CITY OF CAPE TOWN ENVIRONMENTAL MANAGEMENT PROGRAMME

SPECIFICATION: ENVIRONMENTAL MANAGEMENT

DETAILED ENVIRONMENTAL SPECIFICATION

Revision 2007










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SPECIFICATION ENVIRONMENTAL MANAGEMENT (PSEM)

DETAILED SPECIFICATION

REVISION 2007

The requirement that an Environmental Management Programme (EMP) be developed and enforced for this project is indicative of the City of Cape Town's support for best construction practice, which includes ensuring that environmental damage during construction is minimised.

In terms of Clause 2.7 of the General Conditions of Contract 2004, the Engineer has the authority to appoint a representative. This can be in the form of an Engineer's Representative (ER) and/or an Environmental Officer (EO) for the duration of the Contract. These appointments/definitions can be included in the *Contract Specific Data* of the Contract under *Clause 1: Definitions, Interpretations and General Provisions*. The EO shall be responsible for monitoring compliance with the EMP and all instructions given by the EO shall go through the Engineer's Representative (ER), who will then convey these to the Contractor.

Depending on the nature/environmental sensitivity of the contract the following variations in the organisational structure are possible:

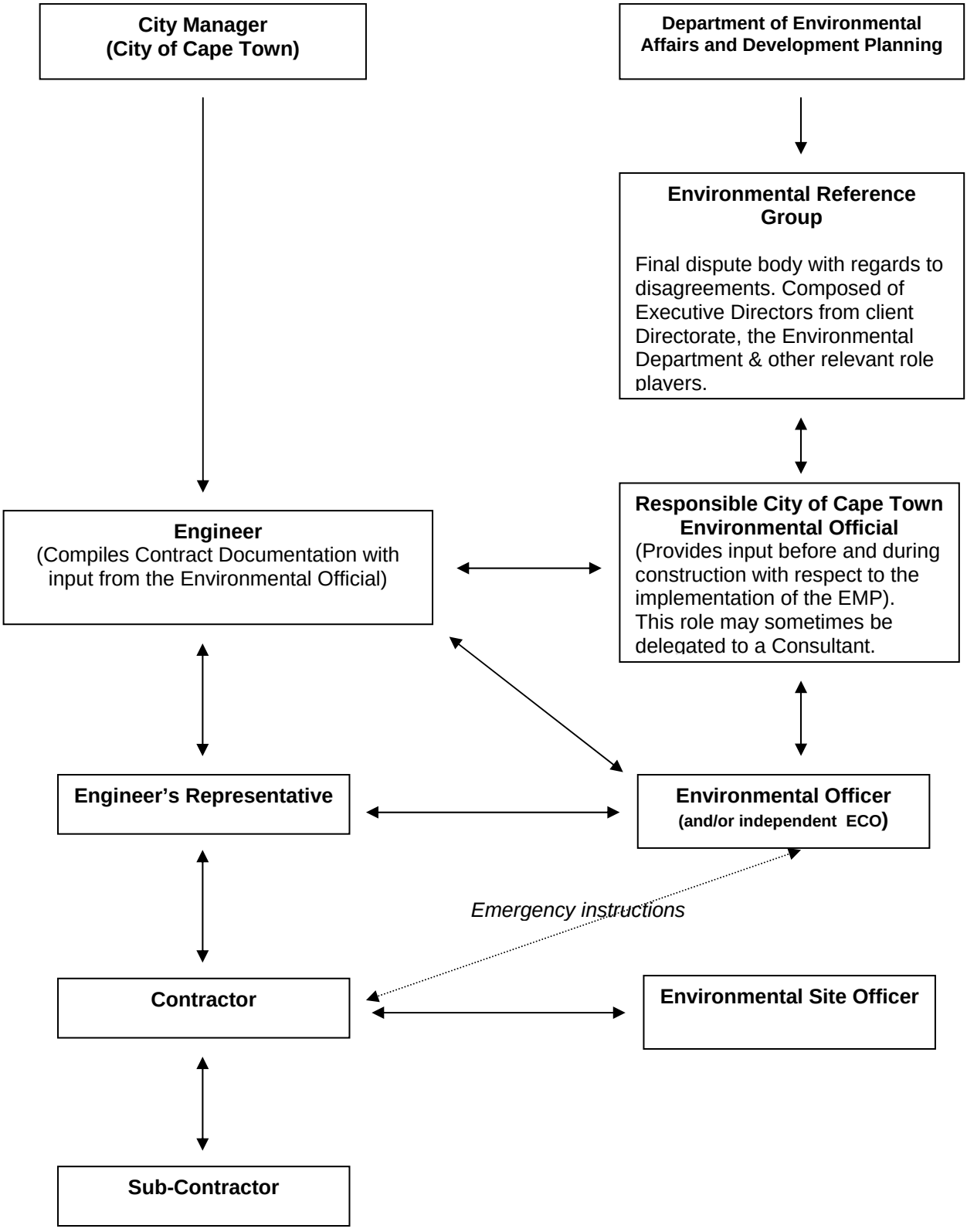
- The ER may work together with an EO; or
- There may be an ER only (for construction projects with low potential for causing significant environmental impacts). In this case the ER has responsibility for the EO's functions.
- There may be an independently appointed Environmental Control Officer who will work in cooperation with the ER or ER and EO. The ECO's duties are essentially the same as those of the EO.

Table 1: Contract Team Organogram

(Source: DEADP (2007) Generic Environmental Management Plan (EMP) for Pre-Construction and Construction, Department of Environmental Affairs and Development Planning (DEADP), Cape Town.)

CE	**Consulting Engineer**	**Contracted by the City of Cape Town** to design and specify the project engineering aspects. Generally the engineer runs the works contract. The CE may also fulfill the role of Project Manager on the proponent's behalf (See PM).
PM	**Project Manager**	The Project Manager has **over-all responsibility for managing the project**, contractors, and consultants and for ensuring that the environmental management requirements are met. The CE may also act as the PM. All decisions regarding environmental procedures must be approved by the PM. The PM has the authority to stop any construction activity in contravention of the EMP in accordance with an agreed warning procedure.
ER	**Engineer's Representative**	The **Consulting Engineer's representative on site**. The ER has the power/mandate to issue site instructions and in some instances, variation orders to the contractor, following request by the EO or ECO. The RE oversees site works, liaison with Contractor and ECO
EO/ EM	**Environmental Officer/ Environmental Manager**	**Appointed by the Consulting Engineers** as their environmental representative on site. The EO is not independent but must rather act on behalf of the consulting engineers with the mandate to enforce compliance under the project contract, which must include the EMP. The EO has the directive to issue non-conformance and hazard certificates. Further, in terms of accepted industry practice the EO could issue the equivalent of a "cease works" instruction only in exceptional circumstances where serious environmental harm has been or is about to be caused i.e. in cases of extreme urgency and then only when the ER is absent. The EO must form part of the project team and be involved in all aspects of project planning that can influence environmental conditions on the site. On certain types of projects, such as linear developments (fences, pipelines, etc), the EO must also be the liaison between the contractor and landowners. The EO must attend relevant project meetings, conduct daily inspections to monitor compliance with the EMP, and be responsible for providing reports and feedback on potential environmental problems associated with the development to the project team and ECO. The EO must convey the contents of this EMP to the Contractor site team and discuss the contents in detail with the Contractor as well as undertake to conduct an induction and an environmental awareness training session prior to site handover to all contractors and their workforce. The EO must be suitably experienced with the relevant qualifications and preferably competent in construction related methods and practices.

ECO	**Environmental Control Officer**	An **independent appointment to objectively monitor implementation** of relevant environmental legislation, conditions of Environmental Authorisations (EA's), and the EMP for the project. The ECO must be on site prior to any site establishment and must endeavour to form an integral part of the project team. The ECO must be proactive and have access to specialist expertise as and when required, these include botanist's ecologists etc. Further the ECO must also have access to expertise such as game capture, snake catching, etc. The ECO must conduct audits on compliance to relevant environmental legislation, conditions of EA, and the EMP for the project. The size and sensitivity of the development, based on the EIA, will determine the frequency at which the ECO will be required to conduct audits. (A minimum of a monthly site inspection must be undertaken). The ECO must be the liaison between the relevant authorities and the project team. The ECO must communicate and inform the developer and consulting engineers of any changes to environmental conditions as required by relevant authoritative bodies. The ECO must ensure that the registration and updating of all relevant EMP documentation is carried out. The ECO must be suitably experienced with the relevant environmental management qualifications and preferably competent in construction related methods and practices. The ECO must handle information received from whistle blowers as confidential and must address and report these incidences to the relevant Authority as soon as possible. On small projects, where no EO is appointed, the ECO must convey the contents of this EMP to the Contractor site team and discuss the contents in detail with the Contractor as well as undertake to conduct an induction and an environmental awareness training session prior to site handover to all contractors and their workforce.
C	**Contractor**	The **principle contractor**, hereafter known as the 'Contractor', is responsible for implementation and compliance with the requirements of the EMP and conditions of the EA's, contract and relevant environmental legislation. The Contractor must ensure that all sub-contractors have a copy of and are fully aware of the content and requirements of this EMP. The contractor is required, where specified, to provide Method Statements setting out in detail how the management actions contained in the EMP will be implemented
ESO	**Environmental Site Officer**	The ESO is **employed by the Contractor** as his/her environmental representative to monitor, review and verify compliance with the EMP by the contractor. This is not an independent appointment; rather the ESO must be a respected member of the contractor's management team. Dependent on the size of the development the ESO must be on site one week prior to the commencement of construction. The ESO must ensure that he/she is involved at **all phases** of the construction (from site clearance to rehabilitation).


City Manager
(City of Cape Town)
Department of Environmental Affairs and Development Planning
Environmental Reference Group
Final dispute body with regards to disagreements. Composed of Executive Directors from client Directorate, the Environmental Department & other relevant role players.
Engineer
(Compiles Contract Documentation with input from the Environmental Official)
Responsible City of Cape Town Environmental Official
(Provides input before and during construction with respect to the implementation of the EMP). This role may sometimes be delegated to a Consultant.
Engineer's Representative
Environmental Officer
(and/or independent ECO)
Emergency instructions
Contractor
Environmental Site Officer
Sub-Contractor

PSEM ENVIRONMENTAL MANAGEMENT. (SPEC EM)

CONTENTS:

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EXPLANATION OF MARGIN ICONS

To expedite the compilation of the Project Specification, generic clauses, appropriate to projects with low or negligible environmental risk have been highlighted using an arrow icon (➔) for several of the detailed specifications. These clauses should be used where the project is of low environmental risk and the issue is relevant to the project at hand. It should be remembered, however, that in addition to these generic clauses, the other clauses should be reviewed to identify any further pertinent issues not covered by the generic clause.

In this way, using the shortlist of specifications and appropriate clauses, the Project Specification is compiled. However, before the Project Specification is included in the Tender Document, it is essential that a suitable qualified documentation engineer review the specification to ensure the use of appropriate terminology and the avoidance of contradiction and ambiguity.

A flag icon 🏳 (located in the right-hand margin) marks certain clauses within the Standard Environmental Specification. This flag denotes standard clauses that refer specifically to the Project Specification. Accordingly, in compiling the Project Specifications due consideration must be given to these aspects and appropriate clauses included in the specification.

PSEM ENVIRONMENTAL MANAGEMENT. (SPEC EM)

PSEM1 SCOPE

The general principles contained within the SPEC EM shall apply to all construction activities.

PSEM2 INTERPRETATIONS

PSEM2.1 Definitions

For the purposes of this Specification the following definitions shall apply: {*include any relevant definitions as illustrated below*}

working area means any area within the boundaries of the Site where construction is taking place

PSEM3 MATERIALS

PSEM3.1 Materials handling, use and storage

3.1.1 Storage

1. Storage areas shall be roofed with impervious material. The ingress of wind-blown rain shall be avoided by sufficient roof overhang or sides of sufficient height. Rainwater run-off shall be channelled or piped away from the area into channels or catchpits as specified elsewhere.

3.1.2 Importation of fill/ soil/ sand materials

➔ 1. Imported materials shall be free of weeds, litter and contaminants.
2. Sources of imported material shall be listed and approved by the Engineer/ECO/EO.
3. The Contractor shall provide samples to the Engineer/ECO/EO for approval.
4. Stockpile areas shall be approved by the Engineer/ECO/EO before any stockpiling commences.

PSEM3.2 Hazardous substances

3.2.1 Paints

1. No paint products may be disposed of on Site.
2. Brush / roller wash facilities shall be established to the satisfaction of the Engineer/ECO/EO.
3. Oil based paints and chemical additives and cleaners such as thinners and turpentine shall be strictly controlled. A Method Statement, approved by the Engineer/ECO/EO, is required.

PSEM4 PLANT

PSEM4.1 Fuel and oils

{permissions/ general provisions}

1. Fuel may be stored on site providing the following is strictly adhered to.
2. All necessary approvals with respect to fuel storage and dispensing shall be obtained from the appropriate authorities.
3. The Municipal Fire Chief must be informed and consulted ito Fire Regulations.

4. The Contractor shall ensure that all liquid fuels and oils are stored in tanks with lids, which are kept firmly shut and under lock and key at all times.
5. Areas for storage of fuels and other flammable materials shall comply with standard fire safety regulations and may require the approval of the Municipal Fire Chief
6. Temporary above ground storage tanks may be permitted at the discretion of the Municipal Fire Chief based on the merit of the situation, provided that the following requirements are complied with:
    a. Written application together with a plan and authority from the City of Cape Town effluent inspector shall be forwarded to the Municipal Fire Chief at least fourteen (14) days prior to the installation being erected on site. Written permission shall be obtained from the chief fire officer for the erection of the installation.
    b. The drawn plan shall be acceptable to the Municipal Fire Chief and to contain the following information:
        i. the scale
        ii. the name and address of the premises,
        iii. the number and the quantity of the tanks,
        iv. the position of the tanks in relation to the boundary, other flammable or combustible materials, etc,
        v. the size and construction materials used for the bund
        vi. the product to be kept in the tank, and
        vii. any other information relevant to the situation.

{location}

➔ 1. The fuel storage area shall be located at one of the following locations: {provide a list of acceptable locations for the fuel storage area}.
2. The Engineer/ECO/EO shall be advised of the area that the Contractor intends using for the storage of fuel.
3. The location of the fuel storage area will determined by the Municipal Fire Chief and be approved by the Engineer/ECO/EO.
4. The tank shall be erected at least 3,5 meters from buildings, boundaries and any other combustible or flammable materials.

{signs/good practice/safety precautions}

1. Symbolic safety signs depicting “No Smoking”, “No Naked Lights” and “Danger” conforming to the requirement of SABS 1186 are to be prominently displayed in and around the fuel storage area. The volume capacity of the tank shall be displayed.

➔ 2. No smoking shall be allowed in the vicinity of the stores.
3. The capacity of the tank shall be clearly displayed and the product contained within the tank clearly identified using the emergency information system detailed in SABS 0232 part 1.
4. There shall be adequate fire-fighting equipment at the fuel storage and dispensing area or areas.

➔ 5. Fuel shall be kept under lock and key at all times.

{tanks}

1. The storage tank shall not have a capacity exceeding 9000 litres and shall not be used for the storage of liquids other than those with a flash point in excess of 40 ºC.
2. If larger capacity tanks are required or the tank is to be a permanent installation, then an acceptable rational design based on a relevant national or international code or standard shall be submitted to the local authority for approval in terms of the National Building Regulations.
3. The storage tank shall be removed on completion of the works.
4. The storage tank shall not be on the premises for longer than 6 months.
5. All such tanks to be designed and constructed in accordance with a recognised code.

6. The rated capacity of tanks shall provide sufficient capacity to permit expansion of the product contained therein by the rise in temperature during storage.

{bunds/storage areas}

➔ 1. Tanks shall be situated in a bunded area the volume of which shall be at least 110% of the volume of the largest tank. The floor of bund shall be smooth and impermeable constructed of concrete or plastic sheeting with impermeable joints with a layer of sand over to prevent perishing. The bund walls shall be formed of well-packed earth with the impermeable lining extending to the crest. The floor of the bund shall be sloped towards an oil trap or sump to enable any spilled fuel and/or fuel-soaked water to be removed.
2. A bacterial hydrocarbon digestion agent that is effective in water approved by the Engineer/ECO/EO shall be installed in the sump.
3. The tanks and bunded areas shall be covered by a roofed structure to prevent the bunded area from filling with rain water. This structure shall be constructed in such a way, and to the approval of the Engineer/ECO/EO, to ensure that it is wind resistant.
4. Any water that collects in the bund shall not be allowed to stand and shall be removed within one day and taken off Site to a disposal site approved by the Engineer/ECO/EO, and the bacterial hydrocarbon digestion agent shall be replenished.
5. The Municipal Fire Chief must be informed and consulted ito Fire Regulations. SANS 10131: Installation of above-ground tanks must be adhered to.

{*Refer to figures at end of this Detailed Environmental Specification*}

{empty containers}

1. Only empty and externally clean tanks may be stored on the bare ground. All empty and externally dirty tanks shall be sealed and stored on an area where the ground has been protected.

{filling/dispensing methods}

1. Any electrical or petrol-driven pump shall be equipped and positioned so as not to cause any danger of ignition of the product.
2. If fuel is dispensed from 200 litre drums, the proper dispensing equipment shall be used. The drum shall not be tipped in order to dispense fuel. The dispensing mechanism of the fuel storage tank shall be stored in a waterproof container when not in use.
3. Adequate precautions shall be provided to prevent spillage during the filling of any tank and during the dispensing of the contents.

{method statements}

1. A method statement is required for the filling of and dispensing from storage tanks.

PSEM4.2 Shutter oil operations

1. Shutter oils are to be applied under controlled conditions to avoid accidental and incidental spillage. Proper brush or roller tools shall be provided for the application of shutter oils and the use of rags or makeshift items will not be allowed.

2. Small or appropriately sized containers shall be provided for the application of decanted oil in order to minimise accidental spillage.

PSEM4.3 Eating areas

➔ 1. The Contractor shall designate eating areas at the following location {*either provide verbal description of potential eating area sites or indicate them on the site plan*}
2. The feeding, or leaving of food, for baboons and other animals is strictly prohibited.
3. Provision of waste bins must be allowed for at the eating areas.

PSEM4.4 Toilet and ablution facilities

{Provision}

1. Provision shall be made for employee facilities including: shelter, toilets and washing facilities.
2. Toilet facilities supplied by the Contractor for the workers shall occur at a maximum ratio of 1 toilet per 30 workers (preferred 1:15).

{Location}

➔ 1. The exact location of the toilets shall be approved by the Engineer/ECO/EO prior to establishment.
2. Sanitation facilities shall be located within 100 m from any point of work, but not closer than 50 m to any water body. {distances can be modified depending on the nature of the project}
3. Toilets shall be within the Contractor's Camp and at work areas more than 50m from the Contractor's Camp.

{Construction/design}

➔ 1. All temporary/ portable toilets shall be secured to the ground to the satisfaction of the Engineer/ECO/EO to prevent them toppling due to wind or any other cause.
2. The Contractor shall ensure that the entrances to toilets are adequately screened from public view.
3. Combinations of urinal and pan type units shall be carefully considered.

{Use/Operation}

1. These facilities shall be maintained in a hygienic state and serviced regularly. Toilet paper shall be provided.
➔ 2. The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from Site.
➔ 3. Discharge of waste from toilets into the environment and burial of waste is strictly prohibited.
4. The Contractor shall ensure that toilets are emptied before the builders' holidays.

PSEM4.5 Solid waste management

General

➔ 1. The Contractor shall set up a solid waste control and removal system and a Method Statement is required in this regard.
➔ 2. Bins shall be emptied on a daily basis.
3. The system shall comply with the following detailed requirements:

Dumping

1. Receipts for hazardous waste disposal shall be copied to the Engineer/ECO/EO.
2. Any proposal to dispose of vegetation cuttings, tree trunks or building waste products such as rubble or asphalt or similar such products as part of backfill or landscape shaping shall require a Method Statement.

Litter and refuse

1. Waste and litter shall be disposed of into scavenger- and weatherproof bins. The Contractor shall then remove the refuse collected from the working areas, from Site at least once a week.
2. Refuse must be disposed at a site approved by the Engineer/ECO/EO.
3. The Contractor shall make provision for workers to clean up the Contractor's camp and working areas at least once a week.

Recycling

1. Wherever possible, materials used or generated by construction shall be recycled.
2. Containers for glass, paper, metals and plastics shall be provided. Office and camp areas are particularly suited to this form of recycling process.
3. Where possible and practical, such as at stores and offices, waste shall be sorted for recycling purposes. Recycling protocols shall sort materials into the following categories:
    a. Paper / cardboard
    b. Aluminium
    c. Metals (other than aluminium)
    d. Organic waste
    e. Glass

Litter and oil traps

1. Refuse screens and oil traps shall be installed at runoff concentration points from large parking facilities, wash bays, stormwater outlets, inlets to detention ponds, workshop forecourt drainage points, ablution and eating areas. These facilities shall be serviced and monitored at the discretion of the Engineer/ECO/EO.

PSEM4.6 Contaminated water

General

➔ 1. The Engineer/ECO/EO's approval will be required prior to the discharge of contaminated water to the Municipal sewer system.

➔ 2. The Contractor shall prevent discharge of any pollutants, such as cements, concrete, lime, chemicals and fuels into any water sources.

3. Water from kitchens, showers, laboratories, sinks etc. shall be discharged into a conservancy tank for removal from the site.
4. Runoff from fuel depots/workshops/truck washing areas and concrete swills shall be directed into a conservancy tank and disposed off at a site approved by the Engineer/ECO/EO and Local Authority.
5. The contaminated water, contaminated run-off, or effluent released into a water body requires analysis in terms of the National Water Act. Contaminated water must not be released into the environment without authorisation from the relevant authority.

Washing areas

1. Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas, which include groundwater, are not polluted.
2. A Method Statement shall be required for all wash areas where hydrocarbon and hazardous materials, and pollutants are expected to be used. This includes, but is not limited to, vehicle washing, workshop wash bays, paint wash and cleaning.
3. Wash areas for domestic use shall ensure that the disposal of contaminated "grey" water is sanctioned by the Engineer/ECO/EO.

PSEM4.7 Dust

1. The Contractors shall be solely responsible for the control of dust arising from the Contractor's operations and for any costs against the Employer for damages resulting from the dust.
2. The Contractor shall take all reasonable measures to minimise the generation of dust as a result of construction activities to the satisfaction of the Engineer/ECO/EO.
3. Removal of vegetation shall be avoided until such time as soil stripping is required and similarly exposed surfaces shall be re-vegetated or stabilised as soon as is practically possible.
4. Excavation, handling and transport of erodible materials shall be avoided under high wind conditions or when a visible dust plume is present.
5. During high wind conditions, the Engineer/ECO/EO will evaluate the situation and make recommendations as to whether dust-damping measures are adequate, or whether working will cease altogether until the wind speed drops to an acceptable level.
6. Where possible, soil stockpiles shall be located in sheltered areas where they are not exposed to the erosive effects of the wind. Where erosion of stockpiles becomes a problem, erosion control measures shall be implemented at the discretion of the Engineer/ECO/EO.
7. Vehicle speeds shall not exceed 45km/h along dust roads or 20km/h when traversing unconsolidated and non-vegetated areas. {*modify speed limits depending on the nature of the project*}
8. Appropriate dust suppression measures shall be used when dust generation is unavoidable, e.g. dampening with water, particularly during prolonged periods of dry weather in summer. Such measures shall also include the use of temporary stabilising measures (e.g. chemical soil binders, straw, brush packs, chipping etc.).
9. Straw stabilisation shall be applied at a rate of one bale/ 10m² and harrowed into the top 100 mm of top material, for all completed earthworks.

PSEM4.8 Lights

1. Where the Engineer/ECO/EO has authorised nightwork, low flux and frequency lighting shall be used. {*applicable in areas where entomology concerns have been identified – a specialist would need to be consulted with respect to determining the appropriate flux and frequency levels*}

PSEM4.9 Workshop, equipment maintenance and storage

Construction camp maintenance

1. The construction camp shall be kept neat and clean at all times.
2. Refuse and waste storage areas shall be positioned away from buildings

Drip trays and bunding

1. Drip trays shall be inspected and emptied daily, and serviced when necessary. In particular drip trays shall be closely monitored during rain events to ensure that they do not overflow.
2. All repairs done on machinery using hydrocarbons as fuels or lubricants shall have a drip tray placed strategically to avoid incidental spillage.
3. All static plant shall be located within a bunded area. The bunded area shall have a smooth impermeable surface (plastic) with an earth bund. The impermeable material shall extend to the crest of the earth bund. The floor of the bunded area shall be sloped towards an oil trap or sump to enable incidental spillage to be removed.
4. The Municipal Fire Chief must be informed and consulted ito Fire Regulations. SANS 10131: Installation of above-ground tanks must be adhered to.

PSEM4.10 Noise

1. Noise levels exceeding 85dB shall only be permitted where approved by the Engineer/ECO/EO or during an emergency situation.

PSEM5 CONSTRUCTION

PSEM5.1 Method Statements

➔ The following Method Statements shall be provided by the Contractor 14 days after receipt of the Letter of Acceptance:

{Add in only those Method Statements relevant to the particular project}

➔ Other Method Statements that shall be required during the course of construction include:

{Add in only those Method Statements relevant to the particular project}

{List of method statements from which the relevant ones must be chosen}:

5.1.1 Access routes

- Upgrading and construction of access routes.
- Rehabilitation of temporary access routes.
- Location of proposed access routes.

5.1.2 Alien plant clearing

- Method of control to be used for the eradication or control of alien vegetation.

5.1.3 Anchors

- Use of rock or ground anchors (epoxy and grouting chemical/safety data sheets to also be provided)

5.1.4 Blasting

- Details of all methods and logistics associated with blasting.

5.1.5 Bunding

- Method of bunding for static plant.

5.1.6 Camp establishment

- Layout and preparation of the construction camp.
- Method of installing fences required for “no go” areas, working areas and construction camp areas
- Preparation of the working area.

5.1.7 Cement /concrete batching

- Location, layout and preparation of cement/ concrete batching facilities including the methods employed for the mixing of concrete including the management of runoff water from such areas.

5.1.8 Contaminated water

- Contaminated water management plan, including the containment of runoff and polluted water.

5.1.9 Demolition

- Proposed method(s) of demolition.

5.1.10 Dredging

- Proposed methods and compounds to treat spills.
- Methods of refuelling dredger.

5.1.11 Drilling and jack hammering

- Method of drill coring with water or coolant lubricants.
- Methods to prevent pollution during drilling operations.

5.1.12 Dust

- Dust control.

5.1.13 Earthwork

- Method for the control of erosion during bulk earthwork operations.
- Method of undertaking earthworks, including hand excavation and spoil management.

5.1.14 Emergency

- Emergency construction method statements.

5.1.15 Environmental awareness course

- Logistics for the environmental awareness course for all the Contractors employees.
- Logistics for the environmental awareness course for the Contractors management staff.

5.1.16 Erosion control

- Method of erosion control, including erosion of spoil material

5.1.17 Exposed aggregate finishes

- The method of control, treatment and disposal with respect to exposed aggregate finishes.

5.1.18 Fire, hazardous and poisonous substances

- Handling and storage of hazardous wastes.
- Emergency spillage procedures and compounds to be used.
- Emergency procedures for fire.
- Use of herbicides, pesticides and other poisonous substances.
- Methods for the disposal of hazardous building materials including asbestos, fibre claddings, refrigerants and coolants.

5.1.19 Fuels and fuel spills

- Methods of refuelling vehicles.
- Details of methods for fuel spills and clean up operations.
- Refuelling of construction vehicles in high flow areas [or in the 1 in 50 year floodplain].
- Method of refuelling dredger during dredging operations.

5.1.20 Piling, jacking and thrust boring

- The method of piling operation (e.g. driven or bored) or in situ casting or pre-cast pile structures.

5.1.21 Rehabilitation

- Rehabilitation of disturbed areas and revegetation after construction is complete.
- Retaining walls and gabions.
- Method for construction and installation of retaining walls/ gabion baskets.

5.1.22 Riverine corridors

- Method of diverting the river during construction.
- Details of methods to control downstream sedimentation. {*There are a series of guidelines, detailed by reach, available from Stormwater Management*}
- Details of methods to control instream and floodplain erosion.
- Details of methods to cross rivers or streams during construction activities.
- Details of the release of any construction related effluent water into any natural stream of river.
- Method for all construction activities within the 1 in 50 year floodplain.
- Method of laying the pipeline across the {*lagoon*}, including details of methods to control sedimentation.

5.1.23 Rock breaking

- Details of chemical applications to be used for rock breaking.

5.1.24 Settlement ponds and sumps

- Layout and preparation of settlement ponds and sumps.

5.1.25 Solid waste management

- Solid waste control and removal of waste from Site.
- Methods for the disposal of vegetation cuttings, tree trunks and or building materials.

5.1.26 Sources of materials

- Details of materials imported to the site (where applicable).

5.1.27 Sensitive environments

- Proposed construction methods within any sensitive environments {*these include but are not limited to wetlands, intertidal zones and estuaries*}

5.1.28 Traffic

- Traffic safety measure for entry/ exit onto/ off public roads.

5.1.29 Vegetation clearing

- Method of vegetation clearing during site establishment.

5.1.30 Wash areas

- Location, layout, preparation and operation of all wash areas, including vehicle wash, workshop washing and paint washing and clearing.

5.1.31 Wastewater treatment works

- Emergency procedures for accidental leaks, spillage or overflow of raw wastewater, semi-treated wastewater, sludge or final effluent. The Method Statement shall include the following:
    a. a comprehensive list of available equipment (*e.g.* pipes and pumps) in the event of a spill
    b. the location of all emergency equipment
    c. the individual(s) responsible for the upkeep and maintenance of the emergency equipment
    d. an indication of how regularly the emergency equipment will be checked to ensure that it is working properly
    e. the location of any and all temporary emergency sumps, including old sludge ponds, clarifiers, low lying areas *etc*.
    f. the size of spillage which the emergency procedures could contain

g. where and how any spilled material will be returned to the wastewater works system
h. who shall be notified in the event of an emergency, including contact numbers for the relevant local authority

- Methods to isolate any section of the wastewater infrastructure for construction or maintenance purposes.
- Methods to connect new structures or reconnect old structures to the wastewater treatment infrastructure.

5.1.32 Water abstraction

- Methods of abstraction and utilisation of water from natural water resources.
- Details of any well point provision.

PSEM5.2 Environmental awareness training

{requirement}

1. All the Contractors employees and Sub-Contractors employees and any suppliers employees that spend more than 1 day a week or four days in a month on site, must attend an Environmental Awareness Training course presented by the Contractor the first of which shall be held within one week of the Commencement Date. Subsequent courses shall be held as and when required.

{given by whom}

1. The Engineer/ECO/EO will provide the Contractor with the course content for the environmental awareness training course, and the Contractor shall communicate this information to his employees on the site, to any new employees coming onto site, to his subcontractors and to his suppliers.
2. The Engineer/ECO/EO or suitably qualified representative will present the environmental awareness training course to the Contractors employees on the site, to any new employees coming onto site and to the Contractors subcontractors and suppliers.

{logistics}

1. No more than 20 people shall attend each course and the cost, venue and logistics for this/ these course/s shall be for the Contractor's responsibility. The cost for each individual course shall be R……...
2. Within seven days from the Commencement Date the Contractor shall ensure that the first course/s is/are held for as many of the employees that are available at this time.
3. The Contractor shall supply the Engineer/ECO/EO with a monthly report indicating the number of employees that will be present on site during the following month and any changes in this number that may occur during the month.

{method statement}

1. The Contractor shall submit a Method Statement detailing the logistics of the environmental awareness training course.

PSEM5.3 Site division

Construction camp location

➔ 1. The construction camp shall be located at an easily accessible point and within an area of low environmental sensitivity. The location shall be identified in consultation
➔ with the Engineer/ECO/EO.

2. No site establishment shall be allowed within 15 m of a drainage channel or water body unless otherwise approved by the Engineer/ECO/EO.

Routing of services

➔ 1. Main bulk service providers such as Telkom and Eskom shall be advised of the construction activities as well as the requirements of this specification and the Contractor shall be responsible for their activities within their work areas.
2. All routes for service infrastructure shall take cognisance of any special features on Site and shall be re-routed around "no go" areas.
3. Where possible, service infrastructure shall be located in the same trench.

Site establishment

➔ 1. To facilitate the necessary monitoring, the Contractor shall inform the Engineer/ECO/EO of the intended actions and programme for site establishment.
➔ 2. The site layout shall take cognisance of access for deliveries and services, and future works. Likely disturbance to neighbours as well as security implications shall be considered.

PSEM5.4 Site demarcation

{General}

➔ 1. The boundaries of the proposed construction camp and working areas are shown in Drawing ????. The site shall be fenced ***by means of/as shown on*** {*insert appropriate specification from list below*}.
2. No-Go areas shall be fenced ***by means of/as shown on*** {*insert appropriate specification from list below*}.
3. ……areas shall be fenced ***by means of/as shown on*** {*insert appropriate specification from list below*}.

{Differing functional areas shall be listed separately with the appropriate fencing specification clearly shown}

➔ 4. The Contractor shall maintain in good order all demarcation fencing and barriers for the duration of construction activities, or as otherwise instructed.

{Specification}

a. a diamond mesh or Bonnox fence with a minimum height of 1,8 m shall be erected around the Site.
b. metal or wooden standards at 20 m centres, with three wooden droppers between the standards. A minimum of 3 plain wire strands shall be tensioned horizontally, the lowest strand being at a height of 500 mm above average ground level and the highest being at 1.2 m. Mesh or Bonnox type fencing, of 1.2 m in height, shall be secured to the wire strands and posts.
c. wooden or metal posts at 3 m centres with 2 plain wire strands tensioned horizontally at 300 mm and 900 mm from ground level. Commercially available extruded plastic mesh fencing shall be secured to these wire strands and posts. The plastic mesh shall be in a clearly seen and visible colour (orange or red). The minimum height shall be 1.2m {*check on standard available sizes*}
d. wooden or metal posts at 3 m centres with 1 plain wire strand tensioned horizontally at 900 mm from ground level. Commercially available danger tape shall be wrapped around the wire strand. The Contractor shall maintain the fence for the duration of the contract and ensure that the danger tape does not become dislodged and cause litter. {*Refer to figures at end of this Detailed Environmental Specification*}
e. Rocks and/ or droppers at 50 m intervals shall be placed along the Site boundary and painted white. The Contractor shall maintain these markers and ensure that they are removed at the end of the Contract.

f. Drawing 8450 CT6 *{Refer to figures at end of this Detailed Environmental Specification}.*

PSEM5.5 "No go" areas

General

➔ 1. A "no go" area shall extend …. {*indicate location and extent of all "no go" areas*}
➔ 2. The Contractor shall ensure that all "no go" areas are demarcated according to the following specifications {*either refer to one of the diagrams or outline demarcation method using specifications given in "Site demarcation"*}.
➔ 3. No unauthorised entry, stockpiling, dumping or storage of equipment or materials shall be allowed within the demarcated "no go" areas.

{*Refer to figures at end of this Detailed Environmental Specification*}

Tree protection

1. All trees, which are to be retained, are to be clearly indicated on a site plan and demarcated.
2. Trees to be demarcated shall be clearly marked under the supervision of the Engineer/ECO/EO. Marking techniques include danger tape, paint (be aware of long term aesthetics), strapping and pegs. Tagging by exclusion shall be considered, i.e. where the number of trees to be cleared is fewer than those to be retained then mark trees for felling and all other trees shall automatically be retained.

➔ 3. Demarcation shall remain in place for the duration of works on site. If damaged, demarcation shall be repaired or replaced immediately.

{*Refer to figures at end of this Detailed Environmental Specification*}

Natural/ special features

1. Special features shall be marked on a site layout plan prior to any works commencing on site. These areas may be designated "No go" areas.
2. Outcrops, rock faces, trees and natural vegetation or any other natural or special features inside and outside the Site, shall not be defaced, painted for benchmarks for survey or any other purposes or otherwise damaged in any way without the prior approval of the Engineer/ECO/EO/ECO/EO. These features shall be demarcated as "no go" areas and shall be fenced or similarly protected, as determined by the Engineer/ECO/EO/ECO/EO.

{*Refer to figures at end of this Detailed Environmental Specification*}

PSEM5.6 Access routes/ haul roads

{Routes}

1. Access to the construction camp and works area is shown on Drawing No ????
2. Haul routes are shown on drawing No ????

➔ 3. Access to the Campsite and works area shall utilise existing roads or tracks where possible.

4. Upgrading of the access roads shall be undertaken within the existing confines of the road, unless otherwise agreed with the Engineer/ECO/EO.

{control}

1. The Contractor shall erect and maintain marker pegs along the boundaries of the working areas, access roads, haul roads or paths, to the satisfaction of the Engineer/ECO/EO, before commencing any other work.

2. The movement of any vehicles and/ or personnel outside of the designated working areas shall not be permitted without the written authorisation of the Engineer/ECO/EO.
3. Should the Contractor not exercise sufficient control to restrict all work to the area within the marker boundaries, then these on instruction of the Engineer/ECO/EO shall be replaced by fencing the additional cost of which shall be borne by the Contractor.
4. Dust control measures such as dampening with water shall be implemented where necessary, as indicated by the Engineer/ECO/EO.

{construction/ maintenance/ rehabilitation}

1. Access and haul roads shall be maintained by the Contractor.
2. Maintenance includes adequate drainage and side drains, dust control and restriction of edge use.
3. All temporary access routes shall be rehabilitated at the end of the contract to the satisfaction of the Engineer/ECO/EO.
4. All public roads shall be kept clear of mud and sand. Mud and sand that has been deposited through construction activities shall be cleared regularly.
5. Any materials used for layerworks shall be approved by the Engineer/ECO/EO prior to the activity commencing.
6. Damage to the existing access roads as a result of construction activities shall be repaired to the satisfaction of the Engineer/ECO/EO, using material similar to that originally used. The cost of the repairs shall be borne by the Contractor

{safety}

1. Traffic safety measures, to the satisfaction of the Engineer/ECO/EO, shall be considered in determining entry / exit onto public roads.
2. All users of haul roads shall not exceed 45 km/h (cars)/ 15 km/h (trucks) {note that the standard spec places a site speed limit of 45 km/h for all vehicles}
3. Appropriate traffic warning signs shall be erected and maintained.
4. Trained and equipped flagmen shall be used where the access road intersects with any public roads.
5. Attention shall be paid to minimising disruption of the flow of traffic and reducing the danger to other road users and pedestrians.

{method statements}

Method statements are required for the following:-

1. Traffic safety measures with regard to entry and exit on public roads and the control of construction traffic.
2. Proposed route for new access roads, tracks, or haul roads; the proposed construction of new roads, and the method of upgrading existing roads; and the proposed methods of rehabilitation on completion.

{*include definition of working area where applicable*}

PSEM5.7 Construction personnel information posters

1. An A3 construction personnel information poster must be laminated and erected in the eating area. The Specifications for the posters are presented in Drawing ???? {*include copy of the construction personnel information poster in the tender document*}
2. The Contractor shall ensure that the construction personnel information poster is not damaged in any way, and shall replace it if any part of it becomes illegible.

{*Refer to figures at end of this Detailed Environmental Specification*}

PSEM5.8 Fire control

1. The Contractor shall take all reasonable and active steps to avoid increasing the risk of fire through their activities on Site. No fires may be lit except at places approved by the Engineer/ECO/EO.
2. The Contractor shall ensure that the basic fire-fighting equipment is to the satisfaction of the Municipal Fire Chief.
3. The Contractor shall supply all living quarters, site offices, kitchen areas, workshop areas, materials, stores and any other areas identified by the Engineer/ECO/EO with tested and approved fire fighting equipment.
4. Fire and "hot work" shall be restricted to a site approved by the Engineer/ECO/EO
5. A braai facility may be considered at the discretion of the Engineer/ECO/EO. The area shall be away from flammable stores. All events shall be under management supervision and a fire extinguisher shall be immediately available. "Low smoke" fuels shall be used. Smoke free zoning regulations shall be considered.
6. Fires within National Parks, Nature Reserves and natural areas are prohibited. Cooking shall be restricted to bottled gas facilities under strict control and supervision. The sensitivity of the surrounding land uses and occurrence of natural indigenous vegetation must be considered when assessing the risk of fires.
7. The Contractor shall take precautions when working with welding or grinding equipment near potential sources of combustion. Such precautions include having a suitable, tested and approved fire extinguisher immediately at hand and the use of welding curtains.
8. The Municipal Fire Chief must be informed and consulted ito Fire Regulations.

PSEM5.9 Emergency procedures

Wastewater treatment works

1. A Method Statement shall be drawn up by the Contractor, in consultation with the wastewater plant manager, on the protocols to be followed, and contingencies in place, in the event of an accidental leak, spillage or overflow of raw wastewater, semi-treated wastewater, sludge or final effluent, as a direct or indirect result of construction activities. The Method Statement shall include the following:
    a. a comprehensive list of available equipment (*e.g.* pipes and pumps) in the event of a spill
    b. the location of all emergency equipment
    c. the individual(s) responsible for the upkeep and maintenance of the emergency equipment
    d. an indication of how regularly the emergency equipment will be checked to ensure that it is working properly
    e. the location of any and all temporary emergency sumps, including old sludge ponds, clarifiers, low lying areas *etc*.
    f. the size of spillage which the emergency procedures could contain
    g. where and how any spilled material will be returned to the wastewater works system
    h. who shall be notified in the event of an emergency, including contact numbers
2. The Contractor shall ensure that his staff and the staff of Subcontractors are aware of the procedure to be followed for dealing with spills and leaks, which shall include notifying the Engineer/ECO/EO and the relevant local authorities. The Contractor shall ensure that the necessary materials and equipment for dealing with spills and leaks are present on Site at all times. The clean-up of spills and any damage caused by the spill or leak shall be for the Contractor's account.

Hydrocarbon spills

➔ 1. An approved Method Statement for spillage treatment is required.

➔ 2. The site shall have a supply of absorbent material readily available to absorb any emergency hydrocarbon spills, and where possible is designed to encapsulate minor hydrocarbon spillage. The quantity of such materials shall be able to absorb / deal with a minimum of 200 l of hydrocarbon liquid spill.

3. There are a number of products on the market, which are designed and suitable to absorbents and encapsulate. The following are examples of those products used to contain incidental spillage:
    a. Spill-Sorb – oil and chemical absorbent & encapsulating products
    b. Drizzat Pads
    c. Enretech Powder – Absorbent & encapsulation
    d. Peat moss

➔ 4. Treatment and remediation of spill areas shall be undertaken to the satisfaction of the Engineer/ECO/EO.

5. Treatment and remediation shall require a Method Statement. Examples of products used for treatment and remediation include:
    a. Chemcap – aqueous silicate, releases and encapsulates
    b. Bio-Systems B110 Series
    c. Enretech products

6. The source of the spillage shall be isolated.

7. The contractor shall contain the spillage using sand berms, sandbags, pre-made booms, sawdust or absorbent materials.

8. Cordon off and ensure safety of the spillage area.

9. Notify the Engineer/ECO/EO and the City of Cape Town Pollution Control Inspectorate.

PSEM5.10 Special environments

➔ {*method statements should be requested for all construction activities within these sensitive areas*}

5.10.1 Intertidal zones and estuaries

1. No vehicle shall be permitted onto a beach without a permit having first been obtained from the Relevant Authority concerned.
2. Any works to be carried out near to or below the high water mark of the sea for which a permit has not been obtained from the Relevant Authority in terms of the Marine Living Resources Act (Act No. 18 of 1998) and National Environmental Management Act (No 107 of 1998) and its Regulations is illegal and shall render the offender to a prison sentence of up to two years and a fine.
3. The removal of any material from below the high water mark of the sea without the necessary permit is an offence and attracts a jail term of up to two years and a fine.
4. Additionally, a court may order the removal of any illegal works carried out below the high water mark of the sea at the offender's expense and further order the rehabilitation and repair of any damage to the sea shore caused by the illegal works.

5.10.2 Rivers and streams

➔ 1. The Contractor shall minimise the extent of any damage to the flood plain to that necessary to complete the works, and shall not pollute the river system as a result of construction activities. The Contractor shall not cause any physical damage to any aspects of a watercourse, other than that necessary to complete the works as specified and in accordance with the accepted method statement.

➔

2. Construction activities shall not permanently alter the surface or subsurface flow of water through the flood plain area. No construction materials shall be stockpiled on the flood plain.
3. Any excavation within the lagoon and flood plain shall be by hand. The Contractor shall ensure that all construction activities within the flood plain and lagoon, including the removal of vegetation, stockpiling of top material, excavating of pipeline route, laying of pipeline, backfilling of excavations and rehabilitation occur within a maximum of a three week period.
4. Baseline water quality of any rivers, streams, wetlands on the Site shall be established prior to onset of any construction activities. These baseline values (total Suspended Solids, pH, conductivity, nitrates, nitrites, ammonia and temperature) shall not be adversely affected by construction-related activities. {*Baseline water quality and monitoring requirements should be established with the City of Cape Town's Scientific Services prior to commencement of construction*}
5. The Contractor shall submit a method statement for review 14 days prior to commencing construction within the 1 in 50 year floodline. The method statement shall highlight (but not be confined to) the following issues:
    a. detailed plan for any crossings, including pipe protection works;
    b. how water flow will be diverted during construction (if applicable);
    c. containment of contaminated runoff and contaminated water;
    d. width of working servitude (if not already detailed in project specification);
    e. final expected profile of river/ stream banks;
    f. reinstatement and rehabilitation of river/ stream banks.
6. All temporary and permanent fill used adjacent to, or within, the river / streambed shall be of clean sand or larger particles. Silts, clays, granitic sands and boulders shall not be permitted in the fill.
7. Plastic sheeting, sandbags or geofabric approved by the Engineer/ECO/EO shall be used to prevent the migration of fines through the edges of the fill into the river.
8. Banks shall be suitably stabilised incrementally immediately after construction allows. Upkeep of stabilisation facilities shall be continuously maintained.
9. The Contractor shall remove herbaceous riparian vegetation as directed by the Engineer/ECO/EO, with their root ball intact. This vegetation shall be kept moist by means of placing it in the shade, covered with moistened hessian cloth until it is replanted within a specified time period.
10. The Contractor shall not modify the banks or bed of a watercourse.
11. Rocks for use in gabion baskets/ reno mattresses shall not be obtained from a watercourse.
12. The Contractor shall not cause any physical damage to any aspects of a watercourse, other than that necessary to complete the works as specified and in accordance with the accepted method statement.
13. The introduction of any construction related effluent water into any natural stream or river requires a Method Statement to be approved by the Engineer/ECO/EO.

{*Refer to figures at end of this Detailed Environmental Specification*}

5.10.3 Wetlands

1. Damage to the wetland areas shall be minimised. The Engineer/ECO/EO shall approve demarcation of work area extent. All potential wetland areas shall be marked clearly on the plan and the Contractor shall submit a Method Statement for review at least 14 days prior to commencing construction in a wetland.
2. Construction may not permanently alter the surface or subsurface flow of water through the wetland.
3. The Contractor shall remove all wetland vegetation, as indicated by the Engineer/ECO/EO, with their root ball intact. This vegetation shall kept moist at all

times and shall be placed in the shade and covered with moistened hessian cloth until replanting within a specified time period.

4. No construction materials shall be stockpiled in any wetland areas.
5. The post-construction profile of the wetland shall be returned to one similar to that before construction, with no created "ridge or channel" features present.

PSEM5.11 Protection of archaeological and palaeontological remains

➔ If remains or artefacts are discovered on Site during earthworks, work shall cease and the Contractor shall immediately inform the Engineer/ECO/EO and contact the relevant authority, i.e. South African Heritage Resources Agency (SAHRA) and Heritage Western Cape (HWC).

PSEM5.12 Erosion and sedimentation control

➔ 1. During construction the Contractor shall protect areas susceptible to erosion by installing necessary temporary and permanent drainage works as soon as possible and by taking other measures necessary to prevent the surface water from being concentrated in streams and from scouring the slopes, banks or other areas.
2. A Method statement shall be developed (in consultation with a specialist if necessary) and submitted to the Engineer/ECO/EO to deal with erosion issues prior to bulk earthworks operations commencing.
3. Any runnels or erosion channels developed during the construction period or during the vegetation establishment period shall be backfilled and compacted, and the areas restored to a proper condition.

➔ 4. Stabilisation of cleared areas to prevent and control erosion shall be actively managed. The method of stabilisation shall determined in consultation with the Engineer/ECO/EO and a specialist if necessary. Consideration and provision shall be made for the following methods (or combination): {*choose appropriate method*}

   Brushcut packing
   Mulch or chip cover
   Straw stabilising (at the rate of one bale/m² and rotated into the top 100mm of the completed earthworks)
   Watering
   Planting / sodding
   Hand seeding sowing
   Hydroseeding
   Soil binders and anti erosion compounds
   Mechanical cover or packing structures
      i. Gabions & mattresses
      ii. Geofabric
      iii. Hessian cover
      iv. Armourflex
      v. Log / pole fencing
      vi. Retaining walls

➔ 5. Traffic and movement over stabilised areas shall be restricted and controlled, and damage to stabilised areas shall be repaired and maintained to the satisfaction of the Engineer/ECO/EO.
6. Anti-erosion compounds shall consist of an organic or inorganic material to bind soil particles together and shall be a proven product able to suppress dust and erosion. The application rate shall conform to the manufacturer's recommendations. The material used shall be of such a quality that grass and fynbos seeds may germinate and not prohibit growth.

{*Refer to figures at end of this Detailed Environmental Specification*}

PSEM5.13 Stormwater controls

➔
1. The Contractor shall take reasonable measures to control the erosive effects of stormwater runoff.
2. The Contractor shall use siltscreens to prevent overland flowing water from causing erosion.
3. The use of straw bales as filters, which are placed across the flow of overland stormwater flows, shall be used as an erosion protection measure.
4. The ploughing-in of straw offers limited protection against stormwater runoff-induced erosion and shall be used as an erosion protection measure.
5. The Contractor shall be liable for any damage to downstream property caused by the diversion of overland stormwater flows.

PSEM5.14 Aesthetics

1. The Contractor shall be required to visually screen the site.
2. Visual screening shall be aesthetically pleasing and shall be erected by the Contractor prior to commencing any activities.
3. Visual screening shall be maintained by the Contractor for the duration of the Contract.
4. Visual screening may be of the following types:
    a. Shade cloth
    b. Hessian
    c. Berms

PSEM5.15 Community relations

5.15.1 Adjoining sites

1. The adjoining site is used by the community as a sportsfield/ soccer pitch. The Contractor shall ensure that his operations do not in any way prejudice or interrupt the safe use of this facility by members of the public.
2. Operations that are likely to be noisy, dusty or otherwise disruptive shall only be commenced after due notice and consultation with the community likely to be affected has been carried out. The following procedure shall be adhered to:- *{insert here procedure which should be dictated by the relevant recommendations of the EMP}*
3. Access to the site will be allowed through the adjoining site only if the access route is clearly marked and demarcated as described in clause **. Particular care shall be taken by all drivers while negotiating this route and all rules laid down in clauses in this regard elsewhere in this Specification shall be strictly adhered to.

{*It must be established whether the Contractor is to be given the responsibility of community relations. If not then the employer must undertake the actions outlined below, and these instructions would not be included in the Project Specification*}

➔
1. The Contractor shall erect an information board containing background information for the construction activity and listing the relevant contact details for complaint. {*the number and location of information boards for each project must be determined when drawing up the tender document*}

[for a project for which an Environmental Impact Assessment process has been undertaken]

2. The Contractor shall distribute letters to all interested and affected parties identified during the Environmental Impact Assessment process, notifying them of the onset of the construction activities and providing the relevant contact details for complaint.

[OR; for a project for which no previous Environmental Impact Assessment process has been undertaken}

2. The Contractor shall undertake a mail drop to residents in the immediate vicinity of the proposed activity, notifying them of the onset of the construction activities and providing the relevant contact details for complaint.

{Information boards}

➔ 3. A2 posters, to be placed on the information boards, printed on vinyl, shall be supplied to the Contractor. The Contractor shall mount the poster on a 0,6 mm white chromodek backing with a 50 mm by 50 mm by 1,6 mm square tube frame. This frame shall be mounted on a 100 mm diameter wooden pole 1,5 m above the ground as directed by the Engineer/ECO/EO. The Contractor shall be responsible for making up and erecting the information boards at the locations indicated above and for maintaining them to the satisfaction of the Engineer/ECO/EO.

PSEM5.16 Access to site

➔ 1. The Contractor shall ensure that access to the Site and associated infrastructure and equipment is off-limits to the public at all times during construction. Additional areas restricted to the public and suggested detours shall be clearly marked on the information boards to the satisfaction of the Engineer/ECO/EO.

PSEM5.17 Anchors

➔ 1. Rock or ground anchors are normally associated with unstable or special engineering circumstances and a Method Statement, approved by the Engineer/ECO/EO, shall be required for these processes.
2. Epoxy and grouting Chemical/safety data sheets to be provided as part of Method Statement.

{*Refer also to Drilling, Protection of natural features, Noise*}

PSEM5.18 Asphalt, bitumen and paving

➔ 1. Over spray of bitumen products outside of the road surface and onto roadside vegetation shall be prevented using a method approved by the Engineer/ECO/EO.

➔ 2. Bitumen drums / products shall be stored in an area approved by the Engineer/ECO/EO. This area shall be indicated on the construction camp layout plan. The storage area shall have a smooth impermeable (concrete or thick plastic covered in sand) floor. The floor shall be bunded and sloped towards a sump to contain any spillages of substances.
3. When heating of bitumen products, the Contractor shall take cognisance of appropriate fire risk controls.
4. Stone chip / gravel excess shall not be left on road / paved area verges. This shall be swept / raked into piles and removed to an area approved by the Engineer/ECO/EO.
5. Milled or cut out bitumen shall be removed to an area approved by the Engineer/ECO/EO.
6. Water quality from runoff from newly /fresh bitumen surfaces shall be monitored by the Engineer/ECO/EO and remedial actions taken where necessary.

7. Heating of bitumen products shall only be undertaken using LPG or similar zero emission fuels.
8. Appropriate fire fighting equipment shall be readily available.

PSEM5.19 Blasting

1. A current and valid authorisation shall be obtained from the relevant authorities and copied to the Engineer/ECO/EO prior to any blasting activity.
2. A Method Statement shall be required for any blasting related activities.
3. All Laws and Regulations applicable to blasting activities shall be adhered to at all times.
4. A qualified and registered blaster shall supervise all blasting and rock splitting operations at all times.
5. The Contractor shall ensure that appropriate pre blast monitoring records are in place (i.e. photographic and inspection records of structures in close proximity to the blast area).
6. The Contractor shall allow for good quality vibration monitoring equipment and record keeping on Site at all times during blasting operations.
7. The Contractor shall ensure that emergency services are notified, in writing, a minimum of 24 hours prior to any blasting activities commencing on Site.
8. The Contractor shall take necessary precautions to prevent damage to special features and the general environment, which includes the removal of flyrock. Environmental damage caused by blasting / drilling shall be repaired at the Contractors expense to the satisfaction of the Engineer/ECO/EO.
9. The Contractor shall ensure that adequate warning is provided immediately prior to all blasting. All signals shall also be clearly given.
10. The Contractor shall use blast mats for cover material during blasting. {*topsoil may not be used as blast cover*}
11. During demolition the Contractor shall ensure, where possible, that trees in the area are not damaged.
12. Appropriate blast shaping techniques shall be employed to aid in the landscaping of blast areas, and a Method Statement to be approved by the Engineer/ECO/EO, shall be required in this regard.
13. At least one week prior to blasting, the relevant occupants/owners of surrounding land shall be notified by the Contractor and any concerns addressed. Buildings within the potential damaging zone of the blast shall be surveyed preferably with the owner present, and any cracks or latent defects pointed out and recorded either using photographs or video. Failing to do so shall render the Contractor fully liable for any claim of whatsoever nature, which may arise. The Contractor shall indemnify the Employer in this regard.

PSEM5.20 Borrow pits and quarries

1. All borrow pit sites shall be clearly indicated on plan.
2. Prior to the onset of any quarrying or borrow pit activities the Contractor shall establish from the Engineer/ECO/EO whether authorisation has been obtained, both in terms of the Mineral and Petroleum Resources Development Act (No 28 of 2002)(via the compilation of an Environmental Management Programme Report) and in terms of the National Environmental Management Act (No 107 of 1998)(via an Environmental Impact Assessment process). No excavation or blasting activities shall commence before the necessary authorisations are in place. {*ensure that necessary authorisations are being processed well in advance of activity going out to tender*}.
3. Borrow pits shall at all times be operated according to the regulations promulgated in terms of the Mineral and Petroleum Resources Development Act (No 28 of 2002);

Mine Health and Safety Act (No 29 of 1996), National Environmental Management Act (No 107 of 1998) and Noise and Nuisance Regulations of the Environment Conservation Act (No 73 of 1989)

4. Only single lane access for construction vehicles shall be provided at borrow pit and quarry sites. New access roads require approval by the Engineer/ECO/EO.
5. Stormwater and groundwater controls shall be implemented
6. Machinery, fuels and hazardous materials vulnerable to flooding shall be stored out of flood risk areas.
7. Vehicles leaving borrow pits shall not deposit/shed mud, sand and debris onto any public road.
8. All loads shall be covered with a tarpaulin or similar to prevent dangers and nuisance to other road users.
9. Trees and debris shall not be permitted to fall outside of the clearing limits. Trees shall be cleared or felled so as not to damage other trees or vegetation
10. Borrow pits shall be fenced to prevent unauthorised persons and vehicles from entering the area. Fences shall also be stock and game proof.
11. Rehabilitation and revegetation of borrow pits sites shall be as detailed in the Specification EM: Revegetation.
12. The contractor shall ensure that blasted faces of the pit shall be shape-blasted to the approval of the Engineer/ECO/EO.
13. Where required, dust and fly-rock prevention methods shall be detailed in a Method Statement to be approved by the Engineer/ECO/EO.
14. During the rehabilitation of borrow bits, the slope of the borrow pit shall be graded to blend with the natural terrain and be stabilised to prevent erosion.

PSEM5.21 Bridges and culverts

1. The Contractor shall ensure that provision is made to facilitate continuity of base water flow at all times during construction of these features
2. Reduction of baseline water quality by construction actions/activities shall be prevented (for example coffer dams, silt traps or plastic lining).
3. Water quality monitoring regimes shall be established prior to the onset of any construction activities within watercourses. {*Baseline water quality and monitoring requirements should be established with the City of Cape Town's Scientific Services prior to commencement of construction*}
4. No watercourse or stream may be diverted, dammed or modified without the approval of the Engineer/ECO/EO.
5. Where stream diversion is required, the Contractor shall submit a Method Statement to the Engineer/ECO/EO for approval prior to commencing construction. Following construction, all diverted streams shall be reinstated to the satisfaction of the Engineer/ECO/EO

{*Refer to figures at end of this Detailed Environmental Specification*}

PSEM5.22 Cement and concrete batching

Location

➔ 1. Concrete shall not be mixed directly on the ground.
2. The concrete batching activity shall be located in an area of low environmental sensitivity to be identified and approved by the Engineer/ECO/EO.
3. The permitted location of the batching plant (including the location of cement stores and sand and aggregate stockpiles) shall be indicated on the Site layout plan and approved by the Engineer/ECO/EO. A Method Statement indicating the layout and preparation of this facility is required in this regard.

Maintenance

1. All wastewater resulting from batching of concrete shall be disposed of via the wastewater management system.
2. The cement/ concrete batching works shall be kept neat and clean at all times. No batching activities shall occur on unprotected substratum of any kind.
3. All runoff from batching areas shall be strictly controlled, and cement-contaminated water shall be collected, stored and disposed of at a site approved by the Engineer/ECO/EO. Dagga boards, mixing trays and impermeable sumps shall be used at all mixing and supply points. Contaminated water shall be disposed at a waste disposal site approved by the Engineer/ECO/EO.
4. Contaminated water storage facilities shall not be allowed to overflow and appropriate protection from rain and flooding shall be implemented.
5. Contaminated water treatment on Site shall require a method statement approved by Engineer/ECO/EO.
6. Unused cement bags are to be stored so as not to be effected by rain or runoff events.
7. Used bags shall be stored in weatherproof containers to prevent wind blown cement dust and water contamination. Used bags shall be disposed of on a regular basis via the solid waste management system, and shall not be used for any other purpose.
8. Concrete transportation shall not result in spillage.
9. Cleaning of equipment and flushing of mixers shall not result in pollution of the surrounding environment: Care shall be taken to collect contaminated wash water from cleaning activities and dispose of it in a manner approved by the Engineer/ECO/EO. To prevent spillage onto roads, ready mix trucks shall rinse off the delivery shoot into a suitable sump prior to leaving Site.
10. Suitable screening and containment shall be in place to prevent wind blown contamination associated with bulk cement silos, loading and batching.
11. With respect to exposed aggregate finishes, the Contractor shall collect all contaminated water & fines and store it in sumps for disposal at an approved waste site.
12. All visible remains of excess concrete shall be physically removed on completion of the plaster or concrete pour section and disposed off. Washing the remains into the ground is not acceptable. All excess aggregate shall also be removed.

PSEM5.23 Pipelines

1. Cleaning/flushing of pipelines shall not impair (down grade) downstream baseline water quality. The water quality of receiving waters shall be monitored by the Contractor during cleaning/ flushing operations. {*Baseline water quality and monitoring requirements should be established with the City of Cape Town's Scientific Services prior to commencement of construction*}
2. Materials used in the sterilisation of pipelines, *viz.* chlorine solutions shall be treated as hazardous substances and disposed of at an approved landfill site.
3. Litter traps shall be installed and maintained at the outflow of all pipelines.
4. The Contractor shall lay the pipeline within the river and flood plain by hand. No diversion or alteration of the normal river or tidal flow of either the lagoon or flood plain shall occur during the excavation, laying and backfilling of the pipeline.
5. Pressurised air shall be used to ensure that the pipeline section and associated concrete anchors along the bed of the river are buried below the bed surface. However, appropriate measures shall be taken to minimise the disturbance and sedimentation caused during this process. A geotextile curtain shall be erected within the water column on either side of the pipeline route during these excavation operations to minimise downstream sedimentation. These curtains shall be removed at the end of each working day and replaced at the start of each working day.

PSEM5.24 Crane operations

1. Drive plants shall be well maintained and drip trays shall be positioned at potential leak areas.
2. Over-greasing of crane cables shall be avoided.
3. The positioning and direction of lighting associated with crane operations shall not cause a nuisance to the surrounding communities or users of the area.
4. ➔ Movement and lifting of hazardous materials shall be undertaken such that they do not cause pollution, spillage or safety risk (in particular where concrete buckets are in use). Where necessary, a method statement is required in this regard.

PSEM5.25 Crushing

1. Main crusher box and conveyor belt heads are to be fitted with fine jet sprinkler heads to minimise dust, and pre- and post- crush stockpiles shall be managed to minimise dust.
2. The positioning of the crusher plant shall take cognisance of noise nuisance.
3. All crushing plant machinery shall have drip trays and all fuels and oils required for the crusher infrastructure shall be stored in the fuel store, if one is present on Site, or in an appropriately bunded and secured area.
4. The site of the crusher shall be fenced and sign-posted, and access to all unauthorised persons and vehicles shall be strictly prohibited.

{*Refer also to dust and noise}*

PSEM5.26 Demolition

1. ➔ Hazardous building materials, including asbestos shall be identified prior to demolition of any buildings and dealt with in accordance with the safety and health legislation. A Method Statement, outlining the proposed approach to the disposal of these materials, must be supplied for approval by the Engineer/ECO/EO.
2. ➔ Hazardous and non-hazardous materials shall be separated at site and disposed of in a manner approved by the Engineer/ECO/EO.
3. All buildings older than 60 years require a permit from South African Heritage Resources Agency in terms of the National Heritage Resources Act (no. 25 of 1999).
4. A demolition permit is also required from the local authority in terms of the National Building Regulations {*this applies to the demolition all buildings, irrespective age*}
5. Municipal and other services shall be isolated prior to any demolition occurring.
6. Hazardous building materials (e.g. asbestos, fibre claddings, refrigerants, coolants, substation cooling oils) shall be identified prior to demolition of the building and dealt with in accordance with the safety and health legislation. A Method Statement shall be supplied for approval by the Engineer/ECO/EO.
7. Safety legislation shall be strictly adhered to in demolishing buildings and structures.
8. A Safety officer shall be appointed to oversee the safe demolition of buildings and structures.
9. Demolition sites shall be kept in a neat, tidy and safe condition.
10. Hazardous and non-hazardous materials shall be separated on Site and disposed off at appropriate licensed disposal sites. The Contractor shall supply the Engineer/ECO/EO with a certificate of disposal.
11. Prior to demolition taking place, the Contractor shall ensure that suitable anti-rodent measures are implemented at any building requiring demolition.

PSEM5.27 Dredging

➔ 1. All craft and equipment used in dredging operations shall be well maintained and free of grease, oil, fuel or other hazardous contaminant leaks. Any incidents of spillage shall be reported to the Engineer/ECO/EO immediately, and appropriate remedial measures, as approved by the Engineer/ECO/EO, implemented.

➔ 2. The Contractor shall ensure that no pollutants such as oil are discharged into the water during maintenance work on the dredger.

3. Appropriate spill treatment facilities or compounds shall be readily available. Such measures shall be detailed in a Method Statement, to be approved by the Engineer/ECO/EO.
4. Any craft or equipment lost overboard or which sinks shall be recovered.
5. The Contractor shall ensure that refuelling of the dredger is undertaken in such a manner that fuel does not spill into the water. A Method Statement for the refuelling of the dredger during dredging operations shall be supplied and approved by the Engineer/ECO/EO prior to any dredging operations commencing.

PSEM5.28 Drilling and jackhammering

➔ 1. The Contractor shall submit a Method Statement detailing his proposals to prevent pollution during drilling operations. This shall be approved by the Engineer/ECO/EO prior to the onset of any drilling operations.

➔ 2. The Contractor shall take all reasonable measures to limit dust generation as a result of drilling operations.

➔ 3. Noise and dust nuisances shall comply with the applicable standards.

4. The Contractor shall ensure that no pollution results from drilling operations, either as a result of oil and fuel drips, or from drilling fluid.
5. All affected parties shall be informed at least one week prior to the onset of the proposed drilling/ jackhammering operations, and their concerns addressed.
6. Drill coring with water or coolant lubricants shall require a Method Statement approved by the Engineer/ECO/EO.
7. Any areas or structures damaged by the drilling and associated activities shall be rehabilitated by the Contractor to the satisfaction of the Engineer/ECO/EO.

PSEM5.29 Earthworks

1. The excavation of any material on Site shall be done in accordance with SABS 1200 D or DB and PSD or PSDB, as applicable.
2. Prior to earthworks (including site clearance) starting on site, a search and rescue operation for bulbs and other indigenous plants of value, as detailed in the Revegetation Specification shall be undertaken.
3. All earthworks shall be undertaken in such a manner so as to minimise the extent of any impacts caused by such activities.
4. Defined access routes to and from the area of operation as well as around the area of operation shall be detailed in a Method Statement for approval by the Engineer/ECO/EO.
5. No equipment associated with the activity shall be allowed outside of these areas unless expressly permitted by the Engineer/ECO/EO.

PSEM5.30 Piling, jacking and thrust boring

1. Piling operations require a Method Statement, which shall detail the type of piling operation as well as *in situ* casting or pre-cast pile structures. In *situ* piles shall take cognisance of possible groundwater impacts.

2. The Contractor shall take preventative measures, such as screening, muffling, dust control, timing. Pre-notification of affected parties shall be implemented to minimise complaints regarding dust, noise and vibration nuisances.
3. The area shall be adequately fenced and warning signs erected.

PSEM5.31 Power tools

➔ 1. The Contractor shall take preventative measures, such as screening, muffling, dust control, timing and pre-notification of affected parties shall be implemented to minimise complaints regarding dust, noise and vibration nuisances.

PSEM5.32 Pumping and sumping

➔ 1. Pumps shall be placed over a drip tray in order to prevent fuel spills and leaks from contaminating the water in the pumped area.
➔ 2. Contaminated water may not be discharged into existing watercourses or streams and a Method Statement for discharge of this contaminated water shall be required.
3. Silt-laden water shall be cleaned by using a perforated 200l drum containing sand and stone separated by geotextile fabric with a central delivery water pipe
4. Silt-laden water shall be cleaned by ensuring that the overland flow of water disperses widely through vegetation.
5. Silt-laden water shall be cleaned by tying a geotextile sock on the delivery pipe of the pump. Other filtration methods may be used and shall be approved by the Engineer/ECO/EO.

PSEM5.33 Settlement ponds

➔ 1. The Contractor shall submit a Method Statement proposal in connection with settlement ponds prior to the construction of any such ponds. The Contractor shall size settlement ponds in accordance with the envisaged scale of operation.
2. Suspended solids and contaminants including oils shall be removed and disposed of by the Contractor at frequent intervals at a site approved by the Engineer/ECO/EO.

PSEM5.34 Retaining walls and gabions

➔ 1. A Method Statement, approved by the Engineer/ECO/EO, shall be required to deal with these structures.
2. Rocks for use in gabion baskets/ reno mattresses shall be obtained from a source approved by the Engineer/ECO/EO
3. Rocks for use in gabion baskets/ reno mattresses shall not be obtained from a watercourse.

PSEM5.35 Rock breaking

1. Mechanical methods of rock breaking, including Montabert type breakers, jackhammers and “boulder busting”, have noise and dust impacts that shall be addressed. Boulder buster use requires that blasting protocols shall be followed.
2. Residents shall be notified at least one week prior to these activities commencing, and their concerns addressed.
3. Chemical breaking shall require a Method Statement approved by the Engineer/ECO/EO.

PSEM5.36 Stream diversion

1. The Contractor shall not divert, dam or modify any watercourse or stream without the approval of the Engineer/ECO/EO.
2. The Contractor shall submit a method statement to the Engineer/ECO/EO for approval prior to commencing construction.
3. Diverted streams shall be reinstated to the satisfaction of the Engineer/ECO/EO.

{*Refer to figures at end of this Detailed Environmental Specification*}

PSEM5.37 Stream crossing

1. This activity requires a Method Statement for approval by the Engineer/ECO/EO.
2. Temporary bridges shall be built in order for the Contractor to cross rivers and, where appropriate, the structure of the bridge shall be such that there is nothing placed in the water (i.e. the bridge shall be "bank-to-bank" in a single span).
3. The fording of rivers by machinery and vehicles shall be undertaken at slow speed and with clean vehicles (i.e. no oil leaks, etc) and along a single track. The methodology of vehicle crossings via fording shall be detailed in a Method Statement.

{*Refer to figures at end of this Detailed Environmental Specification*}

PSEM5.38 Trenching

1. Trenching for services shall be undertaken in accordance with the engineering specifications (SABS 1200DB) with the following environmental amplifications, where applicable:
2. Trenching shall be kept to a minimum through the use of single trenches for multiple service provision.
3. The planning and selection of trench routes shall be undertaken in liaison with the Engineer/ECO/EO and cognisance shall be given to minimising the potential for soil erosion.
4. Trench routes with permitted working areas shall be clearly defined and marked with painted stakes prior to excavation.
5. The stripping and separation of topsoil shall occur as stipulated by the Engineer/ECO/EO. Soil shall be excavated and used for re-filling trenches using the rollover method, i.e. soil from the first trench section shall be stockpiled. Thereafter, soil excavated from subsequent trench lengths shall be used to backfill the trench behind it once the services have been laid. The final trench length shall be re-filled using the soil stockpiled from the first length.
6. Trench lengths shall be kept as short as practically possible before backfilling and compacting.
7. Trenches shall be re-filled to the same level as (or slightly higher to allow for settlement) the surrounding land surface to minimise erosion. Excess soil shall be stockpiled in an appropriate manner.
8. Immediately after re-filling, trenches and associated disturbed working areas shall be planted with a suitable plant species and regularly watered. Where there is a particularly high erosion risk, a fabric such as Geojute (biodegradable) shall be used in addition to planting.

Trenching in ecologically sensitive environments on slopes or through wetlands

1. The upper 250 mm of soil (topsoil, which includes roots and leaf litter) shall be placed in heavy-duty (>300micron) plastic bags on one side of the trench within the specified working corridor;

2. The remainder of the soil shall be placed in separate heavy-duty plastic bags, on the other side of the working corridor in order to ensure separation of subsoil and topsoil. Bags must also be clearly marked as to whether they contain topsoil or subsoil;
3. Topsoil and subsoil may not be mixed at any time, since this impedes the restoration process following closure;
4. Where necessary, bags of excavated subsoil must be placed into the trench at the end of each working day in order to ensure that water does not flow down the trench and cause erosion;
5. Small rocks and stones (to a diameter of 100 mm) should be included in these bags of topsoil and subsoil. Larger rocks and stones (∅ >100 mm) must be placed to the side of the trench within the working corridor for later use in restoration by the restoration sub-contractor;
6. Following the cable/ pipe laying operation, soils are to be replaced in the order in which they were excavated, i.e. subsoil must be replaced first and capped with the topsoil; and,
7. Brush-cut plant material is to be replaced (scattered) within the working corridor on either side of the closed trench.
8. This method reduces erosion, protects the vegetation within the working corridor, and conserves the topsoil and seed-banks.

PSEM5.39 Water abstraction from stream and groundwater

1. Prior to the onset of any water abstraction activities the Contractor shall establish from the Engineer/ECO/EO whether authorisation has been obtained from DWAF should the activity not fall under the general provisions.
2. Abstractions from natural water resources require a Method Statement for prior approval by the Engineer/ECO/EO.

PSEM5.40 Well points

1. Well point provision requires a Method Statement for the approval by the Engineer/ECO/EO.

PSEM5.41 Temporary site closure

In the event of temporary site closure the Contractor's Safety Officers (as defined by the Occupational Health and Safety Act) shall check the site, ensure that the following conditions pertain and report on compliance with this clause;

Fuels / flammables / hazardous materials stores
Fuel stores are as low in volume as practicable.

1. There are no leaks.
2. The outlet is secure and locked.
3. The bund is empty.
4. Fire extinguishers are serviced and accessible.
5. The area is secure from accidental damage through vehicle collision and the like.
6. Emergency and contact numbers are available and displayed.
7. There is adequate ventilation in enclosed spaces.
8. There are no stores or containers within the 1:50 year flood line.

Safety

1. Site safety officer checks have been carried out in accordance with the Occupational Health and Safety Act (No. 85 of 1993) prior to site closure.
2. That there is an inspection schedule and log for use by security or contracts staff.
3. All trenches and manholes are secured.
4. Fencing and barriers in place in accordance with the Occupational Health and Safety Act (No. 85 of 1993).
5. Applicable notice boards are in place and secured.
6. Emergency and Management contact details are prominently displayed.
7. Security personnel have been briefed and have the facilities to contact or be contacted by relevant management and emergency personnel.
8. Night hazards such as reflectors, lighting, traffic signage etc have been checked.
9. Fire hazards identified and the local authority notified of any potential threats e.g. large brush stockpiles, fuels etc.
10. Pipe stockpiles are wedged / secured.
11. Scaffolds are secure.
12. Structures vulnerable to high winds secure.

Erosion

1. Wind and dust mitigation measures such as straw, brush packs, irrigation etc are in place.
2. Excavated and filled slopes and stockpiles are at a stable angle and capable of accommodating normal expected water flows
3. Re-vegetated areas have a water schedule and the supply to such areas is secured.
4. There are sufficient detention ponds or channels in place.

Water contamination and pollution

1. Hazardous fuel stores are secure.
2. Cement and materials stores are secured
3. Toilets are empty and secured
4. Refuse bins are empty and secured
5. Bunding is clean and treated e.g. Spill Sorb or Enretech #1 powder or similar approved product
6. Drip trays empty & secure

PSEM6 TOLERANCES

PSEM6.1 Fines

Fines

Fines will be issued for the transgressions listed below. Fines may be issued per incident at the discretion of the Engineer. Such fines will be issued in addition to any remedial costs incurred as a result of non-compliance with the Environmental Specifications. The Engineer will inform the Contractor of the contravention and the amount of the fine, and will deduct the amount from monies due under the Contract.

Fines for the activities detailed below, will be imposed by the Engineer on the Contractor and/or his Sub-contractors.

A	Any persons, vehicles, plant, or thing related to the Contractors operations within the designated boundaries of a “no-go” area	4,000
B	Any vehicle driving in excess of designated speed limits	1,000
C	Any vehicle being driven, and items of plant or materials being parked or stored outside the demarcated boundaries of the site	2,000

C	Persons walking outside the demarcated boundaries of the site	500
E	Persistent and un-repaired oil leaks from machinery. The use of inappropriate methods of refuelling such as the use of a funnel rather than a pump	3,000
F	Litter on site	1,000
G	Deliberate lighting of illegal fires on site	5,000
H	The eating of meals on site outside the defined eating area. Individual not making use of the site ablution facilities	1,000
I	Dust or excess noise on or emanating from site	1,000
J	Any person, vehicle, item of plant, or any thing related to the Contractors operations causing a public nuisance	2,000

For each subsequent similar offence the fine may, at the discretion of the Engineer, be doubled in value to a maximum value of R50,000.

The Engineer shall be the judge as to what constitutes a transgression in terms of this clause, subject to the provisions of Clause 60(1) of the General Conditions of Contract. In the event that transgressions continue the Contractors attention is drawn to the provisions of Sub-clause 58(1)(b)(vi) of the General Conditions of Contract under which the Engineer may cancel the Contract.

Penalties

1. Where the Contractor inflicts non-repairable damage upon the environment or fails to comply with any of the environmental specifications, he shall be liable to pay a penalty fine over and above any other contractual consequence. {*In terms of the Conventional Penalties Act (1962) a creditor is not entitled to recover both the penalty and damages. Accordingly, were a Contractor causes damage, the Employer can either enforce a penalty or make the Contractor make good the damage, but not both.*}
2. The Contractor is deemed NOT to have complied with the this Specification if:
    a. within the boundaries of the site, site extensions and haul/ access roads there is evidence of contravention of the Specification
    b. environmental damage ensues due to negligence
    c. the Contractor fails to comply with corrective or other instructions issued by the Engineer with in a specific time
    d. the Contractor fails to respond adequately to complaints from the public
3. Payment of any fines in terms of the contract shall not absolve the offender from being liable from prosecution in terms of any law.
4. An Environmental Performance Guarantee of 5% of Contract Value shall be deposited by the Contractor with the Engineer. This fund shall be used in the event of penalties or rehabilitation costs for non-conformance or contraventions of the EMP. The balance shall be given back to the Contractor at Contract closure.
5. The following penalties are suggested for transgressions:

a.	Erosion	A penalty equivalent in value to the cost of rehabilitation plus 20%
b.	Oil spills	A penalty equivalent in value to the cost of clean up operation plus 20%
c.	Damage to indigenous vegetation	A penalty equivalent in value to the cost of restoration plus 20%.
d.	Damage to sensitive environments	A penalty equivalent in value to the cost of restoration plus 20%.
e.	Damage to cultural sites	A penalty to a maximum of R 100 000 shall be paid for any damage to any cultural/ historical sites

f. Damage to trees — A penalty to a maximum of R100 000 shall paid for each tree removed without prior permission, or a maximum of R5 000 for damage to any tree, which is to be retained on site.

g. Penalties for removing or damaging trees:

Girth of trunk (1m above ground level)	Replacement value per tree
0 – 15 mm	R100.00
16 – 30 mm	R200.00
31 – 50 mm	R500.00
51 – 75 mm	R1 000.00
76 – 100 mm	R2 500.00
101 – 150 mm	R5 000.00
150 – 300 mm	R10 000.00
Larger than 300 mm	R15 000.00 to R100 000.00

PSEM7 TESTING

Void

PSEM8 MEASUREMENT AND PAYMENT

PSEM8.1 Environmental awareness training

1. The organisation and attendance of the education course will be measured as a sum.
2. The tender sum shall cover the time cost of all personnel attending the course, the provision of the venue and for any other operation necessary to comply with the requirements of the environmental awareness courses to the satisfaction of the Engineer/ECO/EO.

PSEM8.2 Refuse removal

1. The unit of measurement shall be a sum for the removal of refuse.
2. The rate shall include the collection of refuse, for providing, maintaining and running the refuse vehicles, refuse bins and special refuse enclosures, and for all loading, unloading and double handling as required.

PSEM8.3 Site demarcation

1. The supply, installation and removal at the end of the construction of all temporary fences shall be measured by length for each type of fence scheduled.

PSEM8.4 Dust control

1. The unit of measurement shall be a sum for watering and/ or straw stabilisation.
2. The rate shall include the cost of obtaining, transporting and applying the water and/ or straw stabilisation including supplying and maintaining suitable water bowsers.

PSEM8.5 Pumping

1. The unit of measurement shall be a sum for pumping water into or out of settlement ponds.

2. The tendered rate shall include full compensation for supplying, installing, operating and maintaining the pumps and pump hoses.
3. In the event of the contents of a settlement pond being removed by a suction tanker such removal shall be deemed to be allowed for.

PSEM8.6 Supply and erection of public information boards

1. The supply and erection of public information boards shall be measured by number.
2. {*xx*} A2 copy(ies) of the poster for the board shall be supplied to the Contractor. The rate shall cover the cost of securing the posters to the backing boards, the cost of all labour, materials, plant and equipment necessary for the erection, maintenance and removal on completion.

PSEM8.7 Supply and erection of construction personnel information boards

1. The supply and erection of construction personnel information boards shall be measured by number.
2. The tendered rate shall cover the cost of all printing, labour, materials, plant and equipment, necessary for the erection, maintenance and removal on completion.

PSEM8.8 Speed limit and route marker signs

1. The supply and erection of speed limit signs and signs to indicate the route up the access road to the site shall be measured as a sum.
2. The tendered rate shall cover the cost of all labour, materials, plant and equipment, necessary for the erection, maintenance and removal on completion.

PSEM8.9 Fire control

1. The compliance with fire control requirements shall be measured as a sum.
2. The tendered rate shall cover the cost of all labour, materials, equipment and any other operation or thing necessary to comply with the requirements including maintenance and replacement of defective or damaged equipment, and refilling.

PSEM8.10 "No go" area demarcation

"No go area demarcation Unit: m

1. "No go" area fencing will be measured by length for each type of fence scheduled.
2. The tender rate shall cover the cost of all labour, materials, plant and equipment necessary for the supply, installation and removal of the fences, including for all excavation, temporary strutting, backfilling of holes with earth, finishing and trimming and for any other operation necessary to complete the work to the satisfaction of the Engineer/ECO/EO.

PSEM8.11 All other requirements of the environmental management specification

1. All other work not measured elsewhere, associated with complying with any requirement of the environmental management programme shall be measured as a sum.
2. The tendered rate shall cover any cost associated with complying with the environmental management specification and shall include for all materials, labour and plant required to execute and complete the work as specified, described in the Schedule of Quantities or shown on the drawing(s).