GIS spatial data of the habitat areas data for all estuaries is needed. This is especially important where data are older than 10 years. This would include field surveys to ground truth the data. For example detailed habitat maps for the Rietvlei/Diep system and Richards Bay Harbour are urgently required for planning proposes and to address deficiencies in the current databases. This should include the development of a database with information presented in this study plus GIS maps of all South African estuaries. This spatial data could also feed into the estuary management planning processes.
- **Invasive Species:** With the exception of plants, very little is known about invasive species in South Africa's estuaries. There is an urgent need to have a census on the occurrence of invasive alien species in different estuaries and the potential

environmental impact of these on both the ecosystem function and the value derived from the estuary in question. All invasive species (freshwater, marine and estuarine) should be included in the census.

- **Nursery function for exploited and collapsed fish species:** Recent work has indicated that while most estuaries serve as nurseries, some of the more sediment rich systems are associated with "sediment deltas" in the nearshore environment which serve as nurseries for some species which represent collapsed stocks. It is of the utmost importance that these systems are identified and their nursery function quantified to ensure sustainable resource utilisation into the future. Future biodiversity plans should also include these systems explicitly to align management and conservation priorities.
- **Pollution data:** There is no systematic record of the discharges into estuaries. There is also a need to evaluate the monitoring stations above the estuaries to develop a clear perspective on what is flowing into estuaries and coastal waters.
- **The value of estuaries in South Africa:** There is very little national scale data available on the value of estuaries. As this is one of the key requirements for communicating the relevance of estuaries to coastal communities, and the country as a whole, this lack of data hinders the ability to motivate for rational decision-making.
- **Climate change:** Climate change has the potential to change the processes and functioning of South Africa's estuaries dramatically. Large and local scale climate models are becoming better at accurately predicting the drivers of change in the future. The estuarine research community needs to make this one of their research priorities over the next decade to facilitate better adaptation strategies and ensure ecosystem resilience.
- **Sediment data:** Very little information is available on the sediment structure of South Africa's estuaries. This is a significant data gap as grain size distribution and the mud:sand ratios influence biodiversity patterns. The lack of sediment information also makes it very difficult to assess environmental change in relation to some of the major pressures such as dam development and sand mining.
- **Mapping the 3-dimensional nature of South Africa's estuaries:** Detailed systematic topographical and bathymetrical surveys are needed for all South Africa's estuaries. Cross-sectional survey data are available for less than a third of the estuaries in the country. In most cases these data are over 20 years old. Most planning processes (e.g. ecological water requirement studies, Estuary Management Plans, setback lines, spatial development plans) are of low confidence as they lack this basic information. Assessment of change (sedimentation, erosion sensitivity to

flow modifications, structural developments) is therefore mostly inferred from pressure data. Improved planning and assessments urgently require a significant effort to address these basic data requirements.

- **Up-to-date surveys of the fish and bird fauna of estuaries:** National scale surveys on fish and birds in all South African estuaries were last carried out in the early 1980s. These surveys urgently need to be repeated in a once-off effort that is comparable with the earlier surveys.

18.2 Research Priorities

- **Taxonomic surveys of the invertebrates in all South African estuaries:** There is no national dataset or specimen voucher system for the *South African estuarine invertebrates*. This significant data gap was identified more than a decade ago but little effort has been made on a national scale to address this deficiency. Future assessment and biodiversity plans cannot refine on present findings without filling this gap in a systematic manner.
- **Taxonomic surveys of the plants in all South African estuaries:** The taxonomic revision of salt marsh species should be supported and funded so that macrophyte species lists can be updated for all estuaries. From these data, sites of rare and endangered species can be identified.
- **Refining the typing of estuaries:** The NBA has started the process of refining the typing of South Africa's estuaries, but higher resolution input data on catchment hydrology, bathymetry, sediment structure and water column chemistry (turbidity and salinity) is required to address the needs articulated by specialists in the execution of the NBA 2011.
- **Invasive species as a barrier to connectivity:** The spread of invasive freshwater predatory fish acts as a barrier to migratory species (e.g. eels and freshwater mullet) and compete with estuarine associated species in the river-estuary interface. This aspect needs further investigation to quantify the extent of the problem.
- **Importance of the 71 smaller and/or ephemeral outlets not addressed in this NBA:** There are over 371 river/stream outlets along the SA coast (see Appendix A for a full list), but not all of these are deemed functional estuarine systems, i.e. representative of significant biological activity (Harrison et al. 2000). In total, 71 systems were not assessed, 20 in the Cool Temperate, 33 in the Warm Temperate and 28 in the Subtropical biogeographic region. It is important to note that the

exclusion of these systems from the NBA 2011 assessment leaves them somewhat under protected from future development. It is therefore recommended that a separate study be under taken to demarcate these smaller or more ephemeral outlets, to investigate their ecological importance, and finally integrate them into current planning frameworks.

- **Climate Change:** Climate change has the potential to change the processes and functioning of South Africa's estuaries dramatically. Large and local scale climate models are becoming better at accurately predicting the drivers of change in the near and far future. The estuarine community is urged to make this one of their research priorities over the next decade to facilitate better adaptation strategies and ensure ecosystem resilience.
- **Connectivity and regional importance:** Estuarine ecosystems are not independent and isolated from other ecosystems. Rather, estuaries form part of a regional, national and global ecosystem network through either a direct connection via water flows (the transport of nutrients, detritus, larvae, plankton, etc.) or indirectly via the movement of estuarine fauna. The links between individual estuaries and other ecosystems may span a few hundred metres or thousands of kilometres. Hence, a disturbance to a specific estuary may be reflected in effects on ecosystems remote from that estuary. Unfortunately, although there is ample evidence of the regional interaction and interdependence between estuaries, little quantification has been conducted in South Africa on the connectivity between systems and how to incorporate this into assessments and biodiversity plans.
- **Population genetics studies:** To allow for more detailed biodiversity planning in the future it is important that detailed *population genetics studies* be done on plants, invertebrates and fish to ensure the correct biodiversity protection measures. Preliminary findings indicate that there is a higher degree of isolation than is assumed for the less mobile species (such as plants). This work needs to be done systematically for the higher taxa as well.
- **Recruitment studies of fish and invertebrates:** Recruitment studies are urgently required to ensure sound strategic planning of estuarine biodiversity and resource allocation. While fisheries management measures have become more stringent over the last decade, the stock status of a number of exploited species have stayed the same or declined even further. Recruitment studies would shed light on an important bottle-neck in resource recovery plans, and identify estuaries of conservation and management importance.

- **Nursery function of exploited and collapsed fish species:** Recent work has indicated that while most estuaries serve as nurseries, some of the more sediment rich ones are associated with “sediment deltas” in the nearshore environment which serves as nurseries for some collapsed stock species such as dusky kob. It is important that these systems be identified and their nursery function qualified to ensure sustainable resource utilsation into the future. Future biodiversity plans should also include these systems explicitly to align management and conservation priorities.

18.3 Priority actions for estuarine biodiversity management and conservation

- **Restore the health of St Lucia and conserve the other estuarine lake systems.** South Africa’s estuarine lake systems (St Lucia, Verlorenvlei, Bot, Klein, Wilderness, Swartvlei, Kosi) are all under tremendous pressure, and need to be managed in a more holistic manner. They are important national biodiversity assets, which often pay the price for inappropriate short-term local-level decision-making. In particular, the St Lucia system holds a major share of South Africa’s estuarine biodiversity. As discussed above, the iSimangaliso Wetland Park Authority has initiated measures to combine the uMfolozi with Lake St Lucia with funding support from the Global Environment Facility (GEF) in order to restore the health of the greater ecosystem.
- **Increase protection levels through the implementation of the National Estuary Biodiversity Plan.** The development of the National Estuary Biodiversity Plan was the first step in the planning process. DEA, in collaboration with SANBI, DWA and DAFF, should lead the implementation of the National Estuary Biodiversity Plan. This should include the setting of protected area targets for Estuarine Protected Areas in the short- to medium-term, e.g. 5% of all ecosystem types will be formally protected by 2020 and 20% of all ecosystem types will have Estuary Management Plans by 2020. This also requires the integration of the National Estuary Biodiversity Plan in strategic processes such as the classification of water resources led by the DWA and the upcoming revision of the National Protected Area Expansion Strategy led by DEA.
- **Respond rapidly to emerging invasive species.** Develop protocols and procedures for the early detection, risk assessment and management of invasive alien species. For example, certain invasive alien fish species can act as a barrier to migratory species (eels and fresh water mullet) and influence the species

composition and abundance of species, many of which are commercially important, in the river-estuarine interface.

- **Develop a National Coastal Biodiversity Plan.** Estuaries are not separate from the coast. To ensure their long-term functioning also requires the development of a National Coastal Biodiversity Plan that integrates marine, estuarine, freshwater and terrestrial aspects. Such a plan should be conducted at a fine enough scale to support integrated coastal development at the municipal level.
- **Ensure the total eradication of the alien invasive *Spartina alterniflora* from the Groot Brak estuary before it spreads to other estuaries.** Progress has been made, since early 2011, but it is very important that the initial field tests for chemical and mechanical control be followed up with full eradication and continuous follow up removal to ensure that this highly invasive and damaging plant species does not spread to adjacent systems along the coast.
- **Ensure that the legal definition of estuaries in South Africa includes the estuarine functional zone.** The GNR 546 Listing Notice 3 under the NEMA EIA Regulations (2010) identifies the estuarine functional zone as a sensitive area that requires environmental authorisation before a development may proceed. It is important that this consideration is also taken up by the Integrated Coastal Management Act and the National Water Act, both of which need to recognise the value of the estuarine floodplain and the threat of (back) flooding within this zone.
- **Determine ecological water requirements for all estuaries within 10 years and implement flow requirements within 5 years of their classification.** This process is likely to require a two-tiered approach in which the findings of the NBA 2011 form the basis for allocation on a national level in the classification of water resources in terms of the National Water Act. While more detailed ecological water requirement studies will be needed for water-stressed catchments or biodiversity priority areas, there is also an urgent need for strategic assessments (such as the National Water Resources Strategy) to take cognisance of estuarine flow requirements which are often substantially higher than the flow requirements of the river entering the estuary. This little-recognised fact leads to national and catchment scale water resource plans that over-estimate the water resources available for development, thus compromising the ecosystem processes that coastal communities depend upon.

- **Ensure resilience to climate change and other global change pressure through the appropriate management of the estuarine functional zone. Finalise the National Estuary Management Protocol** to ensure cooperative governance between the lead authorities that manage estuaries and roll out the development and implementation of Estuary Management Plans in terms of the Integrated Coastal Management Act.
- **Finalise and implement the National Estuary Monitoring Programme** currently being developed by DWA. This multi-tier, multi-parameter (include biotic and abiotic components) programme is based on current best practice and with sufficient funding, and support from other organs of state, could go a long way in addressing data deficiencies in future NBA assessments.
- **Development of a National Sustainability Plan for Estuarine Resources** that will ensure alignment between sectoral objectives for estuaries on a national scale. The plan should be developed in consultation with lead authorities (DEA, SANBI, DWA and DAFF) and assist with facilitating the co-operative governance between the lead agents. Once in place, it should serve as the "blue print" for a number of key sectoral resource plans and processes at various levels of governance, e.g. allocation of water resources or Total Allowable Catch in coastal fisheries.

18.4 Recommendations for next NBA

Based on lessons learned during the NBA 2011 process, as well as aspects addressed in lesser detail than we would have liked, the following recommendations are made with reference to future NBAs:

- **National Health Assessment:** The method (based on ecological water requirement method under the Water Act) followed for the National Health Assessment and proved a valuable assessment framework for evaluating ecosystem change on a national scale. It is recommended that this same approach be followed for future NBAs, but with an emphasis on improved pressure data (especially hydrology, catchment land-use and pollution aspects).
- **Climate Change:** While climate change was addressed on a broad-scale from a process perceptive, more detailed work is needed to understand its impact on the functioning and biodiversity of South Africa's estuaries. A better understanding of this threat will greatly enhance our ability to take the necessary management steps

and appropriate water supply decisions. It is strongly recommended that this becomes a major trust of the next NBA.

- **Maximise the value of estuaries in South Africa:** Time and funding constraints prevented this NBA assessment process to adequately define and value the benefits society derive from South Africa's estuaries. Future NBA studies should strive to address this aspect in more detail.
- **Quantifying ecosystem interactions with the marine environment:** Our understanding of estuarine ecosystem functioning is relatively well developed, but more information is required, especially with respect to interactions and connectivity with the marine coastal zone.
- **National biodiversity planning:** While not essential to future NBA assessments, the existing proposed National Estuaries Biodiversity Plan should be periodically reviewed in the light of new pressure information; improved classification/typing; improved ecosystems services data; policy changes and development initiatives. The NBA provides a perfect national platform for the coherent roll-out of biodiversity initiatives.
- **Time-line and project integration:** The high degree of interaction among the core team members added value and facilitated integration between the various components (marine, estuarine, rivers and land). While this aspect may slow down the overall delivery time, it provides for significant knowledge transfer, learning opportunities, and ultimately a better product. In addition, a longer time frame allows for the engagement of domain specialists at time-scales more suitable for smaller individual research projects and scientific curiosity.

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Appendix A:
List of freshwater outlets along the coast of South Africa

Table A. A comprehensive list of the freshwater outlets along the coast of South Africa. The 71 river outlets not included in NBA 2011 are indicated with a X.

Not in NBA	Estuary	X_coord (E)	Y_coord (S)
	Orange (Gariep)	16° 27' 28.0943"	28° 38' 8.6783"
X	*Holgat*	16° 43' 15.6792"	28° 58' 43.946"
	Buffels	17° 3'2.26"	29° 40' 38.17"
X	*Swartlintjies*	*17°15'33.22"*	*30° 15' 47.49"*
	Spoeg	17° 21' 31.4280"	30° 28' 21.691"
X	*Bitter*	17° 26' 34.6020"	30° 35' 53.476"
	Groen	17° 34' 35.6268"	30° 50' 48.472"
X	*Brak*	17° 43' 47.2440"	31° 5' 55.9355"
	Sout	17° 50' 54.2831"	31° 14' 41.207"
	Olifants	18° 11' 13.6283"	31° 42' 3.7583"
X	*Sandlaagte*	*18°13'25.72"*	*31° 45' 52.87"*
	Jakkals	18° 18' 48.2976"	32° 5' 4.70759"
	Wadrift	18° 19' 30.9719"	32° 12' 16.509"
	Verlorenvlei	18° 19' 59.4263"	32° 18' 57.319"
X	*Papkuils*	*18° 19' 2.06"*	*32° 33' 58.53"*
	Berg (Groot)	18° 8' 37.9860"	32° 46' 11.096"
X	*Paternosterbaai*	*17° 54' 1.52"*	*32° 48' 8.96"*
X	*Langebaan*	18° 1.' 42.2831"	33° 5' 10.7196"
X	*Dwars (Noord)*	*18°13 '39.38"*	*33°24' 15.98"*
X	*Dwars (Suid)*	*18°15' 46.92"*	*33°26' 12.16"*
X	*Modder*	*18°18' 24.45"*	*33°29' 5.12"*
X	*Jacobsbaai*	*18°19' 27.45"*	*33° 31' 12.44"*
X	*Loerbaai*	*18°19' 4.72"*	*33° 32' 14.11"*
X	*Bok*	*18° 20' 2.33"*	*33° 34' 8.79"*
X	*Silwerstroom*	*18° 21' 8.74"*	*33° 34' 39.97"*
X	*Sout (Suid)*	*18°21 '21.74"*	*33° 34' 53.79"*
	Rietvlei/Diep	18° 28' 55.7148"	33° 53' 23.654"
	Sout (Wes)	18° 28' 17.7095"	33° 54' 28.925"
	Houtbaai	18° 21' 16.2000"	34° 2' 47.0075"
X	*Goeiehoop*	*18° 21' 10.15"*	*34° 5' 47.91"*
	Wildevoelvlei	18° 20' 35.8332"	34° 7' 38.6796"
	Bokramspruit	18° 19' 57.6335"	34° 8' 3.65999"
	Schuster	18° 22' 15.2651"	34° 12' 7.3619"
	Krom	18° 22' 42.2436"	34° 13' 51.391"
X	*Olifantsbos*	*18°22'58.31"*	*34° 15' 26.47"*
X	*Booiskraal*	*18°23'46.66"*	*34° 17' 14.50"*
	Buffels Wes	18° 27' 42.4151"	34° 19' 5.6532"
	Elsies	18° 25' 53.3495"	34° 9' 37.5083"
	Silvermine	18° 26' 20.1227"	34° 7' 57.9467"

Not in NBA	Estuary	X_coord (E)	Y_coord (S)
	Sand	18° 28' 35.4000"	34° 6' 22.9823"
	Zeekoe	18° 30' 17.7623"	34° 5' 54.3083"
	Eerste	18° 45' 13.4028"	34° 4' 43.7771"
	Lourens	18° 48' 39.0347"	34° 6' 0.18719"
	Sir Lowry's Pass	18° 51' 53.6220"	34° 9' 20.0160"
	Steenbras	18° 49' 9.88319"	34° 11' 41.348"
	Rooiels	18° 49' 15.7620"	34° 17' 44.786"
	Buffels (Oos)	18° 49' 46.3259"	34° 20' 20.209"
	Palmiet	18° 59' 38.9075"	34° 20' 43.584"
	Bot/Kleinmond	19° 5.' 49.6751"	34° 22' 6.3516"
	Onrus	19° 10' 43.2912"	34° 25' 7.1472"
X	*Mossel*	*19°16'21.25"*	*34°24'29.86"*
	Klein	19° 17' 53.3723"	34° 25' 14.354"
	Uilkraals	19° 24' 27.4859"	34° 36' 27.176"
	Ratel	19° 44' 47.4216"	34° 46' 15.668"
	Heuningnes	20° 7' 9.28560"	34° 42' 53.244"
	Klipdrifsfontein	20° 43' 52.7951"	34° 27' 6.8616"
X	*Papkuils*	*18°18'56.85"*	*32°33'52.68"*
	Breede	20° 50' 43.1951"	34° 24' 26.762"
	Duiwenhoks	21° 0' 4.25520"	34° 21' 54.107"
	Goukou (Kaffirkui	21° 25' 24.6972"	34° 22' 42.067"
	Gouritz	21° 53' 9.25440"	34° 20' 43.227"
	Blinde	22° 0' 46.6092"	34° 12' 39.060"
X	*Tweekuilen*	*22° 6'42.11"*	*34° 9'5.51"*
X	*Gericke*	*22° 6'37.50"*	*34° 8'38.35"*
	Hartenbos	22° 7' 32.8152"	34° 6' 54.4032"
	Klein Brak	22° 8' 54.9096"	34° 5' 34.5480"
	Groot Brak	22° 14' 21.4511"	34° 3' 26.1144"
X	*Rooi*	*22°17'3.51"*	*34° 3'3.31"*
	Maalgate	22° 21' 15.9803"	34° 3' 15.8039"
	Gwaing	22° 26' 2.90039"	34° 3' 23.2883"
X	*Skaapkop*	*22°29'55.88"*	*34° 2'23.97"*
X	*Meul*	*22°32'35.86"*	*34° 0'49.26"*
	Kaaimans	22° 33' 25.4015"	33° 59' 52.130"
	Wilderness (Touws)	22° 34' 52.0571"	33° 59' 44.728"
	Swartvlei	22° 47' 46.5215"	34° 1' 53.4576"
	Goukamma	22° 56' 56.8859"	34° 4' 37.7795"
	Knysna	23° 3' 41.2308"	34° 4' 57.7416"
	Noetsie	23° 7' 44.9543"	34° 4' 49.0872"

Not in NBA	Estuary	X_coord (E)	Y_coord (S)
X	*Grooteiland*	*23°12'34.55"*	*34° 5'9.14"*
X	*Kranshoek*	*23°13'30.21"*	*34° 5'11.69"*
X	*Crooks*	*23°14'44.74"*	*34° 5'28.92"*
	Piesang	23° 22' 43.5431"	34° 3' 37.6740"
	Keurbooms	23° 22' 41.4732"	34° 2' 59.4599"
	Matjies/Bitou	23° 28' 12.6552"	34° 0' 7.07399"
X	*Brak*	*23°31'49.54"*	*33°59'49.05"*
	Sout (Oos)	23° 32' 11.5548"	33° 59' 22.207"
	Groot (Wes)	23° 34' 9.04799"	33° 58' 54.411"
X	*Helpmekaars*	*23°35'57.52"*	*33°58'48.34"*
X	*Klip*	*23°37'1.35"*	*33°58'42.35"*
	Bloukrans	23° 38' 50.8884"	33° 58' 46.721"
X	*Witels*	*23°42'8.13"*	*33°59'18.40"*
	Lottering	23° 44' 9.41999"	33° 59' 43.836"
	Elandsbos	23° 46' 4.59120"	34° 0' 12.6467"
X	*Geelhoutbos*	*23°47'8.37"*	*34° 0'22.68"*
X	*Kleinbos*	*23°48'46.99"*	*34° 0'42.70"*
	Storms	23° 54' 10.7568"	34° 1' 15.5064"
X	*Bruglaagte*	*23°56'12.23"*	*34° 1'34.57"*
X	*Langbos*	*23°58'25.39"*	*34° 1'58.79"*
X	*Sanddrif*	*24° 0'17.79"*	*34° 2'13.07"*
	Elands	24° 4' 44.7096"	34° 2' 38.3387"
	Groot (Oos)	24° 11' 42.0683"	34° 3' 35.6219"
X	*Eerste*	*24°14'39.96"*	*34° 4'41.99"*
X	*Klipdrift (Wes)*	*24°16'28.50"*	*34° 5'16.61"*
X	*Boskloof*	*24°17'41.06"*	*34° 5'31.74"*
X	*Kaapsedrif*	*24°23'13.49"*	*34° 6'20.95"*
	Tsitsikamma	24° 26' 17.9736"	34° 8' 8.13480"
	Klipdrif	24° 38' 13.3764"	34° 10' 20.521"
	Slang	24° 39' 13.3271"	34° 10' 26.864"
	Krom Oos (Kromme)	24° 50' 33.8208"	34° 8' 34.6811"
	Seekoei	24° 54' 38.6748"	34° 5' 12.0119"
	Kabeljous	24° 55' 57.0108"	34° 0' 31.7051"
	Gamtoos	25° 2' 4.97040"	33° 58' 13.529"
	Van Stadens	25° 13' 13.2455"	33° 58' 13.994"
	Maitland	25° 17' 31.0271"	33° 59' 16.933"
	Baakens	25° 37' 48.0468"	33° 57' 49.427"
	Papkuils	25° 36' 49.9896"	33° 55' 2.2548"
	Swartkops	25° 37' 58.9619"	33° 51' 58.481"
	Coega (Ngcura)	25° 41' 26.6604"	33° 47' 43.368"
	Sundays	25° 51' 13.4100"	33° 43' 18.609"

Not in NBA	Estuary	X_coord (E)	Y_coord (S)
	Boknes	26° 35' 10.5396"	33° 43' 37.822"
	Bushmans	26° 39' 49.0392"	33° 41' 41.697"
	Kariega	26° 41' 11.0364"	33° 40' 57.975"
	Kasuka	26° 44' 7.07280"	33° 39' 14.741"
	Kowie	26° 54' 5.88240"	33° 36' 13.053"
	Rufane	26° 56' 8.97719"	33° 34' 50.995"
	Riet	27° 0' 49.8671"	33° 33' 40.330"
	Kleinemond Wes	27° 2' 46.1471"	33° 32' 28.845"
	Kleinemond Oos	27° 2' 57.5699"	33° 32' 20.493"
	Klein Palmiet	27° 7' 30.5795"	33° 30' 25.257"
	Great Fish	27° 8' 26.4624"	33° 29' 42.820"
	Old Womans	27° 8' 53.0520"	33° 28' 57.975"
X	*Thatshana*	*27°11'11.80"*	*33°27'47.74"*
	Mpekweni	27° 13' 52.2336"	33° 26' 16.843"
	Mtati	27° 15' 32.6591"	33° 25' 22.360"
	Mgwalana	27° 16' 27.1704"	33° 24' 46.886"
	Bira	27° 19' 33.7116"	33° 23' 1.5360"
	Gqutywa	27° 21' 29.0844"	27° 21' 29.084"
	Ngculura	27° 22' 4.49760"	33° 21' 29.077"
	Blue Krans	27° 22' 36.7139"	33° 21' 15.771"
X	*Freshwaterpoort*	27° 24' 50.4287"	33° 20' 6.1763"
	Mtana	27° 25' 55.7940"	33° 19' 6.9779"
	Keiskamma	27° 29' 28.4388"	33° 16' 53.328"
X	*Shwele-Shwele*	27° 31' 19.3584"	33° 15' 36.460"
	Ngqinisa	27° 31' 40.5696"	33° 15' 9.8603"
	Kiwane	27° 32' 35.4012"	33° 14' 53.887"
	Tyolomnqa	27° 35' 0.31560"	33° 13' 32.779"
	Shelbertsstroom	27° 36' 56.3903"	33° 12' 25.527"
	Lilyvale	27° 38' 12.8723"	33° 11' 34.270"
	Ross' Creek	27° 39' 27.6192"	33° 10' 36.325"
	Ncera	27° 40' 5.54160"	33° 10' 12.417"
	Mlele	27° 40' 47.8631"	33° 9' 34.963"
	Mcantsi	27° 42' 7.11719"	33° 8.' 43.832"
	Gxulu	27° 43' 53.3675"	33° 7' 8.0579"
	Goda	27° 46' 30.1188"	33° 6' 3.9239"
	Hlozi	27° 48' 42.7788"	33° 5' 8.1491"
	Hickman's	27° 50' 22.8767"	33° 4' 14.984"
	Mvubukazi	27° 50' 33.7163"	33° 4' 11.9964"
	Ngqenga	27° 51' 53.5968"	33° 3' 22.7988"
	Buffalo	27° 54' 58.7448"	33° 1' 36.476"
	Blind	27° 55' 39.6983"	27° 55' 39.698"

Not in NBA	Estuary	X_coord (E)	Y_coord (S)
	Hlaze	27° 56' 57.6816"	32° 59' 21.231"
	Nahoon	27° 57' 6.13439"	32° 59' 11.176"
	Qinira	27° 57' 53.3987"	32° 58' 27.130"
	Gqunube	28° 2' 5.63639"	32° 56' 1.9535"
	Kwelera	28° 4' 37.2072"	32° 54' 26.495"
	Bulura	28° 5' 36.2076"	32° 53' 28.805"
	Cunge	28° 6' 37.5263"	32° 51' 39.157"
	Cintsa	28° 7' 1.35839"	32° 49' 53.155"
	Cefane	28° 8.' 13.5528"	32° 48' 34.070"
	Kwenxura	28° 9' 5.71680"	32° 47' 55.589"
	Nyara	28° 10' 55.2611"	32° 47' 6.8279"
	Imtwendwe	28° 14' 13.1135"	32° 46' 12.133"
X	*Haga-haga*	28° 15' 11.4659"	32° 45' 42.901"
	Mtendwe	28° 17' 9.04920"	32° 44' 26.836"
	Quko	28° 18' 34.3367"	32° 43' 32.303"
	Morgan	28° 20' 38.5691"	32° 42' 30.949"
	Cwili	28° 22' 25.4531"	32° 41' 27.214"
	Great Kei	28° 23' 9.47040"	32° 40' 47.593"
	Gxara	28° 23' 56.8679"	32° 39' 58.168"
	Gqwara	28° 24'45.07"	32°39'30.25"
	Ngogwane	28° 25'17.91"	32°38'55.31"
	Qolora	28° 26'5.79"	32°37'47.70"
	Ncizele	28°26'16.68"	32°37'42.50"
	Timba	28° 26'45.16"	32°37'31.65"
X	*Mbokotwana*	28° 27'17.44"	32°37'20.21"
	Kobonqaba	28° 29' 25.2924"	32° 36' 28.209"
	Nxaxo/Ngqusi	28° 31' 34.5323"	32° 35' 5.0315"
X	*Bowkers Bay*	28°33' 16.55"	32°33'5.19"
	Cebe	28° 35' 8.97719"	32° 31' 16.273"
	Gqunqe	28° 35' 22.2396"	32° 31' 7.6836"
	Zalu	28° 36' 11.2572"	32° 30' 9.5183"
	Ngqwara	28° 36' 50.6016"	32° 29' 39.138"
	Sihlontlweni/Gcin	28° 38' 41.3627"	32° 28' 52.957"
	Nebelele	28° 39' 21.3480"	32° 27' 45.575"
	Qora	28° 40' 24.4740"	32° 26' 46.932"
	Jujura	28° 41' 38.2596"	32° 25' 51.960"
	Ngadla	28° 42' 31.2515"	32° 25' 6.0599"
	Shixini	28° 43' 31.8467"	32° 24' 11.163"
	Beechamwood	28° 45' 7.48439"	32° 22' 29.492"
	Unamed1	28° 45' 29.4371"	32° 22' 12.151"
	Kwa-goqo	28° 45' 41.4539"	32° 21' 59.050"

Not in NBA	Estuary	X_coord (E)	Y_coord (S)
	Ku-Nocekedwa	28° 46' 40.0655"	32° 20' 55.766"
	Nqabara	28° 47' 25.1915"	32° 20' 22.970"
X	*Gume*	28° 48' 58.97"	32°19'15.01"
X	*Ngomane*	28° 49' 32.38"	32°18'48.76"
	Ngoma/Kobule	28° 50' 14.3195"	32° 18' 4.1868"
X	*Unnamed*	28° 49' 46.22"	32°18'18.95"
	Mendu	28° 52' 40.0332"	32° 16' 51.297"
	Mendwana	28° 53' 3.25679"	32° 16' 8.1336"
X	*Unnamed*	28° 53'24.33"	32°15'45.67"
	Mbashe	28° 54' 6.84359"	32° 14' 59.946"
	Ku-Mpenzu	28° 54' 51.9012"	32° 14' 37.777"
	Ku-Bhula/Mbhanyan	28° 55' 40.8108"	32° 13' 41.185"
X	*Dakana*	28° 56' 17.94"	32° 13' 13.91"
	Kwa-Suka	28° 56' 48.78"	32°12'19.06"
	Ntlonyane	28° 57' 23.9832"	32° 11' 40.930"
X	*Nyumbazana*	*28°57'42.26"*	*32°11'16.22"*
	Nkanya	28° 58' 29.4888"	28° 58' 29.489"
	Sundwana	28° 58' 55.1280"	32° 10' 24.330"
	Xora	28° 59' 44.1059"	32° 9.' 31.082"
	Bulungula	29° 0.' 41.4647"	32° 8.' 16.828"
	Ku-Amanzimuzama	29° 2' 0.17159"	32° 6.' 53.729"
	Nqakanqa	29° 3' 44.7119"	32° 5' 55.1003"
	Unamed2	29° 4' 9.60240"	32° 5' 18.9023"
	Mncwasa	29° 4' 33.8772"	32° 4.' 57.741"
X	*Lubanzi*	29° 5' 10.83"	32° 4'28.38"
X	*Mhlalane*	29° 5' 14.87"	32° 3'50.23"
	Mpako	29° 6' 27.7019"	32° 2.' 24.853"
X	*Mtonjane*	*29° 6'43.31"*	*32° 1'59.85"*
X	*Ku-Bomvu*	*29° 8'56.27"*	*31°59'19.46"*
	Nenga	29° 9' 6.51600"	31° 59' 7.7460"
	Mapuzi	29° 10' 7.37759"	31° 58' 11.812"
	Mtata	29° 11' 1.52880"	31° 57' 10.666"
	Tshani	29° 12' 31.8960"	31° 56' 41.855"
	Mdumbi	29° 12' 58.6763"	31° 55' 53.220"
	Lwandilana	29° 14' 38.1300"	31° 53' 46.312"
	Lwandile	29° 14' 51.1296"	31° 53' 27.401"
	Mtakatye	29° 16' 12.8892"	31° 51' 33.371"
	Hluleka/Majusini	29° 18' 13.0032"	31° 49' 38.668"
	Mnenu	29° 19' 48.3239"	31° 48' 27.223"
	Mtonga	29° 20' 53.8475"	31° 47' 35.739"
	Mpande	29° 21' 25.7148"	31° 45' 44.096"

Not in NBA	Estuary	X_coord (E)	Y_coord (S)
	Sinangwana	29° 22' 11.6183"	31° 45' 1.7928"
X	*Ndluzula*	*29°23'13.99"*	*31°44'28.08"*
	Mngazana	29° 25' 22.2996"	31° 41' 31.837"
	Mngazi	29° 27' 47.2824"	31° 40' 37.862"
X	*Tyityane*	*29°29'29.66"*	*31°40'5.43"*
X	*Ntloloba*	*29°30'3.59"*	*31°39'33.81"*
	Gxwaleni	29° 30' 24.8148"	31° 39' 19.706"
	Bululo	29° 31' 3.89639"	31° 39' 2.4515"
	Mtambane	29° 31' 13.7316"	29.° -3' -1693."
	Mzimvubu	29° 32' 59.7443"	31° 37' 52.107"
X	*Mnenga*	*29°34'5.42"*	*31°37'0.66"*
	Ntlupeni	29°34'34.30"	31°36'42.18"
X	*Manzana*	*29°36'4.16"*	*31°36'1.38"*
	Nkodusweni	29° 36' 29.39"	31°35'39.42"
X	*Gugu*	*29°36'58.63"*	*31°35'6.44"*
	Mntafufu	29° 38' 15.8244"	31° 33' 45.068"
X	*Ingo*	*29°39'38.90"*	*31°32'56.92"*
X	*Ntyivini*	*29°40'3.39"*	*31°32'41.01"*
X	*Dakane*	*29°40'43.51"*	*31°32'6.49"*
	Mzintlava	29° 41' 23.2475"	31° 31' 21.518"
X	*Mguga*	*29°41'51.93"*	*31°30'45.14"*
	Mzimpunzi	29° 43' 23.1816"	31° 28' 47.852"
	Mbotyi	29° 44' 4.16400"	31° 28' 6.6287"
	Kwanyambalala	29° 44' 4.16400"	31° 28' 6.6287"
	Mkozi	29° 45' 41.6663"	31° 26' 54.722"
	Myekane	29° 46' 6.67920"	31° 26' 42.046"
	Sitatsha	29° 46' 17.00"	31°26'37.98"
X	*Cutweni*	*29°47'12.44"*	*31°26'18.65"*
X	*Mjihlelo*	*29°47'53.83"*	*31°26'9.95"*
X	*Mlambomkulu*	*29°49'18.66"*	*31°26'0.84"*
	Lupatana	29° 51' 5.32440"	31° 25' 23.811"
	Mkweni	29°52'22.20"	31°24'12.27"
X	*Maviti*	*29°53'41.28"*	*31°23'26.23"*
X	*Tezana*	*29°54'21.46"*	*31°22'31.97"*
X	*Magogo*	*29°55'10.02"*	*31°22'1.24"*
X	*Kilroe Beach*	*29°55'45.53"*	*31°21'34.37"*
X	*Mbaxeni*	*29°56'19.92"*	*31°21'3.61"*
	Msikaba	29° 58' 3.74"	31° 19' 9.20"
	Butsha	29°59'6.19"	31° 18' 45.17"
X	Kwa-Nondindwa	*29°59'22.58"*	*31°18'37.38"*
X	Daza	*29°59'50.39"*	*31°18'20.76"*

Not in NBA	Estuary	X_coord (E)	Y_coord (S)
	Mgwegwe	30° 0.' 40.9140"	31° 17' 15.554"
X	*Mkambati*	*30° 1'26.14"*	*31°16'27.98"*
	Mgwetyana	30° 2' 22.9775"	31° 15' 42.454"
	Mtentu	30° 2' 46.5539"	31° 14' 55.885"
	Sikombe	30° 4' 9.86160"	31° 13' 19.333"
	Kwanyana	30° 6' 17.6615"	31° 11' 10.791"
	Mtolane	30° 7' 37.1135"	31° 9' 34.8192"
	Mnyameni	30° 8' 1.60800"	31° 9' 7.67520"
X	*Unnamed*	*30° 8'33.86"*	*31° 8'42.80"*
	Mpahlanyana	30° 9' 36.5831"	31° 7' 27.9768"
	Mpahlane	30° 9' 53.4240"	31° 7' 9.99840"
	Mzamba	30° 10' 26.3999"	31° 6' 31.8600"
	Mtentwana	30° 11' 15.1979"	31° 5' 17.8763"
	Mtamvuna	30° 11' 37.2984"	31° 5' 4.27200"
	Zolwane	30° 12' 17.5427"	31° 4' 31.5876"
	Sandlundlu	30° 13' 44.6087"	31° 2' 33.4319"
	Ku-Boboyi	30° 14' 8.16359"	31° 2' 4.77599"
	Tongazi	30° 15' 24.5915"	31° 0' 41.1732"
	Kandandhlovu	30° 16' 9.45480"	30° 59' 50.625"
	Mpenjati	30° 17' 2.78160"	30° 58' 25.348"
	Umhlangankulu	30° 18' 11.0699"	30° 56' 43.490"
	Kaba	30° 18' 32.3604"	30° 56' 9.4776"
	Mbizana	30° 20' 5.22239"	30° 54' 31.103"
	Mvutshini	30° 20' 49.6895"	30° 53' 38.684"
	Bilanhlolo	30° 20' 56.1479"	30° 53' 24.687"
	Uvuzana	30° 21' 32.2415"	30° 52' 42.254"
	Kongweni	30° 22' 21.8495"	30° 51' 41.288"
	Vungu	30° 23' 43.1303"	30° 50' 11.345"
	Mhlangeni	30° 24' 20.1168"	30° 49' 12.810"
	Zotsha	30° 25' 25.1687"	30° 47' 22.322"
	Boboyi	30° 26' 21.2531"	30° 46' 14.509"
	Mbango	30° 26' 51.6084"	30° 45' 27.745"
	Mzimkulu	30° 27' 29.8800"	30° 44' 23.398"
	Mtentweni	30° 28' 54.1019"	30° 42' 34.534"
	Mhlangamkulu	30° 29' 54.0420"	30° 41' 17.394"
	Damba	30° 30' 37.5335"	30° 40' 20.863"
	Koshwana	30° 31' 2.27280"	30° 39' 37.137"
	Intshambili	30° 32' 11.5223"	30° 38' 13.938"
	Mzumbe	30° 32' 52.0116"	30° 36' 50.133"
	Mhlabatshane	30° 34' 17.0363"	30° 35' 4.1208"
	Mhlungwa	30° 34' 59.6459"	30° 33' 38.926"

Not in NBA	Estuary	X_coord (E)	Y_coord (S)
	Mfazazana	30° 36' 25.4339"	30° 31' 54.534"
	Kwa-Makosi	30° 36' 36.8496"	30° 31' 33.085"
	Mnamfu	30° 37' 28.9991"	30° 30' 30.272"
	Mtwalume	30° 38' 8.16000"	30° 29' 6.6300"
	Mvuzi	30° 38' 51.4104"	30° 28' 11.276"
	Fafa	30° 39' 13.0068"	30° 27' 24.073"
	Mdesingane	30° 40' 17.7275"	30° 25' 33.772"
	Sezela	30° 40' 39.8747"	30° 24' 54.046"
	Mkumbane	30° 40' 58.2060"	30° 24' 20.185"
	Mzinto	30° 42' 32.9219"	30° 22' 3.5075"
	Nkomba	30° 43' 13.3608"	30° 21' 10.357"
	Mzimayi	30° 43' 38.3448"	30° 20' 47.292"
	Mpambanyoni	30° 45' 33.4655"	30° 16' 49.432"
	Mahlongwa	30° 45' 50.1336"	30° 16' 8.8968"
	Mahlongwana	30° 47' 37.4424"	30° 13' 30.478"
	Mkomazi	30° 48' 13.9248"	30° 12' 9.3203"
	Ngane	30° 49' 1.67159"	30° 10' 43.824"
	Umgababa	30° 49' 50.6171"	30° 9' 20.4120"
	Msimbazi	30° 50' 51.5724"	30° 7' 46.2863"
	Lovu	30° 51' 27.2700"	30° 6' 19.5552"
	Little Manzimtoti	30° 52' 23.7395"	30° 4' 40.9152"
	Manzimtoti	30° 53' 4.71480"	30° 3' 30.8159"
	Mbokodweni	30° 56' 12.4367"	30° 0' 34.9524"
	Sipingo	30° 57' 4.53959"	29° 59' 45.229"
X	Umlazi	30° 58' 42.6971"	29° 58' 10.588"

Not in NBA	Estuary	X_coord (E)	Y_coord (S)
	Durban Bay	31° 3.' 45.0288"	29° 51' 58.085"
	Mgeni	31° 2.' 33.4031"	29° 48' 30.585"
	Mhlanga	31° 6.' 5.30279"	29° 42' 10.832"
	Mdloti	31° 7.' 44.9328"	29° 39' 2.1348"
	Tongati	31° 11' 5.58600"	29° 34' 24.275"
	Mhlali	31° 16' 41.4119"	29° 27' 36.575"
	Bobs Stream	31° 17' 41.0496"	29° 26' 16.717"
	Seteni	31° 18' 10.4544"	29° 25' 45.667"
	Mvoti	31° 20' 5.47439"	29° 23' 30.775"
	Mdlotane	31° 22' 25.7844"	29° 21' 8.6507"
	Nonoti	31° 24' 25.4880"	29° 19' 7.8852"
	Zinkwasi	31° 26' 36.5207"	29° 16' 53.724"
	Tugela/Thukela	31° 30' 3.62160"	29° 13' 27.310"
	Matigulu/Nyoni	31° 38' 40.3872"	29° 5' 1.30559"
	Siyaya	31° 45' 47.2968"	28° 58' 0.7716"
	Mlalazi	31° 49' 22.8971"	28° 56' 40.995"
	Mhlathuze	32° 2' 59.9675"	28° 50' 55.949"
	Richard's Bay	32° 5' 51.9611"	28° 48' 51.138"
	Nhlabane	32° 15' 25.6247"	28° 39' 41.061"
	UMfolozi	32° 25' 30.1836"	28° 23' 21.390"
	Msunduzi	32° 25' 20.8020"	28° 24' 10.461"
	St Lucia	32° 25' 29.0243"	28° 22' 57.226"
	Mgobezeleni	32° 40' 50.1419"	27° 32' 22.390"
	Kosi	32° 52' 50.8404"	26° 53' 42.626"

Appendix B:
Estuarine habitat cover in South Africa

Table B. Updated listed of Estuarine habitat cover in South Africa (based on 2010 input data).

Estuary	Intertidal salt marsh	Supratidal salt marsh	Submerged macrophytes	Reeds & sedges	Mangroves	Sand/mud banks	Channel	Rocks	Swamp forest	Total
Orange	83.9	107.8	0	22.02	0	108.3	652.5	0	0	974.52
Buffels	0	37.5	0	152	0	50	0.5	0	0	240
Spoeg	4.87	3.39	0	0.01	0	0	0.47	0	0	8.74
Groen	6.03	0	0	0	0	27.34	10.56	0	0	43.93
Olifants	91.94	849.1	47.72	60.05	0	76.99	227.86	0	0	1353.66
Verlorenvlei	16.2	7.56	3.68	2.3	0	0	4.5	0.5	0	34.74
Berg (Groot)	1667	2545	206	1588	0	?	793	0	0	6799
Langebaan	123.3	250.61	0	0	0	10.2	450.6	0	0	834.71
Rietvlei/Diep	0	0	0	0	0	0	0	0	0	0
Sout Wes	0	0	0	0	0	0	0	0	0	0
Hout Bay	0	0	0	17.15	0	2.53	1.37	0	0	21.05
Wildevoëlvlei	12.72	0	0	15.38	0	172.31	30.46	0	0	230.87
Bokramspruit	0	0	0	0.6	0	0	0.6	0	0	1.2
Schuster	0	0	0	0.14	0	0	0.46	0	0	0.6
Buffels Wes	0	0	0	0.48	0	1.67	1.58	0.02	0	3.75
Elsies	0	0	0	3.76	0	1.67	13.02	0	0	18.45
Krom Wes	0	0	0	1.42	0	0	7.28	0	0	8.7
Silvermine	0	0.19	2.02	2.21	0	2.01	0.09	0	0	6.52
Sand	11.55	0	0	39.76	0	7.02	97.15	0	0	155.48
Zeekoei	0	0	0.2	0.66	0	1.48	0.78	0.05	0	3.17
Eerste	0.29	0	0	1.36	0	6.15	2.4	0	0	10.2
Lourens	0	0	0	0.58	0	4.01	2.5	0	0	7.09
Sir Lowry's Pass	0	0.04	0	0	0	1.74	1.17	0	0	2.95
Steenbras	0	0	0	0	0	0	1.88	0	0	1.88
Rooiels	0	0	0.03	1.81	0	8	1	0	0	10.84
Buffels Oos	0	1.48	0	3.37	0	0.05	12.38	0	0	17.28
Palmiet	0.1	0	0	0	0	11	21.4	0.5	0	33
Bot/Kleinmond	0	92.4	32.3	373.8	0	152.3	1358.2	0	0	2009
Onrus	0	0	0	41.08	0	0	0.05	0	0	41.13
Klein	8.45	161.03	197.49	97.66	0	164.89	704.1	5	0	1338.62
Uilkraals	0	0	37.7	0	0	46	21	0	0	104.7
Ratel	0	0	0	0	0	0.39	0.94	0	0	1.33
Heuningnes	5.53	292.98	27.19	96.76	0	42.61	52.98	0	0	518.05
Klipdrifsfontein	0	0	0	0	0	0	0.6	0	0	0.6
Breede	20.5	29.55	6	4.8	0	136	1367.75	0	0	1564.6
Duiwenhoks	50.78	0	0	0	0	79.38	72.91	0	0	203.07
Goukou	44.2	0	0	0	0	62.78	47.78	0	0	154.76
Gouritz	21.07	0	0	0	0	0	91.51	0	0	112.58
Blinde	0	0	0	0.04	0	0.05	1.66	0	0	1.75
Hartenbos	2.04	13.62	0	0	0	9.21	15.72	0	0	40.59
Klein Brak	17	278	0	2	0	10	77	0	0	384
Groot Brak	13	26.6	0	2.5	0	29.9	33.1	0	0	105.1

Estuary	Intertidal salt marsh	Supratidal salt marsh	Submerged macrophytes	Reeds & sedges	Mangroves	Sand/mud banks	Channel	Rocks	Swamp forest	Total
Maalgate	0	0	0	0	0	1	14.96	0	0	15.96
Gwaing	1.58	0	0	0.14	0	1.82	3.65	0.31	0	7.5
Kaaimans	0.02	0	0	0.6	0	5.36	15.54	0	0	21.52
Wilderness (Touws)	6.3	7.4	4.6	11.2	0	2.1	21.1	0	0	52.7
Swartvlei	135.57	0	219.39	167.06	0	133.36	630.91	0	0	1286.29
Goukamma	1.5	5.2	0	4.1	0	0.21	7.2	0	0	18.21
Knysna	551	?	65.94	38	0	265.49	945.52	0	0	1865.95
Noetsie	0	0	0.1	2.71	0	0	5.06	0	0	7.87
Piesang	0	0	0	3.14	0	80.6	8.5	0	0	92.24
Keurbooms	72.16	41.83	88.73	146.33	0	166.27	159.42	0	0	674.74
Matjies	0	0	0	0.19	0	0	0.51	0	0	0.7
Sout Oos	0.37	0.31	0	0	0	0	2.36	0	0	3.04
Groot Wes	0	0.76	0	2.54	0	8.12	27.86	0	0	39.28
Bloukrans	0	0	0	0	0	0.63	2.88	0	0	3.51
Lottering	0	0	0	0	0	0.38	1.66	0	0	2.04
Elandsbos	0	0	0	0	0	3.04	2.09	0	0	5.13
Storms	0	0	0	0	0	0	12.1	0	0	12.1
Elands	0	0	0	0	0	1.7	5.79	0	0	7.49
Groot Oos	0	0	0	0	0	0.92	8.7	0	0	9.62
Tsitsikamma	0	0	0	1.5	0	0.5	4.5	0	0	6.5
Klipdrif	0	0	0	0.04	0	0.01	0.53	0	0	0.58
Slang	0	0	0	0.01	0	0	0.04	0	0	0.05
Krom Oos	18.13	67.17	30.98	12.95	0	89.65	189.34	0	0	408.22
Seekoei	0	8.18	14.25	26.42	0	0	83.37	0	0	132.22
Kabeljous	0	10.45	21.51	8.56	0	0	77.42	0	0	117.94
Gamtoos	92.92	80.84	5.14	40.88	0	92.12	189.35	0	0	501.25
Van Stadens	0	0	0	5.7	0	1.1	17.4	0	0	24.2
Maitland	0	0	0	4.5	0	0.25	11.4	2.5	0	18.65
Papkuils	0	0	0	0	0	0	0	0	0	0
Swartkops	165	5	12.5	4.5	0	177	135	0	0	499
Koega	0	2.3	1.2	4.3	0	0.04	2.3	0	0	10.14
Sundays	21.8	0	0	31.5	0	118.4	314	0	0	485.7
Boknes	1.5	5	0.5	6	0	0.5	6.5	0	0	20
Bushmans	118.3	0	39.8	20.9	0	?	161.9	0	0	340.9
Kariega	12.5	18.5	9.8	10.2	0	5.2	27.4	0.5	0	84.1
Kasuka	0	0	0	2.5	0	0.5	15.4	2.3	0	20.7
Kowie	35.2	0	0	6.36	0	33.99	43.08	0	0	118.63
Rufane	0	0	0	0.8	0	0	0.01	0	0	0.81
Riet	0	17.4	2.64	12.3	0	3	36.2	1.52	0	73.06
Kleinemond Wes	0	7.1	8.2	4.1	0	0.8	19.2	8.4	0	47.8
Kleinemond Oos	4.04	6.36	14.5	1.01	0	11.61	14.5	0.1	0	52.12
Klein Palmiet	0.001	0	0.02	0.22	0	0	0.29	0	0	0.531
Great Fish	46.7	152.3	0	16.6	0	10.58	139.5	0	0	365.68
Old woman's	0	0	0	14.17	0	0.1	10.7	0.15	0	25.12
Mpekweni	0	27.2	1.59	20.98	0	13.15	63.39	15.1	0	141.41

Estuary	Intertidal salt marsh	Supratidal salt marsh	Submerged macrophytes	Reeds & sedges	Mangroves	Sand/mud banks	Channel	Rocks	Swamp forest	Total
Mtati	0	54.25	3.2	26.2	0	1.45	180.15	21.1	0	286.35
Mgwalana	0	7.62	1.12	48.78	0	5.34	154.3	9.56	0	226.72
Bira	0	2.59	5.3	15.16	0	18.04	122.45	0	0	163.54
Gqutywa	0	1.23	2.5	3.78	0	4.47	38.1	1.56	0	51.64
Blue Krans	0	0	0	1.58	0	0.12	0.58	0.26	0	2.54
Freshwater Poort	0	0	0	0.5	0	0.1	0.15	0.15	0	0.9
Ngculura	0	0	0	0.7	0	1.15	0.5	0	0	2.35
Mtana	0	2.5	2.54	1.25	0	0.15	7.1	2.15	0	15.69
Keiskamma	210.37	91.26	11.33	103.9	0	49.18	277.82	0	0	743.86
Shwele-Shwele	0	0	0	1.34	0	0.41	5.65	0.56	0	7.96
Ngqinisa	0	0	0	2.3	0	0.12	9.05	1.2	0	12.67
Kiwane	0	0	3.56	4.56	0	0.15	8.96	1.57	0	18.8
Tyolomnqa	3.7	15.67	0	0.29	0	0.07	87.71	0	0	107.44
Shelbertsstroom	0	0	0	0	0	0	0.3	0	0	0.3
Lilyvale	0	0	0	0.5	0	0	1.8	0	0	2.3
Ross' Creek	0	0	0.2	0.1	0	0	1	0	0	1.3
Ncera	0	2.9	1	0.9	0	6.7	16.9	0	0	28.4
Mlele	0	0.4	0	0.5	0	0	2.7	0	0	3.6
Mcantsi	0	0.5	0	4	0	0.5	4	0	0	9
Gxulu	1	11.9	0	0.6	0	4	31	0	0	48.5
Goda	0	1.9	0	1.1	0	0.6	13.6	0	0	17.2
Hlozi	0	0	0	0.3	0	0	0.4	0	0	0.7
Hickmans	0	0.8	0	0.4	0	0	3.1	0	0	4.3
Mvubukazi	0	0	0	0	0	0	0.1	0	0	0.1
Ngqenga	0	0	0	0	0	0	0.1	0	0	0.1
Buffalo	0	0.1	0	0.2	0	0	97.7	0	0	98
Blind	0	0.1	0	0	0	0	0.4	0	0	0.5
Hlaze	0	0.1	0	0.7	0	0	0.7	0	0	1.5
Nahoon	2.8	0	2.3	0.2	0.6	4.5	47.3	0	0	57.7
Qinira	16.83	5.7	0	15.2	0	0	34.4	0	0	72.13
Gqunube	3.7	2.2	0.8	0.4	0	6.3	40	0	0	53.4
Kwelera	9.3	7.2	2.3	0.3	0	4.4	26.6	0	0	50.1
Bulura	2.8	5.6	0.4	2.7	0	4.6	19.4	0	0	35.5
Cunge	0	0	0	0.2	0	0	0.3	0	0	0.5
Cintsa	7	7.1	0	1	0	1.6	12.6	0	0	29.3
Cefane	28.1	21.4	0	1.9	0	8.8	22.5	0	0	82.7
Kwenxura	0	3.3	0	2.6	0	5	18.2	0	0	29.1
Nyara	1.1	6.3	0	0.6	0	1.7	7.4	0	0	17.1
Haga-haga	0	0.3	0	0.4	0	1.4	1.3	0	0	3.4
Mtendwe	0	4.1	0	5.6	0	0.2	4.2	0	0	14.1
Quko	3.9	0	0	1.2	0	0.08	31	0	0	36.18
Morgan	0	2	0	1	0	1	20	0	0	24
Cwili	0	0	0	0.6	0	0	0.6	0	0	1.2
Great Kei	5.8	6.2	0	12.3	0	8.7	189.4	0	0	222.4
Gxara	0	1.89	0	6.31	0	1.5	14.2	0	0	23.9

Estuary	Intertidal salt marsh	Supratidal salt marsh	Submerged macrophytes	Reeds & sedges	Mangroves	Sand/mud banks	Channel	Rocks	Swamp forest	Total
Ngogwane	0	0	0	2.35	0	2.1	4.67	0	0	9.12
Qolora	0	0	0	8.7	0	1.2	7.4	5.6	0	22.9
Ncizele	0	0	0	1.23	0	0.005	5.4	0	0	6.635
Kobonqaba	2.3	4.5	0	2.4	1.5	4.6	11.1	0	0	26.4
Ngqusi\Inxaxo	2.35	8.56	0.04	4.65	15	4.56	124.32	0	0	159.48
Cebe	0	0	0	7.63	0	1.4	7.5	0	0	16.53
Gqunqe	0	0	0	9.2	0	0.89	7.85	0	0	17.94
Zalu	0	0	0	5.2	0	0.02	7.14	0	0	12.36
Ngqwara	0	2.34	0	4.68	0	2.1	10.24	0	0	19.36
Sihlontlweni	0	0	0	2.56	0	0.05	8.4	0	0	11.01
Qora	0	0	8.5	5.67	0	10.23	65.23	0	0	89.63
Jujura	0	0	0.05	1.2	0	0.07	3.45	0	0	4.77
Ngadla	0	0	0	5.23	0	0.004	8.65	0	0	13.884
Shixini	0	0	0	5.64	0	5.23	11.23	0	0	22.1
Nqabara	0	0	1.2	4.56	8.5	4.63	89.54	0	1.23	109.66
Ngoma	0	0	0	4.32	0	4.56	1.23	0	0	10.11
Mendu	0	0	0	9.51	0	0	14.32	0	0	23.83
Mendwana										0
Mbashe	2.3	0	1.5	13.45	14	6.7	89.2	0	4.8	131.95
Ku-Mpenzu	0	0	0	4.3	0	1.24	6.54	1.3	0	13.38
Ku-Bhula	0	0	0	2.7	0	0	2.6	2.3	0	7.6
Kwa-Suka	0	0	2.3	7.6	0	0.01	8.23	0	0	18.14
Ntlonyane	0	0	0	7.99	0	3.89	29.46	0	0	41.34
Nkanya	0	0	0	7.4	0	0.05	7.52	0.5	0	15.47
Sundwana	0	0	0	2.3	0	0.01	4.32	0	0	6.63
Xora	0	12.96	2.6	10.12	16.32	17.13	91.45	0	0	150.58
Bulungulu	0	2.3	0	4.7	0	2.5	8.9	0	0	18.4
Ku-amanzimuzama	0	0	0	1.2	0	1.05	1.4	0	0	3.65
Mncwasa	0	0	0	3.7	0	0.156	15.36	0	0	19.216
Mpako	0	0	0	5.13	0	0.96	7.42	0	0	13.51
Nenga	0	0	0	2.1	0	2.17	5.74	0	0	10.01
Mapuzi	0	0	0	7.45	0	0	8.45	0	0	15.9
Mtata	0	21.03	0	6.23	33.5	5.62	102.41	0	0	168.79
Tshani	0	0	0	1.23	0	0.004	2.78	0	0	4.014
Mdumbi	0	8.17	0.05	7.9	0.5	13.88	45.57	0	0	76.07
Lwandilana	0	0	0	2.4	0	0.08	7.21	0	0	9.69
Lwandile	0	0	0	7.4	0	2.4	12.4	0	0	22.2
Mtakatye	0	18.19	1.25	7.56	9	5.21	75.6	0	0	116.81
Hluleka	0	0	0	2.35	0	4.1	8.45	0	0	14.9
Mnenu	0	0	0	44	0	0.08	46.44	0	0	90.52
Mtonga	0	0	0	15.6	0	1.2	15.4	0	0	32.2
Mpande	0	0	0	6.7	0	0.5	7.84	0	0	15.04
Sinangwana	0	0	0	7.4	0	0	5.8	0	0	13.2
Mngazana	1.25	7.4	0.8	11.4	145	5.6	45.6	0	7.8	224.85
Mngazi	0	0	0	4.6	0	0	12.5	0	0	17.1

Estuary	Intertidal salt marsh	Supratidal salt marsh	Submerged macrophytes	Reeds & sedges	Mangroves	Sand/mud banks	Channel	Rocks	Swamp forest	Total
Gxwaleni	0	0	0	5.6	0	0.02	4.5	0	0	10.12
Bululo	0	0	0	6.3	0	0.02	6.3	0	0	12.62
Mtambane	0	0	0	5.41	0	0.12	5.41	0	0	10.94
Mzimvubu	0	0	0	22.3	0	15.23	102.23	0	11.23	150.99
Ntlupeni	0	0	0	0.13	0	0.14	4.1	0	0	4.37
Nkodusweni	0	0	0	4.7	0	5.5	22.4	0	0	32.6
Mntafufu	0	0	0	1.5	13.7	0.75	7.65	0	0.47	24.07
Mzintlava	0	0	0	3.09	2.31	2.89	14.42	0	0.35	23.06
Mzimpunzi	0	0	0	1.41	0	0.6	3.07	0	0	5.08
Kwa-Nyambalala	0	0	0	0.02	0	0.01	0.57	0	0	0.6
Mbotyi	0	0	0	4.16	0	11.41	32.32	0	2.5	50.39
Mkozi	0	0	0	0.5	1.29	0.12	2.1	0	0	4.01
Myekane	0	0	0	0.3	0	0.49	1.13	0	0	1.92
Lupatana	0	0	0	0.22	0	0.15	2.73	0	0.45	3.55
Mkweni	0	0	0	0.34	0	0.15	5.19	0	1.32	7
Msikaba	0	0	0	0.49	0	2.81	10.94	0	0.89	15.13
Butsha	0	0	0	0.35	0	0	0.8	0	1.74	2.89
Mgwegwe	0	0	0	0.15	0	0.8	3.39	0	4.45	8.79
Mgwetyana	0	0	0	0.27	0	0.56	2.45	0	0	3.28
Mtentu	0	0	0	4.76	1.47	8.08	34.95	0	3.67	52.93
Sikombe	0	0	0	0.3	0	0.79	9.21	0	1.18	11.48
Kwanyana	0	0	0	0.71	0	0.1	6.32	0	0	7.13
Mtolane	0	0	0	0	0	0.14	1.15	0	0	1.29
Mnyameni	0	0	0	8.46	0	2.34	17.11	0	0.01	27.92
Mpahlanyana	0	0	0	0.74	0	0.1	3.01	0	0	3.85
Mpahlane	0	0	0	0.66	0	0.29	2.97	0	0	3.92
Mzamba	0	0	0	24.11	0.25	3.97	37.87	0	4.74	70.94
Mtentwana	0	0	0	0	0	1.22	10.21	0	0	11.43
Mtamvuna	0	0	0	15.23	0.3	2.36	45.69	0	0	63.58
Zolwane	0	0	0	0	0	2	0.3	0	0	2.3
Sandlundlu	0	0	0	3.25	0	3	4	0	0.25	10.5
Ku-boboyi	0	0	0	3	0	1	1.1	0	0	5.1
Tongazi	0	0	0	0	0	3	0.78	0	3	6.78
Kandandhlovu	0	0	0	2	0.5	1	1.8	0	0	5.3
Mpenjati	0	0	0	17	0	4.5	11.6	0	0	33.1
Umhlangankulu	0	0	0	4	0.5	1.5	5.8	0	4	15.8
Kaba	0	0	0.25	9	0	3	2.4	0	0	14.65
Mbizana	0	0	0	12	0	1	12.4	0	3	28.4
Mvutshini	0	0	0	0	0	3	0.88	0	0	3.88
Bilanhlolo	0	0	0	8	0.5	3.5	2.6	0	2	16.6
Uvuzana	0	0	0	4.5	0	1	0.6	0	0	6.1
Kongweni	0	0	0	4	0.5	1	1.42	0	0.25	7.17
Vungu	0	0	0	0	0	6	1.13	0	0	7.13
Mhlangeni	0	0	0	8	0	4	3.6	0	0	15.6
Zotsha	0	0	0	13	0	4	7.3	0	5	29.3

Estuary	Intertidal salt marsh	Supratidal salt marsh	Submerged macrophytes	Reeds & sedges	Mangroves	Sand/mud banks	Channel	Rocks	Swamp forest	Total
Boboyi	0	0	0	9	0	4	1.3	0	0	14.3
Mbango	0	0	0	8	0	2	0.9	0	2	12.9
Mzimkulu	0	0	0	18	0	11	73.9	0	15	117.9
Mtentweni	0	0	0	5	0	1	7.98	0	4.5	18.48
Mhlanga	0	0	0	69.9	0	0	30	0	0.2	100.1
Damba	0	0	0	6.25	0	2.7	1.7	0	9	19.65
Koshwana	0	0	0	10	0	1	1.18	0	6	18.18
Intshambili	0	0	0	1.5	0	1	1.7	0	6.25	10.45
Mzumbe	0	0	0	5	0	15	15.8	0	0	35.8
Mhlabatshane	0	0	0	4	0	1.5	2.27	0	11.5	19.27
Mhlungwa	0	0	1.5	7	0	4	3	0	1	16.5
Mfazazana	0	0	0	7.5	0	1	2.1	0	5	15.6
Kwa-Makosi	0	0	0	3.5	0	2	2.45	0	7	14.95
Mnamfu	0	0	0	6	0	3	1.28	0	4	14.28
Mtwalume	0	0	0	4	0	10	24.8	0	0	38.8
Mvuzi	0	0	0	15	0	2	0.8	0	0	17.8
Fafa	0	0	1.5	8	0	7	30	0	4.5	51
Mdesingwana	0	0	0.5	6	0	0.25	0.39	0	0	7.14
Sezela	0	0	0	18	0	1	9	0	0	28
Mkumbane	0	0	0	7	0	5	0.25	0	0	12.25
Mzinto	0	0	0	14	0	4	7	0	4.5	29.5
Nkomba										0
Mzimayi	0	0	0	6	0	6	0.9	0	0	12.9
Rocky Bay (30º20'01"S; 30º44'02E)										0
Mpambanyoni	0	0	0	3	0	7	2.32	0	0.25	12.57
Mahlongwa	0	0	0	7	0	1	5.9	0	0	13.9
Mahlongwana	0	0	3	5	0	2	6.84	0	4	20.84
Mkomazi	0	0	0	5	2	4.9	62.8	0	0	74.7
Ngane	0	0	0	3	0	4	1.36	0	0	8.36
Umgababa	0	0	2.5	15	0	12	17.8	0	0	47.3
Msimbazi	0	0	0	12	0	3	13.2	0	0	28.2
Lovu	0	0	0	19	0	5	10.5	0	5	39.5
Little Manzimtoti	0	0	0	2	0	1.5	1.5	0	5	10
Manzimtoti	0	0	0	5	0	7	6.67	0	2.5	21.17
Mbokodweni	0	0	0	8	0	2.5	7.24	0	0	17.74
Sipingo	0	3	0	2	3.8	1	0.8	0	16	26.6
Umlazi										0
Durban Bay	0	0	8	2	16	37	1080	0	5	1148
Mgeni	2	0	0	2	20.3	11	48	0	0	83.3
Mhlambankulu	0	0	0	0	0	0.68	12	0	0.2	12.88
Mdloti	0	0	0	10	0	7.3	33	0	7.8	58.1
Tongati	0	0	0	17.2	0	2.8	13.9	0	3.4	37.3
Mhlali	0	0	0	6	0	8	21	0	7	42
Bob's Stream										0
Seteni	0	0	0	0.25	0	2	1.13	0	4	7.38

Estuary	Intertidal salt marsh	Supratidal salt marsh	Submerged macrophytes	Reeds & sedges	Mangroves	Sand/mud banks	Channel	Rocks	Swamp forest	Total
Mvoti	0	0	0	1	0	3	18.4	0	0	22.4
Mdlotane	0	0	0.71	6.03	0	0	6.35	0	12.33	25.42
Nonoti	0	0	2.5	2.5	0	3	18	0	1	27
Zinkwasi	0	0	0	39.51	0	0	20.37	0	11.28	71.16
Thukela	0	0	0	12	0	11	55	0	1	79
Matigulu/Nyoni	0	0	0.5	2	0	0.5	122	0	2	127
Siyaya	0	0	0.08	5.31	0	0.21	0.76	0	1.33	7.69
Mlalazi	0	39.31	0.001	19.64	60.7	19.8	95.86	0	3.46	238.771
Mhlathuze	60	0	5	205	652.1	90	679	0	0	1691.1
Richard's Bay	52	0	0	309	267	531	869	0	16	2044
Nhlabane	0	0	1.1	7.8	0	0	5.2	0	0.3	14.4
uMfolozi	0	0	0	78	26	20	8.5	0	5	137.5
St Lucia	516	1706	181	3789	571	206	31610	0	3	38582
Mgobezeleni	0	0	0	5	4.5	0.5	1.3	0	4	15.3
Kosi	0	0	0	100	60.7	18	200	12	25	415.7

Appendix C:
Assessment of the health status of South Africa's estuaries

Table C: Desktop National Health Assessment, with individual ecological components graded from Excellent (dark blue), good (blue), fair (green) to poor (brown). A Provisional Present Ecological Status is also provided. Pressure levels are indicated as very high (VH), high (H), medium (M) or low (L). A Blank indicates the absence of a pressure.

	Pressures								Health Condition											
NAME	Change in flow	Polution	Habitat loss	Mining	Artificial Breaching	Fishing Effort(	Fishing Effort(Catches in tones)	Bait collection	Hydrology	Hydrodynamics	Water Quality	Physical habitat	Habitat State	Microalgae	Macrophytes	Invertebrates	Fish Final	Birds	Biological State	Estuary Health State (Mean)	Ecological Category
Orange (Gariep)	M	L	M		Y	L	5.0	Y													D
Buffels	L	M	M	Y	Y	L	0.1	Y													C
Spoeg	L	L	L			L	0.1	Y													B
Groen	L	L	L			L	0.1	Y													B
Sout	M	L	M				0.0														D
Olifants	M	M	M			VH	121.1	Y													C
Jakkalsvlei	H	M	L			L	0.1	Y													D
Wadrift	H	M	H			L	0.1	Y													E
Verlorenvlei	M	M	M		Y	M	10.0	Y													D
Groot Berg	M	H	M			VH	511.0	Y													D
Rietvlei/Diep	M	H	H		Y	L	0.1	Y													E
Sout (Wes)	H	H	H			L	0.1														F
Houtbaai	L	H	H			L	1.0	Y													E
Wildevoëlvlei	M	H	M			L	0.0	Y													D
Bokramspruit	L	H	L				0.0														C
Schuster	L	L	L				0.0														A
Krom	L	L	L				0.0														A
Buffels Wes	L	H	H				0.0														F
Elsies	L	H	H			L	0.1														E
Silvermine	L	H	H		Y	L	20.0	Y													D
Sand	M	H	M		Y	M	0.1	Y													D
Zeekoei	M	H	H			L	0.1	Y													E
Eerste	M	H	H			L	0.1	Y													E
Lourens	L	H	M			L	0.1	Y													C
Sir Lowry's Pass	M	H	H			L	1.0	Y													E
Steenbras	H	L				L	0.1	Y													B
Rooiels	L	L	L			L	0.1	Y													B
Buffels (Oos)	L	L	L			L	0.2	Y													B
Palmiet	M	L	M			L	70.0	Y													C
Bot/Kleinmond	M	M	M		Y	VH	0.1	Y													C
Onrus	H	H	H			L	80.0	Y													E
Klein	M	M	M		Y	H	2.1	Y													C
Uilkraals	M	M	M			M	0.1	Y													D

NAME	Pressures							Health Condition											
	Change in flow	Polution	Habitat loss	Mining	Artificial Breaching	Fishing Effort(	Fishing Effort(Catches in tones)	Bait collection	Hydrology	Hydrodynamics	Water Quality	Physical habitat	Habitat State	Microalgae	Macrophytes	Invertebrates	Fish Final	Birds	Biological State	Estuary Health State (Mean)	Ecological Category
Ratel	M	M	L			L	10.0	Y													C
Heuningnes	M	M	M		Y	M	0.0	Y													D
Klipdrifsfontein	L	L					80.0														A
Breëde	M	L	L			H	20.0	Y													B
Duiwenhoks	M	L	L			H	13.0	Y													B
Goukou (Kaffirkui	M	M	M			H	20.0	Y													C
Gouritz	M	M	M			H	0.1	Y													C
Blinde	L	M	L			L	2.1	Y													B
Hartenbos	M	H	M		Y	L	10.0	Y													D
Klein Brak	L	M	M			M	0.0	Y													C
Groot Brak	M	M	H		Y	M	1.0	Y													D
Maalgate	L	L				L	1.0	Y													B
Gwaing	L	M	L			L	0.0	Y													B
Kaaimans	L	L	L				0.0	Y													B
Wilderness (Touws)	L	M	M		Y		0.0	Y													B
Swartvlei	L	L	M		Y		4.1	Y													B
Goukamma	L	L	L		Y	M	70.4	Y													B
Knysna	L	M	L			H	0.2	Y													B
Noetsie	L	L	L			L	0.1	Y													B
Piesang	L	M	M			L	10.0	Y													C
Keurbooms	L	L	L			L	0.1	Y													A
Matjies	L	L	L			L	0.5	Y													B
Sout (Oos)	L	L				L	2.9	Y													A
Groot (Wes)	M	L	L			L	1.0	Y													B
Bloukrans	L	L				L	0.2	Y													A
Lottering	L	L				L	0.2	Y													A
Elandsbos	L	L	L			L	0.1	Y													A
Storms	L	L	L			L	0.1														A
Elands	L	L	L			L	0.1	Y													B
Groot (Oos)	M	M	L			L	1.8	Y													B
Tsitsikamma	M	M	L			L	0.1	Y													B
Klipdrif	M	M	M			L	0.1	Y													D
Slang	M	M	M			L	22.1	Y													D
Krom Oos (Kromme)	H	H	M			H	1.0	Y													D
Seekoei	M	M	H			L	2.0	Y													D
Kabeljous	L	M	M			L	19.3	Y													C

NAME	Pressures							Health Condition												
	Change in flow	Polution	Habitat loss	Mining	Artificial Breaching	Fishing Effort(	Fishing Effort(Catches in tones)	Bait collection	Hydrology	Hydrodynamics	Water Quality	Physical habitat	Habitat State	Microalgae	Macrophytes	Invertebrates	Fish Final	Birds	Biological State	Estuary Health State (Mean)	Ecological Category
Gamtoos	M	M	M			H	2.1	Y													C
Van Stadens	L	L	L			L	0.1	Y													B
Maitland	L	M	M			L	0.1	Y													C
Baakens	M	H	H			L	0.1	Y													E
Papenkuils	M	H	H			L	35.0	Y													F
Swartkops	L	H	H			H	10.0	Y													C
Coega (Ngcura)	M	H	H			L	9.0	Y													F
Sundays	M	H	M			H	0.3	Y													C
Boknes	L	L	L			L	11.5	Y													C
Bushmans	L	M	M			H	0.1	Y													C
Kariega	M	L	M			L	2.2	Y													C
Kasuka	L	L	L			L	2.0	Y													B
Kowie	M	M	M			L	0.0	Y													C
Rufane	M	M	M				0.1	Y													C
Riet	L	L	L			L	2.2	Y													B
Kleinemond Wes	L	M	L			L	2.0	Y													B
Kleinemond Oos	L	M	L			L	0.0	Y													B
Klein Palmiet	H	M	M			L	30.0	Y													D
Great Fish	M	M	M			H	0.1	Y													C
Old Womans	L	M	M			L	2.2	Y													C
Mpekweni	L	M	L			M	3.0	Y													B
Mtati	L	L	L			L	3.5	Y													B
Mgwalana	L	L	L			L	8.5	Y													B
Bira	L	L	L			L	0.2	Y													B
Gqutywa	L	L	L			L	0.1	Y													B
Ngculura	L	L	L			L	0.0														B
Blue Krans	L	L	L			L	2.1														A
Mtana	L	M	L			L	50.0	Y													B
Keiskamma	L	M	M			H	0.1	Y													C
Ngqinisa	L	M	L			L	2.0	Y													B
Kiwane	L	L	L			L	20.0	Y													B
Tyolomnqa	L	L	L			M	0.1	Y													B
Shelbertsstroom	L	M	L			L	0.1	Y													C
Lilyvale	L	M	L			L	0.1	Y													B
Ross' Creek	L	M	L			L	2.3	Y													B
Ncera	L	M	L			L	0.1	Y													B
Mlele	L	M	L			L	0.1	Y													B

NAME	Pressures							Health Condition												
	Change in flow	Polution	Habitat loss	Mining	Artificial Breaching	Fishing Effort(	Fishing Effort(Catches in tones)	Bait collection	Hydrology	Hydrodynamics	Water Quality	Physical habitat	Habitat State	Microalgae	Macrophytes	Invertebrates	Fish Final	Birds	Biological State	Estuary Health State (Mean)	Ecological Category
Mcantsi	L	M	M			L	3.2	Y													C
Gxulu	L	L	L			L	1.0	Y													B
Goda	L	L	L			L	0.1	Y													B
Hlozi	L	L	L			L	0.1	Y													B
Hickman's	L	M	L			L	0.1	Y													B
Mvubukazi	L	M	L			L	0.0	Y													B
Ngqenga	L	H	L			L	20.0														C
Buffalo	H	H	L			L	0.1	Y													D
Blind	L	H	L			L	0.1	Y													C
Hlaze	L	M	L			L	7.4	Y													C
Nahoon	M	H	M			H	2.0	Y													C
Qinira	L	M	L			M	7.7	Y													B
Gqunube	L	M	L			M	8.0	Y													B
Kwelera	L	L	L			H	2.0	Y													B
Bulura	L	M	L			H	0.1	Y													B
Cunge	L	L	L			L	3.5	Y													A
Cintsa	L	M	L			L	3.1	Y													C
Cefane	L	L	L			L	3.5	Y													B
Kwenxura	L	L	L			L	0.2	Y													B
Nyara	L	L				L	0.1	Y													A
Mtwendwe	L	L	L			L	1.0	Y													B
Haga-haga	L	L	L			L	0.1	Y													B
Mtendwe	L	L	L			L	3.8	Y													B
Quko	L	L	L			L	2.6	Y													A
Morgan	L	M	L			L	0.1	Y													C
Cwili	L	M	L			L	30.0	Y													B
Great Kei	L	M	L			H	2.3	Y													C
Gxara	L	L	L			L	0.1	Y													B
Ngogwane	L	L	L			L	1.7	Y													B
Qolora	L	L	L			L	0.1	Y													B
Ncizele	L	L	L			L	0.1	Y													B
Timba	L	L	L			L	6.0														A
Kobonqaba	L	L	L			L	3.0	Y													B
Nxaxo/Ngqusi	L	L	M			L	2.4	Y													B
Cebe	L	L	L			L	2.4	Y													B
Gqunqe	L	L	L			L	1.5	Y													A

NAME	Pressures								Health Condition											
	Change in flow	Polution	Habitat loss	Mining	Artificial Breaching	Fishing Effort(	Fishing Effort(Catches in tones)	Bait collection	Hydrology	Hydrodynamics	Water Quality	Physical habitat	Habitat State	Microalgae	Macrophytes	Invertebrates	Fish Final	Birds	Biological State	Estuary Health State (Mean)	Ecological Category
Zalu	L	L	L			L	2.4	Y													A
Ngqwara	L	L	L			L	1.5	Y													A
Sihlontlweni/Gcin	L	L	L			L	0.0	Y													B
Nebelele	L	L					7.0														A
Qora	L	L	L			L	1.3	Y													B
Jujura	L	L	L			L	1.5	Y													B
Ngadla	L	L	L			L	2.5	Y													A
Shixini	L	L	L			L	0.0	Y													B
Beechamwood		L					0.0														A
Unnamed		L					0.0														A
Kwa-Goqo		L					0.0														A
Ku-Nocekedwa		L					8.4														A
Nqabara/Nqabarana	L	L	L			L	1.0	Y													B
Ngoma/Kobule	L	L	L			L	1.0	Y													A
Mendu	L	L	L			L	0.0	Y													A
Mendwana	L	L	L				15.0														A
Mbashe	L	M	L			H	0.1	Y													C
Ku-Mpenzu	L	L	L			L	0.2	Y													B
Ku-Bhula/Mbhanyana	L	L				L	0.1	Y													A
Kwa-Suka	L	L				L	0.5	Y													B
Ntlonyane	L	M	M			L	0.1	Y													B
Nkanya	L	M	L	Y		L	0.0	Y													B
Sundwana		L				L	7.0														A
Xora	L	L	L			L	0.2	Y													B
Bulungula	L	L	L			L	0.0	Y													B
Ku-Amanzimuzama	L	L	L			L	0.0														A
Nqakanqa		L	L				0.0														A
Unnamed2		L	L				2.0														A
Mncwasa	L	L	L			L	0.5	Y													B
Mpako	L	L	L			L	0.1	Y													B
Nenga	L	M	M			L	0.1	Y													C
Mapuzi	L	M	L			L	5.5	Y													B
Mtata	M	H	M			H	0.1	Y													D
Tshani	L	M	L			L	5.0	Y													B
Mdumbi	L	L	M			H	0.1	Y													B
Lwandilana	L	L	L			L	1.0	Y													A

NAME	Pressures								Health Condition											
	Change in flow	Polution	Habitat loss	Mining	Artificial Breaching	Fishing Effort(	Fishing Effort(Catches in tones)	Bait collection	Hydrology	Hydrodynamics	Water Quality	Physical habitat	Habitat State	Microalgae	Macrophytes	Invertebrates	Fish Final	Birds	Biological State	Estuary Health State (Mean)	Ecological Category
Lwandile	L	L	L			L	5.2	Y													A
Mtakatye	L	L	L			H	0.1	Y													B
Hluleka/Majusini	L	L	L			L	6.0	Y													A
Mnenu	L	M	L			L	0.1	Y													B
Mtonga	L	L	L			L	0.1	Y													B
Mpande	L	L				L	1.0	Y													B
Sinangwana	L	L	L			L	6.7	Y													B
Mngazana	L	M	M			H	6.0	Y													B
Mngazi	L	M	L			L	0.1	Y													C
Gxwaleni	L	L				L	0.1	Y													A
Bulolo	L	L	L			L	0.0	Y													B
Mtumbane	L	L	L			L	35.2														B
Mzimvubu	L	M	L			H	0.0	Y													C
Ntlupeni	L	L	L			L	1.0														B
Nkodusweni	L	L	L			L	4.1	Y													B
Mntafufu	L	L	M			H	3.8	Y													B
Mzintlava	L	M	L			H	0.0	Y													B
Mzimpunzi	L	L	L				0.1														B
Kwa-Nyambalala	L	L	L			L	2.0	Y													B
Mbotyi	L	L	L			L	0.0	Y													B
Mkozi	L	L	L				0.0														A
Myekane	L	L					0.0														A
Sitatsha	L	L					0.0														A
Lupatana	L	L					0.0														A
Mkweni	L	L					3.2														A
Msikaba	L	M				H	0.0	Y													A
Butsha			L				0.1														A
Mgwegwe						L	0.1	Y													A
Mgwetyana						L	4.5	Y													A
Mtentu	L	L	L			H	1.0	Y													A
Sikombe	L	L				L	0.1	Y													A
Kwanyana	L	L	L			L	0.1	Y													B
Mtolane	L	L				L	3.5	Y													A
Mnyameni	L	L	M			L	0.1	Y													B
Mpahlanyana	L	L				L	0.1	Y													A
Mpahlane	L	L				L	3.7	Y													A

NAME	Pressures								Health Condition											
	Change in flow	Polution	Habitat loss	Mining	Artificial Breaching	Fishing Effort(	Fishing Effort(Catches in tones)	Bait collection	Hydrology	Hydrodynamics	Water Quality	Physical habitat	Habitat State	Microalgae	Macrophytes	Invertebrates	Fish Final	Birds	Biological State	Estuary Health State (Mean)	Ecological Category
Mzamba	L	M	L			H	0.0	Y													B
Mtentwana	L	M	H				2.5	Y													C
Mtamvuna	L	L	L		?	L	0.1	Y													B
Zolwane	L	L	M		Y	L	0.2	Y													B
Sandlundlu	L	M	M	Y	Y	L	0.2	Y													C
Ku-Boboyi	L	M	M			L	0.0	Y													B
Tongazi	L	M	M				0.2	Y													B
Kandandhlovu	L	M	M			L	0.3	Y													B
Mpenjati	L	M	M	Y	Y	L	0.3	Y													B
Umhlangankulu	L	M	M		Y	L	0.2	Y													C
Kaba	L	M	M			L	0.6	Y													B
Mbizana	L	M	M	Y	?	L	0.2	Y													B
Mvutshini	L	M	M		Y	L	0.2	Y													B
Bilanhlolo	L	M	M		Y	L	0.2	Y													C
Uvuzana	L	M	M		Y	L	0.2	Y													C
Kongweni	L	M	H		Y	L	0.0	Y													C
Vungu	L	M	L				0.2														B
Mhlangeni	L	M	M		Y	L	0.7	Y													C
Zotsha	L	M	M	Y	Y	L	0.2	Y													C
Boboyi	L	H	M			L	0.1	Y													C
Mbango	M	H	H			L	4.0	Y													E
Mzimkulu	M	M	M	Y	Y	H	0.2	Y													C
Mtentweni	L	M	M			L	0.2	Y													C
Mhlangamkulu	L	M	M			L	0.2	Y													C
Damba	L	M	M		Y	L	0.2	Y													C
Koshwana	L	M	M			L	0.2	Y													C
Intshambili	L	L	M			L	0.3	Y													B
Mzumbe	L	M	H	Y		L	0.2	Y													D
Mhlabatshane	L	L	M			L	0.8	Y													B
Mhlungwa	L	M	M			L	0.5	Y													C
Mfazazana	L	M	H			L	0.4	Y													C
Kwa-Makosi	L	M	M			L	0.2	Y													B
Mnamfu	L	M	M			L	0.2	Y													C
Mtwalume	L	M	M	Y		L	0.2	Y													D
Mvuzi	L	M	M			L	0.8	Y													C
Fafa	L	M	M	Y	Y	L	0.1	Y													D
Mdesingane	L	M	H			L	0.0	Y													C

NAME	Pressures								Health Condition											
	Change in flow	Polution	Habitat loss	Mining	Artificial Breaching	Fishing Effort(	Fishing Effort(Catches in tones)	Bait collection	Hydrology	Hydrodynamics	Water Quality	Physical habitat	Habitat State	Microalgae	Macrophytes	Invertebrates	Fish Final	Birds	Biological State	Estuary Health State (Mean)	Ecological Category
Sezela	L	H	M		Y		0.2														D
Mkumbane	L	M	M			L	0.6	Y													C
Mzinto	L	M	M		?	L	0.0	Y													C
Nkomba	L	M	H			L	0.2														C
Mzimayi	L	M	M			L	0.1	Y													C
Mpambanyoni	L	M	M	Y	?	L	7.6	Y													C
Mahlongwa	L	M	M	Y	Y	M	0.4	Y													C
Mahlongwane	L	M	M		?	L	7.0														B
Mkomazi	L	M	M	Y	Y	H	1.9	Y													C
Ngane	L	L	M		?	L	0.0	Y													B
Umgababa	L	L	M		Y		0.0														B
Msimbazi	L	L	L				0.0														B
Lovu	M	M	M	Y	Y		0.0														C
Little Manzimtoti	M	H	H		Y		0.0														D
Manzimtoti	L	H	H	Y	Y		0.0														D
Mbokodweni	M	H	H	Y	Y		0.0														E
Sipingo	H	H	H				53.0														F
Durban Bay	M	H	H			H	3.7	Y													E
Mgeni	M	H	H	Y	Y	L	0.1	Y													D
Mhlanga	M	H	M		Y	L	1.0	Y													D
Mdloti	L	H	H	Y	Y	L	0.6	Y													D
Tongati	L	H	H	Y	Y	L	0.6	Y													E
Mhlali	M	H	M	Y	Y	L	0.0	Y													C
Bob's Stream	M	M	M				0.1	Y													C
Seteni	M	M	M			L	1.0	Y													C
Mvoti	M	H	M	Y	Y	L	0.2	Y													D
Mdlotane	L	L	M			L	0.6	Y													B
Nonoti	L	M	M	Y	Y	L	3.0	Y													B
Zinkwasi	L	M	H	Y	Y	L	17.0	Y													C
Thukela	L	H	M	Y	Y	H	15.0	Y													C
Matigulu/Nyoni	L	L	L			H	0.1	Y													B
Siyaya	H	H	H			L	18.0														F
Mlalazi	L	M	M		Y	H	80.0	Y													B
Mhlathuze	L	M	H	Y		H	88.0	Y													C
Richards Bay	L	M	H			H	0.0	Y													D
Nhlabane (Present)	M	L	H	Y			0.0														D
Msunduzi	L	M	M				8.0														C

NAME	Pressures								Health Condition											
	Change in flow	Polution	Habitat loss	Mining	Artificial Breaching	Fishing Effort(	Fishing Effort(Catches in tones)	Bait collection	Hydrology	Hydrodynamics	Water Quality	Physical habitat	Habitat State	Microalgae	Macrophytes	Invertebrates	Fish Final	Birds	Biological State	Estuary Health State (Mean)	Ecological Category
UMfolozi	L	H	H	Y	Y	H	10.0	Y													D
St Lucia	H	M	H		Y	H	4.0	Y													E
Mgobezeleni	L	L	L		Y	M	300.0														B
Kosi	L	L	M			VH	0.0	Y													B

* *Ecological Category was determined by an ecological water requirement study, otherwise determined by desktop study.*

Appendix D:
National priority estuaries for biodiversity conservation

Table D. National and/or regional priorities, the extent of protection required (Full = full no-take protection, Partialpartial = no-take sanctuary zone where feasible), the recommended proportion of the estuary margin being undeveloped (or with a >100 m development setback line), and Recommended Ecological Category (after Turpie et al. 2012).

Estuary (West to East)	Current health category	National (SA) and regional (C.A.P.E.) priorities	Recommended extent of protection	Recommended degree of undeveloped margin	Recommended Ecological Category
Orange	D	SA/C.A.P.E.	Full	50%	C*
Spoeg	B	SA	Full	100%	A or BAS
Groen	B	SA	Full	100%	A or BAS
Olifants	C	SA/C.A.P.E.	Partial	50%	B*
Verlorenvlei	D	SA	Partial	50%	C
Berg	D	SA/C.A.P.E.	Partial	25%	C*
Rietvlei/ Diep	E	SA/C.A.P.E.	Partial	50%	C
Krom	A	SA/C.A.P.E.	Full	100%	A or BAS
Sand	D	SA/C.A.P.E.	Partial	20%	C
Eerste	E	SA/C.A.P.E.	Full	75%	D
Lourens	C	SA/C.A.P.E.	Full	75%	D
Palmiet	C	SA/C.A.P.E.	Full	50%	B*
Bot / Kleinmond	C	SA/C.A.P.E.	Partial	50%	B
Klein	C	SA/C.A.P.E.	Partial	50%	B
Uilkraals	D	SA	Partial	75%	C
Ratel	C	SA	Full	75%	C
Heuningnes	D	SA/C.A.P.E.	Full	75%	A or BAS
Klipdrifsfontein	A	SA/C.A.P.E.	Full	75%	A
Goukou	C	SA/C.A.P.E.	Partial	50%	B
Gouritz	C	SA/C.A.P.E.	Partial	50%	B
Kaaimans	B	SA	Full	50%	B*
Wilderness (Touws)	B	SA/C.A.P.E.	Partial	50%	A or BAS
Swartvlei	B	SA/C.A.P.E.	Partial	50%	B*
Goukamma	B	SA/C.A.P.E.	Full	75%	A*
Knysna	B	SA/C.A.P.E.	Partial	50%	B*
Piesang	C	SA	Partial	50%	B
Keurbooms	A	SA/C.A.P.E.	Partial	50%	A*
Sout (Oos)	A	SA/C.A.P.E.	Full	100%	A*
Groot (Wes)	B	SA/C.A.P.E.	Full	75%	A or BAS
Bloukrans	A	SA/C.A.P.E.	Full	100%	A or BAS
Lottering	A	SA/C.A.P.E.	Full	100%	A or BAS
Elandsbos	A	SA/C.A.P.E.	Full	100%	A or BAS
Storms	A	SA/C.A.P.E.	Full	100%	A or BAS
Elands	B	SA/C.A.P.E.	Full	100%	A or BAS
Groot (Oos)	B	SA/C.A.P.E.	Full	100%	A or BAS
Tsitsikamma	B	SA	Full	50%	B*
Kromme	D	SA/C.A.P.E.	Partial	25%	C*
Seekoei	D	SA/C.A.P.E.	Partial	25%	B*
Gamtoos	C	SA/C.A.P.E.	Partial	50%	A or BAS
Van Stadens	B	SA/C.A.P.E.	Partial	50%	A or BAS

Estuary (West to East)	Current health category	National (SA) and regional (C.A.P.E.) priorities	Recommended extent of protection	Recommended degree of undeveloped margin	Recommended Ecological Category
Maitland	C	SA/C.A.P.E.	Full	75%	C
Swartkops	C	SA/C.A.P.E.	Partial	25%	B
Sundays	C	SA/C.A.P.E.	Partial	50%	A or BAS
Bushman's	B	SA/C.A.P.E.	Partial	50%	A*
Kariega	C	SA/C.A.P.E.	Partial	50%	B
Great Fish	C	SA/C.A.P.E.	Partial	50%	B
Mgwalana	B	SA	Partial	50%	A
Bira	B	SA	Partial	50%	A
Gqutywa	B	SA/C.A.P.E.	Full	75%	A
Keiskamma	C	SA/C.A.P.E.	Partial	50%	B
Ncera	B	SA	Full	75%	B
Gqunube	B	SA	Partial	50%	A
Kwelera	B	SA	Partial	50%	A
Kwenxura	B	SA/C.A.P.E.	Full	75%	A
Quko	A	SA/C.A.P.E.	Full	50%	A
Great Kei	C	SA/C.A.P.E.	Partial	50%	B*
Ncizele	B	SA	Full	75%	B
Nxaxo/Ngqusi	B	SA/C.A.P.E.	Full	75%	A
Ngqwara	A	SA	Full	75%	A
Qora	B	SA/C.A.P.E.	Partial	75%	A
Ngadla	A	SA	Full	75%	A
Nqabara	B	SA	Partial	75%	A
Mbashe	C	SA/C.A.P.E.	Partial	75%	A or BAS
Ku-Mpenzu	B	SA/C.A.P.E.	Full	75%	B
Ku-Bhula/Mbhanyana	A	SA/C.A.P.E.	Full	75%	A
Ntlonyane	B	SA/C.A.P.E.	Full	75%	B
Nkanya	B	SA/C.A.P.E.	Full	75%	B
Sundwana	A	SA	Full	75%	A
Xora	B	SA	Partial	75%	A
Ngakanqa	A	SA	Full	75%	A
Mtata	D	SA	Partial	50%	C*
Lwandilana	A	SA	Full	75%	A
Mtakatye	B	SA	Partial	75%	B
Hluleka	A	SA	Full	75%	A or BAS
Mngazana	B	SA	Partial	50%	B
Mzimvubu	C	SA	Partial	50%	C
Nkodusweni	B	SA	Partial	75%	A or BAS
Mntafufu	B	SA	Full	75%	A or BAS
Mzintlava	B	SA	Full	75%	A or BAS
Mbotyi	B	SA	Partial	50%	A or BAS
Mkozi	A	SA	Full	75%	A
Myekane	A	SA	Full	75%	A
Mkweni	A	SA	Partial	75%	A or BAS
Msikaba	A	SA	Full	75%	A or BAS
Mtentu	A	SA	Full	75%	A or BAS

Estuary (West to East)	Current health category	National (SA) and regional (C.A.P.E.) priorities	Recommended extent of protection	Recommended degree of undeveloped margin	Recommended Ecological Category
Mnyameni	B	SA	Partial	75%	A or BAS
Mtamvuna	B	SA	Full	75%	A or BAS
Mpenjati	B	SA	Partial	75%	A or BAS
Zotsha	C	SA	Partial	50%	C
Mzimkulu	C	SA	Partial	50%	B
Damba	C	SA	Partial	50%	C
Koshwana	C	SA	Partial	50%	C
Intshambili	B	SA	Partial	50%	B
Mhlabatshane	B	SA	Partial	50%	B
Mfazazana	C	SA	Partial	50%	C
Kwa-Makosi	B	SA	Partial	75%	B
Mkomazi	C	SA	Partial	25%	B
Umgababa	B	SA	Full	50%	B
Msimbazi	B	SA	Full	75%	B
Lovu	C	SA	Partial	50%	C
Durban Bay	E	SA	Partial	25%	B
Mgeni	D	SA	Partial	25%	A or BAS
Mhlanga	D	SA	Full	75%	B*
Mhlali	C	SA	Partial	50%	B
Mvoti	D	SA	Full	75%	D
Mdlotane	B	SA	Full	75%	A
Zinkwasi	C	SA	Partial	50%	B
Matigulu/Nyoni	B	SA	Partial	50%	A
Siyaya	F	SA	Full	50%	B*
Mlalazi	B	SA	Full	75%	A or BAS
Mhlathuze/R.Bay	C	SA	Partial	50%	A or BAS
St Lucia/uMfolozi	D	SA	Full	75%	A*
Mgobezeleni	B	SA	Full	75%	A or BAS
Kosi	B	SA	Full	75%	A or BAS

*Recommended condition were determined by an ecological water requirement study, otherwise determined by desktop study.

Appendix E:
Estuary-associated fish species caught in South African fisheries

Table E.1 Estuary-associated fish species caught in South African fisheries, given in order of estuarine dependence category (Table 2.1) and distribution of catches around the coast. Distribution is divided into West coast (Orange River to Cape Point), South Coast (Cape Point to Port Elizabeth), East Coast (Swartkops to Kei River), Transkei and KwaZulu-Kwazulu Natal (Port Edward to Kosi Bay). The three biogeographical provinces are separated by Cape Point and roughly at the Mbashe River in the Transkei (Emanuel *et al*. 1992, Turpie *et al.* 1999, Maree *et al*. 2000a,b).

Species	Common name	Dependence category	Distribution				
			Cool Temperate	Warm Temperate			Sub-tropical
			West	South	East	Transkei	KZN
Ambassis productus	Longspine glassy	Ia					X
Ambassis gymnocephalus	Bald glassy	Ib		X	X	X	X
Ambassis natalensis	Slender glassy	Ib					X
Rhabdosargus holubi	Cape stumpnose	IIa	X	X	X	X	X
Argyrosomus japonicus	Dusky kob	IIa		X	X	X	X
Mugil cephalus	Flathead/springer mullet	IIa	X	X	X	X	X
Elops machnata	Ladyfish/tenpounder	IIa		X	X	X	X
Lichia amia	Leervis/garrick	IIa	X	X	X	X	X
Acanthropagrus berda	Perch/riverbream	IIa				X	X
Pomadasys commersonni	Spotted grunter	IIa		X	X	X	X
Lithognathus lithognathus	White steenbras	IIa	X	X	X	X	X
Monodactylus falciformis	Cape/Oval moony	IIa			X	X	X
Liza macrolepis	Largescale mullet	IIa					X
Valamugil cunnesius	Longarm mullet	IIa				X	X
Valamugil robustus	Robust mullet	IIa				X	X
Terapon jarbua	Thornfish	IIa			X	X	X
Galeichthyes feliceps	Barbel	IIb	X	X	X	X	X
Sphyraena barracuda	Barracuda	IIb					X
Caranx sexfasciatus	Bigeye kingfish	IIb					X
Caranx ignobilis	Giant kingfish	IIb				X	X
Rhabdosargus sarba	Natal stumpnose	IIb				X	X
Scomberoides lysan	Doublespotted queenfish	IIb					X
Liza tricuspidens	Striped mullet	IIb		X	X	X	X
Thryssa vitrirostris	Orangemouth glassnose	IIb					X
Gerres acinaces	Smallscale pursemouth	IIb					X
Gerres methueni/rappi	Evenfin pursemouth	IIb					X
Leiognathus equula	Slimy	IIb					X
Monodactylus argenteus	Natal/Round moony	IIb				X	X
Liza alata	Diamond mullet	IIb				X	X
Liza dumerilii	Groovy mullet	IIb		X	X	X	X
Liza luciae	St Lucia mullet	IIb					X
Platycephalus indicus	Bartailed flathead	IIc			X	X	X
Diplodus sargus	Dassie/blacktail	IIc		X	X	X	X
Pomatomus saltatrix	Elf	IIc	X	X	X	X	X
Liza richardsonii	Harder	IIc	X	X	X		
Pomadasys hasta/kakaan	Javelin grunter	IIc					X
Johnius dussumieri	Mini kob	IIc			X	X	X
Sphyraena jello	Pickhandle barracuda	IIc					X
Lutjanus argentimactulus	River snapper	IIc				X	X
Sillago sihama	Silver sillago	IIc					X
Sarpa salpa	Strepie	IIc		X	X	X	X
Rhabdosargus globiceps	White stumpnose	IIc	X	X	X		
Carcharhinus leucas	Zambezi shark	IIc					X
Strongylura leiura	Yellowfin needlefish	IIc					X
Caranx melampygus	Bluefin kingfish	IIc					X

Species	Common name	Dependence category	Distribution				
			Cool Temperate	Warm Temperate			Sub-tropical
			West	South	East	Transkei	KZN
Caranx papuensis	Brassy kingfish	IIc					X
Chanos chanos	Milkfish	IIc					X
Lutjanus fulviflamma	Dory snapper	IIc					X
Valamugil buchanani	Bluetail mullet	IIc					X
Valamugil seheli	Bluespot mullet	IIc					X
Dasyatis chrysonota	Blue stingray	III	X	X	X		
Himantura uarnak	Honeycomb stingray	III					X
Gymnura natalensis	Butterfly/diamond ray	III		X	X	X	X
Myliobatus aquila	Eagleray	III	X	X	X		
Mustelus mustelus	Smooth houndshark	III	X	X	X	X	X
Rhinobatos annulatus	Lesser guitarfish/sandshark	III	X	X	X	X	
Epinephelus andersoni	Catface rockcod	III				X	X
Epinephelus malabaricus	Malabar rockcod	III					X
Pomadasys multimaculatum	Cock grunter	III					X
Pomadasys olivaceum	Piggy	III	X				
Chelidonichthyes capensis	Gurnard	III	X	X	X		
Trachurus trachurus	Maasbanker	III	X	X	X		
Lithognathus mormyrus	Sand steenbras	III	X	X	X		
Otolithes ruber	Snapper kob	III					X
Trachinotus africanus	Southern pompano	III			X	X	X
Spondyliosoma emarginatum	Steentjie	III	X	X	X	X	X
Sparodon durbanensis	White musselcracker	III		X	X	X	X
Diplodus cervinus	Zebra/wildeperd	III		X	X	X	X
Kuhlia mugil	Barred flagtail	III			X	X	X
Muraenesox bagio	Pike conger	III			X	X	X
Thrysoidea macrura	Slender giant moray	III					X
Oreochromis mossambicus	Mozambique tilapia	IV	X	X	X	X	X
Clarius gariepinus	Sharptooth catfish	IV	X	X	X	X	X
Glossogobius giuris	Tank goby	IV					X
Anguilla bengalensis	African mottled eel	Va		X	X	X	X
Anguilla bicolor	Shortfin eel	Va		X	X	X	X
Anguilla marmorata	Giant mottled eel	Va		X	X	X	X
Anguilla mossambica	Longfin eel	Va		X	X	X	X
Megalops cyprinoides	Oxeye tarpon	Vb					X
Myxus capensis	Freshwater mullet	Vb		X	X	X	X
TOTAL	**80**		**19**	**34**	**41**	**43**	**71**

Table E.2. The stock status (abundance trend) (A), vulnerability (V), range (R), exploitation level (E) and knowledge (K) of utilized estuarine-associated species in South Africa.

Family	Species	Common name	Cate-gory	CONSERVATION IMPORTANCE				
				A	V	R	E	K
Carcharhinidae	*Carcharhinus leucas*	Zambezi shark	IIc	45	100	0	75	57
Dasyatidae	*Dasyatis chrysonota*	Blue stingray	III	60	0	10	25	71
	Gymnura natalensis	Butterfly/diamond ray	III	60	90	40	50	50
	Himantura uarnak	Honeycomb stingray	III	60	90	0	50	29
Mustelidae	*Mustelus mustelus*	Smooth houndshark	III	55	90	0	100	86
Myliobatidae	*Myliobatus aquila*	Eagleray	III	60	70	0	25	43
Rhinobatidae	*Rhinobatos annulatus*	Lesser guitarfish	III	65	70	10	25	50
Ambassidae	*Ambassis gymnocephalus*	Bald glassy	Ib	55	70	0	0	29
	Ambassis productus	Longspine glassy	Ia	55	70	10	0	29
	Ambassis natalensis	Slender glassy	Ib	55	70	10	0	29
Anguillidae	*Anguilla bengalensis*	African mottled eel	Va	50	100	10	50	50
	Anguilla marmorata	Giant mottled eel	Va	50	100	10	50	50
	Anguilla mossambica	Longfin eel	Va	50	100	10	50	50
	Anguilla bicolor	Shortfin eel	Va	50	100	10	50	50
Ariidae	*Galeichthyes feliceps*	Barbel	IIb	55	100	10	75	71
Belonidae	*Strongylura leiura*	Yellowfin needlefish	IIc	55	70	0	0	21
Carangidae	*Caranx sexfasciatus*	Bigeye kingfish	IIb	55	70	0	25	43
	Caranx melampygus	Bluefin kingfish	IIc	55	70	0	25	21
	Caranx papuensis	Brassy kingfish	IIc	55	70	0	0	21
	Scomberoides lysan	Doublespotted queenfish	IIb	55	70	0	25	7
	Caranx ignobilis	Giant kingfish	IIb	45	80	0	50	50
	Trachurus trachurus	Maasbunker	III	50	70	0	100	79
	Trachinotus africanus	Southern pompano	III	50	70	10	50	21
Chanidae	*Chanos chanos*	Milkfish	IIc	55	80	0	25	43
Charangidae	*Lichia amia*	Leervis/garrick	IIa	50	90	0	75	64
Cichlidae	*Oreochromis mossambicus*	Mozambique tilapia	IV	50	0	10	50	86
Clariidae	*Clarius gariepinus*	Sharptooth catfish	IV	55	0	0	50	86
Elopidae	*Elops machnata*	Ladyfish/tenpounder	IIa	65	100	0	25	36
Engraulidae	*Thryssa vitrirostris*	Orangemouth glassnose	IIb	55	70	0	0	36
Gerreidae	*Gerres methueni/rappi*	Evenfin pursemouth	IIb	55	70	100	50	43
	Gerres acinaces	Smallscale pursemouth	IIb	55	70	0	50	29
Gobiidae	*Glossogobius giuris*	Tank goby	IV	40	70	0	0	36
Haemulidae	*Pomadasys multimaculatum*	Cock grunter	III	45	90	0	50	29
	Pomadasys hasta/kakaan	Javelin grunter	IIc	45	90	0	50	29
	Pomadasys olivaceum	Piggy	III	50	70	0	75	57
	Pomadasys commersonni	Spotted grunter	IIa	40	100	0	100	57
Kuhliidae	*Kuhlia mugil*	Barred flagtail	III	55	0	0	0	29
Leiognathidae	*Leiognathus equula*	Slimy	IIb	55	70	0	0	36
Lutjanidae	*Lutjanus fulviflamma*	Dory snapper	IIc	50	70	0	0	29
	Lutjanus argentimactulus	River snapper	IIc	30	90	0	75	29
Megalopidae	*Megalops cyprinoides*	Oxeye tarpon	Vb	60	90	0	50	14
Monodactylidae	*Monodactylus falciformis*	Cape/Oval moony	IIa	55	70	0	0	36
	Monodactylus argenteus	Natal/Round moony	IIb	55	70	0	0	21
Mugilidae	*Valamugil seheli*	Bluespot mullet	IIc	50	70	0	0	14
	Valamugil buchanani	Bluetail mullet	IIc	50	70	0	25	29
	Liza alata	Diamond mullet	IIb	55	70	0	50	29
	Mugil cephalus	Flathead/springer mullet	IIa	65	90	0	50	50

Table E.2 continued.

Family	Species	Common name	Cate-	CONSERVATION IMPORTANCE				
			gory	A	V	R	E	K
Mugilidae	*Myxus capensis*	Freshwater mullet	Vb	40	70	40	50	36
	Liza dumerilii	Groovy mullet	IIb	50	70	0	50	36
	Liza richardsonii	Harder	IIc	45	90	10	100	26
	Liza macrolepis	Largescale mullet	IIa	50	70	0	75	29
	Valamugil cunnesius	Longarm mullet	IIa	50	70	0	0	29
	Valamugil robustus	Robust mullet	IIa	50	70	10	0	36
	Liza luciae	St Lucia mullet	IIb	50	70	100	25	14
	Liza tricuspidens	Striped mullet	IIb	65	80	40	50	0
Muraenesocidae	*Muraenesox bagio*	Pike conger	III	55	0	0	0	36
Platycephalidae	*Platycephalus indicus*	Bartailed flathead	IIc	55	70	0	0	36
Pomatomidae	*Pomatomus saltatrix*	Elf	IIc	34	100	0	100	86
Sciaenidae	*Argyrosomus japonicus*	Dusky kob	IIa	4	100	40	100	86
	Johnius dussumieri	Mini kob	IIc	55	90	0	25	29
	Otolithes ruber	Snapper kob	III	60	80	0	50	57
Serranidae	*Epinephelus andersoni*	Catface rockcod	III	13	100	60	100	29
	Epinephelus malabaricus	Malabar rockcod	III	20	100	0	75	14
Sillaginidae	*Sillago sihama*	Silver sillagio	IIc	65	80	0	0	7
Sparidae	*Rhabdosargus holubi*	Cape stumpnose	IIa	40	100	40	75	50
	Diplodus sargus	Dassie/blacktail	IIc	35	100	10	100	57
	Rhabdosargus sarba	Natal stumpnose	IIb	35	100	0	75	50
	Acanthropagrus berda	Perch/riverbream	IIa	35	100	0	75	64
	Lithognathus mormyrus	Sand steenbras	III	20	0	0	25	14
	Spondyliosoma emarginatum	Steentjie	III	70	80	40	100	21
	Sarpa salpa	Strepie	IIc	67	90	20	100	71
	Sparodon durbanensis	White musselcracker	III	30	100	40	100	71
	Lithognathus lithognathus	White steenbras	IIa	6	100	40	100	50
	Rhabdosargus globiceps	White stumpnose	IIc	20	100	20	100	57
	Diplodus cervinus	Zebra/wildeperd	III	35	100	40	100	36
Sphyraenidae	*Sphyraena barracuda*	Barracuda	IIb	50	80	0	50	50
	Sphyraena jello	Pickhandle barracuda	IIc	60	70	0	50	0
Teraponidae	*Terapon jarbua*	Thornfish	IIa	55	70	0	0	29
Triglidae	*Chelidonichthyes capensis*	Gurnard	III	60	80	10	25	50

Appendix F:
Estuary synonym list for KwaZulu Natal estuaries
(Source: Ezemvelo KZN Wildlife)

Table F.1 Estuary synonym list for KwaZulu Natal estuaries (Source: B Escott, Ezemvelo KZN Wildlife)

Estuary Name	SYNONYMS
Bilanhlolo	Ibilanhlolo; Big ibilanhlolo
Bobs Stream	Sharks Bay
Boboyi	Imboyboye
Damba	Domba
Durban Bay	Durban Bayhead
Fafa	iFafa
Intshambili	Ntshambili; Injambili
Isolwane	Zolwane
Kaba	Mkobi; Mkobe; Khaba
Kandandhlovu	Khandandlovu, Kandandlovu, Umkandanhlovu
Kongweni	Inkongweni
Koshwana	Ikotshwana
Kosi	
Ku-Boboyi	
Kwa-Makosi	Makosi
Little Manzimtoti	Little Amanzimtoti
Lovu	Illovu
Mahlongwa	Amahlanga, Amahlongwa
Mahlongwana	Amahlongwana
aManzimtoti	Manzimtoti
Matigulu/Nyoni	Amatikulu, (e) Matikulu, Inyoni
Mbango	Imbonga, Imbango
Mbizane	Mbizana
Mbokodweni	Umbogintwini, umbohodweni
Mdesingane	Mdezingane
Mdlotane	Ndlotane, (u)Mhlutini
uMdloti	Umdloti; Umhloti; Mhloti; Mdhloti
Mfazazana	Mfazazaan; Umfazaan; Umfazazane; Umfazaazan
uMfolozi	Mfolozi, Mfolosi
Mgababa	Umgubaba, Umgababa
uMngeni	Mngeni
Mgobozeleni	Mgobezeleni, Ngoboseleni; Ngobeseleni; Sodwana; Sordwana
Mhlabatashane (Mzimayi2)	Mhlabatshane
Mhlali	eMhlali, uMhlali
Mhlanga	Umhlanga, Ohlanga, Umslanga
Mhlangamkulu	
Mhlangeni	
Mhlatuzane	
Mhlatuze	Mhlathuze, Umhlatuze
Mhlungwa	Umhlungwa
Mkumbane	Inkombane, Umkombana

Estuary Name	SYNONYMS
Mlalazi	Umlalazi
Mnamfu	Unamfu
Mpambanyoni	Mpanbanyoni, Mpambonyoni, Umpambinyoni, Umpambumyani
Mpenjati	
Msimbazi	uMzimbasi, Umzimbezi
Mtentweni	Mtentwana, Ententweni
Mtwalume	Umtwalumi, Mtwalumi
Mvoti	Umvoti
Mvutshini	Little iBilanhlolo
Mvuzi	Uvuzi
Mzimayi	Umzimai
Mzimkulu	Mzimkhulu, Umzimkulu
Mzingazi	
Mzinto	Umzinto
Ngane	Ingane, iNgane
Nhlabane	Hlobane
Nkomba	
Nonoti	
Qhubu	
Reunion (Canal)	
Richards Bay	
Sandlundlu	Inhlanhlinhlu
Seteni	
Sezela	Isizela
Shazibe	
Sipingo	Isipingo
Siyaya	Siaya, Siyani, Siyaní, Siyai
St Lucia	
uThongathi	Tongaat; Tongaati; Thongathi; Umtongate; Tongati
Tongazi	Thongazi, Intongazi
Tugela	Thukela, Tukela
Umhlangankulu (South)	Mhlangankulu
uMkhomazi	Mkomazi, Umkomaas, Mkomanzi
Umlazi	Mlazi
Umtamvuna	Mtamvuna, Mthamvuna
Umzumbe	Umzumbe, Mzumba, Mzamba, Mzumbe
Unknown	aManzimnyama canal
Uvuzana	
Vungu	Uvongo
Zinkwazi	Zinkwasi, Sinquasi; Sinkwazi
Zotsha	Izotsha

CAPE TOWN SPATIAL DEVELOPMENT FRAMEWORK

PHASE 3 AND FINAL PUBLIC PARTICIPATION REPORT

May 2011

CitySpace
Planning Cape Town

Metropolitan Spatial Planning Branch
Spatial Planning & Urban Design Department
City of Cape Town

CITY OF CAPE TOWN | ISIXEKO SASEKAPA | STAD KAAPSTAD

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6. Summary of comments received from sub-councils and the response to them;
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8. Draft response to Gavin Smith and associates.

1. INTRODUCTION

The purpose of this report is to provide an overview of the public participation process followed when drafting the Cape Town Spatial Development Framework (CTSDF) and provide evidence of the City's compliance with the legislative requirements outlined below.

On 9 March 2007 the Department of Environmental Affairs & Development Planning, Provincial Government: Western Cape (DEA&DP, PG:WC) granted the City of Cape Town authority in terms of section 4(1) of the Land Use Planning Ordinance (Ordinance no 15 of 1985) (LUPO) to proceed with the preparation of a structure plan in terms of Section 4(6) of LUPO. The DEA&DP, PG:WC further confirmed that the City is required to prepare a Spatial Development Framework (SDF) in terms of the Municipal Systems Act (Act no 32 of 2000) (MSA) and that this process would run concurrently with the approval of the SDF/ Structure Plan in terms of section 4(6) of the LUPO.

As part of the DEA&DP's authority, in terms of section 4(4) of the LUPO, the DEA&DP required the City to grant interested and affected parties the opportunity to comment and provide inputs in the drafting of the plan. In this regard, the DEA&DP required:

- notice to be given in the local media in which the City's intention to prepare the SDF is made known and in which comment and inputs are requested.
- a minimum of 60 days be set aside for the submission of inputs
- public participation be sought at milestone stages of the process as when problems and issues are identified, when goals and objectives are set and when policies and strategies are identified
- written notification be directed to the relevant/ appropriate departments and relevant parties listed in paragraph 6.3 of your letter including national and provincial government departments as well as state-owned enterprises, interested parties and ratepayer associations.
- the City's intention to withdraw historical Structure Plans be specified when making known its intention to prepare the proposed Structure Plan in terms of section 4 (6) of the LUPO

DEA&DP further recommended that additional steps be taken to bolster public participation in the process such as workshops, personal notices etc.

On 18th August 2010 the City submitted the draft CT SDF to DEA&DP, PG:WC for provisional inspection in terms of section 4(5) of the LUPO. In a letter dated 27th September 2010 DEA&DP, PG:WC indicated that the City could proceed to the third and final round of public participation.

2. PUBLIC PARTICIPATION APPROACH FOLLOWED

The City appointed an independent public engagement expert, a joint venture in the persons of David Abrahams (Distinctive Choice) and Eleanor Sonnenberg (Imvusa Trading), to facilitate the first two phases of the public engagement process on the CTSDF and the eight integrated district Spatial Development Plans/ Environmental Management Frameworks (hereafter referred to as the District Plans).

A three phase public participation process was planned and implemented.

2.1 First Phase: Launch and scoping

The purpose of this first round of public consultations was to:

- Launch the process publicly
- Create a sense of public/ stakeholder ownership and involvement in the process
- Elicit the public/stakeholders' views on the development issues facing metropolitan Cape Town and the development principles and strategic goals that should be guiding the preparation of the CTSDF and District SDPs.
- Consultations at sub-council level also sought to confirm district level development informants.

A notice inviting the public to register as interested and affected parties to participate in this process was placed in the citywide press (Cape Times, Die Burger and Weekend Argus) as well as all community newspapers in May 2007. Posters were also put up at libraries, sub-council offices and district offices of the City's Planning & Building Development Management Department.

A subsequent reminder notice was placed in the same media in January 2008.

In addition when it was decided to integrate the environmental management frameworks into the district spatial development plans, a notice was issued in September 2008 in the citywide press (Cape Times, Die Burger & Weekend Argus) inviting interested and affected parties to register their interest in participating in the drafting of the CTSDF & District Plans in terms of the National Environmental Management Act.

One database for the CTSDF & District Plans was created and used for information dissemination on the public engagement processes associated with these products. In addition to those whom registered in response to the above-mentioned advertisements, the City's existing city-wide and sub-council databases of community organisations were used, and of course ad hoc requests were included on the database.

Articles were also placed in the City of Cape Town's City News March 2008 and July 2008 editions aimed at publicising this initiative and sharing information on the project.

A project specific website was also set up in March 2008 on the City of Cape Town's website in order to share information with the public and make information on the project available to the public on an ongoing basis - please use the following link to view this website http://www.capetown.gov.za/en/sdf/Pages/default.aspx.

The following events took place between February and April 2008 in order to engage with the public:

- Stakeholder workshops were held in each of the sub-councils (a total of 31 workshops were planned, 26 took place)
- A city-wide workshop
- Workshops were also held with sub-council members.

A total of 1,299 people participated in the public events in this first round of the public engagement process.

Invitations were sent out by the facilitators to those on the database and adverts were placed in the community newspapers or on community radio stations where relevant. In exceptional circumstances loudhailers were used. Invitations were also sent to sub-councils for further

dissemination to councillors, ward forums and the sub-council's own databases of community organisations. A background information document was included with these invitations.

At the end of 2008, beginning of 2009 a newsletter was prepared and distributed to those on our database, reporting to the public on the outcome of the first phase of the process and updating the public on this project.

Evidence of the above-mentioned steps taken, as well as the report to the City's Planning & Environment Portfolio Committee (PEPCO) on this first phase of the public participation process including the facilitator's report as well as PEPCO's minute in this regard were contained in section 1 of the public participation file submitted to you on 3rd August 2010.

2.2 Second Phase: Invitation to input and comment on draft proposals

The purpose of the second round of public consultations was to:

- Table and discuss the city-wide spatial concept and policy statements contained in the SDF. Particular attention was focussed on the proposed urban edge amendments and the coastal edge and densification strategies
- Table and discuss the 8 District Spatial Development Plans and Environmental Management Frameworks.

In September 2009 a notice was placed in citywide newspapers as well as community newspapers inviting the public to comment on the draft CTSDF and District Plans, as well as the City's draft Densification Strategy & draft Development Edges Policy. The following products were prepared and made available to the public in this regard:

- draft CTSDF "Popular Document" (in English, isiXhosa and Afrikaans)
- draft CTSDF Executive Summary
- draft Cape Town Spatial Development Framework Technical Report
- draft Densification Strategy Executive Summary (in English, isiXhosa & Afrikaans)
- draft Densification Strategy Technical Report
- draft Development Edges Technical Report
- 8 District SDPs

These draft documents were made available for viewing at the City's libraries, Planning & Building Development Management district offices and sub-council offices, as well as on the project website. Where requested, hard copies of the draft documents were made available to individual organisations.

The deadline for comment on the draft policies was set for 31 October 2009 but was subsequently extended to 30 November 2009 (a subsequent notice was placed in the city-wide press notifying the public in this regard).

In addition the following events took place between August and October 2009 in order to facilitate public input and comment on the draft policies:

- 23 district level workshops
- 22 sub-council based open days (including exhibition material on the draft CTSDF, Densification Strategy, Development Edges Policy and District Plans)
- 6 city-wide workshops
- A briefing meeting was held for government departments and state-owned enterprises on 15 October 2009.
- Reports and presentations (where requested) were made to each of the sub-councils

A total of 1,150 people participated in the public events in this round of the public participation process.

Invitations to these events were sent out to those on the database, updated to include those who attended the first round of engagements as well as the City's updated city-wide and sub-council databases. Adverts were placed in the community newspapers or on community radio stations where relevant. In exceptional circumstances loudhailers were used. Invitations were also sent to sub-councils for further dissemination to councillors, ward forums and the sub-councils' own databases of community organisations. The "popular document" on the CTSDF was included with these invitations. The Director: Spatial Planning & Urban Design also provided the secretariats of the Western Cape Developers Forum, South African Planning Institute (Western Cape), the South African Association of Consulting Professional Planners, the Cape Town Partnership, Accelerate Cape Town, the Cape Chamber of Commerce, the Cape Higher Education Consortium and WESSA with schedules of the public events planned for dissemination amongst their membership.

The phase 2 process was launched at a breakfast on 14 August 2009 hosted by the City for the Western Cape Developers Forum, including members of the consulting planning fraternity, where the CTSDF and supporting policies, as well as the District Plans were presented/ exhibited. CD's of the above-mentioned documents were circulated at this breakfast. Officials from DEA&P, PG:WC were present at this breakfast.

As part of this process, presentations and discussions also took place with individual groupings where requested including the Greater Cape Town Civic Alliance on 20 June 2009 and the Cape Chamber of Commerce on 1 October 2009.

Press releases were also issued at key milestones in the process in order to facilitate public interest and awareness in this project.

Section 2 of the file submitted to you on 3rd August 2010 provides evidence of the above-mentioned steps taken, the report to the City's PEPCO on the proposed second phase of the public participation process as well as PEPCO's minute in this regard, and the facilitators report. The file also includes a CD including the documents advertised for comment as well as the above-mentioned newsletter produced, as well as hard copies of these documents where available. Files including the mailing lists, invitation letters and attendance registers are available for viewing at the office of Spatial Planning & Urban Design Department, City of Cape Town.

2.3 Provisional Inspection in terms of section 4(5) of the LUPO

In a letter dated 27 September 2010, the Director: Environmental & Spatial Planning, DEA&DP, PG:WC acknowledged that:

- every effort had been made by the City in the dissemination of the notices pertaining to the draft CTSDF and the document itself.
- Most of the comments provided were adequately addressed
- The content of the CTSDF was sufficiently aligned with the MSA, the NEMA, the LUPO and the PSDF and that the process followed, as stipulated in the Section 4(1) approval letter, met with the Section 4(4) requirements of LUPO which enabled the City to progress to the following step in terms of the LUPO approval process (section 4(5) of LUPO)

Furthermore, with regard to the next step of the public participation process, the DEA&DP commented as follows:

- It confirmed that the third and final round of public participation will take the form of 60 day period for submission of comment and input on the final draft of the plans, as discussed in the meeting of 18 August 2010, at which meeting it was also agreed that this period could take place over the festive season provided a minimum 60 day period was provided for
- The City's proposal to hold a series of city-wide workshops as well as ad-hoc presentations where requested was supported
- Notification should be enhanced through the utilisation of municipal accounts
- The historical, existing 4(6) Structure Plans to be withdrawn in terms of section 4(7) of the ordinance should again be specified in the final round public engagement
- The Department re-affirmed its commitment to assist the City in acquiring comment from Provincial and National Departments in this final round of making known the draft CTSDF.

2.4 Third & Final Phase: Invitation to input and comment on the final draft CTSDF

The third round of public consultations took place when the final draft of the Cape Town SDF had been revised following PG:WC's provisional inspection and feedback in this regard.

The purpose of the third and final phase was to:

- Provide feedback on how the public's comments had been incorporated into the final draft CTSDF
- Elicit the public's final comments on the CTSDF

In November 2010 a press release was issued and notices were placed in municipal accounts, citywide newspapers as well as community newspapers inviting the public to comment on the final draft CTSDF (see Annexure 1). In addition letters regarding the third notice for input and public comment were sent to all the interested and affected parties registered on the database. The secretariats of the Western Cape Developers Forum, South African Planning Institute (Western Cape), the South African Council for Planners, the Cape Town Partnership, Accelerate Cape Town, the Cape Chamber of Commerce, the Cape Higher Education Consortium and WESSA were also informed of the call for public comment and the public events planned for dissemination amongst their membership. In addition an invitation was sent to the relevant government departments and state owned enterprises to comment on the CTSDF in November 2010 and a reminder invitation were sent to them in February 2011. Files including the mailing lists, invitation letters are available for viewing at the office of Spatial Planning & Urban Design Department, City of Cape Town

The following documents were made available for viewing at the City's libraries, Planning & Building Development Management district offices and sub-council offices, as well as on the project website (Refer to Annexure 2). Where requested, hard copies of the draft documents were made available.

- Final Draft Cape Town Spatial Development Framework (November 2010)
- Popular document (November 2010) (in English, isiXhosa and Afrikaans)
- A schedule of the comments received in Phase 2 and the City's response to them
- Supporting studies and ancillary documentation (on website only)

On request, city officials met with organised groupings such as the Property Developers Forum and representatives of residents' associations to present and discuss the content of the final draft CTSDF in more detail.

The following events took place between November 2010 and January 2011:

- a workshop for government departments and state owned enterprises;

- five city-wide public workshops, targeted at different interest groups (e.g. property developers, civic associations, environment and heritage sector); and
- a public hearing, convened by the Planning and Environment Portfolio Committee's SDF and District Plan Task Team (held on the 28th January 2011).

A total of 127 people attended the workshops while 26 organisations/individuals made submissions at the hearings and five organisations / individuals elected to attend the hearings as observers. The attendance register and notes of the workshops are contained in Annexure 3.

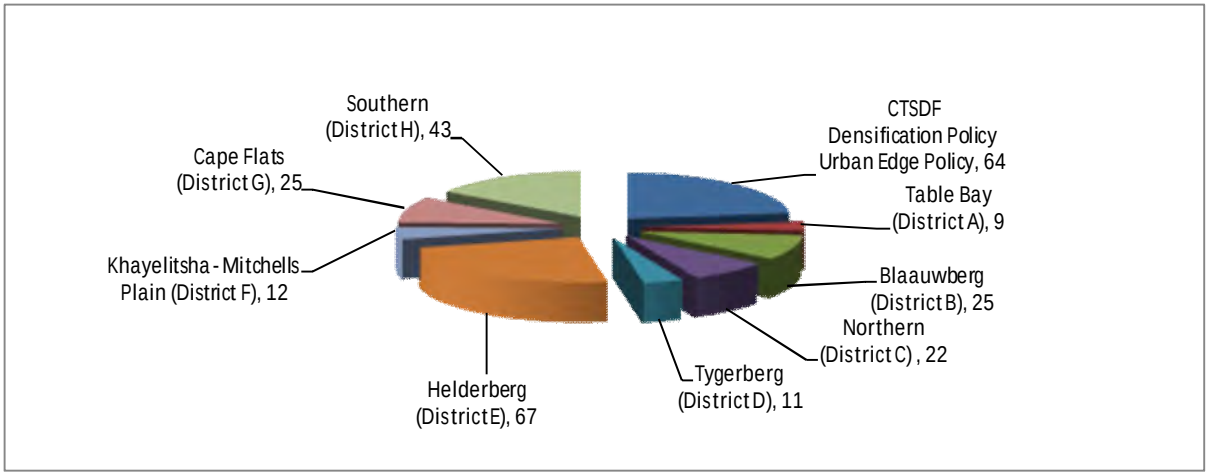
In addition the CTSDF was tabled on the agenda of all sub-councils in November 2010.

3. PUBLIC INPUT AND COMMENT RECEIVED ON THE FINAL DRAFT CTSDF

3.1. Public input phase 2 of the public participation process

In response to the notice and invitations issued as part of phase two of the public participation process, almost 300 written submissions were received from the private sector, NGO/CBO/Civic and external stakeholders. A schematic diagram of the distribution of written submissions is represented on Figure 1.

Figure 1: Distribution of written submissions phase 2 public participation process



Comment focused primarily on the draft CT-SDF, Densification Policy and Urban Edge Policy, with a large proportion of the District Plans' comment focused on the Southern and Helderberg Districts.

A substantial proportion of site specific district based comments were submitted by professional planning consultants on behalf of property owners seeking to motivate development proposals. Submissions were also received from civic organisations and NGO's, whilst state owned enterprises flagged areas of concern relating to particular land utilization requirements and long term property development agendas.

Irrespective of the author, the comments were categorized thematically and disaggregated according to collectively raised issues into a total of 1763 issue specific comments. The thematic categorization incorporates the following themes:

- *The Natural Environment;*
- *Movement;*
- *Economy;*
- *Urban Growth Management;*
- *Integrated Development;*
- *The Built Environment;*

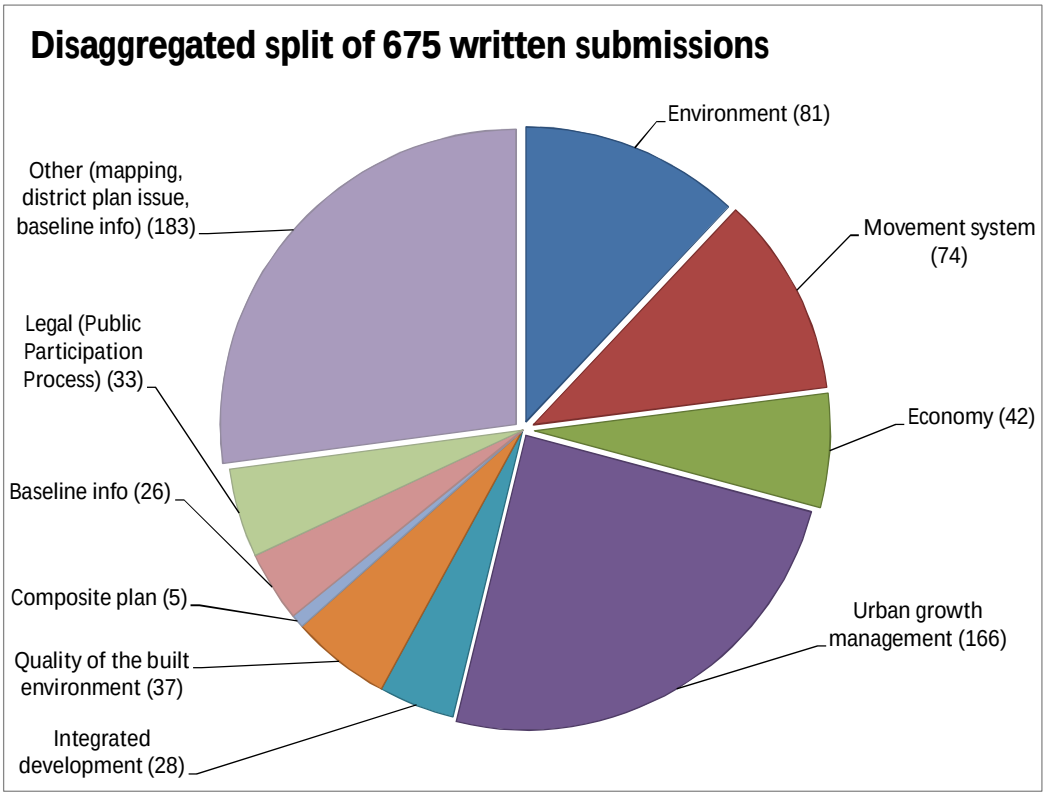
The summary schedule of comments received and the City's response to these comments were attached to our letter to your department dated 3rd August 2010.

With regards to our invitation to government departments, state-owned enterprises etc. to comment on the draft documents the City's letter to your department dated 19 July 2010 has reference. Copies of the comments received were submitted to your department as well as records of where follow up engagements took place with particular government departments or state-owned enterprises. Evidence relating to engagements held with neighbouring municipalities was also supplied to your department (also see Annexure 4).

3.2. Public input phase 3 of the public participation process

A total of 131 written submissions were received on the final draft of the CTSDF, 17 of the comments came from government departments and state owned enterprises (see Annexure 5). The comments were disaggregated into 675 separate comments and grouped in the themes mentioned above.

Figure 2: Distribution of written submissions on CTDSF phase 3 public participation process



A schedule of the comments and the City's response to them is contained in Annexure 5. Generally speaking the comments were very technical and editorial. A large number of them

were incorporated into the redrafted final CTSDF document. Some comments related to legal and process issues (e.g. the public participation process and the link between LUPO and the MSA) and others related to the legality of statements related to inclusionary housing and compliance with the National Heritage Resources Act (No 25, 1999)(NHRA) requirements. We have double checked that the public participation process complies with the relevant legislation and have addressed the other legal concerns in the redrafted CTSDF.

In addition we have improved the heritage component of the CTSDF and will submit the City of Cape Town's Heritage Inventory to Heritage Western Cape (HWC) in terms of s30(5) of the NHRA (see attachment to letter dated 30th May 2011) The submission includes:

- A 'snapshot' map of the metropolitan area reflecting the City's heritage inventory as at May 2011;
- A CD including the City's Heritage Inventory as at May 2011 including shape files and attribute data; and
- A copy of the final CTSDF and associated documentation including the above-mentioned Council resolution and a schedule of comments received on the November 2010 final draft advertised for public comment and the City's responses to these. Please refer to this schedule for the City's responses to comments received from the Director: Cultural Affairs.

A further grouping of comments related to urban growth management, urbanisation, the alignment of the urban and coastal edge, and references to tourism. The CTSDF now places greater emphasis on the opportunities and challenges of urbanisation and *Key Strategy 2: Manage urban growth and create a balance between urban development and environmental protection* has been restructured and has a greater pro-development emphasis. We have improved references to tourism. The PEPCO Urban Edge Task Team reviewed all requests to amend the urban and coastal edge. The finalised urban edge line is indicated on Map 6.1 of the CTSDF and is based on the recommendations of the Urban Edge Task Team endorsed by the City Council on the 30th March 2011 (see Annexure 7).

Mr Gavin Smith submitted a letter raising concern that the comments submitted by him and his colleagues had not been addressed in the City's comments on the comments submitted by some parties in the Phase 2 consultation process. The City's draft response to his letter is contained in Annexure 8. The detailed information referred to in the letter will be supplied by the City on request by PGWC.

4. COMMENTS RECEIVED FROM GOVERNMENT DEPARTMENTS, STATE OWNED ENTERPRISES AND SURROUNDING MUNICIPALITIES

Over the course of the CTSDF preparation process the following government departments, SOE's and surrounding municipalities submitted comments on the CTSDF (see the list below and Annexure 4 for their comments and the City's response to the comments).

National Departments

1. Department of Co-operative Governance and Traditional Affairs: Urban and Rural Development
2. Department of Correctional Services
3. Department of Home Affairs
4. Ministry of National Planning (Presidency)

Provincial Departments

5. Department of Water Affairs
6. Department of Agriculture

7. Department of Cultural Affairs and Sport
8. Department of Environmental Affairs and Development Planning
9. Department of Local Government and Housing: Social Housing Steering Committee
10. Department of Transport and Public Works
11. Department of Rural Development and Land Reform
12. Provincial Treasury
13. Department of Cultural Affairs and Sport

State Owned Enterprises

14. South African Heritage Resources Agency
15. South African Nation Parks (Table Mountain National Park)
16. Cape Nature
17. South African National Roads Agency Limited
18. Airports Company South Africa (ACSA)
19. Transnet
20. Metrorail (PRASA)
21. Eskom (Nuclear Division and Reticulation)
22. National Energy Regulator

Surrounding municipalities

23. Cape Winelands District Municipality

The significant comments received during the Phase 3 public participation process related to the CTSDF route designation, Cape Town International Airport and Koeberg Nuclear Power Station. These have been addressed to the extent that it is possible in the CTSDF and through CoCT: SOE engagements. Refer to Annexure 4 for records of the engagements with ESKOM and ACSA.

5. CITY OF CAPE TOWN INTER-DEPARTMENTAL COMMENT ON THE DRAFT CTSDF

An inter-departmental steering committee was set up to oversee and input into the CTSDF & District Plans. Seven meetings of this Corporate Steering Committee have taken place at key milestones in the plan preparation process, in the main linked to the circulation of draft documents for internal input and comment. Throughout the process there have also been bi-lateral consultations with key departments to ensure their timeous and relevant input into the drafts and debate and resolve areas of mutual interest to ensure cross sectoral alignment.

The August 2010 submission to your department included a record of consultations that took place in the formulation of the Future Cape Town discussion document, being the founding document for the draft Cape Town Spatial Development Framework.

6. OVERVIEW OF DOCUMENTS/ EVIDENCE SUPPLIED

6.1 Submission for Provisional Inspection

In August 2010 a public participation process report file was submitted to your department. It contained the following documents and these documents are not being resubmitted:

1. Evidence: First phase: Launch and Scoping
2. Evidence: Second Phase: Invitation to input and comment on the draft proposals

3. Summary schedule of comments received (Phase 2) and the City of Cape Town's responses to these
4. Comments received from government departments, state owned enterprises etc. and associated documentation (Phase 2)
5. Argument for the Long Term Development of Cape Town (Future Cape Town) – Internal and External consultation processes and interactions June 2005 – September 2006

6.2 Submission for approval

By way of evidence of the process followed in the third and final round of public participation following the DEA&DP, PG:WC's provisional inspection of the CTSDF, the following information is attached as annexures:

1. Evidence: Third Phase: Examples of notifications and invitation to input and comment on the draft proposals;
2. Evidence: Documents made available to the public (Final Draft CTSDF (November 2010) and Popular Documents (November 2010);
3. Evidence: Workshop notes and attendance registers and list of persons/ organisations that made presentations at the public hearings and a CD with copies of the presentations made at the hearings;
4. Comments received from government departments, state owned enterprises in phase 2 and 3; the City's responses to the comments and notes of meetings with the Department of Correctional Services, Western Cape Education Department, ESKOM, Air Traffic Navigation Services and Airports Company South Africa;
5. Summary schedule of all comments received on the final draft CTSDF (Phase 3) and the City's responses to them;
6. Summary of comments received from sub-councils and the response to them;
7. Council endorsed recommendations of the Planning and Environment Portfolio Committee's Urban Edge Task Team regarding requests received in Phase 3 to review the urban and coastal edge; and
8. Draft response to Gavin Smith and associates.

Please note the original copy of comments submitted to the City is available for viewing at the office of the Spatial Planning & Urban Design Department, City of Cape Town

7. CONCLUSION

We trust that the public participation process followed by the City in the compilation of the CTSDF has more than met the requirements of DEADP, PG:WC and the relevant legislation.

Annexure 1

Evidence: Third Phase: Examples of Notifications and Invitation to input and comment on the draft proposals

Annexure 2

Evidence: Documents made available to the public (Final Draft CTSDF (November 2010) and Popular Documents (November 2010)

Annexure 3

Evidence: Workshop notes and attendance registers and list of persons/ organisations that made presentations at the public hearings

Annexure 4

Comments received from government departments, state owned enterprises in phase 2 and 3; the City's responses to the comments and notes of meetings with the Department of Correctional Services, Western Cape Education Department, ESKOM, Air Traffic Navigation Services and Airports Company South Africa

Annexure 5

Summary schedule of all comments received on the final draft CTSDF (Phase 3) and the City's responses to them

Annexure 6

Summary of comments received from sub-councils and the response to them

Annexure 7

Council endorsed recommendations of the Planning and Environment Portfolio Committee's Urban Edge Task Team regarding requests received in Phase 3 to review the urban and coastal edge

Annexure 8

Draft response to Gavin Smith and associates

DRAFT COASTAL PROTECTION ZONE BYLAW

COMMENTS – RESPONSE REPORT

MARCH 2011

Introduction

The City of Cape Town has a coastline of 307km, of which it administers approximately 240km, the remaining 60km falling within the Table Mountain National Park. The City's coastline is arguably its greatest economic, social and environmental asset. The coastline is central to the City's sense of place, identity, global desirability and underpins much of our economy, provides for unique and diverse social recreation and opportunity as well as ecosystem services.

However, due to the high desirability of coastal property, the City's coastline has been extensively altered and impacted through "strip" development, the location of hard infrastructure in a highly dynamic environment and a lack of historical investment and management. As a result the City's coastline is increasingly under pressure and as a social and economic asset is in decline, - notably through increased levels of coastal erosion, permanent loss and destruction of dune systems, loss of fauna and flora and increasing levels of windblown sand problems. In addition, global climate change predictions suggest that amongst others, sea level rise and an increase in the intensity and frequency of storm events may have significant impact on coastlines across the globe. Cape Town with its extensive coastline will be particularly vulnerable to these predicted changes.

In protecting our economic future and social opportunity, lowering environmental and social risk, complying with legislation, specifically the Integrated Coastal Management Act, and ensuring equitable access and opportunities into the future, while adopting a "no regrets" approach to climate change, the City must now institute appropriate means to protect, manage and formalize its coastal zone.

In responding to this need, the City of Cape Town released the Draft Coastal Protection Zone Bylaw for public and stakeholder comment. The Draft Coastal Protection Zone Bylaw was approved for Public and Stakeholder Comment by the Planning and Environment Portfolio Committee (PEPCO) on the 2nd November 2010. On approval by PEPCO, the Public Participation Plan for the bylaw was submitted to, and approved by, the Office of the Speakers Committee (OSCOM) on the 8th November 2010.

Overview of Public Process

The Public Participation Plan for the bylaw consisted of the following components:

1) The comment period for public consultation was set by OSCOM as the 01st February 2011 to 2nd March 2011 to confirm with the City's 30 day public comment policy.
2) The Draft Bylaw was translated into Afrikaans and Xhosa
3) Submission of the Draft Bylaw for comment to all Sub Councils in January 2011.
4) The Draft Bylaw was posted to all stakeholders registered on Sub Council Databases (in excess of 1000 organisations)

5) The Draft Bylaw was advertised for public and stakeholder comment in all local newspapers and the weekend edition of the Argus and Die Burger in the week leading up to the 1st of February 2011.
6) Copies of the Draft bylaw as well as maps of the affected area were placed in 107 public libraries as well as all Sub Council offices
7) The Draft Bylaw was posted on the City's website with access to interactive maps as well as a simple mechanism for posting comments on the bylaw directly through the website.
8) In all communications to the public, a phone, fax, email address, postal address and web address were provided to ensure that the public were informed as to how they could submit their comments
9) A media release by the City indicating that the bylaw was open for public and stakeholder comment was issued on the 31st January 2011 by Corporate Communications.

Report Structure

This report provides a written response to each comment received and is intended to:

- stand as public record of formal responses to those organisations and individuals that submitted comment on the Draft Bylaw
- stand as complete information on the Public Process so as to inform the Planning and Environment Portfolio Committee
- present clear indication of how the Draft Bylaw was revised to evolve into the Final Bylaw for decision by Council.

Overview and summary of comments received

The Draft bylaw was presented to all Sub Councils for comment and information. In summary:

- No Sub Councils objected to the bylaw
- Three Sub Councils submitted amendments to the bylaw (see details in this report)
- One Sub Council requested w workshop on the bylaw which was held and the record of the workshop is detailed in this report.

Comments on the Draft bylaw from the public and stakeholders were received via direct emails to ERMD, the City's website, through the post, by fax as well as a number of comments directly from telephone calls.

In total we received 59 written submissions from the public and stakeholders, of which 23 were from organisations and 36 from individuals. Summary statistics of the comments were:

- 40.68% of all comments received were in full support of the bylaw as it was presented
- 55.93% of comments received supported the bylaw but made recommendations for amendments to the content of the bylaw
- Only 3.39% of the comments received objected to the key intention of the bylaw

Therefore, with relevant amendments made to the Draft bylaw, 96.4% of all comments received were in support of the bylaw.

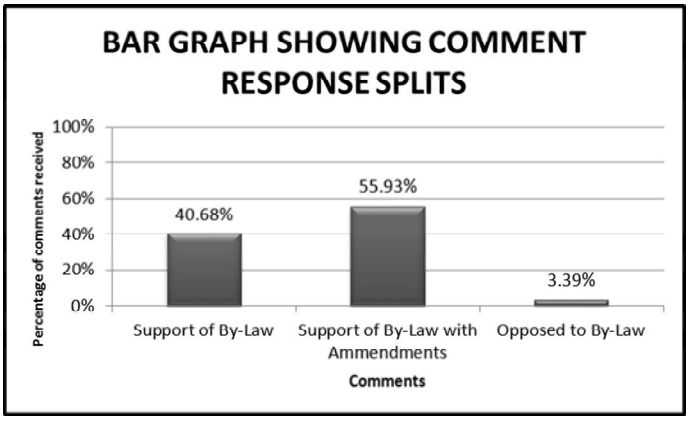
A summary of the key thematic issues raised through the public process on the bylaw include:

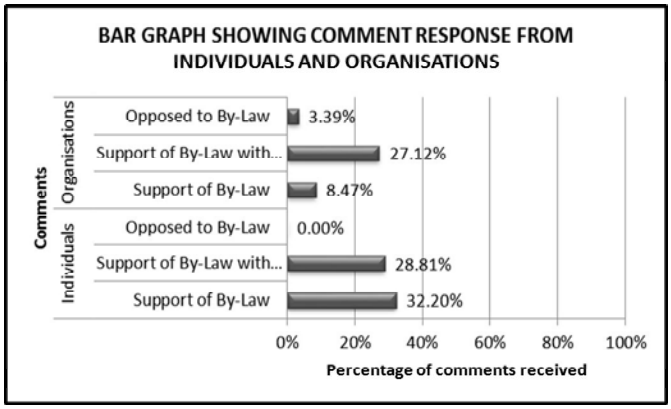
- The need to allow individuals to "beach-comb" without prejudice
- Complaints by the film industry that permitting processes are limiting their commercial opportunities and competitiveness with other coastal destinations. As noted in the responses, the bylaw does not govern or influence this issue which is regulated by the City's Filming and Events Policy
- Objections by individual landowners whose future development opportunities would be limited by the bylaw.
- The need to consider and regulate pets in the coastal zone
- Concerns regarding the condition and state of certain areas of the City's coastline
- Requests for certain areas to be either included or excluded from the coastal protection zone and thereby the regulations of the bylaw
- Various points of clarity on individual words or pieces of text in the bylaw
- Requests for the bylaw to be extended beyond the borders of Cape Town and regulate the coast of the Western Cape
- Confirmation that the bylaw will also regulate the activities and actions of the City itself and its officials
- Requests for extended comment periods on the bylaw. It should be noted here that the consultation process was done precisely and in accordance with the City's public and stakeholder policy.
- Request by Provincial and National Government to amend the name of the bylaw to that of MUNICIPAL Coastal Protection Zone Bylaw to prevent confusion with the

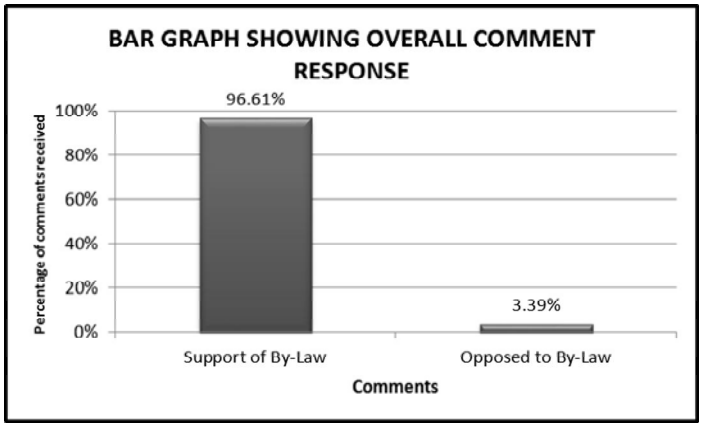
contents if the ICM Act until such time that the CPZ is declared by the MEC as per the Act.

Where relevant and appropriate, amendments to the Draft bylaw have been made based on the comments and suggestions received.
In an effort to ensure a transparent and open process that may stand as record, each comment received has been listed with a specific response to that comment detailed by City officials.

Results from the public and stakeholder consultation process are depicted in the graphics below for easy reference.







Comments and Response: Sub Councils and Ward Forums

Sub Council 1:
That the contents of the Final Draft Coastal Protection Zone By-Law BE NOTED.

Response:
Noted with thanks

Sub Council 2:
That the proposal of Ald M Nieuwoudt be SUPPORTED, namely that on p 148 of the proposed by law, "belongs to" in par. 4(a) on p 148 be amended to "be accessible to" and then that it also be included that where the Council owns coastline properties, such properties must in future not be sold.

Response:
Noted and amendments will be made accordingly

Sub Council 5:
Ms Amy Davison spoke to the report whereupon Cllr AN Abrahams enquired about Baden Powell Drive and the sand that often accumulates in the road which poses a danger hazard. Ms Davison responded that the matter should be addressed with the Department of Roads and Storm water as the By-Law does not address existing problems such as Baden Powell Drive. The intention of the By-Law is to prevent future problems such as that from occurring, i.e. to make sure that in future no more roads such as Baden Powell Drive are built in areas where they will become constantly inundated with sand which is safety hazard

Response:
Noted

Sub Council 7:
1. That the following comments be forwarded to the relevant department in regard to the City of Cape Town's Coastal Protection Zone Draft By-Law:

• That Sub council 7 requests that the implementation of the City of Cape Town's Coastal Protection Zone By-Law should not prejudice the development of the Coastal Area adjacent Atlantis, specifically the 5 km radius between Silwerstroom Strand and Koeberg.

2. That the City of Cape Town's Coastal Protection Zone Draft By-Law BE NOTED.

Response:
The City's Spatial Development Framework and Coastal Edge line makes provision for a development node in the Silwerstroomstrand area. This fits with the overall approach of

nodal coastal developments as opposed to extensive "strip" development and is represented in the City's Draft Spatial Development Framework.

Sub Council 8:
Cllr Heuvel requested that the problems with wet lands that are being filled up with building rubble and thereby restricting the flow of rivers through wet lands and into the sea, be also addressed in this By-Law.
RESOLVED: That comments on the Final Draft Coastal Protection Zone By-law BE SUBMITTED by not later than 2 March 2011 and that this By-Law be also submitted to the Ward Forums for comments.

Response:
The comment by Cllr Heuvel is noted. Infill of wetlands is a significant environmental concern with multiple impacts on the City and its ecosystems. All wetlands that fall within the area defined as the Coastal Protection Zone will be protected from infill and destruction by the bylaw; however the Coastal Protection Zone bylaw cannot address the management and protection of wetlands across the City. The infilling of wetlands is currently protected by other legislation.

Sub Council 9:
Sub Council 9 requested a workshop with the relevant officials to discuss the bylaw. The points listed below are the key comments that emerged from that workshop.

A strong sense of place exists between the locals and the coastal environment. The coastal environment is valued for its traditional and religious offerings to the people. The community members were grateful for the opportunity to voice their concerns and to be included in the process. Community representatives expressed their need to utilise the coastal environment for religious and recreational purposes. The provision of creating and maintaining access to the coast in order to allow the community to benefit from the resources of the coastal environment was appreciated by community representatives. It is understood that this would occur in the form of nodal development as opposed to strip development in order to maintain a balance between social and ecological equity.

Direct questions to address:
1. What measures will the City of Cape Town put in place to ensure that community access to the coast is retained?
2. When will the City of Cape Town inform the community on their rights to construct dwellings in the assigned development node?
3. What will the process entail to be assigned a piece of land for housing purposes?
4. What measures will the City of Cape Town put in place to ensure that community rights to conduct religious practices on the coast are not withheld?
5. Will the City of Cape Town ensure that there is a provision of basic services available when the community is utilising the beach area (eg. lifeguards, security guards and ablution facilities)?
6. What measures will the City of Cape Town put in place to ensure that the natural environment and biodiversity along the coast are not compromised by development?

Response:
Responses to each of the six points raised are listed below:
1. Community access to the coast is guaranteed by the Integrated Coastal Management Act (ICMA). Further this bylaw if implemented would require that the City demarcate public access points as part of its zoning scheme along the entire coast thereby ensuring coastal access to all people
2. The development of the Coastal Nodal Points is being managed by the Spatial Planning and Urban Design department of the City and extensive public consultation will take place as part of that process prior to any development being approved.
3. See point 2 above. The Planning process has only just been initiated and this will become clear with time.
4. The City is in the process of developing a Municipal Coastal Management Plan (MCMP) in terms of the ICMA, and religious practises and allocation of space for such practises will be included in the MCMP. Prior to finalisation the MCMP will itself undergo a public consultation process.
5. Currently these services are provided at various coastal nodes. However it is noted and agreed that these services need to be extended both geographically and beyond peak season time periods. This too will be a key point addressed in the MCMP.
6. It is the explicit intent of the bylaw to achieve the protection of the coast from over-development.

Sub Council 10:
Cllr Arendse commented that there is no nature conversation signage (e.g. no swimming, no fishing, etc) since the death of two people in Wolfgat Nature Reserve and the response was that, the implementation of signage is an ongoing process; some of the signs are either removed or ignored. Fishing is regulated by the National Department of Agriculture but the City of Cape Town is continuously liaising with fishing fraternity.

Response:
Noted

Sub Council 11:
The Sub council commented as follows:
- **Ensure protect and management of City's Coastal Protection Zone as natural space.**
- **Regulate activities taking place**
- **Manage access**

Response:
Noted

Sub Council 15:
RESOLVED that this by-law:
- **the abovementioned report be NOTED**
- **a return of NO COMMENT be SUBMITTED to the relevant department**

Response:
Noted with thanks

Sub Council 16: RESOLVED that this by-law:

- **be forwarded to ward forums**
- **Fire services be notified that Maiden's Cove is no longer a dedicated fireworks site**

Response:
Noted with thanks. Fire Services will be notified once and if the final bylaw is approved by Council

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Sub Council 17:
Cllr Chapple commented that he welcomed the By-law as Cape Town would not exist was it not for its harbour and surrounding sea area. He referred the meeting to page 44, Chapter 4A and stated that he was glad that beaches were made available for everyone. He stated that he was glad that this policy also prevents developers from closing beach accesses for entry fees. He also referred to meeting to page 45, 11f and stated that at the present time there were only two official fishermen's launch points and that was Betty's Bay and Miller's Point. He said that he was happy that the policy recognised the fact that they needed to look along False Bay as well for a safe and secure launch point for the poorer fishermen. Cllr Chapple raised his concern with regard to the protecting and managing of the Eco System and stated that too often the City of Cape Town implement good policies but fail with inadequate policing of the policies. He was pleased to notice that this policy now prevents building on the coastline.

With regard to the penalties, Cllr Chapple felt that it was too small for the Fynbos and coastal areas as developers would just pay the fine and walk. He stated that it took centuries for Milkwood trees and Fynbos to grow.

Cllr Hill supported Cllr Chapple's comments and wanted to know whether the Sub-council should not submit a recommendation regarding the penalties.

Cllr Chapple was of the opinion that this policy need to refer to the tree clauses penalty in the tree policy.

All the Councillors were in agreement with the comments.

Response:
The penalty regulations in the bylaw have been revised to make them more appropriate as a deterrent and penalty for non-compliance to the bylaw

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Sub Council 18:
Mr Tsotsobe explained that the proposed coastal protection zone by-law highlights the importance of planned developmental management in environmentally sensitive areas along the coastline. This is to preserve the coastline from further unplanned development

as it is in decline through increased levels of coastal erosion, destruction of the dune systems and wind-blown sand problems.

Members enquired whether the by-law would address the sand blown onto Baden Powell Drive and whether the by-law is written with due cognizance being taking of the prerequisites of the Spatial Development Framework.

Mr Tsotsobe advised that the by-law is written to incorporate the Spatial Development Framework and that it is an Integrated Coastal Management approach to protecting a worthy environmentally sensitive amenity.

Members thanked the official for a succinct presentation.

RECOMMENDATION
Rondevlei Subcouncil, supports the final draft City of Cape Town Coastal Protection Zone By-law, having taken due cognizance of the contents.

Response:
Noted with thanks

Sub Council 19:
Councillors requested that the following proposals be incorporated in the Draft By-Law:

Chapter 4: The Coastal Protection Zone
• Amend 4 (a) as follows (amendments in bold):"Ensure that the coastline, and associated opportunities, belongs to the citizens of South Africa and remains accessible to the public.

Chapter 6: Additional Regulations pertaining to the use of the Coastal Protection Zone
• Amend 19 as follows (amendments in bold): "No person may have in their possession or discharge, fireworks of any kind within the CPZ, subject to the permission granted, e.g. Sunrise Circle, Muizenberg.
Councillors also requested that should the issuing of fines be delegated to the Sub council, then a table of offences should be compiled, in order to guide the Sub council. RECOMMENDED ACCORDINGLY.

Response:
The request for the amendment to the statements in Chapter 4 and Chapter 6 are noted and the revised bylaw will reflect the appropriate wording. The request for a table of offences to be prepared in the event that issuing of fines is delegated to Sub Council is noted.

Sub Council 20:
Cllr Iversen referred to page 11 where several references were made to "No person" but the document failed to give a definition of "no person". In particular in Section 22, the word "company" should be included as companies often were the cause of dumping pollutants.

The Chairperson pointed out that in terms of National Environmental Legislation, the person dumping on behalf of a company should not be targeted but the manufacturer/producer of the pollutant should be charged.
Cllr Haskin requested that the word "intentionally" be removed from Sections 13 and 14. There was no way to prove that a deed was done intentionally.
The Chairperson was of the view that "intentional" strengthens the prosecution's case.
It was also pointed out that Section 25(a) should be read in conjunction with Section 27. Attention was drawn to the fact that recovering costs were relatively easy as it affected the rates and the prevention of usage of Council's facilities.
The Chairperson suggested that members send their individual comments to the Sub council Manager.
RESOLVED TO RECOMMEND
1. That Protea Sub council (20) NOTES the Final Draft Coastal Protection Zone By-law.

Response:
Noted, relevant amendments will be made

Council 21:
RESOLVED: That the City of Cape Town Coastal Protection Zone By-Law, BE NOTED.

Response:
Noted with thanks

Council 22:
Cllr Raymond had the following comments and add-ons:

- **Who will enforce this by-law?**
- **Pg 62 - (Amendment to the by-law) To ensure that the effluent and the river systems running into the sea would adhere to the Department of Water Affairs standards.**
- **Pg 62 – Why is the Blouberg Conversation Area excluded**
- **Pg 63/64 – Chapter 6 – There must be an Environmental Control Officer appointed by the City and the developer should pay for that, to oversee the building.**
- **Pg 64 – paragraph 21 – The word Environmentalist is left out.**
- **Pg 64 – paragraph 23- The word "private function" is not defined.**

Mr R Bosman said the enforcement of this by-law will rest on his department and he will consult his colleagues with regards to unclear issues.

Response:
Detailed responses are listed below:

- The bylaw will be enforced by the Strategy and Planning Directorate with the assistance where necessary of the City's Law Enforcement
- Pg 62 – Noted, however this aspect is regulated through National Water Quality legislation

- Pg 62 – the amended bylaw will include all areas under the jurisdiction of the City Of Cape Town
- Pg 63/64, noted and agreed
- Pg 64, paragraph 21, noted and amendments will be made
- Pg 64, paragraph 23 noted for amendments
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Ward Forum for Ward 84:

- **Reference to the protection of wetland and river mouths should be included in this by-law, as there are at present many cases in the Helderberg where wetlands are being disturbed and filled up with building rubble;**

- **There should be a reference in the by-law to the National Act that prohibits motor cars and motor cycles to be used on beaches.**

Response:
In terms of the first comment, all wetlands and river mouths that fall within the Coastal Protection Area are covered by the provisions and regulations of the bylaw which would not allow any disturbance, alteration or impact of those ecosystems. However the bylaw cannot regulate wetlands beyond the Coastal Protection Zone. This issue should be addressed through a separate process driven either by Catchment Management or Biodiversity Management. With regards the second comment, noted and reference to the Off Road Vehicle Regulations will be made in the Revised Coastal Protection Zone bylaw.

Comments and Response: Public and Stakeholders

Comment:
I see the bylaw says I may not collect shells. Since when do shells belong to anyone, other than the finder and are not allowed to be picked up? I heard at a stage that there was legislation that had come out which said you may not collect, but I have a huge issue with this and would like this to be removed from the bylaw, or if it is there to stop commercial large scale collection, then to be specified as such. I collected shells as a child and would like my children to be able to do this too, without becoming criminals for no good reason. (Ms Simone De Wet)

Response:
Shells and all organic material derived form the ocean are governed by the Marine Living Resources Act. The harvesting of these resources requires a permit from National Government. The bylaw states that no person may collect or harvest these resources in line with national legislation. This is intended to govern collection of coastal and marine resources for commercial or other forms of gain. It is not intended to regulate or restrict ad hoc collection of shells etc by individuals. The Revised Bylaw will clarify and make this explicit and allow for "beach-combing".

Comment:
Clause 4.a) says "Ensure that the coastline, and associated opportunities, belongs *[sic]* to, and remains accessible, to all Capetonians and South Africans". If it is going to be insisted that the coastline is going to *belong* to Capetonians and South Africans, is there not a case to make it unequivocal that the coastline is also *accessible* to foreign visitors?

Therefore should it not be worded something like "Ensure that the coastline, and its associated opportunities, belong to all Capetonians and South Africans, and remains accessible both to them and foreign visitors"? R M LONGDEN-THURGOOD

Response:
Noted and agreed. The bylaw will be revised as such.

Comment:
Clause 4.l) says "Protect the City, and thereby the City's ratepayers, from increased financial burden resulting from the impacts of coastal erosion, predicted future sea level rise and storm surge events on coastal infrastructure and development". Surely this by-law is primarily intended to protect delineated lengths of the coastal zone from uninhibited private development? The City will presumably set out in detail what conditions any approved development must comply with. Is it not up to the private developer to decide if they want to take the risk that erosion and storms might damage their property? So where is the risk to the City, only in so far as a structure may be so badly damaged that someone has to decide who is going to remove it, if the original owner doesn't wish to rebuild. If the City rehabilitates the land it can presumably make a claim to recover its reasonable costs, not forgetting whatever land rights the original owner has or had.

The City can't escape its own risk involvement with any of its own developments, of course, which are subject to natural events. So, in its present format, I don't see what this clause is intended to achieve *for approved projects*. R M LONGDEN-THURGOOD

Response:
The comment ignores the following facts:

a) The City's coastline is an asset in its entirety and therefore has a stake in the condition of the coast. To assume that the City would allow or have no interest (financial or regulatory) in ensuring that the coast does not one day look like a lot of broken down homes is short sighted. Further 4.i speaks to the objectives and intent of the bylaw which is to not approve further development so as to negate this risk increasing from current levels.
b) Secondly, the City, although not legislated, has an interest in protecting properties and its rates base.
c) Finally, good governance requires that the City acts in a manner that not only reduces risk to itself and its ratepayers, but also put regulatory mechanisms in place to ensure that private individual risk is minimised

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Comment:
Clause 7.d), which concerns land excluded from this by-law, says "Koeberg Nuclear Power Station Land". It is known that one of the sites for further nuclear development lies just to the north of the existing Koeberg power station. Therefore should this clause be contemporaneously restrictive? In other words, should it not be worded something like "Koeberg Nuclear Power Station Land and any other *(adjoining?)* coastal land which is approved for further nuclear power station development in the future"? Does the word I have indicated in italics need to be present? R M LONGDEN-THURGOOD

Response:
The City's Draft Spatial Development Framework does "not support proposals to upgrade KNPS generative capacity or the construction of new installations". The Coastal Protection Zone Bylaw is in line with this and provides a regulatory framework to give effect to this position

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Comment:
Clause 30, the 5th dotted clause, says "• The construction and removal of non-permanent structures as approved by the City's Filming and Events Policy". OK, but suppose - if it isn't priced out of existence by the City's excessive demands, as is being claimed in press comments - the local film production company near Somerset West wants to put up some temporary set in a CPZ which, in some cases, could be quite substantial, and require access roads to be made, etc, does the City envisage permitting anything like this to be done, or what? (And, no, I don't have any interests in any film production companies!). But the point is made in the press that a thriving film industry in the Western Cape helps to put Cape Town on the "international map" for foreign visitors. Either the City is concerned about this, or it isn't. There's no two ways: it's either Cape Town or Durban. R M LONGDEN-THURGOOD

Response:
The bylaw does not add any restriction to the film industry in any way. All filming is currently approved and permitted through the City's Events Office and the bylaw explicitly exempts all activities approved by the City's events office. However no permanent structures of any kind would be approved in this manner as that would be beyond the delegation of the Events Office and the building of permanent structure (including roads) is NOT exempt from this bylaw.

Comment:
Clause 32.a) says "to remedy the harm caused". Merely using the word "remedy" risks being misinterpreted. Shouldn't there be a reference to "environmental rehabilitation", which is applied when appropriate? R M LONGDEN-THURGOOD

Response:
Noted with thanks, the bylaw will be revised as such

Comment:
I looked at the CPZ map on your website, and cannot establish the status of Erf 502 Clifton in relation to the coastal protection zone. My wife owns a bungalow on that Erf, and we need clarity on the status of that Erf. Does it fall within or outside the CPZ? If it falls within the CPZ, how do I apply for that to be changed? - Rick Shuttleworth

Response:
Erf 502 does fall within the Coastal Protection Zone. As stated in the bylaw all existing rights as of 01 November 2010 for Erf 502 are ensured and not affected by the bylaw. On review of Erf 502, a decision was made to adjust the Coastal Edge Line to exclude Erf 502 for the CPZ.

Comment:
This letter constitutes a formal objection to the City of Cape Town's Coastal Protection Zone Management By-Law from the businesses that comprise the South African Association of Stills Producers. (SAASP.)

SAASP represents and coordinates the interests of the 30 companies that specialise in the production of photographic commercials and other shoots in Cape Town, employing thousands of Capetonians and utilising the services of small businesses and suppliers across the city. Our contribution to the local economy in the Western Cape is around R500 million per annum, half of which is experienced directly in the tourism sector, on hotel rooms, car hire etc. The vast majority of productions are known as micro-shoots – small teams of 6-8 personnel travelling in two vehicles and using a number of public locations per day. The maintenance of pristine natural locations is of prime importance to our sector since it is a major selling point and attraction for international clients. We would therefore typically be in support of interventions that protect the environment. However, SAASP is forced to oppose the proposed by-law in its entirety, since it threatens to continue the existing prejudicial approach of the Coastal Coordinator to Stills Producers.

According to Point 30, integrated coastal management activities exempt from the proposed by-law include *the construction and removal of non-permanent structures as approved by the City's Filming and Events Policy*. However, we wish it to be noted for the record that the by-law's position here is entirely disingenuous. Photographic permits in this coastal zone are already actively discouraged by the City's Coastal Management department, and the potential for any filming - let alone the construction of non-permanent sets - is virtually impossible in Cape Town already. Environmental Management has instituted unilateral bans and moritoriums on photographic filming in many areas – and these were implemented without any consultation with the sector.

Furthermore, coastal areas that are open to other high-impact groups remain closed to low-impact photographic productions. As an example, riding schools may receive permits to access the dunes of Hout Bay, Noordhooek and Kommetjie, but a stills shoot with four people and only light equipment is unable to access the same dunes under any circumstances. In effect, The Stills Photographic industry in Cape Town is actively discriminated against by the Coastal Management department, and at the whims of its officers, in direct contradiction with the city's existing film policy documents.

Additionally, since December 2007, the Stills Sector has been formally requesting that the City provide clear guidelines for the legal application of Environmental Control Officers required of Stills Shoots (and at our business owners expense) by environmental management authorities. In particular we have sought clarity on the unfairly applied obligations placed on Stills Producers to pay for environmental checks in areas that are heavily frequented by tourists, bike riders and equestrians. This has also been ignored by the relevant authorities.

As mentioned above, the vast majority of SAASP shoots are micro-shoots, which cause significantly less damage than any comparable activity. Under the circumstances, the South African Association of Stills Producers has no option but to object to this by-law, since it clearly provides for the continuation of the existing prejudicial approach of the city against photographic producers as equal users of the Coastal Management Zone.

On behalf of:

*** 2 Productions – Robert McClelland 27 (0)21 438 3508**
*** Amanda Coulson Productions – Amanda Coulson 27 (0) 21 426 2183**
*** Beach House Productions – Mark Williams 27 (0) 21 789 1409**
*** Big Sky Productions – Rowan Raaff 27 (0) 21 423 2144**
*** BLM Productions – Brad Logan 27 (0)31 207 8117**
*** Cape Town Productions – Gavin Levy 27 (0)21 464 4500**
*** CMK1 – Rudi Reagon 27 (0)82 594 9438**
*** Cool Banana – Marc Beresford 27 (0)21 425 7900**
*** Episode Media Productions – Mona Nortier 27 (0)21 423 3687**
*** Euroconnection Production Services – Julie van Damme Lagoe 27 (0)21 422 0970**
*** Evidencia Africa Productions – Olivier Barrault 27 (0)21 789 2960**
*** First Productions – Melanie Bold 27 (0)21 461 5911**
*** France Productions – France Pareti 27 (0)21 419 1000**
*** Gambit Ideas – Scott Curnow-Baker 27 (0)79 6486 137**
*** Gavin Schneider Productions (PTY) Ltd – Gavin Schneider 27 (0)21 421 2200**
*** Frank – Francien van Eck 27 (0)84 702 0205**

*** Kaap Film Stills – Jeroen Vuyk 27 (0)21 461 1937**
*** Magic Mountain Productions – Sabina Jakob 27 (0)21 465 4143**
*** Nomad Productions – Damon MacDonald 27 (21) 461 1300**
*** North South Productions – Eric Gukelberger 27 (0)21 421 9905**
*** Prinz Productions – Sebastian Prinz / Graeme Allen 27 (0)21 461 7877**
*** SA Media Productions – Susan Anderson 27 (0)21 422 2855**
*** Steel Productions – Caryn van Wyk / Nolan Hooper 27 (0)21 430 5788**
*** Townsend Productions – Bruce Morrow 27 (0)21 434 4955**
*** Zoom Productions Nanette Kröker / Franck Bonnetot - 27 (0)21 789 2230**

Response:
The bylaw does not add any restriction to the film industry in any way. All filming is currently approved and permitted through the City's Events Office and in accordance with the Events Policy and the bylaw explicitly exempts all activities approved by the City's events office. However no permanent structures of any kind would be approved in this manner as that would be beyond the delegation of the Events Office and the building of permanent structure is NOT exempt from this bylaw. It is the view of the Environmental Resource Management Department that it is entirely appropriate and in accordance with Best Environmental Practise that commercial activities such as filming that take place within sensitive natural environments requires Environmental Management Plans as well as Environmental Control Officers where appropriate and at the discretion of the Coastal Coordinators.

Comment:
Congratulations on this overdue protection zone. Herewith comments

- **As the by-law, if in conflict with any other by-law or planning zoning, is supreme/overrides them this may be the cause of the exclusion of certain areas from the CPZ. I presume this because of the exclusion of the City-owned Blaauwberg Conservation Area which has separate controls. However it is most important to ensure that the restrictions that apply in such areas as the BCA are as tough or tougher than the CPZ.**
- **If I am wrong about the above point then there is no reason to exclude the BCA and the CPZ should be continuous and drawn along Otto Du Plessis Drive (the coast road) from Big Bay to Melkbos. Mere ownership is not sufficient protection – witness Green Point Common from the time of its grant to the City when it was open, not sub-divided, apart from a small part with a lease on it (I have the Land Registry Maps) to its re-designation and recreational/built present position (itself an improvement on the position 5 years ago).**
- **Finally do, please, reconsider whether it is reasonable, practical or sensible to stop beach-combing. I include in that the excitement that children get from having access to the seashore. No-one carries a map of the High Water Mark and occasional heavy seas will throw detritus and shells and rocks beyond that point into the CPZ. 6/14 – no person may collect shells and rocks without a formal licence. 7/25 The City may remove members of the public from the CPZ in the event of contravening the provisions of this by-law. 8/31 Any person who contravenes the by-law shall be guilty of an offence with, on conviction, a prison sentence or a fine or both and (8/32) a requirement to remedy the harm. Many of us sit in the sand dunes above the HWM,**

away from the wet sand and delight in the small shells or stones that our children find – are they below the age of criminal responsibility and will we be found guilty if they take the shells home? There should be an allowance for this age-old activity of recreational enjoyment. Malcolm C. Judd

Response:
In terms of your first point and second point, this is noted with thanks and the Coastal Protection Zone will be extended to include both the conservation areas of the BCA and False Bay Ecology Park. In terms of your third point, shells and all organic material derived form the ocean are governed by the Marine Living Resources Act. The harvesting of these resources requires a permit from National Government. The bylaw states that no person may collect or harvest these resources in line with national legislation. This is intended to govern collection of coastal and marine resources for commercial or other forms of gain. It is not intended to regulate or restrict "beach-combing" of shells etc by individuals. The Revised Bylaw will clarify and make this explicit.

Comment:
My query regarding the repair of the road at Strandfontein Pavilion (the road on the right side of the pavilion also known by most local users DIE BINNE PAD or Old Strandfontein road)We are frequent users of this road as anglers and holders of valid angling permits, in fact my late dad and family have brought me to this location when I was but still a child and it is obvious that this road is 50 years + old and probably forms part of a historical road and is part of history with our local population that frequent this road and at that time the only road to use by the public as well as tourist and anglers alike. (I was photographed by tourist on numerous occasions in this road) This road has deteriorated to such an extent that now the road has been closed to us, My question to you sir is why have you allowed this to happen and on occasional times patch and repair the road which is of no use and waste of taxpayers money and have deprived all of us to use this road recreationally, if this road had been repaired properly and proper road construction engineering protocol were used this would never have happened. By patching any road at the sea side is a recipe for disaster. Myself as a angler and user of this road I am strongly suggesting that you erect a sign and say use at own risk as at Kalk Bay harbour, this at the very least will give us as anglers and public entry to this very popular angling spot at own risk, and on a technicality, not depriving us of our sport. It seems that us anglers always have to bear the Brandt of the states poor decisions regarding matters of this nature, let alone the high risk of parking our vehicles elsewhere to be Brocken into and stolen, in the same breath we are given a small and narrow gravel road all along Baden Powell drive(from Strandfontein Pavilion to the first tar parking heading to Muizenburg which is also being neglected), even this has not been properly considered e.g. We parked on this road and almost got knocked over kids and all, so close this road is to the main operating road and if one stands just a foot on to the sand with your vehicle for safety the local officials harass, are rude, arrogant and don't even want to look at reason and want to write you and enormous fine for now standing on the beach .One does this to for safety reasons only to protect ones family and ones-self. It is so bad that if you opened the driver door of your vehicle the on coming vehicles can nock into you and possible cause injury and death, This tells me that the city does not take things into proper perspective and do not have the publics interest at heart and only want to listen to us during election times to gain votes and after that it is listen **and** discard **attitude, the city needs to be reminded as tax payers we have empowered the city to act justly in the publics interest as it is our money that paves the**

way for a better South Africa and have empowered you to look in our interest. - Mr N Gasant

Response:
Vehicle access to the beach is governed by the Off Road Vehicle Regulations, as stipulated by national government. The City has no authority to ignore, change or over-ride this Act. Further the City is required to enforce the Act. In terms of the road access, this road was built in a highly dynamic coastal environment and as a result, it has proved impossible to maintain. Access to the area for various recreational activities will be addressed in the development of the Overlay Zones as per (11) of the Bylaw. The City is committed to ensuring appropriate, relevant and adequate access to all its citizens to its coastal asset.

Comment:
I think the by-law is an excellent idea. More and more of "prime" property on the coastline is being sold to foreigners and the elite of SA. The rate at which developments are taking place in the Western Cape is alarming. We cannot allow developers to have all prime areas to build more houses and complexes etc. The coastline is there for all and we should keep it that way. - Tamlyn De Souza

Response:
Noted with thanks

Comment:
I'd like to enquire of residents that owns houses along the coastlines, what rights do they have against us having permits to catch crayfish, to chase us away saying this is private property: does the coast belong to them????????????? Maahir Salie

Response:
Crayfish catching is permitted under the Marine Living Resources Act. Anyone who has a permit may catch crayfish in accordance with that permit. No private landowner has the right or ability to prevent access to the marine or coastal environment or define where crayfish may or may not be caught.

Comment:
The protection of our natural resources has to date neglected out coast. This initiative is commendable and will go a long way in preventing further destruction by planners, developers and others. One only hopes that the body politic has the guts to enforce it. – Gold Home

Response:
Noted with thanks

Comment:
Well done! This is a great move forward! The sooner this by-law is implemented the better, we need to save our coastline before its to late. Keep up the good work! – Thandi Lamprecht

Response:
Noted with thanks

Comment:
Great initiative - thank you! – David Gibbons

Response:
Noted with thanks

Comment:
I support this Coastal Protection Zone By-law and pray that Cape Town will set a precedent for all of South Africa! Mr Watkyns says it perfectly: It is our responsibility as a City to ensure that this asset is managed and protected to serve the best interest of all residents and visitors and for the sake of our future generations. – Sharon Martin

Response:
Noted with thanks

Comment:
The by-law should be extended to cover the entire Western Cape Region. Cape Town is already hopelessly over developed in coastal zones. The Southern Cape needs to be included in this by-law for it's own preservation and protection. As a southern coastal property agent, I am witnessing the slow but eventual destruction of the highly sensitive river banks of the Lower Breede River Estuary as well as the potential destruction of the coastal buffer zone of San Sebastian Bay, Witsand. The Hessequa municipality has approval for a desalination plant to be erected slap bang on our most recently awarded blue flag beach which will open the doors to further coastal development. There is already an over supply of property for sale in coastal areas, we do not need more developments within the coastal and estuary buffer zones. – Joanne Attenborough

Response:
Noted with thanks. The City of Cape Town cannot extend the Bylaw beyond its area of jurisdiction. However the City is very happy to share its information with other local authorities.

Comment:
How if any will this affect the recreation SCUBA divers that use this area?

Response:
This bylaw will have no effect on SCUBA diving activity as that takes place below the high water mark.

Comment:
I think it is great that the City of Cape Town is way ahead as usual!

The only comment I have, and it may not be relevant however there is no mention of owners with pets. If you consider adding anything about pets, please be kind to pet owners. Our pets are members of our family as well and we would love them to be included in many of our activities without too many restrictions like "Pets not allowed". Tessa Chamberlain

Response:
Noted with thanks. With regards to pets in the coastal zone, the City is of the view that appropriate areas must be made available for those of our community that wish to take their pets to the beach as well as appropriate areas where pets are not allowed for those that wish to visit the coast free of other people's animals. These use zones will be defined in the Coastal Overlay Zone as stipulated in the bylaw. These overlay use zones will be available for public comment and input prior to their finalisation.

Comment:
The bylaw is warmly supported. Rowland Dale

Response:
Noted with thanks

Comment:
We strongly support this by-law.
We do wish to request some amendments:

1. We note that City of Cape Town owned land (Zoned POS Erven 22,38,45) which is closer / similar distance from the sea as adjacent private property (that is included in the Coastal protection Zone) and forms a natural extension to the Table Mountain National Park, has not been included in the Coastal Protection Zone map. Attached please see a zoning map showing the POS's marked as "POS : 22, 38 and 45" in green. We believe that it should be as it conforms to the explicit intent of the City's Coastal Protection Zone stated purposes as formulated in the By-law -under Chapter 4 number 4 a-l and Chapter 5 a-d

2. In Chapter 6 number 18 : *No person may start or maintain a fire within the CPZ unless within a designated braai area within a Coastal Resort area.* We believe there is an oversight in that the wording should at the end include : *" or on land zoned as Private Coastal Land."*Otherwise the owner of private land/house within the CPZ wouldn't be able to braai !

General comment:
We would like to know what enforcement procedures there will be and who would be responsible for this function. Would there be any benefit in appointing honorary or even permanent rangers to help oversee compliance?

Rory Sales - Chairman Noordhoek Conservancy
Response:

Noted with thanks. With regards your specific comments:
1. Agreed and noted with thanks. The Coastal Edge line has been adjusted to incorporate the three erven within the Coastal Protection Zone.

2. Agreed, the revised bylaw will be adjusted to reflect the appropriate wording.

General: The planning components of the bylaw will be enforced, monitored and regulated by the City's Coastal Coordinators and the regulatory components by the City's Law Enforcement. General coastal law enforcement and regulation remains a challenge and it is a priority issue that the Coastal Coordinators are aware of and will address the development of the City's Municipal Coastal Management Plan (MCMP) as per the ICM Act. In terms of that your suggestion of honorary rangers, this will be tabled for consideration as part of the drafting of the MCMP.

Comment:
The Directorate: Housing objects to the alignment of the proposed coastal zone protection boundary around Pelican Heights.

Housing is the custodian of Erf 829, which has been the subject of protracted EIA over the past 5years. At this stage, a biodiversity specialist has advised that limited areas immediately adjacent to the existing settlement have such limited value with respect to biodiversity and ecological systems that the areas may be developed for housing.
We refer you to fig 3 on page 17 of the attached report, which shows the extent on the extension permissible with respect to biodiversity.

We request that the CZP boundary be re- aligned to respect the boundary described above. Peter Oscroft : Head Special Housing Projects, Housing Directorate

Response:
Noted. The Coastal Edge line has been adjusted to accommodate the boundary required by Housing.

Comment:
I totally support the protection zone bylaw. William Hilliker

Response:
Noted with thanks

Comment:
A brilliant proposal, our coast line is already over developed and we run the risk of ruining the very thing that makes the area so desirable in the first place. I do have one question: what happens to existing developments that fall within the new zones, particularly council maintained structures such as Jaegers walk in Fish Hoek. When these places need repairing will this be done or will the opportunity be taken to remove them?

Response:

Noted with thanks. Existing infrastructure within the new zones will be evaluated on a case by case basis when repairs are needed. Inappropriate, problematic or infrastructure that continues to be at risk due to its location in the coastal zone will be removed and/or relocated based on that evaluation.

Comment:

As a stills photographer, I've just read about these proposed by-laws on the SAASP website (URL: http://www.saasp.co.za/coastal-protection-zone-by-law-for-public-comment/#more-604). It is of concern, as we bring a number of international clients to South Africa to shoot their summer catalogues. These are indeed micro-shoots and locations such as Kommetjie, Baden Powell, Bloubergstrand make great beach locations. We're already dealing with an excuse of a permit office that lumps us with all the heavy traffic, noise, multiple vehicle FILM shoots. We literally move with less than half a dozen people, and dont block pathways, beaches, etc. I just shot at Bloubergstrand and had to pay over R150 an hour for an ECO. Totally understandable, but each time we've hired one they laugh that they are not needed for our kind of shoot. Infact this ongoing expense has just caused a local fashion designer client to move his shoot to Durban, a city welcoming this kind of activity. I'm considering taking a small Canadian shoot we're doing later in March to Durban as their policies are a lot more real world, and actually distinguish between STILLS and film shoots. Take the SAASP example of horse riders - they do more damage in 100m that we'd do in probably a decade of shooting. I hope that at some point you do not chase away the small stills photography industry from our coastline. We respect and need it for local shoots, and those international ones we bring out. It really seems that sometimes the reality is quite far from what is proposed in these by-laws. Simon Deiner

Response:

The bylaw does not add any restriction to the film industry in any way. All filming is currently approved and permitted through the City's Events Office and in accordance with the Events Policy and the bylaw explicitly exempts all activities approved by the City's events office. However no permanent structures of any kind would be approved in this manner as that would be beyond the delegation of the Events Office and the building of permanent structure is NOT exempt from this bylaw. It is the view of the Environmental Resource Management Department that it is entirely appropriate and in accordance with Best Environmental Practise that commercial activities such as filming that take place within sensitive natural environments requires Environmental Management Plans as well as Environmental Control Officers where appropriate and at the discretion of the Coastal Coordinators.

Comment:

I am pleased to inform you that I fully support this by-law. I am a born Capetonian and going to the beach has been part of my growing up and would like that for my children and their children as well. I do however feel that this is a by-law, when implemented, should be protected and enforced on people from all walks of life. I think it is not fair to the people of Cape Town, to implement a law, and thereafter they have to learn that the land has been sold to some foreign investor during the time when the by-law was still in process. Keep on preserving our natural resources so that everyone, local and foreigners could keep on enjoying it.

Response:
Noted with thanks. The bylaw will be enforced across all sectors of society and will apply to all income groups, nationals and internationals.

Comment:
Our Association is supportive of this new by-law as we feel that the coastal zone is very vulnerable and need of protection for many reasons including the predicted sea-level rise. However, with respect to the following point in the draft by-law:
Chapter 5: Development Regulations in the Coastal Protection Zone
8. Existing lawful land use rights and lawfully approved departures from land use restrictions which are currently in force, prior to 01 November 2010, in respect of properties situated in the Coastal Protection Zone, shall be unaffected by the provisions of this by-law. We would like to make a comment.

We are concerned that the by-law will not affect existing land-use rights prior to 1 Nov 2010 and that there may be instances where it is necessary to be able to do so. We therefore draw your attention the following comment that our Association submitted to the City when commenting on the draft new Cape Town Zoning Scheme in April 2008:

LIMITED USE ZONES: These are of great concern as many are in environmentally-sensitive areas and are currently zoned 'Amenities' and, it seems, cannot be used as such but have to be rezoned to an appropriate usage before they can be developed. It appears that when they were originally zoned 'amenities' this was done because they were difficult to categorize because of the uncertainty as to what they were in fact suitable for in terms of usage and development. It was basically decided to defer the decision to when the owner wanted to rezone the erf and then decide if the usage being applied for would be appropriate.

An area which falls into this category is the Hout Bay Beach Dunefield. It is zoned 'amenities' and is now being threatened with extremely inappropriate hard development. The community has asked the Council to require a profession study of the area making sure to involving public participation. We strongly believe that this issue must be dealt with here and not ignored particularly with the new Coastal Zone legislation being aimed at protecting coastlines.

In this respect, we wish to point out a section in the existing scheme that deals with unsuitable usage. It is contained in **The Divisional Council of the Cape, TOWN PLANNING REGULATIONS, Vide, Township Ordinance No. 33 of 1934, revised December 1973, in PART II – USE ZONES, SECTION 18 (Page 27)** ***and reads as follows:***

LAND TO BE SUITABLE FOR PROPOSED USE

Notwithstanding conformity with the zoning requirements of the scheme, no building shall be erected or placed and no use shall be established on any land which is not suitable for the use proposed; and for the purpose for determining whether any land is suitable for any particular use, regard shall be had to the best use of the land and its economic servicing and development or redevelopment, to geological conditions, to liability to flooding, erosion or land slip, to stability of foundations, and to access, safety, health and amenities.

This regulation must be retained and inserted into the proposed new scheme as it will help deal with areas of such uncertain zoning (like Amenities/Limited). It neither gives nor takes away rights but it safeguards sensitive land from inappropriate development or use and is therefore a potentially powerful tool for the Council to use in the interests of the environment and the community. It must be retained and inserted in the proposed new scheme.

The development rules for Limited Use are vague and non committal – this area needs further work and consultation.

We suggest that the principle that land must be suitable for the proposed use irrespective of what the historic zoning is should somehow be entrenched in both this By-law and the new Zoning Scheme. We trust that you will be able to do this.

Should there be further discussion on this subject, we request that our Association be included and given due notice. Len Swimmer, Chairperson Residents Association of Hout Bay

Response:
Noted with thanks. The revised bylaw will include the need for land to be suitable for the proposed use.

Comment:
An extensive comment was submitted by Duncan Bates Professional Land Surveyor on behalf of Mr Peter Lancelot Liddell regarding Erven 149366 and 149367 in Kalk Bay. Both erven are currently zoned undetermined and Mr Liddell has applied for consolidation of the erven and for Single Residential Zoning with Building Line Departures. The comment is extensive and the full comment is attached to this report as Annexure A.

In summary comment argues that the property should be excluded from the Coastal Protection Zone and the provisions of the bylaw for the following reasons:

- **Existing properties to the north east of the erven have single residential rights and as such this property should be given the same rights**
- **The property, from the perspective of Mr Duncan Bates is not at risk to sea level rise**
- **The property has no coastal value from a coastal biodiversity, sense of place or public perspective**
- **Metrorail will be responsible for protecting and maintaining the revetment that protects the railway line and by default will therefore ensure the protection of Mr Liddell's property**
- **No coastal erosion is evident**
- **If approved the dwelling constructed would have a lifespan of 20 to 100 years as Mr Bates notes that sea level will only rise by 1m in that time period.**

Response:
The explicit intent of the Coastal Protection Zone is to prevent further development of hard infrastructure along the City's coastline for the reasons as defined within the bylaw. Specific responses to the comment are listed below:

- The properties in question are zoned undetermined and were purchased by Mr Liddell with the knowledge of that zoning. The rights attached to the properties north east of the erven have no bearing on the rights allocation to the erven in question.
- Mr Bates quotes a 1m sea level rise over the next 100 years. Current global scientific models indicate a mean sea level rise of 1,2m to 8m within the next 100 years with the majority of scientists agreeing that the extent will be closer to the 1,2m level. However, recent studies have concluded that the Greenland Ice Sheet will now with certainty melt completely adding 6m- 8m mean sea level rise. What is not known however is the rate of the ice sheet melt and the timeframe for that melt. As such to assume that a mean sea level rise of 1m is assured for the next 100 years has no validity.
- Mr Bates ignores the fundamental issue of predicted increased storm intensity and frequency taking place (key risk to infrastructure) and the compounding of this effect superimposed on an increasing mean sea level.
- Mr Bates assumes that Metrorail will maintain and protect the railway line in the long term (100 years) and thereby the property in question. There is not commitment from Metrorail in this regard and Metrorail may be required to evaluate the feasibility of the railway as time progresses. This is an assumed position by Mr Bates with no supporting qualification.
- In his comment Mr Bates ignores that the intention of the Coastal Protection Zone is multifaceted and includes explicitly the concepts of the need to protect the natural scenic qualities of the coastline and in particular the landscapes and vistas. This property in particular if developed would impact significantly on the landscape and vistas across Fish Hoek Bay from the perspective of motorists and pedestrians using Main Road.
- The proposed development will create a substantial visual intrusion that cannot be mitigated in any way.
- The statements in the submission that "...there are no features worthy of environmental protection..." and "...has no value to the public..." and that including this property in the CPZ is "irrational" and is being done because "...it looks like a good idea..." have absolutely no substance and demonstrate a clear lack of understanding of the purposes of the CPZ.
- Contrary to the arguments in the submission, the site in its un-built state optimises the landscape value of the Bay.

In summary, the Coastal Edge line and Coastal Protection Zone is appropriately and correctly located in this area of the City's coast.

Comment:
An extensive comment was submitted by Laas and Scholtz Attorneys on behalf of Mrs Ronelle Shuttleworth, the owner of a property registered as Erf 502 Clifton. The comment notes the general support for the concept of the Coastal Protection Zone (CPZ) but the incorporation of Erf 502 into the CPZ is questioned and suggests that there are implications for the property as a result of its inclusion. The comment is extensive and the full comment is attached as Annexure A. The summary of the concerns raised in the comment are:

- **The ground level of Erf 502 is more than 11m above sea level**
- **There is a public walkway between Erf 502 and the rocks**
- **There is no sand or beach on the Erf**
- **There are no dynamic coastal processes taking place**

Response:
Upon detailed consideration of the property in question, its location and existing rights it is agreed that including the property in the Coastal Protection Zone has no value for the intent of the CPZ and as such the coastal edge line has been adjusted here to exclude Erf 502 from the CPZ.

Comment:
The Macassar Environmental Association submitted the following comment:

1.The COAST MUST BE PROTECTED BY THE PEOPLE LIVING WITHIN THE COMMUNITY WITHIN WHICH THAT STRECH OF COAST -LINE IS FOUND AND the law enforcement authorities consult at all times with those community structures on all issues regarding coastal protection, viz. Environmental, Nature Conservation and coastal forums and interest groups.

2. This wasn't done in the formulating of this bylaws and is an injustice to the people whom government must serve.

3. The coastal protection zone should not be limited to 500m from the sea but include the Dunes and nature, river, estuaries such in Macassar and other such-like communities. This 500m stipulation, gives Government a loop-hole to allow all kinds of dangerous developments which negatively impact the coast and dunes, nature(Macassar Dunes and ELSEWHERE),and this would be only and mainly for the rich and lower-income peoples who would not be having a good idea about coastal matters & marine life, etc.

4. Housing developments should for all purposes and intent be as far removed from beach and coastal areas.

5. More intense discussion and public meetings be held before putting pressure on communities for comment on CPZ bylaws so in order to engage fairly with all real stake-holders such as in the case of Macassar, False bay, Gordan's Bay.

Thereby we as organization for ask for a more fair process of community participation as an alternate to the process you are following presently and allowing for more time to study these laws.

The laws are extensive and it will be a good thing if you can come into our or the communities to debate and discuss these laws with the citizens instead of following a rushed process.

Macassar Environmental Association: Chairperson. CW HENDRICKS

Response:
The following are responses to each of the points raised:

1) It is agreed that community engagement in coastal management and the long term protection of our coastal asset is essential. The central component of the bylaw is that the CPZ will be protected and managed as a common asset that belongs to all the people and visitors of Cape Town. Increased community engagement in this regard will be

facilitated through the implementation of the yet to be developed Municipal Coastal Management Plan (MCMP) as described in the Integrated Coastal Management Act.

2) The bylaw was formulated through a long engagement process within Council, under the guidance of the Planning and Environment Portfolio Committee and through an external legal review. Once a draft bylaw was approved, the bylaw was submitted for public engagement as per the Council policy on public and stakeholder consultation as required by the Office of the Speakers Committee (OSCOM). Further, the Coastal Edge line which defines the landward boundary of the CPZ was presented to the public through extensive consultation as part of the City's Draft Spatial Development Framework (SDF).
3) The CPZ is not limited to 500m, but has been defined by a host of informants which include dune systems, coastal dynamics, coastal processes, biodiversity, landscapes, public access points, sea level rise modelling and cadastral boundaries.
4) Agreed and it is the explicit intention of the bylaw to achieve exactly that.
5) The public consultation process was extensive and complied in detail with the Council policy and public and stakeholder engagement.
6) It is the view of the City officials that the processes has been fair, open, transparent and adequate and has allowed ample opportunity for public input and comment on the proposed bylaw.

Comment:
The following comments were submitted by attorneys BISSET BOEHMKE McBLAIN on behalf of CapeCoast landowners:

Our clients' properties would fall within the meaning of Private Coastal Land as referred to in the draft by-law. At this stage we wish to submit the following legal and constitutional comments on the proposed by-law :

1. The references in sections 8, 9, 9.1 and 11(g) to the date 1 November 2010 clearly offend against the rule on retrospectivity of subordinate legislation; are ultra vires, and, in any event, have no demonstrative rational connection to the objects of the by-law. Clearly any by-law can only take effect as from the date on which it is passed and promulgated, or a later or future date stipulated in the enactment.
2. Section 9.1 effectively, and for all practical purposes, restricts private coastal land to only use for public purposes which is the very essence of expropriation, without compensation in this instance. While the preamble to the by-law refers to the constitutional provisions regarding arbitrary deprivation of property; that is precisely what the draft by-law proceeds to do as the restrictions imposed on private coastal property are so far reaching and so absolute as to amount to nothing less than expropriation.
3. Section 9.1 fails to make it clear what changes to land use rights are over-ridden by the provisions of the draft by-law.If such is intended to refer to consents or approval etc granted by the City of Cape Town the ex post facto withdrawal thereof is arbitrary and unenforceable.If such is intended to refer to consents or approvals granted by another sphere of government it is patently ultra vires for the by-law to purport to confer upon the Municipality the capacity to override or render nugatory consents or approvals granted at Provincial or National level under other legislation.
4. Section 9.1 is vague and uncertain in the reference to the "aims and objectives" of this by-law which phrase is nowhere defined; there being only section 4 which refers to the "purpose of the coastal protection zone".

We respectfully submit that the basic premises upon which the proposed by-law has been drafted in relation to the above aspects does require to be reconsidered in the light of the arbitrary and absolute terms in which it is at present drafted; otherwise we can well see legal and constitutional challenges arising from various quarters.

Response:
Specific responses to each of the points raised are listed below:

1. Noted and agreed, the bylaw has been amended accordingly.
2. Your interpretation of section 9.1 is incorrect. All private land and existing rights are protected. By not approving or supporting landuse changes, the City is not expropriating the land. All land was purchased by property owners with existing zonings and rights and during purchase not guarantee existed as to the future use of said land. The bylaw has been amended to allow for an application for exemption from the regulations of the bylaw under explicit conditions.
3. Section 9.1 is clear that the City will not grant any new land use rights within the coastal protection zone, whether they be by way of rezoning, subdivision, consent use, reinstatement of lapsed rights or extension of the validity period of rights. The revised bylaw makes provision for application for exemption where certain conditions have been met.
4. Comment noted, Chapter 4 has been changed to refer to "aims and objectives"

Comment:
Further to our conversation of this morning, I have spoken to Johan Claassen of TNPA and we have agreed on your suggestion of a two pronged approach. He will provide comments/objections via the online web site whilst I will raise some of the issues in this email directly with yourself. In my previous emails I sent you a copy of the plan that was prepared in our office where we superimposed our cadastral and jurisdiction areas together with the proposed coastal protection zone (CWN0393m.pdf)
On this plan the areas affected are shown highlighted in a pink colour. The main areas affected are the Greenpoint lighthouse and the area of coastline form Paarden Island all the way North to the Port Jurisdiction line at Table View, with a spur going inland at Boundary road. The areas shown are owned by Transnet and should not have been included

The plan icmadata2.dwg has also been provided to enable your GIS department to plot the data onto your systems and confirm the correctness of our data.

In terms of our previous conversations and the proposed by-law (Chapter 4. Section 7.b) it would seem that the intention is not to include any TNPA property into the definition of the Coastal Protection Zone. Further to this, the statement was made that the only areas to be included were those that the City had jurisdiction over.

It is also stated in Chapter 4. Section 6 that the coastal edge line is a cadastral line, however we find in a number of places that this concept has not been followed and that the line has cut across cadastral erven in a number of places.

In Section 5 – "The Geographic area including all natural features, properties and premise between the High Water Mark and the coastal edge line."

This causes a potential problem in that the line runs around the outside of the port, but along the Quays and walls the HWM is coincident with our boundary, hence their CPZ is effectively a line of zero width, however if we were to plan any developments etc on the seaward side of our boundary we would essentially be crossing into this their CPZ, and seeing as the area would not be registered in Transnet's name yet it would theoretically be under the control of this by-law.

Thus from a Transnet perspective we object to the current placement of the CPZ and we believe that the boundary should be following the Port Jurisdiction line as shown on the proclamation diagram 6220/2008 (Copy attached). Terry Stiles, Transnet Property: Geo-Spatial Manager Western Region

Response:
Noted and agreed. The Coastal Edge Line has been altered to no longer intersect, crossover or interfere with the Port Jurisdiction Area while the phrasing in the bylaw refers only to those areas under the jurisdiction of the City of Cape Town.

Comment: I commend the City of Cape Town for going to this effort to protect our coastlines for the benefit of all present and future South Africans! It would be terrible loss to the country for them to be forever ruined in the pursuit of short-term profits. Graham Poulter

Response:
Noted with thanks

Comment:
I support the protection of our beaches. Roger Griffiths

Response:
Noted with thanks

Comment:
I fully support the adoption and implementation of the proposed Coastal Protection Zone By-law. Shaun Overmeyer

Response:
Noted with thanks

Comment:
Protection of the Coastal Zone, makes complete sense. Coastal damage proceeds unchecked and the damage is irreparable! David Reece

Response:
Noted with thanks

Comment: This by law serves as an example to other municipalities and will benefit the citizens of Cape Town in ensuring access to the coast as well as enabling development of the coast to be controlled. David Whitelaw – Cape Bird Club

Response:
Noted with thanks

Comment:
I am in favour of the bylaw. Riyaad Harris

Response:
Noted with thanks

Comment:
I am in favour of the bylaw. Isabella Hayden

Response:
Noted with thanks

Comment:
Is the mushrooming of the settlements, that is bordering the Strandfontein coastline being monitored. Eg. 7de laan in beach road is like a permanent campsite for the people residing there. From where did they come. And it seems that the settlements is just increasing and becoming a good ground for drug peddling and crime all along Spine Road. Nadia Rakiep

Response:
Noted, the bylaw will prevent inappropriate development and settlement along the City's coastline.

Comment:
I agree with everything in the by-law and feel it should be passed. We need to protect our coastline so that we can ALL enjoy the benefits of living in Cape Town, and a big part of that is being able to go to some of the most beautiful beaches in the world. The wildlife needs to be protected and the beaches and surrounding areas need to be kept clean and be patrolled. Terry Smith

Response:
Noted with thanks

Comment:
I am in favour of the bylaw. Louise Badenhorst

Response:
Noted with thanks

Comment:
The Transnet National Ports Authority land and the water area under the jurisdiction of Transnet Ltd should be excluded from the new draft coastal protection zone by-law. The draft By-law must be amended to exempt all Transnet land including the water space under Transnet jurisdiction from the draft by-law. Transnet National Ports Authority, Port of Cape Town

Response:
Noted and changes have been made to the Coastal Edge Line to reflect Transnet National Ports Authority, Port of Cape Town comments

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Comment:
The following comments were received from the organisation Seafronts For All (Janey Ball For Bennie Rabinowitz):

The recent notice calling for comment on the above by-law refers. As background to our comment...Seafront for All was established to protect and preserve the Public Open Space on the Atlantic seaboard from Bantry Bay to Granger Bay in Mouille Point. We have a related interest in the coastline that abuts the POS in this area. Although the impact of Climate Change upon our coastline is of great concern, for purposes of this comment, our concern relates in particular to the activities within the Coastal Protection Zone (CPZ) which the Draft By-Law seeks to regulate and, in particular to Chapter 4, Section 4a, viz, that "... the coastline ...remains accessible, to all...".

1. The suburbs Clifton through Bantry Bay amply illustrate the absence of such accessibility and the recent threat to the Atlantic seaboard POS provides a current reminder.
2. We see that there is provision in Chapter 5 Point 10 for a coastal overlay for the CPZ but have concerns in this regard –

a) Having been party to the scenic drive discussions, now in their tenth year of discussion and still unresolved, a timeline must be assigned to the approval of this overlay.
b) The City, despite numerous consultants and ample time, still failed to include the scenic drive overlay in the IZS now before Province. What assurance is there that the Coastal Protection Zone overlay will not face the same fate with the consequent threat to enforceability?
c) It has been our recent unfortunate and expensive experience to learn that, regulatory and legal frameworks notwithstanding, an absence of officials can render the most thorough regulatory process ineffectual.
d) And lastly, the City advised, in the context of the scenic drive overlay, that it does not have the time and resources to develop the scenic routes plan and that it will have to be introduced 'in due course'.If the City's Environmental Department is in the same position, how and when is it proposed to address effective implementation and enforcement?
3. Please can you amplify, in regard to the effect upon traders (informal or otherwise) of Point 30, bullet 1, namely the exemption from the Draft By-Law of "...the implementation or action of any City approved policy, guideline, operational procedure or protocol".
4. Please can you advise how the comments on the By-Law will be publicised and when we can expect responses.
5. Also, What is the intended timeline until implementation of the By-Law?
Response:

A response to each of the queries is listed below:
1. Agreed and it is the explicit intention of the bylaw to ensure that we do not replicate issues of perceived access where in truth development has inadvertently restricted public access.
2a) The urgency of the CPZ overlay is supported as well as the much needed inclusion of scenic drives within that overlay. The CPZ overlay zones will be available for public comment during 2011.
2b) If the bylaw is approved the City is liable in terms of its own legislation if the CPZ overlay zones are not completed and implemented. Secondly, the City is required to develop a Municipal Coastal Management Plan (MCMP) in terms of the Act and as such we are confident that due to these two processes the overlay zones will be completed and implemented.
2c) Your concerns are noted. In this case, the City has appointed two Coastal Coordinators whose explicit role is to ensure that the bylaw is developed, implemented and adhered to as well as ensuring that the City complies with the National Coastal Management Act.
2d) The regulations and enforcement of the bylaw will take effect once promulgated and will be further enhanced by the City's MCMP. In additions see point 2c above.
3) Existing permitting processes by the City will remain in place and where permits are issued for various activities those are not constrained by the bylaw.
4) This Comments-Response Report will be made public and sent to all those that commented once it has been submitted to the City Planning and Environment Portfolio Committee
5) It is the intention to submit the final bylaw for approval by the City in April 2011. If approved, the bylaw will come into effect by the middle of 2011.

Comment: An extensive comment was submitted by the Woodbridge Island Corporate Body by Chairperson Mr R Rundle.

We thank you for the opportunity afforded us to comment on the City of Cape Town Draft Coastal Protection Zone Management By-Law of September 2010, and we respectfully submit our concerns for your kind consideration, as follows:

1. Annexure 1 illustrates our primary concern. We would like to bring to your attention that the dunes as well as the lagoon/estuary inlets along the boundary of Woodbridge Island are within the property line of the Woodbridge Island Body Corporate, falling under their care and preservation.

2. The time allowed for comments was not adequate for part-time enthusiasts to study the proposal in depth or in detail, but in general we wish to register our support and delight for the intention of this bylaw.

3. And so, if I may, our second concern is the inadequacy of this bylaw. We are made to understand that the purpose of this bylaw is to "*make bylaws to provide for the implementation, administration and enforcement of the Coastal Management Program as provided for under the National Integrated Coastal Management Act 24 of 2008 (the ICM Act)*". It stands to reason therefore that any penalties arising out of non-compliance with this Act will be those contained therein, and therefore a schedule of penalties (imprisonment not exceeding a year or/and a fine – the extent of which has not been specified) in this bylaw would seem to be superfluous.

4. A further concern to us is that the tone of this bylaw appears very much to reflect prevailing and, possibly, preconceived perceptions without careful reference to the records, or to science that has been properly peer-reviewed. For example, the quoted

assertion that "strip" development has "extensively altered and affected" the coastline. In our very extensive research we can find no evidence that would support such a claim. On the other hand, we have extensive scientific evidence (also a Transnet report) showing that heedless expansion by Transnet of its port structures into the sea is directly responsible for most of the erosion of the coastline surrounding Table Bay. We have in our possession scientific reports also documenting coastal damage due to port operations and structures elsewhere along the coast of South Africa.

Nevertheless, we would be delighted to see close control and oversight of all the so-called "developments" in our Cape Town, as it was for Woodbridge Island back in 1983. We would be even more pleased if it was common knowledge that Cape Town City is itself committed to policing its own activities and functions that may harm our coastal environment.

5. Our reading of the ICM Act shows that it is not only the citizens of Cape Town that are liable and responsible for the general well-being of our coast, but also the City of Cape Town and its servants. The record shows that the pollution and soiling of our coastline is primarily attributable to failures on the part of the City. Further serious concern to us is the coastal pollution facilitated by the Port of Cape Town. Their lack of vigilance in respect of the dumping of bilge water leading to the infestation of the Australian tubeworm (*Ficopomatus enigmaticus*) in the Diep River Estuary, Milnerton, their lack of careful control of shipping movements within the Table Bay Anchorage area leading to sulphur dioxide and noxious nitrogen oxide (NOx) pollution, and their lack of concern for the Table Bay shoreline during winter months when they permit decrepit vessels to anchor within one nautical mile of the coast, despite their own statement on their website under "Anchorage" "*During the winter months, April to September, north and north-west winds are frequent and as there is no safe anchorage in the bay, it should only be used by vessels prepared to proceed to sea at short notice on the approach of bad weather*",

6. The ICM Act section 29 we read as allowing the City of Cape Town authority only over the function of "coastal access", and "coastal protection" only insofar as this access by the public would cause harm by their use of the coastal facilities. Mitigation for climate change, as far as we can see, is not included under the duties or the authority of the City of Cape Town. In September of 2006 Woodbridge Island faced seas that peaked at more than 14 meters. We survived that quite well. Do we need to worry about global warming? We now know that the United Nations' Intergovernmental Panel on Climate Change and its leading scientist, Dr R.K Pachauri, have been discredited for the fabricated data upon which they based their predictions of a global meltdown. For example their prediction of thermal catastrophe in Antarctica was based on temperature readings since 1979 from the few weather stations that were reporting temperatures since that time. The missing data was extrapolated by computer model that has not been made available for peer review. In fact the 2009 Antarctic sea-ice cover was 30 per cent above average. Also the "melting glaciers" in the Himalayas was found to be based on a magazine story, and the global warming "recorded" in Siberia is based on the rings of a single larch that the Climatic Research Unit in Cambridge chose specifically to fit their other data, purposefully dismissing contrary evidence in surrounding trees. We know from scientific reports that sea rise rates currently are at just 3mm per year. This is a figure accepted by international Insurers who insure for coastal damage. For them the so-called tipping point (at which the Insurers withdraw) is a 50cm sea rise. At that rate, (if the current rate of sea rise is sustained) we will reach it in about 170 years from now, by which time no doubt we will have solved this dilemma.

7. Chapter 4 of the proposed bylaw we presume to be simply the stated purpose of the bylaw, without it having the effect of requiring any budgetary allocation for any of the

purposes so listed. In any event, there are already laws in place dealing with these matters and so for the City to duplicate those would surely be of no effect. Also, the list does not refer to any measurable yardsticks; only to subjective values that if they become substantive in this bylaw, we fear may become the unchallengeable domain of a prescriptive martinet.

8. Chapter 5, section 9 of the proposed bylaw we read as being outside the terms of reference of the ICM Act (section 29) for a municipality, otherwise, if it is intended to be an extension of the functions ascribable to the municipality by the ICM Act, then surely section 9 may be seen as being tantamount to a suspension of section 33 of the Constitution for a period approaching a year or more while this bylaw is being finalised.

9. Chapter 6 appears to list a number of sections that are already on the books in law. Other sections under this chapter that would seemingly be difficult to enforce, for example section 14: In Kynance Cove in Cornwall in the UK, the 175,000 visitors each year have removed 500 square metres of vegetation and 150,000 kilograms of soil just in walking between the car park and the beach; while the activities of the "collector" whether for bait, food, souvenirs or educational study are even more marked. And section 21 may be taken to mean that kite surfers are "diminishing the social and recreational value" for ordinary board surfers, or that a boisterous game is categorised similarly by others simply wishing to sunbathe. Section 22 is a puzzle for us since it is primarily the City of Cape Town and has been responsible over the past number of years for sewage leaks and pollution into the sea and for pollution emanating from its stormwater drains. And if section 23 is taken seriously we could frighten our tourists away and a bride will never again become betrothed to her bridegroom on the beach in Blaauwberg without an appropriate certificate from the City of Cape Town, a proviso that will necessitate increasing layers of bureaucracy and paperwork for the long-suffering citizens of Cape Town.

10. Chapter 7 seems to contain a list of what the council may do to "prevent", "take down", "remove" et al, but the regrettably there is no mention of the City applying its resources in aid of its citizens who legitimately have a cause for concern for our coastal environment.

11. Martin Pollack's introduction also refers to "*the explicit intent of the City's Coastal Protection Zone*". We absolutely support the laudable points that follow this statement. However, as we have already noted, we would be pleased to see the City and its servants actively participating as well. If an experimental process does not work then we would want to see a return and a rejigging process until it actually works. There is more than enough science available, as well as experience from other parts of the world, that will allow us to find an appropriate solution to any environmental challenge.

The Tabletalk on 09 February 2011 reporting on "*Legislation to protect coast from destruction*" in the inside page published this letter from a reader:

Beachfront in shocking state

Last Sunday my husband and I decided to take a walk along the Blouberg beachfront from Dolphin beach to Small Bay

We were totally shocked at the state of the beachfront. Yes, we have had strong winds over the past month, but the sand has just built up out of control, blocking the so-called walkway and forcing one to walk among the parking areas which is not safe as cars come speeding along.

Also at least six areas had broken walls and there is a sheer drop down to the beach and all the litter has gathered there. Not only is this unsafe for children and the likes, but it is unsightly and unhygienic.

The environmental experiment is an absolute eyesore and obviously is not respected by the public hence the state of it.

I really do not know what visitors' impressions were over the festive season, but as a ratepayer I feel something should be done to improve this situation.

Come on municipality, let's see the beachfront return to the beautiful pristine place it used to be.

Response:
Responses to each relevant comment are listed below:

1. The Coastal Edge line is not defined by property lines and crosses properties where appropriate. Existing rights that Woodbridge Island have are not affected by the bylaw.
2. Support for the intention of the bylaw is noted with thanks. The public and stakeholder consultation on the bylaw took place as determined by Council Policy on public engagement.
3. This is a City of Cape Town bylaw that primarily seeks to "make and administer by-laws for the effective administration of the matters which it has the right to administer, and to exercise any power concerning a matter reasonably necessary for, or incidental to, the effective performance of its functions". As such the penalties and regulation of the bylaw is directly linked to the management of aspects of the coast that fall within the administration and jurisdiction of the City of Cape Town.
4. Strip development without question has had a negative impact on the coastline of South Africa as a whole and specifically in Cape Town. Examples include Table View and Strand beach fronts where the coastal systems no longer exist as functioning systems, Neptunes Isle area South of the Diep River mouth, Melkbos Strand and many others. The development of the bylaw was based on sound coastal and scientific information that includes biodiversity, sea level risk and flood risk, coastal access, landscapes, coastal processes and erosion risk.
5. The bylaw holds all City of Cape Town officials accountable to the regulations of the bylaw. However the City has no jurisdiction over the governance of the Port or related shipping activity and as such the bylaw cannot attempt to regulate such activities.
6. Climate change adaptation and mitigation is the responsibility of all spheres of government as it relates to their duties, functions and responsibilities. Current accepted global figures for mean sea level rise are in the range of 0.76cm to 1.2m by the year 2100. This is considered conservative by global scientific bodies and does not account for the increased risk of small sea level rise associated with an increase in the intensity and frequency of storms. It is interesting to note that on the north of Woodbridge Island the golf club is an significant risk while just south of Woodbridge Island the Neptunes Isle area is at similar risk.
7. Chapter 4 lists the objectives of the bylaw which is standard practise. The chapters beyond that set the regulations to give effect to the objectives.
8. We do not share this view, the bylaw as stated already is intended to govern those aspects of our coast which fall directly within the control, responsibility and jurisdiction of the City of Cape Town.

9. With reference to your comment on brides, these activities are already governed in terms of the City's events policy and no additional change is brought to bear by the bylaw, other than to ensure governance integration between the bylaw and the policy.
10. Point noted. However this is a bylaw that seeks to regulate and govern. Assistance from the City as you suggest is given in the form of annual budget allocation, Spatial Development Frameworks and council policy.
11. With respect to your comment "**There is more than enough science available, as well as experience from other parts of the world, that will allow us to find an appropriate solution to any environmental challenge".** We do not agree at all. Every country in the world is faced with environmental challenges which we are only beginning to understand now do not have solutions. The premise of this bylaw is that we must stop impacting on dynamic environments as once disturbed we have little or no solutions. Case in point includes coastal erosion and ongoing wind blown sand. The piece from the Table Talk highlights this point again where it is almost impossible to maintain infrastructure in these dynamic environments and also highlights that where we have imposed ourselves on these dynamic environments, the processes continue and are then seen as you put it as "poor management" rather than understanding that this relates directly to impacting on coastal dynamic processes.

Comment: The following comment was submitted by Werksman Attorneys in behalf of the owners of Springfontyn Property Holdings Limited:

1. Our client is the registered owner of the farm Groote Springfontein No 1, situated in the Blaauwberg Municipality, Division Cape.
2. Our client's property is situated within the jurisdiction area of the proposed Coastal Protection by-law to be promulgated in terms of the Integrated Coastal Management Act.
3. Our instructions are to record the following facts which are relevant to determining the Coastal Edge and the Coastal Protection Zone in terms of the proposed Bylaw, in respect of our client's property:
3.1 Our client has in consultation with its town planning and environmental consultants identified two nodes on the property suitable for further development.
3.2 The development of the property has at all relevant times been regarded by all relevant stakeholders as part and parcel of and indeed a catalyst to the development and economic prosperity of Atlantis.
3.3 In this regard Government in the Western Cape at Local and Provincial level has supported the development of the property.
3.4 To this extent the property was expropriated by the State in 1975 for the specific purpose of the development of Atlantis.
3.5 The intention that the property must be developed is duly recorded in correspondence from both the Ministers of Economic Development and Nature Conservation and Tourism, Western Cape, and is also supported at local authority level which recognizes the importance of the development of the property for the socio-economic upliftment of Atlantis and environs.
3.6 The development of the adjacent Silwerstroom Strand is linked to and cannot be considered separately from the development of our client's property.
3.7 Detailed plans for the subdivision, rezoning and the development of the property, which included a residential estate, harbour and hotels, were drafted and approved during 1988 – 1990. The development areas were shown as Town 4, Atlantis.

4. **Springfontein Property Holdings (Pty) Limited acquired the land under the expressed contractual obligation and condition that the property shall be developed for the benefit of the Atlantis and Environs community. This obligation was imposed by the Western Cape Government at the time of acquisition of the property by our client, as a condition of sale.**
5. **In the circumstance our instructions are that the determination of the envisaged Coastal Edge and Coastal Protection Zone in respect of our client's property, can only be finalised or considered when the nodes suitable for development have been identified and approved by the relevant planning authorities.**
6. **This letter is addressed to you following on the comments dates 1 March 2011 to the proposed Bylaw given by our client's Town and Regional Planners, First Plan CC.**

Response:
Responses to relevant points are listed below:

1. For noting, the Blaauwberg Municipality no longer exists and has been incorporated into the City of Cape Town.
2. Noted
3. Extensive discussions regarding the development nodes have been held with Mr Andre Beukes of Springfontyn Property Holdings and appropriate development nodes excluded from the provisions of the bylaw which have been agreed by Mr Beukes
4. See point 3 above. Nodal points have been identified and excluded from the Coastal Edge and regulations of the bylaw
5. See point 3 and 4 above
6. Noted

Comment:
A significant comment from Cape West Pavilion Holdings was submitted. The full comment is attached in Annexure A. In summary the comment requests that the bylaw makes allowance for the development of a Pavilion and Marina District in Blaauwberg specifically and generally to make allowances for the development of small boat harbours and marina's.

Response:
In response the following key points should be noted:

1) Overall support for the bylaw is noted with thanks
2) The City supports the concept of upgrading and re-development to optimise economic and social opportunities form our coastline.
3) The Draft bylaw is not the appropriate planning vehicle to propose the specific development of the Pavilion and Marina District. The proposal should have been submitted through the comment process on the City's Draft Spatial Development Plan.
4) The City is not the approving authority for any coastal development below the high water mark. This is a national competency and significant processes would need to be run prior to any approval being given by national government
5) The CPZ Bylaw has been revised to include a process whereby landowners may apply for exemption from the bylaw where certain criteria can be demonstrated and the coastal environment enhanced as a result of such exemption. This would be the appropriate avenue for the proponents to follow with their proposal.

6) In general the City has a position to not develop further infrastructure within the marine environment due to the possible negative impacts such development has on our coastal processes. This however does not exclude consideration by the City of appropriate plans. The bylaw process is however not the correct or appropriate process to comment in detail on such proposals.

Comment:
The City of Cape Town is to be acknowledged for its pro-active approach to dealing with the threats and risks to our coastline through both inappropriate development and the predicted increased storm frequency. Comments on the Draft for Comment are dealt with below. There are a few additional points which I believe have not been addressed and need to be considered, namely:

1 What happens to the ownership status of private land in the event that it becomes a victim of storm damage and is as a result below the high-water mark? Does it remain in private ownership? Surely it should be ceded to the City or State?

2 What is the City's duty / responsibility in situations where a section of the coast is eroding or is at risk of eroding to the extent that private development and or public infrastructure is a risk? A clear statement about responsibility, or not for coastal defense is required.

3 It must be a legal obligation for estate agents to inform prospective buyers that a property in question is inside or abuts the CPZ and what land-owners rights and responsibilities are ito the CPZ. The same should apply for all bond applications for property in the CPZ .

4 The City needs a specialist CPZ Unit to deal with monitoring, planning, development applications and pro-active management of the Coastal Zone. This Unit needs to include or have access to operational staff who have coastal engineering expertise. An assessment of the vulnerability of infrastructure close to the coast needs to be undertaken to facilitate forward planning. Too often coastal defenses and infrastructure deteriorates to a point that the repair costs are exorbitant. In addition, repair work needs to be undertaken by a team who understand coastal engineering. Fish Hoek beachfront is a case in point where the repair work to the promenade revetment wall has been undertaken repeatedly in the past 3 years by people who do not understand coastal processes – with the result that the `repair' does not last and money is wasted.

<u>Detailed comments on the documentation:</u>

Definitions: Dynamic coastal processes: include sediment movement & dune building processes

Chapter2: Conflict with other laws - the priority given to the Coastal Protection Zone by-law is supported.

Chapter 4: The Coastal Protection Zone
4. The purpose of the Coastal Protection Zone is to:

e) Protect remaining coastal systems as part of our natural heritage and as buffers to future climate change risks

7. Areas Excluded from the Coastal Protection Zone include.
When inappropriate development or coastal zone interference happens within the Excluded Areas, it often has an impact on the abutting sections of `City' coast. Notwithstanding the issue of a hierarchy of authority, the Excluded Areas need to identify a CPZ for their landholdings and manage it ito a special agreement between the City and relevant authority.

Chapter 5

11.f "Marine Access Points which shall provide explicitly for legally compliant public facilities for the launching of motorised watercraft of less than six metres in length." Presume that the historical access to and along beaches for Trek fishers will be secured ito 11 f.

Chapter 6

21. "*No person may act in <u>any way</u> that diminishes the social and recreational value of the CPZ for other members of society."* Competing beach uses such as ball games and sunbathing need use zones rather than a blanket ban of one or the other.

22. "*No person may discharge pollution into the CPZ unless such discharge is authorised in terms of a water use licence under the National Water Act No.36 of 1998 or a waste management licence under the provisions of the National Environmental Management*: *Waste Act No. 59 of 2008*. " Make this stronger to include penalties against the City in the event of sewage discharges in form of spills. There are specific weak points in the waste reticulation network and it must never be an easy option for the City to use the coastal rivers and estuaries as a sewage overflow outlet. Secondly, coastal CBDs are apathetic about their Housekeeping (litter & street run-off) with the result that polluted run-off from the CBDs goes onto the beaches - Fish Hoek Beach & Simon's Town waterfront are two well known cases.

24 This is strongly supported.

Chapter 7: Powers of the Council

28 "The response to all coastal disasters and emergencies are exempt from the provisions of this by-law, including but not limited to: " The City needs a specialist Coastal Unit which amongst other skills can respond to such emergencies so that `rescue / disaster amelioration' operations are carried out with as little additional damage to the coast as possible.

29. The delivery and provision of utility services by the City is exempt from this by-law provided that compliance to the provisions of the NEMA, where necessary, has been attained. The City must go through the process of formal Environmental Approval from the City Manager or his/her delegated authority – and with the recommendations and conditions set out by the specialist Coastal Unit.

Brief comment on some of the Maps with the designated CPZ.
http://www.capetown.gov.za/en/Documents/CoastalZones/25_St_James.pdf
Support the inclusion of railway land and private infrastructure such as Brass bell

http://www.capetown.gov.za/en/Documents/CoastalZones/24_Fish_Hoek_Kalk_Bay.pdf
Support the CPZ going up the Silvermine Estuary. Why is the City parking area and pump station behind Clovelly beach excluded? Also consider including the City Park behind the southern most cnr of Fish Hoek beach.

http://www.capetown.gov.za/en/Documents/CoastalZones/23_Glencairn_Fish_Hoek_South.pdf Support the CPZ going up the Glencairn Estuary. Why are there breaks in the CPZ line in the vicinity of the Glencairn Quarry?

http://www.capetown.gov.za/en/Documents/CoastalZones/21_Simon's_Town_South.pdf
It appears as if Boulders Nat Park is inside the CPZ. Good but isn't this inconsistent with the Exclusion Areas.

http://www.capetown.gov.za/en/Documents/CoastalZones/20_Smitswinkel_Bay_Castle_Rock.pdf It appears as if Miller's Point is inside the CPZ – good.

Kim Kruyshaar

Response:
Noted with thanks. With regards to your comments:

1. As stated by the Integrated Coastal Management Act, property or land that is eroded away and falls below the high water mark for a period longer than two years becomes the property of the state. However, if any organ of state is directly responsible for the erosion caused, that particular organ of sate is liable for that loss of land.

2. The City, or any organ of sate is not responsible for the loss of private property, or the protection of such private property, provided that the City, or any organ of state, is not responsible for that loss of land due to erosion or storm surges. It is the City's responsibility to protect public infrastructure.

3. Your comment is noted and will be considered in the amendments to the Coastal Protection Zone By-law.

4. This relates to broader coastal management within the City. The City has recently completed an Institutional Risk Assessment that determines how best the City can structure itself to more effectively promote and integrated approach to coastal management as well as managing risk into the future. This includes the identification of the relevant skills to manage this dynamic and complex environment.

Definitions: Noted and will be considered in the revision of the draft by-law.

Chapter 2: Noted

Chapter 4 - Point 4e: Noted and will be considered in the revision of the draft by-law.

Chapter 4 - Point 7: Noted and agreed. Under national legislation of the Integrated Coastal Management Act, a development setback needs to be undertaken at a provincial scale. It is envisaged that this process will 'fill the gaps' on property that has been excluded from the CPZ.

Chapter 5 – Point 11f: Historical access will be retained, provided that the management of these access points comply with the requirements of provincial legislation.

Chapter 6 – Point 21: Noted and agreed. The City is in the process of investigating appropriate mechanisms to address the increasing variety of activities taking place on the beach and the near shore surf zone.

Chapter 6 – Point 22: Noted and will be considered in the revision of the draft by-law.

Chapter 6 – Point 24: Noted

Chapter 7 – Point 28: Noted. Comment addressed in point 4, under general comments.

Chapter 7 – Point 29: Noted and will be considered in the revision of the draft by-law.

Map - St_James: Noted

Map – Fish Hoek_Kalk Bay: The position of the CPZ has been defined on the following key coastal informants:

- Risk from sea level rise and storm surges
- Biodiversity
- Access to the coast
- Coastal dynamic processes
- Coastal aesthetics/sense of place

The areas of concern are already severely altered. We cannot defend their inclusion in the CPZ from a coastal perspective based on the informants listed above. We feel that potential activities that may take place in these spaces will be sufficiently regulated through other City mechanisms.

Map – Glencairn_Fish Hoek South: The CPZ does not include these areas as this land belongs to Table Mountain National Park

Map – Simons Town South: Noted and will be considered in the revision of the draft by-law

Map – Smitswinkel Bay_Castle Rock: Noted

Comment:
WESSA, Western Cape thanks you for the opportunity to comment on the above and we acknowledge that the public participation process has been extensive and inclusive.

The Environmental Resource Management Department of the City of Cape Town is congratulated on taking a proactive approach to developing the coastal protection zone

by-law. The need for this by-law is increasingly apparent in the light of development pressures, compliance issues and the need to be responsive to climate change predictions such as sea level rise and the increasing intensity of storm events.

<u>Comments Specific to the Document</u>

Chapter 2. Conflict with other laws
2. We support the proposal that the provisions of the by-law prevail in the event of conflict as this is likely to afford more environmental protection.

Chapter 4. Coastal Protection Zone
4.a) We support the expressed need to ensure that the coastline belongs to and is accessible to all – this is of specific concern in terms of addressing access issues associated with certain private developments which effectively prevent public access to beaches and sections of the coastline.
7. The exclusions may require some explanation. Is it possible to list all the areas excluded?

Chapter 5: Development Regulations in the CPZ
11. b. Coastal Recreational Node.
The provision for "appropriate related commercial activities" would need careful regulation and enforcement.
11.g. Private Coastal Land.
Is it possible for private land owners who wish to exercise exercising rights to indemnify the City from responsibility.

Chapter 6: Additional Regulations pertaining to the use of the CPZ
15. We fully support the point made about encroachment as this is an ongoing problem and impacts on both the natural environment and on the public rights of access. The need for more enforcement is needed.

Chapter 7: Powers of the Council
30: It is of concern that a number of activities undertaken by the City or its contractors are exempt for this by-law. More explicit wording may be beneficial to prevent possible future abuse of this provision. For example the first point provides for "the implementation or action of any City approved policy, guideline, operational procedure or protocol".

- **Contractors, particularly those doing alien clearing, need a more rigorous training process, particularly when working in sensitive ecosystems such as wetlands and coastal dunes. Could provision be made for monitoring the compliance of contractors – ie that their actions are appropriate to the environment in which they are working.**
- **The beach cleaning policy – could provision be made for this to be reviewed periodically.**

Chapter 8: Offences and Penalties
We fully support the provision for penalties for offenders and call for increased capacity within the enforcement department meet this need.

WESSA reserves the right to revise initial comment or make additional comment based on new information that may come to light.
Phillipa Huntley: On behalf of WESSA, Western Cape

Response:
Noted with thanks. Comments provided to each point as follows:

Chapter 2: Noted

Chapter 4: Noted. In terms of exclusions zone: the certain areas have been excluded as the City does not have jurisdiction over these areas. The City cannot therefore apply the by-law to such areas. The areas that have been excluded have been listed in the by-law. They are identified as:

a) The Table Mountain National Park
b) National Port and Harbour Authority land
c) Naval land
d) Koeberg Nuclear Power Station Land
e) The Blaauwberg Conservation Area
f) Kogelberg Biosphere Reserve

Chapter 5: Noted and agreed. The by-law will ensure that decisions surrounding commercial activities will be an open and transparent process and in alignment with the requirements of the broader Spatial Development Framework. In terms of private coastal land, the City, provided it is not responsible for directly or indirectly causing damage to property, is not responsible for damages that may arise from storm surges or coastal erosion.

Chapter 6: Noted

Chapter 7: Noted. The City is aware that its own actions need to be carefully regulated and will strengthen the points you raise, in the by-law. With regards to the beach cleaning policy: the policy has recently been reviewed and will be subject to review based on new information and change in beach dynamics.

Chapter 8: Noted

Comment:
WOULD LIKE TO COMMENT MORE FULLY ON THIS, BUT I AM UNABLE TO ACCESS THE ACTUAL DOCUMENT THIS EVENING, ONLY THE MAP. IT IS A GREAT PITY THAT IT WAS NOT DRAWN UP MANY YEARS AGO.

1. I endorse the areas included as CPZ.
2. There must be no loop-holes for developers, or others, including Council, National Sea Rescue, or any other organization, to build in any of the demarkated areas at any time in the future. There was a section where I felt that there could be loop-holes for this to happen. (as mentioned i am unable to access this document this evening so I cant quote the section)
3. Distance from the high-water mark for any development, probably needs to be further increased.
4. Height of (new) buildings adjacent to the CPZ must be restricted to single storey.
5. How will this be able to be enforced if the DA loses control of the city?
Thank you, Dr DC Timm, Melkbos

Response:
Noted with thanks.

1. Noted

2. Noted

3. The distance of the coastal edge, which defined the landward boundary of the CPZ, is variable. The distance varies based on several key coastal informants. These informants include risk from sea level rise and storm surges, coastal biodiversity, coastal access, costal dynamic process and coastal aesthetics/sense of place. We believe that for each location along the coast where the CPZ is present, is at an appropriate distance.

4. Noted. As this falls outside of the CPZ it will be addressed by the broader coastal development guidelines.

5. The City would like to see continuity and consistency in terms of the regulation of the coast, and the Coastal Protection Zone. It is for this reason that we have adopted the strongest possible mechanism i.e. the by-law to regulate this space, and will hopefully withstand changes in political leadership.

Comment:
Herewith comments from the Mouille Point Ratepayers' Association regarding the Coastal Zone Bylaw:

The Mouille Point Ratepayers' Association has reviewed the Coastal Protection Zone By-law and endorses the classification of the Mouille Point beachfront. We request Council to confirm that the implication of this by-law is that no development will be permitted in the coastal zone. With regard to the parking area at the bottom of Fritz Sonnenberg Road on Beach Road, we specify that activities permitted here are not limited to routine maintenance, but also for upgrading and improvement of the said parking area as a parking area. It must be noted that MPRA supports all other aspects of the draft zone as it applies to this parking area, particularly with regard to the fact that no development will be permitted.

Thank you for your invitation to participate in this process. Jane Meyer, Mouille Point Ratepayers' Association

Response:
Noted with thanks.

Comment:
In general, well done on your CPZ work.

In some areas I feel the buffer allowed for sea-level rise to be excessive (and have always voiced criticism on the quality of science behind this) but nevertheless personally like the idea of restricting development on the coast.

However, I have some comments on the proposed Coastal Protection Zone at Paarden Island (the below also reflects the view of my Director, Andre van Tonder):

Apart from some roadside market activity and (very occasional) surfing at "the Wedge", this coastal strip serves an apparently limited environmental, social or economic function. The area is protected by a substantial dolos wall which provides more than adequate protection to the hinterland and thus serves no role in terms of a protective buffer (apart from allowing space for overtopped water – I think this can be accommodated or prevented relatively easily – e.g. by bolstering the seawall slightly in the event of severe sea-level rise).

The seaward area was identified as an ideal region for port expansion as (a) it is adjacent to an industrial area and (b) appropriate development in this zone would have no impact on the neighbouring beaches at Milnerton (see Strategic Evaluation for Port of Cape Town, CSIR Study, circa 2003). (note that if this area were developed, strategic planning such as strategic dredging to redirect waves and longshore drift could benefit Milnerton beach). Alternatively this would be an ideal area to allow for coastal development (e.g. marina/waterfront/recreational jetty) with a minor environmental impact.

Fostering such development in this (low environmental priority) area should alleviate pressure for development in other areas. Happy to discuss further if required. Geoff Smith, WSP Africa Coastal Engineers

Response:
Noted with thanks. We are confident in the results of our sea level rise modelling undertaken by Professor Geoff Brundrit but do acknowledge and recognise that the modelling is done on a number of predictions. As scientific information becomes available through global climate modelling we will revisit and re-run our modelling. However a number of issues should be noted with regard your comment:

- The Coastal Edge line was not determined alone by sea level rise modelling but includes aspects of biodiversity, coastal processes, coastal dynamics, public access, sense of place, landscapes and other informants. The area you note is not affected by biodiversity but has a large role to play in the coastal dynamics of Table Bay as a whole and in addition view sheds, landscapes and vista's also played a role in the line determination in this area.
- Further, we recently completed a modelling exercise that investigated the interface of the marine and freshwater systems in this area (the Salt River Catchment) under a changing climate scenario. This work done by external specialists PDRW indicated that the area in question is a flood risk from a terrestrial environment as well.
- Land in question that belongs to the National Ports Authority has been excluded from the provisions of the bylaw as required by national legislation. Development on this land is subject to approval through the National Environmental Management Act.

Comment:
We refer to your draft By-Law and fully support your initiative of preventing future development being built too close to the coast. We are also satisfied with the Coastal Protection Zone which has been defined for Gordon's Bay. Rowan Dent *Environmental Portfolio* Gordon's Bay Residents Association.

Response:
Noted with thanks.

Comment:
Chapter 1: Definitions – "Dynamic coastal processes" – include (f) ***sea level changes***
Chapter 4: The Coastal Protection Zone –

> **4. Add -** ***m) Assess existing undesirable developments and risks to CCC thereto*****.**
> **7. Areas as listed a) to f)** ***should be interfaced with the CPZ and cannot be excluded particularly where they may be in contradiction with the principles of the CPZ. Also what about select clubs, be they boating, fishing and yachting as appropriate that may have an impact on the CPZ. Harbours in particular*****.**

Chapter 5: Development Regulations in the CPZ

> **8. Interaction clause is necessary where existing lawful land use may present a risk to the CPZ.**
> **11. An overlay is suggested :** ***h) Anticipated/projected sea level rise in 20, 50 & 100 years.***

Chapter 6: Additional Regulations pertaining to the use of the CPZ –

> **22. No person may discharge pollution into the CPZ –** ***from whatever source*****, unless… etc. also, …authorization granted according to law.. include*****:-*** ***sea borne discharge/pollution, waste or litter*****. This needs to be in conjunction/interface with other government agencies.**

Chapter 7:

> **25. (a) Add;** ***this will be for the cost to the developer/ responsible party*****. This is also applicable to other clauses under Chapter 7**
> ***29. The delivery and provision of utility services by the city cannot be exempt from the requirements of the CPZ. This clause should be re-worded to say that the CCC will also comply with the requirements and where it has deviated from such requirements, laws, by-laws and required legislation, then appropriate steps will be taken, reported upon and actioned for resolution. The CCC should also include the CPZ requirements within its monitoring and auditing programme*****. Obviously the CCC is required to comply with whatever environmental and any other legislated requirements e.g. NEMA.**
> **Sewage outfalls (controlled or uncontrolled) are obvious examples. The pollution of the Disa river by uncontrolled contamination is one example, pipeline and channeled outfalls are others that may or sometimes do present a major problem to the citizens of Cape Town.**
>
> **30. The implementation or action of any City approved policy, guideline, operational procedure or protocol** ***can only be exempt if they fully comply with the appropriate legislation, laws etc. This may be appropriate to, but not limited to NEMA. Furthermore monitoring and auditing programmes must still be developed and followed in each and every case where contracts, permits etc., are issued.***

Chapter 8:

31 Please include (and not necessarily under Chapter 8*), reference to Industrial or any other deleterious discharge into drainage, systems, canals, outfalls and rivers. Such discharges may not occur at the CPZ, but inland from the impact zone*.

(2)Addition to the Draft Document

(2) Please list as an appendix to the document a list of all related legislation that this document embraces. i.e. Local, Regional and National. Include International where applicable.
(3) There is no mention of fishing
(4) There is no mention of any processing plant e.g. fishing, within the CPZ
(5) CCC to have a definitive Register of exceptions (approved or in process, or in question), to the CPZ requirements.
(6) Reference to properties, developments owned by non- SA citizens
(7) Develop/include a formal written QA/Management system to record all events, issues, deficiencies and actions, taken or initiated.
(8) Reference to boating/ water craft activities.
(9) Describe integration network with Provincial zoning controls & monitoring
(10) Describe integration network with National zoning controls & monitoring
(11) Reference to resource commitment and funding.
(12) Provide effect of sea level rise with 20, 50 & 100 year flood lines in estuaries and rivers.
(13) Provide mechanism for re-assessing the 20, 50 & 100 year flood lines due to potential increased rainfall due to climate change. (As applicable per scientific predictions)
(14) Develop and implement formal audit and monitoring programme within the CCC.
(15) Describe interaction and programme with coastal patrols – marine reserves, fishing activities, removal of shell fish (rock habitation) and poaching.
(16) Provisions of the CPZ requirements to be enforced when the status changes of permanent and non-permanent structures had been allowed prior to 1.11.2010

Paul Gray: Member Cape Environmental Trust; Hout Bay & Llandudno Environmental Conservation Group, Trustee of Cape Wetlands Trust.

Response:
Response to each comment is listed below:

Chapter 1: Noted with thanks, addition will be made

Chapter 4:
4. Noted with thanks, amendments will be made
7. Noted, infrastructure below the high-water mark is the sole responsibility of national government (harbours etc) and as such cannot be included in the bylaw

Chapter 5: Development Regulations in the CPZ
8. Noted and amendment will be made to include a principle of "the land must be suitable for the proposed development irrespective of existing rights".

11. Sea level rise modelling has already been completed and is available on our website. The results from that modelling have been a key informant to this work and will also inform future work that will look at existing development risk.

Chapter 6: Additional Regulations pertaining to the use of the CPZ –
22. Although we are in agreement with this sentiment, the City is unable to develop legislation that governs aspects outside of it jurisdiction – pollution from seaborne activities is beyond our jurisdiction

Chapter 7:
25. Noted, amendment will be made
29. Although the sentiment is supported, the City has to continue to provide services to its communities. These service provision components need to be excluded from the bylaw as if not, we would develop a situation whereby service provision will be compromised. City service provision however will be governed by national environmental legislation. This is relevant as in our urban environment much of the services are gravity fed and as such will interface with the coastal environment.
30. Noted and agreed. This bylaw does not and in fact cannot exempt any City activity from national environmental legislation. As part of approvals under that legislation, monitoring and mitigation measure swill be included in any record of decision.

Chapter 8:
31. Noted. This aspect of pollution is regulated through the City's Pollution Control but we will make reference to this in the amended bylaw.

(2)Additions to the Draft Document

2. Noted with thanks
3. Fishing is an activity that is governed through the Marine Living resources Act and is a national competency. The City may not produce legislation to govern a national competency
4. Any processing plant or commercial activity is governed within the CPZ as per the land use approvals process. As such the CPZ bylaw would not allow the development of a fish processing plant within the CPZ
5. Noted, amendments to the bylaw will include a formal permitting process
6. Not relevant as property and land use rules apply irrespective of nationality
7. Noted, the Cit is in the process of developing an extensive coastal monitoring system.
8. Boating and water craft activities will be addresses and regulated through the overlay zones as required by the bylaw.
9. Noted, it is the intention that the CPZ will be submitted to Province for approval as the CPZ under the ICM Act
10. Noted, it is the intention that the CPZ will be submitted to Province for approval as the CPZ under the ICM Act. This will ensure alignment with national legislation
11. Noted, however a bylaw cannot address this aspect. This will be addressed through the development of a City of Cape Town Coastal Policy as part of the development of the Municipal Coastal Management Plan.
12. This work is underway, modelling has been completed for the Salt River Catchment and is currently being done for the other estuary catchments across the City. Regulation based on the results will take place through the City's Stormwater Bylaw.
13. Noted and agreed. Our sea level rise modelling will be done on a regular basis to ensure that as new data and information becomes available this will be fed into our existing sea level rise model. The amended bylaw will make provision for amendments to the Coastal Edge based on the outputs of this work
14. Noted, see response regarding the City's Coastal Monitoring Programme.

15. Noted, again these are national government competencies but we are investigating the role of our local law enforcement in this regard as part of the development of our Municipal Coastal Management Plan.
16. Noted and agreed

Comment:
The Friends of Rietvlei has studied the proposed draft Coastal Protection Zone Management By-law and wish to compliment you on the contents. It is comprehensive, well written, and easy to interpret and understand (this cannot always be said of all legislation!).
The draft by-law meets the requirements of an intergrated coastal management strategy, and we fully endorse and support the promulgation of the proposed Coastal Protection Zone Management By-law. Niel van Wyk Friends of Rietvlei

Response:
Noted with thanks

Comment:
The Victoria and Alfred Waterfront submitted a comment agreeing to the exclusion of the V&A Waterfront form the provisions of the bylaw and recognising that sea ward development or sea ward protection is governed by the National Environmental Management Act.

Response:
Noted and agreed

Comment:
The Cape West Coast Biosphere Reserve (CWCBR) extends from the Diep River in the south to the Berg River in the north and inland to Malmesbury and therefore the proposed development is located within the CWCBR. One of the primary aims of the CWCBR is to implement sustainable development principles along the West Coast, in addition to integrating rapid growth with biodiversity and heritage conservation. In this regard, the CWCBR would like to comment as follows:

- **The Cape West Coast Biosphere Reserve supports the establishment of a coastal protection zone within the City of Cape Town, which will provide for a buffer zone for coastal processes and ecology and prevent inappropriate developments.**
- **The activities that are exempt from the by-laws should be subject to a separate set of regulations.**

Rhett Smart – Conservation Extension Officer

Response:
Noted with thanks

Comments and Response: Provincial and National Government

Comment:
The following comment was submitted by the Provincial Government of the Western Cape:

1.1 The Department of Environmental Affairs and Development Planning (DEADP) provides provincial leadership for promoting sustainable coastal development and integrated coastal management in the Western Cape. The policy guiding this initiative is presented in the White Paper for Sustainable Coastal Development in South Africa.

1.2 One of the requirements of the White Paper was the compilation of a new Coastal Management Act (that would largely replace the Sea Shore Act). This has resulted in the drafting and approval of a National Environmental Management: Integrated Coastal Management Act 24 of 2008 (NEM: ICM Act 24 of 2008).

1.3 The Department wishes to applaud the City of Cape Town for the initiative shown to identify, delineate and draft legislation in the regard. Given the significant challenges in the City of Cape Town, the CPZ regulations will provide much needed protection to vulnerable ecosystems, reduce cost as result of maintenance activities and result in improve planning and sighting of development in respect of the coast. The department furthermore hopes this legislation will improve coastal management in the province and create legal certainty in its application in the CPZ. The Department is committed to assisting and supporting CoCT in their endeavours.

2. Discussion

2.1 There are however a number of issues that requires deliberations and further discussion with specific reference to:

- **Legal context in terms of the NEM: ICM Act;**
- **Roles and responsibilities;**
- **Consultation and participation;**
- **Cooperative governance; and**
- **Planning the way forward.**

2.2 In so far the NEM: ICM Act, section 51 provides: "A municipality may administer its coastal management programme and may make by-laws to provide for the implementation, administration and enforcement of the coastal management programme". It is clear from this provision that By-laws in terms of the NEM: ICM Act can only be promulgated through an approved and adopted municipal Coastal Management Programmes (CMP). In this respect a municipal CMP must also conform and be in aligned with the Provincial and National CMP's. Currently there is no formally adopted Provincial or National CMP in place and the situation is accentuated by the fact that no national guidelines exist to guide the compilation of such a document. The National Department of Environmental Affairs is in the process of drafting national guidelines for compilation of CMP.

2.3 Determination and adjustment of coastal boundaries as it relates to section 26(1)(b) The coastal boundaries of the coastal protection zone may be determined

or adjusted by the MEC in accordance with section 28 by notice in the Gazette. In terms of this provision it is the responsibility of the Member of Executive Council (MEC) to determine and promulgate the CPZ in consultation with the relevant municipalities. Section 62 (1) provides for an organ of state that is responsible for implementing national, provincial or municipal legislation that regulates the planning or development of land must, in a manner that conforms to the principles of co-operative governance contained in Chapter of the Constitution.

2.4 Consultation and public participation – Section 53(1) provides that before exercising a power, which the NEM: ICM Act requires to be exercised in accordance with this section, the Minister, MEC, municipality or other person exercising that power must—

(a) Consult with all Ministers, MEC's or municipalities whose areas of responsibilities will be affected by the exercise of the powers in accordance with the principles of co-operative governance as set out in Chapter 3 of the Constitution;

(b) Publish or broadcast his or her intention to do so in a manner that is reasonably likely to bring it to the attention of the public; and

(c) By notice in the Gazette—

(i) Invite members of the public to submit, within no less than 30 days of such notice, written representations or objections to the proposed exercise of power; and

(ii) Contain sufficient information to enable members of the public to submit representations or objections.

2.5 It is crucial in the context of the above mentioned that agreement and consensus is reached in terms of planning on the way forward. Secondly, alignment of processes (national, provincial and local government) needs to happen in the spirit of cooperative governance and ensure that mandates and responsibilities are exercised in accordance with the legislation enacted for that specific purpose.

2.6 Definitions: There are a number of definitions absent and some which emerged from the document which requires further clarity or description in terms of general coastal management applications. These relate to words such as:

- **CMP and its relation to the NEM: ICM Act;**
- **Emergency incidents / measures (in terms of section 30 of NEMA;**
- **Private functions (what does it entails);**
- **Chapter 3 (relate to the scope of the NEM: ICM Act);**
- **Chapter 4 – description and definition of:**
- **Coastal Protection Zone (CPZ);**
- **Impacts on rights of foreigners;**
- **Definition of coastal property;**
- **Clause 4L only refers to erosion associated problems but does not address sand accretion problem;**
- **Clause 7C – Naval land and Admiralty reserve;**
- **Chapter 5 –**
- **Integrated Coastal Management Objectives (reference to legal and legislative instruments);**
- **Clause 10 – Expropriation in terms of the Constitution;**
- **Clause 11C –Coastal Public Property; and**
- **The issue of Boat launching sites and how it will be affected.**
- **Chapter 6 - Complying with other relevant legislation**

2.7 In order to measure the full extent and impact of the draft CPZ it needs to be considered in conjunction with the draft boundaries. This together with impacts such :

- **Dynamic coastal processes;**
- **Storm surges;**
- **Sea level rises;**
- **Climate change;**
- **Littoral movement (sand deposits)**
- **Areas prone to erosion;**
- **Wind patters**
- **Dune Profiles, etc.**

2.8 It is unclear as what areas will be included and the merits and discussion on areas that would be excluded from the CPZ.

Response:
Response to each point is listed below:

1.1 Noted
1.2 Noted
1.3 Noted with thanks

2.2 There are a number of points that need to be made in response to this issue:

- The City has an approved Coastal Zone Management Strategy adopted in 2003 by Council following a public and stakeholder consultation process
- The City is not bound only by the ICM Act but section 156(2) of the Constitution provides that a municipality may make and administer by-laws for the effective administration of the matters which it has the right to administer, and to exercise any power concerning a matter reasonably necessary for, or incidental to, the effective performance of its functions
- The rate and scale of pressure on the City's coastline does not allow for the lengthy wait that may be necessary if we as a proactive local authority are required to wait for the drafting of national and provincial guidelines
- The City's bylaw will be a cornerstone of the City's Coastal Management Programme (CMP)as per the Act
- The Act does not prescribe that proactive and progressive measures should not be undertaken or may not be undertaken in advance of the CMP
- Finally the City is of the view that the first step in developing is CMP is to define the CPZ and ensure it integrity following which various management plans should be implemented

2.3 In defining the City's Coastal Edge Line, the Provincial Authority has been consulted in a number of ways, namely:

- Through the extensive consultation on the City's Draft Spatial Development Framework that defines the Coastal Edge Line
- Through the Provincial Coastal Coordinating Committee (PCCC)
- Through a number or presentations to various departments within the Provincial government

2.4 (a) Both provincial and national government departments were requested to provide input and comment on the Draft Bylaw

2.4 (b) and (c) The draft bylaw has been through an extensive public and stakeholder consultation process (this report) and terms of the City's Public Consultation Policy

2.5. Agreed. This issue of alignment was extensively discussed with the Department of Oceans and Coasts at National Government level as well. What was agreed in those discussions as the way forward is the following:

- The City is supported to move ahead with its bylaw
- The bylaw should be renamed as the MUNICIPAL Coastal Protection Zone Bylaw
- Once adopted, the City and the Province should enter into a formal engagement to discuss the potential of the City's Coastal Edge Line being declared the boundary for the CPZ by the MEC as per the ICM Act.

2.6 Noted and amendments will be made where relevant

2.7 In defining and delimiting the City's Coastal Edge Line the informants included the following coastal aspects:

- Dynamic coastal processes;
- Storm surges;
- Sea level rises;
- Climate change;
- Littoral movement (sand deposits)
- Areas prone to erosion;
- Wind patterns
- Dune Profiles, etc.
- Social aspects
- Coastal access
- Landscapes
- Sense of place and identity
- Coastal risk and vulnerability
- Coastal biodiversity

2.8 The Coastal Edge line is clearly depicted in the City's Draft Spatial Development Framework.

Comment:
The following comment was submitted by the National Government: Department of Environmental Affairs, Integrated Coastal Management

1 I would like to thank the City of Cape Town (COCT) for the opportunity to comment on the above-mentioned draft by-law. We also appreciate the various discussions between officials in your department and officials from the Department of Environmental Affairs (DEA) Branch Oceans and Coastal Management.

2 The COCT has always played a leading role in environmental issues and we welcome the various initiatives currently being pursued by the COCT to better protect, manage and utilize the coastline. This is largely in line with the vision of the White Paper for Sustainable Development in South Africa (2000) and the requirements of the Integrated

Coastal Management Act (Act no. 24 of 2008); hence we pledge our support for this important initiative.

3 The DEA, however, have some concerns pertaining to certain terms used in the draft By-law, which may cause some confusion and potentially open the COCT to legal challenges, which we conveyed to you during our discussions. These main concerns are expanded on below.

3.1 In addition, the DEA made a number of detailed comments on the enclosed document for your further consideration.

4 As explained during our meetings with the COCT, the DEA is concerned about the use of the term Coastal Protection Zone in this By-law. In terms of the Integrated Coastal Management Act (ICM Act) there are certain powers given to the different spheres of government. These include the power for the MEC to determine set-back lines (S25), determine and adjust the coastal boundary of the coastal protection zone (S28) and make regulations (S84). The latter includes the power to make regulations relating to "the management of the coastal protection zone within the province" and "the granting of permission for the erection, placing, alteration or extension of a structure that is wholly or partially seaward of a coastal set-back line, and the process to be followed for acquiring such permission, including the authority by whom, the circumstances in which, and the conditions on which such permission may be given". These are provincial functions in terms of the ICM Act. Hence, we advise strongly that the COCT resuscitate the efforts to work cooperatively with the Provincial Department of Environmental Affairs and Development Planning (DEADP) to take this process forward, to avoid confusion and potential future legal challenges.

5 Similarly, there are certain functions and responsibilities that have been given to municipalities. These, for example, include functions related to the designation and management of coastal access land (S18 – 20) and the preparation of municipal coastal management programmes (S48 and S49). In terms of S50 of the ICM Act "a municipality may administer its coastal management programme and may make by-laws to provide for the implementation, administration and enforcement of the coastal management programme". For alignment with the ICM Act, the preferred option would have been to develop a Municipal Coastal Management Programme first and thereafter the by-law.

5.1 Further, the COCT could have worked more closely with the provincial Department of Environmental Affairs and Development Planning (DEADP) to determine the boundaries of the Coastal Protection Zone.

6 Whilst we pledge our support to the COCT in proceeding with this by-law, we advise that you align it with the ICM Act, and consider the slight amendment in terms of naming the by-law, as discussed. This could then potentially be changed at a future date once the COCT has developed their Coastal Management Programme and refined the boundary of the Coastal Protection Zone in collaboration with the DEADP. However, we sincerely hope that the COCT will succeed in finding consensus with the DEADP, to avoid name changes, which, as we articulated at our meeting, might jeopardize your local tabling process, which we want to avoid at all cost.

7 In conclusion, we would like to reiterate that we are in support of the intentions and the aims of the by-law, and hope that you give consideration to the above issues. We will

also welcome the opportunity to work cooperatively with the COCT in our integrated coastal management endeavours. Thank you once again for this worthy initiative and for the positive spirit in which our meetings were conducted.

Response:
Response to each point is listed below:

1 Noted

2 Noted with thanks

3 Noted

3.1 The City has considered these comments and referred these comments to Cormac Cullinen in the process of revising the draft by-law.

4 The City acknowledges the concern from the DEA over the use of the term Coastal Protection Zone By-law. To address this matter and to minimise confusion between the City's initiative and the ICM Act as national legislation, the City has renamed the bylaw as the Municipal Coastal Protection Zone By-law. It was agreed that the City would re-initiate discussions and pursue collaboration with the provincial authorities to align both the City's interests with the interests and mandates of the provincial authorities. It is envisaged that the Municipal Coastal Protection Zone for the City of Cape Town will be adopted by the provincial authorities within the framework of the ICM Act as a streamlined, progressive and efficient manner in which to promote integrated coastal management.

5 The City of Cape Town formally adopted its Municipal Coastal Management Plan in 2003. The City therefore sees the development of a coastal by-law as the natural progression from the management plan. The City is also entirely within its right according to both the Constitution of South Africa as well as the ICM Act to develop by-laws that regulate the coastal space. The City has developed the coastal edge and associated by-law within the framework of the City's Spatial Development Framework and Integrated Zoning Scheme.

5.1 The City believes that every effort was made to promote close cooperation and collaboration with the provincial authorities. This was undertaken through the following:

- Advising the provincial authorities on the City's intentions of developing a Coastal Protection Zone By-law through the Provincial Coastal Committee. This is a formal committee that is used to facilitate communication and integration over coastal management across different spheres of government. The City is formally represented on this committee.

- The City was also represented on the steering committee for the development of a methodology for the determination of setbacks for the Western Cape Province. The City gave valuable input into this process through the City's own experience of developing the coastal edge that defines the landward boundary of the Coastal Protection Zone. Through this process the provincial authorities were made aware of the development of the City's Coastal Protection Zone and associated by-law. Reflecting this further was the provinces request that this methodology be tested against the position of our coastal edge, where the two essentially aligned.

- A meeting well in advance of the public participation process for the draft by-law was convened with the relevant provincial authorities to facilitate dialogue and to receive feedback.

- The provincial authorities were also made aware in advance of the public participation period from the 1st of February 2011 to the 2nd of March 2011.

As agreed as the most appropriate way forward the City will re-initiate discussions with the provincial authorities to facilitate alignment of interest and mandates.

6 The City has accommodated this slight amendment by renaming the Coastal Protection Zone By-law as the Municipal Coastal Protection Zone Bylaw. As in point 5.1 above, the City will re-initiate discussions with the provincial authorities to align interests and mandates.

7 Noted with thanks

REPORT TO ECONOMIC ENVIRONMENT AND SPATIAL PLANNING PORTFOLIO COMMITTEE

CITY OF CAPE TOWN | ISIXEKO SASEKAPA | STAD KAAPSTAD

1. **ITEM NUMBER :** **EESP 15/02/12**

2. **SUBJECT**

PROPOSED PLAN OF ACTION FOR THE DEVELOPMENT AND FORMALISATION OF THE CITY'S COASTAL ZONE REGULATORY MECHANISMS IN ACCORDANCE WITH THE REQUIREMENTS OF THE INTEGRATED COASTAL MANAGEMENT ACT (ACT No. 24 of 2008).

ISIHLOKO

ISICWANGCISO ESIPHAKANYISIWEYO SENTSHUKUMO KUMSEBENZI WOKUPHUHLISWA NOKUMISELWA NGOKUSEMTHETHWENI KWEENKQUBO ZESIXEKO ZOLAWULO LWEMIMANDLA ENGASELUNXWEMENI NGOKUNGQINELANA NEEMFUNO ZOMTHETHO WOLAWULO NGOKUHLANGENEYO KWEMIMANDLA ENGASELUNXWEMENI (UMTHETHO onguNomb. 24 ka-2008).

ONDERWERP

VOORGESTELDE AKSIEPLAN VIR DIE ONTWIKKELING EN FORMULERING VAN DIE STAD SE REGULERINGSMEGANISMES VIR KUSSONES IN OOREENSTEMMING MET DIE VEREISTES VAN DIE WET OP GEÏNTEGREERDE KUSBESTUUR (WET 24 van 2008)

LSU: C0184

3. **PURPOSE**

This report seeks support for the process, development and formalisation of a number of coastal zone regulatory mechanisms for the City of Cape Town in accordance with the requirements of the Integrated Coastal Management Act (ICMA). These regulatory mechanisms include the establishment of a Coastal

Development Setback Line, the Coastal Protection Zone, Coastal by-law, Coastal Hazard Policy and Coastal Management Plan.

4. FOR DECISION BY

Delegated: for decision by EESPCO

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5. EXECUTIVE SUMMARY

The City of Cape Town has a coastline of 307km, arguably one of its greatest economic, social and environmental assets. This coastline is increasingly under pressure due to the high desirability of coastal property and extensive "strip" development, alteration of, and impacts on, natural coastal processes and lack of historical regulations to protect coastal processes and coastal assets. Increased levels of coastal erosion, permanent loss and destruction of dune systems, loss of fauna and flora and increasing levels of windblown sand problems are additional coastal pressures facing the City. These pressures on our coastline and related infrastructure are predicted to increase into the future as a result of climate change and associated sea-level rise and storm surge events. In protecting its economic future and social opportunity, lowering environmental, economic and social risk, complying with legislation and to ensure equitable access and opportunities, the City must now institute appropriate means to protect, manage and formalize its coastal zone.

To date the City has lead a proactive response in this regard which includes:

1) Adoption of a Coastal Zone Management Strategy in 2003;
2) The completion of a sea-level rise risk assessment;
3) The determination of a Coastal Urban Edge (defined by coastal risk, social imperatives, ecological values, coastal processes and scenic values) which was incorporated into Cape Town's Spatial Development Framework and District Plans, and
4) Public consultation on a Draft Coastal Protection Zone Bylaw in February 2011 aimed at regulating this Coastal Urban Edge.

On the 1st December 2009, the Integrated Coastal Management Act (ICMA) also became legally enforceable and requires that municipalities develop coastal regulatory mechanisms to achieve the goals of the ICMA and to promote sustainable coastal management.

Much of the work completed by the City was undertaken prior to the formalization of the ICMA and as such the City has engaged extensively with the relevant departments from both National Government (Department of Environmental Affairs: Oceans and Coasts) and Provincial Government (Director: Mr. C. K. Rabie, Environmental & Spatial Planning, Dept. of Environmental Affairs

& Development Planning) in terms of defining and agreeing on the way forward with regards the City's intention to protect and manage its coastline, the existing planning work completed and ensuring that these interventions meet the needs and requirements of the ICMA.

As such the City, Provincial Government of the Western Cape and National Department of Environmental Affairs has agreed that:

1) The City's Coastal Urban Edge as spatially defined in Cape Town's Spatial Development Framework be considered for promulgation by the Government of the Western Cape as the Coastal Development Setback Line as determined and defined in the ICMA. Formal promulgation of this line is in terms of the powers vested in the MEC. This will streamline and reduce the EIA burden on building development applications;
2) As a means to formally and more effectively regulate the space between the High Water Mark and the Coastal Setback Line, the City's current Draft Coastal Protection Zone By-law be re-named and revised in consultation with the relevant provincial department as well as relevant City line functions and be re-advertised for further public comment before being put to Council for adoption;
3) The City in consultation with the relevant provincial department define a Coastal Protection Zone as the area for which the Coastal Management Programme as per the ICMA would be applicable;
4) The City proceed to draft its Coastal Management Programme as per the ICMA for review by the provincial government, and
5) The City, in consultation with the relevant provincial department, develop, draft and approve a City of Cape Town Coastal Hazard Policy. This Coastal Hazard Policy will address all coastal risk to property and infrastructure from coastal processes and hazards including sea-level rise, storm surge events and migrating dune systems. The policy will provide a platform which will strategically and systematically guide decisions relating to coastal property at risk from coastal hazards.

6. RECOMMENDATIONS

Delegated:

It is recommended that the Portfolio Committee:

a) Supports the process, development and formalisation of a number of coastal zone regulatory mechanisms for the City of Cape Town in accordance with the requirements of the Integrated Coastal Management Act (ICMA) as outlined in this report.

b) Formally supports and requests that the City's Coastal Urban Edge as defined in the Spatial Development Framework be formally considered by the Provincial Government of the Western Cape for promulgation as the Coastal Development Setback Line for the City's coastline as required by the ICMA;
c) Supports the renaming, review, revision and further public consultation of the City's Draft Coastal Protection Zone By-law as the appropriate means to regulate the coastal space between the Development Setback Line and the High Water Mark;
d) Supports the spatial definition and mapping of a Coastal Protection Zone for the City for which the Coastal Management Programme would be relevant;
e) Supports the Drafting of the City's Coastal Management Programme as required by the ICMA as well as a key City tool for managing, enhancing and protecting its valuable coastline, and
f) Supports the development of a City Coastal Hazard Policy for the City of Cape Town.

IZINDULULO

Zigunyazisiwe:

Kundululwa ukuba iKomiti yeMicimbi yeSebe:

a) Mayiyixhase inkqubo, yokuphuhliswa nokumiselwa ngokusemthethweni iqela leenkqubo zolawulo lwemimandla engaselunxwemeni zesiXeko saseKapa ngokungqinelana neemfuno zoMthetho woLawulo ngokuHlangeneyo kweMimandla engaseluNxwemeni njengoko kuchaziwe kule ngxelo.
b) Mayixhase ngokusesikweni yaye mayicele ukuba iMida yeDolophu eseluNxwemeni yesiXeko njengoko kuchaziwe kwiSikhokelo soPhuhliso lweMihlaba mayiqwalaselwe ngokusesikweni nguRhulumente wePhondo leNtshona Koloni ukuze ibhengezwe njengoMda eCuthelwe uPhuhliso olungaseluNxwemeni kwiindawo ezingaselunxwemeni zesiXeko njengoko kuyimfuneko ngokweemfuno zoMthetho woLawulo ngokuHlangeneyo kweMimandla engaseluNxwemeni;
c) Mayikuxhase ukuthiywa ngokutsha, ukuphengululwa, ukuphononongwa kunye nokubonisana okongeziweyo noluntu malunga noMthetho kaMasipala olawula ukuKhuselwa kweMimandla engaseluNxwemeni yesiXeko njengendlela efanelekileyo yokulawula amabala angaselunxwemeni phakathi koMda oCuthelwe uPhuhliso kunye noMlinganiselo woMphakamo waManzi;
d) Mayixhase intsingiselo yamabala omhlaba nokuzotywa kwemephu yoMmandla oKhuselweyo ongaseluNxwemeni wesiXeko nalapho ifanelekileyo iNkqubo yoLawulo lwemimandla engaseluNxwemeni;
e) Mayikuxhase ukuqulunqwa kweNkqubo yesiXeko yoLawulo lweMimandla engaseluNxwemeni njengoko kuyimfuneko ngokweemfuno zoMthetho woLawulo ngokuHlangeneyo kweMimandla engaseluNxwemeni ngokunjalo

njengesixhobo esiphambili sesiXeko sokulawula, ukuxhasa nokukhusela imimandla yaso exabisekileyo engaselunxwemeni, yaye

f) Mayixhase ukuqulunqwa koMgaqo-nkqubo wesiXeko ojongene nezinto ezinobuNgozi ngaseluNxwemeni kusenzelwa isiXeko saseKapa.

AANBEVELINGS

Gedelegeer:

Daar word aanbeveel dat die portefeuljekomitee:

a) Die proses, ontwikkeling en formulering steun van 'n aantal reguleringsmeganismes vir kussones vir die Stad Kaapstad in ooreenstemming met die vereistes van die Wet op Geïntegreerde Kusbestuur soos in hierdie verslag uiteengesit.

b) Formeel steun verleen aan en versoek dat die Stad se stedelike kusrand soos in die ruimtelikeontwikkelingsraamwerk omskryf, formeel deur die Wes-Kaapse provinsiale regering oorweeg word vir promulgering as die terugsettingslyn vir kusontwikkeling wat betref die stad se kuslyn, soos vereis deur die ICMA;

c) Steun verleen aan die naamsverandering, hersiening en verdere openbare konsultasie van die Stad se konsepverordening oor kusbewaringsone-bestuur as die toepaslike manier om die kusruimte tussen die ontwikkelingsterugsettingslyn en die hoogwaterlyn te reguleer;

d) Steun verleen aan die ruimtelike definisie en kartering van 'n kusbeskermingsone vir die Stad waarvoor die kusbestuursprogram tersaaklik sou wees;

e) Steun verleen aan die opstel van die Stad se kusbeskermingsprogram soos vereis deur die ICMA asook 'n sleutelmeganisme vir die Stad om sy waardevolle kuslyn te bestuur, te bevorder en te beskerm, en

f) Steun verleen aan die ontwikkeling van 'n Stadsbeleid oor kusgevare vir die Stad Kaapstad.

7. DISCUSSION/CONTENTS

7.1. Constitutional and Policy Implications

Meeting the requirements of the Integrated Coastal Management Act

7.2. Environmental implications

Does your report have any environmental implications: No ☐ Yes ☒

The recommendations of this report will greatly enhance the City's coast as a socio-economic and environmental asset as well as contribute to meeting the policy statements within IMEP.

7.3. Legal Implications

None

7.4. Staff Implications

Does your report impact on staff resources, budget, grading, remuneration, allowances, designation, job description, location or your organisational structure?

No ☒

Yes ☐

7.5. Risk Implications

None

7.6. Other Services Consulted

SPUD:	Norah Walker	021 400 9325
PBDM:	Jaco Van Der Westhuizen	021 400 7576
SR&A:	Sakhile Tsotsobe	021 400 4638

FOR FURTHER DETAILS CONTACT:

NAME	Darryl Colenbrander
CONTACT NUMBERS	021 487 2355
E-MAIL ADDRESS	Darryl.Colenbrander@capetown.gov.za
DIRECTORATE	Economic, Environment and Spatial Planning
FILE REF NO	
SIGNATURE : DIRECTOR ENVIRONMENTAL RESOURCE MANAGEMENT	Gfewans (Acting Director)

☑ REPORT COMPLIANT WITH THE PROVISIONS OF COUNCIL'S DELEGATIONS, POLICIES, BY-LAWS AND ALL LEGISLATION RELATING TO THE MATTER UNDER CONSIDERATION.

☐ NON-COMPLIANT

LEGAL COMPLIANCE

NAME JEAN ROMAN

TEL (021) 400 2753

DATE 24/01/2012

Comment:

~~Certified as legally compliant:~~

Based on the contents of the report.

EXECUTIVE DIRECTOR
Acting: Cheryl Walters

DATE 27.1.2012

Comment:

MAYORAL COMMITTEE MEMBER
Belinda Walker

NAME B. WALKER

DATE 30.1.2012

COMMENT:

Land-use will be controlled through the Cape Town Zoning Scheme and the By-law must note this during the processing thereof.

MINUTES OF THE MEETING OF THE ECONOMIC, ENVIRONMENTAL AND SPATIAL PLANNING PORTFOLIO COMMITTEE OF THE CITY OF CAPE TOWN HELD IN THE CRUSH ROOM, FIFTH FLOOR, PODIUM BLOCK, CIVIC CENTRE, CAPE TOWN ON WEDNESDAY, 8 FEBRUARY 2012 AT 11:00.

PRESENT: ALDERMAN/COUNCILLOR

DEMOCRATIC ALLIANCE

G Bloor (Chairperson)
X Limberg (Deputy Chairperson)
E Anstey
D Bryant
A Kannenberg
M Kleinsmith
J McCarthy
M Nieuwoudt
F Raymond
D Venter

AFRICAN NATIONAL CONGRESS

A Ehrenreich (left the meeting at 13:30)
V Dyanti
Z Qoba
M Sitonga

UNITED DEMOCRATIC MOVEMENT

M Taylor

OTHER COUNCILLORS PRESENT

B Walker – MAYCO member
J Krynauw

ABSENT WITH APOLOGY

D Mphila

OFFICIALS
J Hugo: ED EESP
A Arendse
O Asmal

T Siganda
C Walters
W Carelse

D Colenbrander
M Crous
C Daniels
A Davison
P Evard
N Fillies
L Gerrans
F Kolala
G Kruger
S Mosdell
E Schnackenberg
K Patte
K Palmer
N Primo
M Walker
N Walker
K Wiseman
C Wright
J van der Westhuizen
R van Eeden

PUBLIC AND PRESS

N Flaatten- WESGRO
I Blackie
J Coetzee
N Furnon-Roberts
S Kube
J Maclennin
M Mvemve
N Mqikela
G Nel
G Wehle

EXECUTIVE SUPPORT: OFFICE OF THE CITY MANAGER

R Riffel
G Josephs
Z Maginxa (Interpreter)

ACRONYMS USED IN MINUTES

ALD	Alderman
ANC	African National Congress
BCA	Blaauwberg Conservation Area
CBO's	Community Based Organisations
CLLR	Councillor
CMOSS	Cape Metropolitan Open Space System
DA	Democratic Alliance

DEAT	Department of Environmental Affairs and Tourism
EESP	Economic, Environmental and Spatial Planning Portfolio Committee
ERMD	Environmental Resource Department
EIA	Environmental Impact Assessment
FOCOS	Forum of Chairpersons of Subcouncils
HWC	Heritage Western Cape
ICLEI	International Council for Local Environmental Initiatives
IDP	Integrated Development Plan
IMEP	Integrated Metropolitan Environmental Policy
IUCN	The World Conservation Union
GPUP	Green Point Urban Park
MAYCO	Mayoral Committee
MOSS	Metropolitan Open Space System
NGO's	Non-Government organisations
NSRI	National Sea Rescue Institute
PAWC	Provincial Administration: Western Cape
SARCC	South African Rail Commuter Corporation
SDF	Spatial Development Framework
SLH	Smart Living Handbook
UDM	United Democratic Movement
WOF	Working on Fire

EESP 01/02/12 OPENING AND WELCOME

The Chairperson, Cllr Bloor welcomed everybody to the first meeting of 2012 and requested that a minute of silence be observed.

EESP 02/02/12 APPLICATIONS FOR LEAVE OF ABSENCE

None

EESP 03/02/12 CHAIRPERSONS REPORT/ADDRESS

The Chairperson addressed the Committee on the following:

(a) the opening of Parliament and the state of the Nation Speechby the President.

(b) a Sustainable environment where all role players can contribute and participate.

(c) the presentation by WESGRO (item EESP 06/02/12)

(d) Future activities of the Portfolio Committee which includes a site visit to Soil for Africa, a workshop on the Corporate scorecard, and a workshop to evaluate the impact of funds on economic development projects

Thereafter the Chairperson afforded Mr J Hugo the newly appointed Executive Director: EESP the opportunity to introduce himself to the meeting.

It was further agreed that item **EESP 10/02/12 CAPE TOWN DENSIFICATION POLICY** will be discussed as the last item on the agenda.

EESP 04/02/12 MINUTES FOR CONFIRMATION: 1 NOVEMBER 2011

RESOLVED that the minutes of the meeting held on 1 November 2011 be confirmed subject to the following amendments

AFRICAN NATIONAL CONGRESS
PRESENT
ANC

A Ehrenreich

ACTION: R RIFFEL

EESP 05/02/12 REPORT ON MATTERS OUTSTANDING

See Outstanding matters report.

PRESENTATION

EESP 06/02/12 STRATEGIC PRIORITIES AND PROGRESS REPORT FOR THE WESTERN CAPE INVESTMENT AND TRADE PROMOTION AGENCY (WESGRO) - AN EXTERNAL AGENCY FOR THE CITY OF CAPE TOWN'S INVESTMENT AND TRADE PROMOTION ACTIVITIES

Mr N Flaatten, Chief Executive Officer, WESGRO presented this matter. A copy of the presentation is attached as Annexure A to the official minutes.

Mr Flaatten elaborated on the following:

- Overview of WESGRO
- The South African Economy
- The Western Cape Economy

Members submitted the following questions and comments

- Job creation opportunities in the BPO and agro- processing sectors.
- Positive investment versus job opportunities
- Interaction with communities especially with regards to

training and education
- Responses and impact on employment
- Prioritizing sectors for job creation
- Coherent Strategy for economic development
- Co-operation with all spheres of Government
- Deployment of funds – National initiatives
- Distinguish between government funds and private funds
- Contributions of other Municipalities to WESGRO
- Status of the Wine industry
- Comparison of other Provinces re export/import
- Creation of subcommittees
- Report from the Auditor General
- Is Cape Town Gate way to Africa?

Mr Flaatten responded to the above questions and he also informed the meeting that his office will circulate the following reports to members of the Portfolio Committee:

- Statistics regarding jobs per sector over 3 years
- FDI into the City Private and Public sectors funds
- A copy of the Memorandum of Agreement between the City of Cape Town and WESGRO.

RESOLVED that the presentation by Mr N Flaatten, Chief Executive Officer of WESGRO be noted.

EESP 07/02/12 APPLICATION FOR AN AMENDMENT TO THE IMHOFF'S GIFT LOCAL STRUCTURE PLAN, REZONING AND DEPARTURE IN TERMS OF THE LAND USE PLANNING ORDINANCE NO. 15 OF 1985 AND FOR CONDITIONAL USE IN TERMS OF THE ZONING SCHEME REGULATIONS: ERF 4225 KOMMETJIE, CORNER OF ATLANTIC DRIVE AND RAMERON AVENUE

RECOMMENDED that the application for an amendment to Imhoff's Gift Local Structure Plan as set out in Paragraph 7.9 in respect of the development on Erf 4225, be supported and the competent authority (Provincial Government of the Western Cape) be advised accordingly.

ACTION: R RIFFEL, M WALKER

EESP 08/02/12 APPLICATION FOR 1) AMENDMENT OF THE GUIDE PLAN FOR THE CAPE METROPOLITAN AREA: PENINSULA OF 1988 AND 2) SUBDIVISION OF ERF 226, SCHAAPKRAAL 3) DEPARTURE FROM THE MINIMUM ERF SIZE AND SIDE SPACE IN RESPECT OF ERF 226, SCHAAPKRAAL, CORNER OF VLEI AND MIDDEL ROADS, SCHAAPKRAAL

Ms M Walker confirmed that the application for subdivision resides inside the Urban Edge after a question by Ald Nieuwoudt

Cllr Bloor confirmed that all-encompassing deliberations and consultations needs to take place regarding the greater Philippi area after Cllr Kannenberg enquired about a new study for the Philippi area.

RECOMMENDED that**:**

1 the Executive Mayor and Mayoral Committee (MAYCO) recommends to the Competent Authority that the application for the amendment of the Guide Plan for the Cape Metropolitan Area: Peninsula (deemed to be an urban structure plan) of 1988 with respect to Erf 226, Schaapkraal to permit 2 land units each smaller than 2ha in extent (8121m^2 and 8121m^2) **BE REFUSED** in terms of Section 4(7) of the Land Use Planning Ordinance, 15 of 1985 (LUPO), and Section 6A(19) of Act 88/1967 as remaining applicable under Section 37(1) of the Act 125/1991.

2 subject to the adoption of resolution 1 above by the Executive Mayor, the Spatial Planning Environment and Land Use Management Committee (SPELUM) decision making powers for the application listed under resolution 3 below, **NOT BE EXERCISED** and that resolution 3 below be referred to the Competent Authority together with the application to amend the Guide Plan in line with Provincial Circular 4/2009 (paragraph 4) which deals with development packages.

3 Subject to the adoption of resolution 1 above by the Executive Mayor, **TO RECOMMEND** to the Competent Authority:

3.1 that the application for Subdivision of Erf 226, Schaapkraal as indicated on the plan in Annexure “F” to the report **BE REFUSED** in terms of Section 25(1) of LUPO.

3.2 that the application for Departure from the minimum Erf size of 21,5ha to permit 2 land units of 8121m^2 and 8121m^2 and the side space departure of 12m in lieu of 30m, **BE REFUSED** in terms of Section 15 (1)(b) of LUPO.

ACTION: R RIFFEL, M WALKER

EESP 09/02/12 APPLICATION FOR AN AMENDMENT TO THE SIMON'S TOWN STRUCTURE PLAN, REZONING, SUBDIVISION AND DEPARTURES: REMAINDER ERF 438, PORTION OF ERF 420 AND ERVEN 439, 444,445,446,447, 465,466,467,2451,2452 AND 3735 SIMON'S TOWN, MAIN ROAD (MARINE OIL REFINERY SITE)

Cllr Kannenberg recused himself from the meeting during the discussion of this item.

RECOMMENDED that the application for an amendment to the Simon's Town Structure Plan from existing Industrial to Urban Development for Remainder Erf 438, portion of Erf 420 and Erven 439, 444, 445, 446, 447, 465, 466, 467, 2451,2452 and 3735 Simon's Town as depicted on Plan LUM/67/438 be supported and the competent authority (Provincial Government of the Western Cape) be advised accordingly.

ACTION: R RIFFEL, P EVARD , P HOFFA

EESP 10/02/12 CAPE TOWN DENSIFICATION POLICY

A replacement Annexure 3 – "**INTERIM GUIDELINES FOR THE PROVISION OF PARKING"** was tabled at the meeting, it was agreed that the Annexure be included in the policy document.

Members of the Portfolio Committee proposed the following:

- Cllr Kannenberg proposed that the comments from the Portfolio Committee be submitted to the Executive Mayor and Mayoral Committee and Council in order to haste the approval process;

- Cllr Nieuwoudt proposed that the Densification Task Team be reactivated to oversee the implementation of the policy and to further consult on matters arising from the policy.

  Both proposals were duly supported.

Members of the Portfolio Committee raised the following concerns:

Cllr Nieuwoudt requested that the Densification policy be treated as guidelines until the approval of the draft CTZS and overlay zones.

Cllr Taylor requested clarity regarding the public participation sessions that were held for the general public.

Ms Walker elaborated on Annexure 3, she informed the meeting that the parking policy is now aligned with the integrated zoning

scheme local scale overlay zones, thereafter she responded with regards to the public participation processes.

Cllr Raymond expressed the opinion and proposed that the character of small historical towns and suburbs be protected and preserved.

Cllr Raymond then referred to the term “Inclusionary housing” as reflected under Terms and Definitions (page 807 of the agenda for the meeting), he referred to a recent legal matter in Gauteng and requested that a legal opinion be obtained about the inclusion thereof in the proposed policy.

Ald Sitonga in turn stated that one of the aims of the Densification policy was to integrate the City and if possible the term “Inclusionary housing” should be substituted with another appropriate word but that the principle/ focus of housing integration should remain.

Cllr Taylor referred to the questions raised by the public and the responses thereto during the public participation process, he requested that responses should be submitted in detail along with the relevant reference documents, as an example referred to the first bullet point on page 853 of the agenda for the meeting.

Cllr Kannenberg concurred with Cllr Taylor and referred to:

- page 851 of the agenda for the meeting appendix C 1.2, relating to market realities and specifically to the lack of information referring to the expert review panel on the Blaauwberg road study, he requested more information on this matter.

- Page 830 of the agenda for the meeting DP 16 which refers to maximum parking standards, Cllr Kannenberg stated that it is a problem to limit parking in an area where there is a lack of public transport, he requested that the maximum standards be scrapped and that the minimum standards be retained.

- page 830 of the agenda for the meeting – Annexure 1 Table-: A1 Summary of mechanisms that can be used to encourage densification – incentives- increased developer contributions; he requested that the sentence be rephrased.

Ms N Walker responded to the above submissions.

Discussion ensued about maximum and minimum parking standards several officials verbally responded.

Mr J Hugo, ED Economic, Environment and Spatial Planning referred the meeting to the decline of the CBD of the City of Johannesburg, due to restrictive parking conditions and policy; he further stated that the relevant Portfolio Committees should also consult on the draft parking policy.

After further discussions it was agreed that the technical debate regarding the maximum and minimum parking standards be discussed in detail by the Densification Task team.

Ald Nieuwoudt referred to page 820 of the agenda for the meeting, specifically DP9 and requested that the word **must** in the sentence be replaced by the word **may**.

RECOMMENDED that:

(a) the Executive Mayor and the Mayoral Committee note and considers the comment as submitted by members of the Portfolio Committee;

(b) the Executive Mayor and the Mayoral Committee endorses the Cape Town Densification policy and that it is forwarded to Council for approval;

(c) the Director of Planning and Building Development be requested to circulate the policy to all land use planners within her department to ensure that the policy is used in the assessment of density related applications.

RESOLVED that :

(a) the Densification task team be re-established in order to oversee the implementation of the policy and to further consult on matters arising from the policy;

(b) the maximum and minimum parking standards be discussed in detail by the Densification Task team.

ACTION: R RIFFEL, N WALKER

EESP 11/02/12 APPLICATION FOR A TEMPORARY LAND USE DEPARTURE TO PERMIT OFFICES AND A HAIR SALON IN RESPECT OF ERF 13298, 14 MERLOT AVENUE, TABLE VIEW

Mr J van der Westhuizen confirmed that the “Non Residential Uses in Residential Areas Policy” (2000) is currently under review and that a report in this regard will be submitted to EESP in the near future.

RESOLVED that it be noted that the "Non Residential Uses in Residential Areas Policy" (2000) is currently under review and that a report in this regard will be submitted to EESP in the near future.

ACTION: J VAN DER WESTHUIZEN

EESP 12/02/12 CITY DEVELOPMENT STRATEGY FOR CAPE TOWN 2040: UPDATE AND WAY FORWARD

Ald Sitonga proposed that National Government and State owned entities also be included in the wider stakeholder engagement.

RECOMMENDED that the contents of the report be noted and that National Government and State owned entities also be included in the wider stakeholder engagement.

ACTION: R RIFFEL, SMITH ,C WRIGHT

EESP 13/02/12 BROADER TYGER VALLEY URBAN DESIGN FRAMEWORK: PROGRESS REPORT

Ald Nieuwoudt enquired whether the IRT route and Public Transport nodes have been accommodated in the design framework.

Ald Nieuwoudt enquired about the removal of the sports fields adjacent to the Velodrome, which are currently being utilised by several schools in the area.

Mr G Kruger confirmed that the IRT feeder routes have not been finalised and that the Cycle track and adjacent sports fields will remain.

Ald Sitonga enquired about the future development of the Stellenbosch University site.

Mr G Kruger responded and informed the meeting that the Stellenbosch University matter resides within the Property Management department and those negotiations and consultations are work in progress.

RESOLVED that:

(a) the broad process plan to develop the Tyger Valley Urban design framework be supported;

(b) the next report reflects clarity on the finalisation of the IRT

route and Public transport nodes as well as confirmation that the sports facilities for schools will not be removed.

ACTION: G KRUGER

EESP 14/02/12 SCHEDULE OF LOCAL AREA PLANNING INITIATIVES PRIORITISED BY THE SPATIAL PLANNING AND URBAN DESIGN DEPARTMENT

Ald Sitonga enquired about the inclusion of Khayelitsha, Harare, Site C and the Philippi areas in the Strategy; he also referred to the operations of VPUU and PEDI in the areas.

Cllr Kannenberg referred to the Mayoral Urban regeneration programme and requested clarity on the two initiatives.

Ald Walker, Mayoral Committee member responded and informed the meeting that the Mayoral Urban regeneration programme is based on VPUU principles and is separated from spatial and urban design.

It was agreed that a Task Team be established to discuss spatial and urban design matters.

Ald Nieuwoudt enquired about time frames and resources for local area plans.

Mr Daniels responded in detail about the selection of local area plans, projects current and new as well as progress reports and engagement with the relevant Subcouncils.

Ald Nieuwoudt proposed that the Voortrekker corridor be prioritized.

RESOLVED that**:**

(a) the schedule of local area planning initiatives proposed as SPUD's prioritised programme for the next three years be endorsed;

(b) a Task Team be established to discuss spatial and urban design matters;

(c) the Voortrekker Road corridor be included in the schedule as a priority project.

ACTION: C DANIELS

EESP 15/02/12 PROPOSED PLAN OF ACTION FOR THE DEVELOPMENT AND FORMALISATION OF THE CITY'S COASTAL ZONE REGULATORY MECHANISMS IN ACCORDANCE WITH THE REQUIREMENTS OF THE INTEGRATED COASTAL MANAGEMENT ACT (ACT NO. 24 OF 2008)

Members congratulated the officials for an excellent report and proposed that a coastal engineer be appointed to the department.

Mr Asmal confirmed that the administrative process for filling of the position is in progress and receiving attention.

Ald Nieuwoudt enquired whether the rights of property owners inside the coastal zone will be affected, as no proper answer was forthcoming at the meeting it was agreed that the Legal advisor would provide clarity at the next meeting.

Mr Collenbrander responded and stated that private properties in the coastal zone have been excluded and that rights of these property owners have not been affected.

Ald Nieuwoudt proposed that a report be submitted to EESP regarding the rights of property owners inside the coastal zone.

Cllr Kannenberg referred to the properties in the coastal zone and enquired about the City's operational procedures with regards to rezoning and the submission of new building plans from the property owners.

Ms Walters informed the meeting that the Coastal protection by-law has not been drafted but that it will contain all legal aspects and that the CTZS will determine the land use and rights for all affected properties,

RESOLVED that:

(a) EESP supports the process, development and formalization of a number of coastal zone regulatory mechanisms for the City of Cape Town in accordance with the requirements of the Integrated Coastal Management Act (ICMA) as outlined in this report;

(b) EESP formally supports and requests that the City's Coastal Urban Edge as defined in the Spatial Development Framework be formally considered by the Provincial Government of the Western Cape for promulgation as the Coastal Development Setback Line for the City's coastline as required by the ICMA;

(c) EESP supports the renaming, review, revision and further public consultation of the City's Draft Coastal Protection Zone By-law as the appropriate means to regulate the coastal space between the Development Setback Line and the High Water Mark;

(d) EESP supports the spatial definition and mapping of a coastal Protection Zone for the City for which the Coastal Management Programme would be relevant;

(e) EESP supports the Drafting of the City's Coastal Management Programme as required by the ICMA as well as a key City tool for managing, enhancing and protecting its valuable coastline, and

(f) EESP supports the development of a City Coastal Hazard Policy for the City of Cape Town.

ACTION: D COLLENBRANDER

EESP 16/02/12 THE EXTENT AND STATUS OF REMAINING MINERAL RESOURCES IN THE CITY OF CAPE TOWN

RECOMMENDED that the information provided in this report is noted by the Mayoral Committee and that the relevant City departments use the information in their planning and decision making processes.

RESOLVED that:

(a) the relevant officials inform EESP members as soon as an application for mining authorisation or prospecting in the City of Cape Town area and neighbouring municipalities is accepted by DME in order to afford councillors the opportunity to properly formulate comments;

(b) the result of the research be finalised in such a manner that it can be incorporated and utilised in ISIS.

ACTION: R RIFFEL, A PURVES

EESP 17/02/12 COMMENT ON THE DRAFT WESTERN CAPE AQUACULTURE IMPLEMENTATION PLAN

Members submitted the following proposals to be included as comments from the Portfolio Committee:

- proposed that Local government should be part of the consultation process going forward;

- proposed that Public access to the sea and beaches should be sustained and guaranteed;

- proposed that proper scientific research be done regarding this matter in order to formulate criteria/ guidelines on which all future decisions will be based upon;

The above proposals were duly supported.

Ms A Davison responded to a question about the composition of the Technical team;

Mr J van der Westhuizen responded to the matter of aquaculture zoning stating that property owners will have to apply for consent use.

RESOLVED that the following be put forward as comments from the Portfolio Committee.

(a) that Local government should be part of the consultation process going forward;

(b) that Public access to the sea and beaches should at all times be sustained and guaranteed;

(c) that proper scientific research be done regarding this matter in order to formulate criteria/ guidelines on which all future decisions will be based upon;

ACTION: A DAVISON

EESP 18/02/12 TABLING OF CITY'S ANNUAL REPORT AND EXECUTIVE SUMMARY 2010/2011 FOR COMMENT

Cllr Limberg (Deputy Chairperson), highlighted the following contained in the Annual report:

- 13 145 jobs created through EPWP;
- Expansion of the Cape Town Convention creating a conventions precinct, office blocks and a hospital which will more jobs and stimulate the local economy;
- Energy and Climate Change action plan has resulted that Cape Town has become a more resilient City regard to climate change.

RESOLVED that:

(a) the comments submitted by Cllr Limberg be noted;

(b) members submit comments and questions to the IDP department, for consideration during the oversight process.

ACTION: EESP MEMBERS

EESP 19/02/12 2011/2012 SECOND QUARTER'S PROGRESS REPORT ON CORPORATE PERFORMANCE AND PERFORMANCE OF THE CITY'S ENTITY

Cllr Kannenberg enquired on Annual target for indicator 1A.3 Percentage of Land Use applications finalised within statutory timeframes.

Mr Crous and Ms Walters submitted clarity with regards to the above they elaborated on the target, the submission process and circulation to other departments, 4 month application objections and delegations; lastly they invited members to an informal discussion regarding statistics.

Cllr McCarthy referred to the following indicator for Utility services: 2A.4 number of water service points (taps) installed for informal settlements and enquired what steps have been taken to rectify the situation.

As there was no representative present at the meeting it was agreed that the presentation as mentioned under the column Remedial Action be presented to EESP by the relevant official.

RECOMMENDED that:

(a) the Executive Mayor together with the Mayoral Committee considers and approves the performance of the of the second quarter of the 2011/2012 financial year;

(b) Council notes the performance of the second quarter of the 2011/2012 financial year.

RESOLVED that with reference to the Utility services indicator 2A.4 number of water service points (taps) installed for informal settlements the presentation as mentioned under the column Remedial Action be presented to EESP by the relevant official at the next meeting in March 2012.

ACTION: W STEENKAMP, P MASHOKO, B SAAYMAN.

EESP 20/02/12 ECONOMIC ENVIRONMENTAL AND SPATIAL PLANNING : 2011/21012 SECOND QUARTERS PROGRESS REPORT ON THE DIRECTORATE AND DEPARTMENT'S PERFORMANCE DIRECTORATE

Cllr Raymond requested clarity on the following indicators regarding the ERM department:

- Finalisation of nature reserve boundaries;
- Completion of a 10 year infrastructure development plan
- Management positions filled
- Percentage improvement of responsiveness in service delivery
- Percentage spend on Capital Budget spent
- Percentage Internal Audit findings resolved

Ald Sitonga concurred with Cllr Raymond and expressed his concerns over the low percentage spent on the Capital Budget.

Ald Nieuwoudt enquired on progress regarding the transfer of the Heritage delegations to the City of Cape Town.

Mr Asmal and Ms Gerrans responded to the above questions and comments.

RECOMMENDED that the Executive Mayor approves the Directorate's and Department's performance for the second quarter of the 2010/2012 financial year

ACTION: R RIFFEL, C BASSON

EESP 21/02/12 FEEDBACK REGARDING THE DISTRICT OFFICES PERFORMANCES PERTAINING TO BUILDING PLAN APPLICATIONS APPROVED AND LAND USE APPLICATIONS FINALISED FOR THE PERIOD OCTOBER - DECEMBER 2011

Ald Nieuwoudt congratulated the officials on a well prepared user friendly report; she however expressed her concern over the slow and long reaction times of other departments on applications.

Cllr McCarthy proposed that building plans be circulated electronically amongst the relevant departments and that staff should be performance managed.

Cllr Kannenberg referred to the under performance of the Table bay district office.

Cllr Bryant questioned the impact of objections on building plan

approvals and statistics.

Mr Crous responded to all of the above comments and he further informed the meeting of the time consuming process of obtaining input on building plan and land use applications from other departments he also elaborated on the project progress to electronically circulate building plans electronically amongst relevant departments.

RESOLVED that contents of the report as well as the verbal submissions by Mr Crous be noted.

EESP 22/02/12 VACANCY ANALYSIS

Cllr Raymond requested that critical posts in the Directorate be reflected in the report.

Ald Nieuwoudt referred to the upkeep and maintenance of specific skills and the ageing age analysis of the building inspectors.

Ms Walters responded and stated that resignations and retirements have not affected the department with regards to the loss of institutional knowledge; she further added that long service does not necessary mean good skill.

Ms Walters also confirmed the age analysis of the building inspectors and informed the meeting of the recruitment process.

Cllr Limberg commented on vacancies versus capacity and as an example she mentioned the local business area branch that has a shortage of staff in dealing with informal trading issues.

Mr Asmal commented on ERM vacancies and stated that younger staff members at entry level often seek advancement and move more frequently between positions.

Mr Asmal also informed that the Energy and Renewable energy as well as the Heritage sections are at risk due to the shortage of qualified staff in these areas.

Cllr Bryant referred to the alleged unlawful actions of building inspectors.

Ms C Walters responded and invited all members and the public to report all unlawful actions to the fraud line and to submit concrete evidence in order to institute further action. She also warned against unsubstantiated allegations which could put the City and staff members at a disadvantage.

Mr J Hugo, ED EESP concurred and stated that he has a zero tolerance approach to corruption and unlawful actions of all members of staff and that he will act accordingly.

RESOLVED that critical positions in EESP departments be reflected in all future reports.

ACTION: K PETERSEN, A ARENDSE

MOTION

EESP 23/02/12 ILLEGAL BUILDING WORK - CLLR C ANSTEY

Cllr C Anstey introduced this motion, duly seconded by Cllr J McCarthy.

Cllr Anstey proposed that a Task Team be established to investigate and propose new by- laws to contain and improve the current situation with regards to illegal building work for the following reasons:

(a) the large number of illegal building works continuously occurring in the City on a regular basis and disregard for building regulations;

(b) the large amount of time Councillors and officials are absorbed in dealing with these matters as opposed to promoting and approving correct development plans;

(c) the ineffective penalties applied;

(d) the disruptive nature on neighbouring ratepayers;

(e) the large number of applications through sub councils to correct illegal works which are a result of a total disregard for building regulation without any compensation to the city or ratepayers.

Several members requested that an educational component be added to the mandate of the Task Team.

The proposal was duly supported.

The following members indicated that they will serve on the Task Team:

Cllr Anstey (Chairperson)

Cllr McCarthy

Cllr V Dyantyi

RESOLVED that:

(a) the Illegal Building task team be established consisting of the following members, Cllr Anstey (Chairperson), Cllr McCarthy and Cllr V Dyantyi.

(b) The TASK Team further consult on the matter of an educational component for property and homeowners regarding illegal building work.

ACTION: C WALTERS

THE MEETING TERMINATED AT 15: 20

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G BLOOR
CHAIRPERSON **Date:**

CITY OF CAPE TOWN | ISIXEKO SASEKAPA | STAD KAAPSTAD

THIS CITY WORKS FOR YOU

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CITY OF CAPE TOWN
INTEGRATED COASTAL MANAGEMENT POLICY

GLOSSARY

Definitions used in this policy –

Accretion: Gradual accumulation of sediment.

Aeolian transportation: Carried by wind.

Biodiversity: Biological wealth of a specified geographic region: including the different marine, aquatic and terrestrial ecosystems, communities of organisms within these, and their component species, number and genetic variation.

City: The City of Cape Town established in terms of section 12 of the Local Government: Municipal Structures Act of 1998 by Provincial Notice No. 479 of 2000.

city: Cape Town metropole.

Climate adaptation: Adjustment in natural or human systems in response to actual or expected climate stimuli or their effects, which moderates harm or exploits beneficial opportunities.

Climate change: A significant and lasting change in the statistical distribution of weather patterns over periods ranging from decades to millions of years. It may be a change in average weather conditions or the distribution of events around that average (e.g. more or fewer extreme weather events). Climate change may be limited to a specific region or may occur across the whole earth.

Coast: The inshore marine environment up to 500 metres seaward of the High Water Mark. The interface between the marine and terrestrial environments and the land directly exposed to coastal processes, tidal influence and storm surges.

Coastal Protection Zone: The Coastal Protection Zone contemplated in section 17 of the Integrated Coastal Management Act 2009.

Coastal edge: Area around the coast demarcated in Cape Town's Spatial Development Framework as the seaward extent of the City's development footprint, primarily to protect coastal resources and avoid risks pertaining to flood-prone areas.

Coastal zone: The area seaward of the Coastal Protection Zone boundary, the seashore, coastal waters and the exclusive economic zone and

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includes any aspect of the environment on, in, under and above such area.

Council: City of Cape Town Metropolitan Municipality, established in terms of the Local Government: Municipal Structures Act 1998, read with the Province of the Western Cape: Provincial Gazette 558 dated 22 September 2000.

CTSDF: The Cape Town Spatial Development Framework, as approved in terms of the Municipal Systems Act 32 of 2000 (section 34) as well as the Land Use Planning Ordinance 15 of 1985 (section 4(6)).

Development: Any process initiated by a person to change the use, physical nature or appearance of that place, and includes –

(a) the construction, erection, alteration, demolition or removal of a structure or building;
(b) a process to rezone or subdivide land;
(c) changes to the existing or natural topography of the coastal zone; and
(d) the destruction or removal of indigenous or protected vegetation.

Development footprint: The outer extent of urban development.

Disaster risk management: The continuous and integrated multi-sectoral, multi-disciplinary process of planning and implementation of measures aimed at – (a) preventing or reducing the risk of disasters; (b) mitigating the severity or consequences of disasters; (c) emergency preparedness; (d) a rapid and effective response to disasters; and (e) post-disaster recovery and rehabilitation.

Disaster risk reduction: The systematic development and application of policies, strategies and practices to minimise vulnerabilities and disaster risks throughout a society to prevent and limit negative impacts of hazards, within the broad context of sustainable development. In South Africa, disaster risk reduction is an integral and important part of disaster management.

Dynamic coastal processes: All natural processes continually reshaping the shoreline and near shore seabed, including —

(a) aeolian movement of sand;
(b) migrating dune systems;
(c) wave action;
(d) coastal storms;
(e) currents;

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(f) tidal action;
(g) river flows;
(h) erosion; and
(i) accretion

Ecosystem: A dynamic system of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

EGS: Ecosystem goods and services: The resources and functions that accrue from the natural environment.

Exclusive Economic Zone: The Exclusive Economic Zone of the Republic referred to in section 7 of the Maritime Zones Act 1994.

High Water Mark: The High Water Mark as defined in section 1 of the Integrated Coastal Management Act 2009.

Infrastructure: Any temporary or permanent structure made by humans.

Littoral active zone: Any land forming part of, or adjacent to, the seashore that is –
(a) unstable and dynamic as a result of natural processes; and
(b) characterised by dunes, beaches, sand bars and other landforms composed of unconsolidated land, pebbles or other such material which is either unvegetated or only partially vegetated.

Public Open Space: Land zoned as open space, located in urban areas and accessible to the general public.

Risk: The measure of potential harm from a hazard or threat. Risk is usually associated with the human inability to cope with a particular situation. In terms of disaster risk management it can be defined as the probability of harmful consequences, or expected losses; including death, injury, damage to property and the environment, jobs, disruption of economic activity or social systems. Hazards will affect communities differently in terms of ability and resources with which to cope. Poorer communities will be more at risk than others.

Vulnerability: The degree to which people, property, the environment or social and economic activity – in short, all elements-at-risk – are susceptible to injury, loss of life, damage, disruption, exploitation or incapacitation by all hazards.

Zoning Scheme: Determines the zoning categories and land uses permitted within each category.

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1. Introduction and overview

1.1 The coast as an asset

The City of Cape Town ("City") has an extensive coastline of 307 km which is an important economic, social and environmental asset. Characterised by a highly sensitive, complex and dynamic coastal environment, the city's coastline provides communities and visitors to Cape Town with a multitude of social and economic benefits and opportunities as well as essential Ecosystem Goods and Services (EGS) (Table 1). These goods and services may be broadly categorised into the following coastal services:

Cultural The non-material benefits people obtain from coastal ecosystems such as spiritual enrichment, reflection recreational and aesthetic experiences etc.

Provisional The products obtained from coastal ecosystems, including sea-food, fuel, genetic resources, minerals, natural medicines, pharmaceuticals, ornamental resources etc.

Regulatory The benefits obtained from the regulation of coastal ecosystem processes, including, climate regulation, water regulation, erosion regulation from storm surges, disease regulation, pest regulation, pollination, natural hazard regulation etc.

These goods and services provided by the shoreline are key contributors to the city's economy, desirability and global recognition as one of the world's most beautiful and popular cities.

Cultural	Provisional	Regulatory
Freely accessible recreation and amenity for all from the coast	Marine resources i.e. fish	Assimilatory function for urban waste
Contribution to global desirability of Cape Town	Social development opportunities	Buffer function against storm surges, erosion and sea level rise
Cultural and spiritual sanctuaries	Educational opportunities	Regulation of ecosystems
Coastal aesthetics	Tourism	
Collective identity	Livelihood development opportunities	
Sense of place and heritage as a city	Commerce and industry	
	Enhanced property values	
	Unique and diverse biodiversity	
	Events and filming	

Table 1: Coastal Ecosystem Goods and Services.

Our coastline is an important asset for the City's economy, it is where our communities recreate and where they interact, it draws our visitors, protects our city, property and infrastructure from storm

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surges, receives our waste and supports our unique and diverse fauna and flora. It is central to our history and common identity and shapes Cape Town's unique sense of place.

Central to this value is that the City's coast is, and must remain, a common asset belonging to and accessible to all. Further, this value of the coast is determined by both its quality and functionality.

As such it is imperative that the City implements a policy that not only optimises the value of the coast and protects it as a common asset for all, but one that also creates a framework for the effective governance, decision-making and management of our coastline in the best interests of our city and its communities.

1.2 Coastline: A sensitive and dynamic space prone to risk

Waves and wind are the two dominant natural forces shaping the dynamic coast. Wave action causes erosion of sediment which long-shore winds and currents deposit along the coast, forming beaches and dunes, and further inland. Storms are drivers of rapid coastal change, often leading to abrupt erosion events and inundation of coastal areas.

These important components of healthy coastal systems are highly sensitive to change. This is particularly relevant along Cape Town's high energy coastline which is exposed to large weather systems and coastal storms and in which urban growth and coastal opportunities have created a desire to settle and develop.

Historic planning decisions made without the guidance of a City-wide integrated coastal management framework have resulted in encroachment into these areas, hardening the shoreline, restricting and altering natural processes, increasing the city's risk profile and reducing the value of the coast.

The resultant degradation or loss of ecosystem function compromises the ability of these systems to absorb the impacts of further coastal erosion and storm surge, further exacerbating risk. These problems are likely to worsen given the expected impacts of climate change, which include sea level rise and an increase in the frequency and intensity of coastal storms.

Risk may be physical, social or financial and can be transferred to coastal stakeholders over both temporal and spatial dimensions. The degradation of natural coastal processes negatively impacts the social and economic value of the coast. As the coast is a common asset, coastal risk and loss is shared between the authorities and the general public/individuals.

The decision-making processes behind coastal development are crucial to either creating a risk-prone, degraded coast or a high quality, resilient one.

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2. Rationale for policy and management framework

Coastal risk is compounded through decision-making in a policy vacuum. An effective policy environment is central to good governance, long term planning and optimising sustainable opportunities and growth. This Integrated Coastal Management Policy is therefore central to reducing risk, both to the City and its communities, and is core to retaining and enhancing the many current and future economic, social and environmental opportunities of our unique coastline into the future.

The local authority responsibilities of economic and social development, urban planning and land use management, as well as the Integrated Coastal Management Act's requirement for a Municipal Coastal Management Programme, enables the City of Cape Town to incorporate an integrated coastal management framework into its existing planning and management processes through this policy process.

3. Relevant legislation and approved Council policies

- The Constitution of the Republic of South Africa: Sections 151(3), 152(1) (d) and 156(5)
- Local Government: Municipal Structures Act, Act 117 of 1998
- Local Government: Municipal Systems Act, Act 32 of 2000
- National Environmental Management Act, Act 107 of 1998 (NEMA)
- Environment Conservation Act, Act 73 of 1989
- National Environmental Management: Integrated Coastal Management Act, Act 24 of 2008 (ICMA)
    - Informed by the NEMA principles. These include maintaining and rehabilitating the "diversity, health and productivity of coastal ecosystems" and following a "risk averse and precautionary approach" to coastal management and planning "under conditions of uncertainty".
    - Sections 48-50 deal with municipal coastal management programmes and by-laws.
    - Section 62 deals with the implementation of land use legislation in the coastal protection zone.
- Sea Shore Act, Act 21 of 1935
- National Building Standards and Building Regulations Act, Act 103 of 1977
- Disaster Management Act, Act 57 of 2002
- Spatial Planning and Land Use Management Bill (once promulgated)
- Land Use Planning Act (once promulgated)
- Land Use Planning Ordinance, Ordinance 15 of 1985
- Cape Town Spatial Development Framework 2012
- Cape Town Zoning Scheme 2012
- Cape Town Integrated Metropolitan Environmental Policy 2001 (IMEP)
- Cape Town Floodplain and River Corridor Management Policy (2009)

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4. Strategic intent

The City envisions a coastline of the highest standard, where coastal ecosystems and our rich biodiversity are recognised as sensitive, complex, dynamic and essential to our future prosperity. The coast will be managed as core city infrastructure, valued and protected as an asset for current and future generations. The strategic focus areas of the City of Cape Town are enshrined in the City's Integrated Development Plan (IDP) and are categorised into five pillars. The city's coastal environment has the potential to support all five pillars:

An Opportunity city: by having due care for sustainability implications, this policy supports economic and social development opportunities.

A Well-Run city: through this policy, the City will be accountable to its citizens for its coastal decisions.

A Safe city: the reduction in coastal risk created through the enabling mechanisms of this policy provides a safer city for all.

A Caring city: this policy strives towards taking care of Cape Town's people, especially those most in need of assistance, by retaining and improving the state of their coastal environment.

An Inclusive city: this policy entrenches the rights of access to and enjoyment of the coast for all people and will manage the coast in the best interests of all communities.

5. Coastal policy principles

In working towards the strategic intent of this policy, the following coastal policy principles inform the City of Cape Town's coastal custodianship and will be applied in relation to all City coastal decision-making:

- The coastal environment is a shared asset held in trust for the common good of all. Equitable and ease of public access to all coastal areas and associated opportunities for the entire coastline is central to this value. The right of each individual to enjoy the coastline in the way of their choice, without impacting on other users' enjoyment must be protected.
- Economic and social development opportunities must be optimised to the benefit, and in the interest, of all communities, with on-going active investment in and management of the Cape Town coastline by the City.
- Development of coastal economic and social opportunities must be undertaken in a manner that does not reduce, harm or degrade our coastal environment or its ability to cope with climate risks in the future. The diversity and healthy functioning of natural coastal ecosystems and processes must be protected, restored and enhanced for their intrinsic as well as their economic, social and environmental values.
- Strategic, proactive, consistent and risk-averse coastal decision-making will be made in the best interests of the broader community of Cape Town, including the implementation of

proactive and progressive measures now, to reduce coastal risk from climate change, sea level rise and storm surge events in the future.

- All individuals must be accountable and responsible for their actions and must take due care to avoid creating negative impacts on our coastal environment. Our coastline must be an environment free of crime and where legal rights for sustainable resource consumption are protected while illegal resource consumption is acted against.

6. Policy statements

6.1 Common asset

The coastline is a common asset, a shared space and unique natural environment, which belongs to all South Africans.

In this regard the City will:

- Protect the rights of all people to access the coastline;
- Manage the coastline at all times in the best interests of all and not to the sole benefit or interest of individuals or groups;
- In all decisions, take due care to ensure the coastline and its value are not negatively impacted or degraded as a result of future development or urban growth; and
- Ensure that future development is appropriately set back from the coastline consistent with the City's Spatial Development Framework.

6.2 Access

Development along the coast can result in valuable spaces which should serve as central points of economic, social, cultural, spiritual, educational and recreational experience instead of becoming informally privatised space, limited to a few.

Conversely, uncontrolled or informal access to the coast is one of the primary contributors to dune erosion and disturbances of sensitive ecosystems, ultimately compounding risk from coastal processes.

Equitable access to the coast must therefore be enabled while ensuring that this access is regulated, organised and controlled in a manner that does not detract from, or negatively impact on, coastal values while also ensuring ease of access for all.

In this regard the City will:

- Formally designate Public Coastal Access Land at appropriate locations along the length of the City's coastline in accordance with the Integrated Coastal Management Act (ICMA);
- Ensure lateral coastal public access by acting against encroachment of private property into coastal public open space;

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- Generally not support sea defence mechanisms that result in the loss of public access or amenity; and
- Ensure that formalised public access points are appropriately distributed along the length of the coastline to facilitate public access for all communities.

6.3 Optimise economic and social opportunities

The coastline underpins much of Cape Town's economy and holds significant potential to contribute further economic growth and social development opportunities in Cape Town. However, the economic and social value of the coastline must be well-managed as poor decision-making, poor management, prioritising short term gains, over-development or inappropriate development can substantially diminish current economic and social value while removing the potential for any future economic and social opportunities.

In this regard the City will:

- Prioritise long term economic and social objectives;
- Address the inequalities of the past through promoting appropriate coastal nodal development as detailed in the City's Spatial Development Framework to connect communities to the coastline;
- Assess economic and social development opportunities on the coast in a holistic manner that understands the coastline as a single complex system, which has diverse opportunities and constraints determined by factors outside of our control;
- Optimise and invest the immense potential of Integrated Coastal Management to create long term sustainable employment opportunities across a range of sectors including coastal management, ecotourism, coastal risk reduction and coastal rehabilitation; and
- Invest in appropriate infrastructure that supports a wide range of economic and social development activities and opportunities.

6.4 Coastal recreation

Coastal recreation takes many forms and is one of the largest social activities in Cape Town. Coastal recreation underpins a range of economic activities in Cape Town and provides significant social development value.

In this regard the City will:

- Promote and support coastal recreation through maintaining, investing in and developing infrastructure and services that facilitate appropriate coastal recreation opportunities;
- Manage the coast as a shared environment where all forms of recreation that do not damage or degrade the coast have equal rights;
- Determine appropriate and defined use zones for various forms of coastal recreation where necessary, to reduce conflict, congestion, improve safety or reduce environmental and social impact;

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- Ban a form of coastal recreation in its entirety or from various locations, where it negatively impacts on the economy, social values and quality of the environment; and
- Regulate and enforce any recreation activities that require permits from any sphere of government.

6.5 Natural coastal processes, fauna and flora

Cape Town has a uniquely rich marine and coastal environment with significant diversity of fauna and flora. These natural systems form the foundation from which socio-economic systems benefit and community livelihoods are built, while playing an essential role in mitigating and reducing risk to the City, its infrastructure as well as private property.

In order to reduce coastal risk – especially given the future impacts of climate change on a rise in sea levels and increased frequency and intensity of coastal storm surges, whilst protecting the economic and social value of the coast, and coastal fauna and flora – it is imperative that we maintain a healthy functioning coastline.

In this regard the City will:

- Ensure that future coastal development is sensitive to the need to protect coastal processes and systems;
- Develop and implement a Coastal Overlay Zone as part of the City's Integrated Zoning Scheme to provide an appropriate land use management framework to protect our coastal systems;
- Invest in the on-going rehabilitation of degraded dune systems, beaches, estuaries, coastal corridors, rocky shores and coastal wetland systems;
- Implement Estuary Management Plans that recognise and manage the vital contribution of estuaries to supporting the health of coastal ecosystems, water quality maintenance, the provision of marine species nurseries and the provision of protection against coastal erosion and storm surge damage;
- Designate highly valuable and sensitive natural coastal spaces or coastal heritage sites as Coastal Conservancy land; and
- Undertake coastal waste management in accordance with a Beach Cleaning Operational Protocol that recognises the importance of retaining functional ecological systems while meeting the social and economic needs of high recreation nodal points.

6.6 Heritage, identity and sense of place

Cape Town's coastline is integral to our history, our heritage, sense of place and unique identity. In addition our coastal landscapes underpin our scenic routes and global desirability and recognition.

In this regard the City will:

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- Consider all new coastal developments with regards to their potential impact on this unique and irreplaceable cultural landscape and heritage;
- Take into account architecture, colour, form and position when considering coastal development applications;
- Ensure all signage design and location does not detract from or impact on the unique and irreplaceable coastal landscape and heritage;
- Protect coastal sites and buildings of cultural and historical heritage value;
- Ensure that scenic drives and landscapes are retained and protected, and
- Ensure that any future coastal defences for the protection of private and public properties and City infrastructure are strategically managed by the City to minimise their visual and environmental impact.

6.7 Risk management and mitigation

Determining the most appropriate and sustainable course of action for response to growing coastal pressures requires sensitive navigation through the multiple and often conflicting interests of the various stakeholders, including private developers, property owners, government officials (across all three spheres), beach users, civil society and environmental pressure groups.

Further, it is a well-established fact that engineered coastal defence measures can often exacerbate the problem and cause coastal degradation at a large scale. This consideration is likely to increase in importance given the predicted climate change impacts of sea level rise and more frequent and intense coastal storm surges. Natural systems such as wind, wave action, long shore sand transport, erosion and accretion, and storm action are powerful systems that must inform and guide economic growth and development opportunities. It is therefore critical that decisions to protect any property from coastal dynamic processes are made in the interest of the broader community and after careful consideration.

In this regard the City will:

- Apply a consistent and cautious approach to coastal defences to be detailed and clearly stipulated in the City's Municipal Coastal Management Plan as a Protocol and Standard for Coastal Protection and Coastal Defences in Cape Town;
- Favour soft engineering approaches over hard engineering solutions;
- Require all new coastal developments, and changes to existing developments, to incorporate mitigation of and/or adaptation to coastal climate change impacts as part of their approval process;
- Ensure that coastal defences, to protect private property from the threat of coastal erosion, are only located on private land;
- Not approve coastal defence structures if the risk of shoreline erosion for adjacent areas is influenced;
- Retain the option of managed retreat over defence;
- Require that coastal defences be proven to reduce risk prior to being approved;

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- Favour coastal defences which are reversible, flexible, do not negatively impact on sense of place or aesthetics, and have other positive knock-on effects; and
- Undertake a broadly consultative process with the public when deciding on sea-defence interventions.

6.8 Coastal land alienation and acquisition

Where coastal land is unsuitable for development, either due to zoning or for environmental reasons, state ownership of coastal land will be consolidated. This includes acquisition of land by the City falling within its jurisdiction.

In this regard the City will:

- Guide the acquisition of coastal land in a way that reduces the risks faced by private owners affected by environmental and zoning regulations, thereby providing for enhanced management of sensitive coastal environments and establishing an enabling environment for investment; and
- Not alienate for sale or long-term leasehold any City-owned coastal land unless under exceptional circumstances.

6.9 Coastal safety and security

Illegal activity along the coast impacts negatively on the marine and coastal environment, the interests of residents, local livelihood opportunities, ecotourism potential and the safety of individuals.

Although the City's jurisdiction is determined by the High Water Mark, the City recognises that economic, recreational, environmental as well as illegal activities operate across these jurisdictional boundaries.

In this regard the City will:

- Actively seek to work with all relevant spheres of government and law enforcement agencies by promoting an inter-agency marine and coastal law enforcement approach;
- Protect and support the legal marine and coastal resource consumption activities while actively targeting all illegal resource consumption;
- Develop its own marine and coastal law enforcement capacity and resources;
- Consolidate City Regulations and By-laws to facilitate effective coastal law enforcement;
- Increase visible coastal law enforcement and policing; and
- Ensure appropriate informative regulatory signage is located along the coastline.

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7. Indemnities

The City of Cape Town is legally not responsible for, or required to protect, private property along its coastline that is at risk, becomes vulnerable to risk, or which may become vulnerable to risk as a result of coastal change which includes coastal erosion, accretion, sea level rise, storm surge events or any other coastal processes.

This includes no legal requirement of the City to provide sea defences, fund sea defences, approve or support the building of sea defences, or the financial or other forms of compensation to private property owners whose property has been damaged, destroyed or de-valued as a result of natural coastal processes.

Localised and individual sea defences by private landowners which may exacerbate problems along adjacent stretches of coastline will not be supported by the City. Furthermore, illegal construction of sea defences by private landowners will be acted against in terms of the City's land use management policies.

However, the City recognises that its coastal value is in part determined by the quality of the immediate coastal environment which includes private property. As such, the City is committed to leading open and transparent processes that will seek to find the most appropriate, effective, just and measured solutions to those parts of its coastline where coastal change has resulted in risk to the public amenity, public infrastructure and adjoining private property.

8. Giving effect to this policy – the City's Integrated Coastal Management Framework

To give effect to the policy principles, a set of implementation regulations, mechanisms and tools, which together constitute the City's Integrated Coastal Management Framework, will be developed to protect and manage Cape Town's coast in line with these policy objectives. The overview of the City's Integrated Coastal Management Framework is depicted in the flow diagram below.

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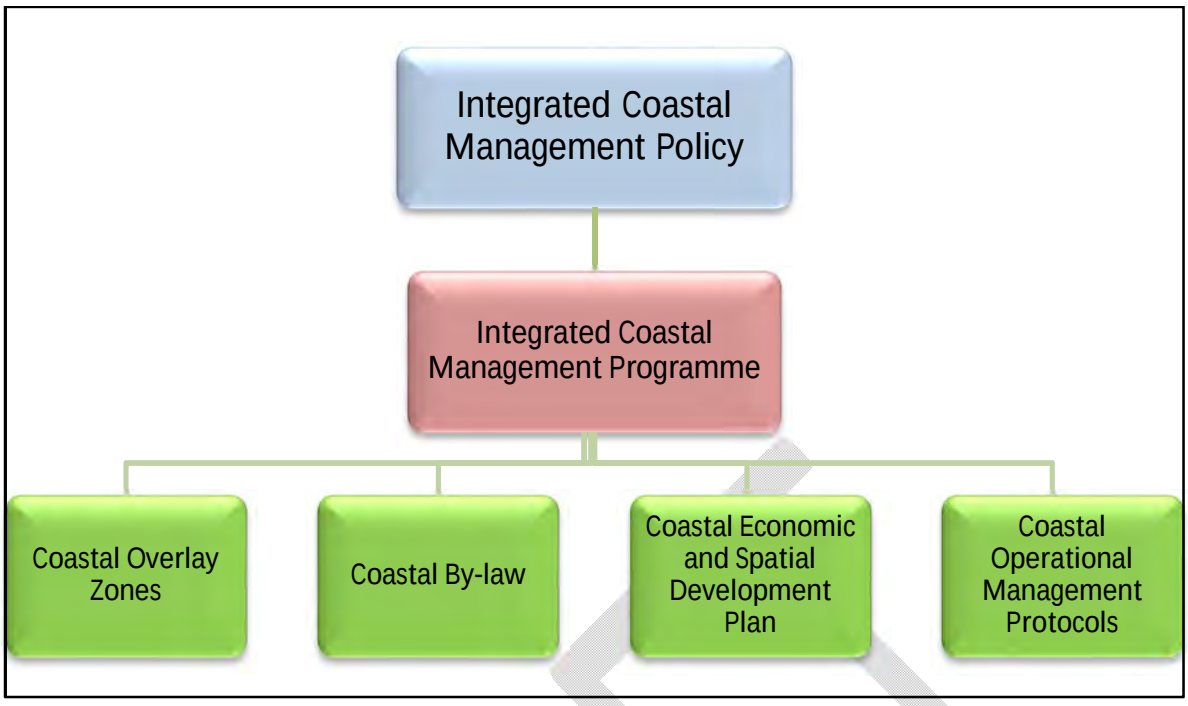


Figure 1: Integrated Coastal Management Framework for the City of Cape Town.

8.1 Coastal area

In order for the City's Integrated Coastal Management Framework to be effective, the spaces which it seeks to manage should be defined in a holistic way, taking into consideration the multitude of factors which impact on or are impacted by the dynamic interface between land and sea masses.

Recognising that social, economic and ecosystem processes take place across the High Water Mark, and given the need to ensure integrated management as well as proactive planning, the City will make an application, as allowed by the ICMA, for its area of responsibility to extend 500 metres seaward of the High Water Mark.

This application, if successful, will increase the effectiveness of the policy as well as the implementation framework. Based on this understanding, the applicability of the City's Overlay Zone and By-law may extend up to 500 metres seaward of the High Water Mark.

8.2 Integrated Coastal Management Programme

The City will develop and implement an Integrated Coastal Management Programme (ICMP), as required by the ICMA. This ICMP will be a comprehensive management and action plan detailing the City's day-to-day management approach for all aspects of the coastal environment over which it has jurisdiction. These management guidelines will be developed as Coastal Operational Protocols that will be used to set consistent standards for a range of coastal management aspects and ensure compliance with national legislation. In addition to these Coastal Operational Protocols, the ICMP

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will be given effect by coastal overlay zones, a coastal by-law and a coastal economic and spatial development plan.

8.3 Coastal overlay zones

Coastal Overlay Zones will be developed as a component of the City's Integrated Zoning Scheme. Overlay zones provide a mechanism which allows for the provision of more specific development rules to achieve the purpose of a particular City policy.

The Coastal Overlay Zones will fulfil the vision of this Integrated Coastal Management Policy, elevating its policy statements to land use regulations to reduce the City's risk profile, build resilience and promote sustainable coastal development. The overlays are considered the most appropriate mechanism to manage and regulate land use and building development.

The overlays will consist of a general overlay, covering the entire coast, to which a general set of regulations will apply; and specific overlays, in which more specific provisions will apply to particular areas.

8.4 Coastal By-law

The City will develop and implement a Coastal By-law. A by-law is the specific regulatory means for the City to regulate activities. The City is committed to ensuring that all activities carried out on the coast are conducted in a manner that is responsible, in the interests of public safety, and that such activities in no way detract from the amenity value of the coast or the natural coastal environment.

The by-law will assist in enhancing, protecting and optimising social and recreational opportunities by providing regulations that ensure socially and environmentally responsible activities along the coast.

8.5 Coastal economic and spatial development plan

The City will develop a strategic plan that examines the coast as a single, connected space and identifies appropriate public coastal development in order to optimise social and economic opportunities, including those linked to the private sector.

The plan will prioritise opportunity development and give effect to the objectives of the City's broader Economic Growth Strategy and Social Development Strategy. The plan will, among other considerations, address coastal resort development, public access, marine access points, coastal public transport and consolidation of ecotourism and other commercial and industrial marine and coastal activities. This long-term planning is especially important in the context of expected climate change impacts, including sea level rise and increased frequency and intensity of storm surges.

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Chapter 5: Coastal By-law

The City's Draft Coastal Management By-law will be taken through a separate stakeholder and public participation process in the near future.

Chapter 6: Economic and Spatial Development Framework for the City's Coast

1. Introduction

The City's coastline is arguably is greatest economic and social asset. Historically, the various municipalities that now form the City of Cape Town invested in the coastline in the development of amenities, facilities and public access points. These investments were localised and driven primarily by local interests without consideration for the fact that the coast is a linked space, socially, environmentally and economically. In addition, focus on coastal dynamics and environmental factors was historically limited, resulting in poor coastal development decisions resulting in a legacy of numerous failed, problematic and under-utilised public assets.

Since the late 1980's, there has been very little public investment by local government in the coastline and as a result many of the facilities are outdated and in poor condition; few new opportunities have been created.

The coastline has significant potential to leverage greater economic and social opportunity for Cape Town through a single strategic coastal plan that identifies and promotes appropriate coastal public development within the context of a dynamic and sensitive coastal environment.

2. Opportunity

Increased focus and investment by the City into its coastline will undoubtedly release significant untapped social and economic opportunities and the associated virtuous cycles of benefit related to private investment, job creation and economic stimulation.

However, in addition to the motivated increased focus by the City into its coastal asset, opportunity currently exists for the City to link into broader provincial and national initiatives related to, amongst others, the small boat harbours in the Western Cape. Secondly, through its SDF the City has prioritised development at a number of coastal nodes such as Monwabisi. This presents an ideal opportunity to integrate these important nodal developments into a broader coastal plan to ensure that the linked and linear opportunities are realised.

3. Cost Benefit: Lack of planning costs the City

Poor coastal development ultimately costs the City in many different ways:

(a) Ongoing daily maintenance costs of public infrastructure inappropriately situated in a harsh environment
(b) The cost of ultimately removing poorly located infrastructure
(c) The cost of protecting, restoring, rehabilitating or fixing problems as a result of inappropriate development
(d) Loss of opportunity; poor quality environments reduce social and economic opportunity
(e) Lack of integration of functions increases cost and duplication across City line departments
(f) Lost opportunities of associated activities for example spin-off benefits associated with marine eco-tourism
(g) Lost income to the City through correct and organised tariffs, permit fees and contributions by commercial activities
(h) Loss of private investment in the coastline due to a lack of a coherent development plan

4. Spatial and Economic Development Plan for the Coast

As part of implementing its Integrated Coastal Management Policy the City will, in conjunction with stakeholders, undertake the development of a coherent and integrated Spatial and Economic Development Plan for its coastline that will:

(a) Assess the coast economically and spatially as a single linear connected space
(b) Identify public development opportunities and linked private sector economic opportunities
(c) Identify appropriate integration opportunities (e.g. locating multi-agency law enforcement stations/hubs at slipways, beach nodal points etc.)
(d) Integrate Coastal Resort development plans as part of a broader economic development approach
(e) Assess and make recommendations with regards to marine access points, marine development opportunities and related national delegations of commercial fishing, small boat harbours and aquaculture
(f) Develop a focused approach to integrating the three fishing harbours into Cape Town's economy and developing all associated opportunities
(g) Identify new public access opportunities, walkways and cycle paths with a focus on linking the coast linearly
(h) Link public transport plans to beach and amenity nodal development
(i) Assess and make recommendations with regards to formalising the marine and coastal eco-tourism industry as a core part of the tourist experience and the spin-off economic potential of eco-tourism hubs
(j) Review and consider the yacht and boat building industry potential with regards to infrastructure needs and as stimulus to broader recreational and economic opportunities
(k) Assess opportunities for the development of new small boat harbours
(l) Identify coastal infrastructure that the City should no longer invest in and remove

5. Process and Management

The proposed Coastal Spatial and Economic Development Plan (CSEDP) will be a single approach supported, financed and integrated across a number of City departments business planning and implementation. The CSEDP will be led by the Spatial Planning and Urban Design Department including:

(a) Formal representation and input by all relevant City Departments and City leadership
(b) Structured and coordinated input by the private sector, business and industry throughout the process
(c) Structured and coordinated input from national and provincial governments
(d) Availability of the report for public and stakeholder comment prior to finalisation

6. Outputs

The final CSEDP will:

(a) Provide a clear long term plan and vision for the City's coastline
(b) Be integrated into the SDF, District Plans, IDP and relevant departments budgets and business plans
(c) Direct future public investment into the coastline
(d) Direct private investment into the coastline
(e) Unlock linked and associated economic and social opportunities
(f) Ensure future development does not create coastal risk or erode the coastal value which is central to Cape Town's identity and economy

7. Timeframes

It is expected that the development of the CSEDP will commence in the 2014/2015 financial year and will be completed within 24 months.

Chapter 7: City Of Cape Town Zoning Scheme draft General Coastal Overlay Zone

1. General Coastal Overlay Zone

a. This general coastal overlay zone provides specific land use provisions and regulations for the coastal area between the High Water Mark (HWM) as defined in the Integrated Coastal Management Act (ICMA)(Act 24 of 2008) and the Coastal Urban Edge as defined in the City of Cape Town's Spatial Development Framework (CT:SDF) and delineated as the City's draft coastal set-back line as per the ICMA.

b. The City will apply the general provisions and regulations stipulated in this General Coastal Overlay Zone to all land use activities between the HWM and the Coastal Urban Edge as defined in the CT:SDF and delineated as the draft coastal setback line as per the ICMA.

c. The City may develop further local area overlay zones and provisions to specific defined areas as well as areas landward of the Coastal Urban Edge as defined in the CT:SDF and delineated as the draft Coastal Setback Line as per the ICMA where risk to coastal hazards has been identified.

2. General Provisions

2.1. Unless otherwise stated, a Site Development Plan (SDP) is required as per the requirements of the City of Cape Town Zoning Scheme Regulations. In addition to the requirements defined in the Zoning Scheme Regulations, an SDP will be required if there is:

a. Any change in land use;
b. Any sub-division;
c. Any construction activity where building plan approval is required;
d. The addition of any new structure, designed with the intent to act as a defence mechanism against wave action, erosion, wind-blown sand or any other coastal process affecting property abutting the coastal environment or coastal public open space;
e. The addition of any new structure with the intent to enclose property or to demarcate the boundary of property;
f. Any excavations below the ground or existing land-level greater than $5m^2$ in extent as a cumulative total for the property;
g. Any building or construction activity that may lead to increased run-off into the coastal environment, and
h. Any alteration that affects the appearance of existing walls abutting the coastal environment or coastal public open space.

2.2. Unless otherwise stated a formal Environmental Authorisation will be required from the City's District Environmental and Heritage Office for any:

a. Removal of vegetation, site clearing or felling of trees,
b. Any activity that in the opinion of the City may significantly alter the landscape or the coastal environment.

The Environmental Authorisation may be granted subject to requirements, including the preparation of an Environmental Management Plan and the appointment of an Environmental Control Officer.

2.3. When building plans are submitted by an applicant for any new structure that has the intent to act as a coastal defence mechanism against wave action or erosion, a report must also be submitted to the District Environmental and Heritage Office for review and approval. This report must be submitted in terms of the Coastal and Sea Defence Protocol as established in the City's Coastal Management Programme.

2.4. Unless otherwise stated, formal Heritage Authorisation from the relevant heritage resources authority i.e. Heritage Western Cape, will be required for:

a. Any activity which may damage, destroy or alter any heritage resource, including archaeological sites, and

2.5 Unless otherwise stated, formal Heritage Authorisation from the City's District and Heritage Office, will be required for:

a. Any activity that may impact on a scenic drive

The Heritage Authorisation may include a requirement for a Heritage Management Plan.

2.5. Unless otherwise stated, the installation of any new signage must be authorised by the District Environmental and Heritage Office in terms of:\

a. Location, alignment and height, and
b. Conformance and compliance to the City's Coastal Signage Guidelines and Format as per the Coastal Signage protocol in the City's Coastal Management Programme.

2.6. Activities exempt from approval, unless otherwise specifically required:

a. Any activity that promotes rehabilitation and or maintenance of natural coastal ecosystems.

3. Coastal Hazard Provisions

3.1. The City may apply specific provisions to a coastal hazard area in terms of the General Coastal Overlay Zone, which may be in addition to, or alternate to the General Provisions.

3.2. Before applying specific provisions to a coastal hazard area in terms of the General Coastal Overlay Zone, as provided for in subsection (1) the City must:

a. Inform the owner or owners of the hazard area of their intention to so apply. Such notice must set out the nature and purpose of the proposed application of the specific provisions, and
b. Provide the owner or owners with a reasonable opportunity to make representations in regard thereto.

3.3. The City must take into account any representations received before it makes a decision in regard to the application of specific provisions in terms of the General Coastal Overlay Zone.

3.4. In considering an application for approval for an activity within a known coastal hazard area and to which the General Coastal Overlay Zone applies, the City may require the applicant to submit the following information in addition to the requirement of an SDP:
a. A statement of significance for the hazard area for which the application is being made;

b. Environmental studies, oceanographic studies or other audits or research;
c. Photographs;
d. Impact assessments;
e. Comment from interested and affected parties, and
f. Any other information it deems necessary in order to make informed decisions regarding such an application.

3.5. In accordance with the procedures defined in the General Provisions of Section 1, the City may require additional studies and interventions to be undertaken for the reduction of risk within hazard areas and the enhancement of the aesthetic, recreational, amenity and ecological value of the coastal zone. These may include but are not limited to:

a. Coastal modelling assessments and reports;
b. Requirements for landscaping;
c. Requirements for building codes and structural design;
d. Use of materials and finishes;
e. Management plans;
f. Requirements for financial guarantees or deposits;
g. Restrictions and/or enhancements;
h. Liability clauses;
i. Implementation timeframes for all work approved;
j. Mitigation measures against hazards posed by the coastal environment, including storm surges, sea-level rise and wind-blown sand, and
k. Method statements.

4. General

4.1. Approval in terms of the General Coastal Overlay Zone does not exempt an applicant from attaining other required approvals in terms of any other legislation.

4.2. Any materials that may be used for the protection of property against coastal processes such as erosion, storm surges or wind-blown sand; or material used for landscaping, enclosure of private property or any other alternation of property which abuts coastal Public Open Space or Coastal Public Property must obtain City approval prior to the installation of such structures or materials.

4.3. The City shall not give its approval in respect of the General Coastal Overlay Zone if such activity, development, demolition, erection or alteration may, in the opinion of the City place the landowner, any other resident or the City:

a. at increased exposure to coastal hazards; or
b. may compromise the cultural, ecological, recreational or amenity value of the coast in which such activity, development, demolition, erection or alteration is proposed.

Chapter 8: Coastal Access Land

Introduction

Central to Cape Town's approach of enhancing the socio-economic value of the coastal environment, is the enshrinement of the right for all abled and disabled people to enjoy the City's beaches without hindrance and in a safe, equitable and environmentally sensitive manner. Equitable access to the coast is especially important given South Africa's history of exclusion and discrimination under apartheid regime, during which time access to parts of Cape Town's coast for "non-whites" was restricted. Furthermore, the manner in which development historically occurred along the city's coastline has in places resulted in the privatisation of the coast, for the exclusive use of privileged coastal land owners. Indeed privatisation of the coast persists today.

Whilst ensuring that access to the coast for the citizens of Cape Town remains a core responsibility of the City, it also remains an inseparable priority to ensure that access to the coast is promoted in an environmentally responsible manner. Uncontrolled, ill-informed or un-planned access to the coast may result in both negative environmental and socio-economic impacts. Thus, and as per the requirement of the Integrated Coastal Management Act (ICMA) (Act 24 of 2008), municipalities are required not only to demarcate and designate strips of coastal access land, but that a Coastal Access Management Strategy (CAMS) is developed to ensure that such access is sustainable.

Vision

Governance of the coastline where the rights of equitable and ease of access to the coast is entrenched as a basic right to the citizens of Cape Town and South Africa. Alongside this is the recognition that coastal ecosystems are sensitive and dynamic spaces, the on-going functionality of which is central to our livelihoods and prosperity. Access to the coast and its resources must be optimised without negatively impacting on the natural coastal environment.

Legislative context

Access to the coast is regulated primarily through the ICMA. The ICMA requires that coastal municipalities designate strips of land as coastal access land (CAL) and sets out the responsibilities of municipalities with regard to CAL. These responsibilities include the following:

1) " signpost entry points to that coastal access land;
2) control the use of, and activities on, that land;
3) protect and enforce the rights of the public to use that land to gain access to coastal public property;
4) maintain that land so as to ensure that the public has access to the relevant coastal public property, including parking areas, toilets, boardwalks and other amenities, taking into account the needs of physically disabled persons;
5) ensure that the provision and use of coastal access land and associated infrastructure do not cause adverse effects on the environment;
6) remove any public access servitude that is causing or contributing to adverse effects that the municipality is unable to prevent or to mitigate adequately;
7) describe or otherwise indicate all coastal access land in any municipal coastal management programme and in any municipal spatial development framework prepared in terms of the Municipal Systems Act, and
8) perform any other actions that may be prescribed, and

9) report to the MEC within two years of the Act coming into force on the measures taken to implement this section" (DEA, 2008:38).

Determining Coastal Access in Cape Town

The methodology applied a hierarchical framework for the categorisation of access typologies along the city's coastline. Two broad levels of access types were identified and were classified according to the scale at which access is promoted along the coast. The first scale, or macro scale, is at the level of promoting broad scale socio-economic benefits through connecting communities to the coast by means of nodal growth points. Typically this includes coastal resorts and identified nodal growth points, in particular along the False Bay coastline. The identification and development of macro scale nodal growth points will be managed through a broader strategic planning process (Annexure A) and in accordance with the City's Spatial Development Framework.

Macro-scale access: Silwerstroomstrand Coastal Resort.



The second tier or micro scale is at the level of promoting safe and environmentally sensitive access to the beach via designated access routes. For a detailed report on the City's methodology in determining CAL, please refer to Annexure B. The ICMA requires that, when designating coastal access land, a municipality must take into account the type of public access required and the way in which it is intended to be used. Upon assessing the coast using aerial imagery and through ground truthing, five types of micro-scale access points were identified:

1) Cul-de-sacs
2) Car parks
3) Boat launch sites
4) Public roads
5) Walkways

Cul-de-sac: an end-point of a road leading to coastal public property.



Beach car park: an area where vehicles can park and from which users can gain access to coastal public property.



Boat Launch Sites: ramps or areas designated for taking boats into and out of the sea. These can be beach launch sites or coastal slipways.



Road: roads leading to the coast with the intent of facilitating access to the coast zone.



Walkway: path that is travelled by pedestrians and/or wheelchair users.



Walkways can take various forms:

a. Boardwalk: consisting of wooden planks
b. Footpath: worn footways without any supporting infrastructure
c. Paved walkway: cemented or bricked
d. Promenade: paved walkway parallel to the shore which curves to the shape of the coastline
e. Ramp: sloping walkway facilitating wheelchair access
f. Staircase: stairs that lead to the beach, often leading from a promenade
g. Stone walkway: gravel paths

Management of Coastal Access Land in Cape Town

The management objectives refer specifically to micro scale access points along the City's coastline. The identification and development of macro scale nodal growth points will be managed through a broader strategic planning process (Annexure A) and in accordance with the City's Spatial Development Framework.

Objectives

1. Promote high quality experience and enjoyment of the coast on an equitable basis
2. Ensure that access to the coast provides an informative, educational experience
3. Ensure that gaining access to the coast is convenient
4. Ensure minimum negative impacts on the sensitive coastal environment
5. Safeguard against encroachment of private property onto coastal access land

MANAGEMENT RESPONSES

	Management responses				
Objective	**Cul-de-sacs**	**Parking lots**	**Boat launches**	**Roads**	**Walkways**
Promote high quality experience and enjoyment of the coast on an equitable basis	Clearly signposted coastal access cul-de-sacs Ensuring pathways leading from cul-de-sacs to coastal POS and CPP are maintained and provided with the relevant infrastructure Ensure that private encroachment does not impede or restrict these access points.	Clearly signposted coastal access parking lots Maintenance of parking lot surfaces, and curbs Maintenance of ancillary facilities, in particular ablutions.	Clearly signposted boat launch sites Assessment of dysfunctional boat launch sites, followed by either upgrade or closure Maintenance of good quality boat launch sites and ensuring that such sites are safe and user friendly Ensure that each launch	Clearly signposted coastal public access roads Ensure maintenance of roads Ensure pedestrian facilities surrounding coastal access roads are safe and are wheel chair friendly	Clearly signposted coastal access walkways Maintenance of good quality walkways and supporting infrastructure Maintenance of appropriate wheelchair ramps at strategic locations across the coast Use of durable and aesthetically pleasing materials

			site has an Operational Management Plan and that such a plan is adopted by a relevant management authority Ensuring that licensed boats are only launched with the relevant permits and that active law enforcement is undertaken at each operational boat launch site.		
Ensure that access to the coast provides an informative, educational experience	Relevant coastal educational signage that is and aesthetically aligned with the coastal landscape at cul-de-sacs	Relevant coastal signage that is educational and aesthetically aligned with the coastal landscape at parking lots	Relevant coastal educational signage that is aesthetically aligned with the coastal landscape at launch sites		Relevant coastal signage that is educational and aesthetically aligned with the coastal landscape at strategic points along walkways
Ensure that gaining access to the coast is convenient	Access points are strategically located around the coast to cater for a range of recreational use needs.	Parking lots are strategically located, with sufficient parking space at nodal beaches Ensuring that appropriate supporting infrastructure such as ablution facilities are available in close proximity to designated coastal access car parks.	Degraded boat launch sites are upgraded at strategic points around the coastline Undertake studies to determine feasibility of developing additional boat launch sites, in particular along the false bay coastline.	Access points are strategically located around the coast and which limits the travelling distance from all corners of the cape metro.	Walkways are strategically located around the coast Ensuring that appropriate supporting infrastructure such as ablution facilities are available Ensuring that infrastructure supporting walkways does not negatively impact on view-sheds or aesthetics

Ensure minimum negative impacts on the sensitive coastal environment	Ensuring a clear path from each cul-de-sac onto the sand Dune systems adjacent to cul-de-sacs will be actively rehabilitated / managed where necessary	Ensuring that parking lots are well-defined and cordoned off to ensure cars cannot park in environmentally sensitive spaces Dune systems adjacent to parking lots will be actively rehabilitated / managed where necessary	Ensure signage with a clear set of rules at boat launch sites to promote environmentally sensitive and responsible behaviour Ensure active law enforcement and regular patrols for compliance with relevant coastal and environmental legislation . Environmental systems adjacent to boat launch sites will be actively rehabilitated / managed where necessary	Environmental spaces adjacent to roads will be actively rehabilitated on an on-going basis. Litter to be removed form roadside verges as and when required. Ensure appropriate barricades are installed and maintained to prevent damage to sensitive coastal environments caused by vehicles leaving the road.	Walkways will be appropriately designed to ensure minimum environmental impact Access points, in particular walkways, will be positioned at strategically determined intervals to promote convenient access, but also to ensure that such access points remain within the carrying capacity of the local coastal ecology from a pedestrian traffic point of view. All informal walkways, with footpaths as the priority, will be closely monitored and assessed based on user volumes and environmental impact. Decisions will then be made on which walkways to formalise and manage accordingly, and which to rehabilitate. Ensuring that formal walkways are well-defined and maintained so that pedestrians cannot stray into environmentally sensitive areas

					Dune systems adjacent to walkways will be actively rehabilitated / managed where necessary Walkways which traverse sensitive and dynamic dune systems will be constructed on wooden slats bount by change to enable such walkways to adapt to the change in dune profile
Safeguard against encroachment of private property onto CAL	The right of the public to use coastal access cul-de-sacs to gain access to the coast will be protected through enforcement of appropriate mechanisms such as a by-law	The right of the public to use coastal access parking lots to gain access to the coast will be protected through enforcement of appropriate mechanisms such as a by-law	The right of the public to use boat launches to gain access to the coast will be protected through enforcement of appropriate mechanisms such as a by-law	The right of the public to use coastal access roads to gain access to the coast will be protected through enforcement of appropriate mechanisms such as a by-law	The right of the public to use coastal access walkways to gain access to the coast will be protected through enforcement of appropriate mechanisms such as a by-law
Record keeping and database management	Signage (date installed, GPS coordinates, maintenance conducted, graffiti incidences. State of access paths leading form the cul-de-sacs State of the coastal environment surrounding cul-de-sacs.	Signage (date installed, GPS coordinates, maintenance conducted, graffiti incidences. State of access paths leading from car parks State of the coastal environment surrounding car parks Maintenance interventions required for	Signage (date installed, GPS coordinates, maintenance conducted, graffiti incidences). State of the coastal environment surrounding access slipways. Maintenance interventions required for slipways and damage that may be incurred From storm surges or	Damage to any roads (which may lead restricted access for the public) as a consequence of coastal process. Data to be recorded to focus on: - Damage caused by storm surge events and the location of this damage - Wind blow sand,	Signage at walkways (date installed, GPS coordinates, maintenance conducted, graffiti incidences) Maintenance interventions required for each walkway and at what frequency Maintenance records of any infrastructure i.e. wooden slats and

		each car park and identification of potential recurring maintenance problems i.e. frequent replacement of curbs, un-blocking of storm water inlets. Maintenance records of any infrastructure i.e. wooden bollards and fences which may form a boundary between car parks and the natural coastal environment	through ware and tare. Tracking of criminal activities with the express intent to catch repeat offenders.	the severity, and the location.	bollards and fences which may form a boundary between car parks and the natural coastal environment Damage caused to walkways due to coastal processes, notably: - Storm surge events - Wind-blown sand

1. **ITEM NUMBER :** **PLAN 15/08/09**

2. **SUBJECT:**
RAPID PLANNING REVIEW OF POTENTIAL FUTURE DEVELOPMENT AREAS ALONG FALSE BAY COASTLINE (CAPE FLATS AND KHAYELITSHA/MITCHELLS PLAIN DISTRICTS)

ONDERWERP:
SNELBEPLANNINGSOORSIG VAN MOONTLIKE TOEKOMSTIGE ONTWIKKELINGSGEBIEDE AAN DIE VALSBAAIKUS (KAAPSE VLAKTE- EN KHAYELITSHA/MITCHELLS PLAIN-DISTRIK)

ISIHLOKO:
UHLAZIYO OLUKHAWULEZAYO LOCWANGCISO LOPHUHLISO OLUNOKUQHUBEKA KWIXESHA ELIZAYO KWIINDAWO EZINGAKUNXWEME LWASE-FALSE BAY (KWIZITHILI ZE-CAPE FLATS NASEKHAYELITSHA/MITCHELLS PLAIN)

3. **PURPOSE**

This report seeks endorsement from the Planning and Environment Portfolio Committee (PEPCO) for a set of sub-regional guiding principles for development relating to a stretch of the False Bay coastline (from Strandfontein Pavilion to Monwabisi) based on a rapid planning investigation into future urban development opportunities in the area.

4. **STRATEGIC INTENT**

Spatial and land use planning should aim to promote:

- *Shared Economic Growth and Development*
- *Sustainable Urban Infrastructure and Services*
- *Energy Efficiency for a Sustainable Future*
- *Public Transport Systems*
- *Integrated Human Settlements*
- *Safety and Security*
- *Health, Social and Human Capital Development*
- *Good Governance and Regulatory Reform*

City leadership in clarifying the City's expectations of development and providing development guidelines in appropriate locations along the coast upfront creates a predictable decision-making culture for development, which is in the interests of good governance and regulatory reform.

5. FOR DECISION BY

Delegated: for decision by PEPCO
The terms of reference of this committee is policy formulation and implementation monitoring within *inter alia* the following functional areas:

The Planning function which includes:
Citywide Planning & Urban Design services
(1) To develop policy relating to the functions described in terms of reference of this committee (excluding the functions listed on 37(7)) and to recommend same to the Executive Mayor.
(6) To ensure public participation in the development of policy, legislation, IDP's and budget.

(System of Delegations, City of Cape Town, June 2009)

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6. EXECUTIVE SUMMARY

Cape Town's coastline is seen as one of its greatest natural and economic assets. Relatively little urban development has occurred along False Bay, particularly the stretch of coastline between Strandfontein and Macassar. To date, apartheid policies of contained township development, as well as environmental constraints and unique climatic conditions have historically limited development along False Bay.

Recent city policy has acknowledged this historic deficiency and recommended that development appropriate to the specific context, and mindful of environmental constraints and imperatives, should be encouraged to facilitate urban development that is people-centered, is spatially and socially integrated, and which maximizes the coastline's amenity opportunities.

As a means to reflect on the possibilities for coastal development along this stretch of coastline, a rapid planning review was undertaken, focusing on a 15km stretch of the False Bay coastline between Strandfontein Pavilion and Monwabisi Coastal Resort (see Annexure A.1). This was presented to sub councils 10 and 12 in April and May of 2009 for comment and support before submission of the rapid planning review to PEPCO for endorsement (see Annexure A.7).

The outcomes of the study reflect four key, but varied, coastal nodal development opportunities at the sub-regional scale including Monwabisi, Mnandi, Bluewaters and Strandfontein Pavillion nodes. It is proposed that development of these nodes should be informed by the set of guiding principles as identified in the Chapter 8 (Discussion/Contents) of this report and that site planning within the coastal nodes take informants identified in Annexure A.5 and A.6 into consideration when developing proposals. Furthermore, it is proposed that planning resources be prioritized around the Monwabisi and Mnandi coastal nodes due to existing planning initiatives and funding allocation by the Neighbourhood Development Partnership Grant Programme and Presidential Urban Renewal Programme respectively.

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7. RECOMMENDATIONS

Delegated: for decision by PEPCO

It is recommended that:

(a) PEPCO endorse the set of sub-regional guiding principles for development relating to the stretch of the False Bay coastline (from Strandfontein Pavilion to Monwabisi) based on a rapid planning investigation into future urban development opportunities in the area;

(b) The Rapid Planning Review of potential future development areas along the False Bay coastline serve as an input to the District Planning process and local planning initiatives.

(c) That the main nodal opportunities (Monwabisi and Mnandi / Kapteinsklip) be prioritized for planning intervention due to existing initiatives and funding allocation (through the Urban Renewal and Neighbourhood Development Partnership Grant programmes respectively) for these projects.

AANBEVELING

Gedelegeer vir besluitneming deur die portefeuljekomitee oor beplanning en omgewingsake (PEPCO):

Daar word soos volg aanbeveel:

(a) Dat PEPCO die stel subgebiedsrigsnoere vir die ontwikkeling van die stuk Valsbaaikus (van die Strandfontein-paviljoen tot by Monwabisi) op grond van 'n snelbeplanningsondersoek na toekomstige stedelikeontwikkelingsgeleenthede in die gebied onderskryf.

(b) Dat die snelbeplanningsoorsig van moontlike toekomstige ontwikkelingsgebiede aan die Valsbaaikus by die distriksbeplanningsproses en plaaslikeregeringsprojekte ingevoer word.

(c) Dat die hoof- nodale geleenthede (Monwabisi en Mnandi/Kapteinsklip) die voorrang geniet vir beplanningsintervensie, aangesien dit reeds (deur die program vir stadsvernuwing, en die vennootskapsprogram vir buurtontwikkeling onderskeidelik) deur veldtogte en finansiering gerugsteun word.

IZINDULULO

Zithunyelwe kwi-PEPCO ukuba ithathe isiqqibo

Kundululwa ukuba :

(a) I-PEPCO iqinisele imithetho-siseko esisikhokelo sengingqana sophuhliso oluphathelele kwindawo engakunxweme lwe-False Bay (ukusuka eStrandfontein Pavilion ukuya eMonwabisi) esekelwe kuphando locwangciso olukhawulezayo lwamathuba ophuhliso lwedolophu kule ndawo;

(b) UHlaziyo loCwangciso oluKhawulezayo lophuhliso olunokuqhubeka kwixesha elizayo kwindawo engakunxweme lwe-False Bay liza kuba ligalelo kwinkqubo yoCwangciso lweSithili kunye naminye imisebenzi yocwangciso yale ngingqi.

(c) Amathuba apho zidibana khona ezi ndawo (Monwabisi and Mnandi / Kapteinsklip) abonwe nje ngawona aphambili kwimisebenzi yocwangciso ngenxa yokuqhubekayo kwezi ndawo ngoku kwakunye nemali ebekelwe bucala (essiibonelelo seenkqubo ze-Urban Renewal and Neighbourhood Development Partnership ngokulandelelanayo) ukulungiselela ezi projekthi.

8. DISCUSSION/CONTENTS

Cape Town's coastline is seen as one of its greatest natural and economic assets. To date, extensive development has occurred along many coastal areas in Cape Town, including: Camps Bay, Clifton, Sea Point, Hout Bay, Table View, Simonstown, Fish Hoek, Muizenberg, Strand, and Gordon's Bay. Areas that have to date not been developed face increasing development pressure.

Relatively little urban development has occurred along False Bay, particularly the stretch of coastline between Strandfontein and Macassar. This is attributable to two main reasons. Firstly, Apartheid policies of contained township development for coloured and black groups and planning approaches of the time resulted in townships along the coastline having little or no spatial relationship with the coast. Development along the False Bay coastline (FBC) over the last number of decades was limited to a number of coastal resorts that were designated for use by so-called 'non-white' residents of Cape Town. These coastal resorts include Strandfontein, Bluewaters, Mnandi, and Monwabisi.

Secondly, environmental constraints and unique climatic conditions have historically limited development along False Bay. Recent recognition of biodiversity value and maintaining connectivity of green spaces within the City has prompted the conservation of biodiversity corridors, such as the biodiversity corridor along False Bay coastline. Part of which is conserved by the Wolfgat Nature Reserve. Sea level rise is also an imminent threat to development at the coast, the impacts of which will have significant effects on existing coastal systems, built infrastructure, and property. Therefore, coastal inundation is considered as a key informant to development along the False Bay coast. Fortunately, because the primary dune system along this stretch of coastline is in a relatively good state, the impact of coastal inundation during storm surges and incremental climate change is minimal. Provided that the integrity of the coastal dune systems along the False Bay coast are maintained, development would be possible with little or no impact from coastal inundation.

To date, residents living in close proximity of the False Bay coastline remain disconnected from it. This is due in part to the limitations and decline of coastal resorts within the study area. Recent city policy has acknowledged this historic deficiency and recommended that development appropriate to the specific context, and mindful of environmental constraints and imperatives, should be encouraged to facilitate urban development that is people-centered, is spatially and socially integrated, which maximizes its amenity opportunities, and which better connects settlements such as Khayelitsha and Mitchells Plain with the coast.

As a means to confirm the possibilities for coastal development along this stretch of coastline, a rapid planning investigation was undertaken focusing on a 15km stretch of the FBC, between Strandfontein Pavilion and Monwabisi Coastal Resort (see Annexure A.1).

The focus of the rapid planning investigation is the following:

- To develop a concise synthesis of current strategy and policy imperatives, which inform development along the coast. (see Annexure A.2)
- To identify key development challenges and opportunities experienced within the study area. (see Annexure A.3).
- To define zones of development opportunity along the relevant section of the False Bay coastline. (see Annexure A.4).
- To identify a set of guiding principles that should inform any development proposals along this stretch of coastline.
- A detailed analysis of the local physical informants to development at identified zones of opportunity. (see Annexure A.6).

- To identify a set of local development guidelines, to be considered when planning development within the proposed coastal development nodes (see Annexure A.7).

The outcomes of the study reflect four key, but varied, coastal nodal development opportunities at the sub-regional scale including Monwabisi, Mnandi, Bluewaters and Strandfontein Pavillion nodes. It is proposed that Monwabisi and Mnandi be prioritized due to existing planning initiatives and funding allocation to these nodes. Monwabisi Coastal Node is a Neighbourhood Development Partnership Grant Project (NDPG) with funding allocated to the City of Cape Town by National Treasury. In this regard, the Spatial Planning and Urban Design Department is currently conducting an investigation into the feasibility of developing the broader coastal node. The Department of Sports, Recreation and Amenities is running a project (with NDPG support) focussed on upgrading amenities at the resort. Furthermore the Spatial Planning and Urban Design Department, in conjunction with the Presidential Urban Renewal Programme, is in the process of establishing a planning and urban design framework for the development of the Kapteinsklip precinct, including the Mnandi Resort area. The objective is to enhance the precinct as a destination place and new coastal development node. The process is currently at the prefeasibility stage, and upon completion will inform an implementation process.

It is proposed that the following guiding principles for development at the sub-regional and local scale, inform development proposals along the False Bay Coastline and within coastal development nodes respectively. These are informed by an understanding of context and planning imperatives.

- **Guiding Principle 1: Promote nodal development in identified zones of opportunity:** All development should be nodal rather than strip development and should be situated in the zones of highest opportunity as identified in the preceding analysis. These nodes include Strandfontein Pavilion, Mnandi, Monwabisi and Blue Waters coastal resorts.

- **Guiding Principle 2: Maintain a continuous east west ecological corridor:** East-west biodiversity connectivity (especially for faunal movement) must be maintained. Strandveld corridors connecting larger remnants should be a minimum of 200m wide to sustain ecological functioning. Faunal corridors of Strandveld vegetation should be a minimum of 20m wide with a buffer of 25m on either side. This amounts to a minimum combined corridor width of 70m to ensure connectivity for faunal species.

- **Guiding Principle 3: Ensure public access to and along the coast is maintained:** Public access to the coast should be a foremost consideration in any development proposal for coastal nodes. Infrastructure that facilitates public access and experience of the coastline such as boardwalks, hiking trails and viewing platforms are critical. No privatisation of the coastline to the detriment of public access to and along it should be considered.

- **Guiding Principle 4: Address inequities through promoting active, diverse and safe coastal nodes which become destination places:** The coastal nodes should become vibrant people places. The coastal nodes should be considered as distinct from each other and could reflect varying roles which should be a response to local contextual conditions and need.

  Public recreational and tourism opportunities should be the key component of the coastal nodes. Activities that maximise people's experience of the coastline are envisaged. These should aim to provide recreational, social and local economic opportunity in areas where they are greatly needed.

Residential development and intensification of underdeveloped areas should be pursued as a means to create the necessary thresholds to support such destination places.

Safety and security in respect of any development along the FBC should receive priority. High intensity mixed-use development within appropriate areas of coastal nodes should be promoted to facilitate/maximise surveillance.

- **Guiding Principle 5: Design with due regard for coastal processes:** At nodal development areas environmental constraints (wind, sand, storm surges, coastal inundation/sea level rise, etc.) and coastal processes must be key informants to development guidelines and local design considerations. In particular, shelter from the elements and maintenance of infrastructure should be afforded careful consideration to ensure sustainability from a maintenance perspective.

  Roads in an east west direction in close proximity to the frontal dune system should be avoided along this coastline as they cannot be sustainably managed, given the mobility of sand in particular. North south access roads should be promoted to provide access to coastal nodes.

  A minimum buffer of 50m from primary dune areas should be respected to ensure that development impact on coastal processes is mitigated as far as possible.

- **Guiding Principle 6: Maintain visual quality along the False Bay coast:** The scenic beauty of the FBC is a significant asset, which needs to be managed effectively. Mitigating visual impact should be given attention in visually sensitive areas.

  The scenic drive status of Baden Powell Drive should be a consideration in any development proposal and the visual impact of development along this route should be carefully considered. Furthermore, areas with the potential to enable the visual experience of the FBC by the public should be enhanced, and made secure for public enjoyment.

The rapid planning investigation also identifies informants, at the site level, which should be considered in the development of nodal development proposals. (see Annexure A.6 and A.7).

8.1. Constitutional and Policy Implications

All relevant constitutional and council policy informants have been considered in undertaking this investigation.

8.2. Environmental implications

Does your report result in any of the following:

No ☐

Yes (if yes, please complete the section below by clicking on the relevant tick boxes)

Loss of or negative impact on natural space and/or natural vegetation, rivers, vleis or wetlands?	☐	Loss of or negative impact on the city's heritage, cultural and scenic resources?	☐
An increase in waste production or concentration, pollution or water usage?	☐	Development or any construction within 500m of the coastline?	☒

Does your activity comply with the National Environmental Management Act (NEMA)?
(mark by clicking on the tick box)

Yes ☒ No ☐

Does your report complement and support the City's approved IMEP strategies?
(if yes, please select from list below by clicking on the relevant tick box)

Biodiversity Strategy and Biodiversity Network	☒	Coastal Zone Management Strategy	☒	Energy and Climate Change Strategy	☒
Environmental Education and Training Strategy	☐	Heritage Management Strategy	☐	Air Quality Management Plan	☐
Integrated Waste Management Strategy	☐	Invasive Species Strategy	☐		

Do the activities/actions arising from your report:
(if yes, please select from list below by clicking on the relevant tick box)

Enhance Cape Town's unique environmental assets?	☒	Negatively impact on Cape Town's unique environmental assets?	☐

8.3. Legal Implications

This report is an investigation into the potential for development along the False Bay Coastline. Guidelines are proposed and no steps are required to comply with any legal requirements. Legal informants, insofar as they are relevant to this environment, were taken into account as part of the preparation of the report.

8.4. Staff Implications

Does your report impact on staff resources or result in any additional staffing resources being required?

No ☒

Yes ☐

8.5. Risk Implications

Does this report and/or its recommendations expose the City to any risk?
(i.e. does it have any adverse influence on service delivery?)
No ☒
Yes ☐

8.6. Other Services Consulted

Department of Environmental Resource Management: Biodiversity Management Branch (Dr. Patricia Holmes – tel: 021 514 4170)

Department of Environmental Resource Management (Ms. Janet Bodenstein – tel: 021 487 2133

Spatial Planning and Urban Design Department: Metropolitan Spatial Planning Branch (Mrs. Anele Horn – tel: 021 400 2161)

Department of Sports, Recreation and Amenities (Mr. Joe Olivier - tel: 021 400 4181).

These departments have supported the proposed development guidelines and provided input and comment regarding this rapid planning review.

ANNEXURES

Annexure A1:	The study area (Map)
Annexure A2:	Strategy and policy imperatives
Annexure A3:	Summary of the key development challenges and opportunities
Annexure A4:	Zones of opportunity
Annexure A5:	Local informants: Coastal Nodes
Annexure A6:	Local guidelines: Coastal Nodes
Annexure A7:	Subcouncil meeting minutes

FOR FURTHER DETAILS CONTACT :

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DIRECTORATE	*Strategy and Planning*
FILE REF NO	
SIGNATURE : DIRECTOR	

☑ REPORT COMPLIANT WITH THE PROVISIONS OF COUNCIL'S DELEGATIONS, POLICIES, BY-LAWS AND ALL LEGISLATION RELATING TO THE MATTER UNDER CONSIDERATION.

LEGAL COMPLIANCE

☐ NON-COMPLIANT

COMMENT :

DATE 21 July 2009

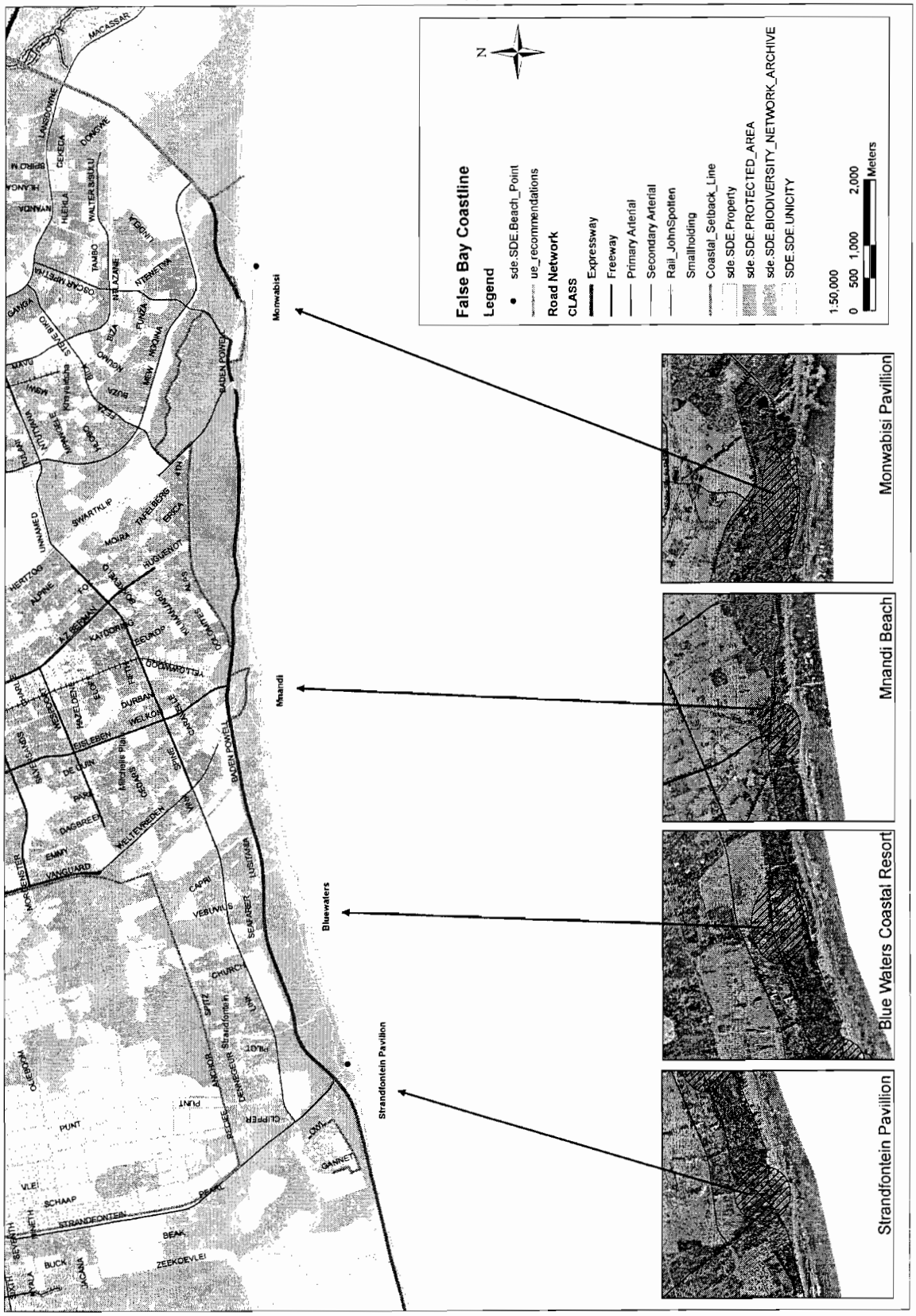
EXECUTIVE DIRECTOR
PIET VAN ZYL

Comment:

For review and approval by PEPCO.

DATE 23.07.2009

ANNEXURE A.1 – The study area



City-wide policy and planning frameworks that inform the development of the False Bay Coast include:

- Future Cape Town: An argument for the long-term spatial development of Cape Town (2006);
- City of Cape Town: Coastal Zone Management Strategy (2003);
- The Biodiversity Strategy (2003);
- Draft City of Cape Town - Coastal Development Guidelines report (2007);
- Draft City Development Edges Policy: Urban and Coastal Edge (April, 2009) and
- Draft Cape Town Spatial Development Framework and Draft District SDP/EMF Documents (Districts F and G)

All of the abovementioned documents subscribe to the vision of managing this coastline in an innovative and integrated manner that will ensure the environmentally sustainable functioning of its natural systems while optimizing its economic and social benefits (CoCT (b), 2005/06). There is also general alignment with reference to the principles relating to the "meeting of the coast."

Two key high level spatial directives emanating from the abovementioned policy and planning frameworks reviewed are clear:

- Firstly, meeting the coast should involve the creation of special people places. Celebrating the coast as a city destination place supports citywide policy imperatives of creating more great people places. Appropriate development at the coast contributes to the unique sense of place of Cape Town by creating new special places.
- Secondly, the creation of special people places should carried out while creating and maintaining a "functional coastal biodiversity corridor". We need to be mindful of the biodiversity imperatives of this significant coastal asset so that this great opportunity can be enjoyed by present and future generations.

ANNEXURE A.3 - Summary of the key development challenges and opportunities

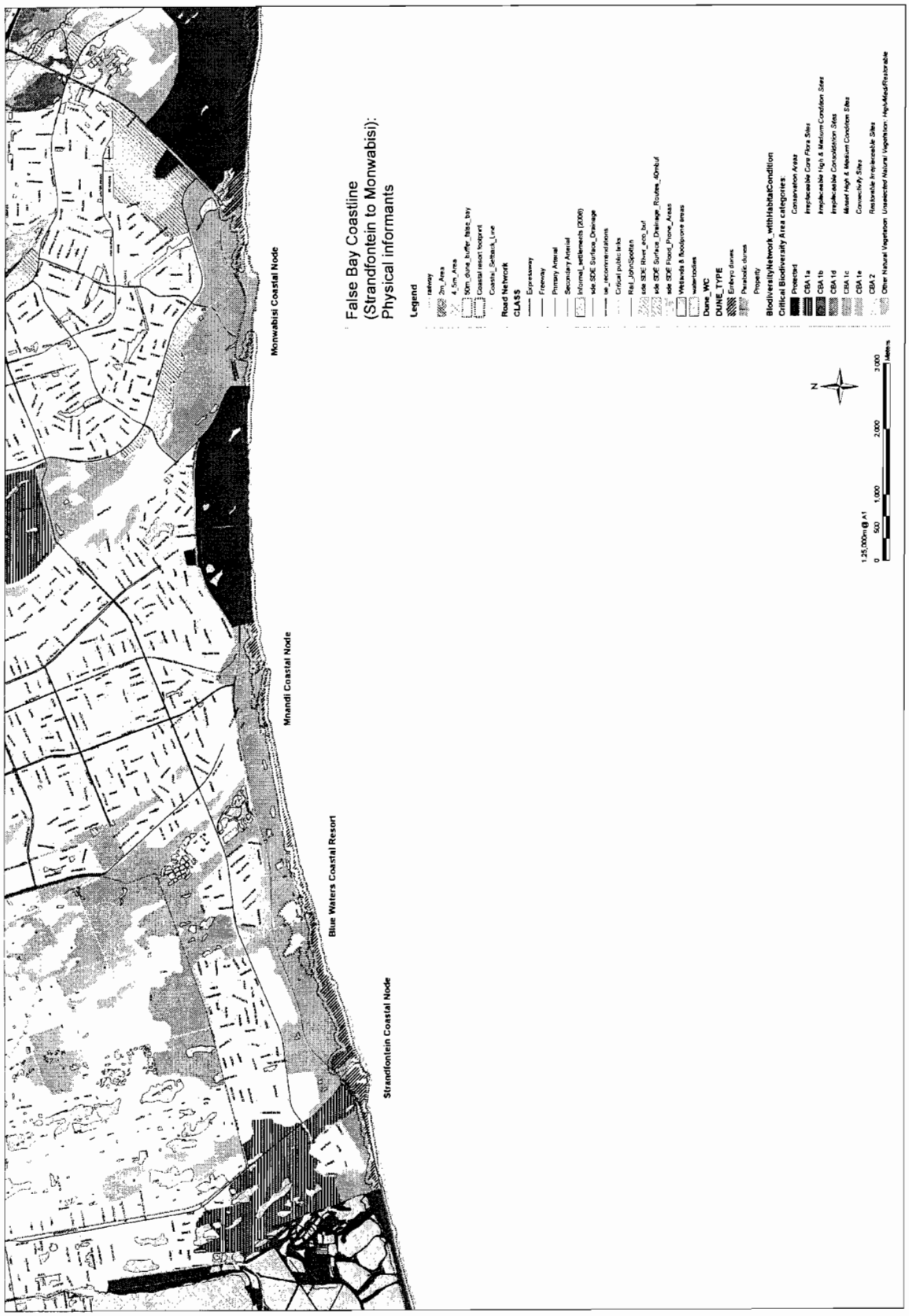
The following key development challenges and opportunities have been identified in respect of analysis of the sub-regional physical informants to development within the study area. Physical informants analyzed include coastal primary dune areas and associated buffers, coastal inundation and storm surge areas, topography, critical biodiversity areas, access and movement desire lines, settlement patterns, and existing infrastructure and coastal resort footprints (see figure below – False Bay physical informants: Strandfontein to Monwabisi).

(i) Challenges

- Achieving balance between the need for development and the maintenance of the integrity of a biodiversity corridor and other biophysical systems is a key challenge. Maintaining and enhancing a green corridor along the False Bay coast is seen as critical given the City wide importance of the False Bay coastline as one of the last remaining major ecological corridors.
- Limited physical linkage between communities and existing underdeveloped coastal recreation areas needs to be addressed. Development aimed at creating better access to the coast should actively seek means to create more accessible, safer and mixed use destination places that are sustainable and that enhance communities" (particularly poor communities) experience of the coastline.
- The inherent tension between the need to protect nature areas and the imperative to meet the coast to create 'great people places' requires careful consideration in determining guidelines for development in coastal nodes.
- Lack of safety and security along the FBC and particularly at existing coastal recreation nodes is a significant constraint. Mono-functionality of the existing resorts results in limited thresholds in terms of the users of these areas throughout the year.
- Land invasion, especially between Monwabisi and Khayelitsha remains a risk given the uncertainty over the future of this area. Ever-increasing levels of urbanisation and an escalating housing backlog means that land invasion will increase over time.

(ii) Opportunities

- Maintaining the integrity of the False Bay coastal biodiversity corridor between coastal development areas presents key recreational opportunities such as recreational walks on hiking trails and boardwalks, environmental education, lookout points and scenic views etc. The minimum corridor width for Dune Strandveld vegetation connecting larger remnants is 200m, with an accepted width of 70m to maintain connectivity for faunal movement where the east-west corridor intersects with coastal development nodes.
- Higher intensity activities of a mixed-use nature at coastal nodes could create the necessary preconditions to promote thresholds to support well functioning destination places. This will have a positive impact on the current safety and security challenge. Disturbed areas and existing infrastructure at coastal resorts present opportunities for higher intensity mixed land uses.
- Baden Powell Drive is identified as a scenic drive. Appropriate development at certain coastal nodes along its length could create destination points along its course, thereby further enhancing the functionality of the route as a scenic route. The City of Cape Town: Scenic policy guidelines should be considered when compiling detailed planning frameworks for identified zones of opportunity.
- Sea-level rise is a real threat to all coastal areas, both natural and developed. However, the advantage of the False Bay Coastline lies in the primary dune systems, which provides protection to areas landward of the dunes. Design and development with due regard for coastal processes will enable sustainable development along the False Bay Coast.


False Bay Coastline
(Strandfontein to Monwabisi):
Physical informants
Legend
railway
2m_Area
4.5m_Area
50m_dune_buffer_false_bay
Coastal resort footprint
Coastal_Setback_Line
Road Network
CLASS
Expressway
Freeway
Primary Arterial
Secondary Arterial
Informal_settlements (2006)
sde.SDE.Surface_Drainage
we_reconnaissance
Critical public links
Rail_JohnSpotten
sde.SDE.River_and_buf
sde.SDE.Surface_Drainage_Routes_40mbuf
sde.SDE.Flood_Prone_Areas
Wetlands & floodplains areas
waterbodies
Dune_WC
DUNE_TYPE
Embryo dunes
Parabolic dunes
Property
BiodiversityNetwork_withHabitatCondition
Critical Biodiversity Area categories:
Protected
Conservation Areas
CBA 1a
Irreplaceable Core Flora Sites
CBA 1b
Irreplaceable High & Medium Condition Sites
CBA 1d
Irreplaceable Consolidation Sites
CBA 1c
Mixed High & Medium Condition Sites
CBA 1e
Connectivity Sites
CBA 2
Restorable Irreplaceable Sites
Other Natural Vegetation
Unrestricted Natural Vegetation: High/Med/Restorable
N
1:25,000 @ A1
0
500
1,000
2,000
3,000
Meters
Monwabisi Coastal Node
Mnandi Coastal Node
Blue Waters Coastal Resort
Strandfontein Coastal Node

ANNEXURE A.4 – Zones of opportunity

Taking into consideration the key challenges and opportunities, as well as the key policy and planning imperatives, it is apparent that specific zones of opportunity can be identified. Each of the zones shares a number of common characteristics in that they are areas in which the key opportunities identified are present. They present opportunities to optimise meeting the coast in a manner that respects existing natural systems and maximises linkages with adjacent communities.

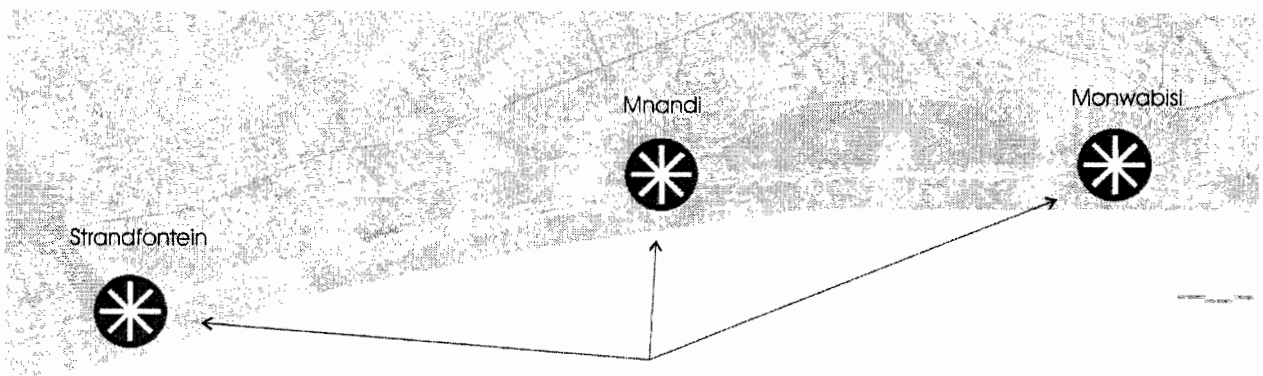
The rationale for identifying these coastal development zones includes:

- Areas that will facilitate nodal development at the coast as opposed to strip development
- Focussing on existing areas of environmental disturbance and existing infrastructure.
- Minimising potential impacts on dynamic coastal processes and critical biodiversity remnants.
- Capitalising on areas with high levels of accessibility within the study area (transport routes of sub-metropolitan and metropolitan significance)

The zones of higher intensity coastal development opportunity include (see figure below – coastal development zones of opportunity):

- Strandfontein Pavilion
- Mnandi Beach Resort,
- Monwabisi Coastal Resort.

It is envisaged that these locations accommodate high intensity mixed use activities that promote the creation of higher intensity destination places in meeting the False Bay coast. Blue Waters Resort and Promenade represents a lower intensity coastal development zone of opportunity due to its suitability (less accessible, more exposed to environmental processes etc) as a predominantly recreation and tourism node.



Coastal Development Zones
of Opportunity

ANNEXURE A.5 – Local Informants: Coastal Nodes

The following section is an extract from the False Bay Coastal Investigation technical report, which identifies the local physical informants in relation to identified zones of opportunity. These informants form the basis for determining development guidelines for each of the coastal nodes.

A.5.1 Monwabisi Coastal Node

At the local scale the following informants are applicable (refer to figure A.5.1):

- Relief (steep hill slopes; gentle slopes)

Most of the landscape in this zone consists of undulating plains. A larger dune ridge is situated to the immediate south of Mew Way, extending southwards from Monwabisi Park informal settlement to the primary dune system to the east of Monwabisi Resort. The area to the north of Mowabisi Resort on the landward side of Baden Powell Drive is of a gentler gradient, and may be better suited to development.

- Primary dunes

The extent of primary/embryonic dunes is limited within the Monwabisi Coastal Node area as this part of the coastline is made predominantly of rocky outcrops. There has been limited development in proximity to these dunes, thus they are in a relatively good condition. Future development should continue to respect a 50m buffer from primary dune areas.

- Flood prone areas

Due to the levels of protection provided by the primary dune system and the rocky coastline at Monwabisi Coastal Node, the area is at low risk from inundation and storm surge flooding. A stormwater detention pond exists south of Enkanini Informal Settlement, between Mew Way and Baden Powell Drive. The seepage from the detention pond flows southwards towards the ocean to the east of Monwabisi Resort.

- Green links

'High & medium condition' biodiversity sites are located within the Monwabisi Coastal Node. Ecological corridor linkages are required in this area to maintain biodiversity connectivity

- Movement desire lines

A strong desire line of movement exists between Monwabisi Park informal settlement and Monwabisi Resort. This desire line extends through harsh natural terrain and presents the opportunity to provide direct access with active land use interfaces fronting onto it.

- Informal settlements

The expansion of Monwabisi Park informal settlement south of Khayelitsha, on the seaward side of Mew Way, has resulted in increased development pressure on the biodiversity corridor at Monwabisi Coastal Node. Since Baden Powell runs relatively close to the coast at Monwabisi Coastal Node, it has been easier for informal settlements to expand southwards towards the coast.

- Existing areas of disturbance

Facilities existing at the resort include the beach and tidal pool area, an administration office, braai facilities, and a caravan park and overnight chalets. The footprint of Monwabisi Coastal Node is quite extensive due to the overnight camping facilities and chalets and other day recreation facilities.

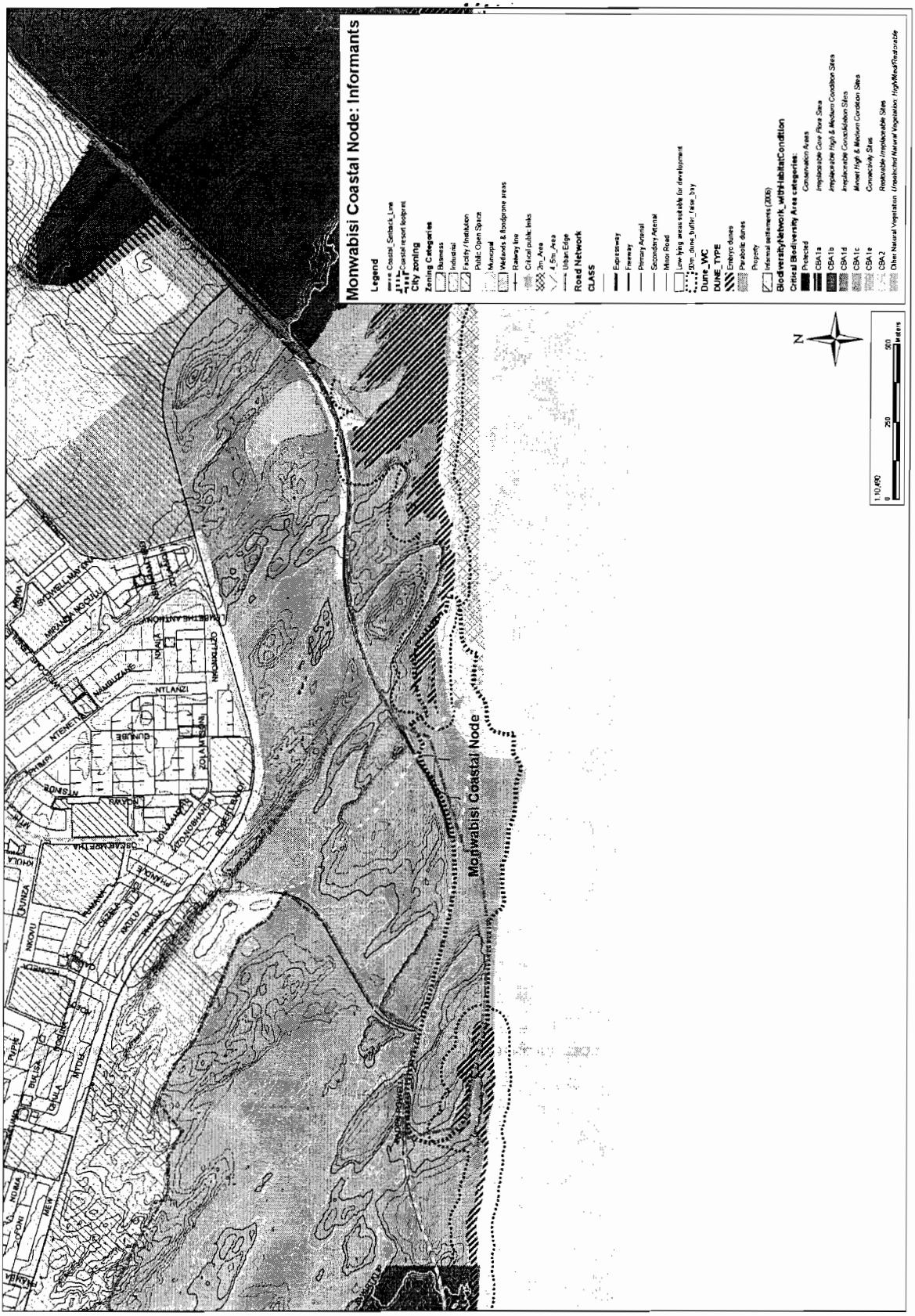


Figure A.5.1: Monwabisi Coastal Node - Informants

A.5.2 Mnandi Coastal Node

At the local scale the following informants are applicable (refer to figure A.5.2):

- Relief (steep hill slopes; gentle slopes)

Steep dune slopes exist within the Mnandi precinct, separating Mnandi coastal node from Kapteinsklip. The existence of these steep dune slopes reinforces the scenic quality of Baden Powell Drive.

- Primary dunes

Primary/embryonic dunes are not prevalent within the Mnandi Coastal Node area as this part of the coastline comprises predominantly rocky outcrops. Impact levels on existing primary dunes are low to moderate due to limited development impact.

- Flood prone areas

Due to the levels of protection provided by the primary dune system and the rocky coastline at Mnandi Coastal Node, the area is at low risk from inundation and storm surge flooding.

- Green links

The Mnandi Coastal Node is located within a 'high & medium condition' biodiversity site. An east-west ecological corridor linkage needs to be determined in this area to maintain biodiversity connectivity. A corridor link may be most appropriate along the southern boundary of Baden Powell Drive since this area is mostly covered by steep hill slopes.

- Movement desire lines

A strong desire line exists between Kapteinsklip Station and Mnandi Coastal Node. This desire line is enhanced by the pedestrian bridge linking these precincts across Baden Powell Drive. However, since there is no form of activity along this desire line, pedestrian movement during times of low activity is unsafe.

- Informal settlements

A small informal settlement exists on City-owned land north of Baden Powell Drive in close proximity of Kapteinsklip Station. Since there is no immediate planning for the area, the potential expansion of this informal settlement is a quite tangible threat to future development within the node.

- Existing areas of disturbance

Existing facilities available at the resort include the Mnandi Blue Flag Beach area, day recreation facilities, and extensive parking facilities. Facilities are scattered throughout the Mnandi Coastal Node are in relatively good condition and are in keeping with the standard of Mnandi Blue Flag Beach.

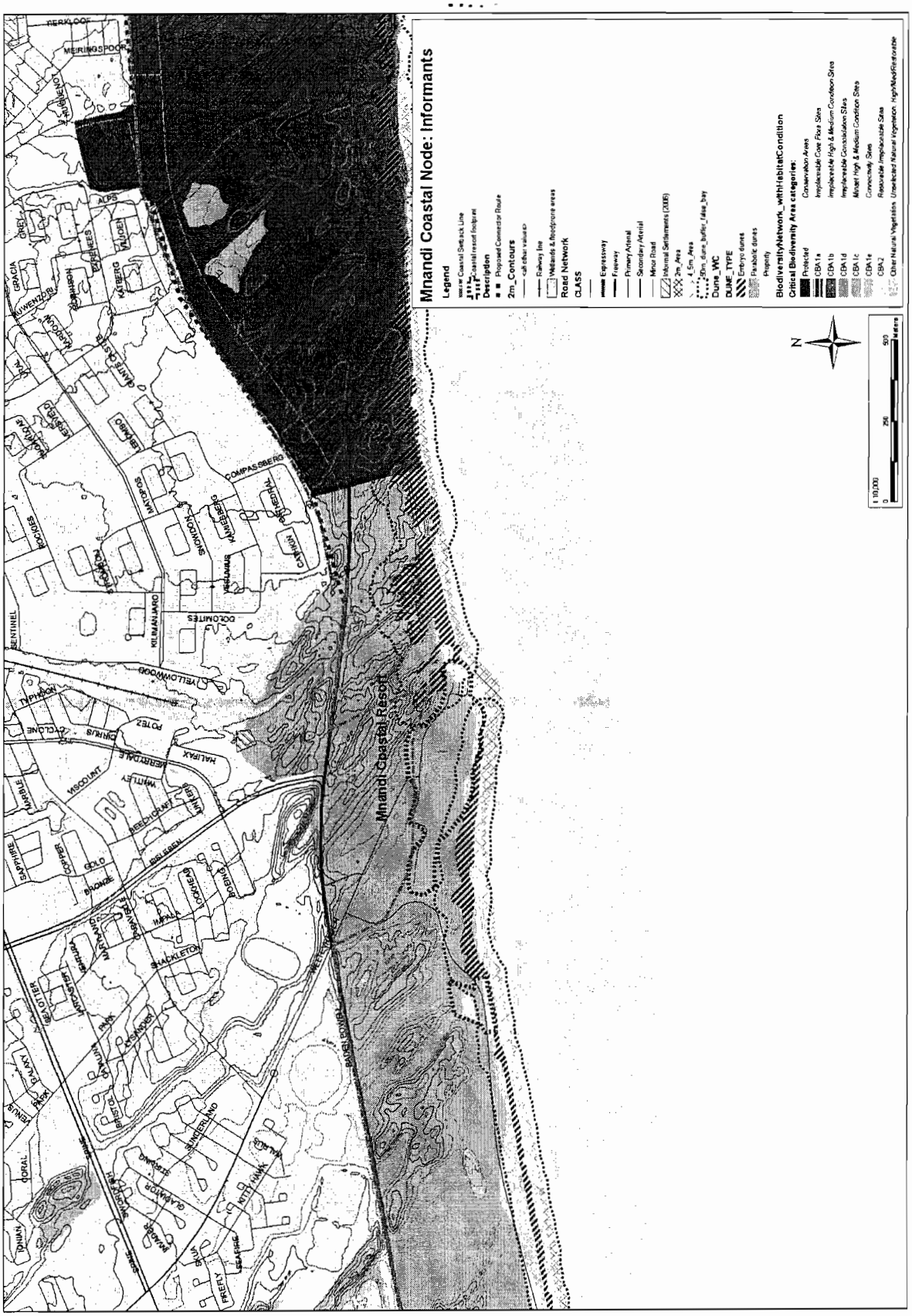


Figure A.5.2: Mnandi Coastal Node - Informants

A.5.3 Strandfontein Pavilion Coastal Node

At the local scale the following informants are applicable (refer to figure A.5.3):

- Relief (steep hill slopes; gentle slopes)

Relief is a significant informant to areas suitable for development. 2m contours, used to analyze the relief for the area indicate that steep slopes exist along the eastern side of Strandfontein Road (between Spine Road and Baden Powell Drive), with the primary ridge lines extending northwards into the False Bay Ecology Park and into Philippi.

Other slopes exist to the east of Strandfontein Sports Complex. These are major informants to the determination of functional ecological corridor links. Areas of gentler gradient should be considered more for development.

- Primary dunes

Primary/embryonic dunes are prevalent within the Strandfontein Resort area. These areas are partially vegetated and dissected by roads. Primary dunes have been moderately impacted on by urban development within the coastal node.

- Flood prone areas

Low-lying areas prone to flooding exist south of the Strandfontein Sports Complex. However, these are isolated depressions which do not form part of any larger watercourses or wetland systems.

Certain areas within the existing Strandfontein Resort footprint are prone to inundation during storm surges. However, the impacts of storm surges on the coastal node are moderate due to the integrity of the primary dune system.

- Green links

Parts of the Strandfontein Coastal Node are identified as 'high & medium condition' sites (refer to figure 6). These sites are selected areas in terms of national biodiversity targets. They require further articulation in terms of functional ecological connectivity in terms of physical analysis of the area.

- Movement desire lines

Currently, the coastal node is dislocated from the Strandfontein Community. Pedestrian and NMT links are virtually non-existent. However, footpaths are visible between the pavilion area and Strandfontein Sports Complex.

In addition, Camp Street is a tarred road, which provides vehicular access to Strandfontein coastal node. Camp Street does not provide vehicular access onto Baden Powell Drive as it passes underneath it. Other desire lines to the coast are visible from Pelikan Heights. It is most likely that these are unsafe passages for pedestrians.

- Informal settlements

A small informal settlement exists on City-owned land north of Baden Powell Drive and west of Camp Street. Since there is no immediate planning for the area, the potential expansion of this informal settlement presents a tangible threat to land suitable for development as well as the existing biodiversity corridor.

- Existing areas of disturbance

The existing Strandfontein coastal resort footprint constitutes an area of existing disturbance and could present opportunities for development. Existing facilities available at the resort include a tidal pool, a concrete berm/windbreak, a beach office, ablution facilities, and substantial parking

facilities. Structures are scattered throughout the resort area with extensive grass embankments in between.



Figure A.5.3: Strandfontein Coastal Node - Informants

A.5.4 Blue Waters Coastal Resort

At the local scale the following informants are applicable (refer to figure A.5.4):

- Relief (steep hill slopes; gentle slopes)

This section of the FBC is a relatively flat plain. Blue Waters Coastal Resort is partially protected by the parabolic dunes in the coastal zone, which provide sheltered from cold on-shore winds at night. Most of the Blue Waters overnight accommodation (chalets and camping areas) are found within this protected zone.

- Primary dunes

Extensive embryonic dune systems defend this stretch of the coast. However, these are significantly impacted on by built infrastructure. The Middelbank Promenade area is situated directly within the primary dune system up to the high water mark. In addition, Lukannon Drive, linking Strandfontein and Mnandi Coastal Nodes, and providing access to Blue waters Resort, dissects the Primary dune system and is often covered by windblown sand.

- Flood prone areas

The coastal zone at Blue Waters is fairly well protected from inundation by the primary dune system. There are a few isolated depressions on the landward side of the dunes which are prone to flooding.

- Green links

With the exception of the Blue Waters Resort area, this stretch of the coastal zone is identified as a 'high & medium condition' site. These sites are selected areas in terms of national biodiversity targets. They require further articulation in terms of functional ecological connectivity in terms of physical analysis of the area.

It is proposed that the existing resort footprint be rationalised to a more contained and manageable size. This will free up more land for rehabilitation of natural vegetation.

- Movement desire lines

Like Camp Street to the west of Blue Waters, Nautilus Road is an underpass with no road access being provided onto Baden Powell Drive. Nautilus Road to the east of Blue Waters provides direct access from Strandfontein to the coast.

At present, road access to Blue Waters Resort can only be obtained via Lukannon Drive between Strandfontein and Mnandi Coastal Nodes. This is problematic as Lukannon Drive is plagued by windblown sand, which has to be cleared regularly to keep the road open. This road is also unsafe, especially at night, as there is no lighting and there is very little activity apart from fishermen.

Salerno Way, which extends from Spine Road to Baden Powell Drive, is viewed as a critical movement desire line. The possible extension of Salerno Way to meet the road infrastructure at Blue Waters Resport would provide the opportunity for access to the Resort to be obtained from Baden Powell Drive.

- Existing areas of disturbance

Blue Waters is a predominantly recreational node. Infrastructure at Blue Waters Resort is currently scattered over a large footprint. The level of disturbance is moderate. Existing facilities and activities include a caravan park and chalets, staff housing, Department of Sports, Recreation and Amenities district offices, Blue Waters Life Saving Club (Beach area), braai areas on the seaward side of Lukannon Drive (Beach area).

The Blue Waters Resort was developed under the Apartheid Separate Amenities Act, No. 49 of 1953, which forced 'non-white' persons to use the resort, with the result of a false market being created for it. These days the resort is not seen as an attraction for most middle income holiday-makers. However, there is still some level of usage by the lower income segment of the market. More recently, a temporary refugee camp has been established to accommodate the overflow of foreign migrants to the city.

Structures are scattered over a large footprint, making inefficient use of available land. Extensive grassed areas exist on the periphery used for camping and daily recreation activities such as braaing and picnicking. Only certain portions of these areas are being maintained, while others have been overgrown with natural vegetation.

Infrastructure at Blue Waters Promenade area is a significant disturbance to coastal processes, especially embryonic dune movement. The promenade is highly visible and the towers are used as lookout points. This area is especially prone to vandalism (graffiti, theft, etc.) and vagrancy due to the general lack of activity limited to fishermen. There are a number of under-utilised parking areas along Lukannon Drive.

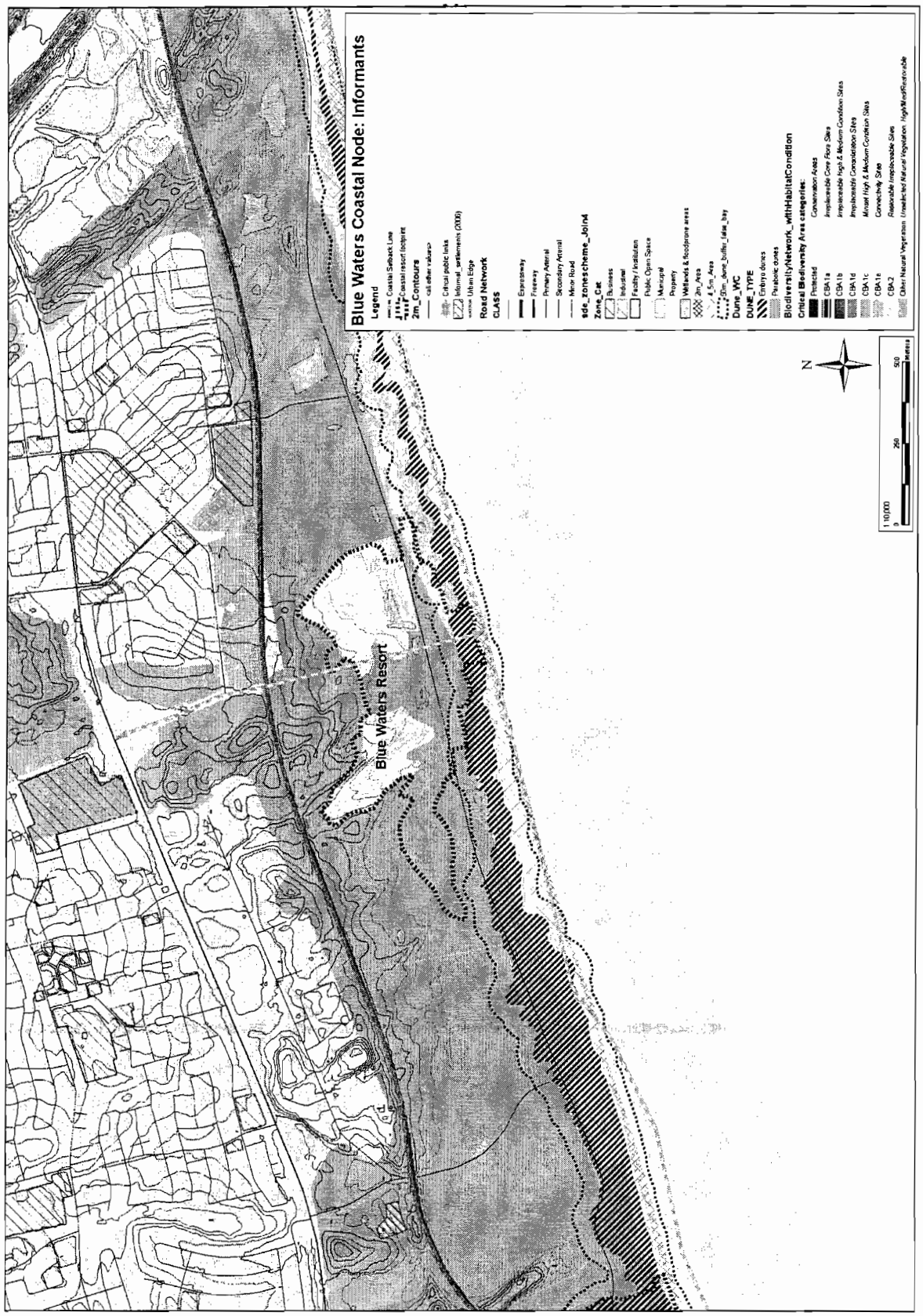


Figure A.5.4: Blue Waters Coastal Node - Informants

Annexure A.6 - Local Guidelines: Coastal Nodes

The purpose of this section is to provide localised development guidelines that reflect an understanding of the local context of the proposed coastal development nodes.

A.6.1 Monwabisi Resort

Local guidelines are developed in terms of generalised sub-regional guidelines for development (refer to figure A.6.1):

(1) Maintain a continuous east-west biodiversity corridor

a. Any development proposals in relation to the node should maintain and enhance a functional green link connecting Wolfgat Nature Reserve and Macassar Dunes Nature Reserve, running along the southern edge of Monwabisi Park Informal Settlement.
b. The biodiversity corridor should extend along the major dune ridge in a south-easterly direction towards the eastern edge of the Monwabisi Coastal Node.

(2) Ensure public access to and along the coast is maintained

a. A new access to the resort area off Oscar Mpetha Road, should be considered to provide direction public access to the focal point of the resort area tidal pool).
b. Safe north-south pedestrian movement should be prioritized between Khayelitsha and the resort area as part of any development proposals.
c. Any development proposal should enhance opportunity for public access along the coastline. This should be focussed on clearly demarcated footpaths designed so as to reduce impact on sensitive environments.

(3) Promote active, diverse and safe coastal nodes which become destination places

a. Promote active multi-functional places supporting higher thresholds for public services and public facilities:

- The broader nodal area should be developed as a high density mixed use coastal node linked to Khayelitsha via a development corridor. This type of development should occur in identified areas to the north of Baden Powell Drive.

b. Safe public destination places which promote tourism development

- Development within the existing resort footprint of Monwabisi should the focus on public facilities, tourism infrastructure which could include low impact or sensitively designed overnight accommodation. This development should contribute to the destination role of the resort.
- Existing resort buildings should be upgraded or reused where appropriate.

(4) Design with due regard for coastal processes

a. The beach area around the tidal pool as well as grass areas within the primary dune system should be rehabilitated. Protected natural dune corridors should serve as connectors of protected areas.
b. Active open space activities should be used as transitional areas between natural areas and urban development.
c. New development should avoid sensitive areas around the coastal cliffs to the west of the resort area.

(5) Maintain visual quality along the False Bay coast

a. The visual sensitivity of the Baden Powell scenic drive should be responded to when developing in proximity of this alignment.

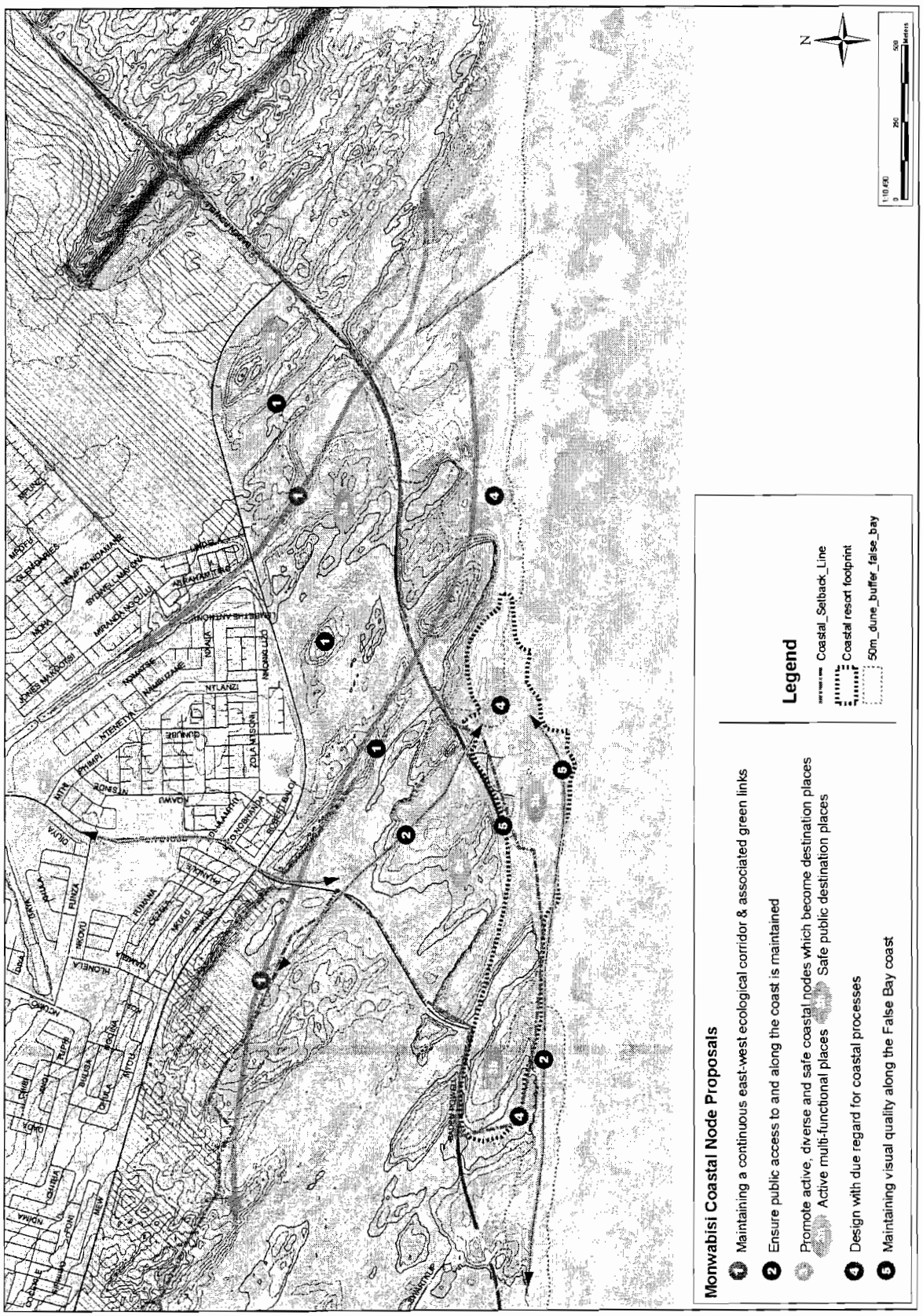


Figure A.6.1: Monwabisi Coastal Node - Proposals

A.6.2 Mnandi

Local guidelines are developed in terms of generalised sub-regional guidelines for development (refer to figure A.6.2):

(1) Maintain a continuous east-west biodiversity corridor

a. An east-west biodiversity link along the southern edge of Baden Powell Drive should be maintained. This alignment coincides with the major dune ridge running through Mnandi Coastal Node.
b. Biodiversity outside the coastal node between Baden Powell Drive and the high water mark should be protected. This includes embryonic dunes within this area.

(2) Ensure public access to and along the coast is maintained

a. NMT access from Kapteinsklip Station to Mnandi Coastal Node should be enabled and strengthened by new development within the precinct.
b. Public access along the coastline should be retained as an integral element of the any development proposal.

(3) Promote active, diverse and safe coastal nodes which become destination places

3a Active multi-functional places supporting higher thresholds for public services and public facilities:

- Land north of Baden Powell Drive (Kapteinsklip Station Precinct) should be developed in accordance with transit-oriented development principles to encourage a vibrant mixed use station precinct.
- Development relating to the resort area should include higher intensity mixed use activity promoting increased activity within the coastal node. Positive relationships should be ensured between development and upgraded public areas (resort and beachfront areas).

3b Safe public destination places which promote tourism development

- The existing resort footprint of Mnandi should be upgraded and public spaces and facilities enhanced with low intensity recreational and tourism infrastructure. This will reinforce the status of Mnandi Beach as a 'blue flag' beach and increase the tourism potential of the area.

(4) Design with due regard for coastal processes

a. The major dune ridge running in a south-easterly direction from the eastern section of Mnandi Coastal Node to the Baden Powell/Eisleben t-junction should be protected.
b. Embryonic dunes as well as the identified 50m dune buffer should be protected from any urban development. Therefore, development along the southern edge of the resort area should be managed to facilitate an appropriate transition between urban development and the coast.
c. The possible partial closure of Lukannon Drive should be investigated to encourage the rehabilitation of the embryonic dune system along this stretch of the coast and reinforce north-south links as the access to the coast.

(5) Maintain visual quality along the False Bay coast

a. The visual sensitivity of Baden Powell Drive should be adhered to by wrapping development around the existing Mnandi Resort footprint.

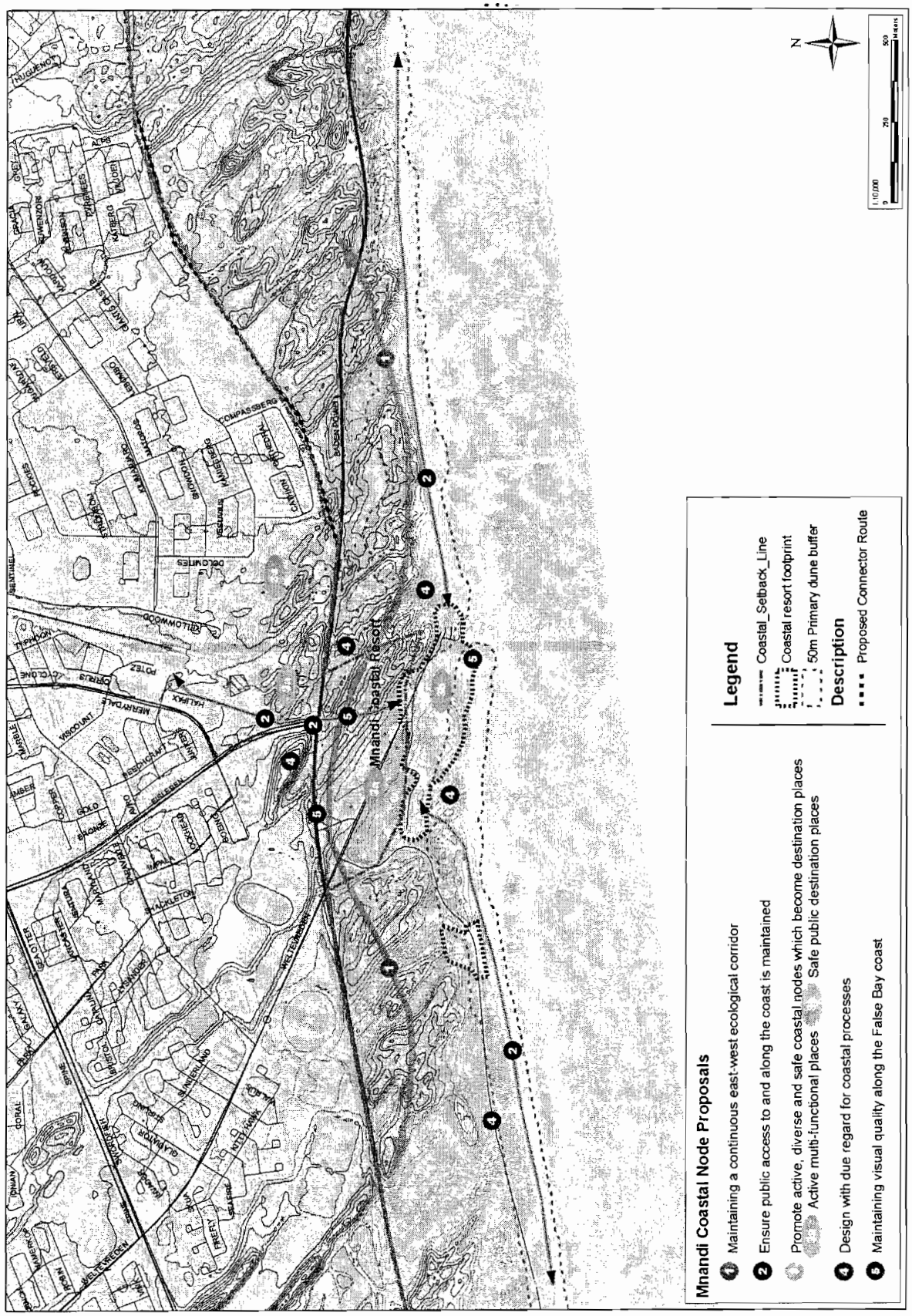


Figure A.6.2: Mnandi Coastal Node - Proposals

A.6.3 Strandfontein

Local guidelines are developed in terms of generalised sub-regional guidelines for development (refer to figure A.6.3):

(1) Maintain a continuous east-west biodiversity corridor

a. An east west biodiversity corridor should be maintained in the area between the eastern edges of Pelican Heights and the Strandfontein Sports Complex, and the southern edge of Pelikan Heights and the high water mark up to Strandfontein Coastal Node. The corridor should also include the dune ridge running between Strandfontein Road and the western boundary of the Strandfontein Sports Complex. The alignment of the biodiversity corridor should run along the seaward side of Baden Powell Drive where it intersects with Strandfontein Coastal Node, and continue along the landward side of the primary dune to the east of the coastal node.

(2) Ensure public access to and along the coast is maintained

a. NMT access between Strandfontein Sports Complex and Strandfontein Coastal Node should be enabled by new development in and around the resort area.
b. Public access along the coastline should be retained as an integral element of the development proposal

(3) Promote active, diverse and safe coastal nodes which become destination places

3a Active multi-functional places supporting higher thresholds for public services and public facilities:

- South of Spine Road, North of Baden Powell Drive, west of Camp Road and east of the dune, and adjacent to the eastern edge of the Strandfontein Sports Complex.
- East of the ridge, which is adjacent to the eastern edge of Strandfontein Road, south of the southern boundary of the Strandfontein Sports complex, north of Baden Powell Drive and west of the dune ridge identified east of the Strandfontein Sports complex.
- West of Camp Road, south of Baden Powell Road and north of the proposed east west green link (which is proposed approximately 50m north of Lukannon Drive), east of the existing eastern edge of the coastal resort and
- The area east of Camp Road, south of Spine Road and north of Baden Powell Drive comprises underdeveloped land which is home to various public institutions. The land is owned by the City of Cape Town and is leased to these institutions. The ad hoc and disjointed nature of the development has resulted in sub-optimal use of the land and thus it is proposed that the land is redeveloped and land uses intensified. This should be a mixed use precinct.

3b Safe public destination places which promote tourism development

- Urban development should seek to create a positive interface and well defined edge to the Strandfontein sports complex.
- Low intensity recreational and tourism infrastructure should focus within the disturbed area within the resort footprint.

(4) Design with due regard for coastal processes

a. Major dune ridges running along the eastern edge of Strandfontein Road between Strandfontein Road and the western edge of the Strandfontein Sports Complex and and to the western edge of the Strandfontein Sports Complex south of Spine Road and north of Baden Powell Drive should not be developed.
b. The embryonic dune, as well as a 50m buffer adjacent to the dune which has been identified along the entire length of the stretch of coastline in proximity to the Strandfontein node should be protected from any urban development.

c. The dune system and its restoration should be an integral part of the proposed recreational and tourism infrastructure proposed at the existing coastal resort.
d. The partial closure of Lukannon drive and facilitating access to the existing resort via a north south link should be considered.

(5) Maintain visual quality along the False Bay coast

a. The development of Strandfontein resort should celebrate its role as a gateway to the coast. Design should be sensitive to the role of Baden Powell Drive as a scenic drive.

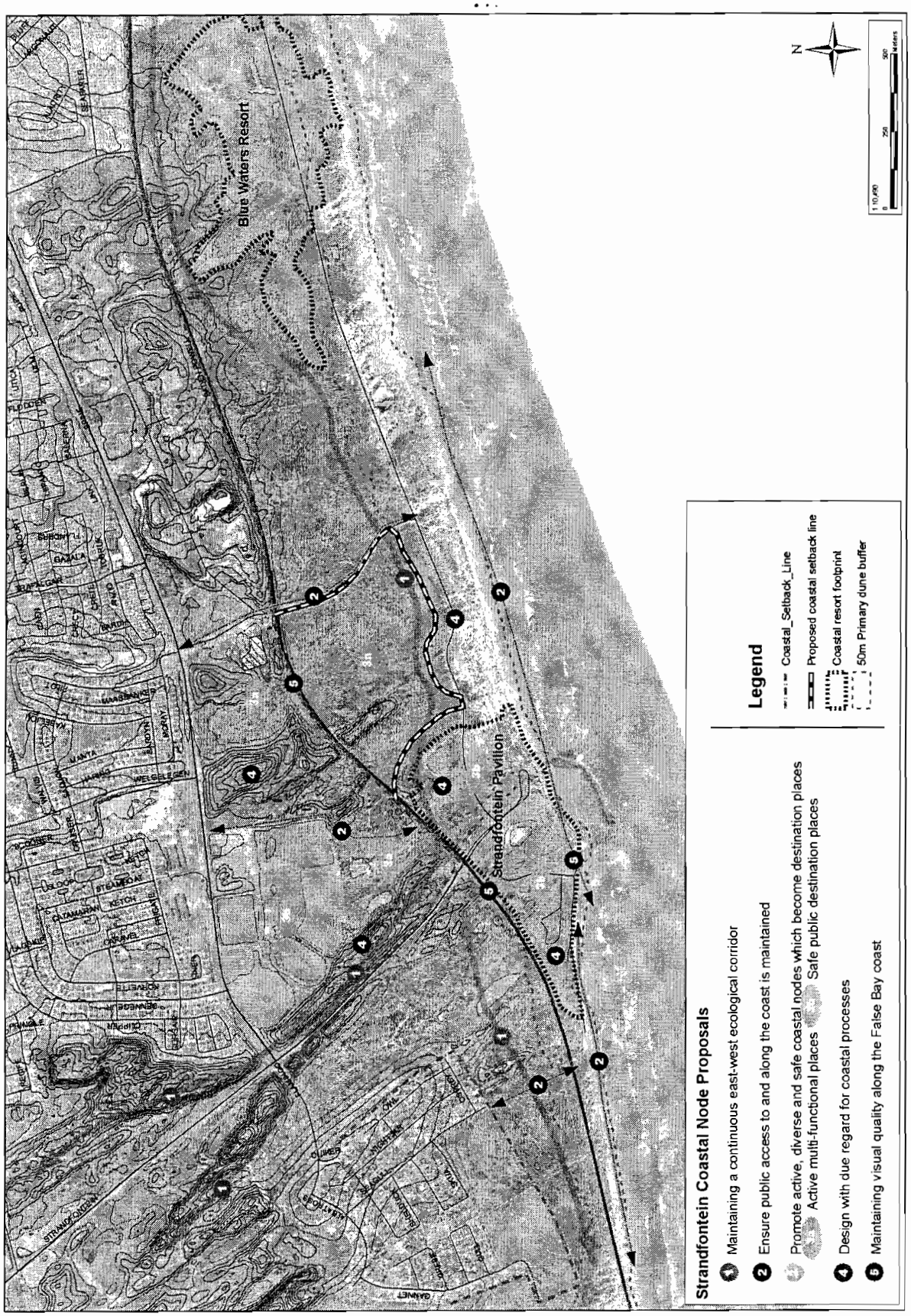


Figure A.6.3: Strandfontein Coastal Node - Proposals

A.6.4 Blue Waters Resort

The characteristics of the Blue Waters resort are distinctly different from the other three coastal development zones discussed. It is recommended that the Blue Waters Resort should remain a community resort which is easily accessible, particularly to local residents of the adjacent residential areas. Improvements should be made to existing resort infrastructure and beach facilities (refer to figure A.6.4).

(1) Maintain a continuous east-west biodiversity corridor

a. Essentially, the entire strip of the coastal zone on the seaward side of Baden Powell Drive between Strandfontein and Mnandi Coastal Nodes should be identified as a green corridor link, with Blue Waters Resort continuing to function within this link.

(2) Ensure public access to and along the coast is maintained

a. Consideration should be given to extending Salerno Way from Baden Powell Drive to meet the coast, in order to increase local access to the resort.
b. Consideration should be given to linking Salerno Street link with existing road infrastructure at the Department of Sports, Recreation and Amenities district offices, and provide north-south access to the coast at Blue Waters Promenade in order to provide direct and safer access to the resort and beach areas off Baden Powell Drive.
c. Camp and Nautilus Streets are existing north-south road links providing direct access to the coast for the residents of Strandfontein. Parking areas with ablution facilities should be provided on the landward side of the primary dune area, with boardwalks linking parking areas with the beach.
d. Any development proposals should maintain public access along the coast (e.g. through the provision of a structured east-west coastal pedestrian walkway).

(3) Promote active, diverse and safe coastal nodes which become destination places

3a Active multi-functional places supporting higher thresholds for public services and public facilities:

- Due to the role of Blue Waters Resort as a low intensity recreational node, no high intensity development is proposed.

3b Safe public destination places which promote tourism development

- Development should focus on upgrading and consolidation of existing infrastructure within the report footprint with a focus on tourism and recreation infrastructure.
- Consolidation of infrastructure should enable the shrinking of the grassed resort area and the re-establishment of natural vegetation (within areas such as the camp site).
- Consideration should be given to upgrading the chalet area and potential increased development of tourism accommodation in a low impact manner..
- The current main entrance to Blue Waters along Lukannon Drive is seen as a gateway precinct to the entire node. Consideration should be given to appropriately enhancing this precinct by means of landscaping (parking areas and visible signage) and high quality public recreation areas to maximise the public experience and promote tourism.

(4) Design with due regard for coastal processes

a. The existing resort footprint should be consolidated in order to restore under-utilised areas to their natural state, ensure more efficient use of land to facilitate the development of a higher quality multi-functional public destination place.
b. Consideration should be given to the closure of Lukannon Drive between Strandfontein and Mnandi Coastal Nodes, and the rationalisation of parking and ablution facilities along its

length to north-south road links to reduce the development impact of infrastructure on the primary dune system and also to minimise the maintenance costs.

(5) Maintain visual quality along the False Bay coast

a. The visual quality of the area should be maintained and enhanced where possible. To this extent, consideration should be given to investigation the potential of the little 'koppie' to the south-west of the district offices, as well as the towers at Blue Waters Promenade as public lookout points.
b. The visual sensitivity of the Baden Powell scenic drive should be responded to when developing in proximity of this alignment.

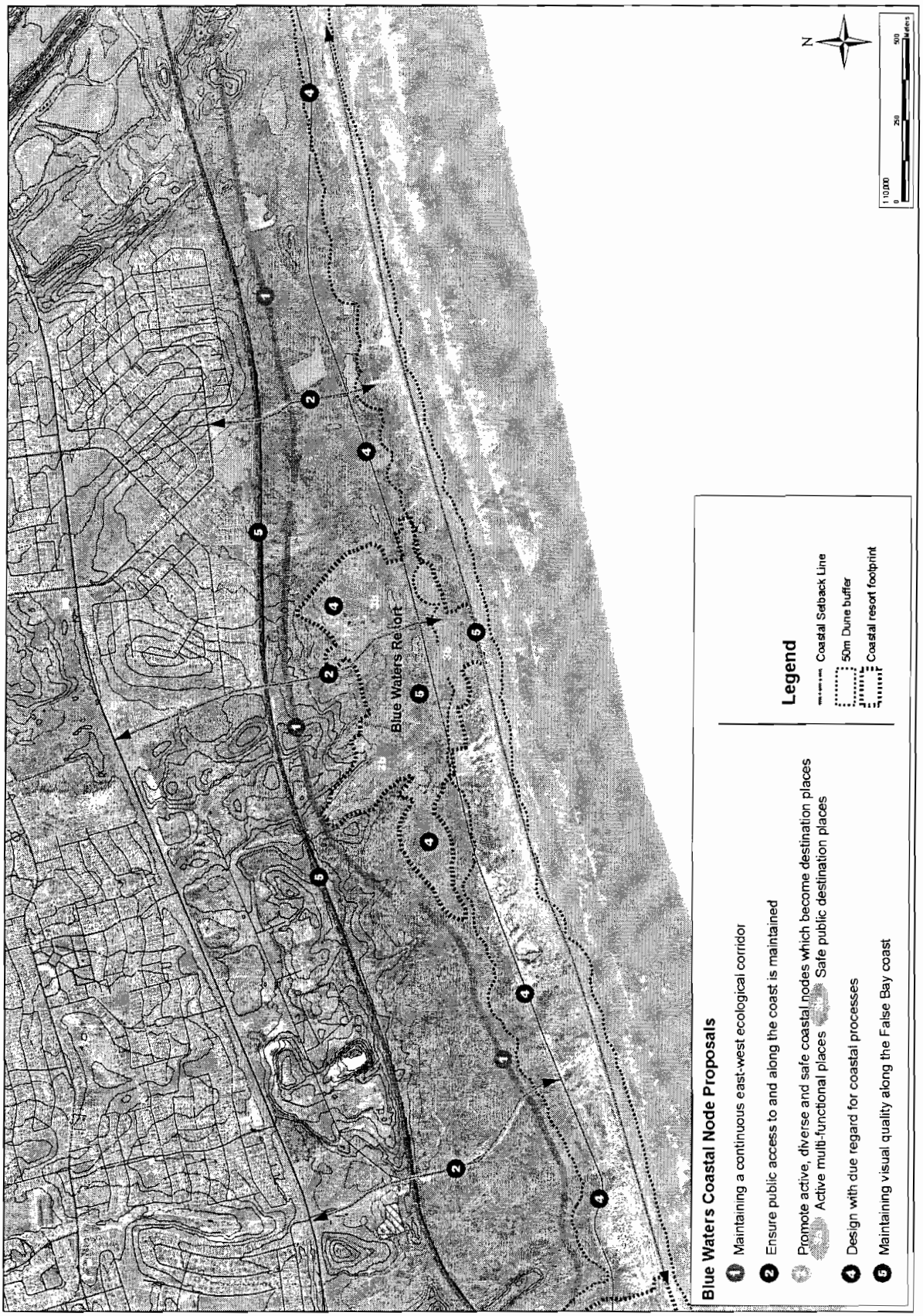


Figure A.6.4: Blue Waters Coastal Node – Proposals

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Agenda Item No	10SUB10/05/09
Subject	RAPID PLANNING REVIEW OF POTENTIAL FUTURE DEVELOPMENT AREAS ALONG FALSE BAY COASTLINE (DISTRICTS G 7 F)
SubCouncil	Charlotte Maxeke SubCouncil
Meeting Date	Monday, May 18, 2009
Resolution	;#Noted;#
Date Closed	Saturday, May 30, 2009

Resolution Detail

Mr Siwisa mentioned that he attended Sub-council 12 meeting and Mitchell's Plain people have been very vocal about development of False Bay coast line and it will also benefit the community of Khayelitsha since the document is submitted to this Sub-council for comments before it can be submitted to PEPCO for endorsement as per recommendations.

Resolved that

The report be noted by Sub-council 10.

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Agenda Item No	12SUB12/04/09
Subject	RAPID PLANNING REVIEW OF POTENTIAL FUTURE DEVELOOPMENT AREAS ALONG FALSE BAY COASTLINE (DISTRICTS G & F)
SubCouncil	Mitchells Plain SubCouncil
Meeting Date	Thursday, April 30, 2009
Resolution	;#Noted;#
Date Closed	Thursday, April 30, 2009

Resolution Detail

This item was dealt with item 12SUB08/04/09

Action: Refer to L Boyd (author)

Annexure B

A preliminary assessment towards a Coastal Access Management Plan for the City of Cape Town in terms of section 18(1) of the Integrated Coastal Management (ICM) Act (No. 24 of 2008)

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1. Introduction

Cape Town's coastline is approximately 307km in length, making it the largest coastal metropolis in South Africa. The coastline of Cape Town extends from Silwerstroomstrand (18˚20'34.959"E and 33˚34'14.994"S) on the west coast to just south of Kogelbaai (18˚50'44.905"E and 34˚16'10.554"S) on the east coast (Figure 1). Cape Town is renowned for its beaches and coastal beauty which are arguably its greatest socio-economic and environmental asset, providing a support base, both directly and indirectly, to a coastal population with vast socio-economic inequalities.

Value from the coast is derived from a multiplicity of ecosystems goods and services (EGS) as a consequence of the coast's unique biophysical attributes. Ecosystems goods and services may be broadly categorised as cultural, regulatory, supportive and provisional. Reflecting the value of the coastline, and based on cultural services alone, it is estimated that the city's beaches are valued at approximately R77 million per annum. This figure reflects only a fraction of the Total Economic Value (TEV) as it is based purely on the cultural value of beaches alone in Cape Town. It does not reflect the regulatory, provisional and support value (de Wit *et al*, 2009). Considering the value and importance of the City's coastline, and South Africa's past of separation and exclusion, it is of utmost importance that these historical inequalities are redressed through promoting equitable access to these coastal resources for all the residents of Cape Town in perpetuity.



Figure 1: City of Cape Town coastline

South Africa's coast is governed by a number of Acts. The most important of which is the Integrated Coastal Management Act (No. 24 of 2008) – hereinafter referred to as the ICMA. The ICMA requires that municipalities, whose area includes Coastal Public Property (CPP), demarcate strips of land as coastal access land to secure public access to the coast and its resources. The ICMA defines coastal access land in terms of section 18(1), read with section 26.

There are a number of factors to consider before designating access land. These factors can be considered as general principles, and are obtainable from section 29 of the ICMA. Amongst others they include the need to take into account what the access is required for, i.e. pedestrians, vehicles, vessels, etc. A critical objective in the promotion of access to the coast is that such access is sustainable and socially responsible. In order to achieve this, the ICMA requires that each coastal municipality develop a Coastal Access Management Plan. Prior to developing the Coastal Access Management Plan, the City considered it necessary to undertake a status quo assessment of existing access along Cape Town's Coastline. This report describes the City's method in reviewing existing access along the metro's coastline and presents the results of the assessment.

2. Methodology for determining the status quo of Coastal Access Land

Upon assessing the coast using aerial imagery, the City's Environmental Resource Management Department (ERMD) identified a range of access types along the City's coastline. These range from footpaths, to parking areas, to promenades, to stairways, etc.
Baseline data that was used for this is obtainable from the City's GIS Server. GIS layers that were used include Aerial Imagery (AP 2011 Dec and AP 2012 Dec) suburbs and a formal roads layer. The aerial imagery helped with identifying the access points, whereas the suburbs layer helped with determining the geographical location of the access areas, and thus the location of the access areas is labelled according to the suburbs. Points of access that were considered and digitised were those that fell within 150m landward of the high water mark. The distance was considered as a crude proxy for identifying access points as being 'coastal' provided there was evidence of access to CPP.

2.1. Categories of coastal access

The methodology applied a hierarchical approach for the categorisation of access types along the City's coastline. Two broad levels of access types were identified and were classified according to the scale at which access is promoted along the coast. The first scale, or macro scale, is at the level of promoting broad scale socio-economic benefits through connecting communities to the coast by means of nodal growth points. Typically this includes coastal resorts and identified nodal growth points, in particular along the False Bay coastline.



Figure 2: Macro – scale access, Silwerstroomstrand Coastal Resort.

The second tier or micro scale is at the level of promoting safe and environmentally sensitive access to the beach via designated access routes. The ICMA requires that, when designating coastal access land, a municipality must take into account the type of public access required and the way in which it is intended to be used. Upon assessing the coast using aerial imagery and through ground proofing, five types of micro-scale access points were identified:

1) Cul-de-sacs
2) Car parks
3) Boat launch sites
4) Public roads
5) Walkways

These access types were then categorised as either formal or informal access points:

Formal – refers to access points that have the explicit purpose of promoting access to the coast and which may or may not have supporting infrastructure.

Informal – refers to access areas that have developed over time as a result of continued use. These generally have no supporting infrastructure. Informal may also refer to access areas that fall within private property and/or are servicing private property.

Informal access points were then distinguished between public and private:

Public – refers to access points that fall within public and/or state owned land; and/or that the general public can use freely to gain access to CPP.

Private – refers to access points that service private residential property and which is generally inaccessible to the broader public.

3. Definition of access types

3.1. Cul-de-sacs

Cul-de-sacs refer to an end point of a road leading to CPP. These are demarcated as *point features*. Only those that are within 150m of the high water mark (HWM) were considered for the purpose of this *exercise.*

Cul-de-sacs are defined as point features where an end point of a road providing access to CPP. Where paths extend to CPP from the cul-de-sacs, a point feature has been created at the cul-de-sac. Where cul-de-sacs had no paths (formal or informal) leading from them, and provided they fell within 150m of the HWM, point features were still created for them. The cul-de-sacs were further categorised as formal or informal. Formal cul-de-sacs were those that are located on City land (with supporting infrastructure) and those located on private land (informal). Cul-de-sacs were further classified as either public or private. The classification was based on whether the cul-de-sac was located on public or private owned land.

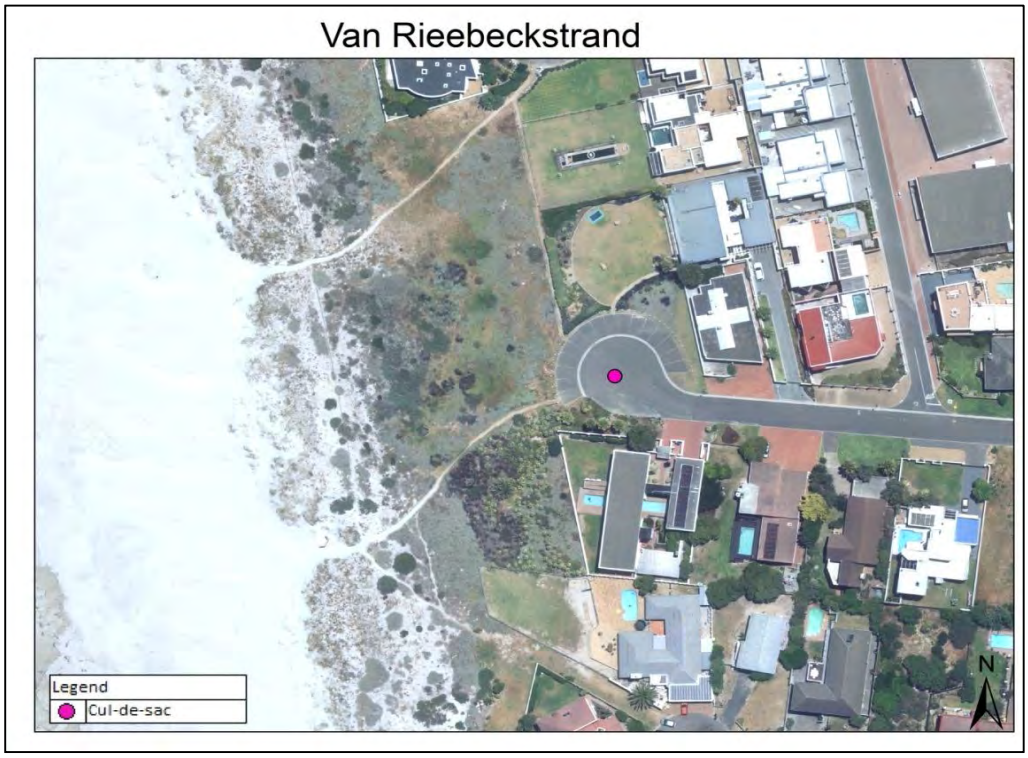


Figure 3: Formal Cul-de-sac providing access to CPP in Van Riebeeckstrand.

3.2. Car Parks

Car parks are areas where vehicles can park and users can access CPP. Car parks are demarcated as *polygon features*. Only those that are within 150m of the high water mark (HWM) were considered for the purpose of this *exercise.*

All car parks are categorised as formal and public. Polygon features were used to demarcate car parks so as to enable the calculation of their total area for each district.

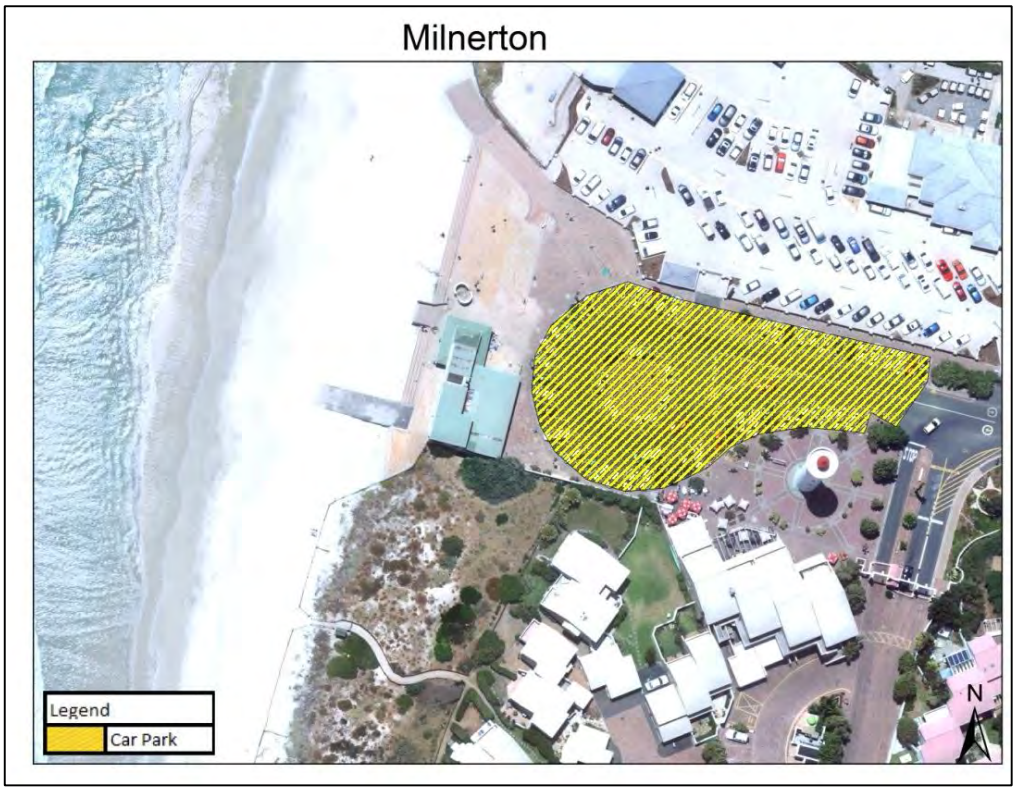


Figure 4: Car park in Milnerton

3.3. Boat Launch Sites

Boat launch sites refer to ramps or areas used to facilitate access to the sea for vessels. Boat launch sites are demarcated as *point features.* Only those that are adjacent to the coast – as opposed to those along estuaries – were considered and are recognised as registered boat launch sites, for the purpose of this *exercise.* Therefore the estuary launch sites such as in Muizenberg and Zandvlei were not considered.

Boat launch sites within the coastal area can be either one of two surface types, i.e. beach launch or coastal slipway. These were demarcated as point features. Attributes collected for launch sites included site name, location (GPS coordinates), launch surface type (coastal slipway or beach launch), management authority, lease status (depending on who the management authority is for a particular boat launch site.

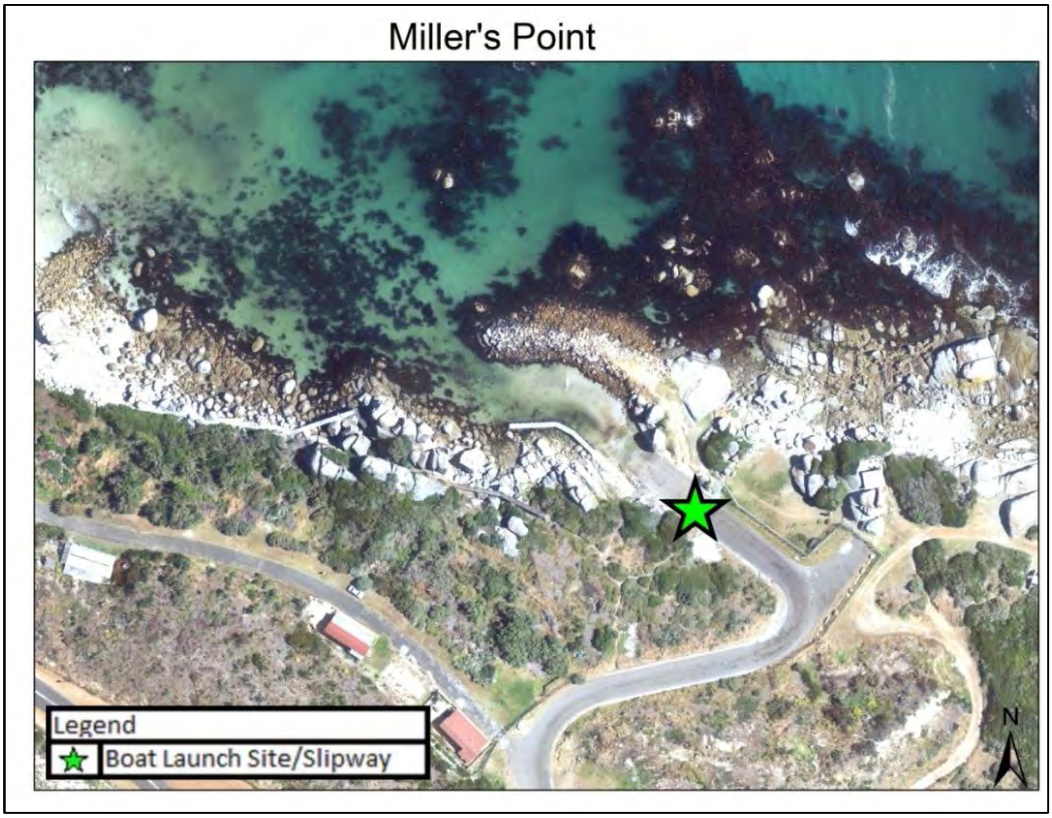


Figure 5: Miller's Point slipway

3.4. Roads

Roads refer to any path and/or tarred surface on which vehicles travel and which are demarcated in the City's spatial data as the formal roads layer. Coastal access roads are demarcated as *line features.* Only those that are within 150m of the HWM were considered for the purpose of this *exercise.* Where perpendicular roads (to the coast) lead to parallel roads (to the coast) – and where these parallel roads have access points leading from them, the perpendicular roads are not defined. In the case where a road originates from an area above the 150m buffer zone, the road is only marked from the buffer line.

Roads that fall within private land but lead to coastal public property were also defined (e.g. Silwerstroomstrand).

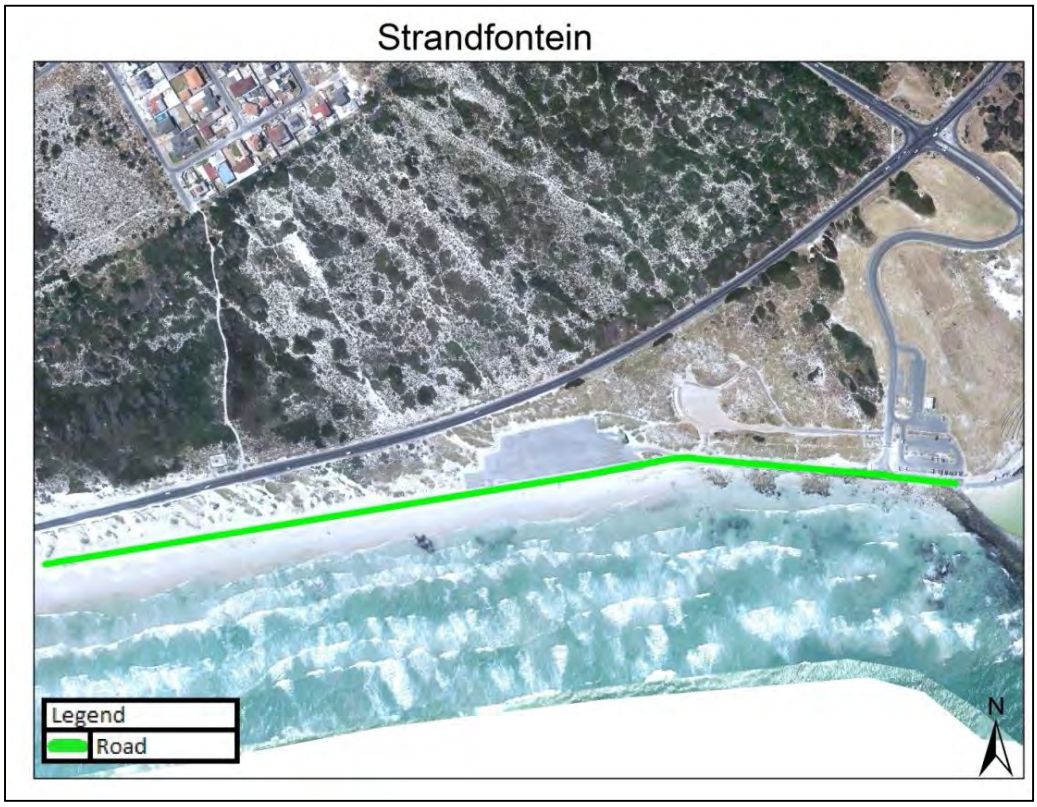


Figure 6: Strandfontein public road

3.5. Walkways

Walkways were identified as any paths or routes designed to facilitate pedestrian access to or along the coast. Walkways were further divided into formal and informal walkways. Formal walkways are those that have been constructed by the municipality for public use, and informal walkways are those created by the public. The following types of walkways have been identified:

1. Boardwalk: constructed from wooden planks or slabs;
2. Footpath: dirt paths, typically informal;
3. Paved walkway: cemented or constructed from bricks;
4. Promenade: paved walkway along the beach/shoreline which often doubles as a sea defence structure (i.e. the Sea Point promenade)
5. Ramp: sloping walkway to facilitate wheelchair access to the beach;
6. Staircase: stairs that lead to the beach (often leading from a promenade), and
7. Stone walkway: constructed from gravel paths.

These access types are demarcated as line features. Only those that are within 150m of the HWM and which provide access to CPP were considered for the purpose of this *exercise*.

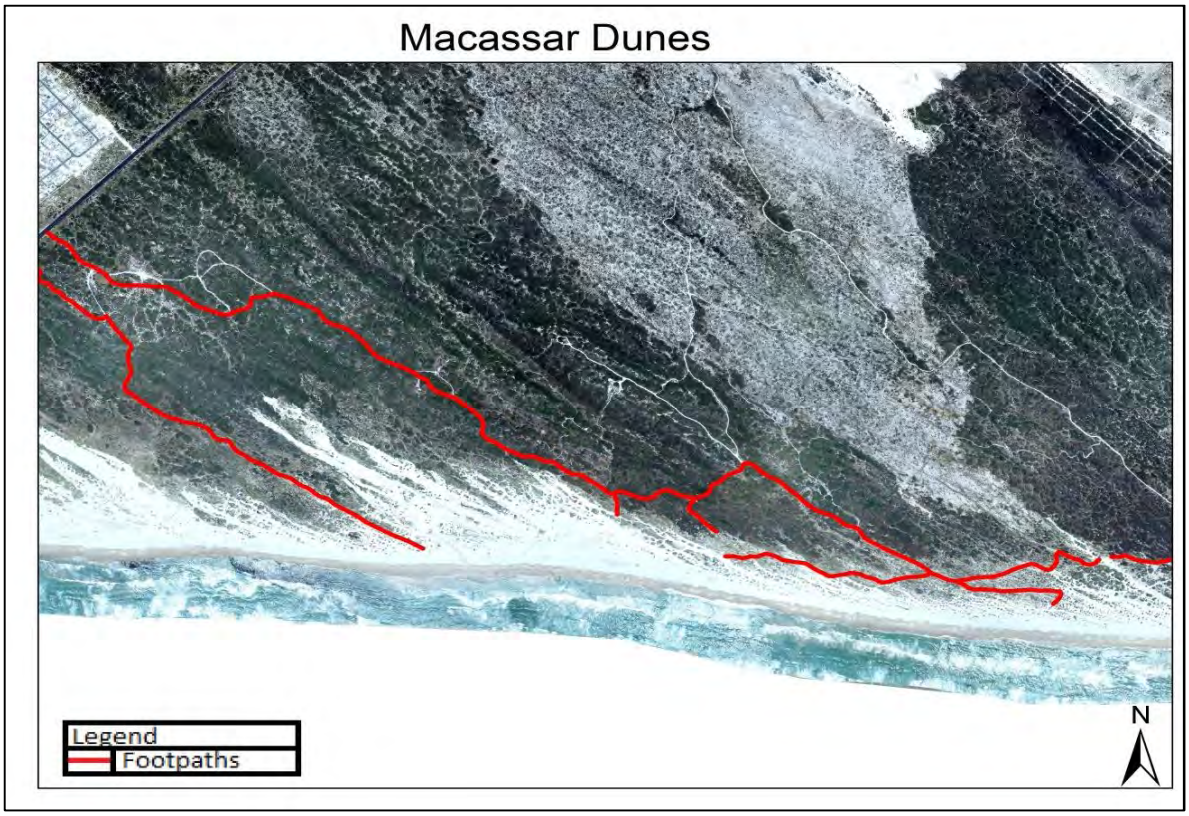


Figure 7: Footpaths, Macassar dunes



Figure 8: Boardwalk in Big Bay



Figure 9**: Paved Walkway, Bikini Beach.**

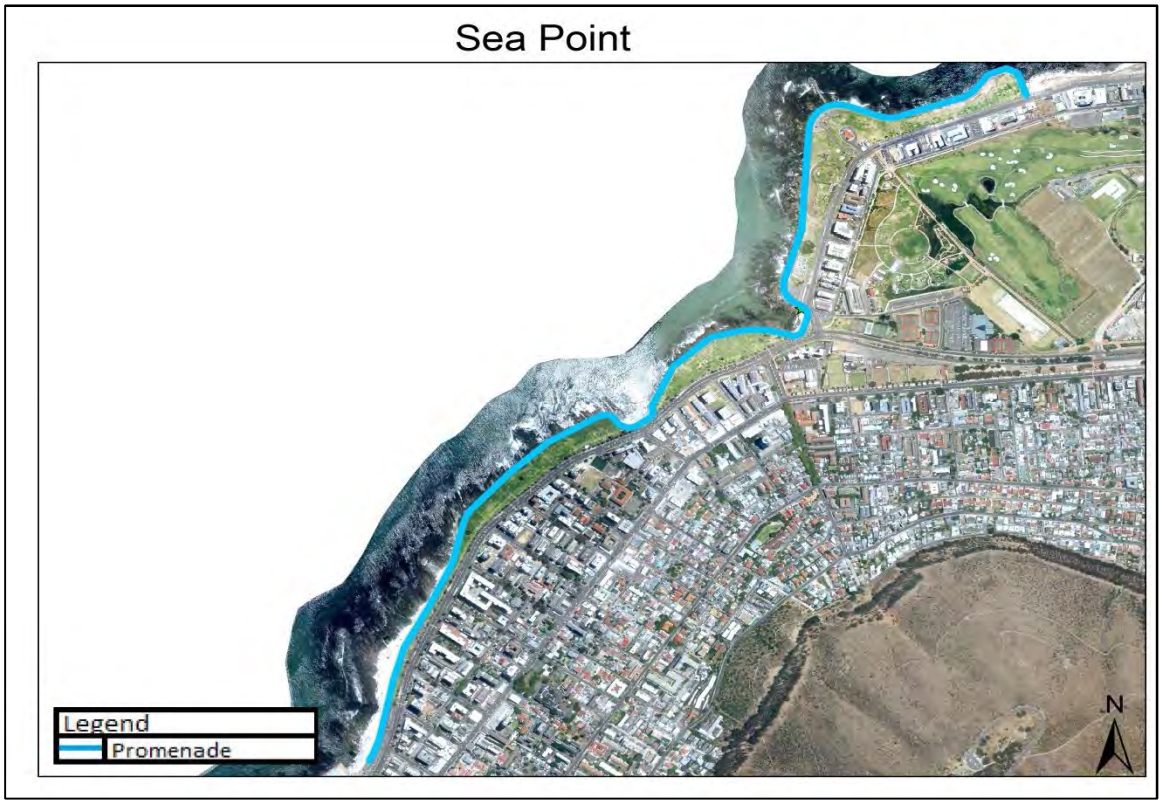


Figure 10: Promenade, Sea Point

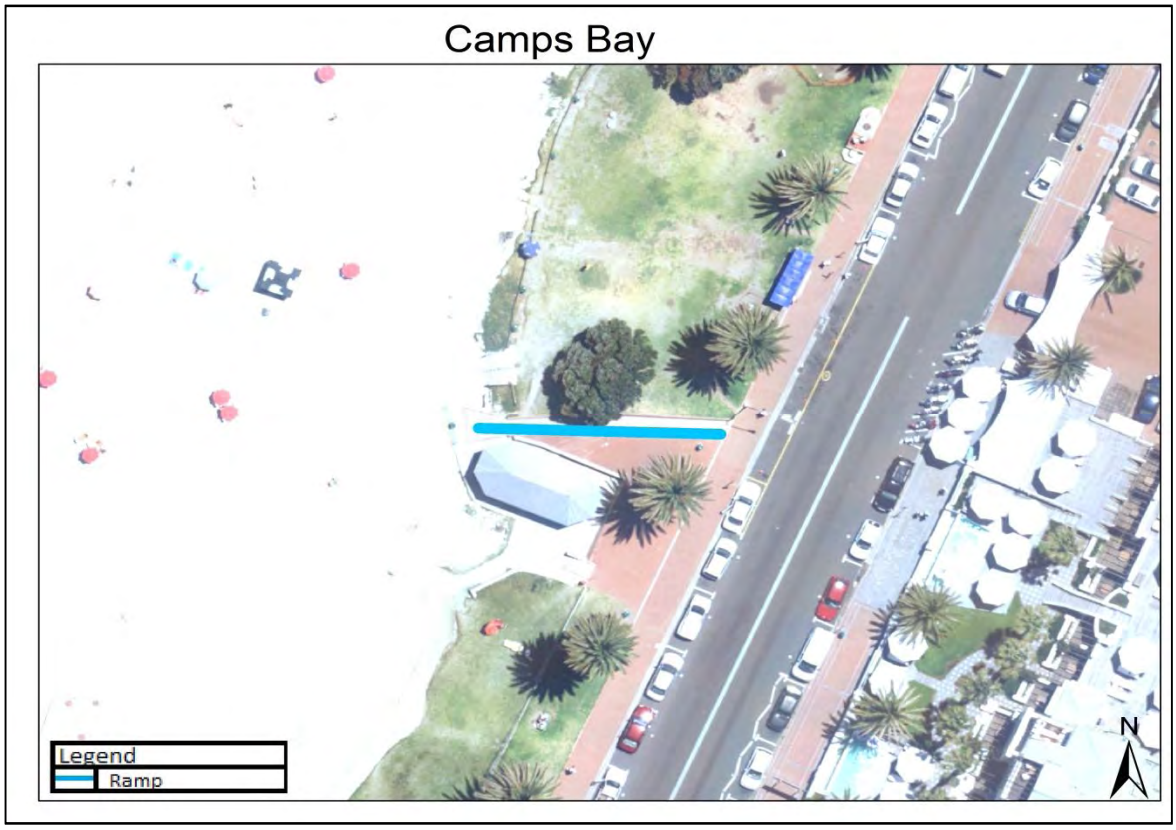


Figure 11: Ramp, Camps Bay

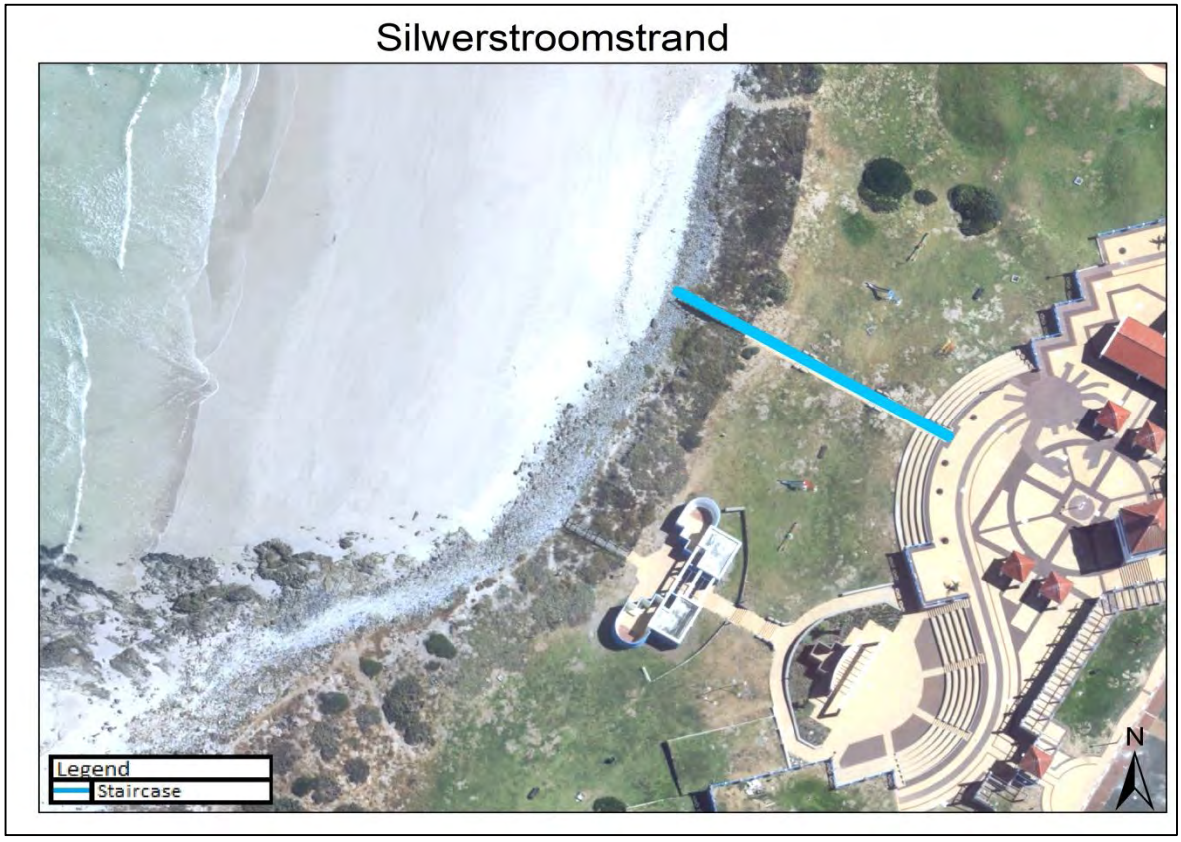


Figure 12: Staircase, Silwerstroomstrand

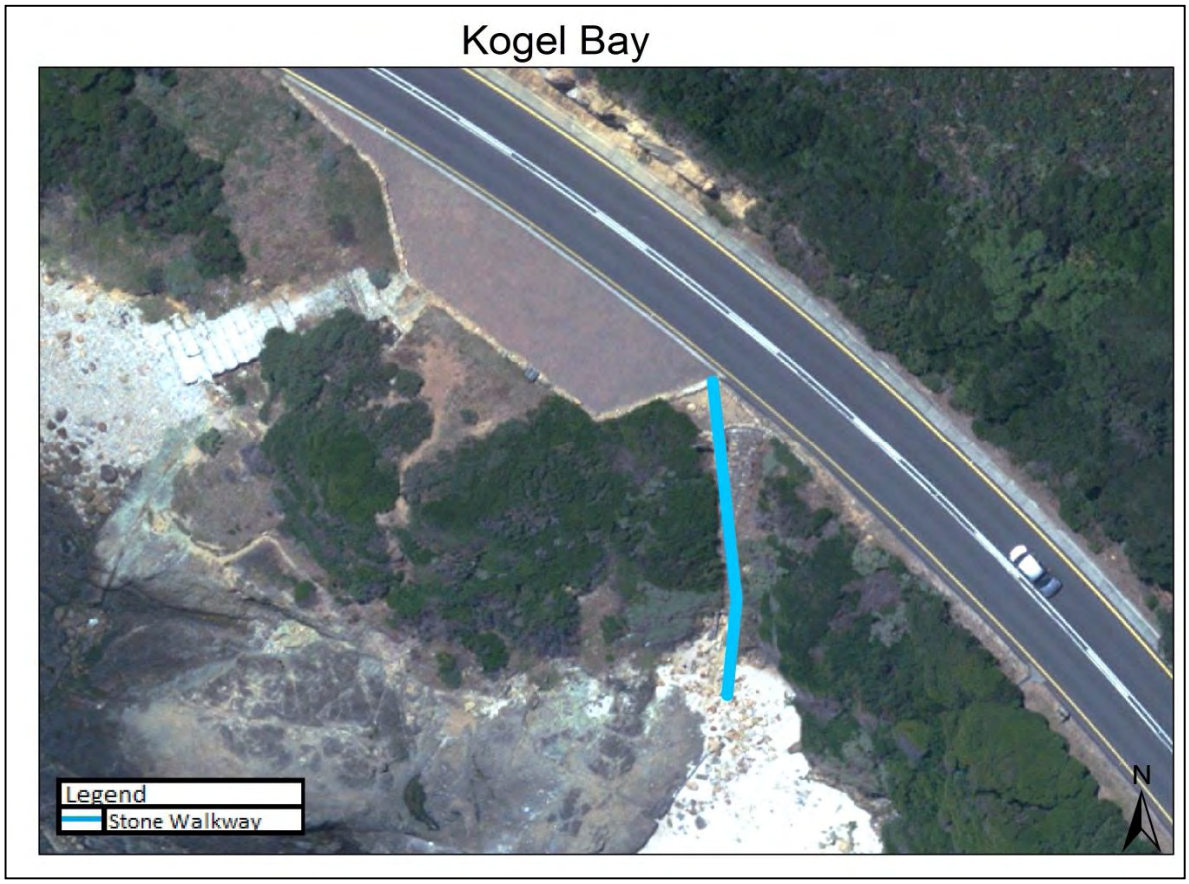
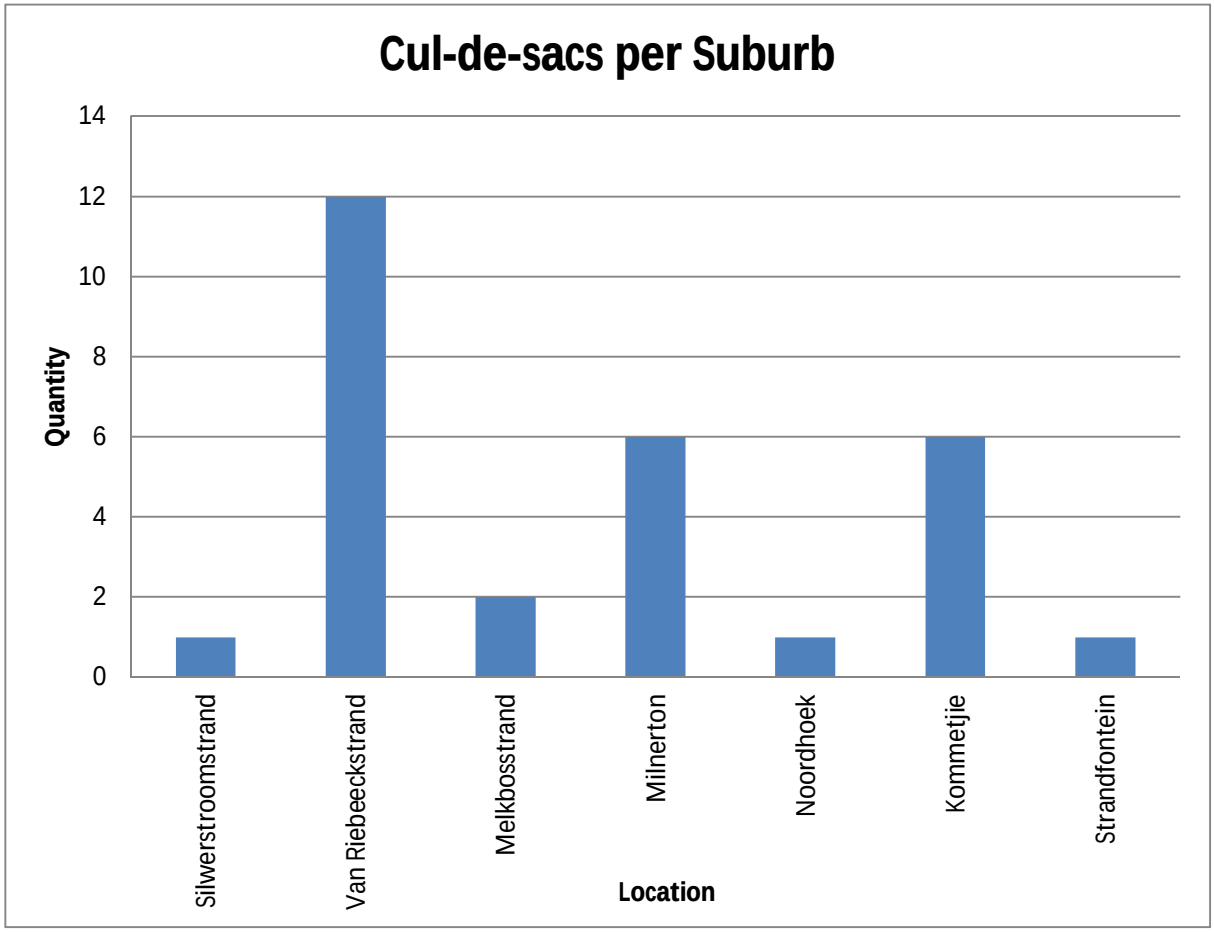


Figure 13: Stone Walkway, Kogelberg

4. Results and Analysis

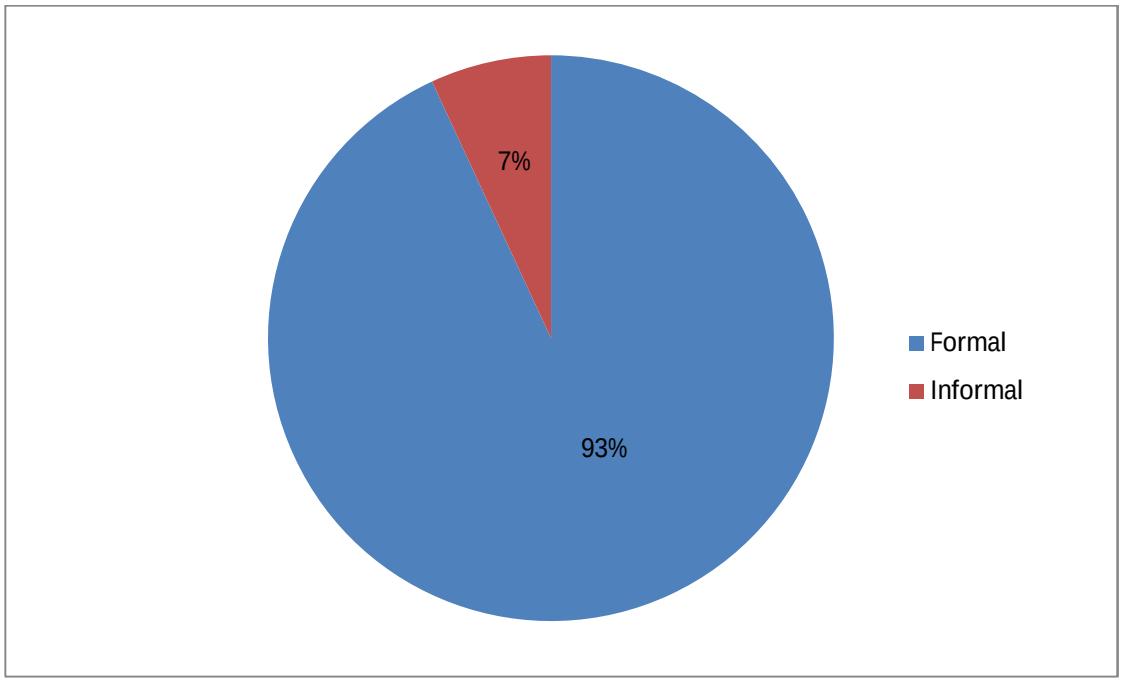
4.1. Cul-de-sacs

Most (12 out of 29) of the cul-de-sacs are located in Van Riebeeckstrand (Graph 1). 86% of all cul-de-sacs (24 out of 28) are formal with supporting infrastructure and 5 cul-de-sacs are informal (Graph 2). The informal cul-de-sac were categorised as such because they either fall within private land (e.g. in Cape Farms - District B); or because they are on an informal road (e.g. Strandfontein). They are also classified according to whether they are private or public, i.e. 9 cul-de-sacs are classed as private, whereas the remainder (20) are all classed as public (Graph 3).



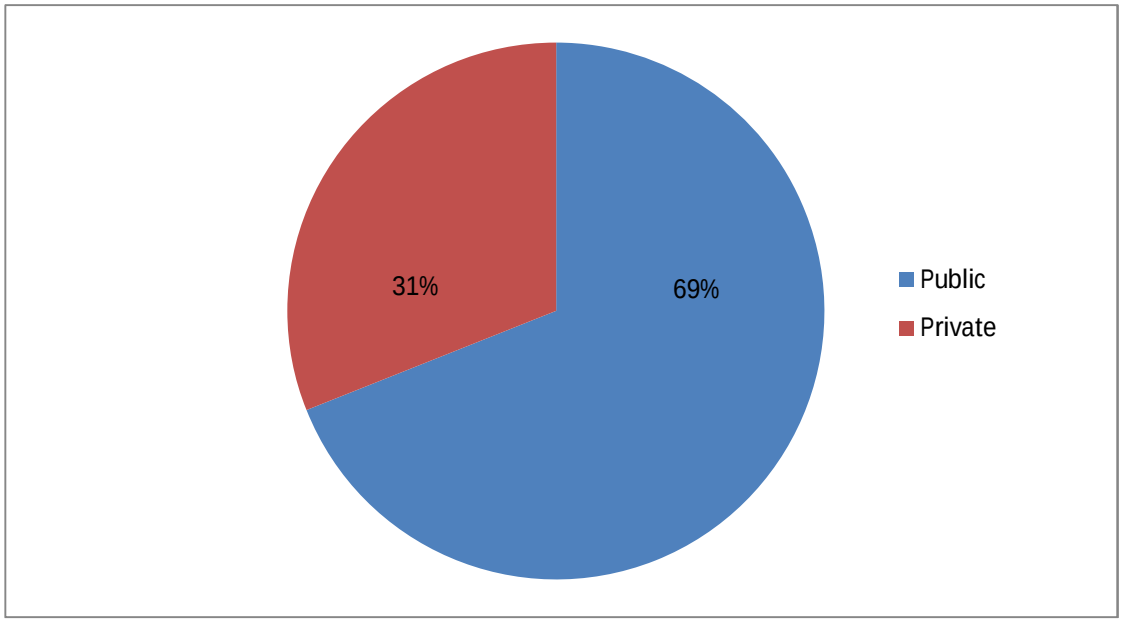
Graph 1: Cul-de-sacs per suburb

The above graph indicates Van Riebeeckstrand as having the highest number of cul-de-sacs, followed by Milnerton and Kommetjie with both having 6 cul-de-sacs. Silwerstroomstrand Noordhoek and Strandfontein have the same number of cul-de-sacs, i.e. 1.



Graph 2: Formal vs. informal cul-de-sacs

The pie chart above indicates that the larger percentage (93%) of the cul-de-sacs are formal with the minority (2) of them are informal. One of the two informal cul-de-sacs are located in Silwerstroomstrand on a gravel road within private land whereas the other one is located in Strandfontein on an informal road.

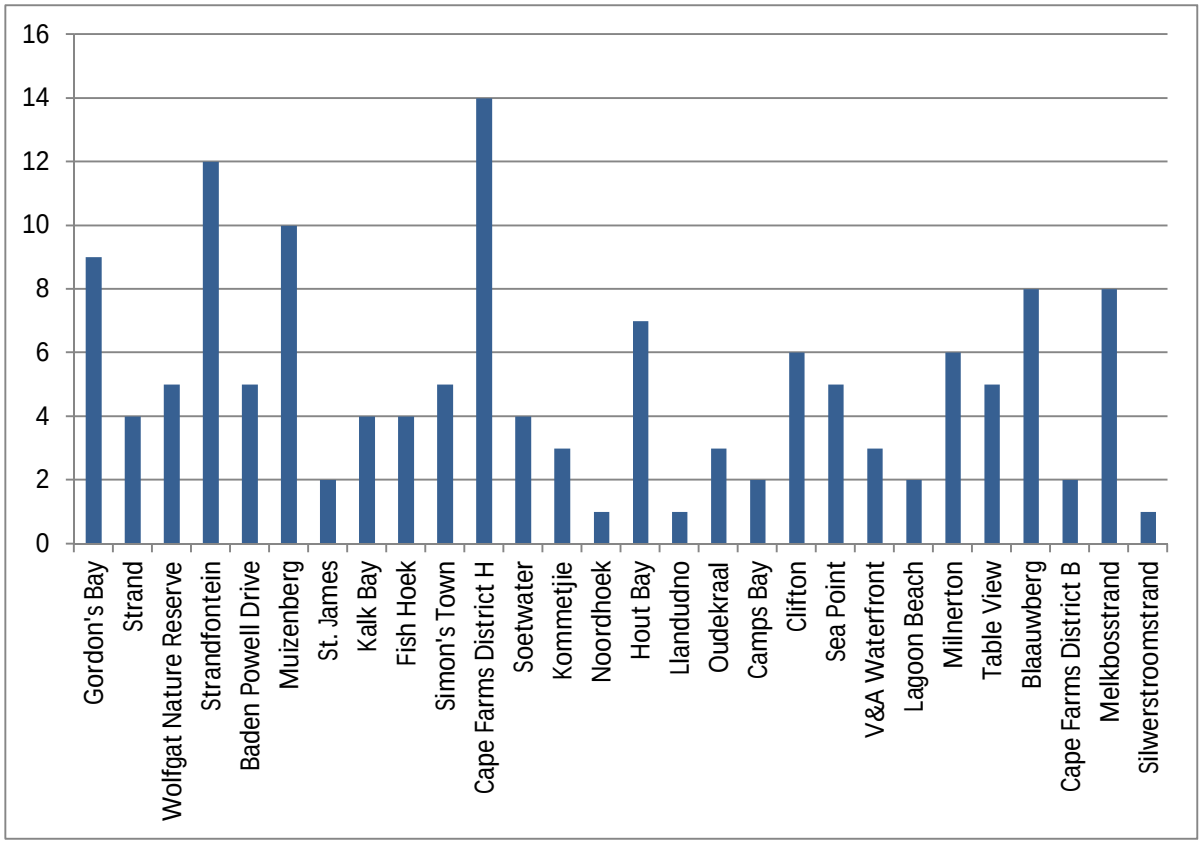


Graph 3: Public vs. private cul-de-sacs

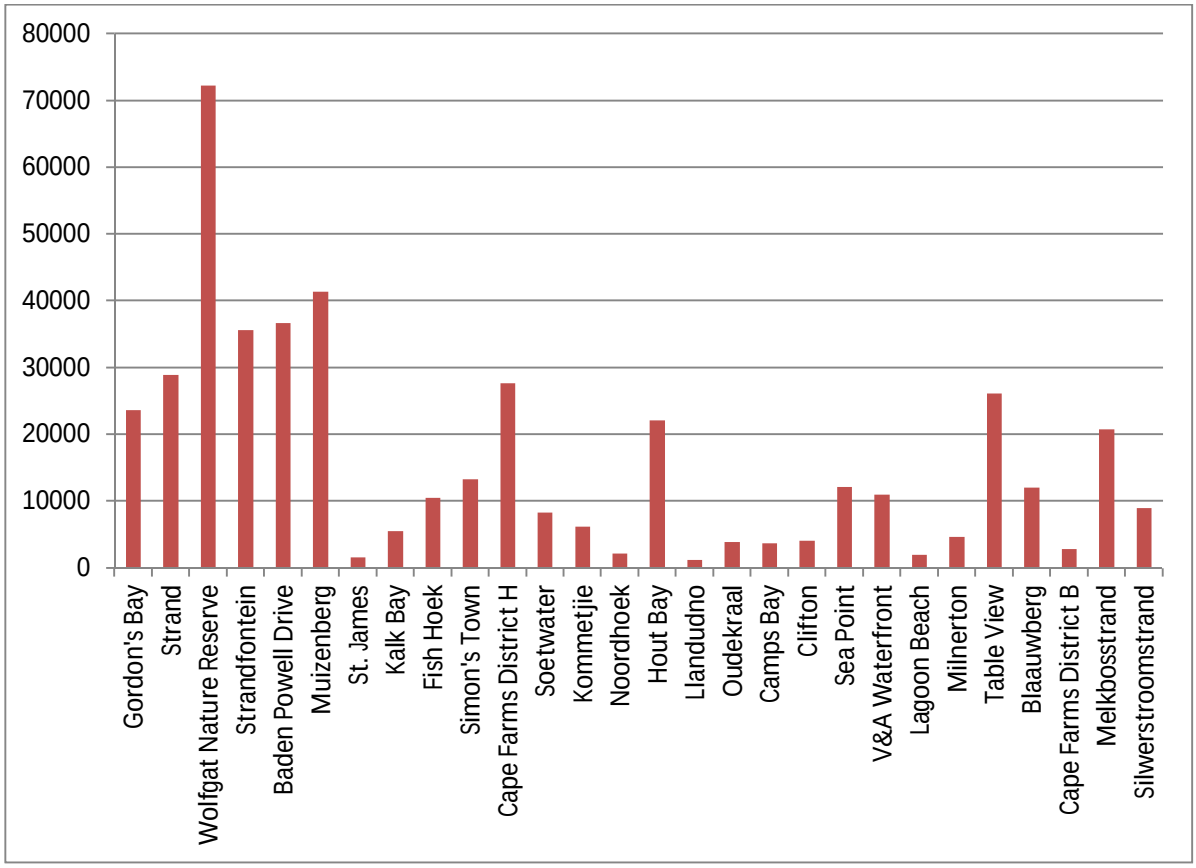
From the above pie chart, it is evident that most (69%) of the cul-de-sacs are classified as public and 31% of the cul-de-sacs are private – located in Silwerstroomstrand (1) Milnerton (6) and Kommetjie (2).

4.2. Car Parks

According to Graph 4, the Cape Farms – District H has 14 car parks that cover a surface area of approximately 27657m^2 (Graph 5) – this district includes the following suburbs: Witsands, Scarborough, Olifantsbos, Platboom, Buffels Bay, Bordtjiesdrift and Miller's Point, making it the district with the largest area covered by car parks (Graph 4). Compared to the other suburbs, Wolfgat Nature Reserve has few car parks that cover a large surface area (approximately 72240m^2). Conversely, in other instances, it is found that there are a number of car parks that cover only a small surface area, examples include – Milnerton (6 car parks covering 4642m^2), Kalk Bay(4 car parks covering 5518m^2), Oudekraal (3 car parks covering 3918m^2), Clifton (6 car parks covering 4099m^2). This trend is interesting to note because although there are a number of car parks, the surface area they occupy is quite small. However, the majority of cases depict a trend where an area has few car parks that cover a large surface area, examples include – Table View (5 car parks covering 26109m^2), Strand (4 car parks covering 28912m^2).



Graph 4: Number of car parks per suburb



Graph 5: Area of car parks (m²) per suburb.

Graph 4 shows that the Cape Farms District H (14), Strandfontein (12) and Muizenberg (10) have the three highest numbers of car parks; yet the car parks in Muizenberg cover a larger area than those in the Cape Farms District H and Strandfontein. The highest area taken up by car parks, however, is in Wolfgat Nature Reserve Area (72240m^2). The least area covered by car parks is in St. James (with only 1604m^2 of land covered). The total area covered by the total number (141) of car parks across the City is approximately 448312m^2.

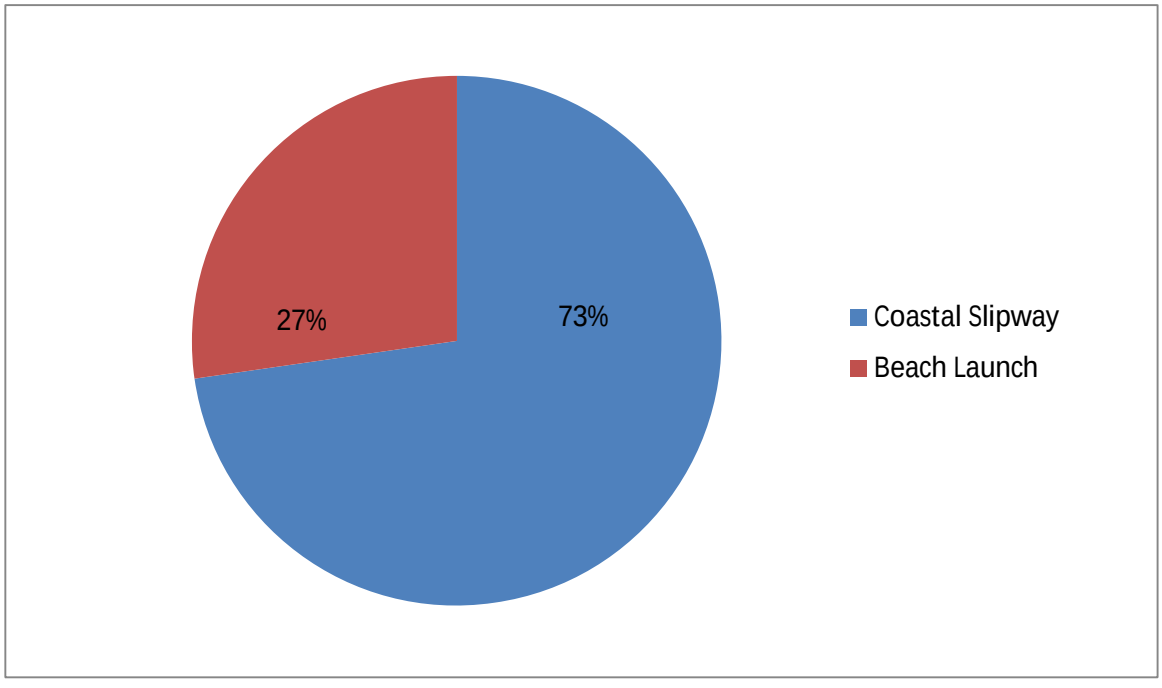
4.3. Boat Launch Sites

Within the City of Cape Town Metro, there are approximately 11 boat launch sites (Table 1). These can be categorised into beach launch sites and coastal slipways. For purposes of this *exercise*, the sites that were considered are those that are within 150m of the HWM and those that do not fall within land administered by Table Mountain National Park. These boat launch sites are spread among 9 suburbs from Silwerstroomstrand to Strand Beach. As per the table below, there are 19 coastal slipways in total. 64% of the boat launch sites are managed and maintained by the City and the remaining sites are leased and managed by privately owned clubs.

NAME/LOCATION	COORDINATES	MANAGEMENT AUTHORITY	AUTHORISATION	VALIDITY	LEASE STATUS
Silwerstroomstrand	33°35'16"S 18°21'39"E	City of Cape Town	Department waiting response	Withdrawn	N/A
Melkbosstrand	33°43'42"S 18°26'19"E	City of Cape Town	Department waiting response	25/02/2016	N/A
Table View	33°48'36"S 18°28'6"E	City of Cape Town	Department waiting response	Pending	N/A
Three Anchor Bay	33°54'20"S 18°23'52"E	City of Cape Town	Department waiting response		N/A
Kommetjie	34°8'24"S 18°19'20"E	Kommetjie Boat Club	Not	Pending	Expired
Witsands	34°10'39"S 18°20'40"E	City of Cape Town	Authorised	Pending	N/A
Miller's Point, Rumbly Bay	34°13'49"S 18°28'26"E	Cape Boat and Ski Club	Authorised	Pending	Missing
Fish Hoek (sailing)	34°8'13"S 18°26'2"E	Fish Hoek Sailing Club	Authorised	Withdrawn	Missing
Hottentots Holland Beach Sailing Club	34°6'18"S 18°49'1"E	Hottentots Holland Sailing Club	Authorised	25/02/2016	Expired
Melkbaai, Strand	34°7'4"S 18°49'37"E	City of Cape Town	Authorised	Withdrawn	N/A
Strand	34°6'30"S 18°49'12"E	City of Cape Town	Authorised	25/02/2016	N/A

Table 1: City of Cape Town boat launch sites

The City has recommended that Silwerstroomstrand's launch site should only be used for life saving purposes; Three Anchor Bay's launch site should only be used to launch kayaks; the Fish Hoek Beach Sailing Club slipway should only be used for vessels without vehicles; and the Melkbaai (Strand) slipway should only be used for utilities and specific events.



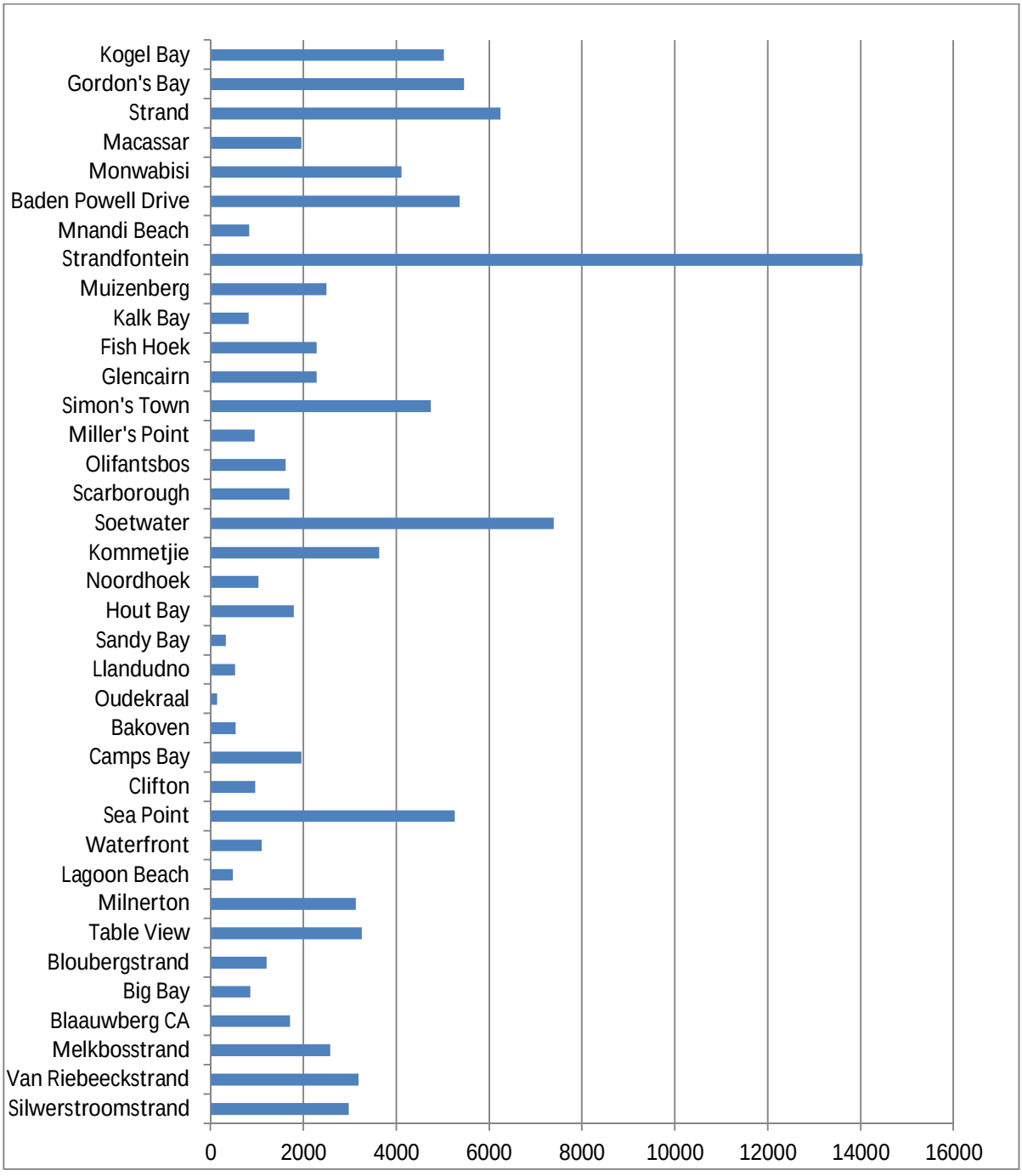
Graph 6: Launch surface types

On average, suburbs have one boat launch site, with exception to Strand (which has three launch sites). Approximately three quarters of the boat launch sites are coastal slipways, and the remainder are beach launches. All identified launch types are considered to be in a fair to good condition, thus they are suitable for launching vessels and all launch sites are considered to be formal and public.

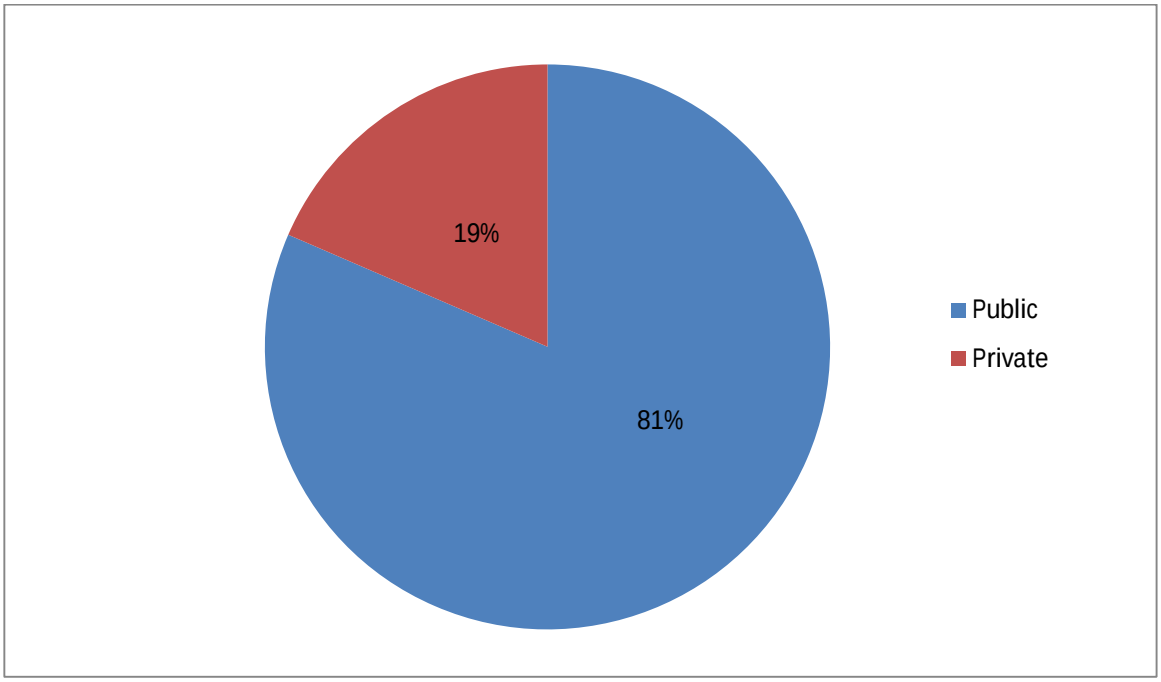
4.4. Roads

The City's coastline consists of approximately 94.92505km of roads (that fall within 150m of the HWM) which were categorised as formal (public) or informal (private). About 81% of all roads that fell within 150m of the HWM were classified as public. The remainder 19% of roads are private.
Built-up suburbs have a significant length of road network that falls within 150m of the HWM. These suburbs include Melkbosstrand, Table View, Sea Point, Camps Bay, Simon's Town, Glencairn, Fish Hoek, Muizenberg, Strandfontein, Baden Powell Drive and Strand. This is mainly due to the fact that these formal-public roads provide direct access to the coast and/or provide access to smaller access routes such as footpaths and walkways.

It is evident from Graph 7 that Strandfontein has the highest total length of public roads (14,037km) falling within 150m of the HWM. One should also consider that areas such as Kommetjie have many small access roads (public-formal) accumulating to the overall length of that particular suburb. Other examples of these types of public-formal roads are also found the following suburbs: Van Riebeeckstrand, Melkbosstrand, Bloubergstrand, Milnerton, Hout Bay, Simon's town, Strandfontein and Gordon's Bay.



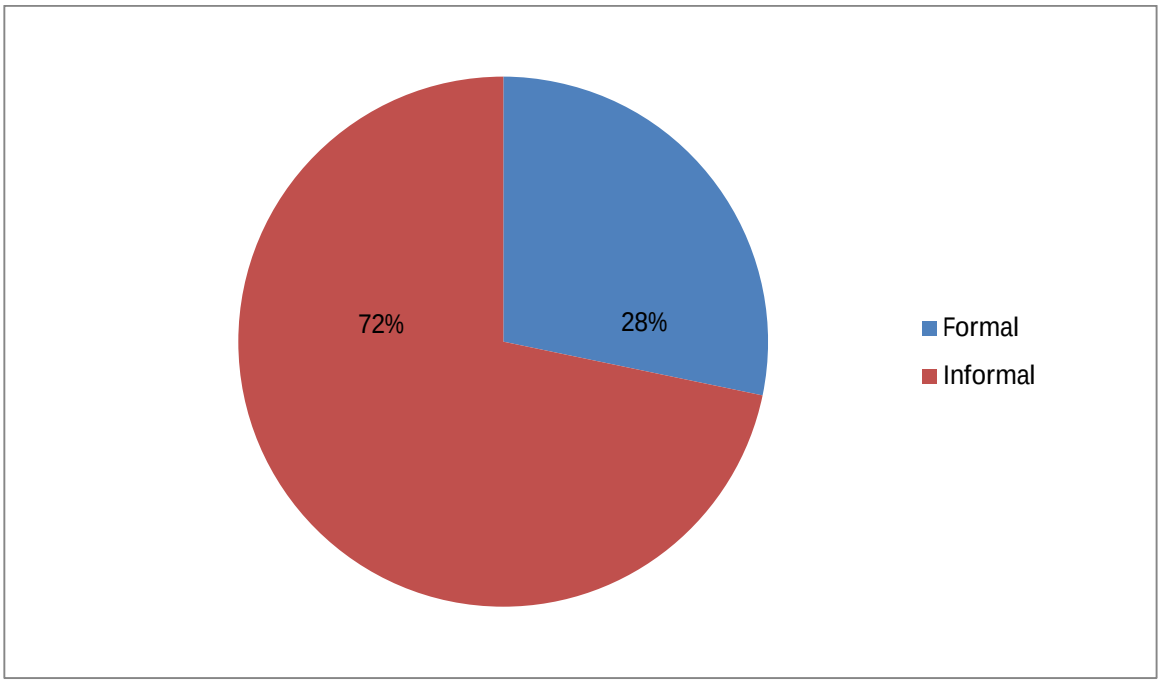
Graph 7: Total length of roads per suburb (meters)



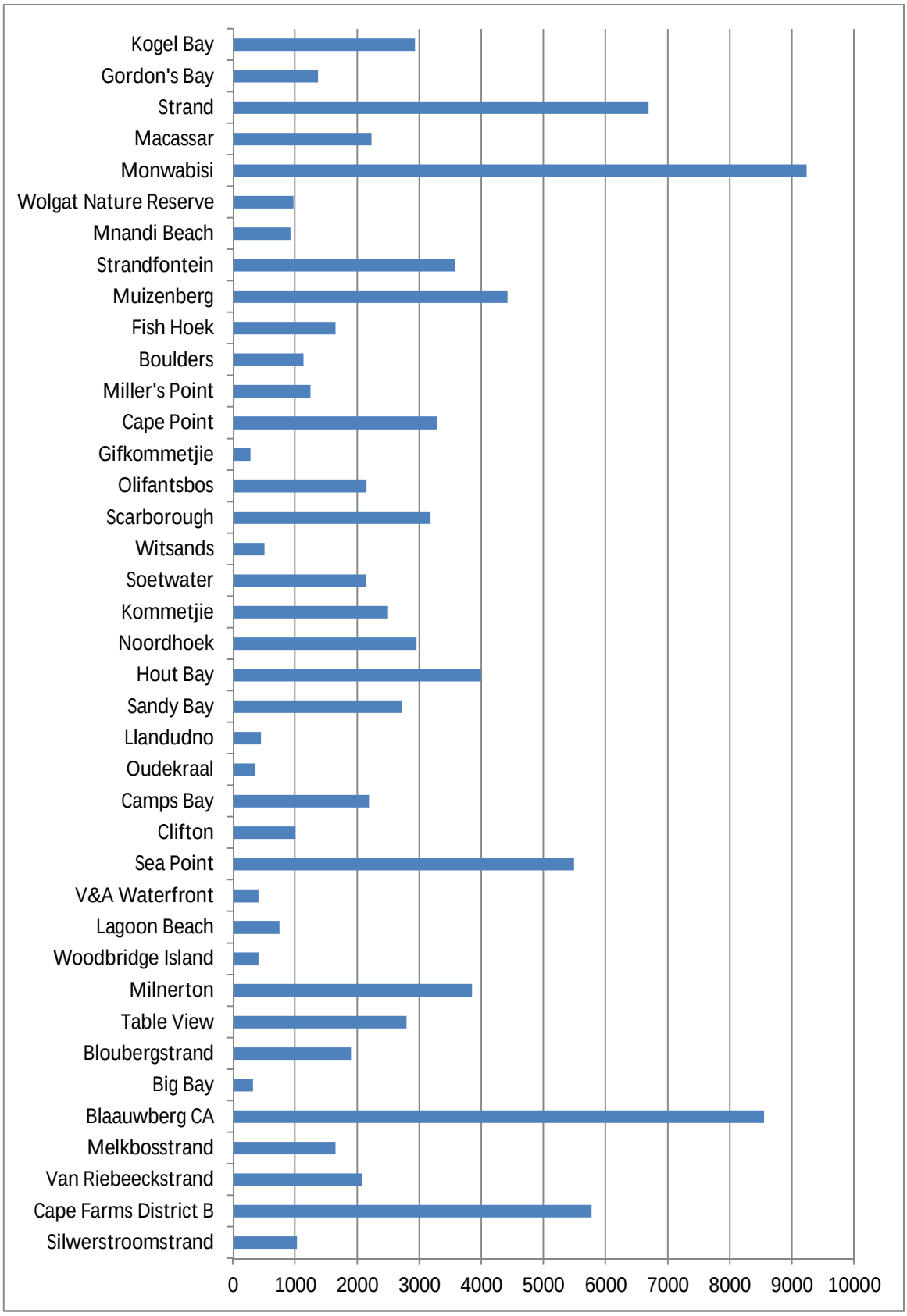
Graph 8: Total percentage of public vs. private roads

4.5. Walkways

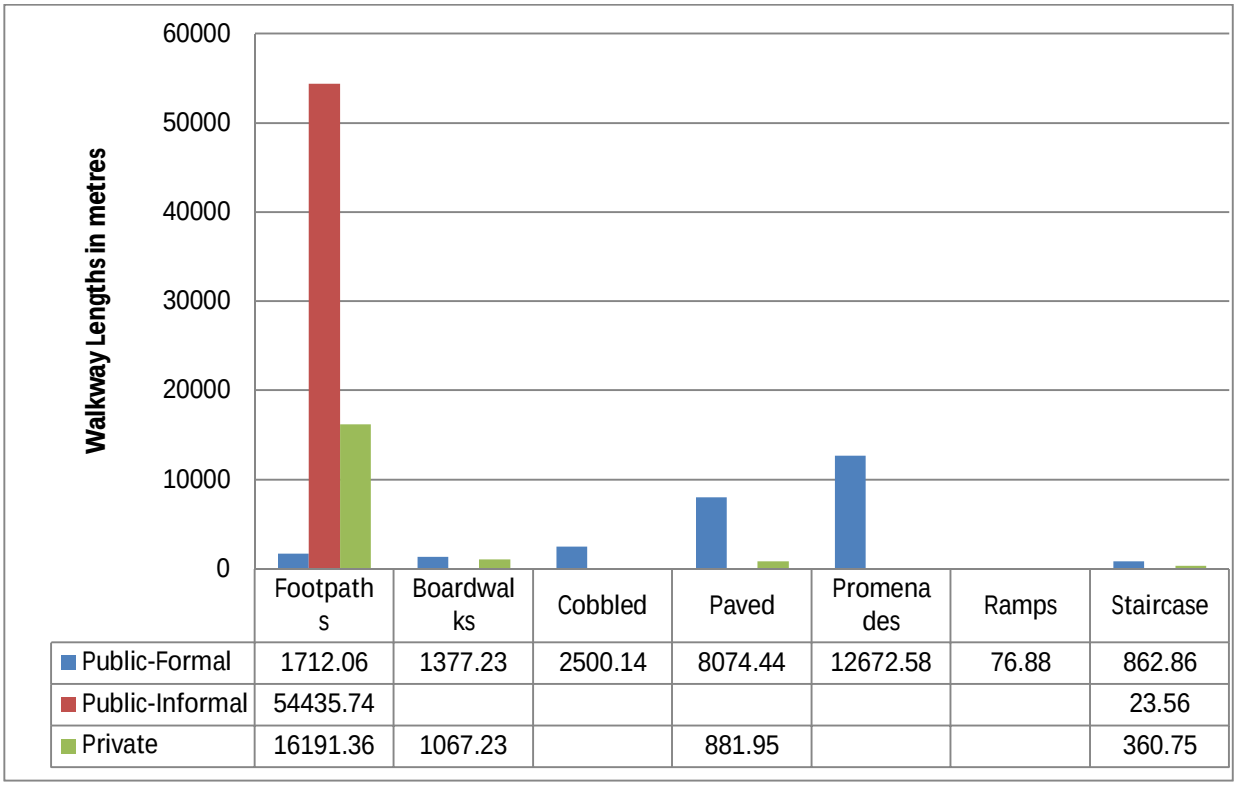
Walkways cover a length of approximately 99km across the City's coastline. The majority of these walkways are informal (72% - Graph 10) as they either do not have supporting infrastructure or are located on private land. Looking at the walkways per suburb, it was evident that Monwabisi and Blaauwberg Conservation Area have the highest total length of walkways – the majority of these walkways were identified as footpaths.



Graph 9: Formal vs. informal walkways



Graph 10: Total length of walkways per suburb (meters)

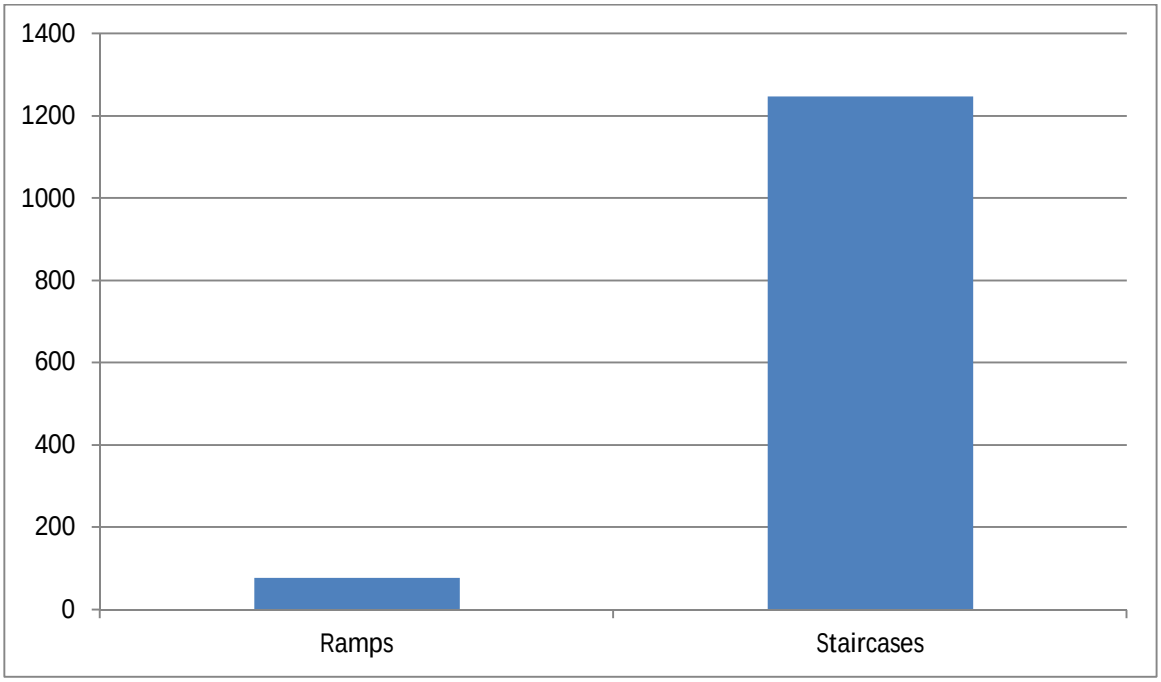


	Footpaths	Boardwalks	Cobbled	Paved	Promenades	Ramps	Staircase
Public-Formal	1712.06	1377.23	2500.14	8074.44	12672.58	76.88	862.86
Public-Informal	54435.74						23.56
Private	16191.36	1067.23		881.95			360.75

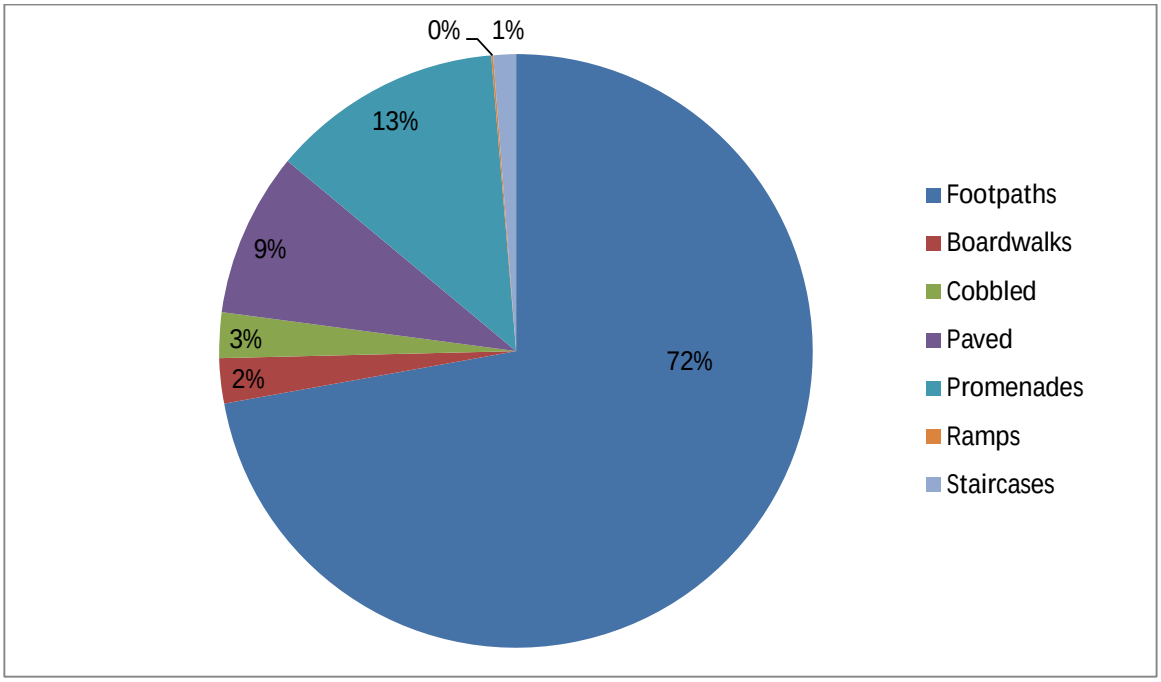
Graph 11: Category and classification of walkways (meters)

It is evident from the graph above as well as Graph 14 that footpaths dominate the types of walkways across the City's coastline. Approximately 78% of all footpaths are publically accessible with approximately 16km of footpaths being privatised for residential use or are merely located on private land for the length of the City's coastline. Most private footpaths (in terms of collective length) are located in the following suburbs: Riebeeckstrand, Melkbosstrand, Milnerton, Kommetjie, Strand and Gordon's Bay.

All promenades are public and formal and located in the following suburbs: Melkbosstrand, Lagoon Beach, Sea Point, Camps Bay, Strand and Gordon's Bay. They occupy nearly 13% of the identified walkways, of the coast. Public and formal staircases were predominately located in the following suburbs: Bloubergstrand, Clifton, Camps Bay, Fish Hoek, Muizenberg, Monwabisi, Strand and Gordon's Bay.

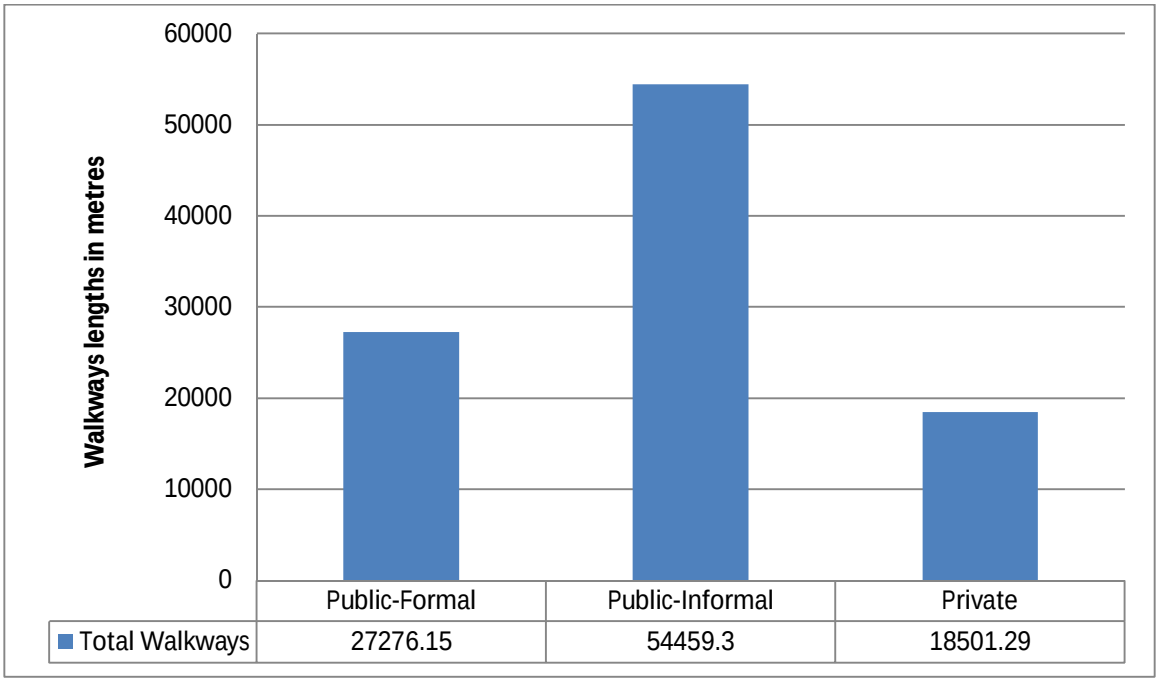


Graph 12: Count of ramps and staircases



Graph 13: Percentage of overall walkway types

Footpaths account for the most part of walkways – 72%. Although promenades makeup a small percentage, it is noteworthy to mention that they do cover longer stretches of coastline for example in areas such as: Melkbosstrand, Lagoon Beach, Sea Point, Camps Bay, Strand and Gordon's Bay.



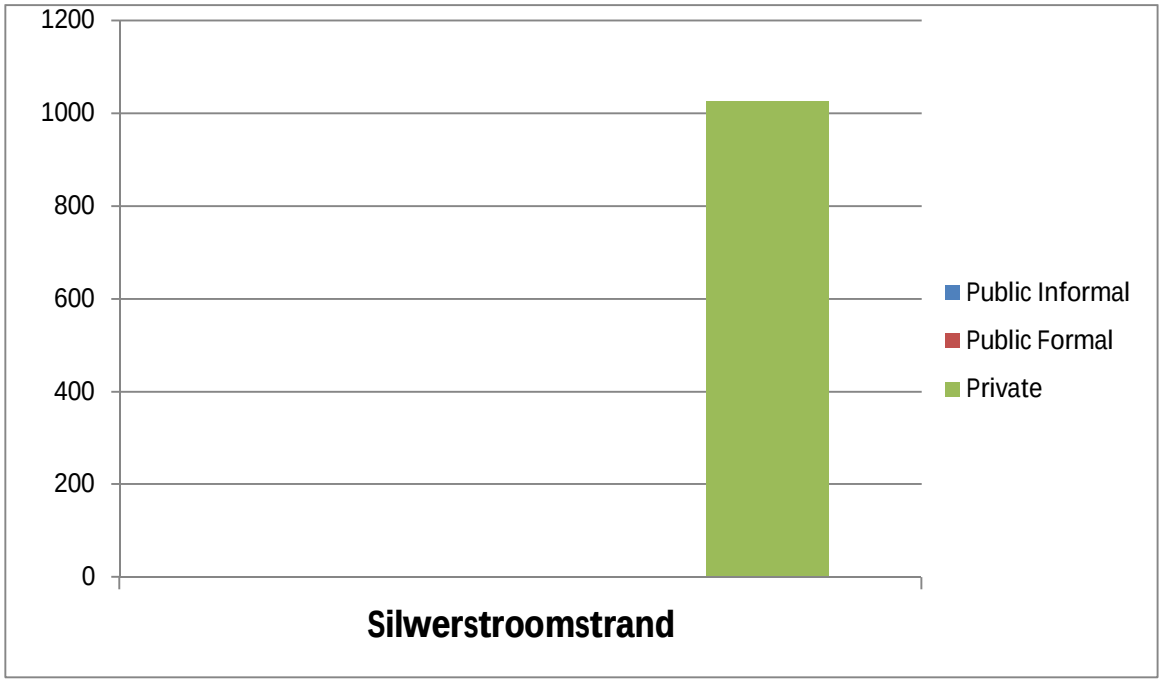
Graph 14: Public formal and public informal vs. private walkways

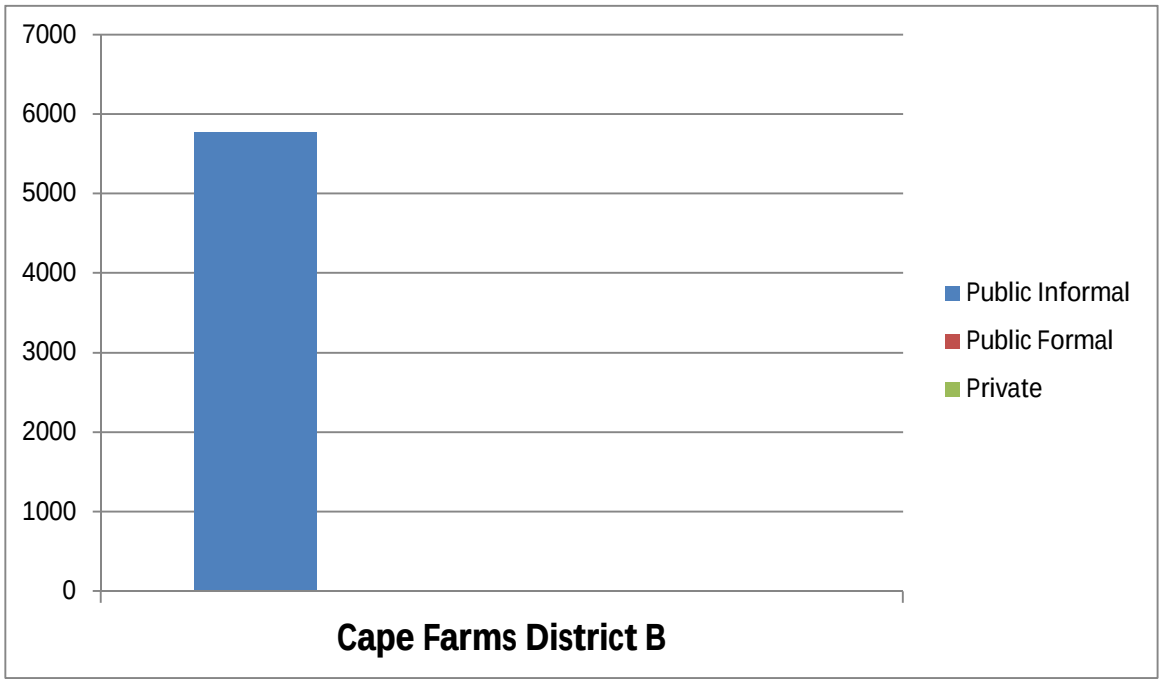
5. Conclusion

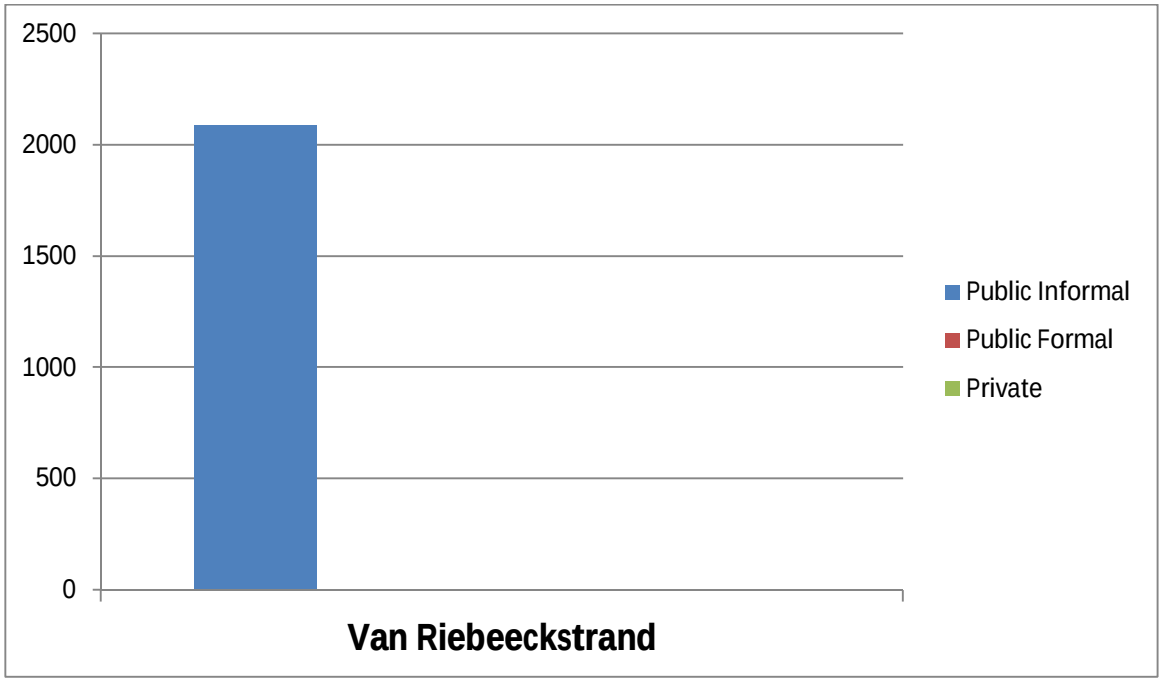
The majority of access land across the city of Cape Town is public, yet informal in nature. This combination is indicative of a lack of strategic planning regards to the facilitation of appropriate and environmentally sensitive access to and along the coast. Yet there is clearly the demand for access to the entire coast by the public. This type of access has the potential to negatively and irreparably impact the sensitive coastal environment and its resources. This matter needs to be addressed urgently so as to minimise and control the degradation along the coast. This report helps in outlining the areas that require the most urgent of interventions.

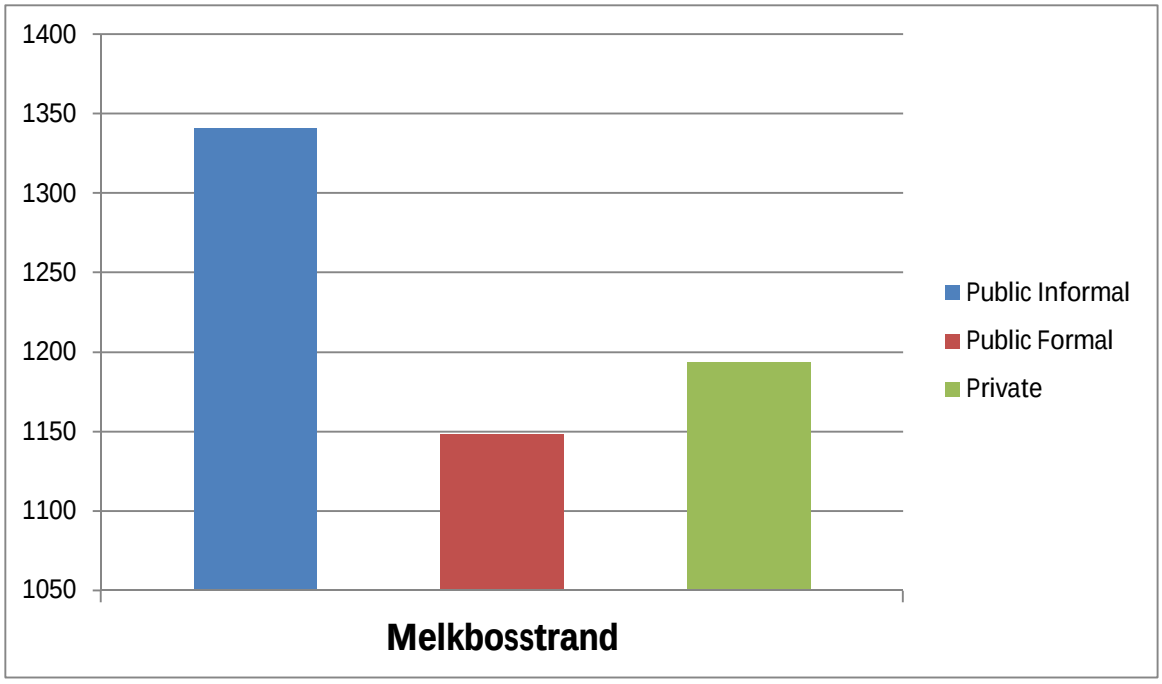
6. Appendix

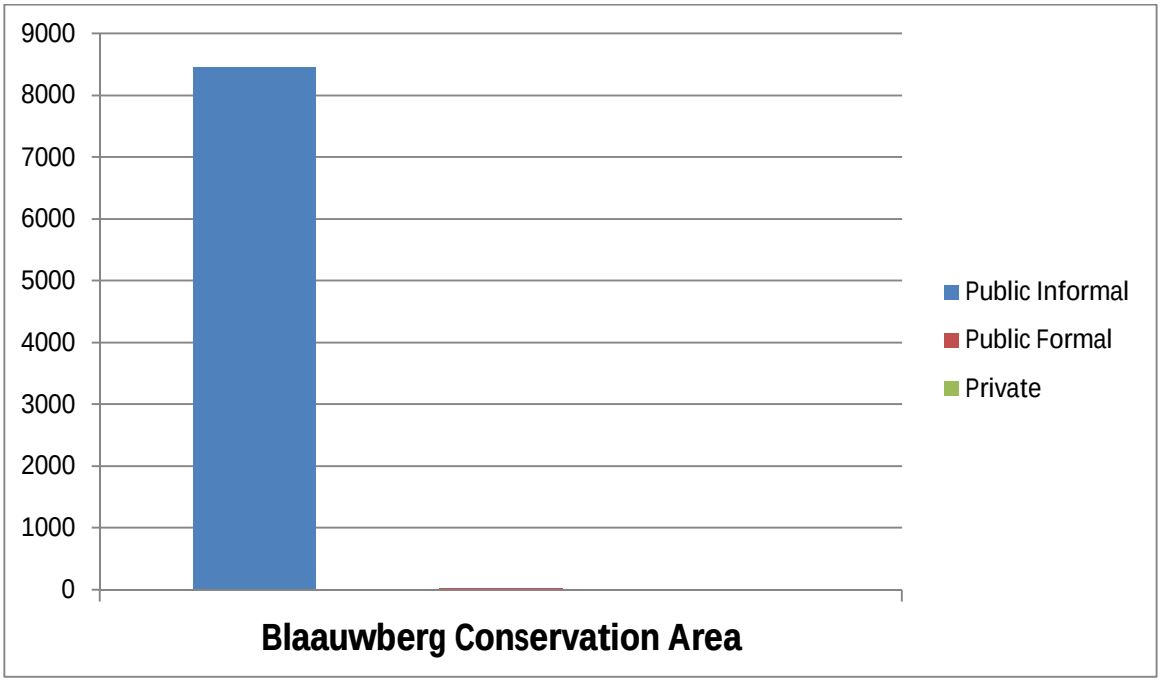
Length of walkways per suburb (meters)

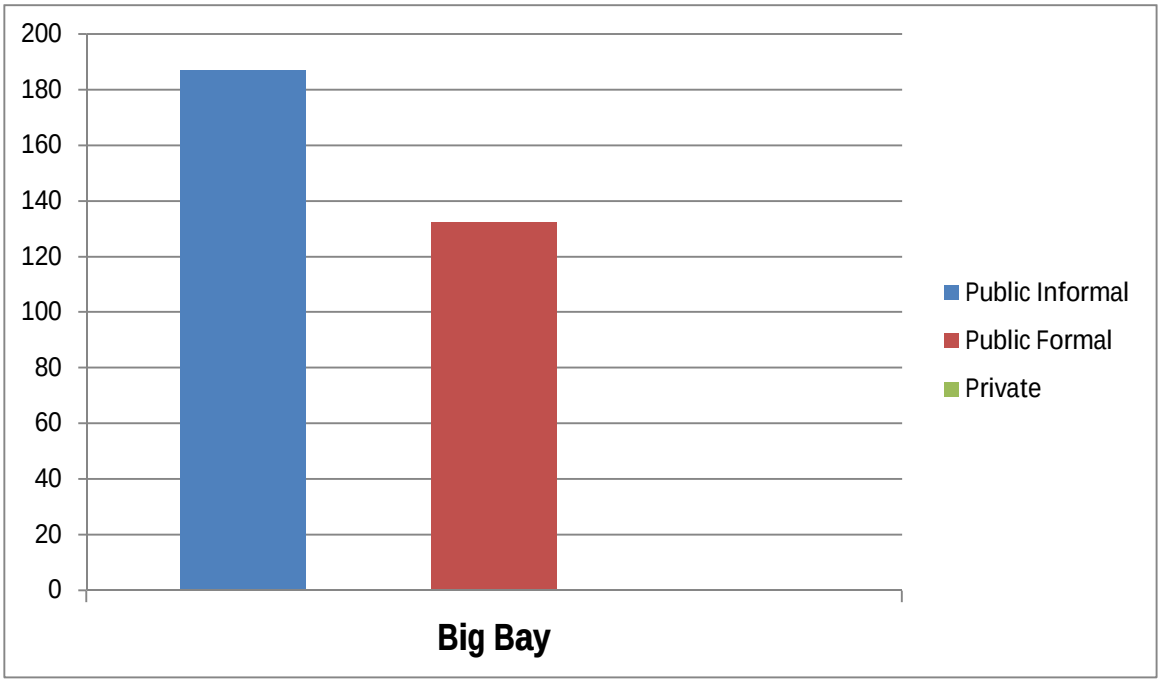


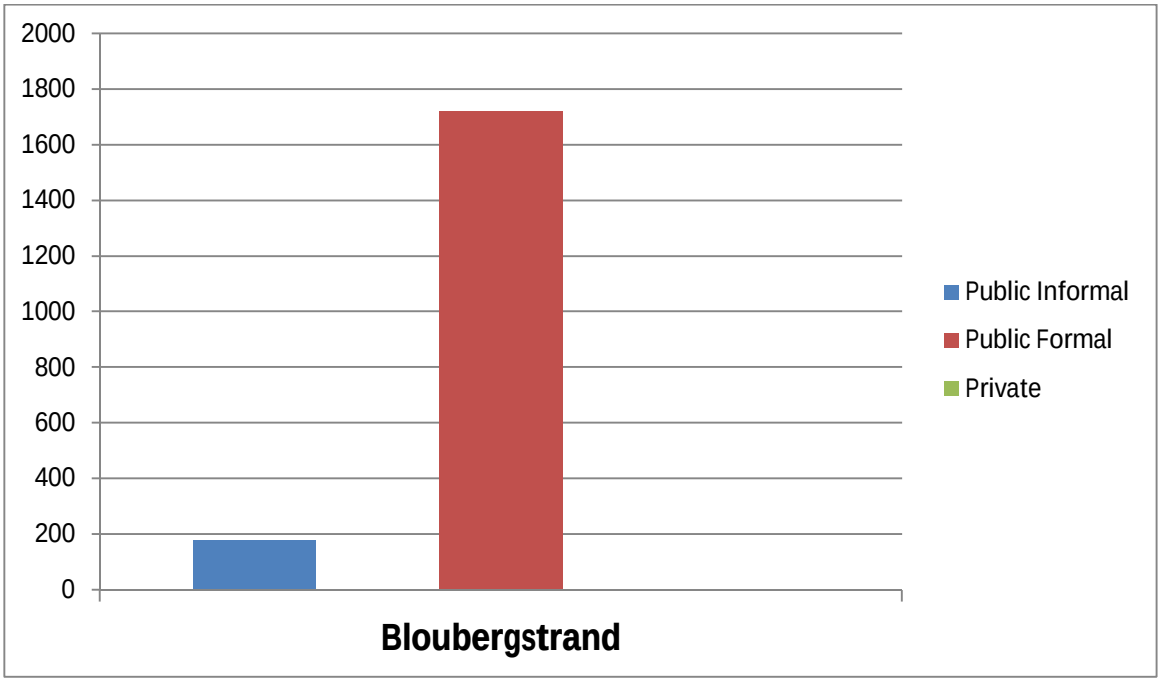


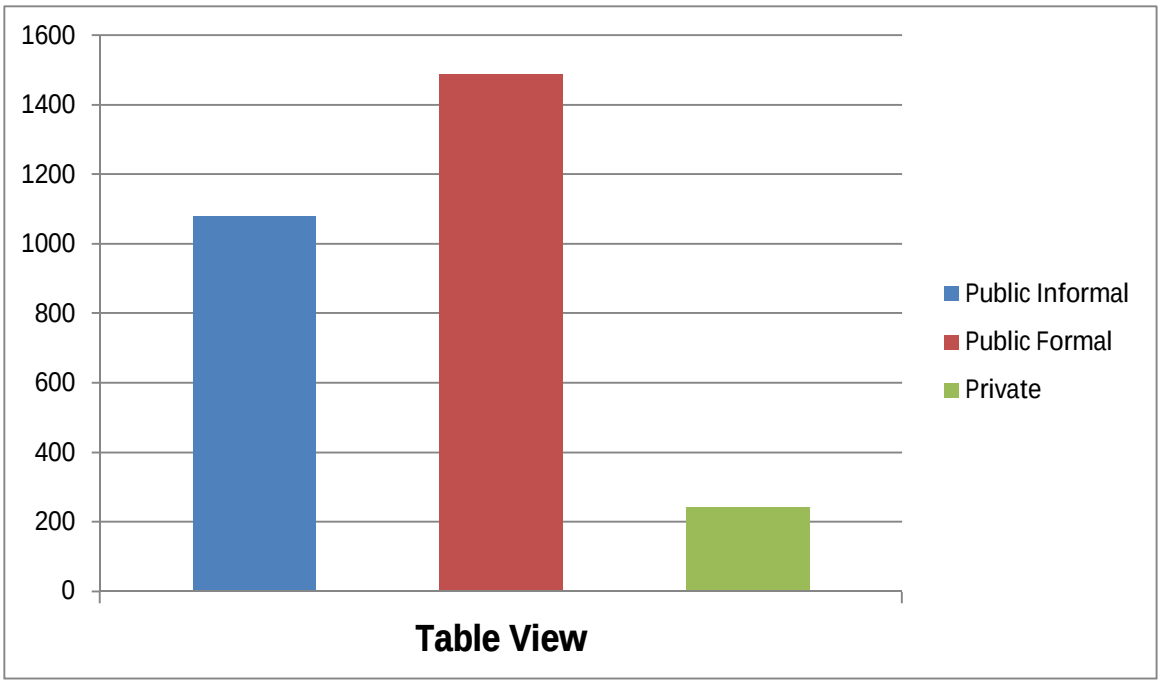

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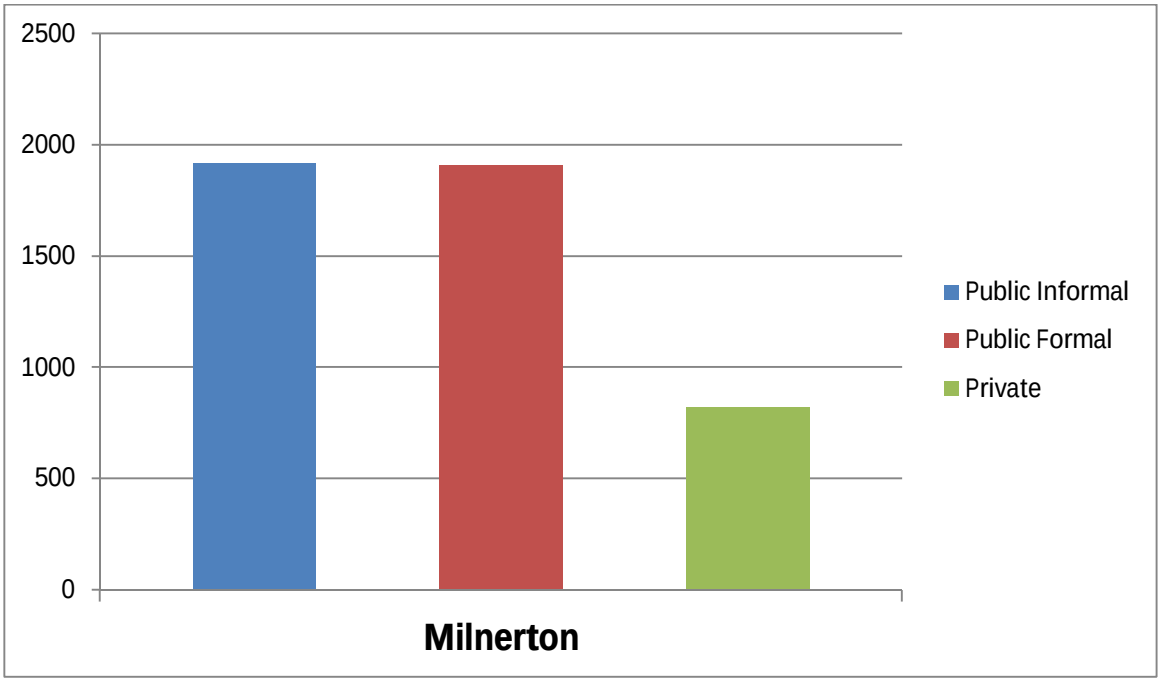

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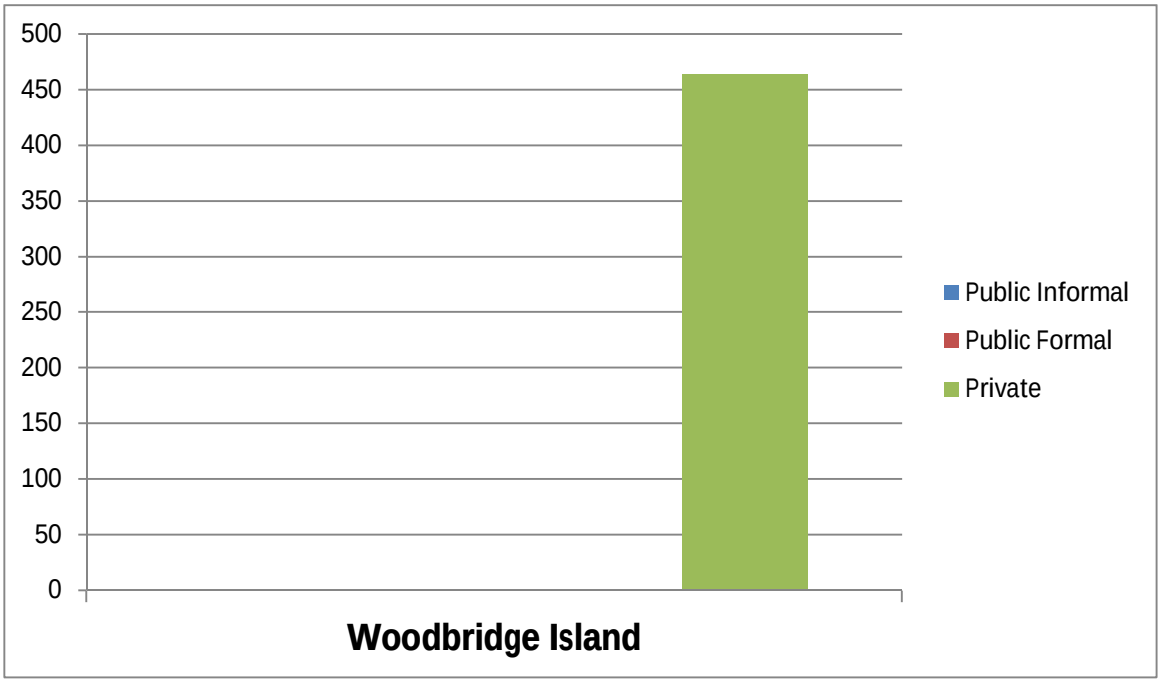

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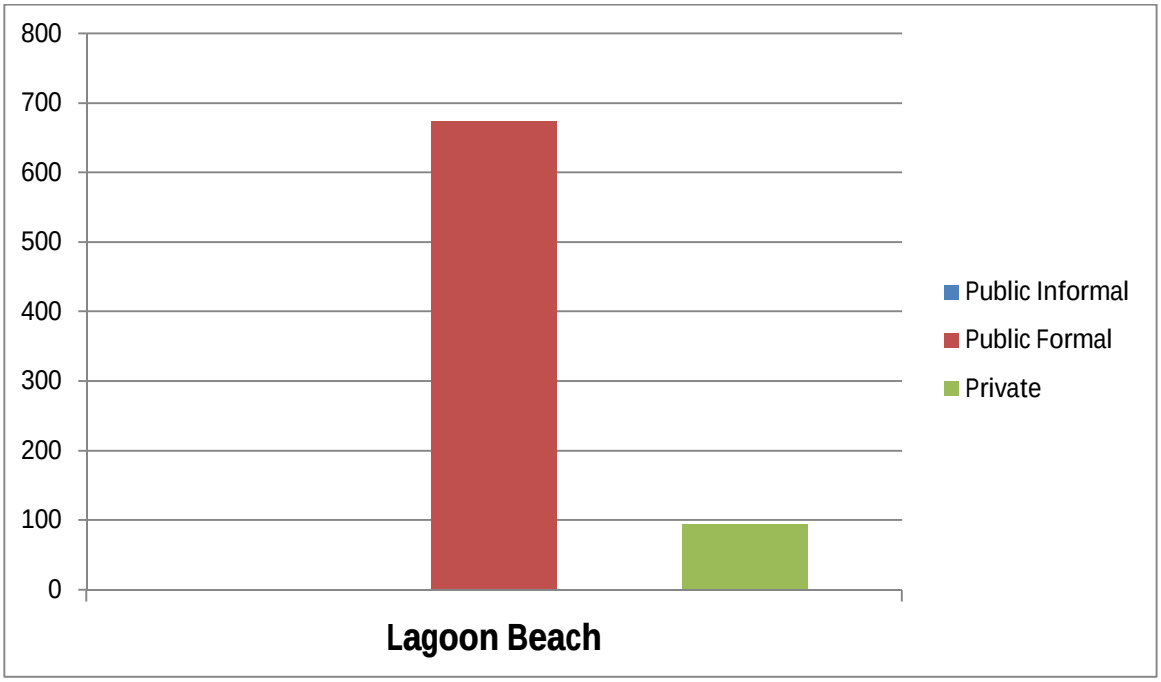

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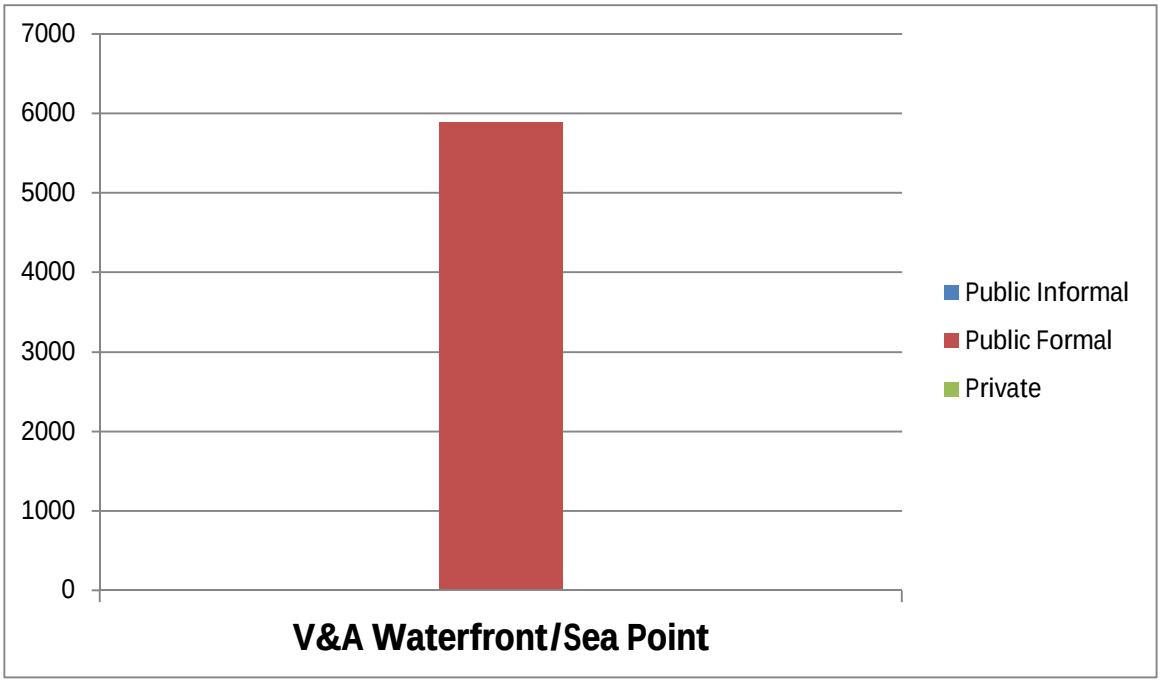

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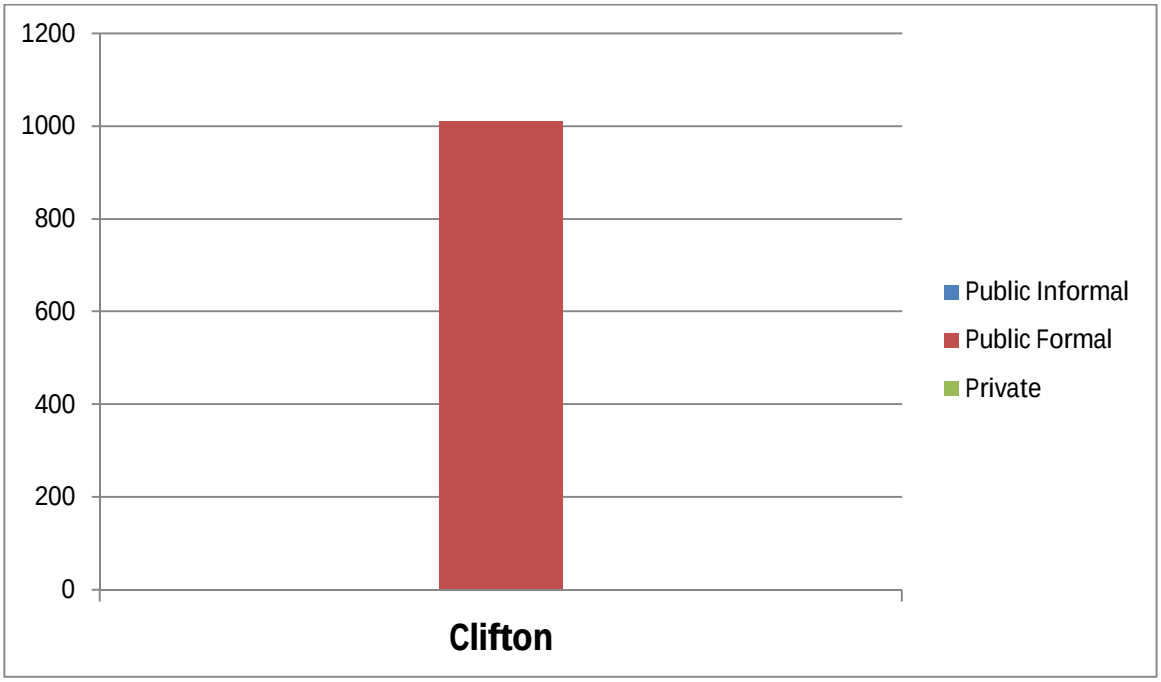

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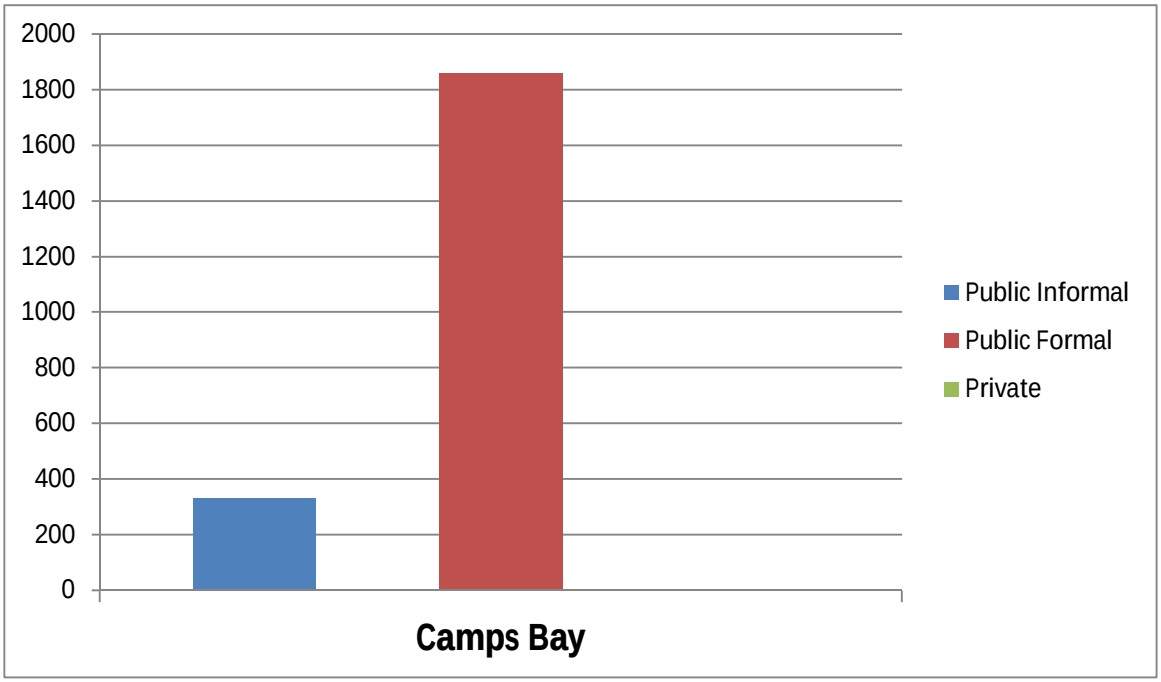

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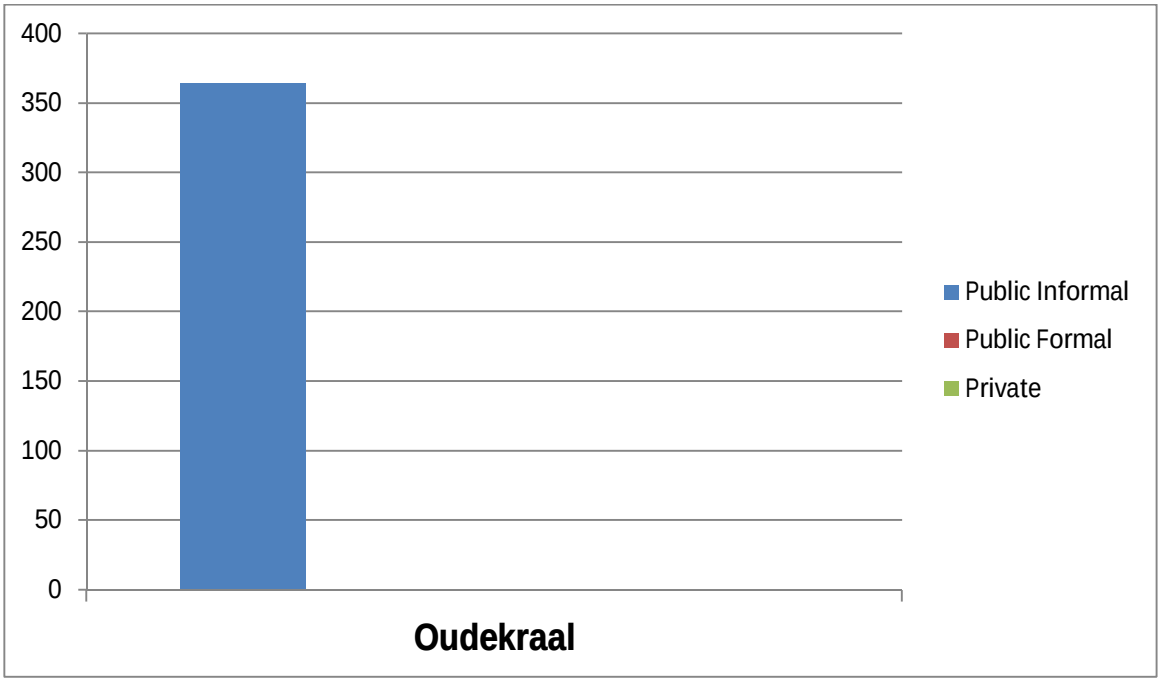

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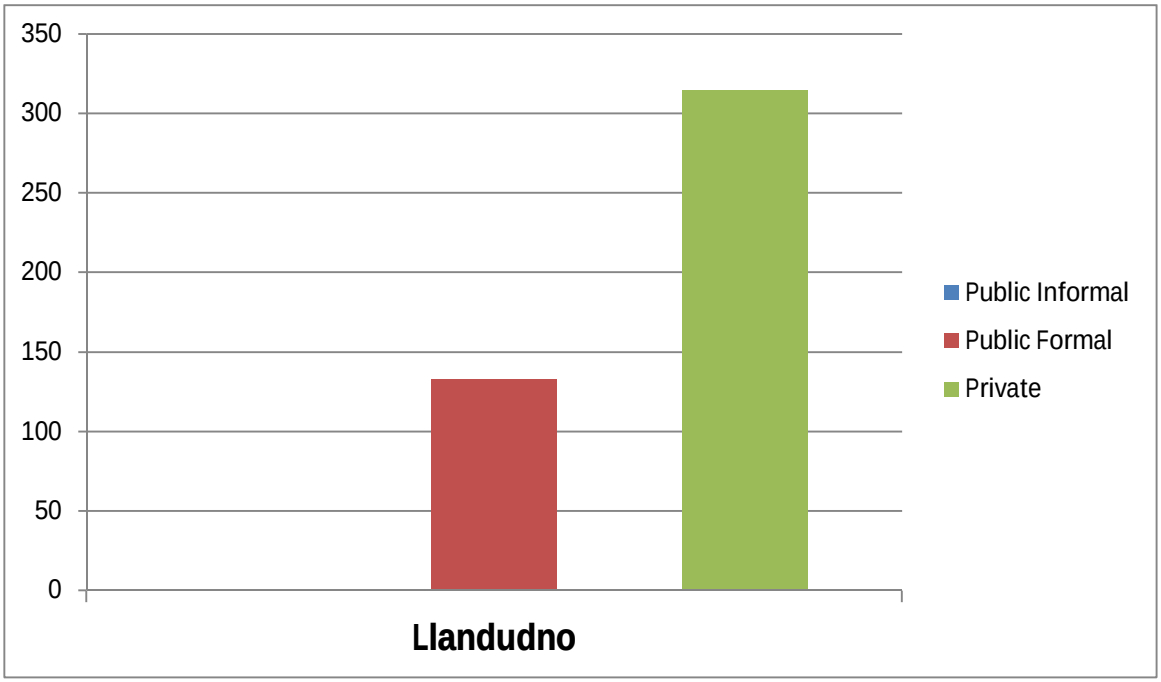

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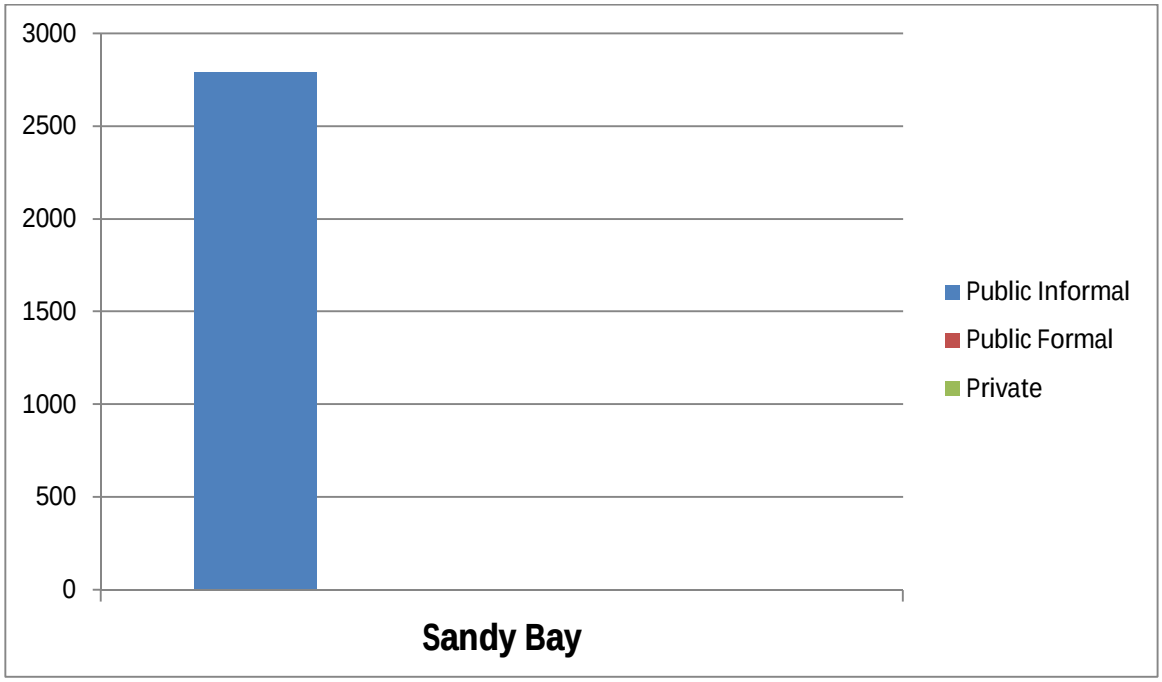

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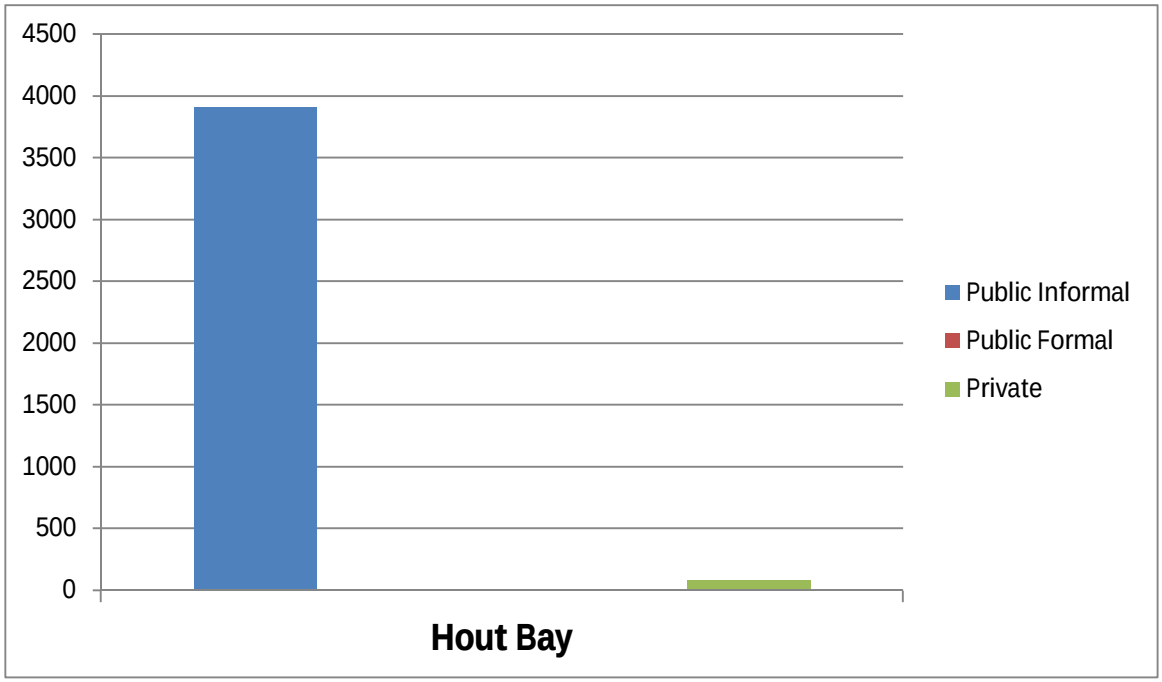

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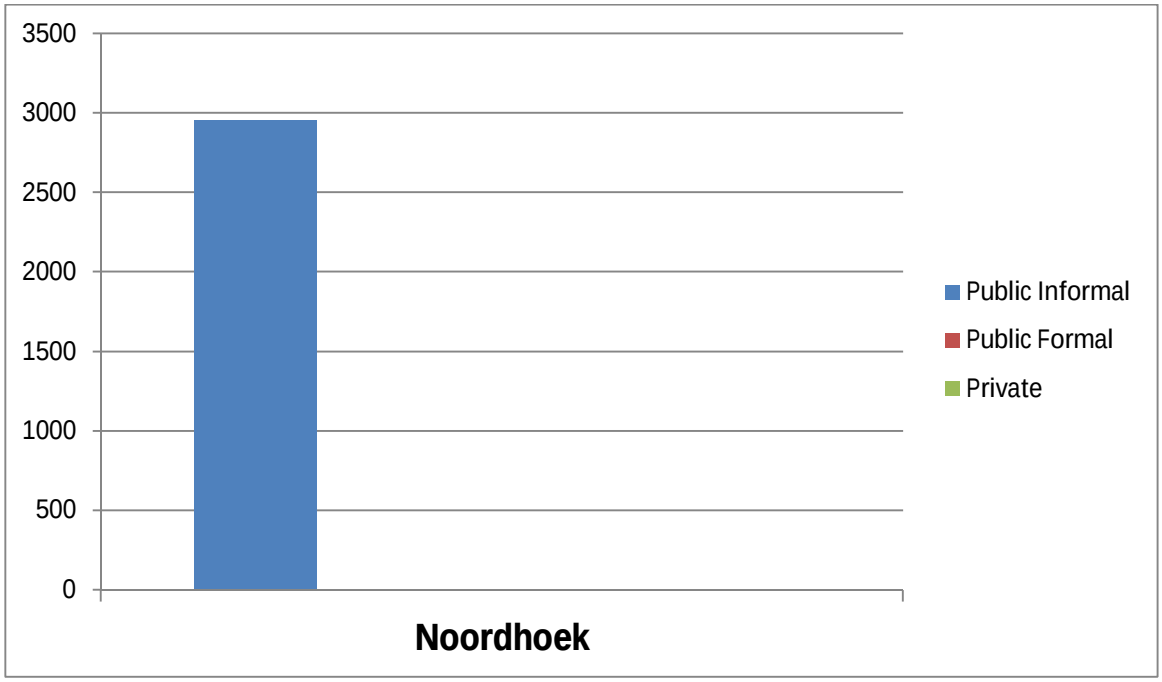

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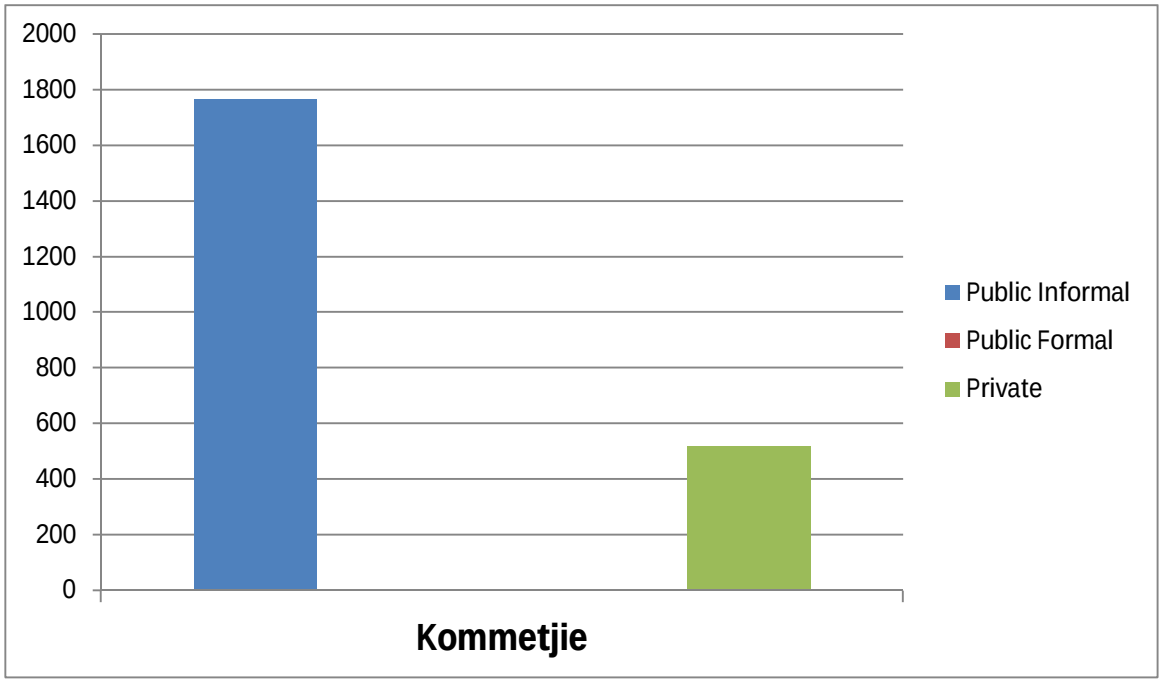

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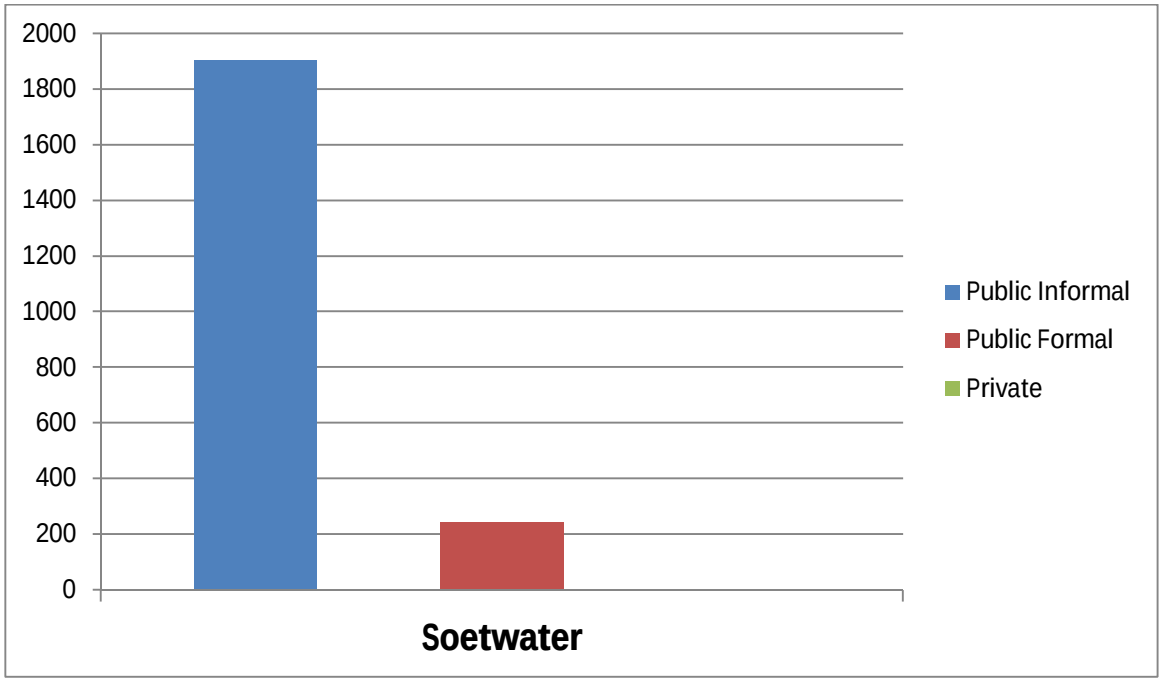

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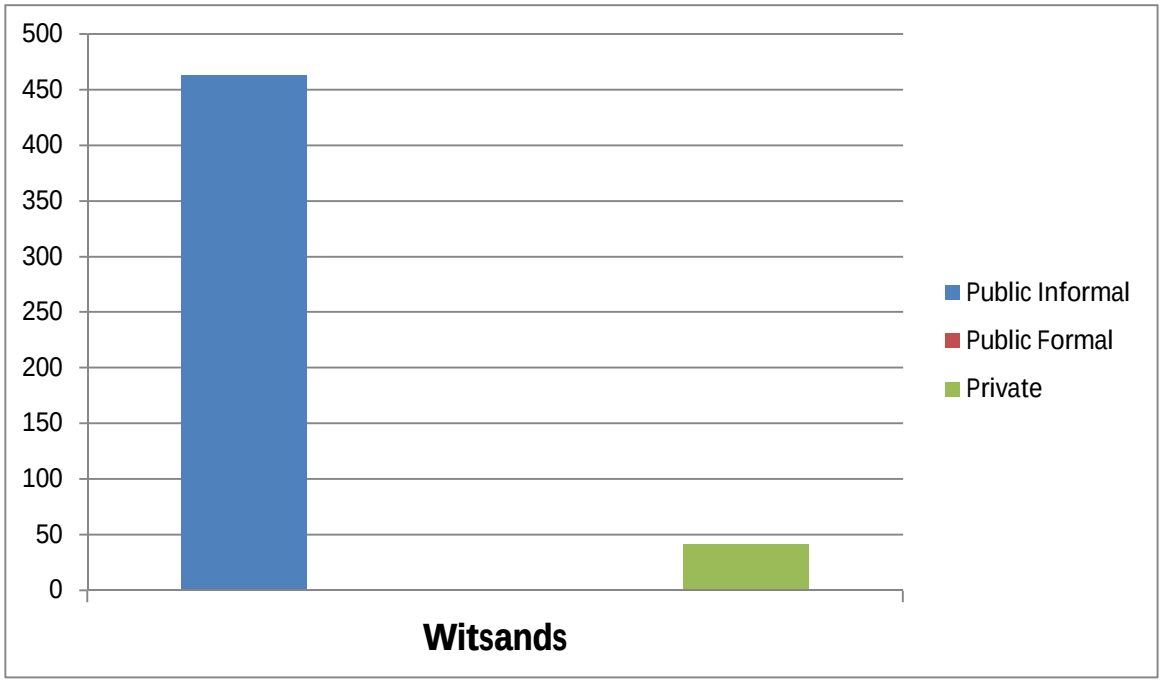

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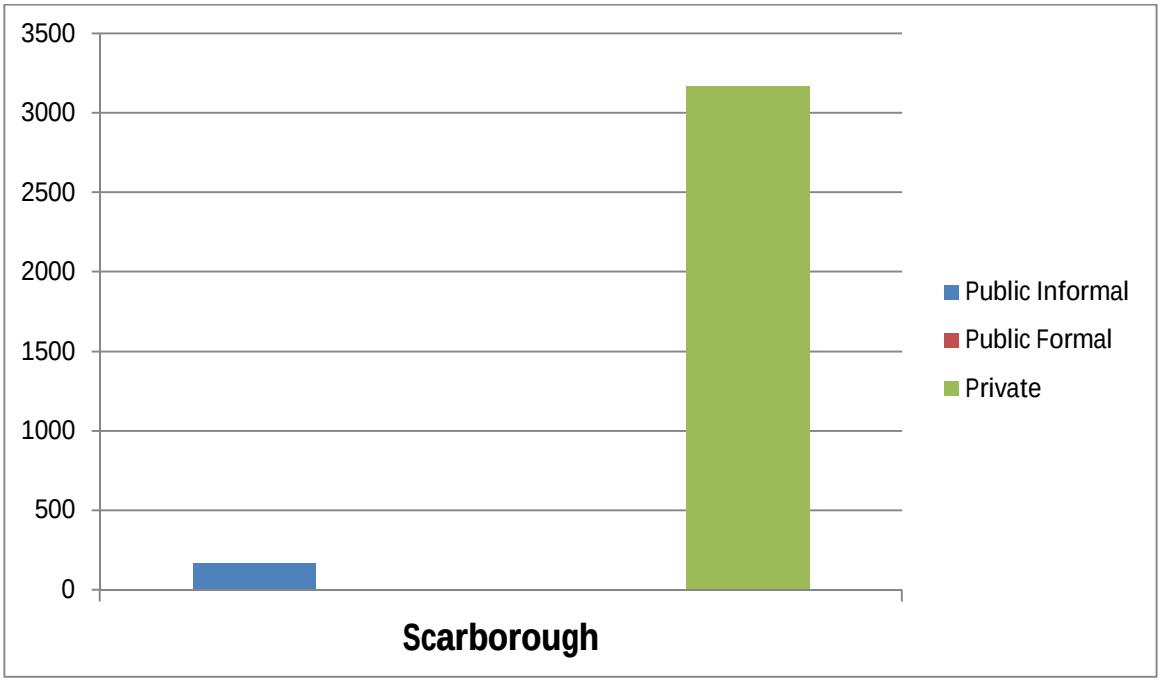

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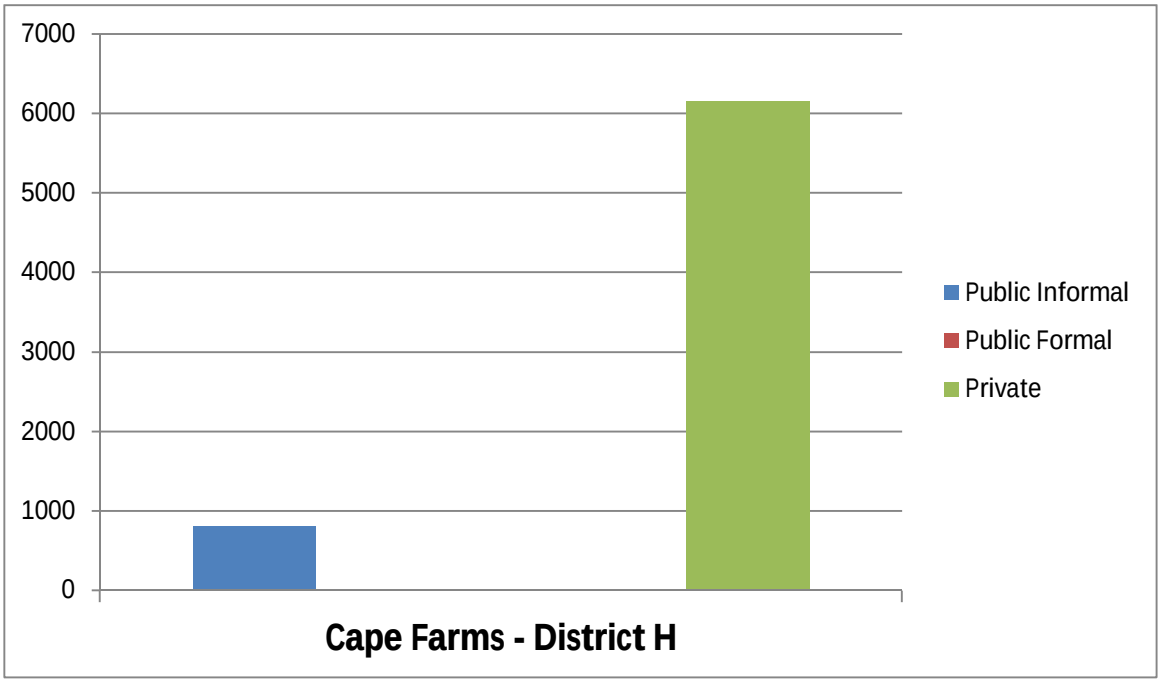

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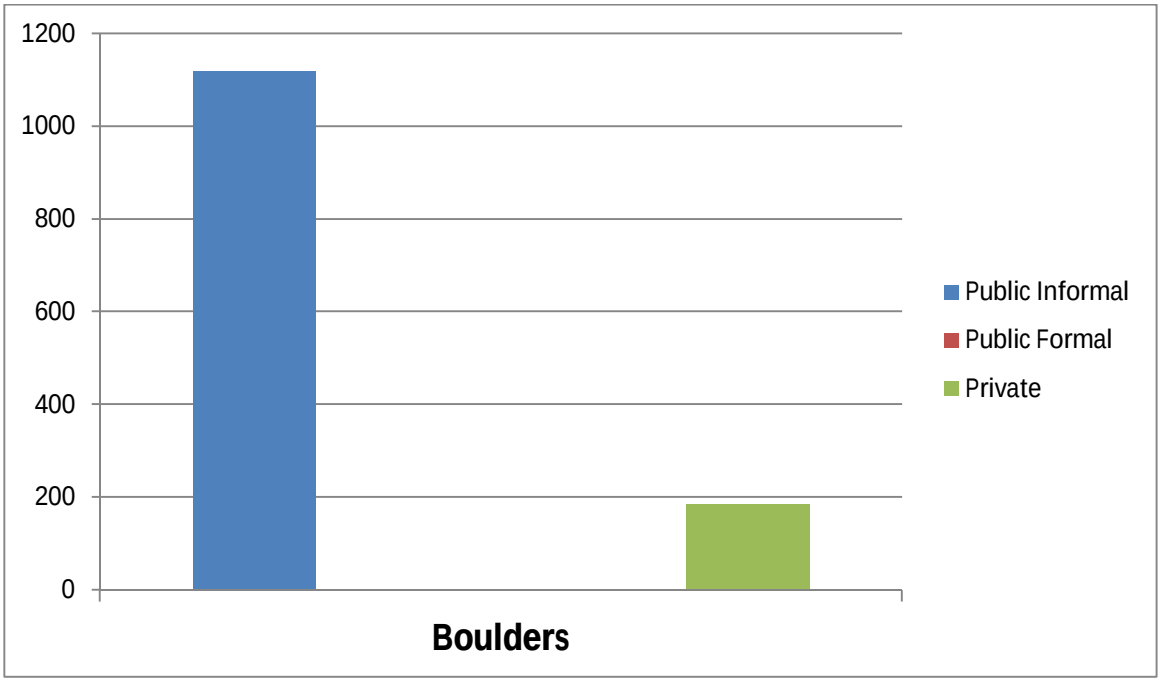

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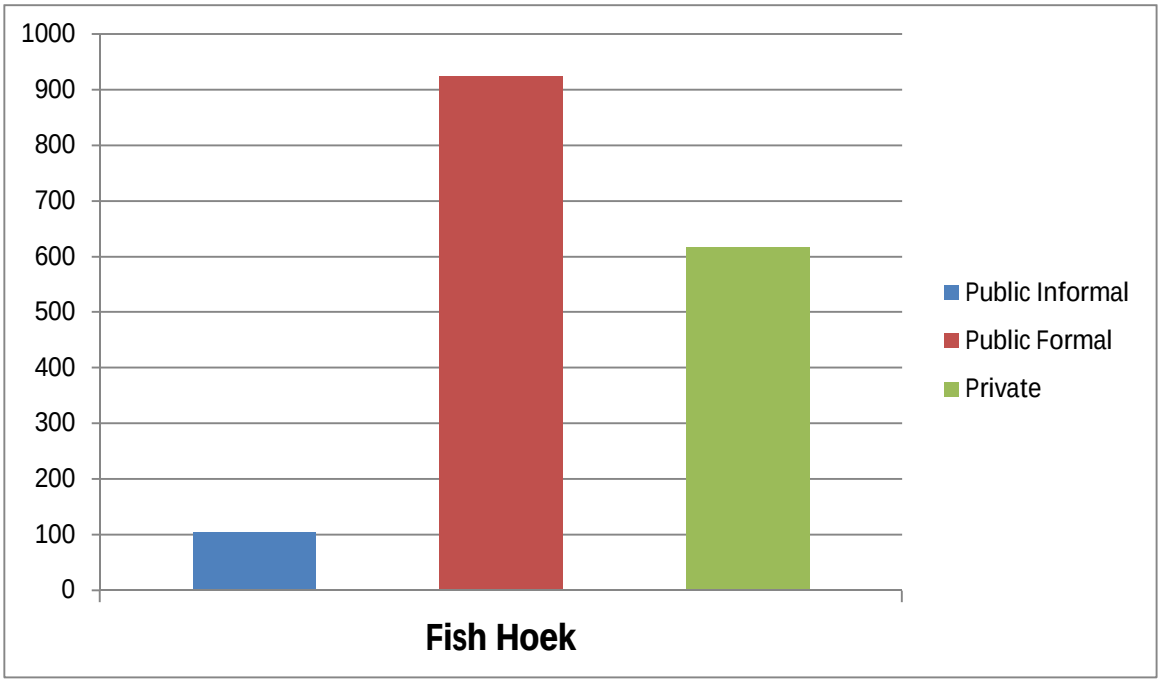

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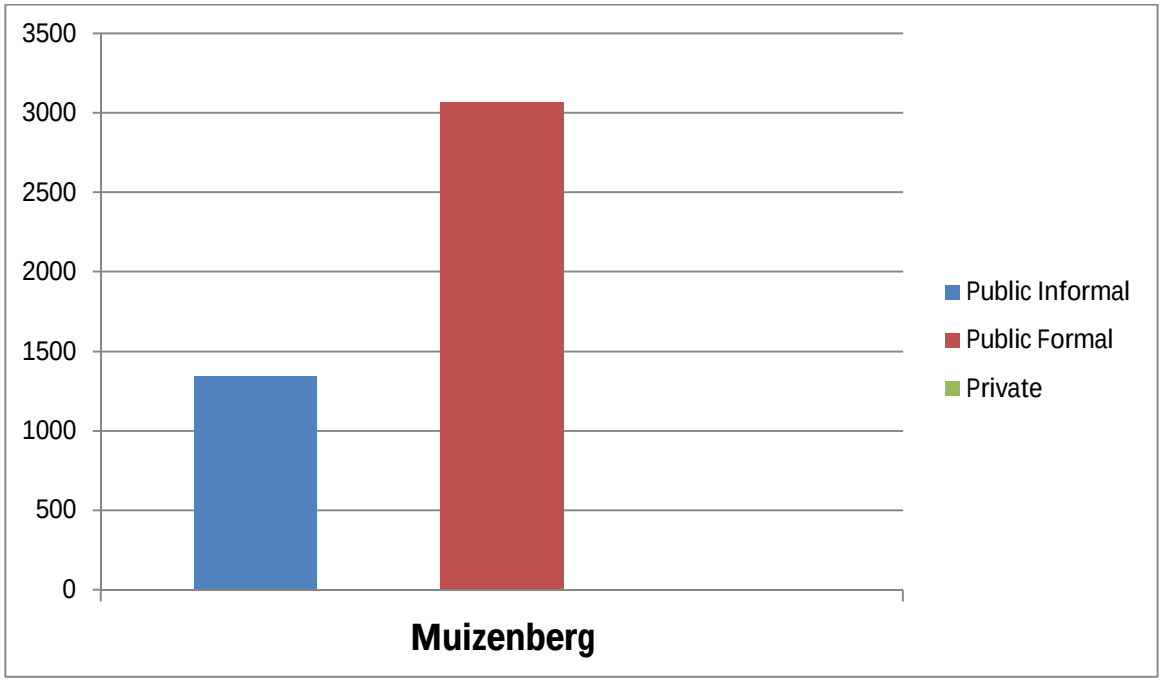

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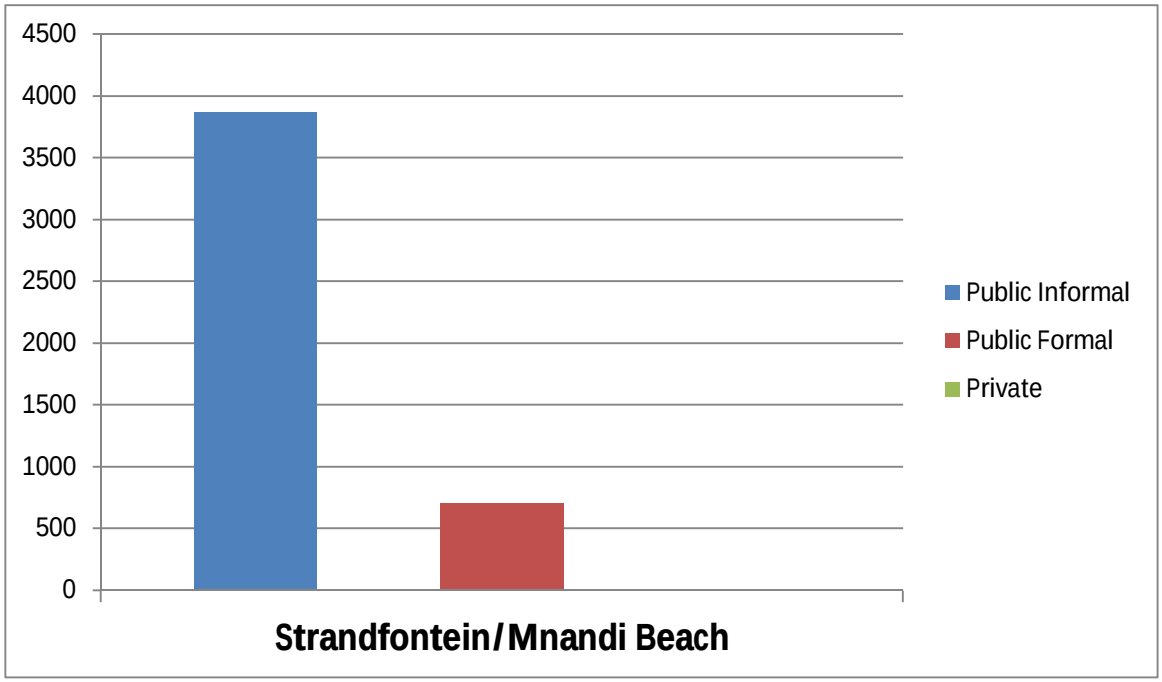

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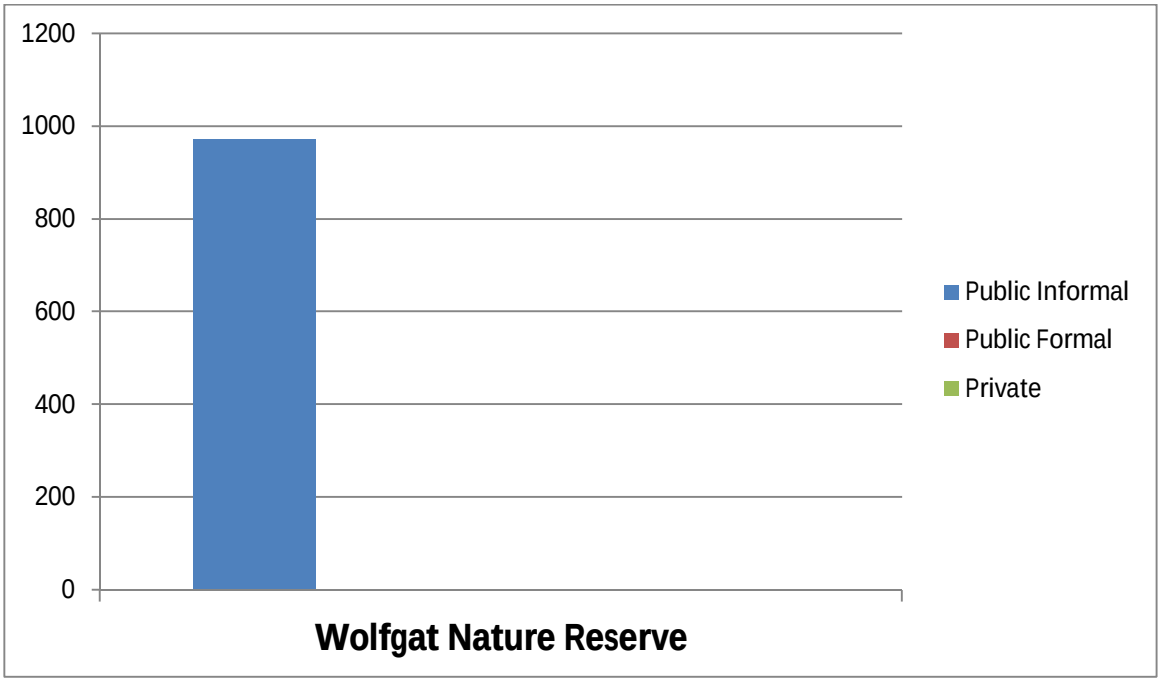

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Cape Farms - District H

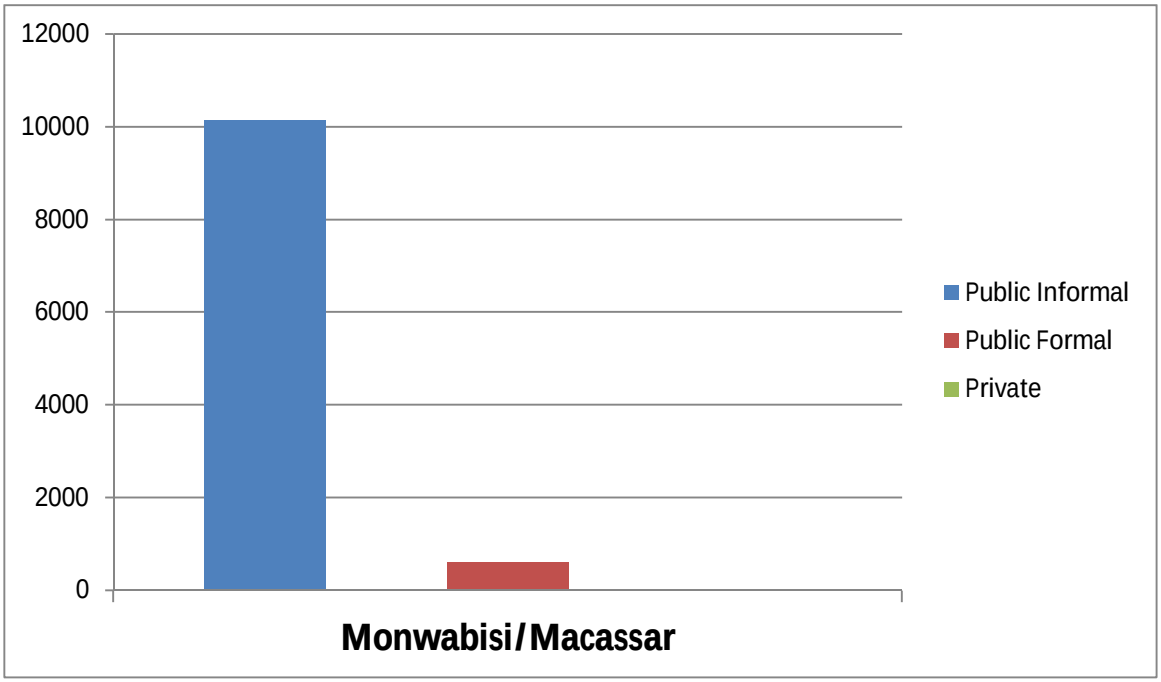

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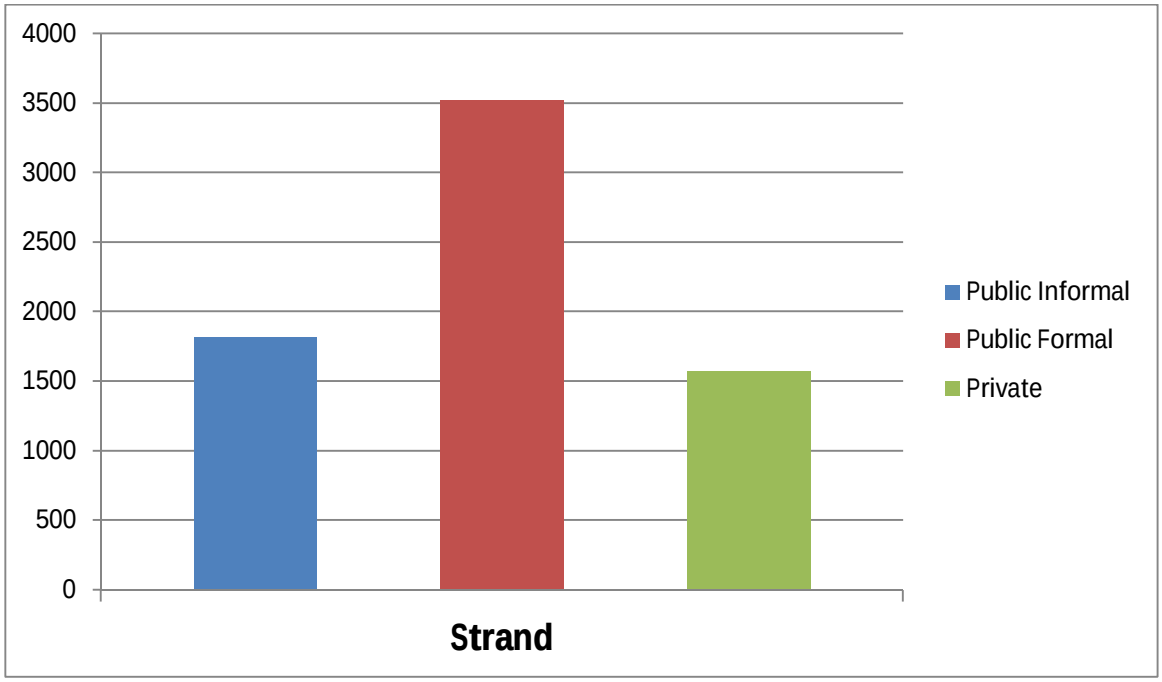

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Fish Hoek

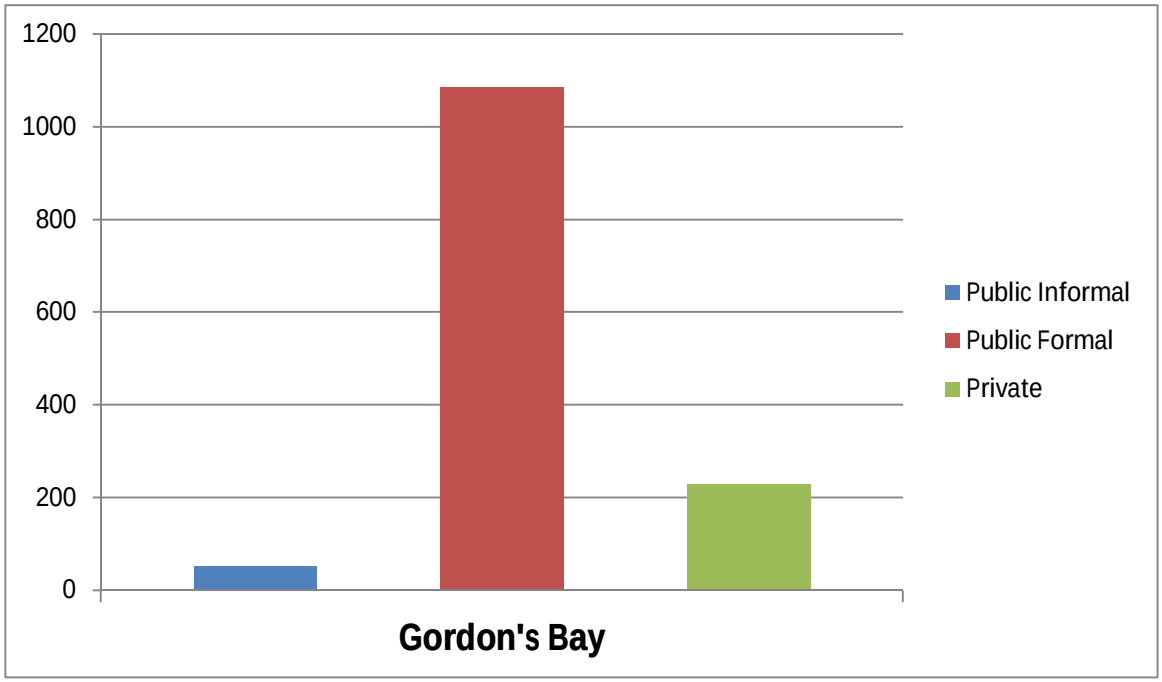

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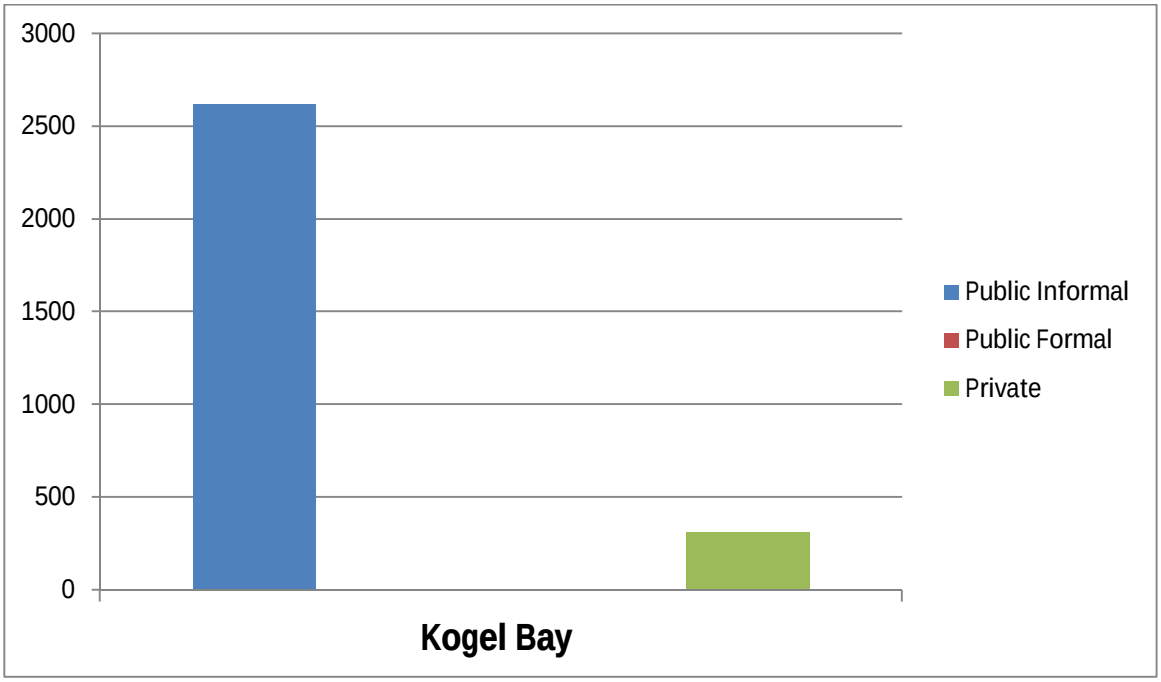

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Public Formal
Private
Strandfontein/Mnandi Beach


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Public Informal
Public Formal
Private
Wolfgat Nature Reserve


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10000
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Public Informal
Public Formal
Private
Monwabisi/Macassar


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Public Informal
Public Formal
Private
Strand


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Public Formal
Private
Gordon's Bay


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Public Informal
Public Formal
Private
Kogel Bay

Chapter 9: Coastal Development Nodes – Connecting Communities to the Coast

1. Introduction

The Integrated Coastal Management Act makes specific reference for the Municipal Coastal Management Plan to make provision for:

- [the equitable designation of] *zones as contemplated in section 56(1)(a)(i) for the purpose of mixed cost housing taking into account the needs of previously disadvantaged individuals*

Cape Town, like all coastal areas within South Africa, has a very strong and remaining Apartheid Planning legacy. This legacy historically restricted opportunities for owning land in close proximity to the coastline for ethnic groups other than the white population. Rare exceptions to this include the communities of Kalk Bay and Hangberg.

At the core of the City's priorities are the Economic and Social Development Strategies aimed explicitly at reducing inequalities within our communities, increasing opportunities for all and improving the quality and standard of living for all Capetonians. As part of these leading City strategies, the City is committed to optimising coastal opportunities for all its communities and where possible, restore some equity in coastal land ownership through prioritising coastal nodal development that will connect previously disadvantaged communities to the coastline.

2. Context

Historical context of coastal development in Cape Town must inform the perspective on future nodal development. The coastline by its very nature is a highly complex and dynamic space influenced by a multitude of environmental and socio-economic factors. It is these factors that primarily historically determined the most desirable and appropriate locations for development. In short, not all coastal space is equal in terms of its appropriateness or desirability for development, particularly development associated with residential and recreational objectives. Globally, the spatial pattern of coastal development has been informed by a range of factors including, but not limited to:

- Sheltered and calm bays for harbours
- Exposure to wind and storm activity
- Highly dynamic unstable sand systems versus rocky shorelines
- Elevation, views and landscapes
- Wave action
- Wind shadows and contour conditions
- Proximity to high quality recreational beaches which in turn are themselves determined by a host of factors such as prevailing wind direction, shelter, wave action and dynamics
- Estuaries, coastal wetlands and floodplains

With the history of development in Cape Town, these factors were the primary determinants behind the spatial coastal form that Cape Town now presents. As a result, and as part of the Apartheid legacy, almost all of the physically appropriate and desirable coastal spaces have been developed. The vacant stretches of coast that remain, are subject to harsh environmental conditions, such as persistent south easterly winds, subsequent colder temperature and wind-driven sand. This spatial form of Cape Town's coastline has also been shaped in the last 15 years by the proclamation of the Table Mountain National Park, a highly advantageous, beneficial

and positive long term asset to the City, but which has removed approximately 60km of coastline from future nodal development options.

This context is an important starting point in considerations with regards working towards successful future nodal development on our coastline that will in part begin to reverse some of the historical coastal inequalities.

3. Lessons learned and Constraints

In planning and considering future nodal development, it is essential that we learn from past experience and clearly understand relevant constraints. Without these key informants, such as increasing pressure form sea-level rise, not only are we likely to create unsuccessful coastal opportunities but will in many cases substantially increase the risk and long term cost of poorly located development nodes to both the City as well as the individual residents who may move into that area. Further, creating unrealistic expectations of desirability in terms of the real quality of the coastal living environment, need to be fully understood as perceptions are often not realised in reality. Environmental constraints such as prevailing wind conditions, sand source and movement as well as seasonal temperature, are typically overlooked when planning for coastal development but which are central to the success of these coastal developments. This is particularly relevant along the False Bay coastline.

Lessons learned

- Highly dynamic coastal spaces cannot be engineered to accommodate infrastructure (e.g. Hout Bay windblown sand, Macassar resort, Monwabisi resort, Table Bay erosion, frequent flooding of Camps Bay and the Strand)
- Infrastructure that impedes or alters natural coastal systems often dramatically increases coastal risk which requires long term and highly costly interventions to reduce or mitigate the risk that has been created and which is often then inherited by local communities
- Engineering solutions run the risk of either failure in mitigating risk or in some cases exacerbating the risk. Typically this includes the deflection of storm surge energy to neighbouring properties and the exacerbation of erosion on these neighbouring properties

Natural Constraints

- Prevailing wind direction and strength
- Mobile sand systems replenished and fed by seasonal marine transport
- Eroding coastal conditions
- Predicted mean sea level rise and associated storm surge events
- Maintaining infrastructure in a high wind blown sand/salt spray environment
- Colder temperatures during the summer months

4. City priorities

Within the constraints and challenges, the City is however committed to identifying appropriate coastal nodal development points along our coastline that will give effect to the City's priority of opportunity, upliftment, reducing inequalities and attracting investment. A central component to the methodology for defining the City's Coastal Urban Edge as part of the Spatial Development Framework (SDF), was the application of best available technical and local knowledge to spatially define as part of the SDF, appropriate, risk averse and developable nodal points that would connect existing communities on the Cape Flats and West Coast to the coastline in a responsible and risk averse manner. The Coastal Urban Edge spatially defines these appropriate coastal spaces, and where these spaces may accommodate a mix of future residential, recreational and commercial development consistent with existing coastal development.

5. Process

During the three-year process to define the Coastal Urban Edge, an extensive methodology was applied in defining the Coastal Development Nodes. This included the following:

- Information from the City's Sea Level Rise Risk Assessment
- Mobile dune systems and substrate conditions
- Prevailing weather and wind conditions
- Contour and elevation considerations
- Existing infrastructure, access points and coastal amenities
- Biodiversity and nature reserve demarcations
- Estuary and river mouths
- Wave action and exposure

Following a lengthy and detailed process that proposed five Coastal Nodal Development Points, further engagements to incorporate local input included:

- Site visit to all areas by the Political Task Team that oversaw the SDF. This included local Ward Councillors from the affected areas
- An extensive public participation process as part of the SDF finalisation that included no less than three full public engagement processes and amendments

6. Outcomes

The City's approved SDF makes provision for five future Coastal Nodal Development points that are well located to meet the needs of connecting communities to the coast in the most appropriate manner, with minimal risk and maximum desirability within the constraints of a particularly harsh coastal environment. The SDF includes four nodal development points on the False Bay coastline that will link the communities of Strandfontein, Mitchells Plan and Khayelitsha to the coastline, and a fifth proposed nodal development point on the West Coast to create a corridor linkage for the community of Atlantis and surrounds to the coastline. Whilst these nodal points have been identified and flagged for future development, further detailed studies will be applied to ensure that these nodal growth points are designed to mitigate the social impacts that may out of the harsh environmental conditions.

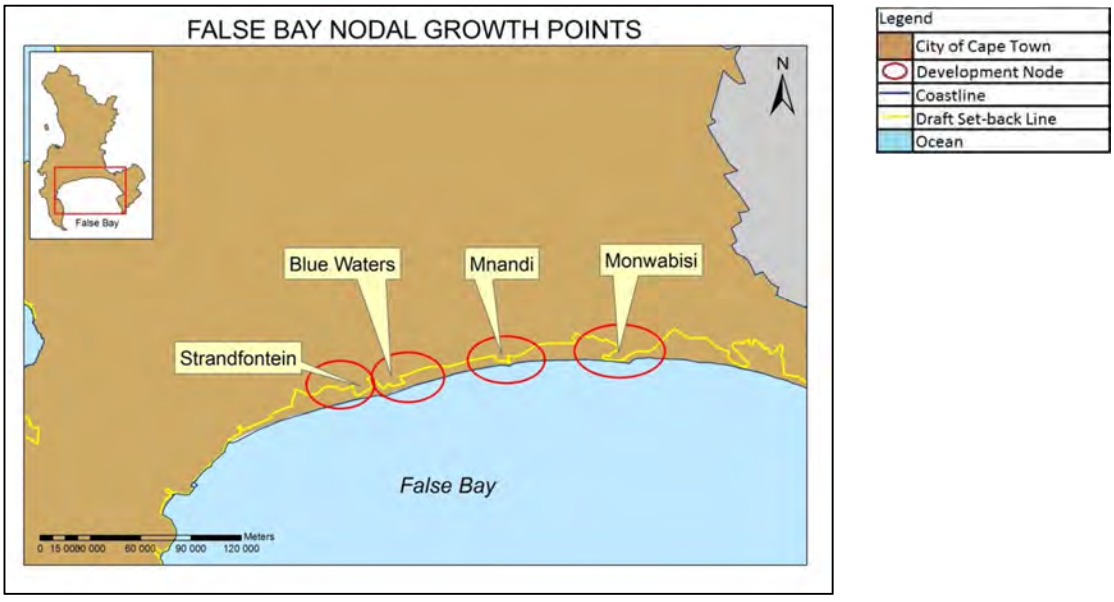
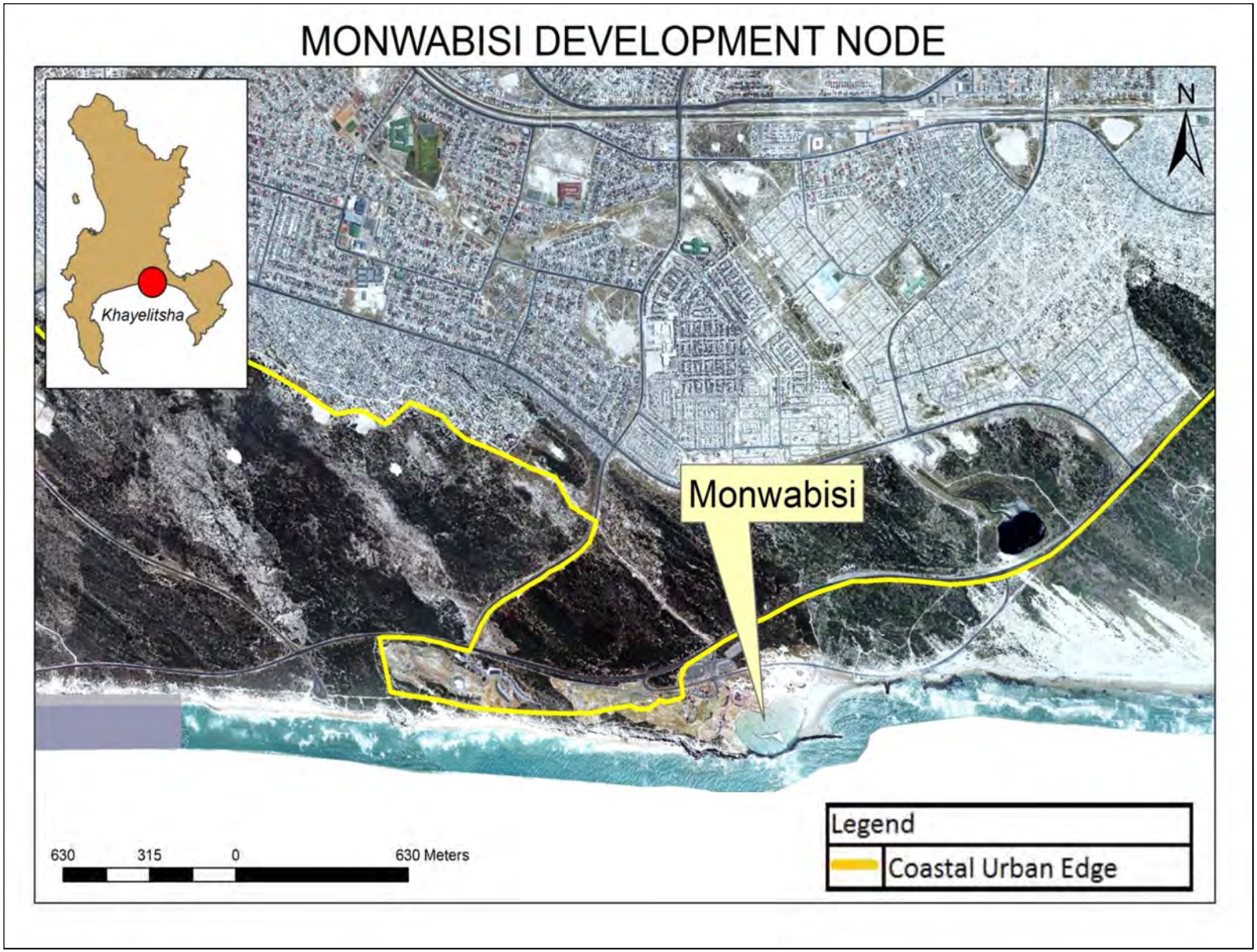


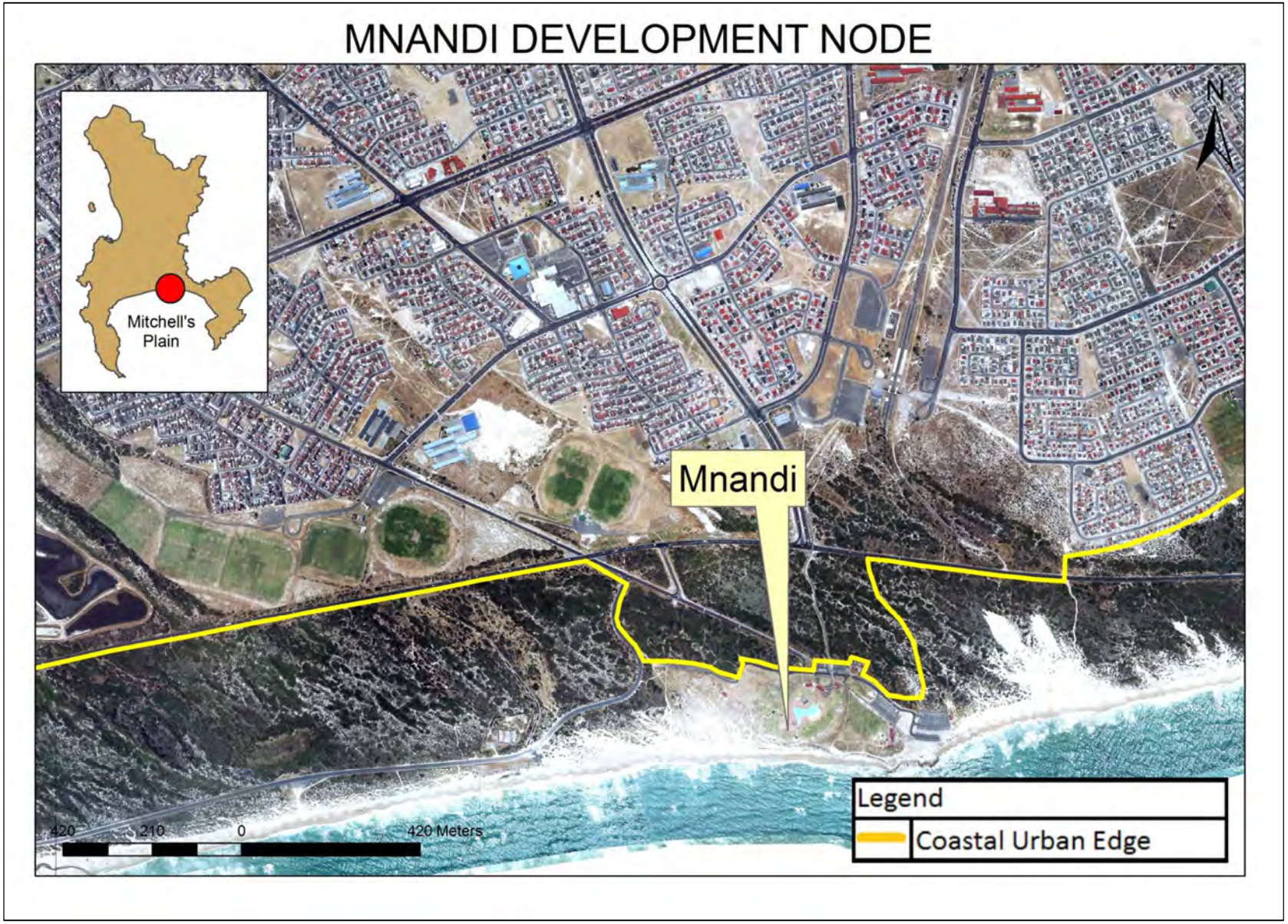
Figure 1: Overview of False Bay Coastal Development Nodes

7. The Coastal Nodal Development Nodes

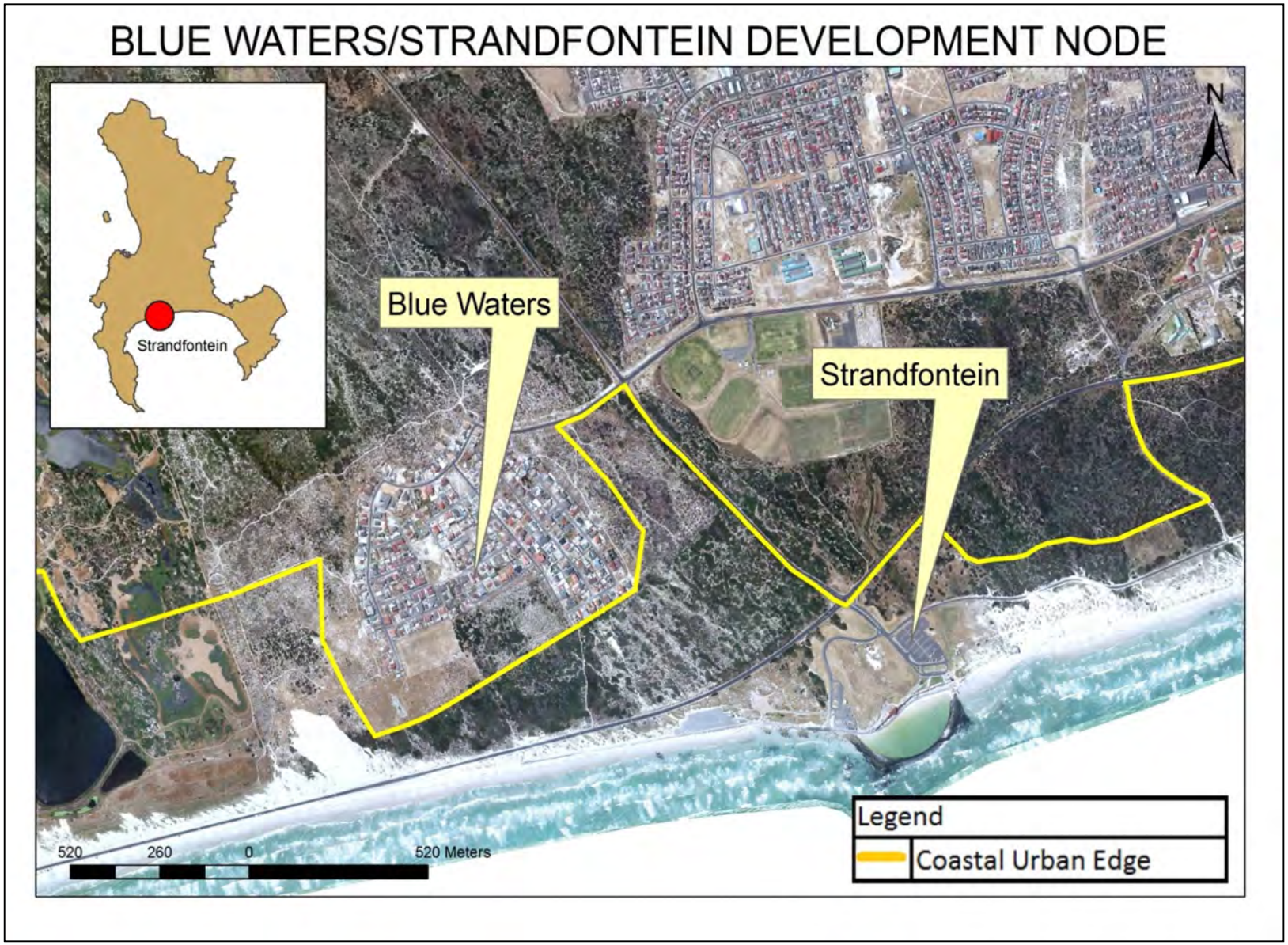
a) Connecting Khayelitsha through Monwabisi



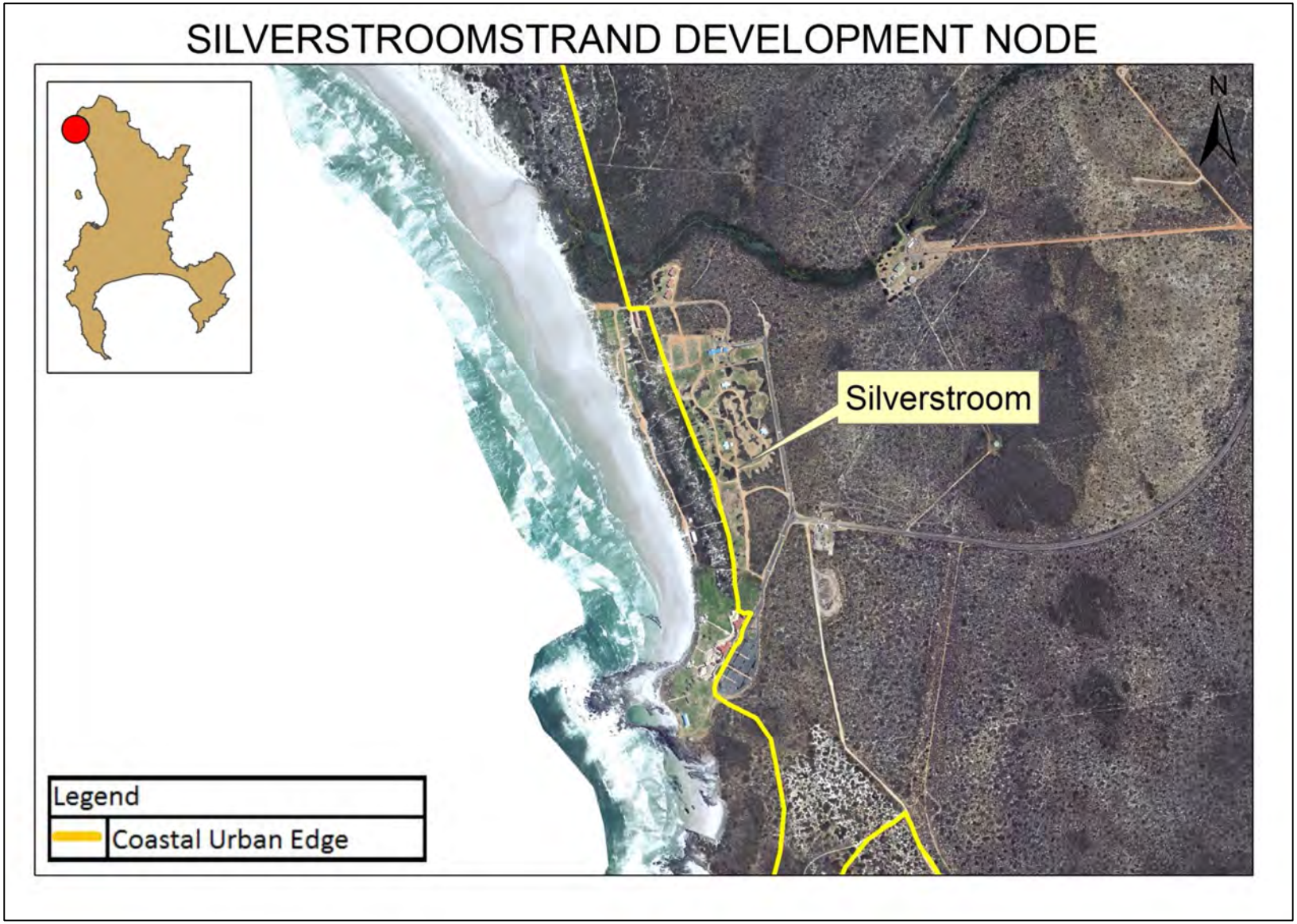
b) Connecting Mitchells Plain through Mnandi/Kapteinsklip



c) Double Node connecting Strandfontein through Blue Waters and Strandfontein Pavilion



d) Connecting Atlantis and West Coast Communities through Silwerstroomstrand



Way Forward

The City's Spatial Planning and Urban Design Department (SPUD) will lead the initial spatial planning and conceptual design for each development node. These planning processes will determine the way forward as well as the role of public and private sector involvement.

Planning processes have already begun for the Monwabisi Node as well as the Mnandi/Kapteinsklip node.