



DISCUSSION DOCUMENT:

TOWARDS GUIDELINES FOR THE PLANNING, DESIGN AND IMPLEMENTATION OF HUMAN SETTLEMENTS PROJECTS IN CAPE TOWN

28 APRIL 2016



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

Making progress possible. Together.

CONTENTS

INTRODUCTION	5
INTENT AND STRUCTURE OF THIS DOCUMENT	6
PROCESS	6
POLICY CONTEXT	6
PART 1 PROBLEM STATEMENT	7
1.1 PROBLEM STATEMENT	7
1.2 CONTEXTUAL FACTORS INFORMING A NEW APPROACH	10
1.3 KEY DIRECTIONS FROM THE IHSF	11
1.4 THE NEED FOR A PARADIGM SHIFT TOWARDS AN URBAN SOCIETY	12
PART 2 DEVELOPMENT IMPERATIVES	14
2.1 BUILDING SUSTAINABLE URBAN ENVIRONMENTS AND A VIBRANT URBAN ECONOMY THROUGH THE HOUSING PROCESS	14
2.2 THE SHIFTING ROLE OF GOVERNMENT FROM PROVIDER TO FACILITATOR	14
2.3 ENGAGING COMMUNITIES THROUGH THE DESIGN PROCESS	15
2.4 PROVIDE ALL THE NECESSARY SOCIAL AMENITIES FOR THE DEVELOPMENT OF HEALTHY COMMUNITIES	15
2.5 BUILD COMMUNITIES THROUGH "SOFTER" SOCIAL PROGRAMMES PRE AND POST CONSTRUCTION	15
2.6 UNDERSTAND CONTEXT AND DEVELOP SITE SPECIFIC SOLUTIONS	16
2.7 ENSURE THE INTEGRITY OF NATURAL SYSTEMS	16
2.8 UNDERSTAND THE LOCAL TOPOGRAPHICAL CONDITIONS AND NATURAL DRAINAGE	17
2.9 PROMOTE THE EFFICIENT DEVELOPMENT OF LAND	18

This report has been compiled by the Department of Spatial Planning and Urban Design and forms part of the Integrated Human Settlements Framework Implementation Plan.

For further information contact

Marco Geretto

Spatial Planning and Urban Design
024 400 9442
Marco.Geretto@capetown.gov.za

2.10 FOCUS ON THE PUBLIC ENVIRONMENT AND ENSURE FUNCTIONALITY	18
2.11 PROMOTE THE COMPACT CITY, TRANSIT ORIENTED DEVELOPMENT AND DESIGN FOR DENSITY	19
2.12 ENCOURAGE PRIVATE SECTOR RENTAL AS A MEANS TO HELP ADDRESS HOUSING DEMAND	22
2.13 PROMOTE INCREMENTAL DEVELOPMENT	24
2.14 MINIMUM LEVELS OF SERVICE	25
2.15 STREETS AS THE PRINCIPLE ELEMENT OF PUBLIC STRUCTURE	26
2.16 VEHICULAR ACCESS AND CAR PARKING	32
2.17 STREET BUILDING LINES, DEFINING THE URBAN BLOCK AND OPTIMISING LAND FOR DEVELOPMENT	40
2.18 MINIMUM PLOT SIZE	41
2.19 BUILT FORM AND BUILDING TYPOLOGIES	44
2.20 HOUSE TYPOLOGIES AND OWNERSHIP	45
2.21 NON-GROUND RELATED OR MULTI-OWNER BUILDINGS TYPES	46
2.22 UNIT TYPOLOGIES	47
2.24 THE IMPORTANCE OF STARTER STRUCTURES	50
2.25 EMERGENCY HOUSING AND TRANSITION AREAS	52
2.26 LOCATION OF SERVICES WITHIN THE SITE	54
2.27 ALTERNATIVE AND SUSTAINABLE TECHNOLOGIES	56

PART 3 PLANNING DIRECTIVES	58
3.1 PROCESS GUIDELINES	60
3.2 DEVELOPMENT PRINCIPLES	62
3.3 GENERAL PROVISIONS	63
3.4 PERFORMANCE CRITERIA	64
3.5 MINIMUM LEVELS OF SERVICE	65
3.6 STORMWATER DESIGN	66
3.7 INFRASTRUCTURE AND SERVICES	67
3.8 STREET DESIGN GUIDELINES	69
3.9 PUBLIC FACILITIES AND PUBLIC OPEN SPACE	78
3.10 BLOCK AND PLOTS	82
3.11 BUILDING DESIGN AND LAYOUT	84
3.12 BUILDING TECHNOLOGIES AND CONSTRUCTION MATERIALS	89
3.13 EMERGENCY HOUSING	90
PART 4 FURTHER AREAS OF STUDY	92
GLOSSARY OF TERMS	96

INTRODUCTION

For the City of Cape Town to improve the quality of life of its citizens, positively address the challenges of rapid urbanisation while simultaneously ensuring the long term sustainability of the city, radical changes are required in the way we plan and deliver housing and infrastructure. The City of Cape Town, through its subsidised human settlements projects is the largest developer in Cape Town. It therefore has the potential to lay the foundations for a healthy and more sustainable urban future. Public housing projects do not only provide shelter for the poor and most vulnerable. They are an investment in the future; they provide structure to the city and they service land so that it becomes an asset for beneficiaries to build their own future.

The Integrated Human Settlements Framework (IHSF), developed by the City, in partnership with Provincial Government, presents a paradigm shift in the way human settlement projects are planned and delivered. While the IHSF promoted a range of housing solutions it signals a radical shift from delivering complete housing products towards a “less for more” approach that focuses on informal settlement upgrading and incremental development. National Treasury's Built Environment Performance Plan (BEPP) guidelines also require the City to develop a robust informal settlement upgrading programme in order to address the housing backlog and access grant funding. Lastly the City's commitment to improving access to public transport and supporting Transit Oriented Development (TOD) is key to transforming the form and nature of the city and creating a sustainable and resilient future. The underlying objective of all these initiatives is to ensure that as many people as possible benefit from strategic public investment.

At the level of the housing project it has become apparent that existing standards, mechanisms and tools for planning and delivering new housing projects are cumbersome, inadequate and result in inefficient and unsustainable settlements. The shift towards a more incremental urban paradigm requires a review of current standards and methods of approach.

The City has therefore embarked on a process of reviewing the technical planning guidelines to arrive at a set of directives that will determine the way human settlement projects within the municipal boundary are done. The intention is to have these directives approved and test and refine them through practice and implementation.

As the starting point for the review process the following proposition was put forward:

As an enabler of development, through the provision of formal services and subsidised housing units, the City provides a platform for a bottom-up development process. This requires a consistent level of service across all forms of housing and that the housing typologies / strategies delivered create enabling and adaptable environments within which beneficiaries can meaningfully invest in their properties and improve their quality of life.

This document outlines the technical preconditions required to realise this objective.



INTENT AND STRUCTURE OF THIS DOCUMENT

This report is structured as a discussion document to enable nonprofessional, nontechnical people to understand how the team arrived at the final draft of the directives. The report is divided into four parts:

1. Part one - defines the nature of the problem. It provides an overview of the contextual informants and highlights the need for a transition towards an urban paradigm.
2. Part two - outlines a number of development imperatives and current best practice that has been used to inform the guidelines / directives.
3. Part three - are the directives that have been broken up into various headings dealing with process, house type, streets design and public infrastructure requirements.
4. Part four - identifies areas of policy and practice that need to be reviewed and investigated further to ensure that housing delivery is accelerated.

The intention is that, once this document has been through a stakeholder participation process, and has been tested through real projects, parts one and two will be omitted and the guidelines (part three) will be approved as directives and will be issued to consultants and planners undertaking human settlement projects and form the basis of development briefs and public engagement processes.

PROCESS

Given the complex and interrelated nature of urban systems a technical steering committee consisting of a wide cross-section of built environment professions within the City was assembled. The steering committee included officials from Human Settlements, Spatial Planning and Urban Design, Transport for Cape Town, Utility Services (Electricity, Water and Sanitation, Solid Waste), Disaster Risk Management, Planning and Development Management and Eskom.

A series of workshops took place between June and August 2015. During these workshops the nature of the problem was unpacked, building typologies were explored, alternative infrastructure designs considered and key development principles agreed. These principles have been compiled into a discussion document that was the subject of engagement with internal and external stakeholders.

A draft discussion document was circulated internally within the City in November 2015 to solicit comment and input. The final draft of the discussion document has taken on board these comments and further detail has been provided.

POLICY CONTEXT

The need for guidelines is informed by a number of policy documents and informed by laws and regulations including:

- The National Development Plan 2030
- Housing Code (2019)
- The Integrated Development Plan for the City of Cape Town (2013-2015) IDP
- Cape Town Spatial Development Framework
- The Built Environment Performance Plan for the City of Cape Town 2015/16 (BEPP)
- The Integrated Human Settlements Framework (IHSF) (2014)
- The Spatial Planning and Land Use Management Act 2014 (SPLUMA)
- The National Environmental Management Act and its associated regulations.
- The Municipal Planning By-Law, City of Cape Town 2014
- National Building Regulations

PART 1

PROBLEM STATEMENT

1.1 PROBLEM STATEMENT

People come to cities to live together and in so doing enjoy the benefits of sharing the burdens and opportunities that result from co-inhabitation. In this context the key objective of local government is to create the preconditions for healthy interactions that stimulate the economy and enrich the human experience through social and cultural practice. Cape Town is in a critical period in its history and decisions made today will determine the future health and well being of the city.

The Built Environment Performance Plan (BEPP) recently completed by City of Cape Town gives a clear indication that future population growth will be concentrated within the lower income sector. This places greater pressure on the rapid delivery of affordable and subsidised housing.

Taken together, local and provincial government are the largest developers in the city delivering between 6000 and 8000 subsidised units per annum (approx. 80% of all new housing built). Not only does this rate of delivery fall short of what is required (targeted 30 000 new opportunities per annum), but the manner in which new housing is delivered creates serious long term challenges for urban management. This is because whilst delivering new housing opportunities government inadvertently creates new infrastructure that needs to be managed and maintained. This is further problematic as the initial capital investment into buildings roads and infrastructure does not generate any additional revenue for the City as subsidised housing is generally exempt from rates and require ongoing subsidies for services and utilities.

At the same time, given the scarcity of land within the urban edge, Human Settlements departments are under increasing pressure to deliver higher densities within the constraints of the subsidy regime. In response, different



6000 Units / annum

22km of infrastructure

CURRENT RATE OF DELIVERY (2015)



30 000 Units / annum

120km of infrastructure

IHSF TARGET (2031)

INCREASES THE
TOTAL LENGTH OF
CITY'S UTILITY NETWORK
BY
1%
PER ANNUM

*The above diagram illustrates the City's intent to increase the rate of housing delivery from approximately 6000 units per annum to 30 000 units/ annum until 2031. This will increase the length of roads and services in the city by 1% annually, effectively increasing the length of public infrastructure by 15% over the 15 year period. * Note the length of service is determined assuming an average 7.5m plot frontage.*



These photos illustrate the predominant form of housing delivered by the state - generally low density, single land use environments that are inefficient in their use of land and resources.

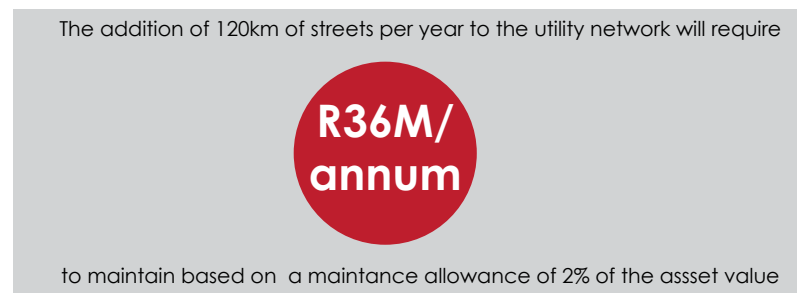
housing typologies are being explored and plot sizes are being reduced whilst maintaining very high levels of service in terms of infrastructure and service provision. The consequences of this approach are profound and wide reaching.

In informal settlement upgrading projects, the current standards are dogmatically applied, the space required for engineering services becomes excessive and most often requires a significant number of residents to be relocated out of the settlement. Not only does additional land have to be secured and serviced before the project can commence, but relocations are highly disruptive at a social and household level. Beneficiaries are often relocated further away from their places of schooling, employment and, perhaps more importantly, the social support networks that they depend on. These are often broken with disastrous consequences.

At a technical level, when plot sizes are reduced, and infrastructure standards remain high, the provision of infrastructure in itself becomes costly and highly inefficient as the amount of land allocated towards roads and infrastructure is disproportionate to the amount of land serviced for development. While the capital costs for infrastructure is secured initially through grant funding, the issue of the long term operational funding is not addressed prior to implementation.

FINANCIAL ASSESSMENT OF MAINTAINING THE LEVEL OF INFRASTRUCTURE THE CITY CURRENTLY HAS

Length of public streets in Cape Town (A)	9,392 km
Current cost of building single carriageway road with services (B)	R 15,000,000 /km
Estimated total asset value of public Infrastructure (AxB)	R 140,880,000,000 *
Recommended % of asset value that should be set aside annually for maintenance	2%**
Required annual budget for maintenance	R 2,817,600,000
Current budget allocation for maintenance 15/16***	R 1,148,266,000



NOTES:

- * This amount is a gross underestimate as it excludes large cost items such as substations, waste water treatment plants, water works, traffic signals.
- ** This assumes the complete replacement of the asset every 50-60 years.
- *** This figure comes directly out of the draft budget (MBRR Table SA 34c). It is likely that additional provisions for maintenance have been made elsewhere within the budget.

The above info graphic provides a high level indication that the City can not afford to maintain the amount of infrastructure it currently has.

Lastly, the type of housing unit provided and the reduction of plot sizes undermine the natural processes of city making and restrict what can be achieved on the site and limits the ability of beneficiaries to invest meaningfully in their properties. The long term implications for the City is that the urban fabric become a constrain and is unable to adapt to the changing demands of society. It also means that low income communities and neighbourhoods risk becoming socioeconomic “slumps” and poverty traps, are not able to develop effectively and therefore do not contribute meaningfully to the progressive development of the city and society at large.

It is clear that the current situation is problematic and unsustainable. A coordinated approach that brings together aspects of environmental planning, town planning, urban design, housing delivery and engineering services design is required.

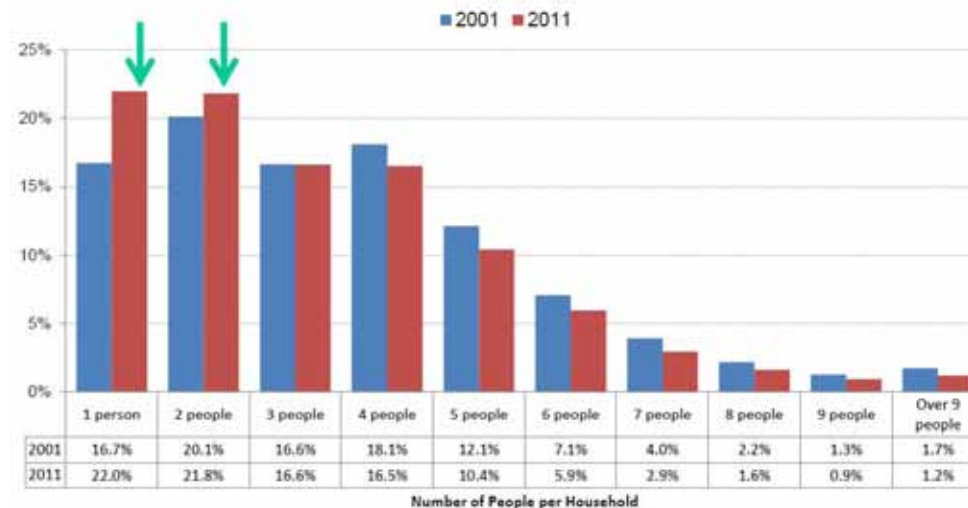


The above comparison of London, Medellin (Colombia) and Cape Town illustrates the profound implications of low densities on urban management. In London the authorities need to maintain 1.8m of infrastructure per person, in Medellin (known for being one of the most progressive and innovative cities in the world) the length of infrastructure that the local authority needs to maintain per capita is reduced to 0.75m. In Cape Town, the City of Cape Town is expected to maintain 2.7m per person - 30% more than the authorities in London and 70% more than the City of Medellin. What is more concerning is that the City of Cape Town has less operational funding to maintain its infrastructure off a proportionately small rates base.

1.2 CONTEXTUAL FACTORS INFORMING A NEW APPROACH

The following important contextual factors have informed the review process:

- Cape Town is situated in a water scarce region and climate change, as a result of global warming, will place further stresses on the city and its inhabitants with prolonged periods of drought, increased temperatures, wild fires, strengthening winds, and more severe storm events.
- The city's infrastructure network is aging and there is significant backlog in terms of infrastructure renewal and replacement programmes across all utility services.
- There is a limited amount of land within the urban edge and within public ownership that can be developed for housing.
- The 2011 census suggests that migration into the city is increasing and is projected to continuing to grow into the foreseeable future.
- Population growth has been strongest within lower income groups.
- The economically challenged parts of the city are continuing to absorb new urban migrants. This is partly a result of the prevalence of backyard dwelling (that has increased 244.2% between 1996 and 2011) but also due to overcrowding.
- Undeveloped land and sites that are perceived to be vacant (open spaces, vacant community facility sites and ecological areas) are vulnerable to invasion, encroachment and occupation.



	Black African	Coloured	Asian	White	Total
1996	3.83	4.77	4.33	2.79	3.92
2001	3.65	4.49	4.12	2.64	3.72
2011	3.25	4.42	3.63	2.52	3.50

Household size breakdown by race

The above graph and table provide an indication of the change in household sizes in Cape Town from 1996 to 2011.

- Levels of formal unemployment remain stubbornly high and the majority of the urban poor are reliant on the informal sector to access services and for employment and income generation.
- The urban population is more mobile than originally thought and people move around within the city for a number of different reasons.
- Household sizes are getting smaller on average (down from 3.92pph on average in 1996 to 3.5pph in 2011) - see adjacent tables.
- 44% of households are 1 or 2 person households. This suggests a high demand for more smaller 1 and 2 bed units. This is an important factor as it is not practical or feasible to build stand alone houses for small households. Different types of dwellings need to be considered.

- The IHSF projects that by 2032 approximately 650 000 households will require subsidised housing. These fall into the following categories:
 - 22% (143,823) are currently living in informal settlement (regardless of income);
 - 11% (73,506) are currently living in backyard rental (with hh income below R13,000);
 - 2% (12,297) are currently living in hostels (regardless of income);
 - 16% (104,774) are currently living in overcrowded conditions in formal housing (with hh income below R13,000); and
 - 49% (317,388) are estimated to be new arrivals to the city and will earn below R13,000.
- A number of informal settlements (and future housing areas) experience flooding on a regular basis due to inappropriate location and / or development upstream. This situation could be exacerbated with climate change projections.
- A significant proportion of those people living in informal settlements do not qualify for a state housing subsidy for a number of reasons (eg. they have already benefited from a subsidy, are foreign nationals etc.)
- The City is under serious financial constraints that limit its ability to deliver housing and service land.
- While desirable from a spatial planning and transport planning perspective the cost of building and managing high rental accommodation (flats) hinders the City's ability to address the housing need.
- There is a clear preference from Government to provide beneficiaries of public housing scheme with full title and this approach is generally supported by the future beneficiaries of public housing.
- Transport costs account for up to 40% of a poor households monthly expenditure.
- Income from backyard units and second dwellings are an important source of income for low income families who own property.
- Household circumstances and family dynamics change over time, which often means that the way houses and properties are used changes. Minor modifications to the house are often necessary to meet the immediate needs of the occupants.
- Cultural practice, particularly within black African communities, require young men to move out of the primary dwelling after initiation. This creates a demand for smaller units for young single men who are often unemployed or still dependent on the assistance of others.

1.3 KEY DIRECTIONS FROM THE IHSF

In order to address the challenge of delivering the estimated 650 000 housing interventions by 2032 the IHSF provides the following direction:

- The City needs to shift its delivery emphasis away from providing formal give-away houses to providing access to well located land, good quality municipal services, improving the public environment and supporting households to build their own houses.
- The City must recognise and incorporate as much of its current informal settlements as possible and focus on incrementally improving the sub-optimal conditions in these settlements. This should be done progressively over all settlements and in a manner that maximises the use of the existing land and infrastructure.
- The City must take advantage of the significant opportunity that household densification offers. The City needs to encourage and enable existing households to accommodate additional households on their existing properties. An added advantage of this is that through this process the existing households become more sustainable and better able to pay rates and taxes.
- The City must actively promote the delivery of substantial new housing stock. This must be undertaken in a consistent, fair and equitable manner that ensures a similar product being offered to all households.
- The City must mobilise additional non-municipal delivery capacity (existing households and the Private Sector) to deliver a significant portion of the required housing required.

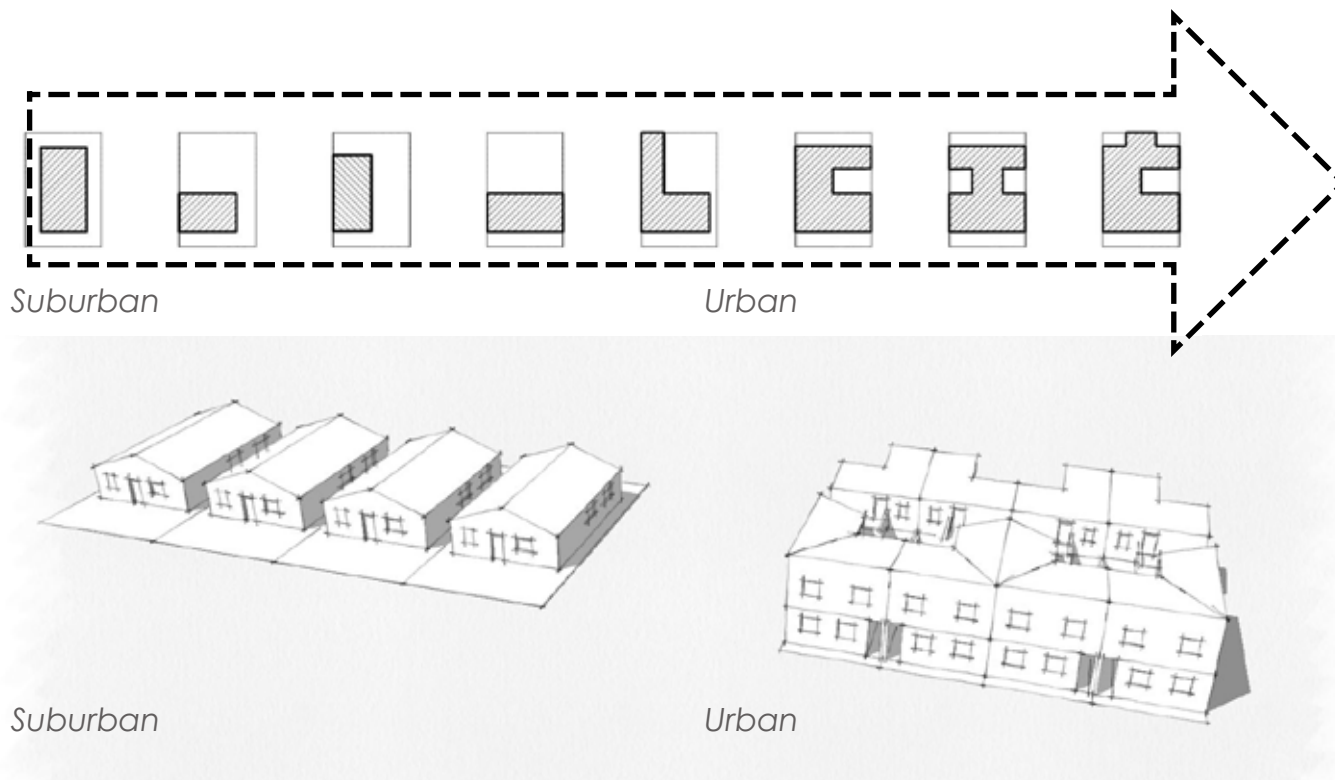
These directives provide technical planning guidelines for how these objectives can be achieved.

1.4 THE NEED FOR A PARADIGM SHIFT TOWARDS AN URBAN SOCIETY AND COMPACT CITY FORM

The core challenge for society at large will be achieving a paradigm shift from suburban to urban ways of living. This shift will need to be accompanied by changes in everyday life that will in turn change the way institutions are run, spaces are used, buildings are built and how public infrastructure is designed, delivered and maintained.

The adjacent illustrations show how the built form of the city needs to change from low density, single storey detached family homes to more high density, multi-storey, multi-occupant building types. The images at the bottom of the page contrast the two types of environment. On the left is an image of low density state provided housing in Khayelitsha and the image on the right shows owner-built urban housing in Bogota, Colombia. What is critical to note is that the Bogota example was achieved with limited public investment into roads and infrastructure. The land owner was responsible for the construction and management of their own house with no state assistance or intervention.

The page overleaf makes the point that while it is technically possible to densify a suburban house over time, the way the site is initially developed is restrictive and does not offer the level of flexibility and urban efficiency that an urban model presents.



Low density environments comprised of single storey, detached family homes

High density, bottom-up environments with multi storey, attached urban buildings providing a range types of accommodation



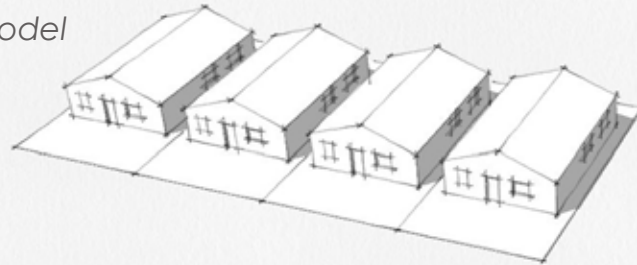
Typical low density public housing in Khayelitsha



Self built, high density, owner-built housing in Bogota Colombia

The illustrations and explanation below demonstrates why urban typologies lend themselves more easily to incremental densification.

Suburban model



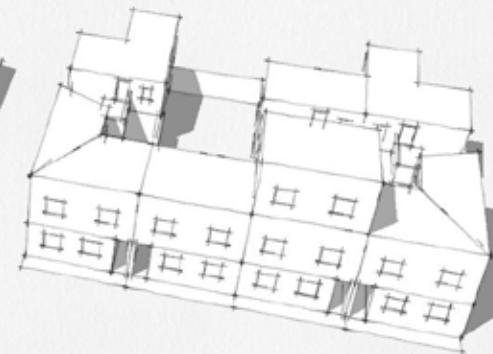
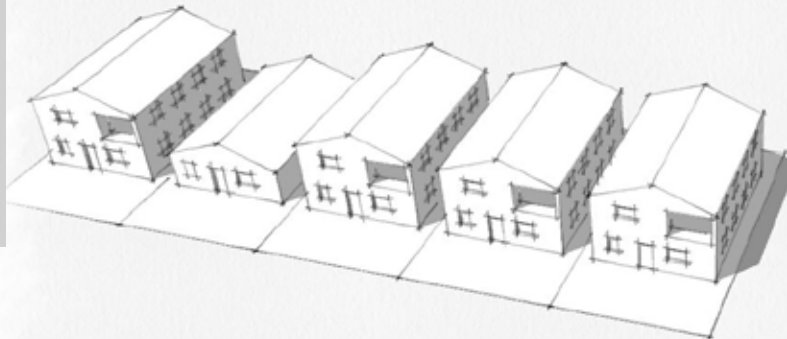
Urban model



While it is possible to adapt and transform a suburban house type to an urban model the list below outlines some of the shortcomings with the suburban house type and why this transition is often difficult.

- The suburban house does not lend itself to incremental development as it is typically located in the centre of the site and extensions and additions are limited by the location of existing windows and doors that provide ventilation and natural light to the interior rooms.
- In most cases the transition requires a large capital investment (savings / loans) as the only viable extension option is vertical (adding a second storey).
- Vertical expansion typically requires residents to move out during construction.
- Vertical expansion requires the original building to have adequate foundations (which is often not the case).
- The spaces of the side of the house are typically required for light and ventilation and can not be used effectively for other purposes.
- The detached building type is more vulnerable to crime as perpetrators of crime have access to all facades.

DENSIFICATION
OVER TIME



The primary benefits of an urban house typology are as follows

- A smaller footprint allows for the affordable occupation of the ground plain through:
 - the expansion of the primary dwelling;
 - additions to the primary dwelling; and
 - additional dwellings to the rear of the property
- It allows vertical expansion (provided the foundations of the existing structure are adequate).
- It creates a continuous and defensible street edge, which is more resilient to crime.

PART 2

DEVELOPMENT IMPERATIVES

DEVELOPMENT IMPERATIVES AND LESSONS FROM PRACTICE

As articulated previously delivering sustainable human settlements is a complex process that needs to take into account the different and often competing objectives and strategies of the stakeholders involved in the development process. Part two unpacks the development imperatives that have informed the guidelines / directives that follow in part 3 of this document. It explores emerging policy and development trends, reviews current best practice and presents case studies that illustrate the impact of design decisions on the built environment.

2.1 BUILDING SUSTAINABLE URBAN ENVIRONMENTS AND A VIBRANT URBAN ECONOMY THROUGH THE HOUSING PROCESS

The process of delivering public housing needs to be seen, not simply as providing shelter, but, as part of the process of city building that provides the foundations for an urban economy and a platform for social interaction. Housing delivery in this light is about creating the enabling infrastructure that can be adapted and changed to suit the varying and changing needs of society over time. This is only possible if one considers housing, not as a single residential land use, but as a framework that may contain economic activity through a mix of uses and activities. This is significant in light of the resource and financial constraints that government is facing and the fact that the urban poor will be looking.

New human settlement projects must create the preconditions that support a broad base of low level economic activity so that the poor and small businesses are able to earn a living and support their families. This requires an approach to development and land use management that is more pragmatic and that allows people to seize the opportunities that present themselves.



The delivery of subsidised housing by the state is more than providing shelter. It provides a platform for investment and the foundation for economic activities. The above two pictures from Bogotá Colombia illustrate how the urban fabric changes and matures over time to accommodate a mix of uses and how this in turn creates economic opportunities for small scale businesses and enterprises.

2.2 THE SHIFTING ROLE OF GOVERNMENT FROM PROVIDER TO FACILITATOR

It has become increasingly apparent that government's ability to deliver housing for the poor is limited by the financial and human resources it has at its disposal. In order to accelerate the pace of delivery and to unlock the capacity of other actors to participate in the delivery process the role of Government must shift from the provider and developer of housing to the facilitator of the housing process.

One consequence of this approach is a move towards incremental development where beneficiaries of public housing programmes are provided with land, security of tenure and access to services and are assisted in building their own housing with the support of the Government and other stakeholders.

2.3 ENGAGING COMMUNITIES THROUGH THE DESIGN PROCESS

All human settlement projects have at their heart a concern for the health and wellbeing of people. It is therefore important to engage directly with the communities who will ultimately benefit from the housing project and those who will live in the newly created neighbourhood. The level of engagement and participation will depend on the scale and nature of the project and the community involved. Community participation during the planning process for new greenfield development is not essential however it is critical to ensure that the housing product and environment that is created meets the expectations of the beneficiary community.

Informal settlement upgrading projects, on the other hand, are inherently more complex and challenging as the upgrading process requires temporary relocation during implementation and invariably also entails the permanent relocation of a portion of the resident community after the project is complete. An intensive public participation process is required that works on the basis of consensus building, aims towards a situation of equity amongst beneficiaries, protects the most vulnerable within the community and seeks to minimise relocations where possible. In these processes beneficiaries must be capacitated to play an active role in decision making and participation processes must be designed for communities to input meaningfully in the planning and design process.

2.4 PROVIDE ALL THE NECESSARY SOCIAL AMENITIES FOR THE DEVELOPMENT OF HEALTHY COMMUNITIES

Sustainable human settlements are more than just houses and infrastructure. They are places where children grow up and where people grow old. It is therefore critical that provision is made within new developments for public open space and public facilities such as schools, hospitals and clinics but also for community based organisations such as religious institutions and NGOs who fulfil important social and cultural functions.

2.5 BUILD COMMUNITIES THROUGH “SOFTER” SOCIAL PROGRAMMES PRE AND POST CONSTRUCTION

For all human settlement projects, but particularly in those projects that involve direct engagement with existing communities, it is important to consider softer social programmes in the run up to the development phase and then initiate these programmes immediately after implementation to ensure that the ground work for the development of a healthy community is laid out. Some projects may include support services to the most vulnerable (early childhood development centres for example) but others may be more practically oriented and help equip beneficiaries with the skills and knowledge to manage and maintain their homes or manage household budgets.



It is critical to engage directly with the communities who will be the beneficiaries of housing projects. Scale models are valuable tools for helping people understand the organisation of space, how the project will affect their lives and how they are able to make meaningful inputs into decision making processes.

2.6 UNDERSTAND CONTEXT AND DEVELOP SITE SPECIFIC SOLUTIONS

All housing projects will differ depending on their location within the city and the layout will be informed by site specific conditions. The planning process should respond positively to existing constraints, opportunities and local features to create a new neighbourhood with a distinct sense of place. It is important that the design process begins with an analytical phase through which an intimate understanding of the site and how it forms part of the city is obtained.

As a matter of principle new developments should form an integral part of the city and integrate effectively with surrounding neighbourhoods, link into street and open space networks. Please refer to the Urban Design Policy for future guidance.

2.7 ENSURE THE INTEGRITY OF NATURAL SYSTEMS

Cape Town is internationally renowned as a city of exceeding natural beauty and home to a unique and protected ecological environment. At the same time the city is in an early phase of maturity and there is an inherent tension between ecological preservation and the need for land for housing. In the process of city building therefore it is important to ensure that ecological spaces are valued and that communities benefit from their proximity and take advantage of the amenities and opportunities provided by natural ecosystems. This needs to happen on two levels; firstly by making these spaces relevant for people themselves (through education and activities that make the advantages and benefits clear and valuable) and then by managing ecological areas so that they remain valuable assets.

Whilst it may be possible to “sacrifice” portions of ecologically sensitive land for housing it is important to ensure that the holistic functioning of critical ecosystems is not undermined or threatened. A broader understanding of ecological systems is therefore essential when identifying land for new housing projects and where such systems exist these must be integrated into the layout of new housing areas with appropriate mitigation measures and management plans.

At the project level it is important to ensure that smaller pockets of ecologically sensitive areas are effectively integrated into the open space network and stormwater system. When features such as wetlands become isolated, they cease to function from an ecological perspective and are at risk of becoming problematic from a urban management perspective. Serious consideration needs to be given to consolidating and rationalising environmentally important areas to ensure that they are contiguous and of a scale that they are functional and can be managed effectively.



The arrangement of buildings streets and spaces must retain and enhance the natural spaces that permeate the city and turn these spaces into functional spaces that people can enjoy.

2.8 UNDERSTAND THE LOCAL TOPOGRAPHICAL CONDITIONS AND NATURAL DRAINAGE

A detailed understanding of the local topographical conditions of any site is an essential first stage of the analytical process that should precede any design process. This understanding should inform the proposed open space network as well as the street and infrastructure layout as the topography will dictate where stormwater will flow, where the wet areas are likely to be, what the street gradients will be and how gravity related services (the sewer network) will work. Adopting this approach is more efficient as a layout based on water systems does not require extensive underground pipe networks which saves on development costs and makes maintenance easier.

Given the largely flat topography of Cape Town particular attention needs to be given to strategic stormwater planning to prevent flooding in the context of climate change and sea level rise. It is also important to note that it is seldom possible to develop solutions to stormwater management within the confines of a site. This calls for a more systemic, catchment wide approach to stormwater management. When such an approach is taken it is possible to arrive at ecologically sustainable and resilient solutions that include a combination of hard engineering solutions (within dense urban areas that are easier to manage) and softer systems based on sustainable urban drainage principles in other more appropriate areas. This is likely to be more efficient and release more land for housing and other forms of development. Regional attenuation area can then also be integrated into natural systems giving them purpose and providing natural amenity to residents. Where it is feasible off-site attenuation will help to minimise permanent relocations in informal settlement upgrading projects.

Accommodating stormwater is particularly challenging when planning low income neighbourhoods and when upgrading existing informal settlements as formalisation typically goes hand in hand with surface hardening, which increases stormwater run off. A review of aerial photos of numerous low income neighbourhoods illustrates that buildings occupy up to 80% of the site, limiting opportunities for ground water recharge and on site attenuation and infiltration.

The combination of surface hardening and rain water discharge from roofs accelerate surface run off during storm events and necessitates the creation of retention and detention areas where rain water can be stored temporarily and infiltrate into the ground to prevent flooding. In informal settlement upgrading project this often requires the permanent relocation of beneficiaries to off-site locations.

At the level of the housing project alternative on-site technical stormwater management solutions such as permeable paving exist and should be explored early on in the design process.



In rapidly urbanising environments there is a tension between the natural environment and the need for housing. In this example in Khayelitsha the functioning of the wetland is completely undermined by uncontrolled development and lack of services.

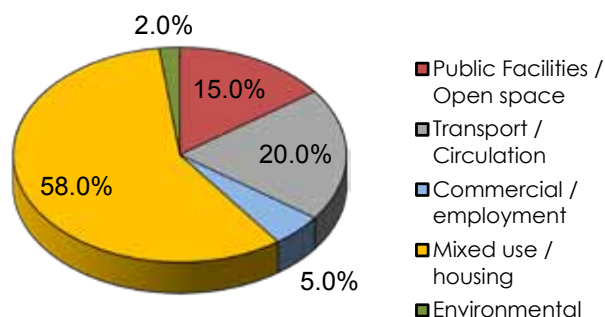


An aerial photo of Mfuleni illustrates that buildings cover a large percentage of the site limiting opportunities for on site attenuation and ground water recharge

2.9 PROMOTE THE EFFICIENT DEVELOPMENT OF LAND

Land is a limited resource and it is incumbent on Government to ensure that it is efficiently used and developed. It is therefore critical to ensure that in new housing layouts that the proportion of land allocated to roads, circulation and infrastructure relative to the amount of land serviced for development (residential and commercial properties and community facilities) is appropriate and that other facilities such as public open space and stormwater infrastructure are functional.

Dense multi-storey buildings should be promoted, excessively wide road reserves should be avoided and public open space must be intentionally designed and managed and not be the consequence of poor planning or space left over that can not be developed.



Typical land use budget for human settlement projects

2.10 FOCUS ON THE PUBLIC ENVIRONMENT AND ENSURE FUNCTIONALITY

In the context of scarce resources public investment needs to be focused on providing those elements of the built environment that ordinary citizens are unable to provide for themselves. This generally means that public resources should be directed towards the provision of public infrastructure (roads, streets, bulk services, public facilities and public open spaces). Private resources should be directed towards building those parts of the city where the state plays a limited role (private houses and commercial buildings).

In all aspects, functionality and the quality of the urban infrastructure should be prioritised above any quantitative requirements. The City's preference is to spatially target public investment to create a smaller number of high quality public facilities in strategic locations rather than lots of small facilities that spread the limited resources too thinly and become a burden to maintain. Facilities should not be provided if there is no realistic expectation that the departments responsible for implementing and managing the facility are adequately resourced.



The above example in Khayelitsha illustrates how a public open space, detailed simply and robustly results in a functional public environment that is able to accommodate a range of uses over time.

2.11 PROMOTE THE COMPACT CITY, TRANSIT ORIENTED DEVELOPMENT AND DESIGN FOR DENSITY

The benefits of high-to-medium density, well located housing for low income households is well documented and set out in other policy documents but it is worth noting here:

- That poor households typically spend up to 40% of their disposable income on transport.
- Well located housing encourages more sustainable travel behaviour (walking and cycling) reduces the need to travel long distances and reduces travel costs and time allocated to travel.
- Higher residential densities also help overcome economic thresholds and support small scale local economic activity.
- Higher densities reduce the cost of infrastructure provision in the short term and maintenance costs in the long term.
- Well located housing also reduces risk to the affected communities from natural disasters (e.g. flooding) and helps to protect critical biodiversity areas and open spaces which provide both recreational and natural ecosystem services (such as water retention and cleansing)

Density is also key in supporting and making other public sector investments such as public transport viable. While there are other factors that influence the viability of road based public transport, it is commonly accepted that a minimum gross density of 90 ppl/Ha is required to overcome the thresholds for a regular scheduled service. The adjacent table illustrates that as a whole Cape Town

City	District	Population	Ppl/km ²	Ppl/Ha
Cape Town		3,740,026	1424	14.24
	Voortreker Road Corridor		3150	31.5
	Sea Point		8,400	84
	Woodstock		3,000	30
	Khayelitsha		10,000	100
	Mfuleni		3,900	39
	Pinelands		2,400	24
OTHER LEADING DEVELOPING WORLD CITIES				
Bogota		9,285,331	13500	135
	Sante Fe	107,044		161
Curitiba		1,879,355	4,062	43.17
	Cajuru	89,784		77.72
Istanbul		14,377,019	7 700	77
	Bağcılar	749,024		360
Medellin		3,731,447	3 592	35.92
	Aranjuez	135 167		277
OTHER WORLD CLASS CITIES (DEVELOPED WORLD)				
Barcelona		4,693,000	15722	157.22
	City Centre			252
London		8,416,535	5100	51
	Tower Hamlets			98
	Islington			117
Madrid		6,183,000	5 208	52.08
	City Centre			172
New York		19,746,227	10 336	103.36
	City Centre			225
Paris		10,516,110	20425	204.25
	City Centre			240

as a whole falls far short of this threshold target and only two districts considered in the table, Khayelitsha and Sea Point, overcome this hurdle.

In addition many low income areas in Cape Flats exceed this threshold but due to the location of job opportunities people are forced to travel long distances on a daily basis. This produces an unbalanced travel demand that makes the provision of regular services unsustainable as the system must address high demand during peak period while demand during off peak periods are low. It should also be noted that high levels of joblessness in some of these areas inhibit effective demand for commuting services.

Ultimately decisions around density will hinge around the locational advantages of a site relative to job opportunities and public transport. It is often difficult to anticipate how much an area will densify over time but it is important that infrastructure should be designed to accommodate incremental intensification. This requires that infrastructure planners incorporate principles of redundancy and scalability into their designs, as retrofitting infrastructure at a later stage is much more costly and in some cases is simply impractical.

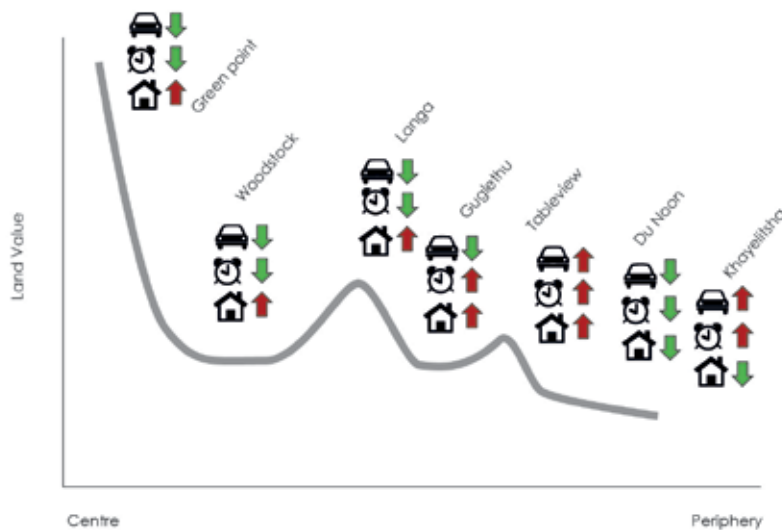
All Human Settlement projects should, as a minimum achieve a base minimum density of 150 ppl/Ha (gross) (approx. 50Du/Ha) and those that are better located should be designed in such a manner that they are able to support densities of up to 500 ppl/Ha (gross) (approx. 200 Du/Ha).



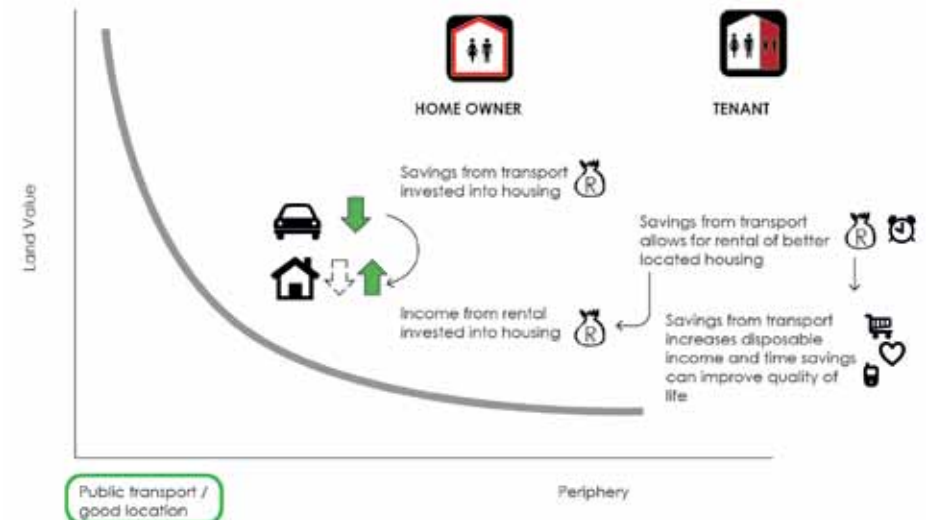
1: Traditional bid-rent curve

-  - Cost of transport
-  - Time spent on transport
-  - Value of properties

It is also worthwhile highlighting that density should not be pursued as an end in itself. Higher densities are typically the consequence of good planning and the result of developers and property owners responding to the locational advantages of a particular area. The above diagrams build on the bid-rent theory model (Figure 1) that holds that as one moves closer to the city centre property prices increase, travel costs decrease and travel times decrease. However in reality Cape Town is a complex place with multiple nodes and districts, each with different locational benefits and that people have their own preferences (Figure 2).



2: A more complex urban environment has different regions with multiple location benefits for different users.



3: The preconditions for incremental densification are created when the locational benefits of a site make it viable / profitable for property owner to build a rental unit on their property

Figure 3 illustrates a hypothetical condition that supports densification and small scale incremental development. If the property is well located the savings in terms of time and money as a result of shorter commuting distances, can be reinvested into the house increasing its value. Alternatively the property owner may choose to build a rental unit that supplements the households income. This income can be reinvested into the property or be used for other purposes. For the tenant an improved location reduces the cost burden of travel and allows for these saving to be used to secure better located accommodation or alternatively can be used to pay for those goods and services that improve their quality of life (such as private health care, modern conveniences or further education). Reduced travel times also frees individuals to participate in social or other economic activity which is to the benefit of society at large. This of course is only possible if there is a willingness on the part of the home owner.

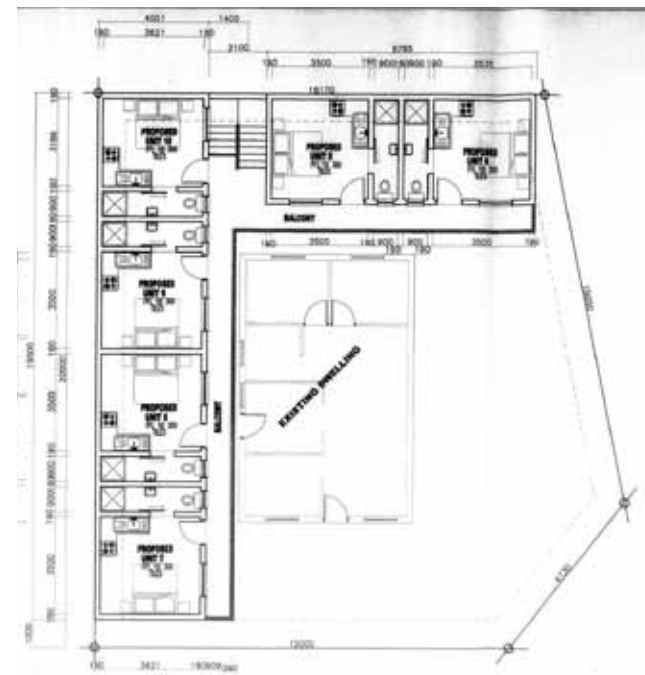
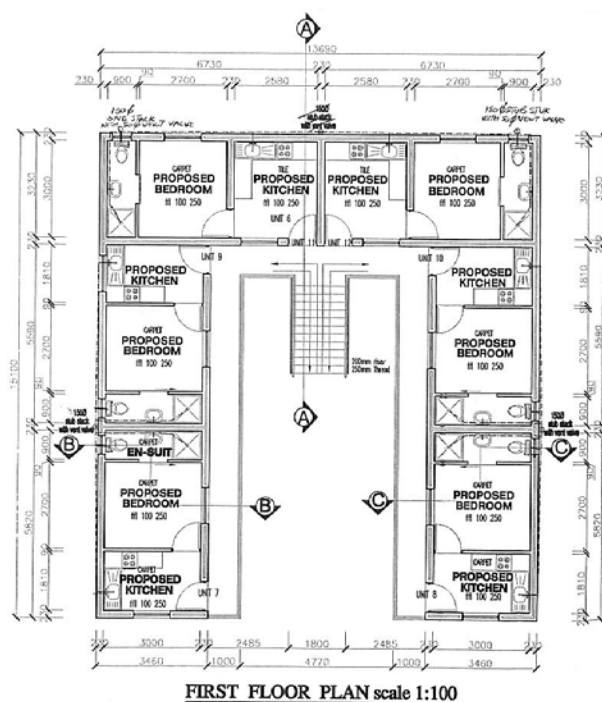
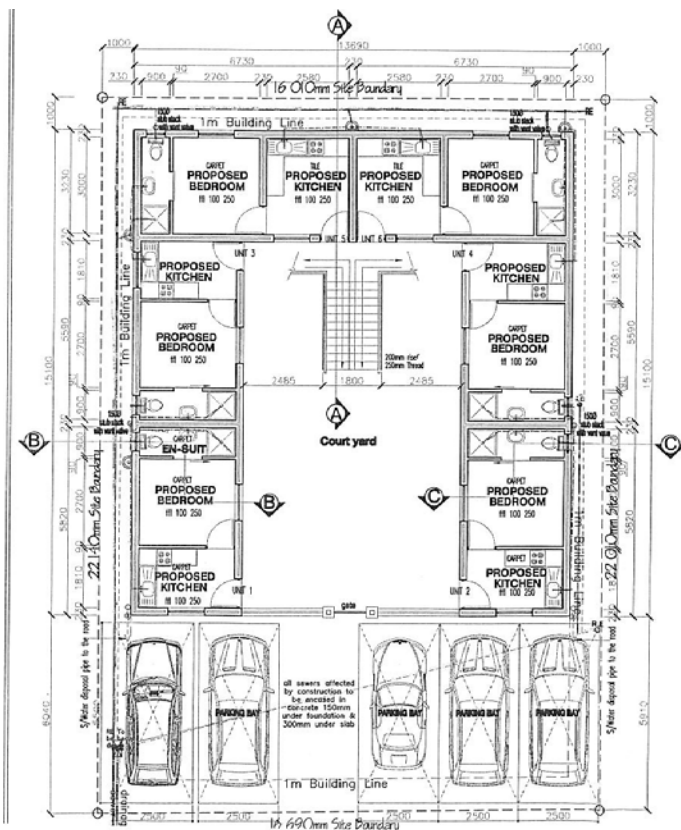
Finally, it is also important to emphasise that achieving compact city form has as much to do with the intensification of activity and floor space as it does with achieving higher residential densities. Intensification must focus on increasing concentrations of economic activity within the urban footprint. Thus there must be a shift away from the uni-functional conceptions of residential neighbourhoods as dormitory suburbs. Housing projects need to be seen as sites of economic activity, the intensity of which may change and fluctuate over time. The built environment must be able to accommodate those commercial and productive activities that are compatible with residential uses and provide services and employment opportunities close to where people live. This will ensure that the economic benefits of agglomeration are accessible to a broad base of potential actors and help support a vibrant property market through increased rentals and property prices.



2.12 ENCOURAGE PRIVATE SECTOR RENTAL AS A MEANS TO HELP ADDRESS HOUSING DEMAND

As alluded to above the City is not able to address the need for housing alone. Greater emphasis needs to be placed on creating an environment where developers and individual home owners are able to develop their properties in such a manner that provides more housing opportunities within the city. In essence this involves promoting small scale development and a private rental market that provides quality accommodation for low income households. Particular attention needs to be given to the incremental upgrading of existing informal structures on private properties into formal structures that ensure the health and well being of tenants and occupants.

In conceptualizing house type designs consideration needs to be given to how second and third dwellings can be added, and even how the building can be converted into a small block of flats so that they can be rented out by the land lord.



The above examples from Khayelitsha and Dunoon illustrate that the development of rental accommodation at the lower end of the property market is currently happening and is very attractive for small scale developers. This form of densification should be promoted as it provides dignified accommodation for the poor in structures that are infinitely safer than informal structures.

2.13 PROMOTE INCREMENTAL DEVELOPMENT

Cities are always in a process of becoming and it is the collective action of its citizens that make cities alive. This fluidity and dynamism is a natural response to the different needs, opportunities and desires that exist within society. When considering the long term development of the city and the role of subsidised housing developments in forging the future shape of the city it is important to recognise the ability and resourcefulness of the urban poor and their capacity to meet their own housing needs.

The approach is very simple and is based on the reality that the housing unit delivered through the subsidy is inadequate for meeting the multiplicity of needs of the households. It is therefore essential that the housing unit that is provided is considered conceptually as an element of infrastructure that can be adapted and shaped by households over time. The success of this approach is evident in many South American and Indian cities where the poor have played an active role in building the city as exemplified in the work of John Turner in the 1960s and 70s.

In the context of Cape Town it is important to understand the prevailing development environment, infrastructure capacity as well as the social, cultural, financial, technological and legal barriers that are currently preventing a more rapid expansion of incremental development and overcome these.



Examples of the incremental city citing examples from Chile (Elemental), Bogota (Colombia) and India (Jaipur)

2.14 MINIMUM LEVELS OF SERVICE

When considering the reorientation of housing delivery towards incremental housing one must ask the question of what minimum level of service should be provided by the City to support incremental development processes and ensure the a healthy and sustainable urban environment.

Through engagement with multiple stakeholders the following three factors must be addressed for the City to responsibly fulfil its role as regulator and provider:

1. Reducing public risk

- Avoiding areas at risk of flooding

- Avoiding man-made risks and conflicts (power lines, conflict areas between road users etc.)

- Ensuring adequate access for emergency services

- Preventing fire spread

2. Promoting public health

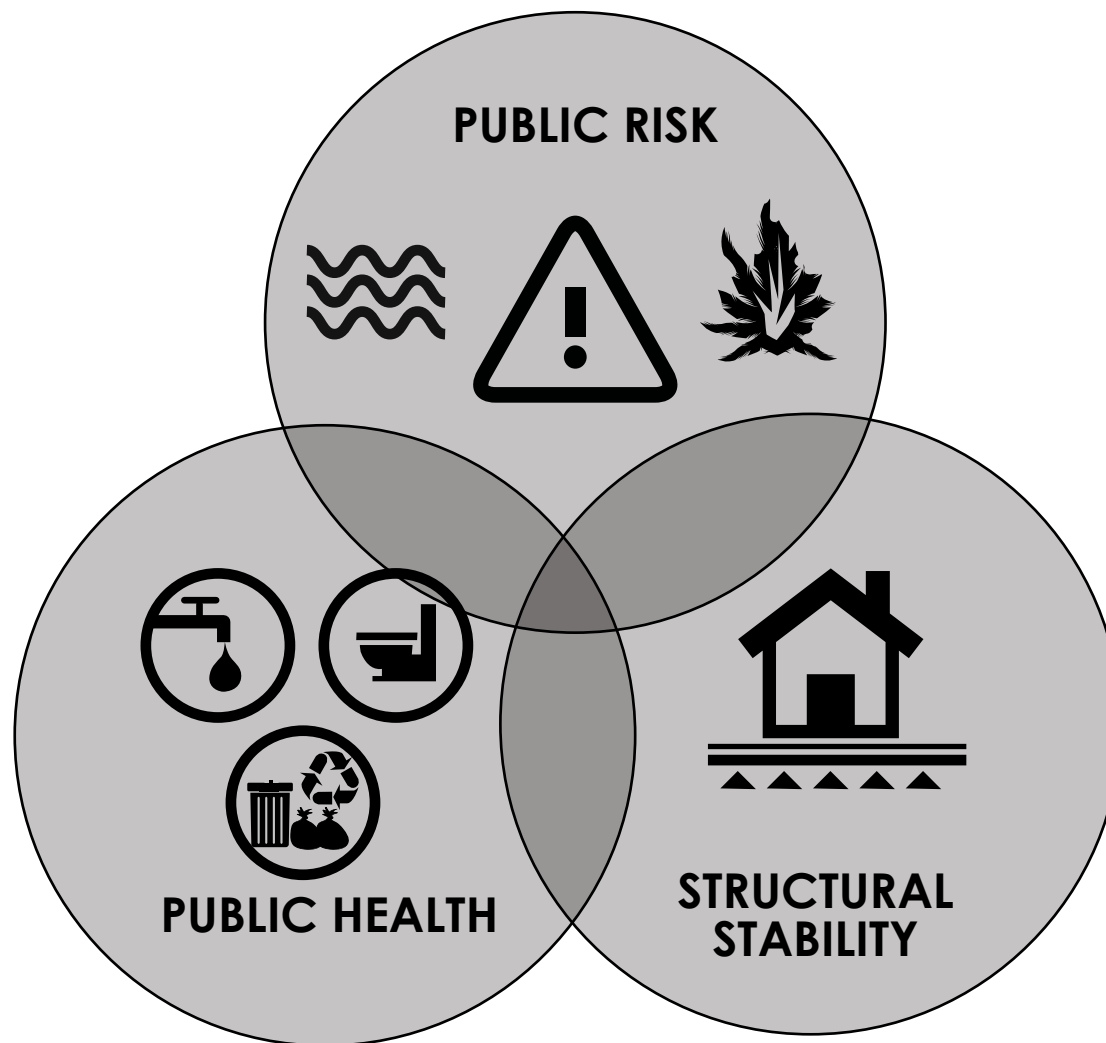
- Providing access to sanitation and basic services

- Ensuring adequate light and ventilation to habitable rooms

3. Ensuring structural stability

- Providing the structural preconditions from which to start the construction of a house.

(See the guidelines in Part three where the technical requirements are unpacked in more detail)



2.15 STREETS AS THE PRINCIPLE ELEMENT OF PUBLIC STRUCTURE

The design of streets and the layout of the street network are arguably the most important things to consider when developing the layout for a new settlement or when planning an upgrade of an informal settlement. Streets are public assets and are, both in terms of coverage and value, the most extensive and expensive public elements of the city. Streets are also fundamental to the health and wellbeing of urban communities as they are platforms for social and economic activity and ensure the movement of and access to goods and services.

The role of streets within cities can be summarised as follows:

- Streets support economic development, job creation and local economic activity by providing access;
- Streets provide a network for a range of mobility options and choice in how people and goods can move around the city;
- Streets are places that encourage recreation and social interaction;
- Streets enable safer and more cohesive communities; and
- Streets provide platforms for the creative expression of local cultures and values.

In essence, streets are public rights-of-way that are built and maintained by Government for the benefit of society.

The five functions of streets

In cities streets are typically lined with buildings and public spaces, and while movement is a key function of streets, they perform five other critical functions. It is important that the design of streets ensures that these other functions are fulfilled. The five functions are as follows:

Place

The place function is what distinguishes a street from a road. The sense of place is fundamental to achieving a richer and more fulfilling urban environment. This quality comes largely from creating a strong relationship between the street and the buildings and spaces that frame it. The sense of place of any street is informed by the following:

- The role of the street within the city and broader area;
- Aspects of local distinctiveness - local features/landmarks;
- The visual / aesthetic quality created by the buildings and streets themselves; and
- The propensity of the particular street to encourage social and economic activity

Movement

The movement function is primarily about mobility and getting people and goods from point A to point B. In a well-functioning city, citizens have access to a wide range of mobility options to choose from and the more sustainable mobility options are prioritised. For poorer communities, who are generally the recipients of public housing, the modes of walking, cycling and the use of public transport predominate and streets must be designed around the requirements of these users. Streets in cities form part of mobility networks that are generally hierarchical. New neighbourhoods therefore have to fit into the city's network of streets, with some streets performing more of a mobility function than others.

Access

As physical beings people are generally only able to engage in civic, commercial or social activities if they are physically present. Access to buildings, places and public spaces is therefore critical and distinctly different from movement. The nature of access is also critical to consider as requirements for emergency, servicing access and pedestrian access need to be mediated through the design process.

Parking

In the age of private motor vehicles streets provide places for vehicles to park temporarily while people engage in off street activities. The design of the street therefore needs to accommodate parking and different types of parking depending on the nature of the street.

Drainage, utilities and street lighting.

Often unseen and unnoticed, streets function as conduits for rainwater and utility services. Most of these services are buried under the ground but during heavy rains the role of the street as a conduit for rainwater is evident as rain water is directed overland into detention ponds or rivers to ensure that houses are not flooded. Most underground services are installed when a settlement is first laid out but in time these services (pipes and cables) need to be maintained and replaced. It is therefore essential that streets are not only designed to accommodate services but also so that maintenance can be done cost effectively and without causing undue inconvenience to residents and street users.

When planning neighbourhoods for poor households it is therefore important to consider the street as a complete environment and recognise that the place function of streets has the biggest impact on the lives and experiences of residents.

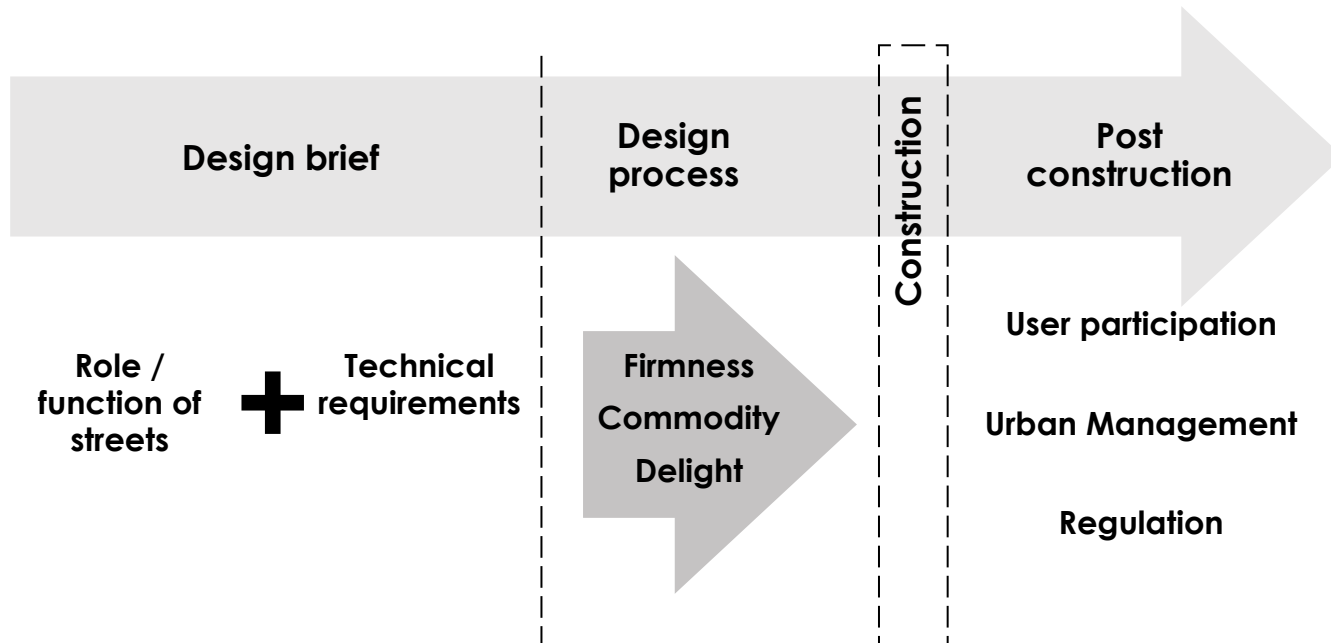
Designing streets

In the first century BC Vitruvius Pollio talked of design as the process of arranging the physical elements of an object with firmness, commodity and delight. His principles apply to the design of any object whether it be a tool, building or streets. Firmness implies physical strength and structural integrity; commodity (or utility) – implies an efficient arrangement of spaces, materials and mechanical systems to meet the functional needs of the users; and delight refers to the aesthetic quality and creative activities that result from use of the object. The adjacent diagram outlines the design process and highlights that the creation of a positive street environment does not finish when the street has been built. Often more important is how streets are used, maintained, managed and regulated after construction.

Implications of poor design

When streets are inappropriately designed the following problems become common place:

Access for emergency vehicles is hindered - putting lives and property at risk; injury and death - as a result of road accidents where there is conflict between different road users; sand from unsurfaced sidewalks and verges washes into and blocks the stormwater system; people walk in the road as the sidewalks are uneven and become puddles in rainy seasons - putting their lives at risk; the road surface degrades rapidly and becomes a burden for the City to maintain; properties become damaged by sudden infrastructure failures (burst water mains / collapsing sewers); building within the road reserve prevents access to services and in some instances damages these services; disruption in service due to infrastructure failure; and difficulty in maintaining public infrastructure.



These photographs illustrate the quality of environment that is typically delivered in subsidised housing developments. In order to reduce costs the paved sidewalks are omitted and the quality of the public environment, particularly for pedestrians is compromised. These soft verges become uncomfortable to walk on and access for the disabled is impossible. Sand from walkways and verges also enters stormwater catch pits and leads to further management problems.

It is also worth mentioning again that once the houses are handed over to beneficiaries the responsibility for the maintenance of the public environment falls upon the City. The City however does not have the resources to come back at a later date to finish off the sidewalks and if these are not provided with the subsidy from the outset it is not likely to be provided in the near future, if at all.



Performance criteria

In order to avoid these problems street design should meet the following performance criteria:

1. A complete street - a finished product that is visually appealing and complete with street lighting, tree planting and public furniture. The quality of this environment is maintained through a strict maintenance regime.
2. Fit for purpose- fulfilling its role within the street network and focused on the needs of all road users.
3. A safe environment for all road users – by promoting community ownership, increasing visibility, providing lighting, providing safe crossing points and NMT facilities and by discouraging speeding and bad driver behaviour.
4. Efficient – both in terms of the use of land and in terms of the use of resources and materials employed for the construction of the street.
5. Robust - durability of materials and ease of maintenance. This aspect is particularly important for dense, low income environments where the intensity of use requires streets withstanding heavy impacts.
6. Flexibility and resilience –streets that are not optimised for one end user, but that have “long-life and loose-fit”, meaning that they are able to accommodate a range of uses over time or over the course of the day, to allow for multiple forms of occupation without redesign.

Street widths

In urban environments streets typically take up 15-20% of the land budget and vary in width from 4m wide pedestrian lanes to 50m wide boulevards. In determining the appropriate width of a street it is important to understand the nature and role of each street, its associated land use and mobility function and engage with the end users to ensure that the design meets their requirements.

The City of Cape Town has standard street widths and specific design criteria for each street (Please see Minimum Standards for Engineering Services in Townships 2013).

The standard street widths are:

- 40/36m
- 20m
- 16m
- 13m
- 10m
- 8m

Currently the minimum street width for a residential street with vehicular access is 8m. This standard, with certain provisions at intersections ensures that all utility services can be accommodated within the road reserve and that the maintenance and emergency vehicles can be circulate efficiently.

During this review process the shortcomings of the traditional 8m street cross section was discussed in light of the performance criteria raised above. It was highlighted that, whilst the City has it's standards, compromises are often made due to the cost constraints of the subsidy regime. The problem is that these compromises have

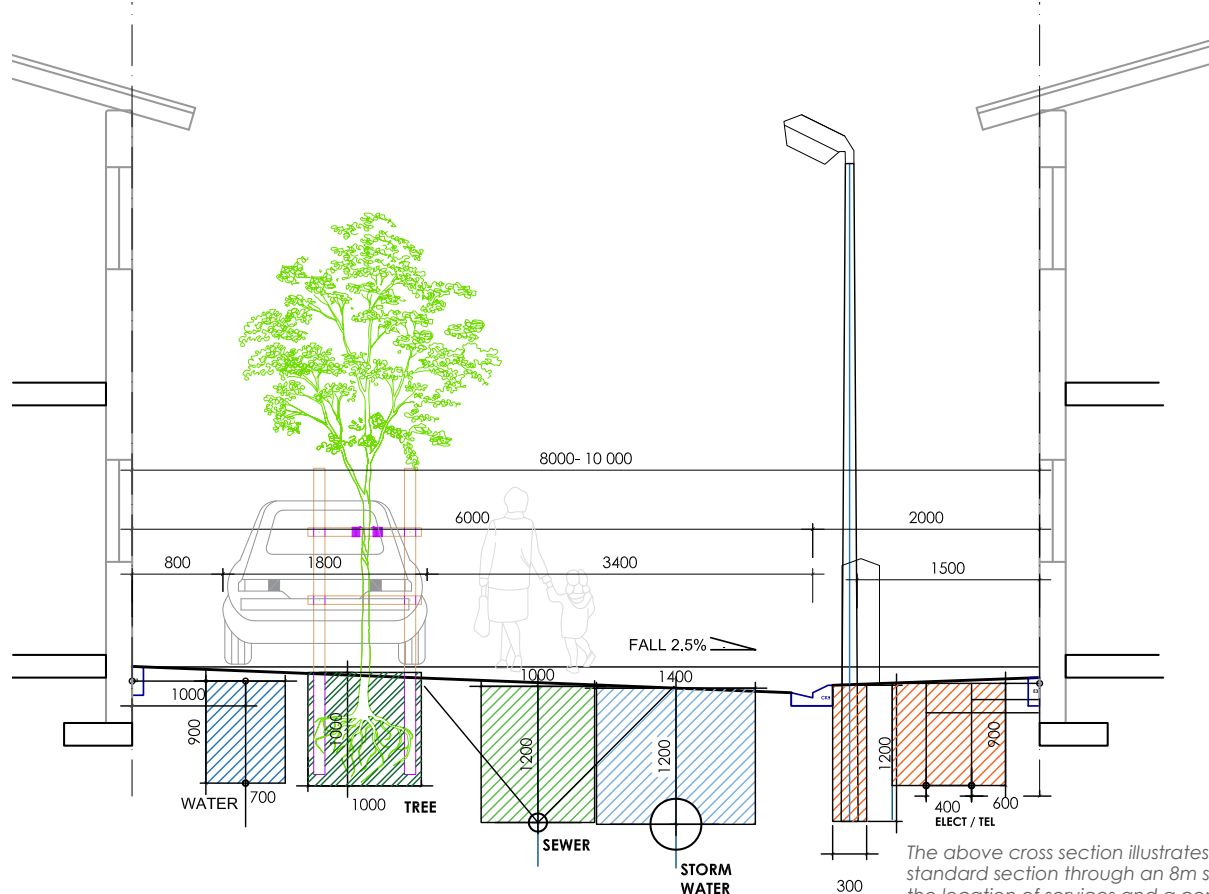


Examples of narrow urban streets in South Africa and elsewhere - Joe Slovo - Langa, Bogota - Colombia, Melaka - Malaysia, London and Lisbon,

significant implications for maintenance and management and over the long term short term cost cutting initiatives often cost the City more in the long term. If the City is intending to roll out houses, streets and infrastructure at an accelerated pace and at the same time want to create dignified environments for the poor it must secure additional funding and land and commit to building streets properly the first time round as there are no resources nor is there additional capacity for the City to come back at a later date to complete a partially finished product.

The adjacent cross section illustrates an alternative street design that is a more multifunctional, pedestrian priority street. The street surface and pavement substructure is taken across the entire road reserve, from street boundary to street boundary, with a single fall within the road directing rainwater to an off-centre roll over kerb and channel. This creates a simple multifunctional surface that can accommodate informal activities, pedestrians, cars, and car parking in a more organic and negotiated space.

The implications of such a cross section are: higher construction costs and more costly maintenance as utilities (water and electrical services) are buried beneath the structural pavement of the street. While the cross section allows for street trees, careful consideration needs to be given to the type of tree and how the tree pit is detailed and constructed (root barriers). While this can be managed through design, specification and management problems can also arise due to water penetration into the pavement structure from the tree pit and roots can damage services and the road surface itself. It is arguably more appropriate to provide street trees strategically, in open spaces or in sections where the road reserve is wide enough to allow for trees.



The above cross section illustrates an alternative standard section through an 8m street illustrating the location of services and a continuous surface treatment from street boundary to street boundary. The cross section allows for tree planting and informal car parking along the road reserve. Illustrations of such environments are provided below.

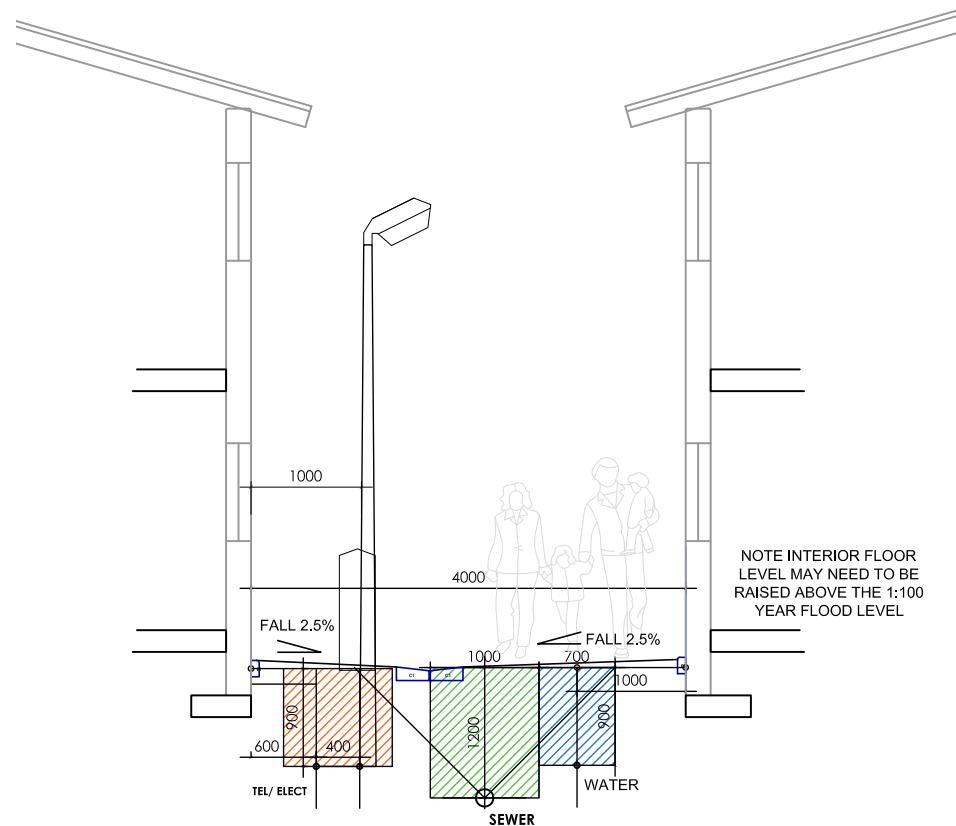


Departing from the City's standards is possible and indeed encouraged, but this can only be approved on a case by case basis. Proposals must be supported by detailed design proposals that resolve any issues to do with emergency access, stormwater management, accommodation of utility services, material performance, management and maintenance.

Pedestrian lanes

In light of the fact that many beneficiaries of public housing are poor and will never realistically be able to afford a private motor vehicle, the inclusion of pedestrian only lanes within a development is considered acceptable, within limits.

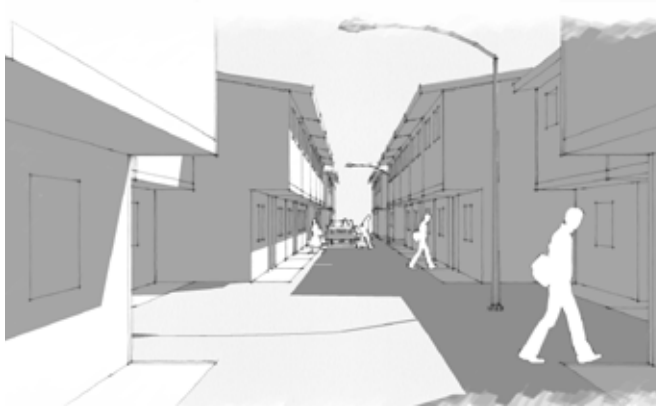
In order to accommodate all the required utility services it has been determined that a minimum road reserve width of 4m is required for a pedestrian only lane (as illustrated in the adjacent cross section). This ensures that sewer pipes can be located in the centre of the road reserve where they can be relatively shallow and easy to access. Pressurised water mains can be located 1m away from the street property boundaries to allow for excavation and also avoids the potentially undermining buildings located close to the street should they burst. Electrical services can be located on the opposite side of the street from the water main and streets lights can be centrally located to prevent light poles being used by perpetrators of crime to access adjacent properties. Special consideration also needs to be given to the interior floor level of the houses to ensure that they are not flooded in high rainfall events as the streets act as rain water channels at such times as there is no under ground stormwater system.



The narrow width of the lane does pose particular challenges for maintenance and such proposals need to be discussed with line departments during the design phase of the project. The limited access will for example have implications on the types of street lights that can be used, increases the risk of vandalism and will determine how the lights are maintained. It also means that should there be a need to excavate trenches to repair or replace services this excavation will need to be done by hand or with smaller machinery that takes more time. Trenches will also need to be shored / boarded to create a safe working environments and to prevent collapse. Special plans will also need to be made to ensure continuous pedestrian access to properties and for storing of excavated material during construction. All these aspect add to the complexity of the repair work and add significant cost further down the line.

It is also important to understand how such narrow streets fit within a road network to ensure adequate access for emergency and refuse vehicles (that prefer moving in forward motion only). Where 4m pedestrian lanes are considered these should be by a maximum of 90m long to allow access to properties with fire houses. Embayments will also need to be created at the end of the streets to store bins temporarily on bin collection days and households will need to take responsibility for taking their bins to these collection points (unless purpose designed skips are provided for this purpose).

Finally, for these streets to be safe it is critical to ensure that the buildings front onto the street have windows and doors overlooking the space to ensure that there is passive surveillance and control over the street environment.



The above drawing illustrates the conceptual design of a 4m wide pedestrian lane and the location of services. The inclusion of this cross section within any development needs to be carefully considered as it has implications for management, maintenance and stormwater management.

2.16 VEHICULAR ACCESS AND CAR PARKING

Vehicular access and car parking provision is a critical determinant of any settlement layout. While private motor vehicles provide a very useful utility function, designing exclusively for private motor vehicles results in grossly inefficient development layouts, undermines the achievement of higher densities and makes the achievement of quality, people centred environments very difficult.

The following factors have therefore been considered:

1. The Integrated Public Transport Network (IPTN) aims to ensure access to a public transport service within 400m of every home in the city.
2. Public transport subsidies are aimed at reducing the cost burden of public transport on the poor.
3. While providing people with choice in how they move around the city the City is encouraging the use public transport and non-motorised transport. The more convenient it is to use a private motor car, the less likely it will be that people will be to use public transport or shift their travel behaviours.
4. The majority of public housing beneficiaries are low income earners and are not able to afford private motor vehicles.
5. Car parking can generally be accommodated within the public road reserve as on-street parking, provided the street has been designed appropriately.



The above aerial photos of Joe Slovo Langa, Scottsdene and Steenberg social housing estate illustrate that levels of car ownership are low and suggest reduced car parking in areas that have high densities and access to public transport services should be supported.

6. On narrow streets, cars often park on the pavement forcing pedestrians to walk in the road reserve. While this may be problematic on busy collector or distributor routes if streets are designed as shared spaces then the presence of people walking in the streets changes driver behaviour and reduces vehicle speed.
7. Where on-street parking is the only alternative communities are generally more vigilant and aware of what is happening on the street. This increases eyes on the street that improves levels of safety.
8. Apart from the Municipal Planning By-Law (that may be deviated from within reason) there is no requirement in law to provide vehicular access to a residential property or to provide parking on site. In fact the by law does not require any parking on sites smaller than 100m² in areas served by public transport.
9. Off street car parking on most residential sites is possible if the residential accommodation is moved to the first floor. This is a choice available to all property owners provided it is safe to access the property by car from the street.

It is therefore argued that car parking provision within human settlements projects should be limited and that a strategic long term view needs to be taken to ensure that people have a choice of modes of transport and still have the possibility of owning a car.



Even in narrow road reserves parking can be accommodated informally without causing undue inconvenience

2.17 URBAN BLOCKS

The arrangement of streets and residential plots into urban blocks plays a fundamental role in creating a unique sense of place and has profound implications on urban efficiencies. From a spatial planning perspective it is important to note that once an urban block network has been established the potential for the block structure to change over time is limited by the services located within the road reserve. Once these services are in place the street network is generally fixed until a time where the entire area is redeveloped (which only occurs after time of war or after catastrophic natural disasters that destroy and render the services unusable). Elective and deliberate redesign at scale is not conceivable within the prevailing socioeconomic situation.

As cities are constantly in a state of development it needs to be ensured that the blocks themselves are able to change and adapt over time through consolidations and subdivisions and redevelopment. If the proportions of the block are limiting the ability of the block to change over time is also limited. Other factors that may limit the ability and inner growth are the shape of the land parcel and the location of the buildings and services within the property, as will be discussed later.

A review of cities from around the world reveals that most urban blocks are deeper than 30m (generally between 30 and 90m deep). There are very few examples of urban blocks that are less than 20m in depth and that have lasted the test of time. Urban blocks that have a depth of 30m are considered robust and adaptable as they are able to accommodate a range of different buildings typologies (including 4 and 5 storey buildings) and change over time

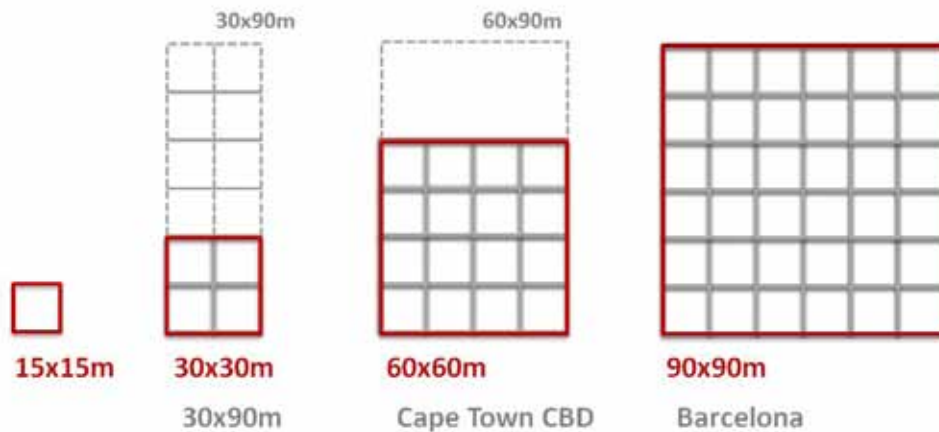
London



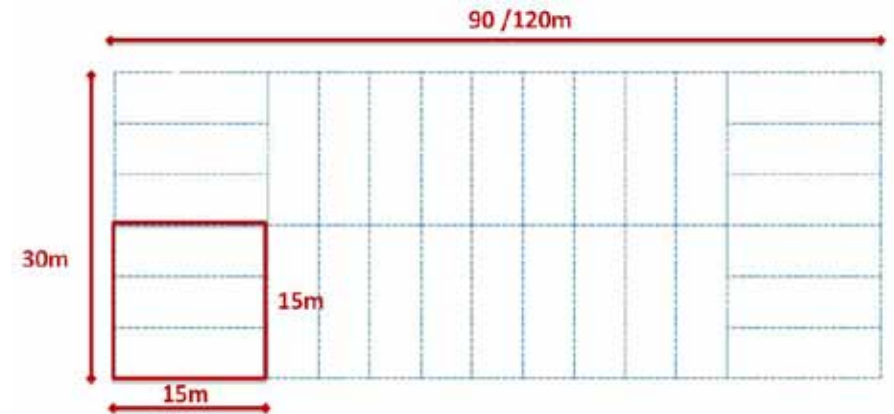
Urban tissue study - Left - Marylebone London, Right Diana Turbay Bogota, Colombia illustrates that blocks of approximately 30m in depth are able to accommodate a range of different buildings type. It also illustrates that street width vary from 4.5 to 14m. This gives structure to the place and ensures access for services

Bogota





The above diagrams illustrate how regular modules like a 15x15m are represented in various cities, including Cape Town CBD



An example of the most efficient residential block type and subdivision

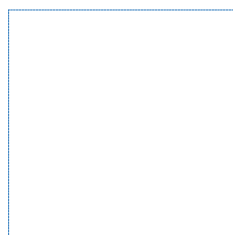
The diagrams above illustrate the benefits of a 15x15m module. Similar models have been developed historically to guide the layout of new towns and cities (See the adjacent case study - Law of the Indies). This module can be repeated to create efficient blocks 30 to 90m in depth and 60 - 180m in length. These proportions are efficient for service provision and are able to accommodate a variety of building types. The study on the page overleaf illustrates how the 15x15m module can be subdivided into smaller land parcels / plots. As a minimum plots are 15m deep and frontages of 3.75m, 5m, 7.5m, 10m and 15 allow for a variety of building types over time. Deeper plots of 20 - 30m are also possible.

Case study: Law of the Indies

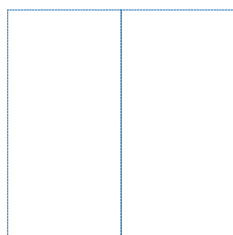
The most significant guideline for town planning in the modern world was the Law of the Indies developed by King Phillip II in 1680 to guide and regularize the establishment of military towns, missions, and civilian towns during the colonisation of Latin America. This comprehensive guide was composed of 148 ordinances to aid colonists in locating, building, and populating settlements. Cities built on these principles have been enduring and proved able to adapt to the needs of modern society.



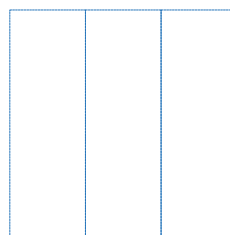
Photo courtesy of <http://www.oldtownfernandina.org>.



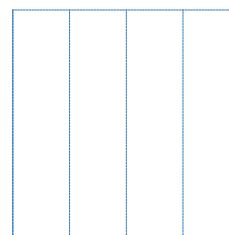
1x15m



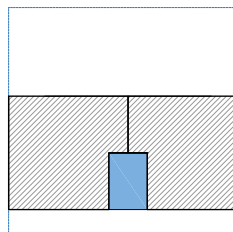
2x7.5m



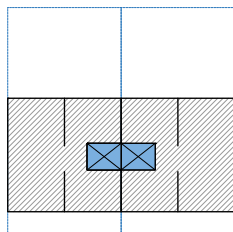
3x5m



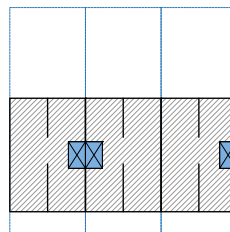
4x3.75m



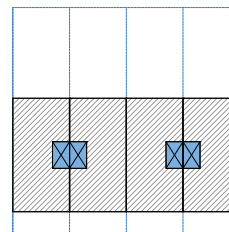
1x15m



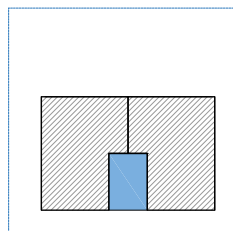
2x7.5m



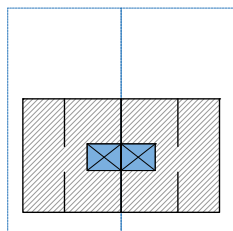
3x5m



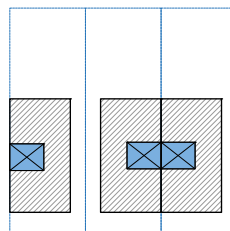
4x3.75m



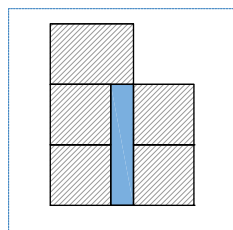
1x15m



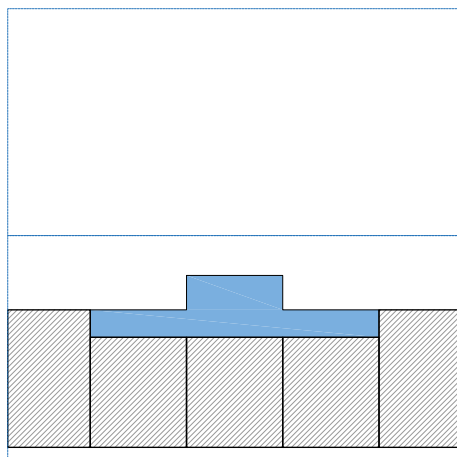
2x7.5m



3x5m



1x15m



1x30m

LEGEND

-  - Plot boundary
-  - Buildings footprint
-  - Vertical circulation (stairs)

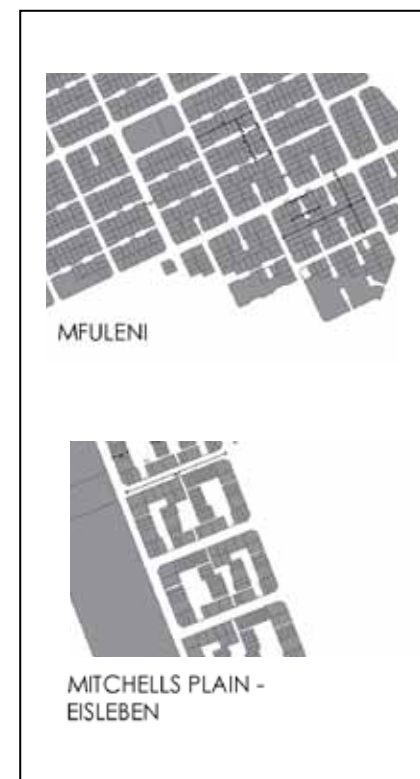
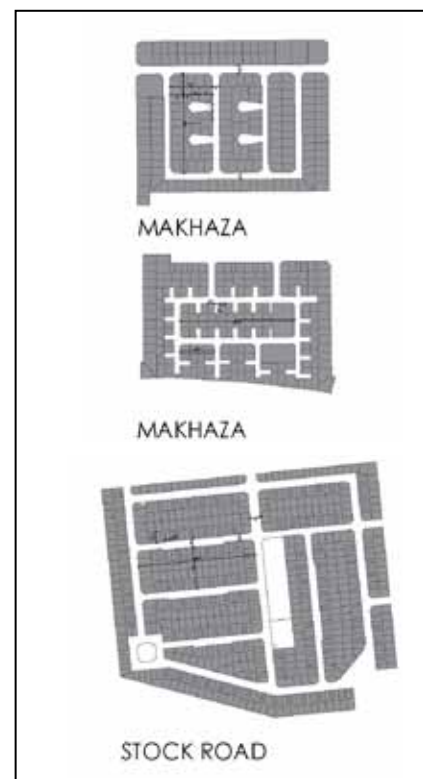
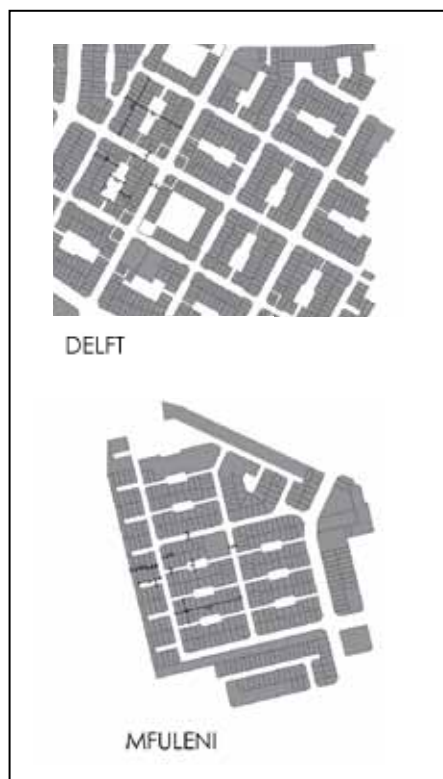
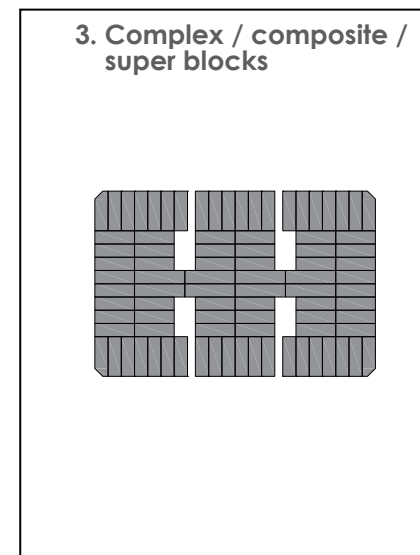
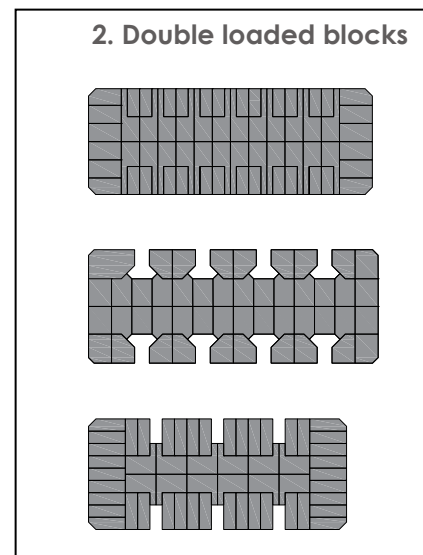
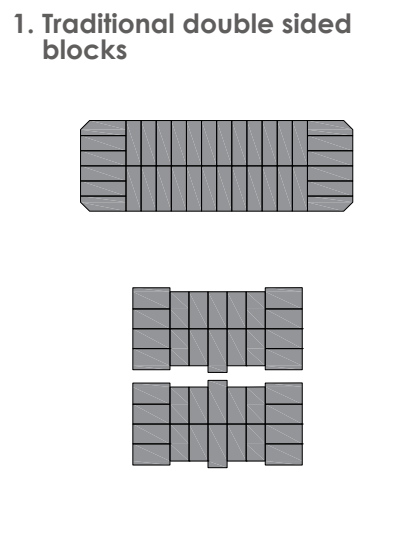
The above diagrams illustrate the variety of different house types that can be developed within the 15x15m module. The larger module can be subdivided into plots that are 1 plot of 15x15m, 2 plots of 7.5x15m, 3 plots of 5x15m or 4 plots of 3.75x15m. As the width of the plot decreases the types of house that can be accommodated on the plot decrease.

There are essentially three typologies of urban block and these are determined by how the individual plots within the block are accessed, serviced and how light and ventilation is provided to the buildings. The three typologies are as follows:

1. Traditional double sided blocks
2. Double loaded blocks
3. Complex / composite blocks / superblocks

These blocks can have distorted shapes and may be combined in a number of ways depending on the topography of the site, the parcelation of land, the arrangement of the street network and open space systems.

When considering the block and street layout designers are able to influence the shape of the environment and this in turn will influence peoples behaviour within the public realm. Distorting the urban grid and creating discontinuity within the road network for vehicles can discourage speeding and dangerous or unsafe driver behaviour. The orientation of urban block can also be used to mitigate against local climatic conditions (such as wind, ensure higher level of lighting into buildings and can also create safe and level spaces for people to play or recreate on the street (when roads run parallel to the contours / slopes).



As alluded to above, the arrangement of urban blocks and streets has profound implications for urban efficiencies and in turn to the cost of the project. The adjacent study compares a number of different block layouts with the view of getting a better understanding of urban efficiency.

Generally the following is noted that :

- Narrower and deeper plots are more efficient from a servicing perspective.
- A land budget that allocates more than 30-35% of land to circulation is considered inefficient.
- Efficient layouts tend to have between 3-4m of services per housing opportunity.
- An important factor to consider in assessing efficiency is the amount of land serviced per linear meter of infrastructure. In this respect layouts 1,2 and 8 are considered to be very inefficient.
- Block lengths of 90m work well in terms of service runs and spacing between manholes.
- Block types 1,2 and 8 are highly inefficient and should be avoided.
- Plots with regular shapes are generally easier for people to develop.
- Plots with regular shapes have more easily determined common boundaries, which prevents encroachment and makes it easier for the local authority to manage and enforce development rules.
- While double loaded blocks with panhandle plots achieve greater efficiencies the shape of some of the plots makes them difficult to develop, particularly at high densities.
- Urban blocks that are between 30 and 60m in depth offer the greatest level of flexibility for development.

		Land budget											
		Total Area	Developable area		Circulation		Linear meter of services per unit	Ave. sqm. of circulation per unit	Ratio of circulation to plot	Ave plot size	Units	Sqm of land serviced / linear meter of service	Gross density
			sqm	sqm	%	sqm							
1	Wide shallow plots	12,084	7,608	63%	4,476	37%	5.6	46.6	0.6	80	96	14.3	79.44
2	Narrow roads small plots	5,056	3,354	66%	1,702	34%	3.9	21.8	0.5	40	78	10.4	154.27
3	5x15m plots with 8m str.	14,895	10,728	72%	4,167	28%	3.8	28.9	0.4	75	144	19.5	96.68
4	Pan handle	26,260	20,874	79%	5,386	21%	3.4	29.9	0.3	112	180	32.8	68.55
5	Narrow row with ped lanes	14,308	10,604	74%	3,704	26%	3.8	26.5	0.4	75	140	19.5	97.85
6	Super block with lanes	18,753	13,404	71%	5,349	29%	4.4	29.1	0.4	75	184	17.0	98.12
7	Mfuleni superblock	17,784	13,480	76%	4,304	24%	3.7	24.5	0.3	75	176	20.1	98.97
8	Joe Slovo	14,765	7,192	49%	7,573	51%	4.2	30.7	1.0	30	247	7.2	167.29

The above table compares a number of different block typologies in terms of land and infrastructure efficiencies. Note: It is dangerous to use the above table as a pure comparison between block types as the average plot size (noted in red) varies between layouts. What is clear is that block types 3,4, 5 and 6 offer the greatest levels of efficiency and the simple plot geometries are easier for the City to manage and for people to develop. It is also worth noting that all block types apart from 2 and 8 have the ability to accommodate further densification over time.

PERFORMANCE

- EXCELLENT
- GOOD
- ACCEPTABLE
- NOT ACCEPTABLE

2.17 STREET BUILDING LINES, DEFINING THE URBAN BLOCK AND OPTIMISING LAND FOR DEVELOPMENT

In a rapidly urbanising environment and in the context of scarce resources the enforcement of some aspects of the development management scheme is challenging. This specifically applies street and common boundary building line. Where the street boundary is not physically defined by a pavement or kerb encroachment into the road reserve is common and difficult to rectify. It is therefore necessary to define the street physically with a hard surface or built edge and then accept that, in an attempt to maximise the development potential of the site, property owners will build hard up against the street boundary. Rather than penalising property owners for noncompliance with the zoning scheme the City should be encouraging this type of development, provided that it does not put the public or infrastructure in the road reserve at risk.

Further the complex stepping of the street boundary to create “visual interest” (as illustrated in the adjacent aerial photos) is often not appreciated by the communities that inhabit the spaces. This often results in encroachments into the public road reserve, as this open space is perceived to be part of their property and potentially developable space. If the intention is to create variation in the streetscape this is more easily achieved by maintaining regular street boundaries and setting buildings back slightly from the street edge. Where there steps or pinch points in the road reserve are introduced, the street boundary line must be defined physically with hard surface and the amount of stepping should be limited. Elements such as cantilevers and overhangs over the street boundary should be supported within reason.



Urban streets from around the world illustrate that building right up to the street boundary line optimises the development potential of the land and creates well defined streets and positive urban environments.



The above examples illustrate that when the public realm is not clearly defined by a hard surface and physical built edge it is vulnerable to encroachment.

Left - Delft – The irregular subdivision and soft road verges has lead to encroachments into the road reserve

Right - Pelican Park. A well defined public realm and hard surfacing across the entire road reserve is less vulnerable to encroachment.

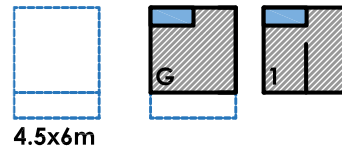
2.18 MINIMUM PLOT SIZE

In an effort to achieve high densities many planners look to reduce the size of residential plot to a minimum to fit as many units onto the site as possible. Rather than create a viable urban environment small plot sizes limit what can be achieved on any given site over the long term. The core objective of any housing project must be to service and subdivide land in such a manner that it allows the future occupants some flexibility with regards to how the site can be developed. The proportions of the plot will determine what house types may be developed on any given site.

While it is technically possible to build on very small sites the study overleaf illustrates that sites that are shallower than 10m and narrower than 5m create undesirable living conditions where the level of natural ventilation and lighting into habitable rooms is compromised. Small sites also increase the risk of fire spread and prevent any form of addition or expansion, apart from adding a second or third storey to the original dwelling.

From a land use management and regulatory perspective small sites present serious challenges, particularly when the cadastral boundaries are not clearly defined. Extensions to buildings on small plots are difficult to achieve within the parameters of the Development Management Scheme, building lines are difficult to enforce and consequently properties are vulnerable to illegal encroachment which leads to boundary disputes. These disputes are invariably difficult to resolve and require legal and procedural processes that the City and beneficiaries are not able to afford

Investigation into what type of housing is possible on site of different sizes



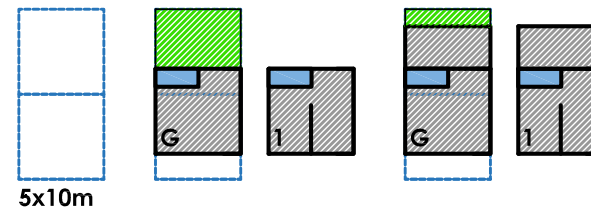
A double storey subsidy house can fit on a 30m² plot but space is required to the front and back of the unit for light and ventilation. This can be provided from a street or communal court, as is the case in Joe Slovo Langa.

A deep narrow plot allows for a multitude of potential expansion options and also allows for a second dwelling. Thus plots with a frontages of between 3.75 and 7m and with a depth of more than 15m are preferred.

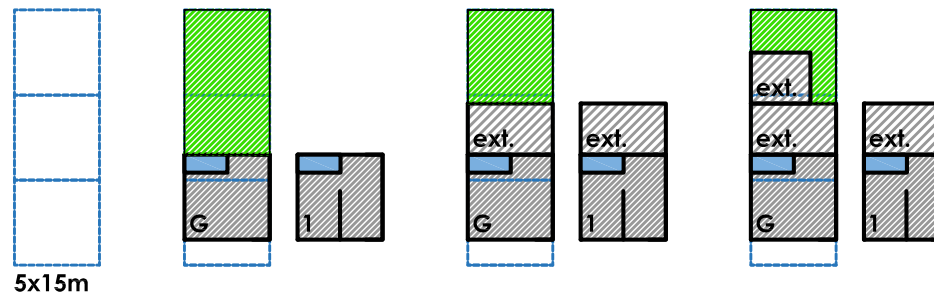
The plans on the next page illustrate the flexibility of a 5x15m deep plot, the different types of housing than can be developed in an incremental way.

The key finding of this study are that:

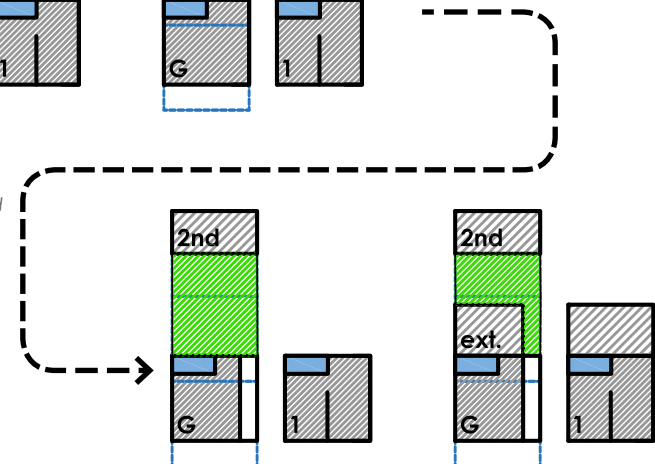
- Buildings can be built on small plots but the smaller the plot the more limited it is in terms of what can be achieved on the site.
- Plots with a width of between 3.5 and 6m are suitable for row housing
- Plots of between 5 and 9m are suitable for semi-detached housing.
- Deeper sites (15-20m in depth) allow for formal buildings to be constructed at the front of the properties and for extensions and second dwelling to happen to the rear. This has positive implications for the aesthetics of the neighbourhood.
- Typically plot sizes for multi-owner type buildings (flats) should be a minimum of 10-12m wide, which allows for car access to the back of the property and buildings to be 6-8m wide - allowing for a two bedroom frontage.
- Plots for multi-owner developments (flats) should ideally be a minimum of 25 -30m deep to allow for car parking to be located at the back of the site and for the building to address and define the street

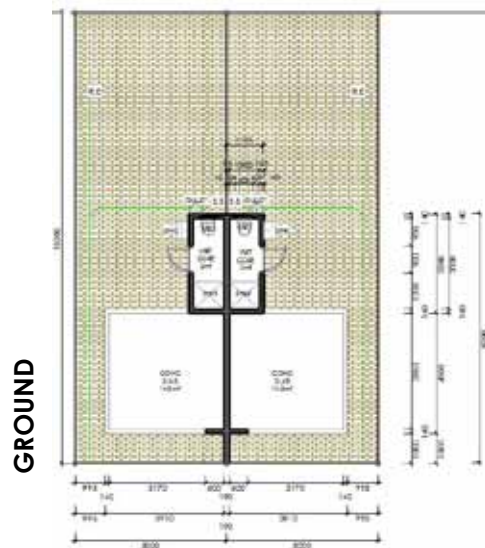


A 50m² plot is able to accommodate a double storey subsidy house. This plot size allows for one level of expansion but the quality of light and ventilation provided by the small court is not ideal.



A 75m² plot is able to accommodate wide range of house types and development options including a double storey subsidy house, an extension with a garden as well as a second dwelling.





INCREMENTAL STARTER UNIT



A SUBSIDY HOUSE WITH A DETACHED WET CORE TO PROMOTE A SECOND DWELLING



A 3 BED HOUSE WITH A RENTAL UNIT AT THE REAR OF THE PROPERTY



A 3 BED HOUSE WITH TWO RENTAL UNITS AT THE REAR OF THE PROPERTY

The above plans illustrate the flexibility of the 5x15m plot. They show how the same plot can be developed from a starter unit that provides a party wall and a slab, to a double storey subsidy type house, to a subsidy house with a second dwelling as well as a primary dwelling with two small flats to the rear for second dwellings.

2.19 BUILT FORM AND BUILDING TYPOLOGIES

In terms of built form it is possible to define four typologies of building. These typologies are defined by the location of the building on the site, its relationship to the adjacent streets, and open spaces and how it is located relative to adjacent buildings. These are explained below and illustrated in the adjacent diagrams.

- **Point / pavilion buildings** - Buildings that are completely detached / surrounded by open space (gardens or street).
- **Attached or semi detached buildings** - Buildings that are built against one property common lateral property boundary so that they share a wall with the adjacent building.
- **Row or terraced buildings** - Buildings that stretch across the entire width or frontage of the property connecting physically with the adjacent buildings on either side forming a continuous built edge along the street.
- **Courtyard buildings** - A building type where rooms are arranged along the periphery of the properties with rooms facing onto a courtyard, atrium or light well.

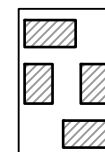
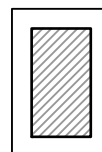
It is worth noting that point / pavilion buildings are typical in suburbia and attached models are more common in urban environments. It is also worth noting that urban typologies can be considered a family of buildings as one typology can develop into another. Urban typologies also tend to have a building footprints occupy a high percentage of the site and have a close and direct relationship with the street.

SUBURBAN



POINT

FRONTAGE : 9-15m
DEPTH : 15-30m

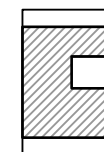
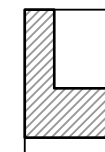
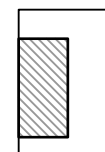
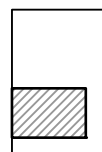


URBAN



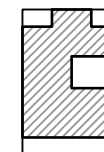
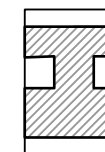
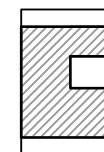
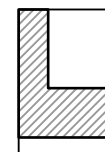
ATTACHED

FRONTAGE : 5-15m
DEPTH : 15-30m



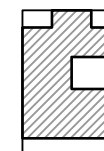
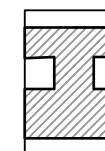
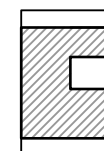
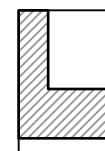
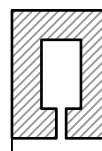
CONTINUOUS

FRONTAGE : 3-8m
DEPTH : 15-30m



COURTYARD

FRONTAGE : 12-15m



While not common in Cape Town courtyard buildings are particularly well suited to the local climatic conditions as they create wind protected courts that are sheltered from the dominant south-easter in summer and also protected from the wet north wester in winter. They are also more secure from a crime and safety perspective.

2.20 HOUSE TYPOLOGIES AND OWNERSHIP

House types can also be categorised according to ownership and can be divided into two different groups depending on how the ownership of the land and the residential unit is dealt with.

The first group are “**ground related**” or single ownership typologies where both the land and the housing unit are owned by the same person (single ownership / typical of full title). Ground related housing typologies are a combination of the built form (the previous section and the unit type (See the next section)

The second group of residential buildings are “**non-ground related / multi-owner**” typologies where the land is owned collectively by the various households who live on the site but the residential units themselves are individually owned by the household or by a land lord. This is typically commonly known as a blocks of flats / apartments or sectional title development.

While non-ground related typologies are strongly supported these guidelines focus primarily on ground related typologies, as this is the most common form of housing delivered through the subsidised housing programme.

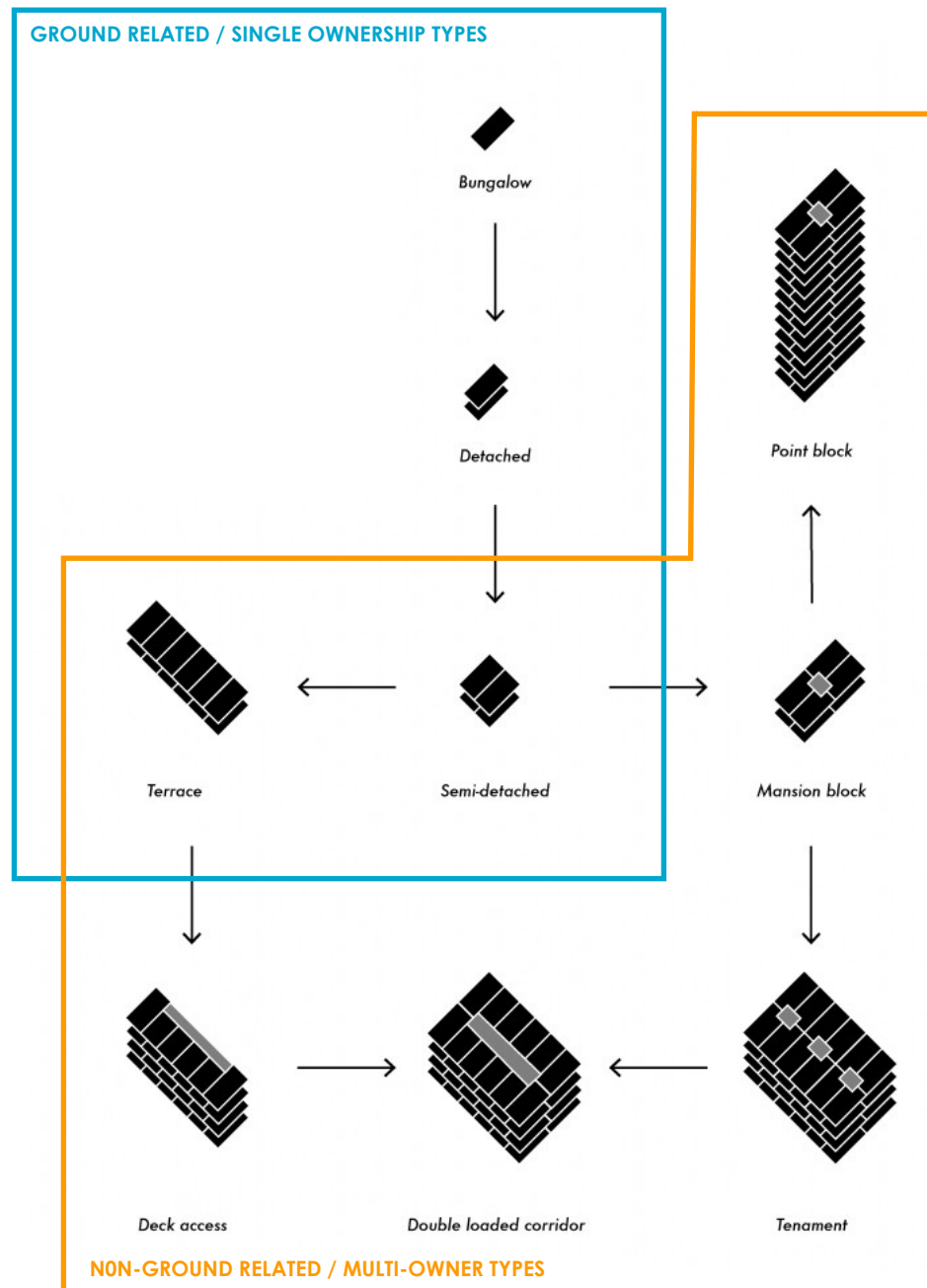


Image courtesy of Euan Mills

2.21 NON-GROUND RELATED OR MULTI-OWNER BUILDINGS TYPES

While not dealt with extensively in this document there are essentially five different typologies of no-ground related building types from which a more complex buildings can be developed through combining or merging building types. These are:

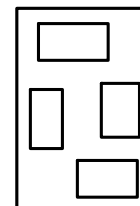
- **Maisonettes** - typically small blocks of flats of two or more floors that are arranged in such a manner that each unit has its own front door on the street.
- **Compounds** - A large site, typically surrounded by a wall or buildings with one access point, within which multiple dwellings or units are arranged (each with their own footprints). The individual units may be one or more storeys.
- **Core access / tenements / maison blocks** - Multi-storey buildings with access provided to each floor by a central circulation core containing stairs and/or lifts. Each floor may contain one or more units.
- **Gallery / deck access** - Multi-storey buildings where units take access from a gallery / common walkway that is accessed from a circulation core.
- **Corridor type buildings** - Multi-storey buildings where individual units take access from a common corridor and circulation core. This typology is typical in hotels and generally requires artificial ventilation and specialist fire designs.

Not only are these types of buildings more structurally complex and expensive to build (double the cost of traditional RDP type subsidy houses) but they require more sophisticated management / institutional arrangements, such a body corporates and managing agents, who are tasked with maintaining and managing the buildings and common property. Such building types are best suited for social housing or managed rental property that typically does not cater for very low income households due to the additional management costs.

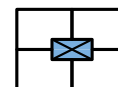
Maisonette



Compound



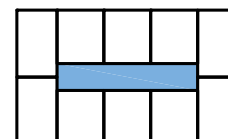
Core Access / Tenement



Gallery access type



Corridor type



2.22 UNIT TYPOLOGIES

The internal arrangement of rooms within a unit is an exercise of providing light and ventilation to habitable rooms. The arrangement of rooms, doors and window openings give rise to two different types of units:

1. **Single aspect units** - units that obtain light and ventilation from one side / facade only. This type of unit does not facilitate for cross ventilation and may in some cases require artificial ventilation.
2. **Dual aspect units** - units that can access light and ventilation from two or more sides / facades of the building. Dual aspect units facilitate natural cross ventilation that produces much healthier internal living environments. They are therefore preferable for low income housing.

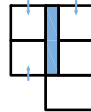
Further, the arrangement of rooms, corridors, vertical circulation (stairs) and open spaces (courts and gardens) within the site gives rise to six different house / unit types. The six unit typologies can be defined as follows:

- **Double loaded corridor units** with rooms accessed off a central corridor (generally with a width of between 6 and 9m).
- **Single loaded corridor** - with rooms access from one side of a corridor (generally with a width of between 3.5 and 5m).
- **Central Core buildings** - where rooms are accessed off a central circulation core, staircase or landing (generally with a width of between 3 and 8m).
- **Corner Core buildings** - are similar to the central core but with the circulation in the corner (generally with a width of between 6 and 8m).
- **A fulcrum unit** - units with an open plan living area with rooms accessed from a central space (generally with a width of between 6 and 8m).
- **Courtyard buildings** - where rooms are accessed off a common courtyard (generally with a width of between 9 and 12m).

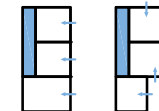
More complex buildings are often a combination of these six types.

UNIT TYPES

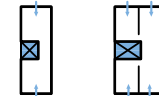
DOUBLE
LOADED
CORRIDOR



SINGLE
LOADED
CORRIDOR



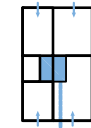
CENTRAL
CORE



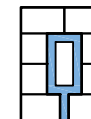
CORNER
CORE



FULCRUM

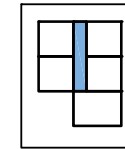


COURTYARD

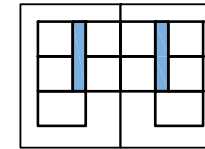


POSSIBLE COMBINATION OF BUILDING AND UNIT TYPES

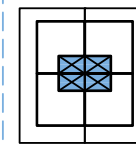
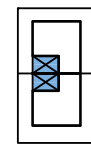
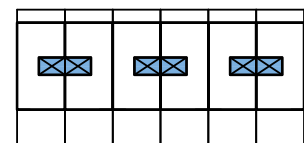
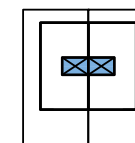
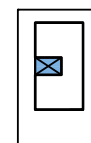
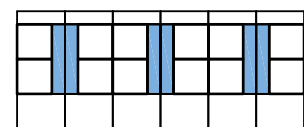
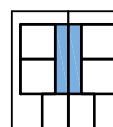
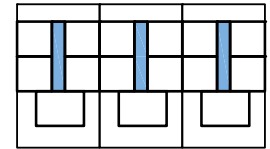
POINT



ATTACHED



ROW



LEGEND

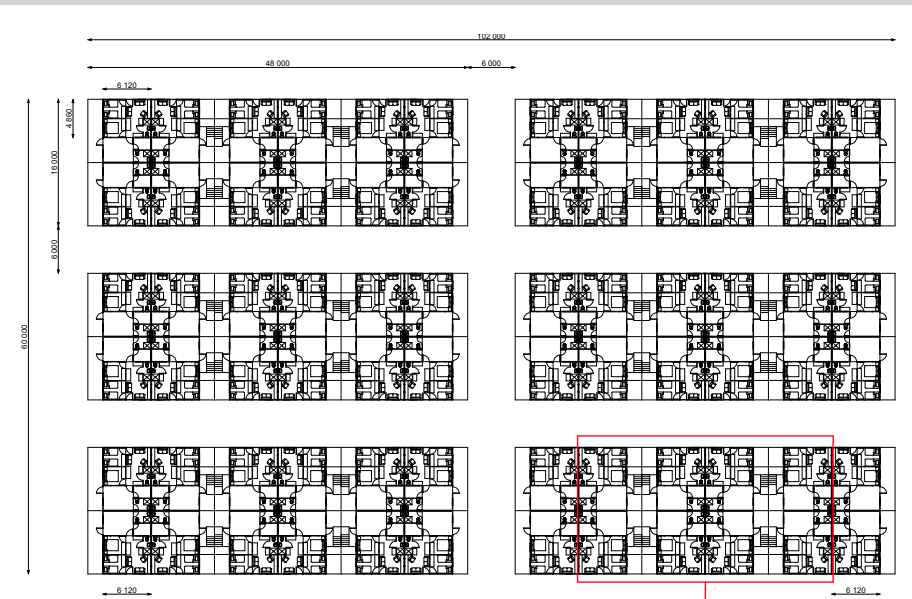
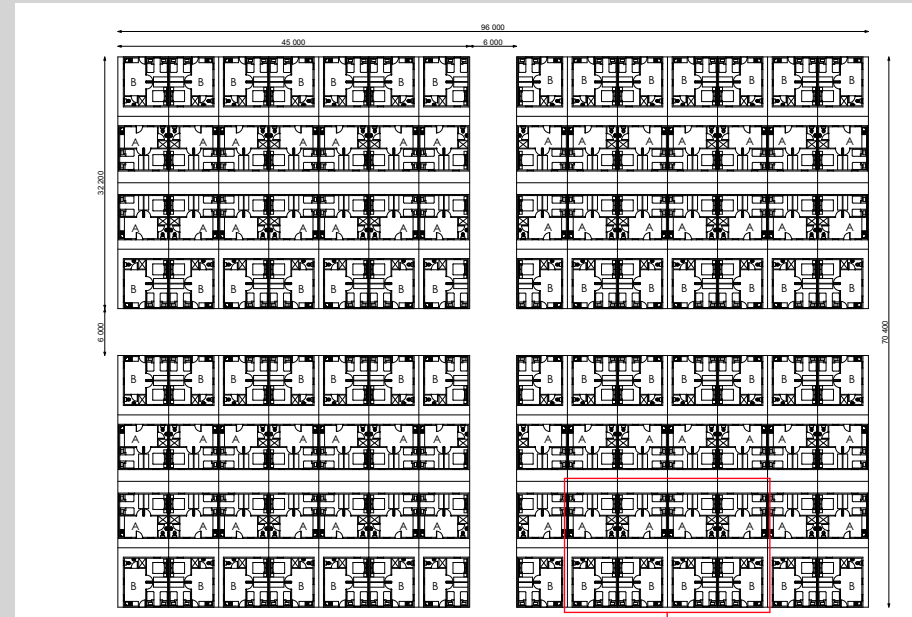
- access to light / air
- circulation (lift or stair)

Case study: Recent exploration of housing typologies for the Department of Human Settlements

The adjacent examples illustrate some of the most recent explorations by the Human Settlements department in relation to potential house typologies and emergency housing. While these layouts yield relatively high densities the proposed typologies do not align with many of the principles outlined in this document. In particular:

- Plot sizes are restrictive and limit the extent to which beneficiaries can invest in their properties.
- It is often difficult and in some cases impossible to extend or build onto the original structure.
- The amount of land serviced created per linear meter of infrastructure is low.
- There is limited potential to increase densities within the development over time.
- The small light and ventilation wells do not create dignified living environments.
- The size of plots is so small that even the consolidation of multiple properties is not likely to create a large enough development parcel that could accommodate a different house type.
- There is very little quality private open space for households.
- There are often no opportunities to develop second dwellings to supplement the household income or accommodate additional family members.
- The delivery of such typologies at scale will result in an undifferentiated housing market where all units are essentially the same. This could result in social and economic slumps and poverty traps as people who are able to make an investment into property have no choice but to move out of the area rather than invest in building the community.
- Housing of this nature is never likely to break the property rates threshold and will never contribute to the City's fiscus.

Ultimately beneficiaries become locked into a urban environment that is inflexible and not able to change.



2.24 THE IMPORTANCE OF STARTER STRUCTURES

A review of the sites and service projects that have been rolled out in Cape Town over the past 20 years suggests that the provision of services and tenure alone is not enough to incentivise incremental development and encourage the formalisation process that would result in the creation of sustainable and healthy urban environments. The provision of a rudimentary starter structure can accelerate the formalisation process and ensure that aspects such as structural stability and public health are addressed. The components of a starter structure could vary but should consist of a combination of the following elements: a wet core (containing water and sanitation connections), a party wall (providing structural stability and fire protection) and a slab (ensuring a dry and stable foundation). Various design and combinations of these three elements are possible and should be workshopped with each community during the planning process.

The detail design of the starter structures should provide clues to how beneficiaries should build onto or upon the starter core. For example: slots could be left open in the wall for rafters, wall stiffeners and foundation walls could indicate where future walls should be built and lintel ring beams could indicate where it is safe to support a second storey (see sections over leaf).

The location of starter structures on the plot can also define the common boundary, which will help the home owners know where their properties begin and end for construction purposes and will assist the local authority in dealing with boundary disputes and enforcement. The clever arrangement of services and structures within the site can also create opportunities for second dwellings or allow the conversion of part of the house into a business.

Not only is it important to design the starter structure but thought should be given to the range of possibilities that the structure might create for the beneficiary. Generic house plans should be developed, complete with technical specifications so that the end product complies with regulations and can be approved by the City for construction. This will also encourage beneficiaries to build safely and negotiate with building contractors.

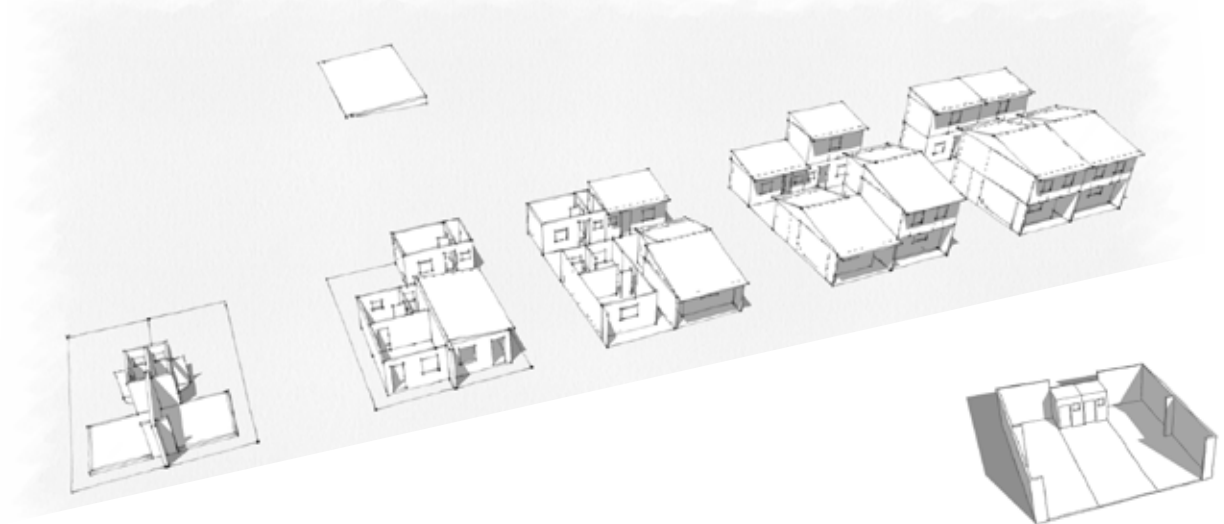
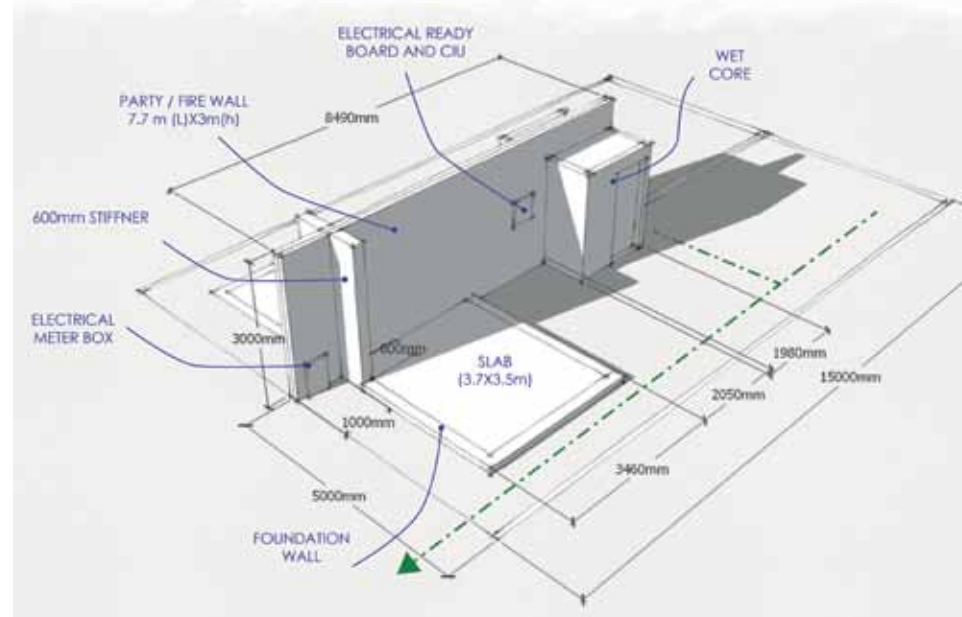
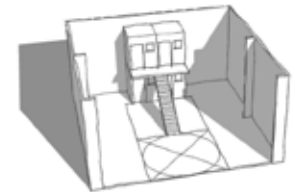


ILLUSTRATION OF THE POTENTIAL PROGRESSION FROM STARTER UNIT TO FORMAL BUILDING

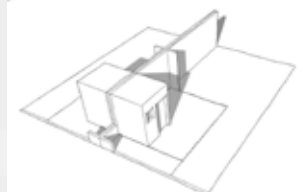


STARTER STRUCTURE OPTIONS

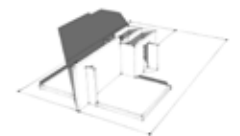
Multiple tenure option



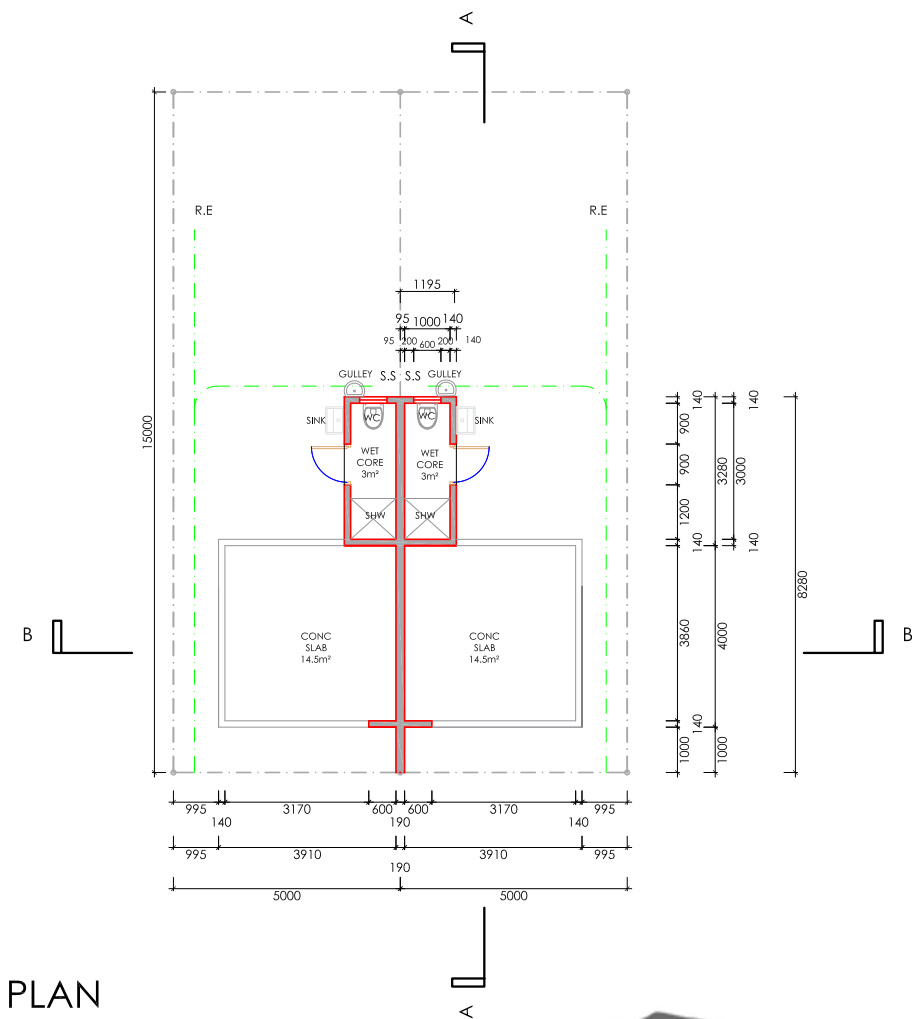
Multiple tenure option



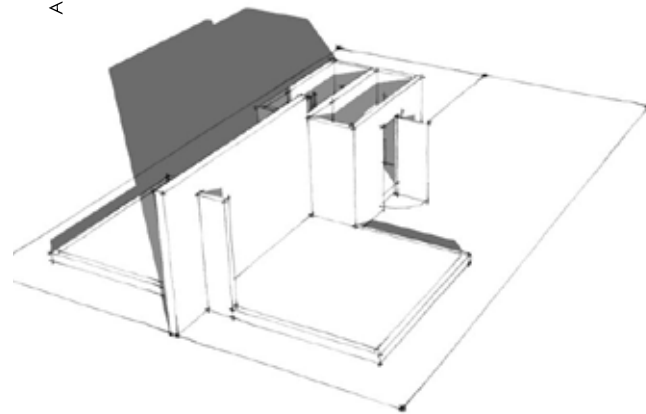
Wet core to the front of the plot



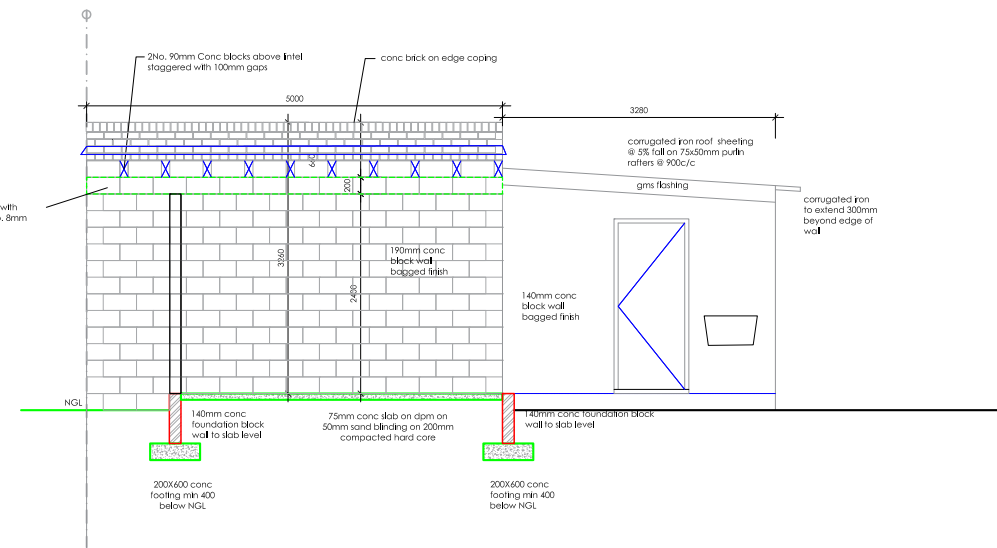
Simple wet core to the rear of the plot



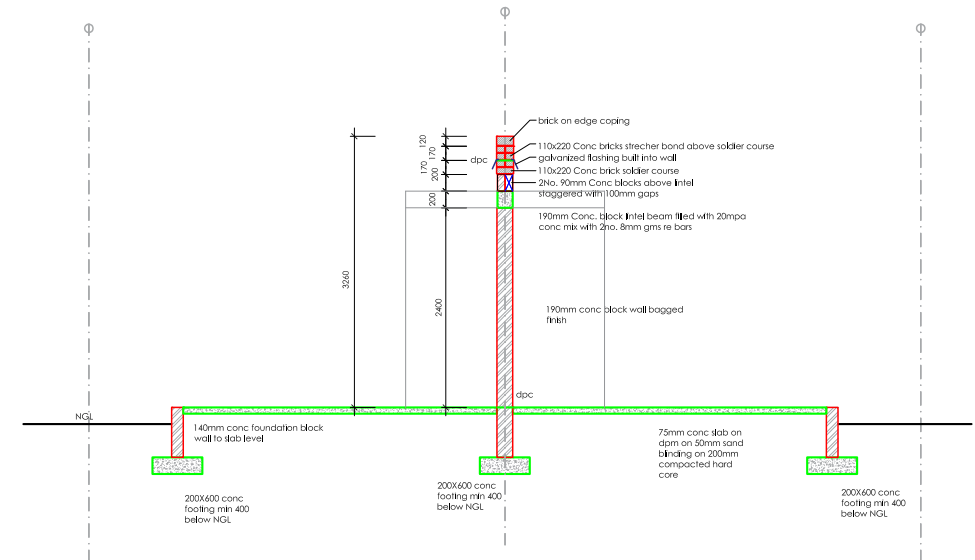
PLAN
SCALE 1:100



Technical exploration



SECTION A-A
SCALE 1:50



SECTION B-B
SCALE 1:50

2.25 EMERGENCY HOUSING AND TRANSITION AREAS

Poor communities living in informal conditions are the most vulnerable members of society and regularly fall victim to fires and flooding. It is therefore necessary to conceptualise an approach to emergency housing that ensures that victims of natural and man made disasters are provided with adequate shelter and access to services until more permanent housing solutions are found.

A review of the Temporary Relocation Areas (TRA) and emergency housing sites that have been delivered in Cape Town over the past 20 years reveals that such settlements, while planned to be temporary, have remained permanent features within the urban landscape and are the source of social hardship. It is therefore critical to ensure that emergency housing projects are planned, laid out and constructed so that they can be fully integrated within their surrounding neighbourhoods and formalised over time without relocating the infrastructure that is installed as an emergency measure. This will ensure that public investment is optimised.

From the outset it is fundamental to ensure that there is commitment to formalise these areas incrementally over time and that these areas are planned to become healthy and vibrant urban neighbourhoods in the long term. At the first level this means ensuring that emergency housing sites are well located and effectively integrated with their adjacent urban neighbourhoods through roads and infrastructure networks. Secondly, provision must be made for the non-residential components of a neighbourhood such as public facilities, schools and open spaces. Thirdly, it is critical that the proportion of residential land units (plots and urban blocks) and the provision of services and infrastructure does not prevent the transformation of the temporary settlement into a permanent settlement

through future land use applications (consolidation and subdivision). Lastly, issues around tenure need to be determined up front and discussed and agreed to with the community who move into the settlement to allow for households to incremental investment into the property over time if that is an option that is agreed to.

The City has explored different approaches to emergency housing. Two alternative urban block configurations are illustrated in the diagrams overleaf. It must be noted that these are not the only alternatives and further explorations and variations of these approaches with input from utility departments and TCT. The diagrams also illustrate how the plots within the urban blocks could be consolidated and resubdivided in time.

Alternative one: involves a 32m wide urban block with four small erven accessed off a shared access lane. Structures are arranged around a shared / communal court with toilets provided to the centre of the properties.

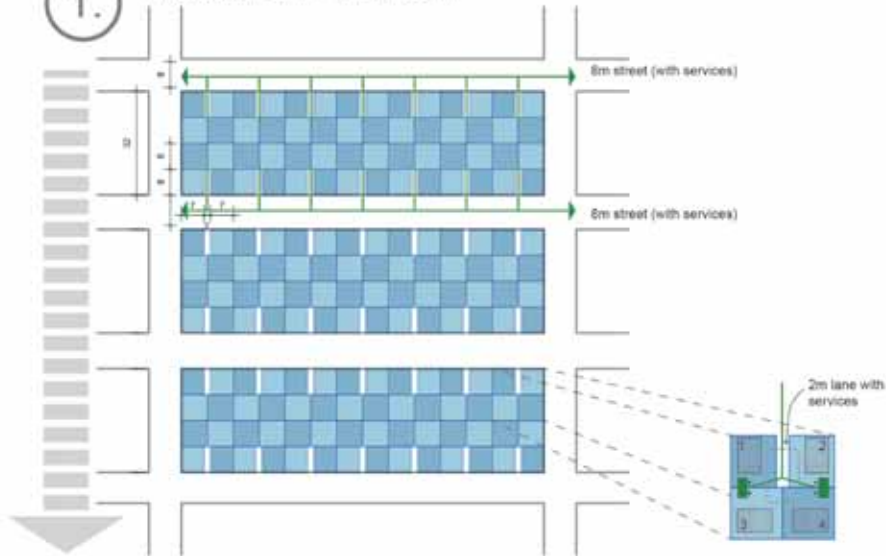
Alternative two: involves pairing two narrower 16m blocks with alternating 8m streets and 3 m access lanes. Services are only installed in the 8m streets to allow for the closure of the lane and its consolidation with adjoining properties in later stages of upgrading to create a 35m wide urban block that can be subdivided later as illustrated.



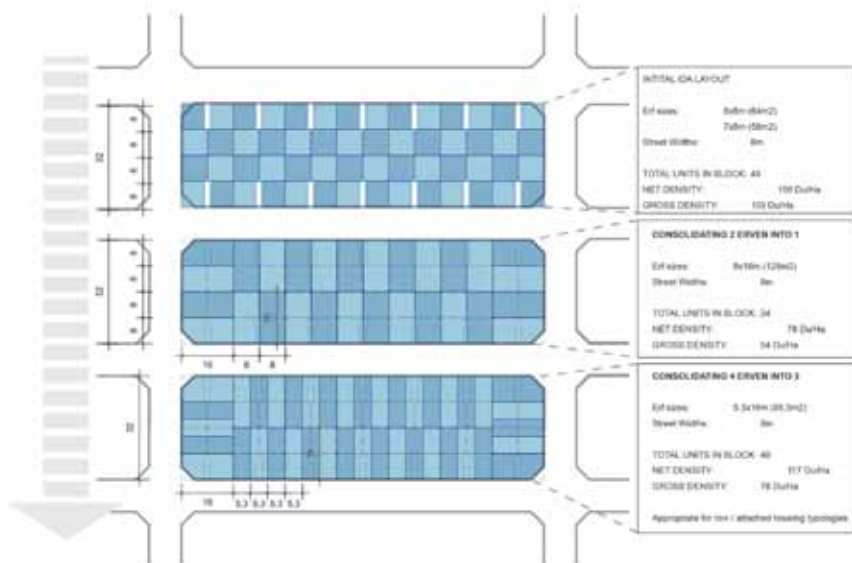
Emergency housing around OR Tambo Hall in Khayelitsha

ALTERNATIVE ONE

1. PHASE ONE: EMERGENCY HOUSING LAYOUT

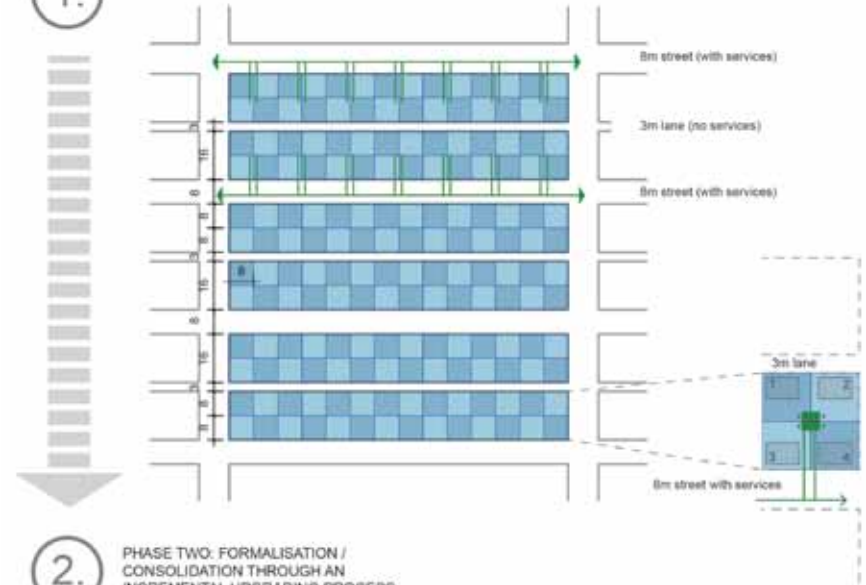


2. PHASE TWO: FORMALISATION / CONSOLIDATION THROUGH AN INCREMENTAL UPGRADING PROCESS

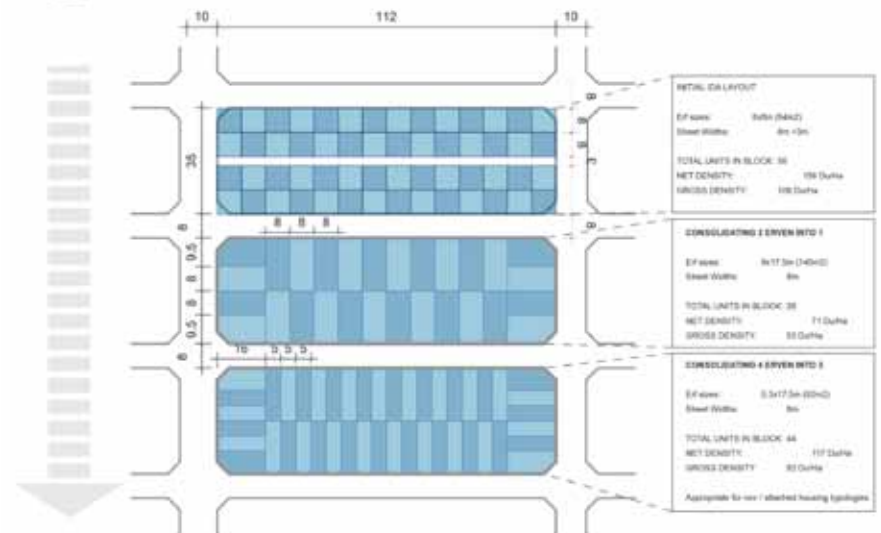


ALTERNATIVE TWO

1. PHASE ONE: EMERGENCY HOUSING LAYOUT



2. PHASE TWO: FORMALISATION / CONSOLIDATION THROUGH AN INCREMENTAL UPGRADING PROCESS



2.26 LOCATION OF SERVICES WITHIN THE SITE

While the provision of bulk services within the road and street network is the responsibility of the City, residents gain access to the utility network through on-site utility connections. The location of these connections (specifically wet services) within the property can either support or hinder future development.

The following factors are important to consider:

- Electricity services are less restrictive than other wet services as they can be moved around the property relatively easily by a registered professional. Ideally an electrical connection should be provided from the street front, with one connection point per property which should be located on the street boundary. The connection point would typically take the form of a meter box that could contain more than one meter, but should be designed and provided with the expected maximum number of dwellings in mind. The size of the service connection cable and the backbone infrastructure must be sufficient to allow for the foreseeable maximum load of the neighbourhood once fully developed.
- The location of wet services within the property usually becomes a fix for how the site could be developed as these services, particularly waste water service connections, are constrained by the depth and gradients of pipes. If the service connections are not located optimally within the site the property owner will be forced to relocate such services. Not only is this a cost that the home owner will need to bare but it could be considered a wasteful public investment as a more optimal arrangement of the services

would have allowed the owners investment into the property to be directed towards adding value to the building rather than moving services.

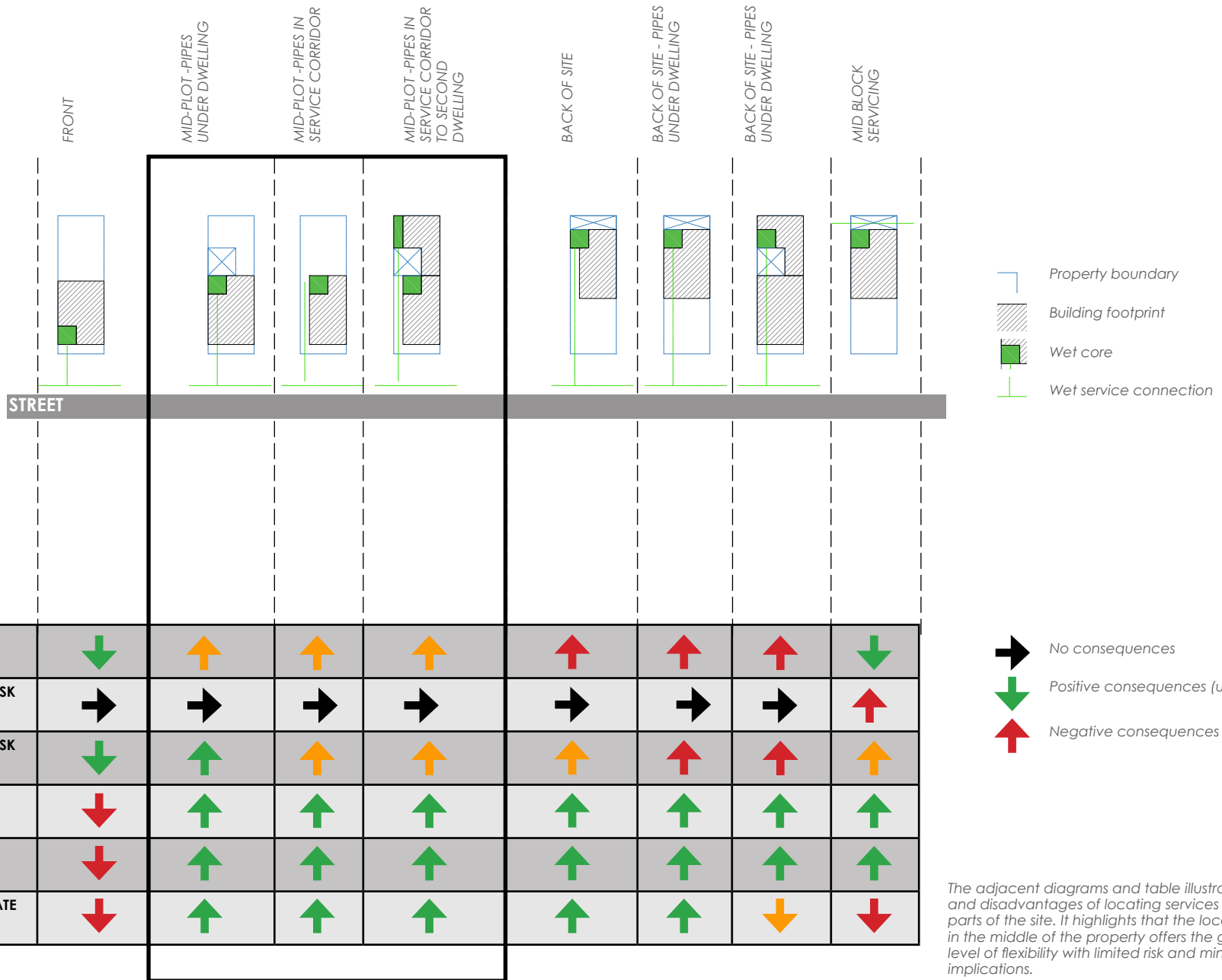
- While locating services at the front of the property is more cost effective from a project implementation perspective, the location of wet services on the street means that toilets and bathrooms occupy the most valuable frontage of the site where levels of natural light and ventilation are best. These locations should be reserved for bedrooms and other habitable rooms.
- Locating the wet cores and toilets on the street frontage has a negative aesthetic impact on the public environment and reduces opportunities for overlooking, which in turn has negative consequences for crime and safety.
- The responsibility of the City to maintain services technically ends at the property boundary, however if the services within the properties fail (sewerage for example) as a result of improper installation there is a risk to adjacent properties. The City is obliged to consider the design and installation of services when the site is first development.
- Should the homeowner want to provide a second or third dwelling on the property the central location of services allows for ease of connections without the need to install long pipes through or under an existing building.
- Should a second dwelling be constructed access to a gully and water point in the courtyard or alley will provide backyarders with a point to discharge grey water into the formal sewer network and avoid polluting the stormwater system.

- The location of the wet core in the centre of the property also promotes the creation of a courtyard / back garden as the bathrooms need to be ventilated.
- Mid-block serving is not supported as buildings are often built over servitudes which prevent access for maintenance and can damage infrastructure.

The adjacent diagrams and table illustrate the benefits and disadvantages of locating services in different locations within the property. It highlights that the location of services in the middle of the property offers the greatest level of flexibility, with limited risk to both the City and the owner and with minimal cost implications.

As set out in 2.8 the planning of any settlement should seek to ensure that all residential properties are higher than the street so that they are self draining. This will avoid the need for stormwater facilities within the property. However where contextual conditions require it, such as on steep slopes rain water catch pits and formal connections to the stormwater system must be provided. It is also important to ensure that special attention is given to the design of the house unit to ensure that roofs are sloped in the right direction and rain water goods (gutters and down pipes) are provided to direct stormwater into the road.

LOCATION OF SERVICES



2.27 ALTERNATIVE AND SUSTAINABLE TECHNOLOGIES

Resource efficiency is critical to sustainable socio-economic growth and development. In this context Cape Town operates within serious and increasing energy, water and waste constraints. Cape Town's competitiveness will be dependent on improving resilience to threats such as climate change, economic meltdowns, population pressure, energy price shocks and unstable energy supply.

While alternative and innovative sustainable technologies are increasingly becoming a reality and offer the potential to radically change the way in which cities work and are planned many technologies are untested at scale, require a high levels of maintenance, and are not applicable for high density environments. Most of these new technologies are inappropriate for low income housing as they shift the burden of maintenance from the State to the household who, in the instance of low income households, are not able to maintain such services. Serious consideration therefore needs to be given to long term life cycle requirements of such systems.

It is therefore important to ensure that when new technologies are implemented that these are backed up with connections to conventional services. This often requires a level of redundancy and duplication of services with significant cost implications. However as technologies are tested and improve the need for backup infrastructure may fall away.

Further, consideration also needs to be given to the perceptions of alternative technologies within beneficiary communities. Alternative technologies are often considered inferior and tradesmen are often not equipped to service and maintain new technologies. They therefore need to be introduced with care and together with training programmes for both beneficiaries and tradesmen.



Part 3 consolidates a set of design and planning guidelines into directives that will inform the design process and layout of all future human settlements projects that the City of Cape Town undertakes. In most cases this will involve the establishment of a township or an amendment of an existing township scheme. A township development is defined as the planning, design and construction of the roads and utility networks that are required to service an urban community. Any proposed layout or amendment to a township scheme must be informed by the City of Cape Town's relevant policies, technical standards and guidelines that are updated from time to time. For ease of reference these are identified in the adjacent call out box.

Objectives

The objectives of these directives are:

- To promote the development of sustainable urban environments that fulfil the economic, social and cultural needs of society;
- To make project managers, designers and planners aware of the City's adopted policies and technical standards;
- To provide clear principles, performance criteria and design guidance for new human settlements projects; and
- To provide a technical basis for engaging communities in jointly developing solutions for their housing needs.

RELEVANT POLICIES, STANDARDS, GUIDELINES AND REGULATIONS

Layout

- Urban Design Policy (2013)
- Summary Guidelines and Standards for the Planning of City of Cape Town Social Facilities and Recreational Spaces (3rd revision 2014)
- Design and Management Guidelines For A Safer City (2014)
- Floodplain and River Corridor Management Policy (2009)
- The Development Management Scheme (2015)
- Standard Operating Procedure Guidelines for New Developments Adjacent to Conservation Areas (2013)
- Framework for Resource Efficiency Criteria for Development in the City of Cape Town (Draft June 2015)

Stormwater

- Stormwater Management Planning and Design Guidelines for New Developments (2002)
- Stormwater Management of Slopes Adjacent to Natural Areas (2003)
- Management of Urban Stormwater Impact Policy (2009)
- Floodplain and River Corridor Management Policy (2009)

Water services

- Service Guidelines & Standards, Water & Sanitation Department (November 2013)

Electrical services

- Residential Electricity Reticulation Policy 2013
- Electrification Of Backyard Dwellings Policy (2014)
- Design Standards And Specifications For The Provision Of Public Lighting Services. (2007)

Streets and Roads

- Road Access Guidelines, 2002
- Minimum Standards For Civil Engineering Services In Townships (2013)
- Draft Parking Strategy and Policy Framework (2012)
- NMT Policy and Strategy (TCT 2005)
- NMT Facility Guidelines (DoT -2015)
- Universal Access Policy (2014)
- Traffic Calming Policy (Jan 2016)

Refuse / waste management

- Minimum Requirements For Vehicle Access / Waste Collection (2015)
- Standards And Guidelines For Refuse Room, Refuse Storage Areas (2015)

Buildings

- Smart Building Handbook (June 2012)
- National Building Regulations (SANS 10400)

Applicability

These directives are applicable to all human settlements projects carried out in Cape Town. They will also be used by City line departments in assessing and commenting on development applications, whether they be from other public sector organisations or private developers.

Deviations

It is important to note that deviations and exemptions from these directive for sound reasons will be considered. Designers are however encouraged to engage with the relevant line departments or asset owners during the design phase for direction and guidance.

This is particularly relevant for in-situ informal settlement upgrading projects as these projects require bespoke and often non-conventional solutions to minimise the displacement and the disruption of the social networks on which poor communities depend. Departures will generally be supported on the basis of a sound and rational argument and provided the performance criteria identified in 3.4 are met.

3.1 PROCESS GUIDELINES

1. Develop an understanding of how any particular project or site fits into the City's housing plan and what other potential projects (bulk infrastructure upgrades for example) are likely to be linked to the project.
2. Where public participation to inform the planning process is appropriate ensure that the participation process is designed in such a way that beneficiaries are aware of the factors that will influence the design and can make meaningful inputs into the decision making process. All public participation processes should be communicated to and endorsed by the beneficiary community.
3. Engage the beneficiary community where this is possible. Be transparent and communicate regularly and effectively.
4. Undertake detailed enumeration studies with the community to get an understanding of the community composition and needs. Maintain a land register to ensure that the needs of the community are understood and the nature of the project can be determined.
5. Undertake a basic due diligence study that must include an environmental scan, topographical and geo-technical study prior to developing a brief for the project.
6. Develop a strategic approach to all projects that takes into account differences within the beneficiary community, makes provision for relocations, ensures the integration of statutory processes (NEMA / land use) and considers phasing and temporary relocations.
7. Establish a Project Management Team (PMT) with representatives from all relevant City line departments prior to the start of the project to provide input into the terms of reference.
8. Hold PMT meetings at key milestones of the project to allow officials to provide input into the design process.
9. No plan or proposal should be presented to the beneficiary community without the endorsement of the plan or strategy by the PMT.
10. Work with other government departments (Education, Health etc.) and internal line departments to integrate capital and operational budgets so as to ensure that sites left open for community facilities and public open spaces are developed, secured and maintained.
11. When considering rental housing projects or multi-owner typologies consideration needs to be given to the long term operational requirements and financial implications for the City and beneficiaries.
12. The double occupation of properties by more than one beneficiary should be explored as a temporary measure to minimise displacement and disruption during informal settlement upgrading projects. Prior to considering such proposals it is critical that:
 - there is engagement and buy-in from the beneficiary community,
 - there is clarity on which beneficiary will eventually own the property,
 - the rights and obligations of the land owner and second occupant are respected,
 - it is clear what type of development may occur on the property and the time period for which double occupation will be acceptable.
13. Education and capacitation programmes must be planned and executed with beneficiary communities during the planning phase and prior to the occupation of the site to ensure that people clearly understand their rights and obligations as citizens of the city. Beneficiaries should also be equipped with some of the basic skills and knowledge that is necessary to manage and maintain their own properties and live healthy lifestyles. This should include handing over maintenance manuals, pre-approved buildings or advice on how to go about extending or adding to a property.

14. Where a development includes stormwater facilities or is close to a water system targeted programmes should be rolled out shortly after occupation and regularly thereafter to ensure that residents understand and come to value the function of such facilities within their neighbourhoods.
15. Post construction monitoring and evaluation programmes must be undertaken to measure the success of the any project so that lessons learnt can be applied to future project. Such programmes must be built into project budgets and should be undertaken at the following intervals after completion:
 - 12 months
 - 36 months (3 years); and
 - 60 months (5 years).
16. Especially where new and innovative technologies, construction methods are proposed a post-user occupancy survey must be undertaken to provide insight into what works and what does not.

3.2 DEVELOPMENT PRINCIPLES

The following principles must guide all human settlement project:

- 1. Avoid risk areas and sites of ecological importance** - Human settlements should only be planned where it is safe for people to live and where the integrity of natural systems is not undermined by development or through human activity. Flood plains, contaminated areas, servitudes and areas where residents would be subjected to severe health risks should be avoided.
- 2. Manage risk responsibly** - In the current socioeconomic environment it is unreasonable to expect all risks to be eliminated. This calls on the City to implement actions that ensure risks are identified and that reasonable steps are taken to ensure risks are minimised or eliminated where possible.
- 3. Integrate neighbourhoods and improve access** - New development areas must integrate effectively with their surrounding neighbourhoods, linking into surrounding street and utility networks and improve access to public amenities and services. Ensure that residents have access to alternative forms of transport, including public transport, so that they are able to access the opportunities and services available in the city.
- 4. Help build the compact city and plan for sustainable mobility** - new settlements must be planned around access to public transport and other sustainable modes of transport and achieve the density thresholds to support economic activity.
- 5. Focus public investment on public infrastructure** - In the context of scarce resources the City's role needs to be focused on providing that which individual households are not able to provide on their own. This typically includes the provision of bulk infrastructure, formal streets and public facilities.
- 6. Prioritise functionality and quality above quantity** In the provision of public facilities and infrastructure it is important that all facilities are functional. The provision of fewer high quality facilities that serve the needs of the community and can be maintained by the City is more important than dogmatically complying with standards based on quantitative thresholds.
- 7. Variety** - New developments should include a variety of land uses, plot sizes, building types, streets widths and public spaces.
- 8. Resilience, adaptability, flexibility and freedom** - All development parcels should be able to accommodate different types of buildings, accommodate change and allow beneficiaries to invest in their properties as they see fit. Prescriptive designs should be avoided.
- 9. Provide security of tenure** - Beneficiaries must have security of tenure to ensure that the investment they make in their buildings and property is secure and transferable.
- 10. Promote incremental densification and second dwellings** - Utility services and land parcels should allow for intensification and densification over time. All sites should allow for second dwellings as these are critical for accommodating the needs of growing families and help to supplement household income with income generated from the rental units.
- 11. Incremental compliance** - given the limited financial resources available to low income households it must be accepted that it will not be possible to comply with all regulations, norms and standards from the outset. There needs to be a shift from "compliance" to "fit-for-purpose" and the types of solutions adopted should allow for beneficiaries to comply with norms and standards over time.
- 12. Create healthy living environments** - It must be ensured that the places where people live are not harmful to their health and that adequate provision is made for natural light and ventilation.
- 13. Achieve greater resource efficiency** - Proposals must seek to achieve greater resource efficiency, both in terms of energy and materials. This applies to both during construction as well as post-construction operations and management. Assessments should be carried out to determine what is most cost effective to beneficiaries and the City over the long term, considering all life cycle costs.

3.3 GENERAL PROVISIONS

1. Where it is safe to do so, upgrade informal settlements in-situ and deliver urban house typologies to achieve higher densities to minimise relocations.
2. All new human settlement projects larger than 2Ha should include a proportion of incremental housing (minimum 30%).
3. Ensure adequate access to public transport in the long term and plan for sustainable transport modes.
4. An assessment must be made during the planning phase of the project to determine the types of public facilities that would be required for development of a socially sustainable community where the immediate needs of the residents are met within 800m from where they live or by public transport. (See section 3.9)
5. Sites must be set aside for commercial and nonresidential uses within the new settlement. When considering the scale and location of such sites consideration needs to be given to the location of the property within the urban network and the scale of development that could be developed by the private sector. Processes must be put in place to ensure that these sites are allocated or released to the market within a reasonable time frame.
6. Layouts must achieve a minimum gross density of 50du/Ha (or 150 persons/Ha)
7. The layout must demonstrate an efficient ratio of development area to circulation. No more than 30-35% of the land budget should be allocated for circulation / road reserves.
8. The implications of design decisions on long term operations, maintenance and management must be taken into account during the design process. Maintenance manuals must be developed for the development as a whole as well as for individual pieces of public infrastructure.

3.4 PERFORMANCE CRITERIA

While there are different means of delivering housing all development proposals must:

1. Reduce public risk by:

Avoiding areas at risk of flooding

Avoiding man-made risks (polluted stormwater systems etc.) and conflicts (power lines, conflict areas between road users etc.)

Ensuring access for emergency services

Preventing the spread of fire

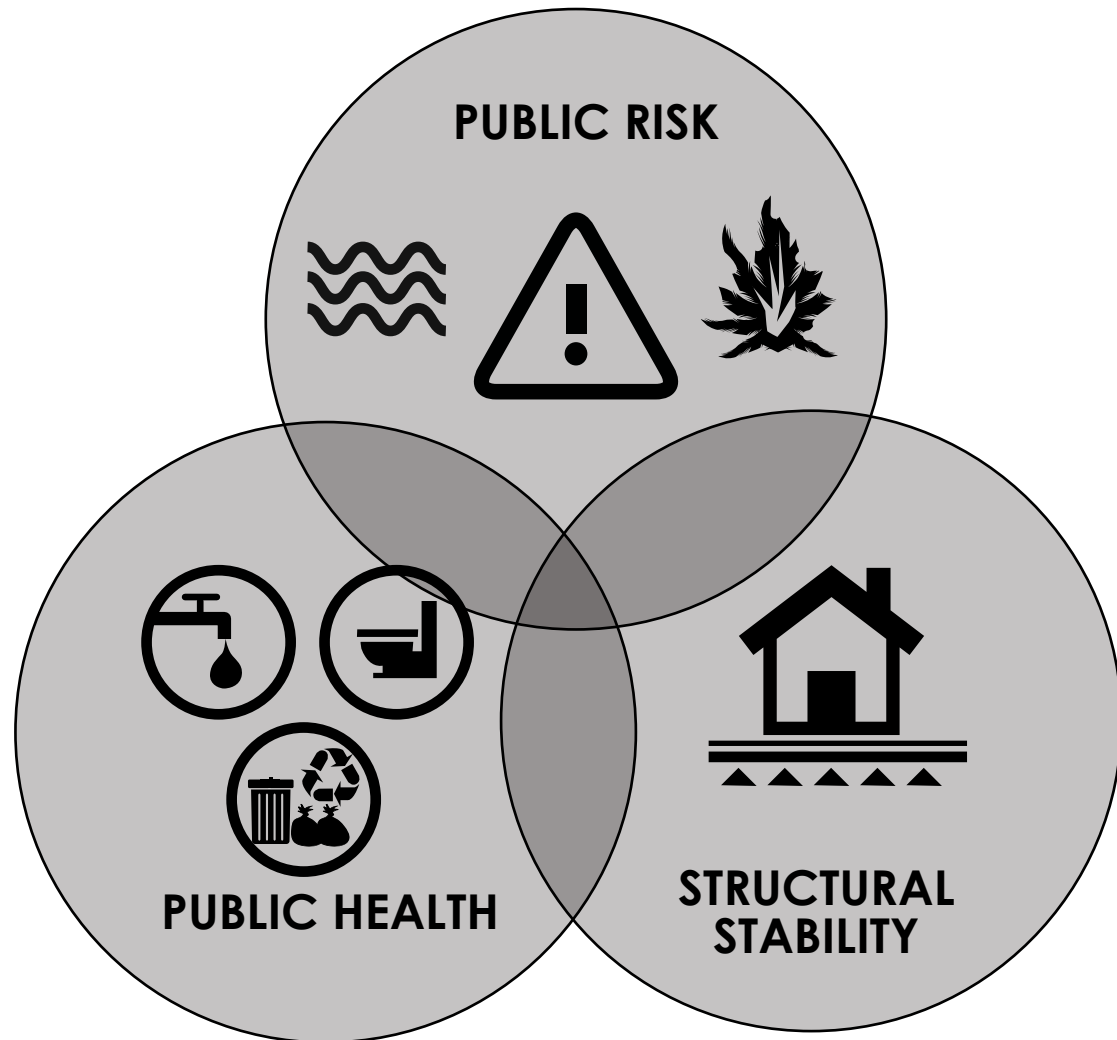
2. Ensure public health by:

Providing access to sanitation and basic services

Ensuring adequate light and ventilation to habitable rooms

3. Ensure structural stability by:

Providing the structural preconditions from which to start the construction of a house.



3.5 MINIMUM LEVELS OF SERVICE

As a minimum the developer must provide:

1. A complete, dignified and well managed public environment. This is defined as an urban street that is surfaced for the entire width of the road reserve, is regularly maintained and equipped with street lightning.
2. A self draining site with access to formal stormwater services located in the road reserve that is connected to on site or regional attenuation facilities and other stormwater infrastructure.
3. One 40AMP electrical connection per plot with the municipal network designed to meet the demand of up to 3 dwelling units per property (where sites are smaller than 100m² (400du/Ha)) and with an additional dwelling unit for every additional 50m² of site thereafter. The electrical design must allow for multiple meters within the plot(1 per dwelling unit).
4. One water connection per plot with the network potential to meet the demand of up to 3 dwelling units per plot (where sites are smaller than 100m² (400du/Ha)) and with an additional dwelling unit for every additional 50m² of site thereafter.
5. One formal connection to the waste water system with the sewer network able to meet the demand of up to 3 dwelling units per plot (where sites are smaller than 100m² (400du/Ha)) and with an additional dwelling unit for every additional 50m² of site thereafter.
6. An incremental starter structure consisting of:
 - A wet core (composed on an enclosed toilet, hand wash basin - plumbed with cold water, an open gully and foul sewer connection);
 - A party wall (to reduce fire risk and ensure structural stability),
 - A floor slab with foundation walls that are able to support a building of 3 stories (to ensure a dry and sound footing)
7. Direct vehicular access to the property for 70-80% of properties.
8. Access to a solid waste service within 20-40m of the housing unit.

*Where double occupation of a property is considered as a short term measure each property must have a single connection to the municipal mains and multiple meters must be provided, one to each household.

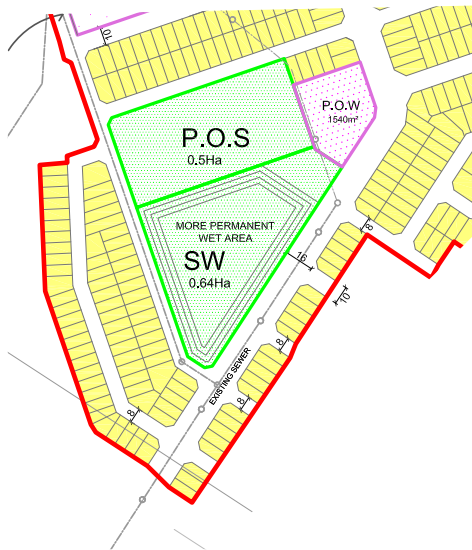
3.6 STORMWATER DESIGN

1. Develop a regional / site wide approach to stormwater management and seek to develop solutions to stormwater management at the scale of the catchment area and in accordance with the City's stormwater masterplanning.
2. Start the design process by developing a clear understanding of the topography of the site and how natural drainage works.
3. A Stormwater Management Plan must be produced which takes cognizance of applicable stormwater, policies, masterplans, guidelines and by-laws, and must be approved by the City's Stormwater and Sustainability Branch. This plan should not create an additional stormwater management burden on the City or expose residents to undue flood or pollution risk.
4. Avoid creating low points and eliminate trapped lows that cannot be drained naturally.
5. Stormwater attenuation areas must to be provided within the broader site for sites over 4000m² as required by City Policy.
6. Develop stormwater solutions that are easy to maintain. In some situations closed, consolidated systems that include dry ponds that require less maintenance are preferred to open systems such as swales and open channels which can become a public health risk due to solid waste and polluted grey water deposition.
7. Overland stormwater escape routes must be planned for.
8. Stormwater quality management should ideally be dealt with within the development. Where this is not practical stormwater quality can be managed with off site provided these regional facilities are built / upgraded as part of the housing project and form part of a catchment wide stormwater management masterplan.
9. Alternative designs for attenuation and infiltration within the road reserve can be considered but these should not increase the maintenance burden to the City.
10. The co-location of stormwater facilities and public open space or public parking courts is encouraged.
11. Channels and retention areas must integrated into the landscape plan of parks as positive / multi-functional amenities.
12. A detailed landscape plan of all facilities must be submitted for approval.
13. Stormwater conveyance, attenuation and treatment facilities with standing water must be designed carefully to adhere to the National Health and Safety legislation in order to ensure a safe environment, prevent drowning, discourage illegal dumping and facilitate operation and maintenance activities. Physical barriers such as bollards must be installed to discourage illegal dumping, infilling and inappropriate settling.
14. Where swales or sustainable urban drainage are provided that run alongside a street these should form part of the road reserve and should not be zoned open space.



Before beginning the design process develop an understanding of the topography and how water currently flows / moves across the site

15. "Maintenance Management Plans" (maintenance manuals) must be developed for all stormwater facilities. Such MMPs must be approved by the relevant department and handed over prior to the completion of the project.
16. Service level agreements between the different departments who may play a role in maintaining the facility (City Parks, TCT and Solid Waste) must be signed off prior to implementation. The continuation of linear or linked open spaces associated with the stormwater network must be ensured.
17. Sites that are earmarked for development must be graded / sloped / raised to ensure that storm water flows into the street. When appropriate (such as on steeply sloping sites) formal connections to the storm water network in the road reserve should be provided.
18. Floodlines (1 in 50 year) should be physically and visibly demarcated on development sites that may be exposed to flood events to ensure that residents can take appropriate action in the event of such floods.



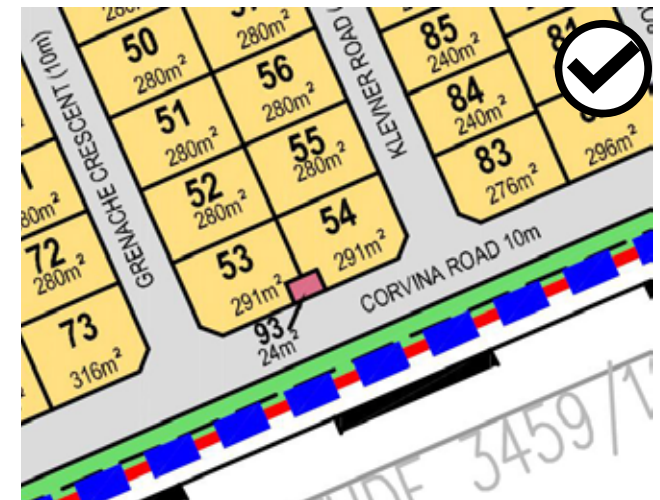
The integration of stormwater facilities within public open spaces is encouraged, but care needs to be taken in how the spaces are designed. Management agreements need to be entered into between various departments to ensure that the facilities are effectively maintained. It is essential that the properties that surround these spaces provide a positive interface with the park or stormwater facility and that the location of the facility does not compromise the functionality of the park.

3.7 INFRASTRUCTURE AND SERVICES

1. The ultimate design density of the development must be determined up front and infrastructure designed appropriately.
2. Utilities networks must be designed for incremental growth and intensification. It is recommended that the services should be designed to support a net density of 1600 persons/Ha or 400du/Ha over within those areas designated for residential development.
3. Integrate the bulk engineering design and layout into the design process (for all services - water, waste water and electricity) and ensure that adequate provision is made for larger elements of infrastructure such as transformer stations, electrical substations and pump stations.
4. Ensure that the street layout responds positively to the existing topography, that the site is self draining and that gravity related services predominate.
5. Minimise the need for pump stations, manholes and junctions.
6. Investigate the use of recycled and renewable materials for road base courses and retaining structures (geotextiles and natural fibres).
7. Unless services can be accommodated safely and attractively within the road reserve, separate erven should be created for utility services and zoned for utility services.(pump stations, electrical substations).
8. Avoid locating utility services (pump stations, substations etc) on public open space where they can compromise the functionality of the space.
9. Avoid locating utility services (pump stations, substations etc) on street corners.



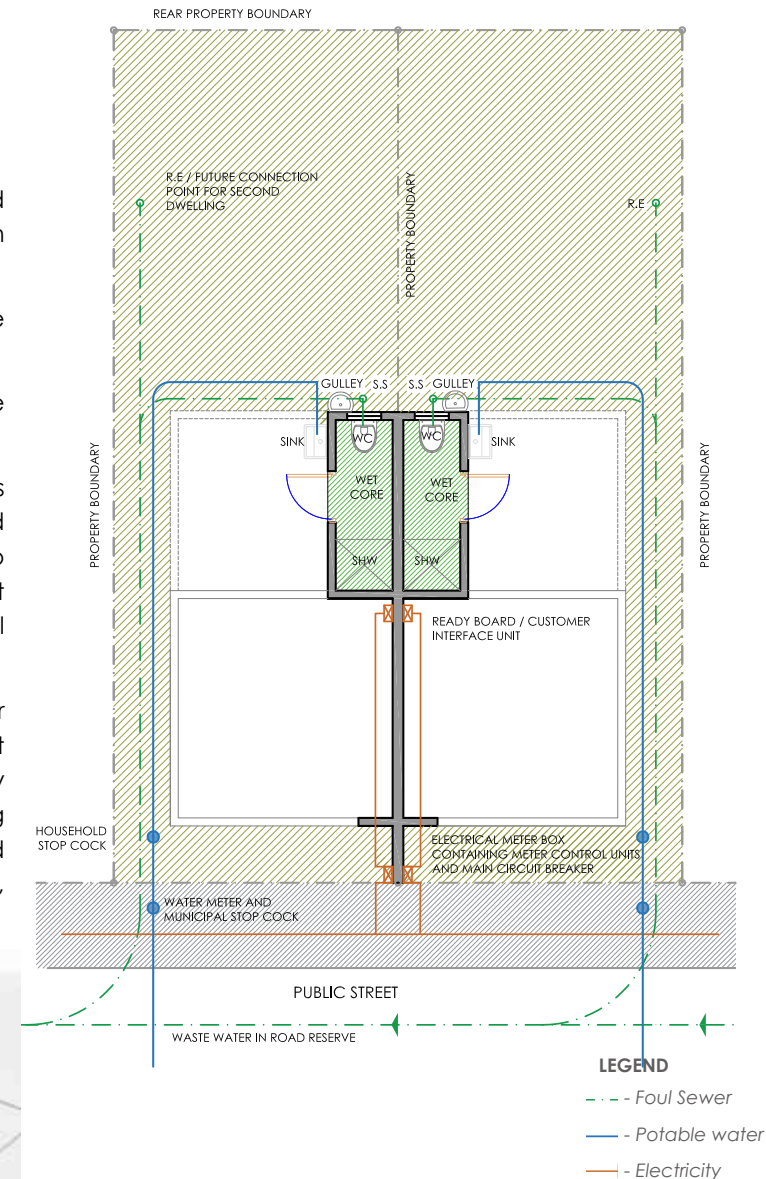
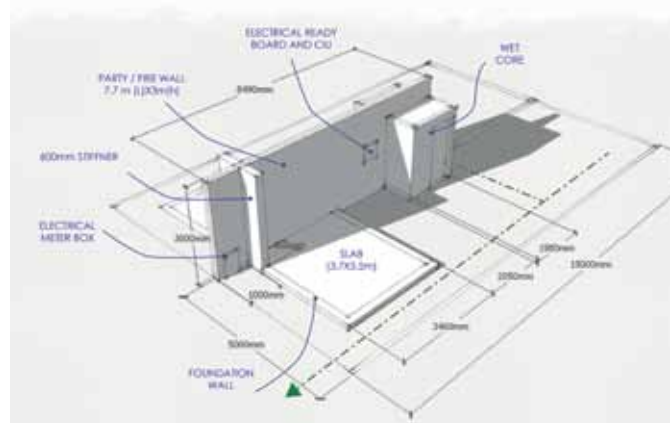
Avoid placing substations on public open space as this undermines the functionality of these spaces as amenity spaces and recreational areas



Substation sites should ideally not be located on corner sites but rather within the urban block and at a mid-point where they can serve multiple directions.

10. Mid-block servicing and servitudes across private properties is not supported.
11. Wet services (potable water and waste water connections) should generally be located in the centre of the property so as not to limit future development. This will make it easy and safe for additional connections to link into the formal utility network when required.
12. Conduits for telecommunication and fibreoptic cables must be included in the road reserve.
13. As a rule of thumb one substation site (5x3.5m) must be provided for every 100 to 150 properties.
14. Electrical sub-stations should be located as close to intersections as possible to allow them to service in multiple directions, but not on the street corner.
15. All electrical cables should be underground and substations should be ground-mounted.
16. Provision must be made within / directly adjacent to the road reserve for distribution kiosks (as a rule of thumb provide 1 kiosk for every 8-12 properties).
17. Provision must be made in the electricity network design and meter box layout for the maximum agreed number of dwellings per site.
18. Each property must be provided with one electrical connection with a single circuit breaker to the site.
19. Multiple electrical meters may be provided on the property for second dwellings or tenants at a later date or as part of the project provided there is only one connection to the property.

20. Customer Interface Units (CIUs, or keypads) should be installed in each dwelling at its main distribution board or next to the readyboard.
21. Meter Control Units (MCUs) should be installed in the centralised meter box on the street boundary.
22. Water meters must be located in the road reserve where they are accessible.
23. When non-conventional, sustainable technologies and services are proposed and implemented, and where their failure could potentially create a risk to the health and wellbeing of residents these must be backed up with connections to traditional civil engineering services.
24. As-built drawings of all utility installations together with their instruction and maintenance manuals as must be provided to and verified by the relevant utility department prior to sign off and transfer. This drawing package must include a digital geo-referenced drawing in GIS format locating all utility lines, substations, manholes etc.



THE LOCATION OF SERVICES WITHIN THE SITE

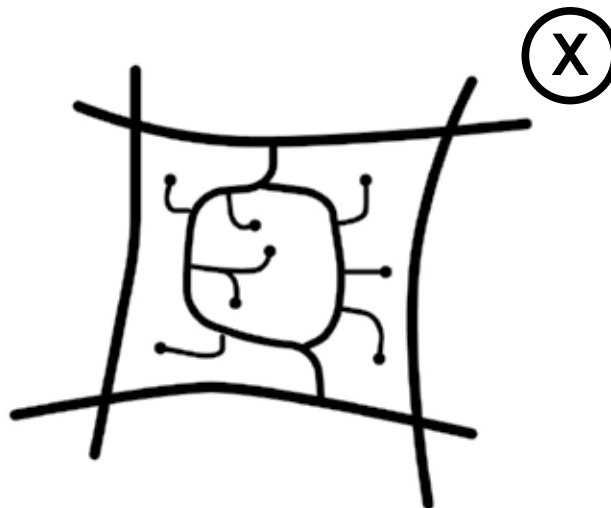
The utility connections to the plot should enter the property from the public road reserve with circuit breakers and municipal stock cocks accessible from the road reserve. The wet core and sewer connection should ideally be located in the centre of the property / plot to provide the household to extend or move services around with the greatest of flexibility.

3.8 STREET DESIGN GUIDELINES

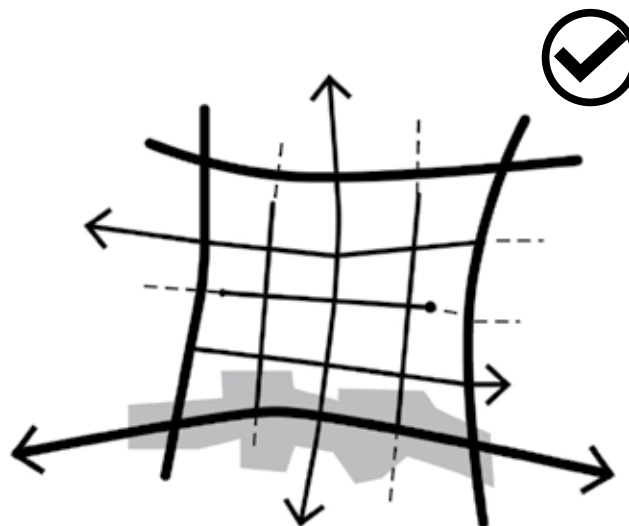
Streets must be designed intentionally to provide structure, create a sense of place, provide access, ensure safe and efficient movement, convenient parking and to act as conduits for utility services. In particular:

PLACE AND STRUCTURE

1. Understand the nature of the streets that are being created. Take into consideration: the types of land uses and activities that will be located alongside them, the types of people who will use them, the role of the street within the broader city street network and the mobility function it will need to fulfil.
2. The street network should create a clear structure to the neighbourhood and contribute to the neighbourhood's unique sense of place.
3. Ensure that the width of the road reserve is sufficient to accommodate its particular requirements. (See standard street widths)
4. Overly complex, convoluted and discontinuous street networks should be avoided.
5. Streets must be designed as flexible spaces that are able to accommodate a range of uses, users and activities.
6. Streets must be designed to be safe for all road users and buildings should look onto and define the street.
7. The road reserve must be treated as a complete environment with quality durable materials, details and finishes. Soft verges are to be avoided unless these have a specific function and were the road reserve width allows.
8. The road reserve should be defined clearly and simply. Irregular street boundaries (small steps or recesses) should be avoided;



Avoid discontinuous street layouts that become circuitous as these make orientation difficult and limit permeability for pedestrians and NMT users.



Ensure that the layout the street network creates an ordered and legible street network that responds and distorts to local contextual conditions. The grid network should create different levels of permeability for different road users to ensure convenience and promote sustainable modes of transport.



Ensure that the entire road reserve is delivered as a complete street from boundary line to boundary line

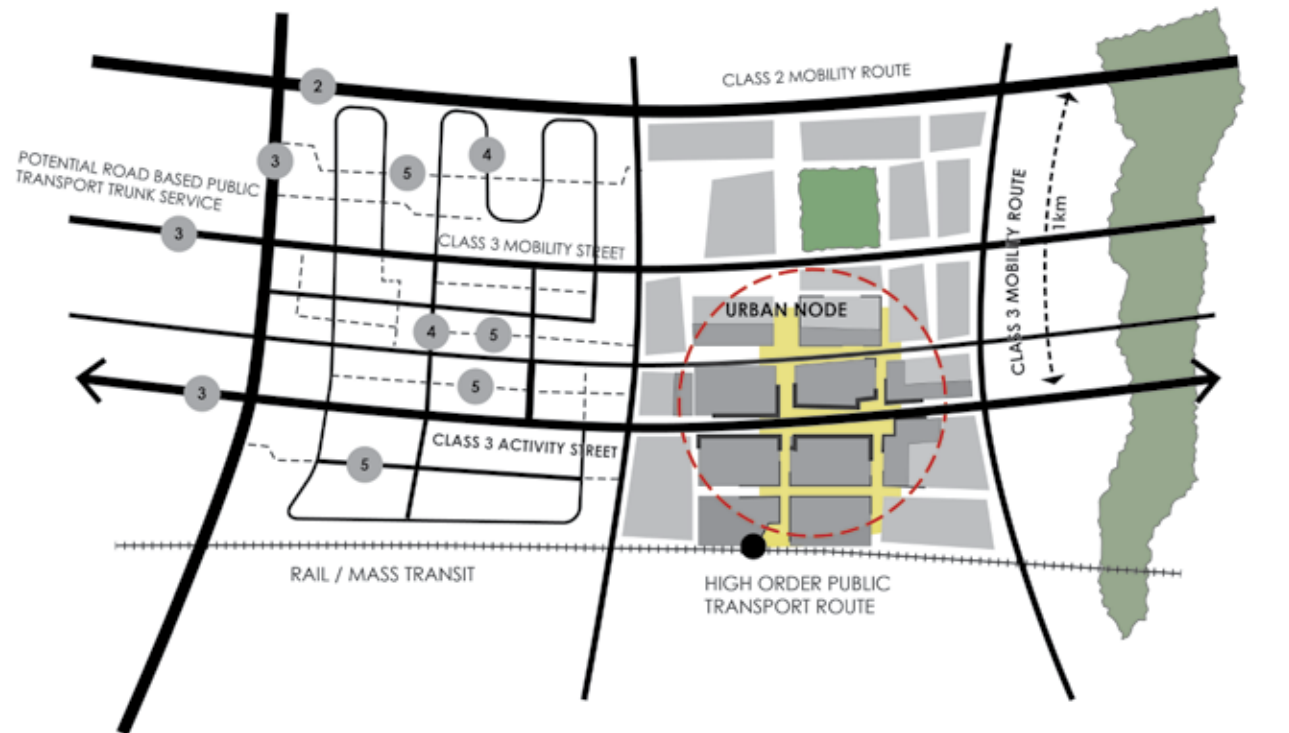


Where possible orientate streets to pick up on existing and future local landmarks and public facilities. This helps create a sense of place with orientation.

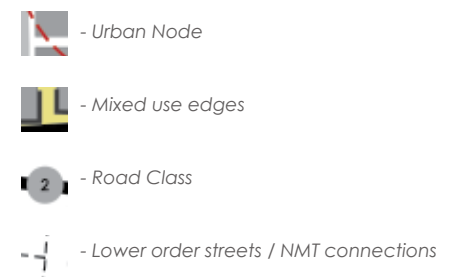


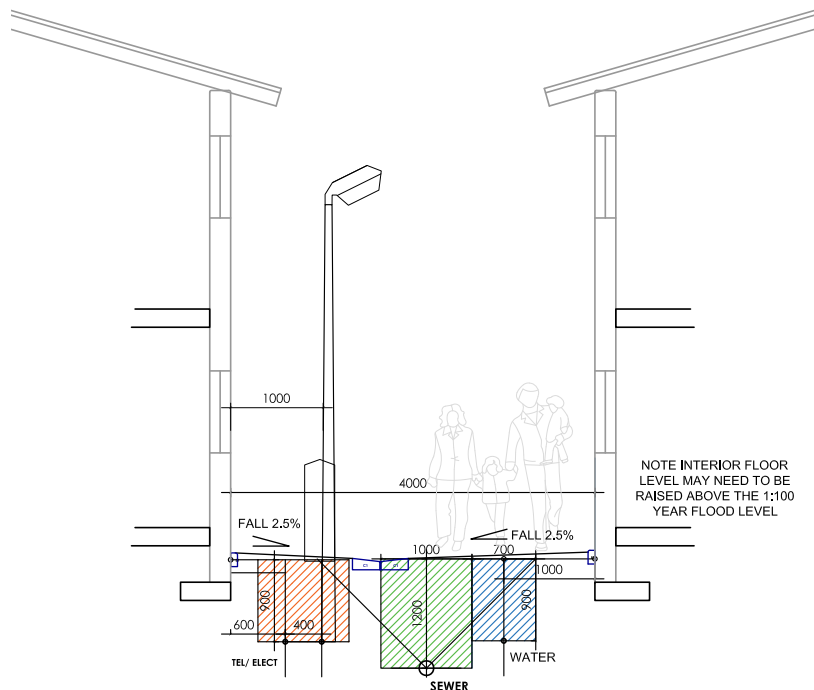
Most residential streets should be designed as shared / pedestrian priority environments with trees and parking helping to negotiate the spaces.

9. Most road reserves should be 8m wide and be treated as shared spaces / pedestrian priority environments.
10. Where there is a mix of formal top structures and incremental housing the formal top structures should be located along the main structuring routes to define the public realm.
11. Where 4m wide pedestrian lanes are proposed properties should be arranged to take access directly from these streets and buildings must overlook these spaces with doors and window from habitable rooms.
12. Keep the road reserves as narrow as possible and widen them at key points to accommodate other bus stops informal trade and other uses.
13. Provide splays at major intersections where sight distances are critical. (Typical splay dimensions are 3, 5 or 7m).
14. In low order residential environments, shared spaces and along pedestrian only lanes where the intention is to discourage speeding and create negotiated spaces square corners are acceptable, provided services can be adequately accommodated.
15. Open spaces should be surrounded by streets or footways to ensure that they are overlooked and that their edges are activated.
16. Look to include street trees within the road reserve to mitigate the impacts of climate change
17. Impact planting with signature trees (mature 200L trees) at strategic places is preferred to tree lined streets.



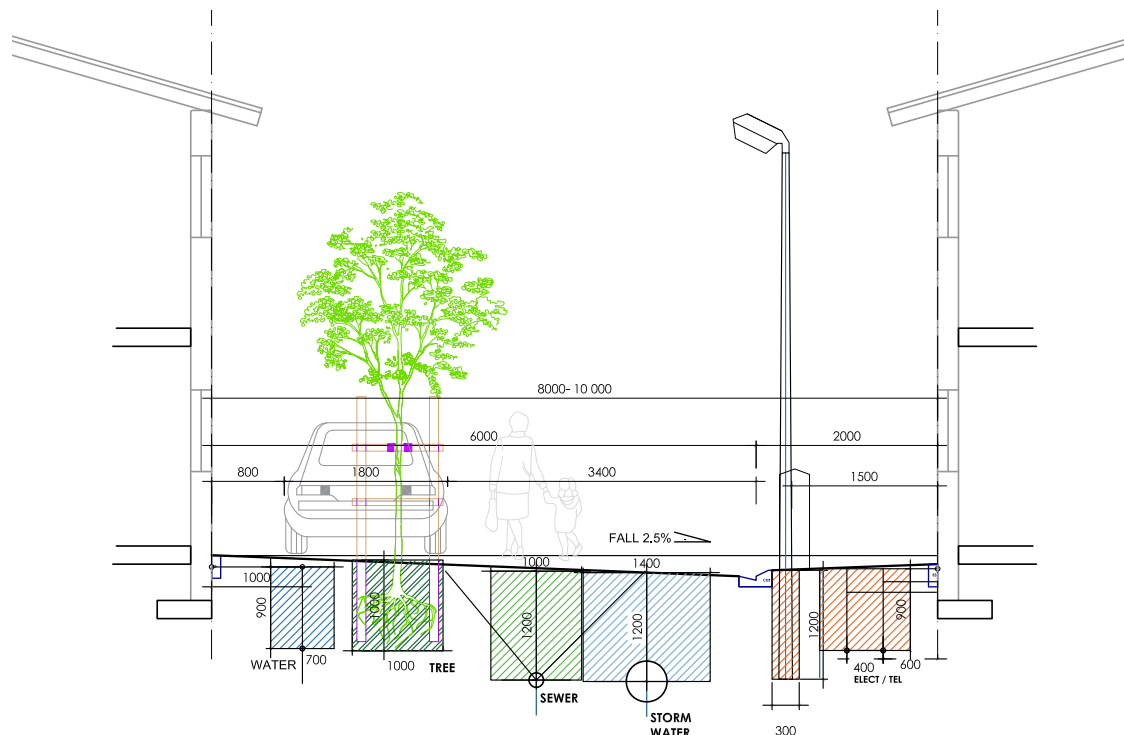
When planning a new development area it is critical to understand how the site fits into the existing and future road network. As far as possible the street network should be arranged into an open grid network with mobility routes supporting urban nodes and activity streets. It is essential to consider the nature of each street and connection, taking into consideration the land use / urban function as well as the mobility function. In all planning it is essential to consider both road and rail based public transport and ensure the continuity of activity routes and ensure that nodes are supported by public transport infrastructure





4m

Proposed typical 4m wide pedestrian lane



8-10m

Proposed typical 8m wide multi-functional street

* Variations of this street section of between 8 and 10m will be considered where appropriate

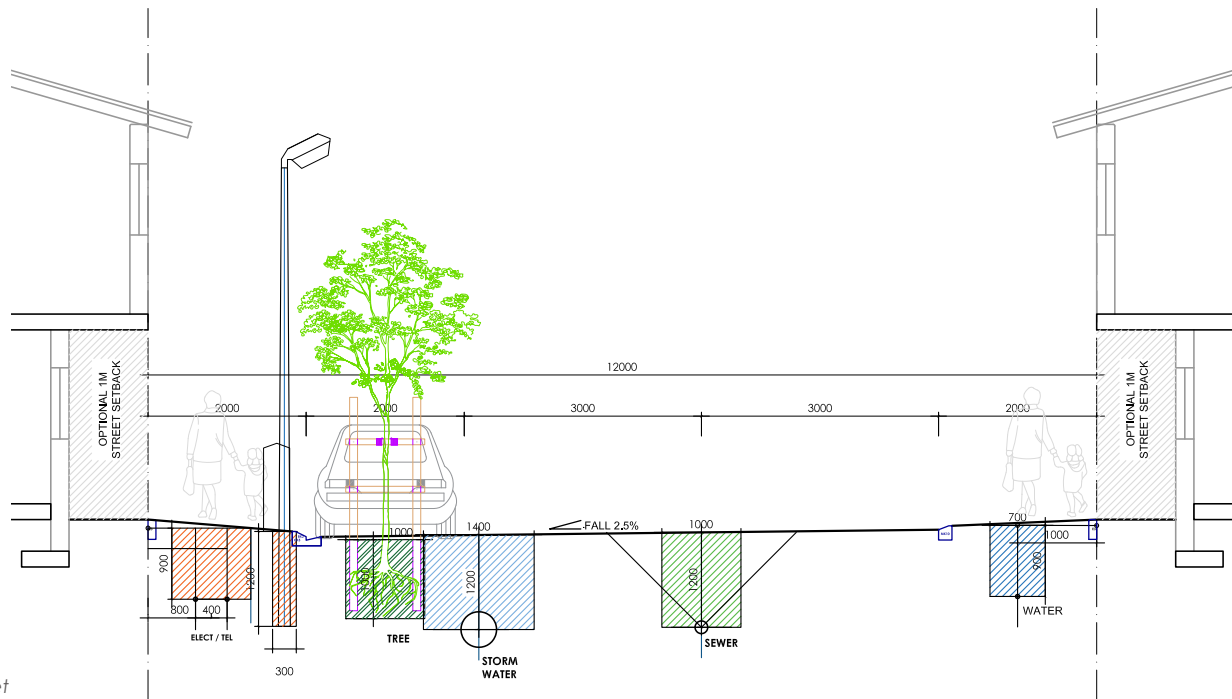
* Note: For material standards, technical specifications and performance criteria please refer to the latest version of the Minimum Standards for Engineering Services in Cape Town available from TCT

Typical road reserve widths

Reserve width	Class	Description
40-25m	2/3	Major distributors / IRT trunk routes with dedicated NMT facilities (preferably segregated Class 2 facilities). Cross sections to be agreed with TCT based on the role of the street and Road Access Guidelines
20m	4	High order streets accommodating public transport and class 3 NMT facilities.
16m	4/5	Allows for on street parking, tree planting and 2m wide pavements.
12m	4/5	Allows for 2m wide formal sidewalks on both sides of the street and on-street parking on one side of the road.
8-10m	5/6	Should comprise the majority of streets within a settlement - the minimum width can vary from 8m minimum to 10m where required to accommodate services and should be multifunctional in nature.
4m	6	Pedestrian only lanes should only provide access to 30% of properties.

MAJORITY OF ROADS IN HUMAN SETTLEMENT PROJECTS ARE LOWER ORDER STREETS

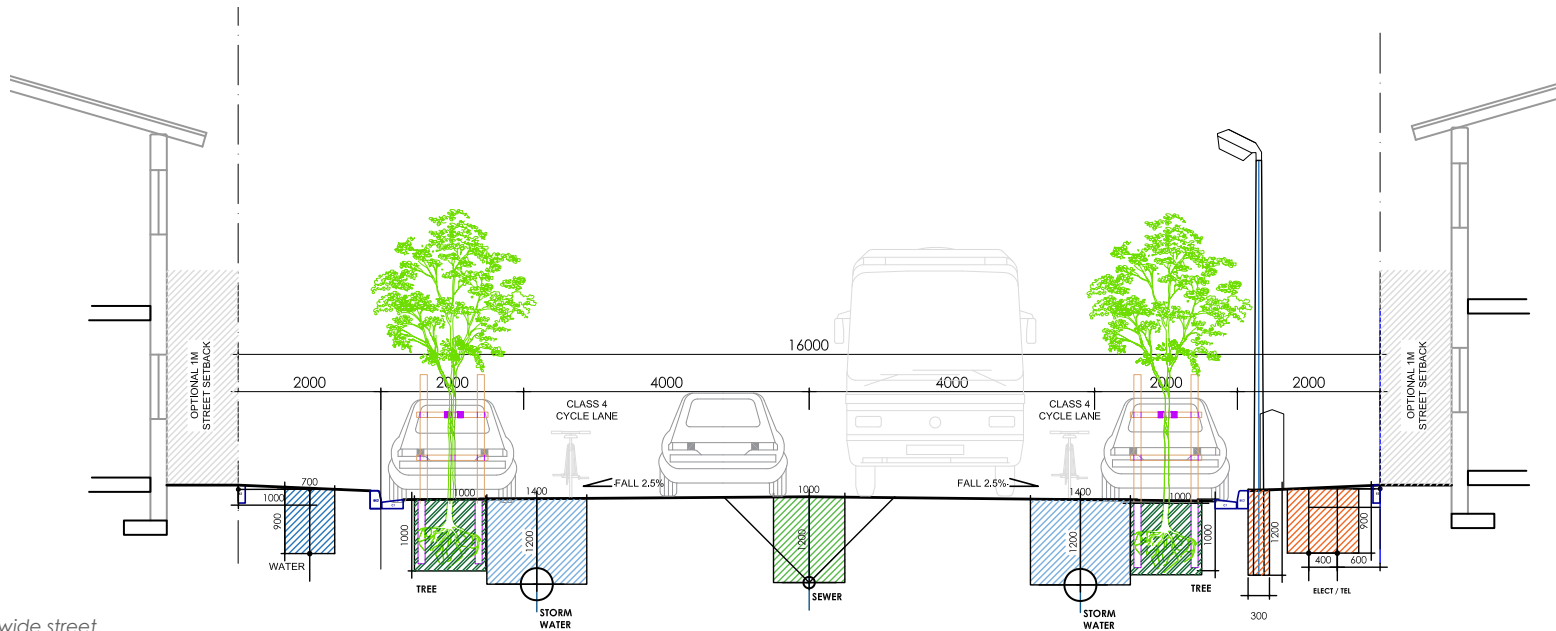
12m



Proposed typical 12m wide street

Allows for formal roads, 2m wide pavements and on-street parking on one side of the road

16m

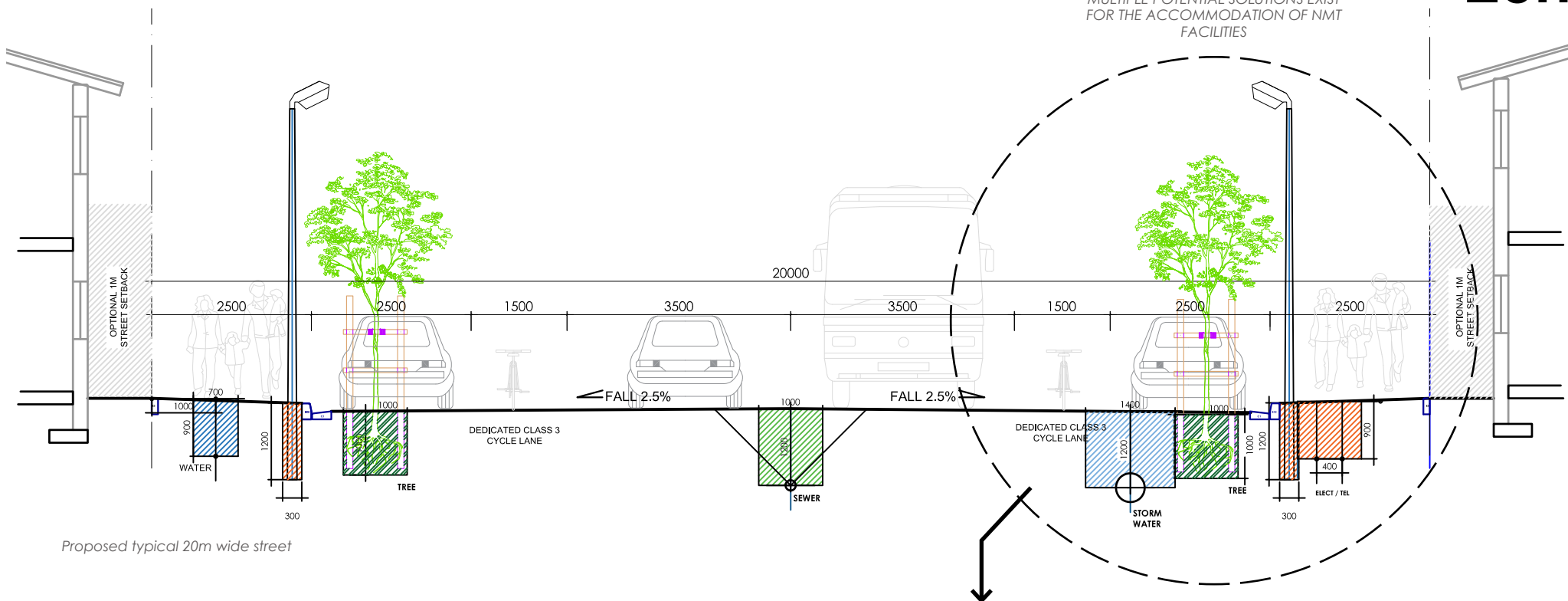


Proposed typical 16m wide street

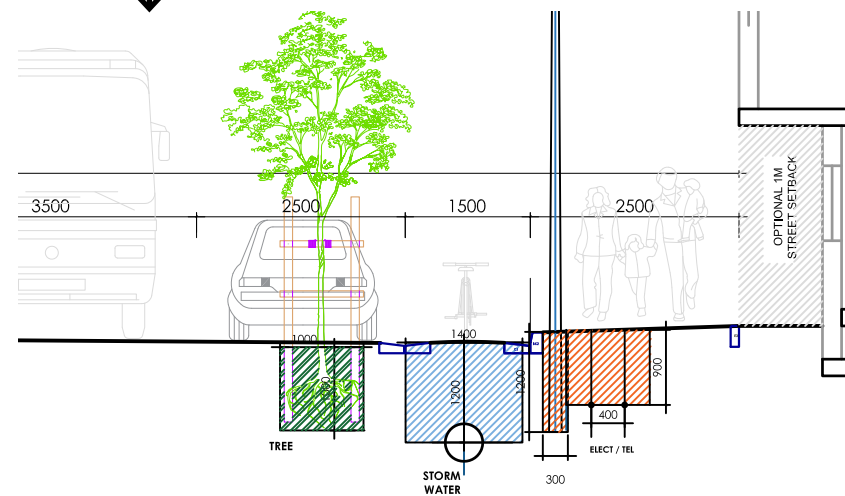
- allows for on street parking, tree planting, non dedicated cycle lane in the road reserve and 2m wide pavements

20m

MULTIPLE POTENTIAL SOLUTIONS EXIST FOR THE ACCOMMODATION OF NMT FACILITIES



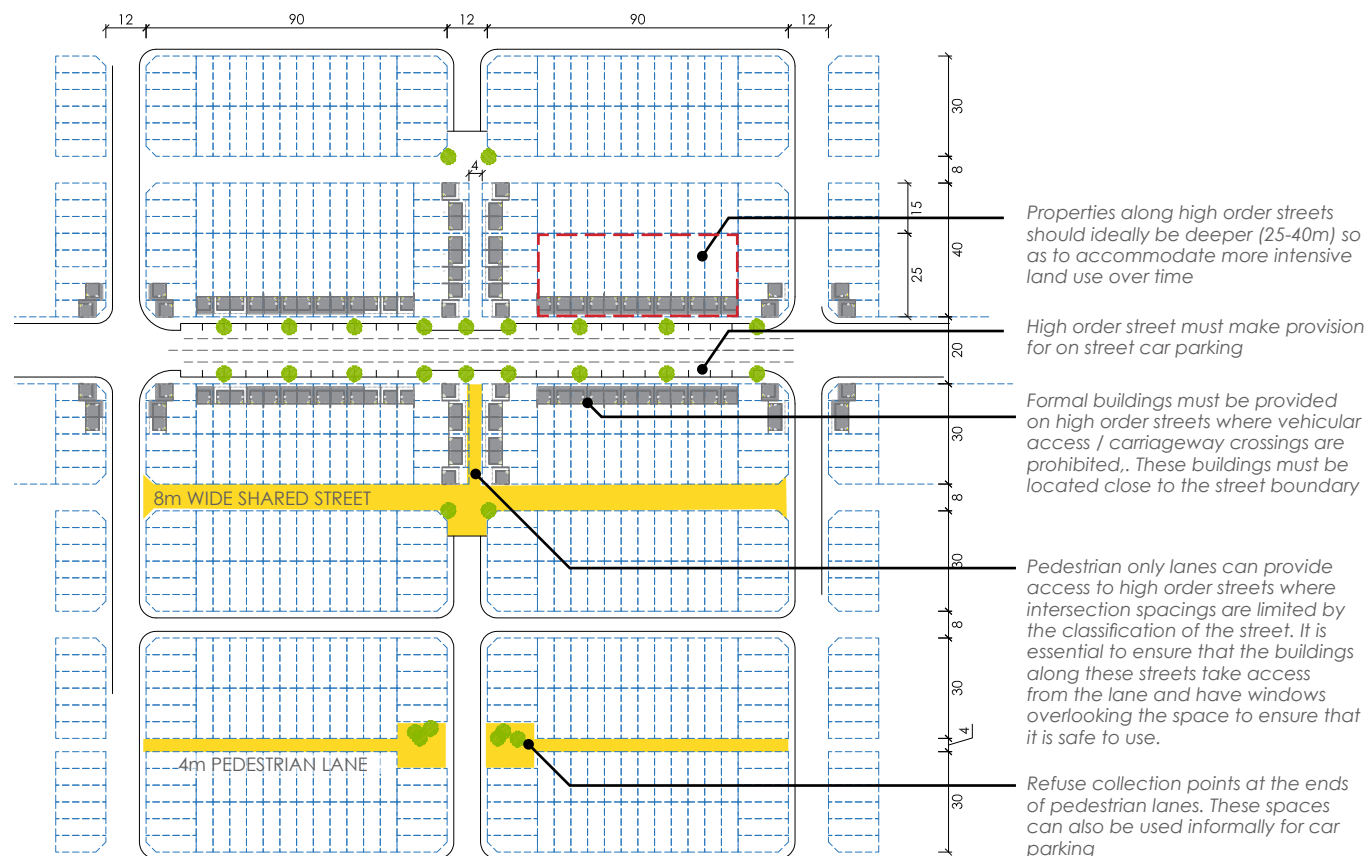
Proposed typical 20m wide street



Alternative arrangement with a protected bike lane (this alternative is appropriate where intersections spacing are long and where there are limited carriageway crossings)

ACCESS

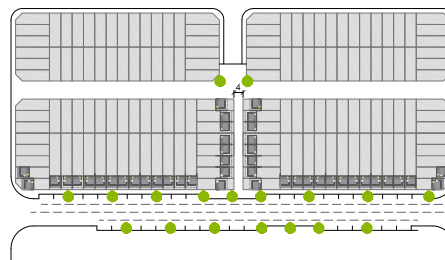
18. Ensure adequate access for emergency services and service vehicles. As far as is practical ensure that refuse vehicles are able to travel in a continuous forward motion.
19. Link the proposed street network into the existing surrounding street network and accommodate existing and anticipated pedestrian desire lines.
20. All streets should provide universal access and be designed to facilitate access for those with disabilities.
21. Avoid gradients over 1:10 (10%).
22. Ensure that between 70 and 80% of properties are accessible by vehicle.
23. Where the road section includes barrier kerbs these should allow for the safe turning of refuse vehicles. Standard radii are 2, 5, 10 and 15m.
24. Carriageway crossings to individual properties must be provided as part of the development. The approval of additional crossings is at the discretion of TCT and the District Manager (PBDM).



An example of street grid within an incremental development area with varying street widths accommodating the needs of all road users

25. Direct vehicular access to properties along Class 2 and Class 3 Streets will not be permitted unless these comply with the Road Access Guidelines.
26. Formal top structures must be built on those properties adjacent to higher order roads (Class 2 and Class 3 streets or where otherwise deemed appropriate). These houses must be located as close to the street boundary as possible to define the street and will not be permitted vehicular access from the road reserve unless it is safe to do so. The houses should also address the street positively with windows overlooking the street. Barrier kerbs and other obstacles (trees, streetlights etc.) should be installed along the road reserve to prevent and discourage informal access. On street parking in these instances should be considered (apart from on Class 2 Streets) and pedestrian access from the house onto the street is encouraged.
27. Pedestrian access to properties via 4m wide pedestrian only lanes is acceptable. Such lanes should be no longer than 90m to ensure that man holes can be inspected and adequate access for emergency services. The placement of street furniture and buildings should prevent / discourage vehicular access into these streets.
28. A 2m wide pavement should be provided on all streets wider than 8m, on both sides of the street.
29. When laying out nonresidential sites consider the servicing requirements of future buildings and how car parking will be provided within the site.

POTENTIAL ACCESS ARRANGEMENT AND BLOCK LAYOUTS ALONG HIGH ORDER (CLASS 3 STREETS)



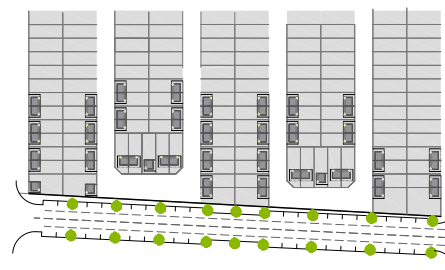
Plots front onto the street but no vehicular access is permitted. Parallel parking may be provided on street.



Plots fronting onto high order roads access via pan handle. Parallel parking may be provided on street.



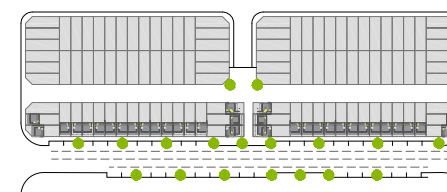
Plots fronting onto high order roads access via cul-de-sac. Parallel parking may be provided on street.



The arrangement of blocks allow for short service roads along high order street allowing for circulation of larger vehicles within the development. Barrier kerbs, bollards and trees can be used to restrict illegal vehicular access from the minor streets onto the high order streets



If it is not possible to use any of the above layouts alternatives long narrow plots may be provided but the urban block must be at least 30m deep and buildings must be built on these site within 1m of the rear street boundary (along the higher order road). This will allow such sites to accommodate more intense urban development.



Narrow blocks along high order streets should be avoided but if these are necessary formal buildings must be built on these site within 1m of the rear street boundary (along the higher order road) and the buildings must have windows overlooking the street.



MOVEMENT

30. Prioritise NMT modes and the use of public transport as the primary means of transport.
31. Develop a strategy for the incremental roll out of public transport services and ensure that sufficient provision is made for facilities (such as taxi ranks and embayments) with the new development area.
32. The street network must create a road hierarchy to ensure access to all parts of the development and provide sufficient distribution of traffic onto and from the metropolitan road network.
33. The street network must be intentionally designed to discourage speeding and unsafe driving behaviour without the installation of speed calming measures.
34. Control measures at intersections must be designed to deal appropriately with current and anticipated future traffic volumes without the need for redesign.
35. As a general rule streets should either be 4m wide pedestrian lanes (prohibiting access by vehicle) or 8m wide facilitating vehicular access and movement.
36. 8m wide vehicular streets may be narrowed or pinched down to 5.5m in select places to manage traffic flow, but this should not be for longer than 15-20m.
37. Plan the NMT network up front and secure appropriate road reserves for NMT facilities.
38. NMT routes should be continuous, with proper indication of the intended way to integrate with other traffic where dedicated routes end.
39. Where dedicated NMT facilities are provided it is necessary to consider bi-directional movement and future desire lines.
40. Dedicated NMT facilities must be provided along higher order mobility routes. It is therefore important to ensure that these can be accessed at regular intervals.
41. The street network must allow for the penetration and circulation of public transport services.
42. Plan the width of the road reserve by considering both adjacent land uses and future levels of traffic.
43. Ensure good sight conditions at busy intersections and avoid creating intersections with an angle of less than 70°.

ON-STREET PARKING

44. The street network must be designed to accommodate on street parking where it is likely to be needed. This may require the widening of the road reserve in select locations.
45. When off street parking is not provided provision must be made for on-street parking formally or informally in the road reserve at a ratio of 1 parking bay for every 4 residential properties across the development.
46. On-street parallel parking must be provided along wider road reserves and where properties are not permitted to have carriageway crossings.
47. Public parking courts should be avoided. Where there is a need to increase the amount of on-street parking the road reserve should be widened at specific points to include different types of parking (perpendicular / 45 degree parking).



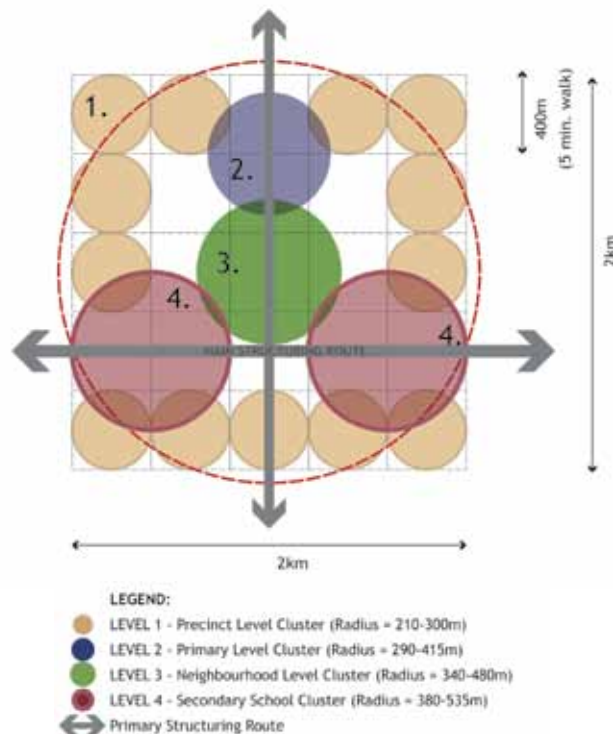
Different ways of accommodating on street parking.

UTILITIES AND STREET LIGHTING

48. Design streets and the street network as a conduit of stormwater that directs rain water into detention and attenuation areas.
49. Investigate sub surface stormwater quality management solutions within the road reserve (such as permeable paving and infiltration strips).
50. Road reserves must be wide enough to accommodate all services (stormwater network, potable water reticulation, sewer reticulation, electrical reticulation, street lights, telecommunications network services) below ground.
51. Road reserves should be wide enough to get access to and maintain services without risk of damage to adjacent properties or other services.
52. Fire hydrants must be provided in accessible locations and in positions that ensure adequate coverage for fire hose reels.
53. The location of services within the road reserve must take into account the likelihood that buildings will be built right up to the street property boundary.
54. Where there are curves in the street network seek to achieve straight runs between man holes of 60-90m in order to be efficient.
55. Substations, minisubs, pump stations and other control boxes must be located in a manner that does not undermine the quality of the public realm, create blind spots, entrapments spaces or create an obstacle / nuisance within the road reserve whilst at the same time ensure efficiency of service provision. Ideally these should be located outside the road reserve and on separate erven.
56. Street lights must be provided along all streets to ensure adequate levels of illumination in hours of darkness.
57. Public street lights may not be fixed to buildings and should be placed away from buildings to prevent them from being used to provide access for criminals.
58. Where vehicular access is limited spaces must be created within the layout for refuse collection points on collection day. These spaces should be sized according to the number of properties the area served and detailed appropriately.
59. Develop maintenance plans and manuals for streets prior to implementation.

3.9 PUBLIC FACILITIES AND PUBLIC OPEN SPACE

1. Planning for public facilities must begin at a regional and subregional level to ensure that there is sufficient access to high order facilities. This should be based on the "Summary Guidelines and Standards for the Planning of City of Cape Town Social Facilities and Recreational Spaces (3rd revision)", CSIR, 2014.
2. If there are existing facilities within the local area that are accessible from the site it is preferable to invest in and upgrade these rather than provide new facilities as part of the project.
3. Sites that are well located, relative to existing or future public transport should be set aside for public facility clusters / civic precincts.
4. Where the scale of the development is such that there is a clear need for public facilities, provision must be made for these within the site.
5. If no operational funding is available or if no management arrangements can be agreed to to secure a site for a public facility / public open space or deliver facility within 5 years of occupation, sites for public facilities should not be provided.
6. When required provide fewer, larger, high quality public facilities (rather than many smaller ones).
7. Create a hierarchy of civic precincts / civic clusters within the settlement based on the principles set out in "Annexure E: The cluster approach to the provision of public facilities within urban areas" CSIR, 2014 to minimise operational costs and give structure to the neighbourhood.



THE CLUSTER APPROACH TO PUBLIC FACILITY PROVISION

See annexure E: the cluster approach to the provision of public facilities within urban areas" in summary guidelines and standards for the planning of city of cape town social facilities and recreational spaces (3rd revision)", CSIR, 2014

The diagram above illustrates an abstract arrangement of facility clusters for a neighbourhood of 20 000 people / 6000 units at a gross density of 50du/ha. This requires an area of 114Ha, which is approximately 4 km². In principle each neighbourhood of 20 000 people should have access to clusters containing two secondary schools and three primary schools. In practice this diagram will be distorted by local conditions. It needs to be highlighted that the application of the cluster approach needs to be contextualized. The typologies and layouts cannot be dogmatically applied to all new developments.

The adjacent diagrams seek to provide an indication of what the different levels of civic cluster could look like. Again the composition and arrangement of the elements within the cluster will vary to create a unique sense of place and identity

Level one cluster - Community level (3000 pop)

Community level clusters are very localized and based on the threshold for a crèche or place of worship (2000 – 3000 pop).



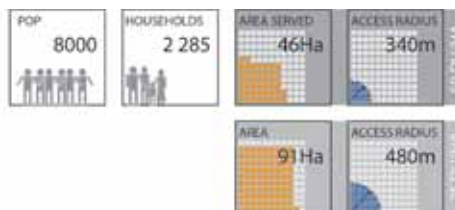
Level two cluster - Primary school cluster (6000 pop)

Primary level nodes are still localized and based on the threshold for a primary school (6000 pop). This implies that the daily needs of a small child are accessible within a 5-10m minute walk.



Level three cluster - Neighbourhood cluster (8 000 pop)

Neighbourhood Level clusters are similar to a level two / primary level cluster and based on the threshold population of 8000 people. This scale of node makes provision for a neighbourhood scale public open space of between 5000 and 10000m².



Level four cluster - Secondary School level cluster (10 000 pop)

Level four clusters operate on the neighbourhood level and are based on the threshold for a secondary school (8000 - 10000 pop). This implies that the typical needs for a secondary school learner are accessible within a 5-10m minute walk.



8. When creating the subdivision for civic precincts provide large, generous, undivided plots for community facilities that can be subdivided at a later date if necessary. These properties must be formally transferred to the City and allocated to the relevant department and secured and protected after construction until buildings are developed.
9. District systems (such as grey water recycling systems and district energy systems) should be investigated within civic precincts to reduce operating costs.
10. The types of buildings and public facilities provided or planned for should be urban in nature, making the most effective use of the land available through multi-storey, multifunctional buildings.
11. New typologies of public building should be developed so that the use of these multi-functional building can be optimised and a range of services can be provided to the residential community.
12. Avoid locating sports fields, public open spaces and schools along high order roads as this creates conflict between pedestrians and traffic.
13. Layouts should include larger properties (300m²) adjacent to public open spaces for low order community facilities such as Early Childhood development Centres (ECDs) and places of worship. Processes must be put in place to ensure that these sites are allocated and released to the appropriate organisations and institutions for development (Preferably through long lease agreements).
14. Provision must be made within the budget of new housing projects for the construction of quality public open spaces.



Avoid creating public open spaces that are awkwardly shaped and which are backed onto by development.



Create civic nodes by clustering public facilities, public open space, business and sites for commercial activity. It is also important to ensure that public open spaces are surrounded by public streets and overlooked by development. (Mfuleni)

15. Public spaces must be intentionally designed to encourage play, recreation and social interaction.
16. Public spaces should be detailed to be attractive and robust.
17. There is a preference for the provision of fewer, more substantial, functional open spaces within a development as opposed to many small open spaces that are a challenge to manage and maintain.
18. The capital costs and operational implications for the maintenance of the public spaces (parks and streets) must be agreed to with the relevant line department before the project starts and agreements committed to writing.
19. A portion (20%) of the area of the road reserve can be considered part of the open space provision, provided the street environment is designed as a pedestrian priority area and landscaped appropriately.
20. Tree planting and soft landscaping should be implemented to mitigate the consequences of climate change, reduce heat stress and prevent the urban heat island effect. Impact planting with signature trees (mature 200L trees) at strategic places is promoted above a proposal that involves more extensive tree planting.
21. Tree and plant species should be drought resistant and require minimal irrigation.
22. Where required all green open spaces and trees must be equipped with automatic irrigation and maintained by the developer for a minimum period of 3 years after construction (once established irrigation may not be required depending on the type of species planted).
23. Alternative water supply should be used for irrigation (treated effluent and borehole water).



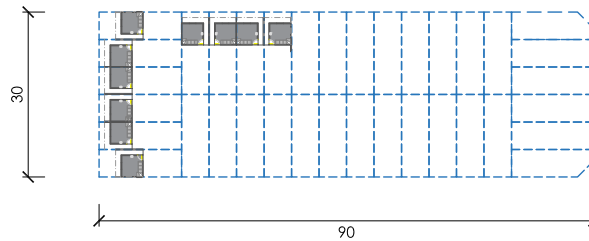
New types of public facilities need to be developed with an emphasis on multi-functionality and managed through new operational arrangements.



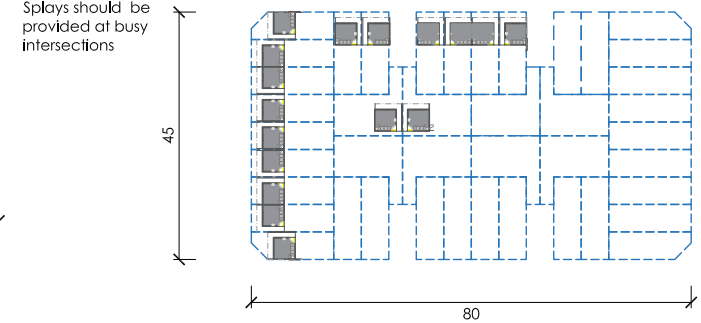
Public open spaces should be designed to be robust and hard wearing and buildings must look out onto the space

3.10 BLOCK AND PLOTS

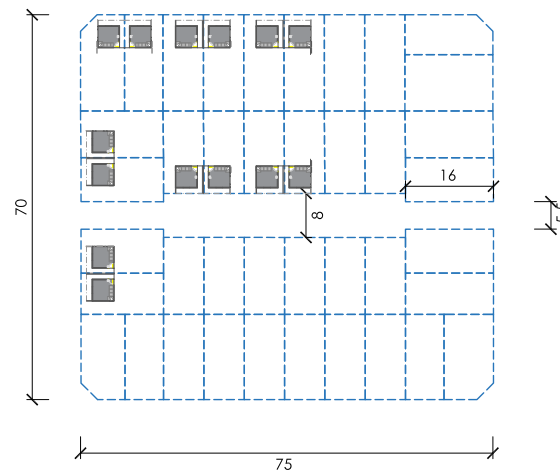
1. Urban block and plots should be graded and levelled to drain towards the street;
2. Single sided blocks that back onto streets and open spaces should be avoided. If this is unavoidable plots in these blocks should be a minimum of 30m deep.
3. Unless single sided, urban blocks should be a minimum of 30m in depth so as to accommodate individual plots that are between 15 and 20m deep.
4. Urban blocks should preferably be between 60 and 160m in length to balance the need of infrastructure efficiency and pedestrian permeability. Unless special circumstances require it blocks should be no shorter than 60m and no longer than 200m.
5. Avoid creating blocks that are between 100 and 120m in length as these require additional manholes that add cost to the project and are less efficient.
6. The shape and proportions of the individual plots should be simple so as to accommodate different house types and also to help manage common boundaries.
7. The size of plots should vary depending on their location within the urban network. Deeper sites should be provided along high order streets to accommodate commercial activity, but in general residential plots should be between 75 and 100m².
8. Plot sizes should be a minimum of 75m² to allow for the future expansion of dwellings, second dwelling and private open space, preferably towards the back of the property (Deviations of up to 10% will be considered in exceptional circumstances.)



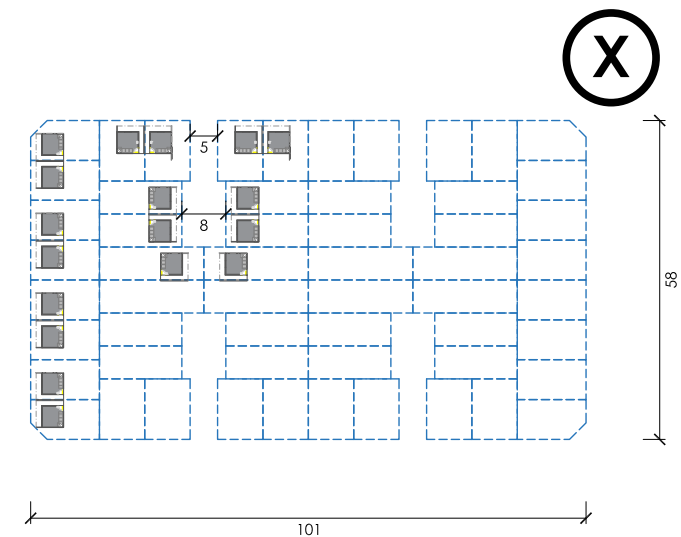
Urban blocks should optimally be 30m deep and 90m long to achieve optimum land use efficiencies. Variations of 10% will be considered where appropriate or in informal settlement upgrading projects where there is a need to provide accommodation for as many beneficiaries within the settlement as possible.



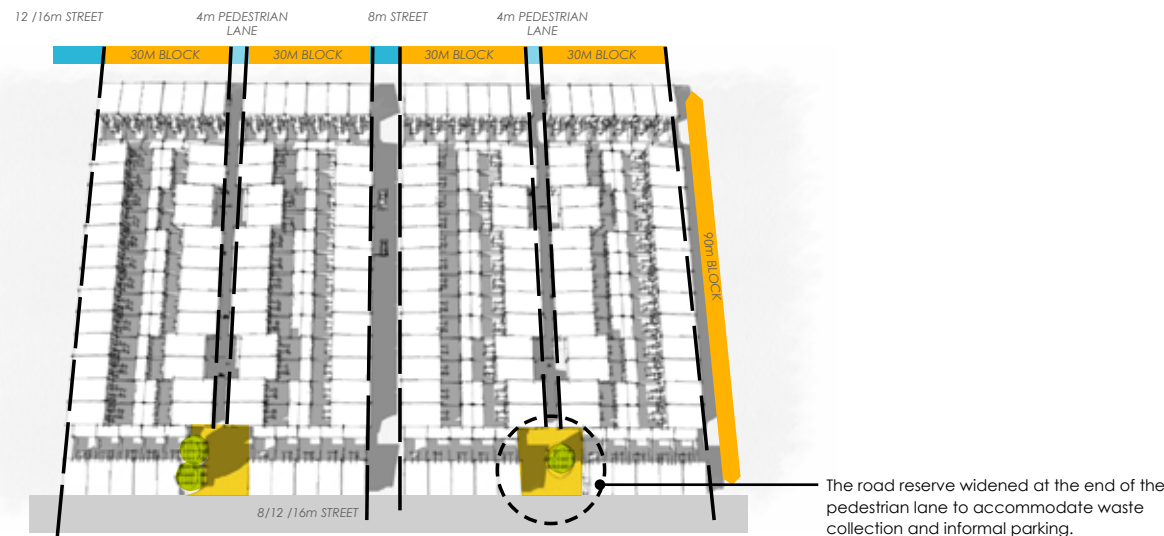
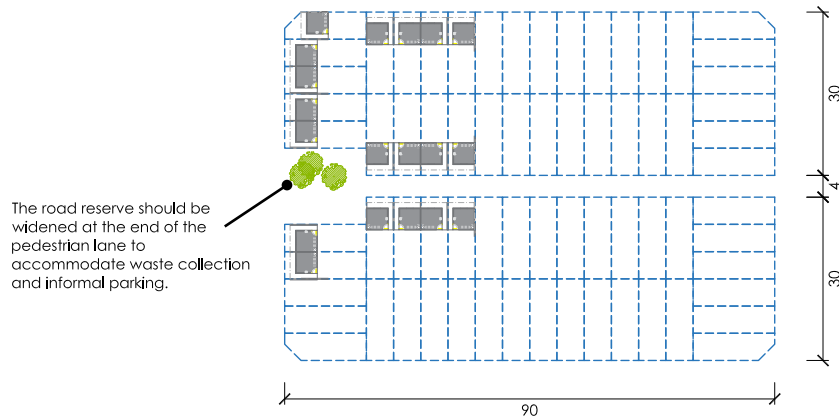
Deeper double loaded urban blocks that include shared access should be explored to improve land use efficiency, but consideration needs to be given to the cumulative servicing costs of this model. Special attention also needs to be given to the shape of erven to ensure that they can be developed effectively and also to ensure common boundaries are easy to identify for enforcement purposes.



Vehicular streets may be narrowed or throttled at key points to create a more pedestrian oriented environment and discourage speeding but the shape of the road reserve should remain simple. Detailed consideration needs to be given to how such blocks fit into the road network and how carriageway crossings and kerbs are detailed.



While it is possible to create larger composite blocks with cul-de-sacs that are more efficient in terms of land use this arrangement requires additional manholes and the levels need to be dealt with carefully to ensure that the sites and roads drain naturally.



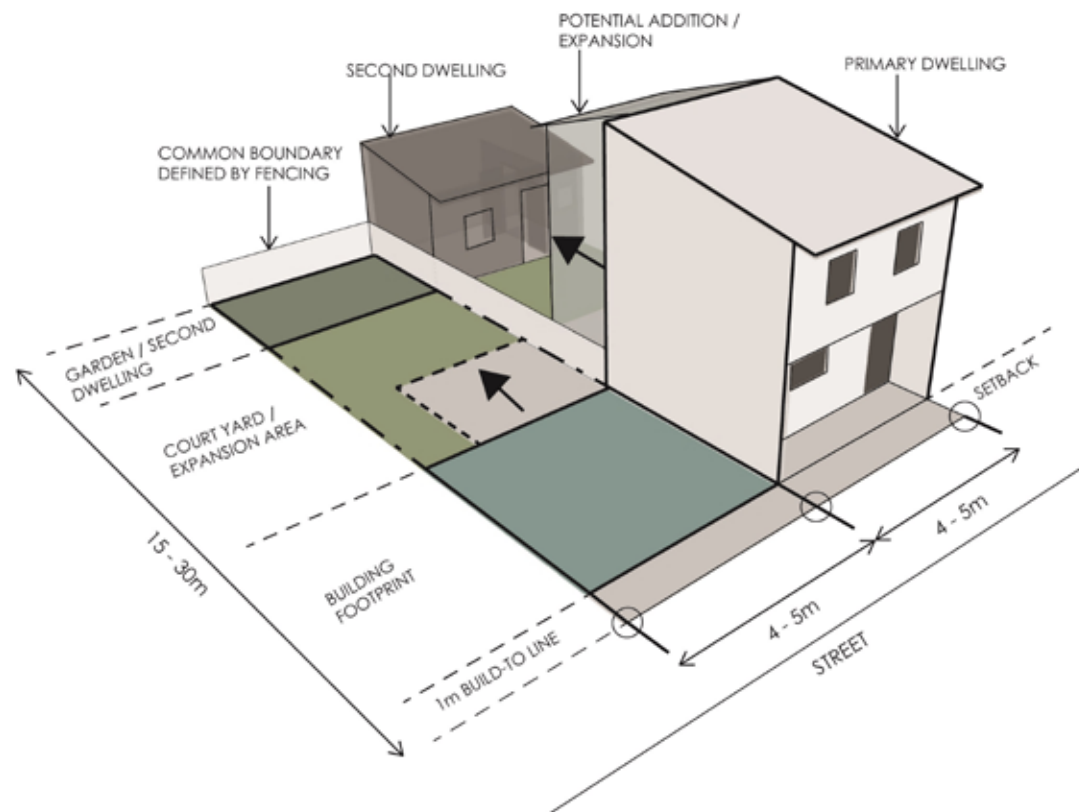
The above diagram and plan illustrates the potential arrangement of traditional 30m urban blocks into a street network that includes 8/12/16m vehicular streets and 4m wide pedestrian lanes.

9. Plot dimensions should promote attached urban house typologies. These should generally be narrow (3.75 - 7.5m) and deep (15-20m) to increase infrastructure efficiencies, promote natural surveillance, cross ventilation natural lighting and encourage the development of urban house typologies.
10. Typical erf dimension are as follows: 3.75x20m, 5x15/20m 6x15/20m and 7.5x20m.
11. Double - loaded blocks, four erven deep should be explored to achieve greater efficiencies.
12. There must be a clear definition of public and private space within the development.
13. Common boundaries must be physically demarcated to prevent encroachment. The minimum provision of wire fences with posts on the boundary peg is required, but low precast / timber fences along common boundaries are preferable.

3.11 BUILDING DESIGN AND LAYOUT

BUILDING LOCATION AND SITE LAYOUT

1. Create a well defined and legible urban structure and public environment through the placement of buildings to make it easy and convenient for people to orientate themselves.
2. Buildings must be located as close to the street boundary as possible. 1/1.5m build-to-lines from the street boundary are strongly encouraged.
3. Building typologies directly on the street boundary should be investigated, but it must be ensured that the foundations and footings do not protrude into the road reserve where they could cause damage to services. It must also be ensured that these are sufficiently deep to ensure that they are not undermined should a water pipe burst in the road reserve.
4. Interior finished floor levels should be raised above the 1:100 year flood level, but where this is not practical entrance thresholds could be raised to prevent water ingress during infrequent flood events. In these cases due consideration should be given to how access is provided for people with disabilities.



Key principles of building placement

PARKING

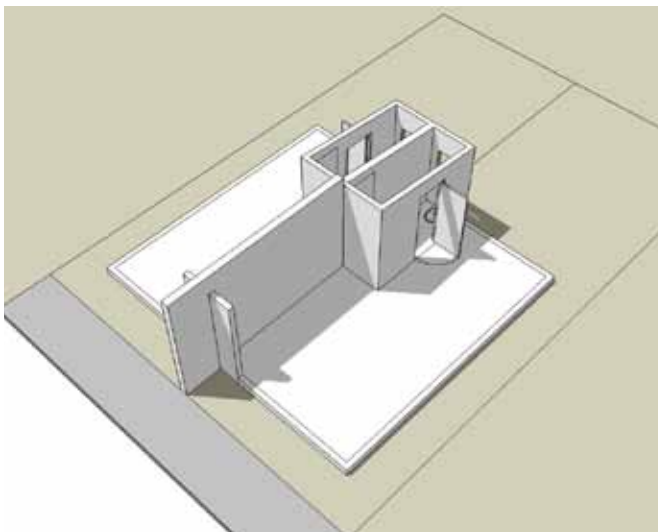
5. There is no requirement for off-street car parking within subsidised housing developments where properties are less than 100m².
6. The design and layout of plots and house types should allow beneficiaries to convert a portion of their houses into garages and accommodate parking on site if they wish to and where it is safe to do so from a traffic management perspective.
7. Communal parking areas should only be proposed within private properties where the ownership and management of the spaces is committed to in writing prior to implementation.

INCREMENTAL HOUSING

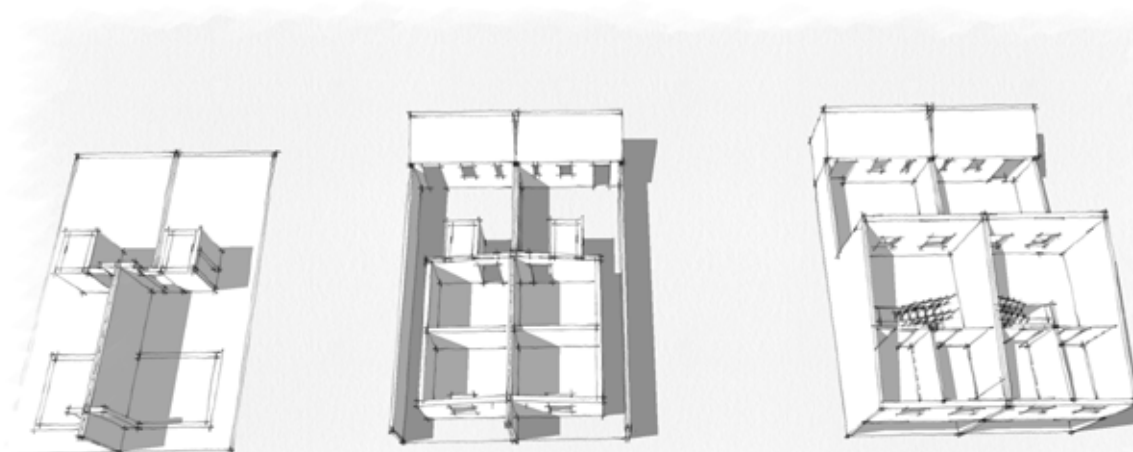
8. Where incremental development is proposed a starter structure, including a party wall, wet core, slab and foundations must be provided on each site.
9. Foundations for all load bearing walls must be designed to sustain the loading of a 3 storey building, built with traditional construction methods (masonry walls, timber roof structure).
10. Generic house plans should be developed to the level that can be submitted for building plan approval illustrating how the starter unit can be extended and added to over time so as to comply with National Building Regulations. These plans should be issued to the household prior to occupation.

HOUSE TYPES

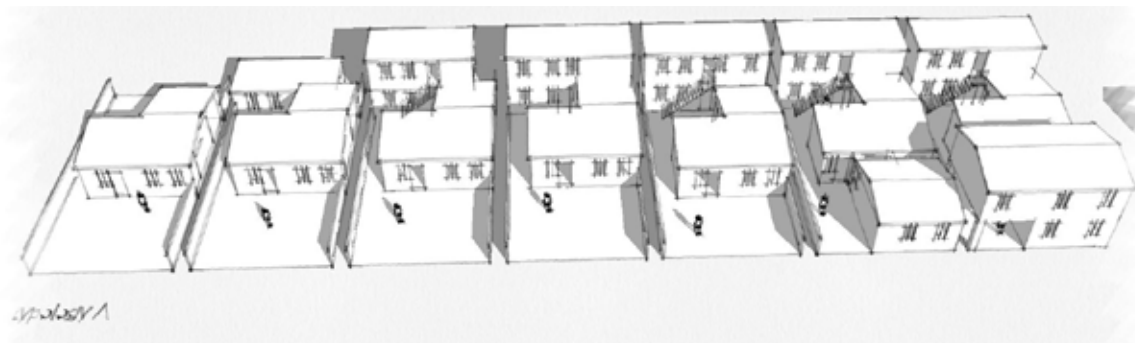
11. Urban house typologies (semi-detached, row houses and courtyard houses) are preferred.
12. Buildings / unit typologies should be dual-aspect to facilitate natural cross ventilation and provide natural light into all rooms. Bathrooms should be naturally lit and ventilated (Avoid extractor fans / mechanical ventilation)
13. Building types must take into consideration how rain water will be collected off roofs and hard surfaces to avoid flooding and the discharge of rain water to adjacent properties.
14. The design of the residential unit should not be prescriptive or limit how a unit can be extended or added on to.
15. Building types must be adaptable and able to accommodate additions, extensions and second dwellings.



When delivering incremental housing different types of starter structures should be provided.



16. All load bearing walls must be designed to sustain the loading of a 3 storey building, built using traditional construction methods (masonry walls, timber roof structure).
17. Avoid locating bathrooms and wet cores on the street facade.
18. Places for hanging washing and storing refuse bins must be considered during the design of the house.
19. Generic house plans should be developed to the level of detail required for building plan submission in order to illustrate how the different building types could be extended over time, adding a potential second and third dwelling to the site.
20. Buildings should be designed to allow for ground floor accommodation to be converted into commercial / business units, particularly on routes that are likely to experience high pedestrian traffic volumes.
21. Generic building plans should also illustrate how a garage or car parking space could be accommodated on the property. Where this is proposed residential accommodation must be provided above the garage with windows looking onto the street.
22. Threshold elements (such as porches, overhangs or recesses) should be provided for each unit along the street frontage / in front of the front door to the unit.
23. Where semi-public or semi-private spaces are provided it must be clear who the owners of these spaces are and who is responsible for the maintenance and management thereof.



Conceptual diagrams illustrating how generic house types can be added to and extended over time



Stoops and overhangs along the street boundary create a threshold between public and private space and improve the street interface.



Rear common boundaries must be clearly defined with a fence or wall, to define private spaces and improve levels of safety.

FLATS AND GROUP HOUSING

24. The layout of general residential type developments (cluster housing and flats) and specifically rental housing, must allow for the individual units and blocks of flats to be subdivided, sectionalised and privatised in future.
25. Avoid large gated estates that hinder accessibility.
26. Flats must be designed to discourage illegal extensions and second dwellings, or make it easy to identify and enforce regulations as soon as illegal structures are built.
27. Articulate the roof line and façade of larger buildings to break up the scale and massing of the buildings and introduce a more human scale to the development.
28. Washing lines, refuse bin stores and letter-boxes must be considered and appropriately located within the property.
29. Each block of flats must be designed with safety and secure access in mind. Gates should be provided to limit / control access.
30. Security devices such as burglar bars and gates must be considered during the design phase and installed as part of the project to ensure an attractive and uniform approach within the development.
31. Each block of flats should ideally have a maximum of 20 - 25 units accessed off a single circulation core to help maintain levels of intimacy and improve levels of safety and security within the development.
32. Dedicated storage areas for bicycles and other items must be considered during the design process.
33. Ensure that the shape and geometry of rooms are able to accommodate furniture in a variety of ways and that furniture is able to fit upstairs.
34. The design of ground floor units should facilitate their conversion into commercial units / live-work units. Any changes in land use must go through a statutory process to ensure compatibility with residential uses.



Springfield Terrance in Woodstock is an excellent example of how social housing can be integrated into an existing network of streets. Certain buildings have since been sectionalised and are now owned and managed privately



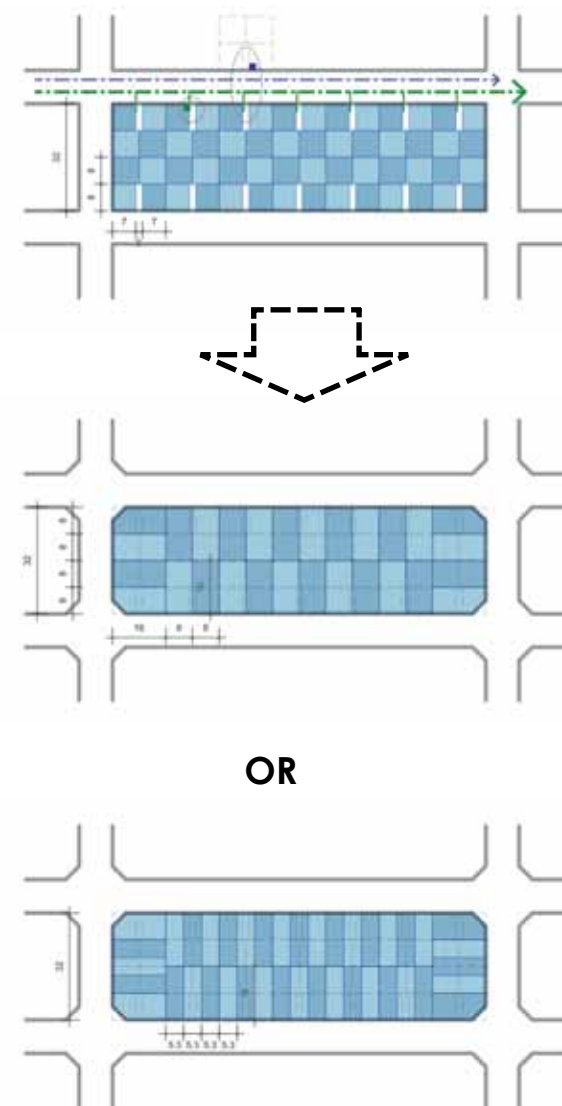
Large gated social housing estates, while easier to manage and control restrict public access in, around and through the development, do not create any private space for residents and create sterile environments that are institutionalised and not able to change over time.

3.12 BUILDING TECHNOLOGIES AND CONSTRUCTION MATERIALS

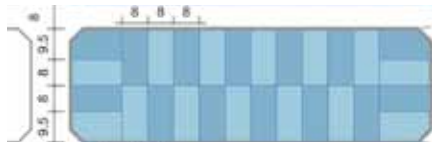
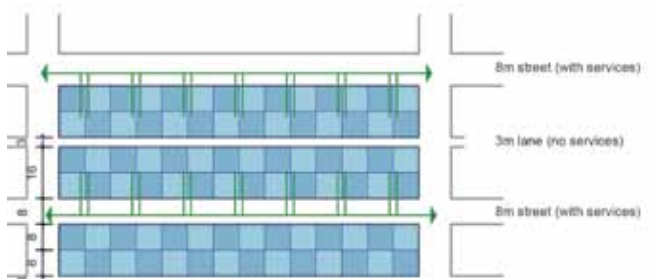
1. Investigate the use of recycled and renewable materials for the construction of road pavements and houses.
2. Innovative, non-conventional and prefabricated building materials should be explored during the design process, however wherever possible use building materials and technologies that are readily available in local building supply stores and that make it easy for beneficiaries to extend or add to the original structure.
3. Sustainable technologies should not burden the household or the City with operating costs and maintenance requirements that they can not afford.
4. Where sustainable technologies are not provided from the outset, ensure that sustainable building technologies (solar water heating / heat pumps etc) can be retrofitted to the building without major modification to the structure or reticulation systems.
5. Use robust, durable and efficient materials.
6. Promote the use of local resources - such as sand bag houses.
7. Where emergency starter kits are provided seek to ensure that these are fire resistant where possible or treated with a fire retardant.
8. Consider the entire buildings process and methods of construction to minimise waste and ensure that buildings can be added to over time so as to ultimately comply with building regulations.
9. Keep the detail of junctions between different building materials simple and ensure that waterproofing and rainwater management solutions are easy to install, maintain and replace.
10. The detail design of the units, especially starter units or incremental houses, should provide simple clues to home owners for how to expand or alter the original structure
For example, a concrete ring beam built into a wall could indicate where a wall bracket can be hung to support a suspended floor; or an oversized wall nib could suggest how off-the-shelf burglar bars could be installed onto a stoep.

3.13 EMERGENCY HOUSING

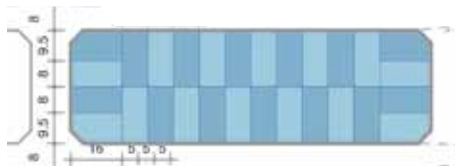
1. Any emergency housing project must be based on the principles set out in this document.
2. The planning of these areas must follow an accelerated land use planning process and rights must be obtained for the long term development of the site.
3. It is essential that a technical Project Management Team composed of officials from various line departments is set up to input into the layout and allow for the rapid resolution of strategic and technical issues.
4. Locations of emergency housing sites must be carefully considered taking into account where people would be moving from, where they work or attend school and what they depend on for their livelihoods.
5. A strategic stormwater management plan must be developed for the site to ensure that no trapped lows are created and that the site can be naturally drained. Appropriate measures must be implemented at retention areas and discharge points to deal with pollution from litter and grey water.
6. Emergency housing sites must be planned so that the urban blocks created and services delivered can be integrated into the adjacent streets and utility networks at a later date without the need to relocate services and infrastructure.
7. Emergency housing sites must be fenced with an appropriate fencing that allows the full integration of the settlement with future / adjacent development. The fence must have one or more vehicular entrances but multiple pedestrian entrances should be provided where pedestrian desire lines are likely to be. Due consideration must be given to the aesthetic impact of the fence on the receiving context.
8. Formal infrastructure and utility networks must be installed to comply with the City's standards and specifications. Such infrastructure must be signed off and maintained by the relevant line department once installed.
9. Where there are no connections to bulk services waste water should be directed into central conservancy tanks for storage and removal. Such conservancy tanks should be located at the low points of the site where they can be connected to formal services in the future. Alternative technologies such as bio digesters and package plants should be investigated.
10. Chemical and VIP toilets should also be considered as a temporary measure.
11. Communal ablutions and service points may be provided.
12. Locate sanitary facilities in such a manner so as to ensure safety to vulnerable members of the community.
13. Water points should only be provided where there is a connection to a waste water system.



Conceptual diagrams illustrating a typical emergency housing block that may be resubdivided at a later date to form individual erven.



OR



14. Gravel streets within the settlement are acceptable as a short term measure provided sufficient operational budget is secured to maintain such a street. The streets must be graded to direct stormwater to appropriate discharge points and upgraded with a traditional asphalt surface to comply with standards within two years of implementation.
15. The main access road into the settlement must have a formal asphalt surface for the first 30m from where it links onto the formal road network.
16. Smaller 30 -60m² plots may be created but only as an interim / temporary measure.
17. Temporary plots and internal services must be arranged so that in the long term the individual erven and access streets can be consolidated into urban blocks at least 30m in depth and then resubdivided into individual erven to allow for a range of different house typologies to be developed.
18. The urban block (including any minor lanes) created must be subdivided and rezoned as a single erf with a single residential two (SR2) zoning to allow for future subdivision.
19. The land must remain in the ownership of the City but residents must have security of tenure.
20. Pedestrian lanes are permitted but any lanes less than 4m in width may not contain any utility services .
21. A minimum width of a temporary pedestrian lane is 3m.
22. Emergency temporary top structures and fire fighting installations must be provided to the satisfaction of the Fire Department.
23. Provision must be made for soft public infrastructure such as crèches.
24. At least one public open space must be designed and delivered as part of the project. This facility must be equipped with play equipment for young children and a multifunctional open space for adults and youth.
25. A waste management plan must be developed to ensure that waste and refuse is collected on a regular basis.
26. A strategy must be developed to facilitate and manage informal trade and informal economic activity within an emergency housing area. A careful balance needs to be struck between balancing economic needs of residents and the potential negative impacts (sound and disturbance).

In order to promote a more compact city and support incremental densification as articulated in this document further changes to policy are required. Some areas that do require review and study include the following:

1. A study of the long and short term cost implications of these proposed guidelines and standards

While the guidelines set new benchmarks and principles for housing delivery, the cost implications of these directives need to be unpacked and interrogated further. It is acknowledged that the high levels of service proposed for public roads and infrastructure will substantially increase the initial capital cost of housing projects, but this needs to be seen against reductions in operations and management costs over the longer term. These costs are considered to be justifiable as dense urban environments are more intensely used and require a higher level of service than the housing subsidy does not currently make adequate provision for. What also needs to be factored into this study are the intangible benefits that communities will experience from living in higher quality environments.

Further engagement with other spheres of Government will be necessary and it is likely that the structure of existing subsidies will need to be changed or modified to facilitate incremental development and the delivery of elements such as starter units for incremental development.

2. New forms of agency and approaches to engagement, participation and partnership

As highlighted in the document the delivery of housing is both a technical and a social process. Given the magnitude of the challenge, the complexity of engaging with communities and the anticipated rate of housing delivery new forms of agency and ways of communicating and engaging with communities will need to be found, developed and operationalised. This will require an interrogation of the traditional role of the State and the parts that intermediaries, NGOs and communities play in the development process.

3. Material to make the guidelines and directives accessible to ordinary people

These directives and guidelines are technical in nature and difficult for non-technical people to understand and engage with. Consideration should be given to producing simple and concise booklets and information brochures that communicate the key concepts and processes to ordinary people and communities who will be involved in the development process. Such brochures will need to be very visual and translated into local languages.

4. Engagement with the development industry

Formal engagement with formal bodies such as the National Home Builders Registration Council (NHBR) as well as the financial sector (insurers and banking institutions) is required to ensure that beneficiaries are able to invest meaningfully in their properties in an incremental manner and transact in the housing market. Pre-approved buildings plans may help bring resolution to the more technical aspects of construction and regular inspections could allow for staged completion of the housing product.

5. A review of current standards and regulations

This discussion document in many ways pushes the boundaries of some City policies and technical standards. Many of these policies are in the process of being reviewed and will need to make provision for the type of development envisaged in this document. For example due to issues with management and the potential harmful consequences of pollutant stormwater systems, there must be further study around stormwater management. Other regulations that should be reviewed include the Minimum Standards for Engineering Services in Townships, 2013 amongst others.

6. A review of public facility designs, standards and provision

While the City recently appointed the CSIR to review its facility standards document and assess the need for public facilities in the metro these standards are still biased towards suburban building typologies that are space extensive. Further engagement with other stakeholders and other spheres of government needs to happen and new urban typologies need to be developed that are efficient in terms of land take (multi-storey) and flexible and adaptable in terms of their use. This will require additional capital budgets for the construction of facilities.

Mechanisms and strategies also need to be developed to safeguard sites that are set aside for public facilities from invasion and encroachment. This requires new forms of public land management to ensure the long term health and wellbeing of communities.

7. Floodline reviews and topographical surveys

The National Human Settlements department requires that no low cost housing developments are situated in 1:100 year floodlines (previous this was the 1:50 year flood line). This might be a precautionary response to climate change but also alludes to the fact that the floodline mapping in many parts of the country may be

out of date. It is recommended that high level topographical surveys are undertaken of all existing informal settlements and future housing sites to determine the extent to which they are affected by stormwater drainage issues and that floodline mapping is updated as to only prohibit development on land that is at definite risk of flooding (rather than sterilizing land for development unnecessarily).

8. A review of the strategic road network, Road Access Guidelines and Road Traffic regulations

Whilst mobility within the city is important the city's structure is currently dictated by the needs of people using private motor vehicles as their primary mode of transport. The consequence of a high percentage of single occupancy vehicles is a highly congested road network during peak periods. Achieving a modal shift in travel behaviour towards NMT and public transport will go a long way to improving this situation

In the context of urban change and massive human settlement projects one needs to ask what types of streets are being created, whether these are the types of streets the city needs and where value is created. This is particularly important given the push for higher densities and smaller and narrower residential properties.

The Provincial Road Access Guidelines govern the planning of the road network and access to properties in the Western Cape. These standards are biased towards suburban environments with high levels of car ownership and premised on increasing vehicle speeds by reducing friction within the road network. A review of such guidelines is essential if we are to move towards a more compact city and a balance needs to be struck between access, mobility, development and road safety. This requires a critical review of the road and street network to identify an appropriate network of collector and distributor routes that will also allow for the some streets to be downgraded in their classification so that they are able to add value to the economy.

In addition specific attention needs to be given to the classification and rights associated to road users within the lower classes of road (Class 4 and 5) which are more pedestrian priority environments / homezones / woonerfs.

9. A review of the Development Charges Policy

Currently the manner in which development charges are applied and calculated could penalise property owners financially for developing their sites more intensely. This policy should to be reviewed so as to encourage incremental intensification in well located areas. In this regard review of the minimum thresholds may be appropriate.

10. Amendments to the Development Management Scheme

Most properties within the municipal boundary are zoned single residential (SR) and it is likely that the majority of new properties created through human settlements projects will be given a SR1 or SR2 zoning. While the development parameters for small sites (under 200m²) are permissive it may be worth revisiting some of the development parameters (5.1.2ci and 5.1.2cii), the additional use rights basket and consent uses to encourage second and third dwellings, work from home and mixed use development so as to avoid statutory processes.

Further consideration should be given to what zoning those sites that are identified as incremental development are given during township establishment as SR2 zoning permits shelters which prevents the City from exercising its responsibility as the regulator. Ways to work within the existing legislative and regulatory framework need to be found and produces like generic approved buildings plans could assist in creating a direction forward.

Further, in order to promote incremental densification across the city it is recommended that all those properties zoned single residential, that are well located relative to public transport and job opportunities; and where services capacity exist are pro-actively rezoned to a general residential zone that permits more intensive land use (flats). The SR2 zone could also be considered as a transitional zoning that may lead to a property being classified SR1 or GR2 at a particular point in time.

11. Regulatory and support services to address the undesirable consequences of densification

While this document promotes densification through second and third dwellings as well as multiple occupation measures need to be put in place to prevent excessive overcrowding and unsanitary living conditions. Consideration should be given to establishing an advisory panel within the City to inform property owners who want to develop their properties for rental accommodation on how to make the most effective use of their properties and encourage those who currently have unauthorised structures within their properties to formalise these within the framework of legislation.

Demonstration projects and user friendly publications could go a long way to informing the public other benefits and options available.

Stronger enforcement is also perhaps also required and improved access to and operation of the Rental Housing Tribunal could also make a positive impact in this regards - although capacity constraints need to be recognised.

12. A strategic review of the National Buildings Regulations

The NBR are in place to ensure that buildings are safe for use and habitation. However in the context of rapid urbanisation and given that poor households are not immediately able to build houses that comply with regulations and standards processes need to be introduced to allow and facilitate incremental compliance. Temporary and permanent exemptions from certain parts of the NBR (Part XA for example) should be considered.

13. Proactive engagement of the building industry and reconceptualising the role of building inspectors

Building inspectors and the building industry at large also need to be capacitated to advise owner builders on how to build safely and arrive at pragmatic and cost effective solutions to meet their particular housing needs. It is likely that more resources will need to be allocated in this area. New forms of relationship potentially including the National Home Builders Registration Council (NHBC) will be required.

Further, as alternative technologies and buildings systems (prefabrication and modular systems) become more common the building industry will need to be capacitated and skills and trades developed to ensure that the new building fabric can be maintained.

14. Further engagement with Solid Waste Management

The storage of solid waste and refuse is often problematic on small properties. Current level of service is based on providing a weekly, kerb side, otto bin collection service. This has implications for road network planning and densities. Further engagement at a strategic level is required to investigate alternatives that may include more regular collections, skip type services, recycling collection and community based services.

15. Improved access to finance, technical advise and building materials

One of the biggest hurdles for poor households who want to build their own houses is access to finance and materials for construction. A comprehensive review of the financial mechanisms available and the existing Peoples Housing Process is required to support owner builders.

The direct involvement of established financial institutions at the lower end of the housing market should be explored. Technical support centres could also provide advice to owner builders and bulk buying materials by the state could reduce buildings costs for those who qualify for state support, recognising that mechanisms

will need to be put in place to protect supplies to the market as this could create undesirable distortions and could lead to abuse.

16. Community parking surveys

This discussion document takes a bold position with regards to the provision of car parking within low cost housing environments. It is recommended that surveys are undertaken, with the support of anthropologists and sociologists to gain a better understanding of how cars are perceived and used within communities and the challenges that they face on a daily basis.

GLOSSARY OF TERMS

Accessibility

The degree to which a site, building, service, or environment is accessible to people, irrespective of who they are or how they move.

Active frontage/ interface

Refers to street frontages where there is an active visual engagement between those in the street and those on the ground floors of buildings. This quality is assisted where the front facade of buildings, including the main entrance, faces and opens towards the street, and also where ground floor uses accommodate activities that provide interaction between pedestrians and the building uses including cafes/restaurants, shops, offices etc.

Adaptability

The capacity of a building or space to be changed so that it responds to changing social, technological and economic conditions.

Agency

The capacity, condition or state of performing an action. Relates to the shifting roles played by different actors in the delivery of housing.

Built form

The shape and massing of a development. Built form relates to qualities such as density or quantum of development (often referred to as massing), coverage (how much of the site is built up), building height, the distance from property lines.

Community facility

A building or structure which houses a service to the public or a select group or community. Such facilities include crèches, religious institutions and clubs. Full public access to such facilities is often restricted or limited.

Classes of Roads

Roads are categorised into different classes in the Road Access Guidelines, where higher order (lower number) classes refer to roads with a larger geographic scale of traffic distribution. Class 2 roads are Primary Distributors, meaning that they are vehicle only routes that service the urban area as a whole and are used for long distance traffic movement around the City. Class 3,4 and 5 roads are all mixed pedestrian/ vehicle routes. Class 3 roads distribute traffic between different districts and provide the link between the primary network and residential roads. Class 4 roads are residential through roads which distribute traffic within neighbourhoods and link higher order roads with access roads (class 5 roads). Class 5 roads provide access to specific buildings and land within neighbourhoods.

Context

The broader environment within which a development or site is located. Context is a broad term and can refer to natural systems, topography, the social and economic environment, the built environment, access, public institutions, public space, and public utility services.

Desire line

An imaginary line linking facilities or places. Desire lines become evident when watching people move through an area and are often visible through informal footpaths across open spaces.

Diversity

A place which offers variety and choice in terms of land use activity and mobility options.

Enclosure

An experience in which a pedestrian feels sheltered within the public realm. Buildings, walls, trees, landscaping and street widths are all factors in creating a sense of enclosure.

Form

The layout (structure and urban grain), density, scale (height and massing), appearance (materials and details) and landscape of development.

Higher order structuring route

Streets or movement corridors which play a critical role in determining the structure of the urban environment. The following are characteristics of structuring routes: high levels of spatial continuity and access; a concentration of mixed land uses and activities; contain higher order public facilities; development is generally more dense; and an intensity in the movement of people, goods, public transport and private vehicles.

Integration

The spatial and functional linking of areas of development and their inhabitants. Integrated areas form a coherent physical whole where, in livability terms, the whole is greater than the sum of its parts.

Intensity

Refers to achieving a greater spectrum of mixed land uses through increased use of space, both horizontally and vertically, within existing areas, properties and new developments.

Landmark

A building or structure which is recognisable and stands out from its background by virtue of height, size or some other aspect of design.

Landscaped

The intentional arrangement of soft (trees and planting) and hard elements within a space.

Layout

The way buildings, routes and open spaces are placed in relation to each other.

Legibility

The degree to which the qualities or structure of a neighbourhood or building can be perceived and understood.

Massing

The combined effect of the arrangement, volume and shape of a building or group of buildings in relation to other buildings and spaces.

Node

A point within the urban system where activities, land uses and development is concentrated. Nodes are typically located where levels of accessibility are high and at the confluence of movement and public transport routes. The size and extent of a node depends, on the nodes location within the larger urban system and on the limitations of a pedestrian to move within it. A node generally has a sphere of influence of between 200 - 400m from its centre.

Overlooking/ overlooked

When a building has doors and windows positioned in such a manner that they allow the occupants inside a building to visually connect with the spaces outside of that building.

Passive surveillance is the casual observance of public and private areas by people in the course of their normal activities.

Permeability

The degree to which an area has a variety of pleasant, convenient and safe routes through it.

Public facility

A building which is owned, built, managed and maintained by a governmental institution or which provides a service on behalf of government.

Public good

The condition in which all citizens are able to enjoy in the benefits urban living to the extent that each individual's actions does not lead to a subtraction or diminishment of any other individual's or groups ability to act or enjoy the same benefits.

Public realm/ environment

The collection of physical and nonphysical elements which are accessible or impact on the general public. Some aspects of the public realm are privately owned and managed. The public realm includes amongst others all forms of media, open spaces and streets.

Public space

The public space includes the natural and built environment used by the general public on a day-to-day basis such as streets, plazas, parks, and public infrastructure.

Semi private space

A space that may be communally or publicly owned but the manner in which it is used means that the not all members of the public have access to or may not use the space. For example: a shared parking court or a communal play area with restricted access or a stoep outside a house or a private garden within a block of flats.

Semi public space

A space that may be privately owned but the manner in which it is used and fact that the public may have access to the gives the impression that the space may be used by anyone. For example: a colonnade outside a shop, or a shopping mall.

Sense of Place

The quality of a space which makes it feel special or unique, and helps to foster a sense of belonging for those who have attachment to the space. It is associated with a strong identity or uniqueness.

Surveillance

The ability of a person or thing to observe and control activities within a defined space. Surveillance may be achieved passively - by providing physical opportunities to connect a surveyor to a space; or through active or artificial means - through CCTV or law enforcement patrols.

Sustainable Urban Drainage Systems (SUDS)

A branch of Water Sensitive Urban Design which focuses specifically on stormwater management

Top Structure

A formal house provided through the government subsidy program that complies with National Building Regulations.

Views & vistas

A visual quality within the landscape/urban landscape that typically provides some visual amenity. The importance of the view typically relates to the level of amenity the view provides. A vista is a corridor view usually framed by an avenue of trees or buildings.

Urban grain

A description of the density and nature of development which results from the arrangement of buildings in space. The term urban grain is used at a variety of scale and can refer to the density of urban blocks, streets, plot or buildings footprints.

Urban structure

The structuring framework of a region, town or precinct, showing relationships between zones of topography, natural environments, activities, built form and open space. It encompasses broader systems including transport and infrastructure networks.

Water Sensitive Urban Design

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. Sustainable water supply, sanitation and stormwater management are encompassed within the WSUD approach.

