PROPOSED TOWNSHIP ESTABLISHMENT ON PORTION 105 OF THE FARM OKAHANDJA TOWN AND TOWNLANDS NO. 277

(OKAHANDJA MUNICIPALITY)

GENERAL CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

DECEMBER 2015

URBAN green cc
Town and Regional Planning Consultants
Environmental Managers

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GLOSSARY

Audit:	Regular inspection and verification of construction activities for implementation of the EMP
Batch plant	Machinery used on site for the mixing and production of concrete and associated equipment and materials.
Bund	Enclosure under/around a hazardous substance storage facility to contain any spillage.
Contaminated water	Water contaminated by the Contractor's activities, e.g. concrete water and runoff from plant/personnel wash areas.
Contractor	The principal person or company, including all subcontractors, undertaking the construction of the development as appointed by the Developer.
Council	The authority, Okahandja Town Council within which jurisdictional area the development is taking place.
DEA	Namibia's Department of Environmental Affairs, the Government authority responsible for authorising activities in terms of the appropriate Environmental Management Act.
Developer	The company or its duly authorised and appointed representative, with rights to undertake the development on the Site.
ECO	Environmental Control Officer, a suitably qualified official of the DEA who oversees the environmental responsibilities of the Developer.

EMP This document, Environmental Management Plan for managing potential environmental impacts during the construction phase of a development.

Emergency situation An incident, which potentially has the ability to significantly impact on the environment, and which, could cause irreparable damage to sensitive environmental features. Typical situations entail amongst others the:-

- Spill of petroleum products and lubricants into the aquatic system;
- Potential damage, erosion and slumping of unstable river embankments or drainage channels;
- Potential event of impeding the continuous flow of water to downstream water users dependant on the flow; and
- Dangerous situation where livestock and children can be injured by any activity emanating from the construction or rehabilitation of the project implementation.

Engineer/Project Manager The person(s) who represents the Developer and are responsible for the technical and contractual implementation of the works to be undertaken.

Environment The biosphere in which people and other organisms live. It consists of renewable and non-renewable natural resources, natural or modified ecosystems and habitats, and places of cultural significance.

ESM Environmental Site Manager, a suitably qualified professional to be appointed by the Developer who oversees the implementation of the EMP on site.

Hazardous substance	A substance that, in the reasonable opinion of the Engineer and/or ESM, can have a harmful effect on the environment.
Method Statement	A written submission by the Contractor to the ESM and RE, setting out the plant, materials, labour and method the Contractor proposes using to carry out an activity, in such detail that the ESM is enabled to assess whether the Contractor's proposal is in accordance with the environmental specifications.
Monitoring	Regular inspection and verification of construction activities for degree of compliance to the EMP.
'No Go' Areas	Areas identified as being environmentally sensitive in some manner and demarcated on plan, and on the Site with pegs or fencing and which are out of bounds to unauthorised persons. Authorisation must be obtained prior to entry.
Resident Engineer	Resident Engineer (RE), a person who represents the Engineer on Site and is responsible for the technical and contractual implementation of the works to be undertaken.
Site	The boundary and extent of development works and infrastructure, including any areas off the main site on which works are to be carried out in order to allow the development to proceed successfully.
Solid waste	All solid waste, including construction debris, chemical waste, excess cement/concrete, wrapping materials, timber, tins and cans, drums, wire, nails, food and domestic waste.
Specification	A technical descriptions of the standards of materials and workmanship that the Contractor is to use in the works to

	be executed, the performance of the works when completed and the manner in which payment is to be made.
Works	The construction operations and all related and incidental works, such as search and rescue, fencing and rehabilitation, in connection with the execution and carrying to completion of the project.

PART 1: BACKGROUND AND RESPONSIBILITIES

1.1 INTRODUCTION

Although the site and surrounding area is characterised by some habitat value some areas must be disturbed to develop much needed infrastructure required for an expanding economy as well as to keep the specific land viable.

This proposed Environmental Management Plan (EMP) attempts to achieve this, but also to ensure environmental protection in a sustainable manner and within socially acceptable terms.

This EMP has been drawn up for the construction phase of the Portion 105 of the Farm Okahandja Town and Townlands No. 277 (Otjozondjupa Region) by constructing a new township with associated infrastructure to form part of the Municipality of Okahandja. The EMP intends to guide and manage the construction activities on the construction site and surrounding areas as they relate to the environment. It describes mitigation measures in detail, and is prescriptive, identifying specific people or organisations to undertake specific tasks, in order to ensure that impacts as identified during the Environmental Scoping are minimised. This document must further be seen as open-ended, requiring regular review and updating via the correct channels in order for it to effectively guide environmental management of this project.

The responsibility for the implementation of this EMP on site rests with the appointed Contractor, but must be enforced on behalf of the Municipality of Okahandja, the Otjozondjupa Regional Council and by both the Environmental Control Officer (ECO), and the Environmental Site Manager (ESM) and Engineer.

1.2 FORMAT OF THE EMP

The EMP is relevant to construction works and is designed to fit within current civil engineering and building contract documentations.

This document consists of two sections:

- **Part 1** contains brief information on the development, the project, general requirements, responsibilities of the different role players, financing of environmental control, dispute resolution, and requirements for monitoring.

- **Part 2** details the Environmental Specifications that set out the environmental objectives and targets with which the Contractor shall comply.

This EMP is a general construction EMP and has been compiled to guide the Construction Activities. This EMP is not based on the outcome of the EIA conducted for the proposed Project as the EIA is being finalised.

1.3 THE PROJECT

The Project to be undertaken by the appointed Contractor/s is for the construction of the new Okahandja Township with associated infrastructure on Portion 105 of the Farm Okahandja Town and Townlands No. 277 (Otjozondjupa Region).

1.4 IMPLEMENTATION OF THE EMP

Implementation of the EMP will be the responsibility of all parties involved with the construction work. The Engineer and ESM will be central to this implementation.

Copies of the documents described below must be maintained on site at all times, available to both the Engineer and ESM, to be provided on request to authorities or stakeholders for inspection. Contractors' meeting minutes must reflect environmental queries, agreed actions and dates of eventual compliance.

1.4.1 Site instruction entries

The Site Instruction Book entries will be used for the recording of general site instructions as they relate to the works on site and EMP measures. It will also be used for the issuing of stop-work orders issued by the ECO for the purposes of immediately halting any particular activities of the Contractor in lieu of the environmental risk that they may pose.

1.4.2 ECO diary entries

The purpose of these entries will be to record the comments of the ECO as they relate to activities on the site including infringements, possible changes to the EMP or work stop orders.

1.4.3 Method statements

Method statements from the Contractor will be required for specific sensitive actions on request of the authorities or ESM. A method statement forms the baseline information on which sensitive area work takes place and is thus considered a "live document" in that modifications can be negotiated between the Contractor and ESM if or as required. The Contractor (and, where relevant, any subcontractors) must also sign the Method Statement, thereby indicating that the works will be carried out according to the approved methodology. Changes in the methodology must be reflected by amendments to the original approved Method Statement. Amendments must be signed by both the ESM and RE, denoting that the change is environmentally acceptable. The Contractor must also sign the amended Method Statement.

All method statements will form part of the EMP documentation and are subject to all terms and conditions contained within the EMP main document. The Method Statement shall cover applicable details with regard to (see Appendix C):

- Construction procedures;
- Materials and equipment to be used;
- How and where materials will be stored;
- The containment of accidental leaks or spills;
- Timing and location of activities; and
- Any other information deemed necessary by the ESM.

A method statement describes the scope of the intended work in a step-by-step description in order for the ESM or Engineer to understand the Contractor's intentions. This will enable them to assist in devising any mitigation measures, which would minimise environmental impact during these tasks. The method statement should also clearly stipulate mitigation methods of the intended works, against which the contractor's performance will be measured. For each instance wherein it is requested that the Contractor submit a method statement to the satisfaction of the ESM and Engineer, the format should clearly indicate the following:-

- **What** - a concise, description of the task/work to be undertaken;
- **How** - a detailed description of the process of work, methods, materials and mitigation strategies;
- **Where** - a description/sketch map of the locality of work (if applicable); and
- **When** - the sequencing of actions with due commencement dates and completion date estimates.

The Contractor must submit the method statement two weeks before any particular construction activity is due to start, especially with respect to impacts on sensitive ecosystems. Work may not commence until the method statement has been accepted by the ESM and Engineer, and clearly communicated to the workforce. The Contractor shall, except in the case of emergency activities, allow 14 days for consideration and approval of the Method Statement. The RE or ESM may require changes to a Method Statement if the proposal does not comply with the specifications or if, in the reasonable opinion of the RE or ESM, the proposal may result in damage to the environment in excess of that permitted by the specifications. Approved Method Statements shall be communicated to all relevant personnel.

All Method Statements listed below, shall be provided by the Contractor before the activity commences:

(i) *Bunding*

Method of bunding for static plant and bulk fuel storage.

(ii) *Camp establishment and fencing*

- *Location and layout of the Contractor's Camp.*
- *Method of installing fences required for working areas and Contractor's Camp.*

(iii) *Concrete batching*

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

(iv) *Bulk earthworks*

Location, layout, silt/sediment management and the management of runoff from bulk earthworks areas.

(v) *Demolition*

Proposed method of demolition, including handling and disposal of materials.

(vi) *Dust*

Dust control protocol.

(vii) *Fire and hazardous substances*

- *Handling and storage of hazardous wastes.*
- *Emergency spillage procedures and compounds to be used.*
- *Emergency procedures for accidental fire.*
- *Methods for the disposal of hazardous materials.*

(viii) *Fuels and fuel spills*

- *Methods of refuelling vehicles.*
- *Details of methods for fuel spills and clean-up operations.*

(ix) *Protection of archaeological resources*

Methods for dealing with archaeological resources in the event that any are found.

(x) *Protection of environmentally sensitive resources (fauna and flora)*

- *Methods for dealing with conservation areas or areas identified as environmentally sensitive requiring protection.*
- *Locality and preparation of onsite nursery to house vegetation relocated from construction areas or propagated locally for replanting purposes.*
- *Details of methods dealing with the identification, transportation and transplanting of flora species of conservation value.*
- *Details of methods dealing with the identification, capture and relocation of fauna species of conservation value.*

(xi) *Rehabilitation*

Rehabilitation of disturbed areas after construction is complete.

(xii) *Settlement ponds and sumps*

Layout and preparation of settlement ponds and sumps.

(xiii) *Solid waste management*

Solid waste control and removal of waste from Site.

(xiv) *Sources of materials*

Details of materials imported to the Site (where applicable).

(xv) *Topsoil handling and stockpiling*

Details on stripping, handling and stockpiling of topsoil.

(xvi) *Wash areas*

Location, layout, preparation and operation of all wash areas.

(xvii) *Storm water management*

Details of how storm water is to be handled on Site.

1.5 ENVIRONMENTAL EDUCATION

Before any work is commenced on the Site, the entire Contractor's staff including foremen shall attend an environmental education talk, presented by the ESM with the assistance of the Contractor. The Contractor shall liaise with the ESM prior to the commencement date to fix a date and venue for the talk. The Contractor shall ensure that all the employees attend the talk.

Follow-up education talks shall be held for any new employee/s coming onto Site from time to time. The ESM shall ensure that all attendees sign an attendance register, and shall provide the ECO with a copy of the attendance register.

1.6 RECORD KEEPING

All records related to the implementation of this management plan (e.g. site instruction book, ECO diary, induction records, method statements) must be kept together in an office where it is safe and can be retrieved easily. All relevant records should be kept for a minimum of two years after construction and should at any time be available for scrutiny by any relevant authority or stakeholder.

It is recommended that photographs (fixed-point photographs for better comparisons before/during/after) are taken of the site prior to, during and immediately after construction as a visual reference. These photographs should be stored with related documents and other records related to this EMP.

1.7 ENVIRONMENTAL COMPLETION STATEMENT

An Environmental Completion Statement will be prepared by the ESM for submission to the Department of Environmental Affairs (Ministry of Environment and Tourism) indicating completion of the project and compliance with the EMP and conditions. This statement will be prepared after the final audit after the rehabilitation phase.

1.8 RESPONSIBILITIES OF EACH ROLE PLAYER

1.8.1 Responsibilities of the ESM (to be appointed Environmental Consultant)

- The ESM shall make recommendations independent of the Engineer who shall consider implementing such recommendations and fines as well as other issues picked up by the ESM.
- The ESM must oversee the mitigation measures and ensure compliance with the conditions of approval and the EMP.
- Involve specialists to advise on environmental management issues as they emerge during the construction phase.

- The ESM will be responsible to the Developer.
- The ESM will be on Site at a predetermined frequency (at least once a week) and will be responsible for ensuring implementation of the EMP throughout the construction period.
- The ESM, along with the Engineer and RE, must obtain, examine and approve Method Statements.
- Advise the Contractor on environmental issues within the defined work areas.
- Review the site logbook with regard to records of site activities that may pertain to the environment.
- Recommend corrective action to the Contractor and the RE where construction activities are not in compliance with the EMP.
- To environmentally educate and raise the awareness of the Contractor and his staff as to the sensitivity of the Site and to facilitate the spread of the correct attitude during works on Site.
- To take immediate action on Site where clearly defined and agreed 'no go' areas are violated, or in danger of being violated, and to inform the RE of the occurrence and action taken.
- To take immediate action on Site when prescriptive conditions are violated, or in danger of being violated, and to inform the RE immediately of the occurrence and to take action, e.g. issuing of fines.
- To keep a comprehensive environmental record (site diary and photographs) of activities on Site.
- To be reachable by the public regarding matters of environmental concern as they relate to the development (register of complaints and actions to be kept).
- To have input into the EMP documentation and to ensure compliance by the Contractor with the prescriptive conditions.
- The ESM shall have the right to investigate the site at any time during the project phases and unexpected visits will be allowed.

1.8.2 Responsibilities of the Developer

- Attain all necessary approvals.
- Liaise with the ESM regarding environmental management and provide the ESM with all relevant documentation and plans.

- Support and comply with the EMP specifications.

1.8.3 Responsibility of the Engineer

- Assisting the ESM in ensuring that the conditions of the EMP are being adhered to and implemented.
- The Engineer, along with the ESM and RE, must obtain, examine and approve Method Statements.
- Promptly issuing instructions requested by the ESM to the Contractor.
- Deduct environmental penalties from certificate payments.
- Assisting the ESM in making decisions and finding solutions to environmental problems that may arise during the construction phase.
- Oversee the responsibilities of the RE and assist in all required matters.

1.8.4 Responsibilities of the Contractor (To be appointed)

- Inform both the RE and ESM should environmental issues on Site go wrong, e.g. erosion, dumping and pollution, etc.
- Adhere to the conditions of the EMP.
- Assisting in finding solutions to environmental problems that may arise during construction.
- Carrying out instructions issued in the site instruction book by the RE.
- Compile Method Statements as listed under 1.4.3 above.

1.9 FINANCING OF ENVIRONMENTAL CONTROL

Financing of the environmental requirements as outlined in this document, apart from the appointment of the ESM and specialists, is the sole responsibility of the Contractor appointed by the Developer. Therefore, it is accepted that the cost incurred for implementing this EMP by the Contractor would be allocated for in the tender document. Any responsibilities not defined in this document or where any uncertainties arise in this matter will be the responsibility of the Developer.

1.10 AMENDMENTS OF THE EMP

Any party involved with the project can suggest changes to the EMP via the ESM or RE. Such suggestions will be discussed with the Environmental Forum. Approved changes will be minute and drafted into the existing EMP in the form of an appendix or amendments.

1.11 DISPUTES AND DISAGREEMENTS

Any disputes or disagreements between role players on Site (with regard to environmental management) will be referred to the Environmental Forum. If no resolution on the matter is possible it must be presented to the ECO for clarification.

1.12 MONITORING

The ESM will carry the responsibility of monitoring the implementation of the EMP on Site, assisted by the RE. In this regard, the ESM will submit a monthly monitoring report to the DEA until after all rehabilitation work has been completed. A pro-forma monitoring report is contained in Appendix A.

Regular meetings will be held between the Engineer, RE and the ESM. The purposes of the meetings shall be:

- To establish the suitability of the Contractor's methods and machinery in an effort to lower the risk involved for the environment.
- To discuss possible non-conformance to EMP guidelines or environmental legislation.
- To assess the general state of the environment on site and discuss any environmental problems which may have materialised.
- To accommodate the local community in the decision-making process regarding social and environmental issues on site.

The monthly report should include:

- A description of exceptional conditions on site whether they be meteorological, personnel related, machinery related, or otherwise stipulated;
- A description of any environmental accident or developments which could potentially develop into a non-conformance event by the Contractor; and
- Minutes from the meetings.

Non-conformance reports will describe, in detail, the cause, nature and effects of any environmental non-conformance by the Contractor and could stand as evidence should legal action be required. If

possible photographs should also be included as evidence to substantiate the report. This report will also suggest mitigation measures to correct the non-conformance (if necessary) and contemplate revisions to any of the strategies used in the construction phase, whether they pertain to monitoring or to construction methods used on site.

PART 2: ENVIRONMENTAL SPECIFICATIONS

2.1 SCOPE

These specifications cover the requirements for controlling the impact of construction activities on the natural and social environment.

2.2 CONSTRUCTION

One week's notice, in writing, must be given to the ESM which again will inform the MET: DEA before commencement of construction activities.

2.2.1 Site division

The Contractor shall restrict all his activities, materials, equipment and personnel to within the specified area. A Method Statement detailing the location, layout and method of establishment of the Contractor's Camp (including all buildings, offices, lay down yards, plant wash areas, fuel storage areas, batching areas and other infrastructure required for the running of the project) shall be provided.

<u>Contractor's Camp</u>

- The Contractor shall submit a Method Statement, indicating the layout and preparation of the Contractor's Camp (this shall include the positioning of any fuels/hazardous materials stores). The extent and location of the Contractor's Camp shall be indicated on the site plans to be approved by the Engineer and ESM.
- The planning and design for the Construction Camp must ensure that there is minimal impact on the environment. The following should apply –
    - The Construction Camp will be placed within an existing disturbed area as far as possible.
    - The Contractor's Camp shall be located in an area of low environmental and social sensitivity.
    - The construction camp must preferably be located away from the B1 (Otjiwarongo-Okahandja Road) to minimise visual impact.
    - Its final location shall be identified in consultation with the Engineer and ESM.
- With the decommissioning of the structures all compacted platforms and slab foundations must be ripped up and be removed.

Vehicle Parking Area

- All vehicles will be allocated a dedicated parking area in the Contractor's Camp.
- No storage of vehicles will be allowed outside of the designated area.

2.2.2 Cement and concrete batching

Location

- Concrete shall not be mixed directly on the ground. Boards, plastic sheeting or other protective materials shall be used for this purpose.
- The concrete batching activity shall be located in an area of low environmental sensitivity to be identified and approved by the RE and ESM.
- The permitted location of a 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 and ESM. A Method Statement indicating the layout and preparation of this facility is required in this regard.

Maintenance

- All wastewater resulting from batching of concrete shall be disposed of via the wastewater management system.
- The concrete batching works shall be kept neat and clean at all times. No batching activities shall occur on unprotected substratum of any kind.
- 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 and ESM. Dagga boards, mixing trays and impermeable sumps shall be used at all mixing and supply points.
- Contaminated water storage facilities shall not be allowed to overflow and appropriate protection from rain and flooding shall be implemented.
- Contaminated water treatment on Site shall require a Method Statement.
- Unused cement bags are to be stored so as not to be effected by rain or runoff events.
- Used cement bags shall be stored in weatherproof containers to prevent windblown 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.

- 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 RE and ESM.

- Suitable screening and containment shall be in place to prevent wind-blown contamination associated with bulk cement silos, loading and batching.

- With respect to exposed aggregate finishes, the Contractor shall collect all contaminated water and fine material, and store it in sumps for disposal at an approved waste-disposal site.

- All visible remains of excess concrete shall be removed on completion of the plaster or concrete pour work and disposed of. All excess aggregate shall also be removed.

2.2.3 Drilling and jackhammering

The Contractor shall ensure that no pollution results from drilling operations. Either as a result of oil and fuel drips, or from drilling fluid. The Contractor shall submit a Method Statement detailing his proposals to prevent pollution during drilling operations. The Contractor shall take all reasonable measures to limit dust generation as a result of drilling operations. Any areas or structures damaged by the drilling and associated activities shall be rehabilitated by the Contractor to the satisfaction of the Engineer and ESM.

2.2.4 Earthworks

All earthworks shall be undertaken in such a manner so as to minimise the extent of any impacts caused by such activities. The Contractor shall take all reasonable measures to limit dust generation as a result of earthworks. Earthworks are to be phased so that no areas are left exposed for longer than is necessary. This is especially important during the rainy season where runoff causes siltation downstream & overall erosion and loss of topsoil, etc.

<u>Borrow pits</u>

If borrow pits are required, the Engineer need to obtain approval from the DEA. A Method Statement shall be required in this regard.

2.2.5 Fencing

It is important that excavation works are conducted within a limited area to facilitate control and to minimise impacts on the surrounding environment. The purpose of the fenced areas is to control construction and personnel activity within the designated areas, and limit unauthorised access.

- Where deemed necessary by the ESM or RE, sensitive areas shall be fenced off by the Contractor by means of a two-strand wire fence on which danger tape has been securely placed.

- Fencing of the labour campsite (if applicable) and construction area shall be suitably secured to prohibit access by livestock and local fauna. Full shade cloth demarcation of 1.8m in height is recommended for the Contractor's Camp.

- Fences will be constructed around Heritage resources (should these be present) to prevent access into such areas during construction.

- No unauthorised pedestrian or vehicular access shall be allowed into fenced, off-limit areas.

- If fencing is removed temporarily for the execution of work, the Contractor shall reinstate it as soon as practicable. Until re-instatement, the contractor shall demarcate the working area by surrounding it with danger-tape marking.

- Breaches in the fencing must be repaired immediately.

- The Contractor to the satisfaction of the RE and ESM shall erect and maintain all fencing. Such fences shall be erected before the start of any construction works.

2.2.6 Access routes

Roads in the direct vicinity of the site will be subject to continual use by construction vehicles, particularly heavy vehicles, carrying building materials, waste, etc. Special care should be taken to prevent spillages on the roads. Vehicles should be equipped with drip trays to prevent oil and fuel spillages. In the event of spillages, it should be reported immediately and cleaned as soon as possible. Notices should be placed on visible locations in the vicinity of the construction site to warn public of construction activities and indicating that heavy vehicles may be using the road.

On the Site, the Contractor shall control the movement of all vehicles and plant machinery so that they remain on designated/demarcated routes.

- Existing roads will be used as far as possible. No temporary access roads will be permitted, unless negotiated with the ESM or Engineer and affected land owners.

- Any temporary roads required shall be decommissioned by the Contractor and rehabilitated using stockpiled topsoil.

- Topsoil shall be removed as described under 'Clearing and Grubbing' prior to the construction of the road/s.

- During construction the Contractor shall protect all areas susceptible to erosion by installing all necessary temporary and permanent drainage works as soon as possible.

2.2.7 Clearing and grubbing for construction purpose

Clearing should first be discussed with the Engineer and ESM before commencement. Clearing should be phased in accordance with a preapproved Method Statement.

Plant location and rescue

- If considered necessary, the location and rescue of endemic plants, and their transfer to a specified location shall be conducted by a suitably qualified contractor prior to the onset of any site clearing operations.
- Where possible direct transplantation of rescued plant material, into areas earmarked and prepared for revegetation, shall occur. Transplantation shall only occur in areas of similar habitat and soil type from which rescued plant material originates.
- Where direct transplantation is not feasible, plant material shall be moved to a nursery for transplantation once the permanent revegetation areas become available.
- Rescued plants, which are to be stockpiled at a nursery, shall be stored under damp shade cloth/hessian until they are transported to these sites. They shall be watered and bagged in the topsoil from the area.

Vegetation clearance

- Before any area is cleared of vegetation a Method Statement shall be provided.
- All cleared areas shall be stabilised as soon as possible. Areas that are, in the opinion of the Landscape Architect, less stable, shall be stabilised immediately following vegetation clearance. It is recommended that the Method Statement contains a phased vegetation clearance plan and strategy, accompanied with a map.
- The disposal of vegetation by burying or burning is prohibited. Cleared vegetative material shall:
    - be removed from Site and disposed of at an approved disposal site;
    - be chipped and mulched, where suitable.
- Vegetation shall be cleared mechanically. Care shall be taken to minimise the disturbance to topsoil during this process.
- During site clearance, any old concrete, rubble or refuse shall be removed from the Site, or stockpiled for disposal at an approved disposal site. All stockpiles shall be managed so as to avoid damage to vegetation.

- Where practical, indigenous plant material shall be kept separate from alien material. The vegetative material shall be reduced either by mechanical means (chipper) or by hand axing to sticks of no longer than 100 mm.

- All indigenous vegetation cleared from the Site shall be collected for later use. Where appropriate, with permission from the Landscape Architect, the indigenous material shall be collected simultaneously with the topsoil.

- The Contractor shall store the mulched vegetation in bags. The bags shall be approved by the ESM and shall allow air to pass through the enclosed material. Mulch shall be protected from wetting.

- Subject to the approval of the Landscape Architect, seed-free material from exotic invasive plants (should these occur on site) shall be chipped and used to prepare mulch.

- The Contractor shall stabilise soil in unstable areas in order to control wind-blown dust and sand.

The following methods shall be considered for soil stabilisation:

Mulch stabilisation

- Mulch shall be applied by hand to achieve a layer of uniform thickness. The mulch shall then be lightly worked into the topsoil layer so that it mixes with the soil and serves to bind it.

- The mulch shall be spread at a coverage rate of 100 kg per 250m².

- Where brush-cut material is to be utilised as mulch, this material shall be evenly spread across the area to a uniform depth of 25mm. The mulch shall then immediately be rotovated into the upper 100 mm layer of soil. This operation shall not be attempted when the wind strength is such as to remove the mulch before it can be rotovated in.

- If the area is exposed to strong wind (August winds in the case of the Site) the mulch stockpile shall be covered with a fine nylon net with 100mm × 100mm openings.

Straw stabilisation

Straw shall be utilised as a binding material in sandy areas. Baled straw shall be placed on the cleared area, opened and spread evenly by hand or machine at a coverage rate of 1 bale per 20 m² over the area to be stabilised. It shall then immediately be rotovated into the upper 100 mm layer of soil. This operation shall not be attempted when the wind strength is such as to remove the straw before it can be rotovated into the sand.

Stabilisation of steep slopes

- The Contractor shall take measures to protect all areas susceptible to erosion by installing all the necessary temporary and permanent drainage works as soon as possible. The Contractor shall take any other measures that may be necessary to prevent surface water from being concentrated in streams and from scouring the slopes, banks or other areas.

- If runnels or erosion channels develop, they shall be back-filled and compacted, and the areas restored to a proper (stable) condition. The Contractor shall not allow erosion to develop on a large scale before effecting repairs.

- Where artificial slope stabilisers are used, these should be applied to the slope before top soiling.

- Near vertical slopes shall be stabilised using natural rock wall structures, stacked precast concrete blocks or rock-filled gabion baskets. All structures shall have a 'natural' look and facilities for plants to grow in.

- Where the slopes are 1:3 to 1:6 they should be logged or otherwise stepped (using stabilisation cylinders or similar) in order to prevent soil erosion. Logs/cylinders must be laid in continuous lines following the contours and spaced vertically 0.8-1.2 m apart, depending on the steepness of the slope. These logs/cylinders must be secured by means of steel pegs and wire in rocky areas, and treated wooden pegs in other areas.

- In areas where slopes are less than 1:6, horizontal grooves, shallow steps or ledges parallel to contours should be made on the cut slopes.

- In areas where slopes are less than 1:6 these slopes should be stabilised by using logs in parallel rows, or stabilisation cylinders fastened randomly into position or using biodegradable netting. These structures shall hold the top-material on the slopes and serve as erosion prevention structures.

- Shallow slopes shall be stabilised using commercial available and approved anti-erosion compounds.

Conservation of Topsoil

- The Contractor shall at all times carefully consider what machinery is appropriate for the task while minimising the extent of environmental damage.

- Topsoil shall be cleared of woody vegetation, and specifically exotic vegetation (should this occur), before ripping and removing. Identification of these species should be done by a competent person qualified accordingly.

- The topsoil is regarded as the top 300 mm of the soil profile.
- Topsoil is to be handled twice only – once during clearing and stockpiling & once during rehabilitation.
- The topsoil, including the existing grass cover is to be shallowly ripped (only the depth of the topsoil) before removal. This is to ensure that organic plant material, and the natural seed base is included in the stripping process.
- Soil stockpiles shall not be higher than 2.5m or stored for a period longer than one year. The slopes of soil stockpiles shall not be steeper than 1 to 2.5 (vertical/horizontal).
- No vehicles shall be allowed access onto the stockpiles after they have been placed.
- Stockpiles shall not be allowed to become contaminated with oil, diesel, petrol, garbage or any other material, which may inhibit the later growth of vegetation.
- The Contractor shall apply soil conservation measures to the stockpiles to prevent erosion. This can include the use of erosion control fabric or grass seeding.

2.2.8 'No go' areas

- All areas outside the demarcated working areas and Contractor's Camp as well as areas on the Site identified as sensitive by the ESM and/or Landscape Architect, are 'no go' areas.
- No unauthorised entry, stockpiling, dumping or storage of equipment or materials shall be allowed outside the demarcated work areas and Contractor's Camp.

2.2.9 Protection of indigenous fauna and flora

- Collecting of wood and/or killing trees in the area for the purpose of fire wood is prohibited.
- Trapping, removal, harming and/or killing of animals (reptiles, amphibians, mammals, avian/birds) are forbidden.
- No domestic pets are permitted on Site**.**
- All alien vegetation identified along the route alignments (should this occur) will be cleared by the Contractor. An effort must be made to remove the entire root system, and the plant left to dry out on a hard surface to prevent seed germination.
- Where the use of herbicides, pesticides and other poisonous substances has been specified, the Contractor shall submit a method statement. The use of these substances should be kept to an absolute minimum.

- Disturbance and protection of fauna and flora within the boundaries of the Site must be done in accordance with the Method. Outside work areas, flora shall not be removed, damaged or disturbed in any way.

2.2.10 Erosion/siltation control

During construction works the Contractor shall protect all areas susceptible to erosion and siltation (e.g. stream banks) by installing the necessary drainage or retaining works and by taking other measures necessary to prevent the surface water from being concentrated in streams and from scouring the stream banks and depositing silt outside the demarcated work areas. Any runnels or erosion channels developed during the works or rehabilitation period shall be backfilled and compacted, and the areas restored.

A Method Statement shall be prepared and submitted to the Engineer to deal with erosion and siltation issues prior to bulk earthworks commencing. Stabilisation of cleared areas to prevent and control erosion shall be actively managed. 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.

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 method of stabilisation shall be determined in consultation with the Engineer and Landscape Architect.

Consideration and provision shall be made for the following methods (or combination):

- Brush cut packing
- Mulch or chip cover
- Straw stabilising (at the rate of one bale/20m² and, if required, additional straw should be added and rotated into the top 100 mm of the completed earthworks)
- Watering (in consultation with Council)
- Planting/sodding
- Hand seeding sowing
- Hydroseeding
- Soil binders and anti-erosion compounds
- Mechanical cover or packing structures, e.g. gabions and mattresses, geofabric, hessian cover, armour flex, log/pole fencing and retaining walls

2.2.11 Landscaping/rehabilitation

Plant location and rescue

- If considered necessary, the location and rescue of endemic plants, and their transfer to a specified location (on-site nursery) shall be conducted by a suitably qualified contractor prior to the onset of any site clearing operations.
- Where possible direct transplantation of rescued plant material, into areas earmarked and prepared for revegetation, shall occur. Transplantation shall only occur in areas of similar habitat and soil type from which rescued plant material originates.
- Where direct transplantation is not feasible, plant material shall be moved to a nursery for transplantation once the permanent revegetation areas become available.
- Rescued plants, which are to be stockpiled at a nursery, shall be stored under damp shade cloth/hessian until they are transported to these sites. They shall be dipped into a moisture-retaining agent and bagged in the topsoil from the area.

Vegetation clearance

- Before any area is cleared of vegetation a Method Statement shall be provided.
- All cleared areas shall be stabilised as soon as possible. Areas that are, in the opinion of the ESM, less stable, shall be stabilised immediately following vegetation clearance. It is recommended that the Method Statement contains a phased vegetation clearance plan and strategy, accompanied with a map.
- The disposal of vegetation by burying or burning is prohibited. Cleared vegetative material shall:
    - be removed from Site and disposed of at an approved disposal site;
    - be chipped and mulched, where suitable.
- Vegetation shall be cleared mechanically. Care shall be taken to minimise the disturbance to topsoil during this process.
- During site clearance, any old concrete, rubble or refuse shall be removed from the Site, or stockpiled for disposal at an approved disposal site. All stockpiles shall be managed so as to avoid damage to vegetation.

- Where practical, indigenous plant material shall be kept separate from alien material. The vegetative material shall be reduced either by mechanical means (chipper) or by hand axing to sticks of no longer than 100 mm.

- All indigenous vegetation cleared from the Site shall be collected for later use. Where appropriate, with permission from the ESM, the indigenous material shall be collected simultaneously with the topsoil.

- The Contractor shall store the mulched vegetation in bags. The bags shall be approved by the ESM and shall allow air to pass through the enclosed material. Mulch shall be protected from wetting.

- Subject to the approval of the ESM, seed-free material from exotic invasive plants shall be chipped and used to prepare mulch.

- The Contractor shall stabilise soil in unstable areas in order to control wind-blown dust and sand.

Fertilisation

Fertiliser shall be added to the soil on seeding or planting. The rate of application shall be as directed by the ESM after he has had the opportunity of testing the requirements of the soil in which the vegetation is to be planted. Because of the high phosphate level in the canals, fertilisers containing fast-release phosphates, such as Super Phosphate, should not be used. Fertilisers to be considered must be approved by the ESM prior to purchase and application.

Time of planting

The Contractor shall not begin planting work until all construction activities in the area to be revegetated have been completed. Reseeding and replanting shall occur at a time as indicated by the ESM by taking the summer rainfall period of the area into account. If planting occurs in the dry periods it shall be necessary to irrigate plants to ensure their successful establishment.

Traffic on revegetated areas

No vehicle or unauthorised personnel shall be allowed onto revegetated areas. Only persons or equipment required for the preparation of areas, application of fertiliser and spreading of topsoil shall be allowed to operate on these areas.

The following methods shall be considered for soil stabilisation:

Mulch stabilisation

- Mulch shall be applied by hand to achieve a layer of uniform thickness. The mulch shall then be lightly worked into the topsoil layer so that it mixes with the soil and serves to bind it.
- The mulch shall be spread at a coverage rate of 100 kg per 250m².
- Where brush-cut material is to be utilised as mulch, this material shall be evenly spread across the area to a uniform depth of 25mm. The mulch shall then immediately be rotovated into the upper 100 mm layer of soil. This operation shall not be attempted when the wind strength is such as to remove the mulch before it can be rotovated in.
- If the area is exposed to strong wind (August winds in the case of the Site) the mulch stockpile shall be covered with a fine nylon net with 100mm × 100mm openings.

Straw stabilisation

Straw shall be utilised as a binding material in sandy areas. Baled straw shall be placed on the cleared area, opened and spread evenly by hand or machine at a coverage rate of 1 bale per 20 m² over the area to be stabilised. It shall then immediately be rotovated into the upper 100 mm layer of soil. This operation shall not be attempted when the wind strength is such as to remove the straw before it can be rotovated into the sand.

Stabilisation of steep slopes

- The Contractor shall take measures to protect all areas susceptible to erosion by installing all the necessary temporary and permanent drainage works as soon as possible. The Contractor shall take any other measures that may be necessary to prevent surface water from being concentrated in streams and from scouring the slopes, banks or other areas.
- If runnels or erosion channels develop, they shall be back-filled and compacted, and the areas restored to a proper condition. The Contractor shall not allow erosion to develop on a large scale before effecting repairs.
- Where artificial slope stabilisers are used, these should be applied to the slope before top soiling.
- Near vertical slopes shall be stabilised using natural rock wall structures, stacked precast concrete blocks or rock-filled gabion baskets. All structures shall have a 'natural' look and facilities for plants to grow in.
- Where the slopes are 1:3 to 1:6 they should be logged or otherwise stepped (using stabilisation cylinders or similar) in order to prevent soil erosion. Logs/cylinders must be laid in

continuous lines following the contours and spaced vertically 0.8-1.2 m apart, depending on the steepness of the slope. These logs/cylinders must be secured by means of steel pegs and wire in rocky areas, and treated wooden pegs in other areas.

- In areas where slopes are less than 1:6, horizontal grooves, shallow steps or ledges parallel to contours should be made on the cut slopes.
- In areas where slopes are less than 1:6 these slopes should be stabilised by using logs in parallel rows, or stabilisation cylinders fastened randomly into position or using biodegradable netting. These structures shall hold the top-material on the slopes and serve as erosion prevention structures.
- Shallow slopes shall be stabilised using commercial available and approved anti-erosion compounds.

2.2.12 Protection of archaeological sites

Archaeological sites are protected by the National Heritage Act No 27 of 2004. Generally, it is an offence to disturb, destroy or remove from its original site any archaeological material, or excavate any such site without permission. Should any archaeological materials, such as human remains, burial sites and other artefacts, be uncovered during earthworks, works in the area are to be stopped immediately, and the find immediately reported to the ESM and the National Monuments Council. The latter will inspect the area within 24 hours of a find being reported (to prevent unnecessary delays in works) and make further recommendations. The archaeologist must inform National Heritage Council of any materials uncovered during works. Mitigation measures should be implemented if required.

2.2.13 Safety

Relevant occupational Health and Safety requirements shall be adhered to. Telephone numbers of emergency services, including the fire safety officer, shall be displayed conspicuously in the Contractor's office near a telephone. No firearms are permitted.

Staff must be made aware of their responsibilities to ensure that impacts such as fire, safety and pollution are taken care of. This must form part of the Environmental Education. The movement of construction workers must be controlled and access to adjacent properties must be prohibited.

The contractor’s personnel must be adequately trained and informed in the tasks that they are expected to perform. This is required for their own safety as well as the safety of colleagues and other interested and/or affected parties.

All excavated areas and/or holes should be clearly demarcated.

2.2.14 Fire control

Any fires that occur shall immediately be reported to both the Engineer and ESM. Smoking shall not be permitted in those areas where it is a fire hazard. Such areas shall include the workshop and fuel storage areas and any areas where the vegetation or other material is such as to make liable the rapid spread of an initial flame. Cigarette butts must be disposed of in designated containers. Burning is not permitted as a disposal method.

The Contractor shall appoint a competent fire safety officer who shall be responsible for ensuring immediate and appropriate actions in the event of a fire and shall ensure that employees are aware of the procedure to be followed. The Contractor shall ensure that there is basic fire-fighting equipment (e.g. fire buckets, extinguishers, fire beaters, etc.) available on Site at all times. This shall include at least one fire extinguisher of the appropriate type when welding or other "hot" activities are undertaken.

Open fires for cooking purpose are not allowed, except within the Contractor's camp under controlled conditions.

2.2.15 Emergency procedures

The Contractor shall submit Method Statements covering the procedures for the following emergencies:

(i) Fire

The Contractor shall inform all relevant parties of a fire as soon as one starts and shall not wait until it can no longer be controlled. The Contractor shall ensure that his employees are aware of the procedure to be followed in the event of a fire.

(ii) Accidental leaks and spillages

The Contractor shall ensure that his employees are aware of the procedure to be followed for dealing with spills and leaks, which shall include notifying the Engineer and ESM. The Contractor shall ensure that the necessary materials (e.g. chemcap, spill-sorb, drizzat pads, enretech and peat moss) and equipment for dealing with spills and leaks are available on Site at all times. The source of the spillage shall be isolated. The Contractor shall contain the spillage using sand berms, sandbags, pre-made booms, sawdust or absorbent materials. Treatment and remediation of the spill areas shall be undertaken to the reasonable satisfaction of the Engineer and ESM.

2.2.16 Community relations

The Contractor shall erect and maintain information boards in the position, quantity, design and dimensions specified. Such boards shall include contact details for complaints by members of the public in accordance with details provided by the Engineer. The Contractor shall also keep a

"Complaints Register" on Site. The Register shall contain all contact details of the person who made the complaint, and information regarding the complaint itself.

2.2.17 Construction personnel information posters

The Contractor shall erect and maintain information posters for the information of his employees depicting actions to be taken to ensure compliance with aspects of the specifications. Such posters shall be erected at the eating areas, 'no go' areas and any other locations specified by the Engineer and/or ESM.

2.2.18 Temporary site closure

If the Site is closed for a period exceeding one week, the following checklist procedure shall be carried out by the Contractor in consultation with the RE and ESM. Contractor's Safety Officers (in terms of the relevant Occupational Health and Safety Act) to check the Site and report.

<u>Fuels/flammables/hazardous materials stores</u>

- Ensure fuel stores as low in volume as possible.
- No leaks.
- Outlet secure/locked.
- Bund empty.
- Fire extinguishers serviced and accessible.
- Secure area from accidental damage, e.g. plant collision.
- Emergency and contact numbers to be available and displayed.
- Adequate ventilation.

<u>Safety</u>

- Fencing and barriers in place as per the relevant Occupational Health and Safety Act.
- Notice boards applicable and secured.
- Emergency and management contact details displayed.
- Site safety officer checks prior to closure as per the relevant Occupational Health and Safety Act.

- Security persons briefed and have facility for contact.
- Fire hazards identified.
- Scaffolds secure.
- Inspection schedule and log by security staff.

Erosion and siltation

- Wind and dust mitigation in place.
- Stockpiles at stable angle.
- Detention ponds or channels in place.
- Erosion protection measures in place.

Water contamination and pollution

- Fuels hazardous stores secure.
- Cement and materials stores secured.
- Toilets empty and secured.
- Refuse bins empty and secured (lids).
- Bunding clean and treated.
- Drip trays empty and secure (where possible).
- Structures vulnerable to high winds secure.

2.3 MATERIALS

2.3.1 Handling, use and storage of construction materials

The Contractor shall ensure that delivery personnel are informed of all procedures and restrictions (including 'no go' areas) required to comply with the specifications. The Contractor shall ensure that delivery personnel are supervised during offloading by someone with an adequate understanding of the requirements of the specifications.

Materials shall be appropriately secured to ensure safe passage between destinations. Loads including, but not limited to sand, stone chip, cement and refuse, shall have appropriate cover to

prevent them spilling during transit. The Contractor shall be responsible for any clean-up resulting from the failure by his employees or suppliers to properly secure transported materials.

All manufactured and/or imported material shall be stored within the Contractor's Camp, and, if so required, out of the rain. All lay down areas outside of the Contractor's Camp shall be subject to the ESM's approval, which shall not unreasonably be withheld.

Importation of fill/soil/sand materials

- Imported materials shall be free of weeds, seeds, litter and contaminants.
- Sources of imported material shall be listed and approved by the Engineer.
- Stockpile areas will be identified by the Engineer and agreed upon by the ESM and ESM before any stockpiling commences.

Topsoil

- The top 30 cm of topsoil must be stripped before any grading or bulk earthworks begin and stockpiled separately for use in rehabilitation. Topsoil may not be compacted or covered in any way during stockpiling.
- Topsoil shall be stockpiled in the area where it was removed and should be used again in the vicinity where it was removed.
- A Method Statement for stockpiling of topsoil shall be submitted to the Engineer for approval prior to any site clearing activities commencing.

Spoil material

- The location of spoil stockpiles shall be identified by the Engineer and agreed upon by the ESM prior to any stockpiling.
- No spoil material shall be dumped outside the defined site unless it is being removed from the Site, as approved by the Engineer.
- Spoil stockpiles shall be convex and should not exceed 2 m in height. The Contractor shall ensure that the spoil material does not blow or wash away. If it is in danger of being washed or blown away, the Contractor shall cover it with a suitable material, such as hessian or plastic.

2.3.2 Plant material

For all landscaping and rehabilitation work only plants approved by the ESM may be used. No declared invasive alien species may be used.

Shrubs and trees

- The Contractor shall ensure that each plant is handled and packed in the approved manner for that species or variety, and that all necessary precautions are taken to ensure that the plants arrive on Site in a proper condition for successful growth.

- Trucks used for transporting plants shall be equipped with covers to protect the plants from windburn. Containers shall be in a good condition. Plants shall be protected from wind during the transportation thereof.

- The Contractor shall ensure that the plants are in a good condition and free from plant diseases and pests. The Contractor shall immediately remove plants containing any diseases and/or pests from the Site.

- There shall be sufficient topsoil around each plant to prevent desiccation of the root system. Where plants are stored on Site prior to planting they shall be maintained to ensure that the root systems remain moist.

2.4 CONSTRUCTION PLANT

2.4.1 Fuel and oil

If so required, fuel may be stored on Site in a depot complying with the requirements listed below. Where reasonably practical, construction vehicles and equipment shall be refuelled at the depot or at the workshop as applicable. The surface under the refuelling area shall be protected (bunded) against pollution to the satisfaction of the Engineer and ESM prior to any refuelling activities.

The Contractor shall ensure that there is always a supply of absorbent material (e.g. chemcap, spill-sorb, drizzat pads, enretech and peat moss) readily available to neutralise and where possible be designed to encapsulate minor spillage. The quantity of such materials shall be able to handle a minimum of 200 ℓ of liquid spill.

Fuel storage areas

- The Engineer shall be advised of the area that the Contractor intends using for the storage of fuel. Fuels shall be stored at a suitable location inside the Contractor's Camp.

- The fuel storage area must not be located near (i.e. less than 100m) any water resource, including a river, stream or surface water body.

- The Contractor shall ensure that all liquid fuels (petrol and diesel) are stored in tanks with lids, which are kept firmly shut.

- The tanks shall be situated on a smooth impermeable surface (plastic or concrete) base with an earth bund (plastic must have sand on top to prevent perishing). The impermeable lining shall extend to the crest of the bund and the volume inside the bund shall be 110% x the total capacity of all the storage tanks.

- The Contractor shall keep fuel under lock and key at all times.

- No smoking shall be allowed in the vicinity of fuel tanks.

- The Contractor shall educate workers on the appropriate methods for workshop maintenance and fuel points to prevent fuel and oil being washed out of containment areas.

- 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. In addition, if fuel is dispensed from 200 ℓ drums, the proper dispensing equipment shall be used, and 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.

- Symbolic safety signs depicting “No Smoking”, “No Naked Lights” and “Danger” are to be provided, and are to conform to the requirement of SABS 1186.

- The product contained within the tank shall be clearly identified, using the emergency information system detailed in SABS 0232 part 1.

- Any electrical or petrol-driven pump shall be equipped and positioned, so as not to cause any danger of ignition of the product.

- Areas for storage of fuels and other flammable materials shall comply with standard fire safety regulations and may require the approval of the fire safety officer.

- The Contractor shall ensure that there is adequate fire-fighting equipment at the fuel stores and that staff are adequately trained to use this equipment.

<u>Fuel storage tanks</u>

- Temporary above ground storage tanks may be permitted at the discretion of the safety officer based on the merit of the situation, provided that the following requirements are met:

    - All such tanks are to be designed and constructed in accordance with a recognised Act and code (Petroleum Product and Energy Act, No. 13 of 1990, as amended).

    - The rated capacity of such a tank shall provide sufficient capacity to permit expansion of the product contained therein by the rise in temperature during storage.

- The tank shall be erected at least 3.5 m from buildings, boundaries and any other combustible or flammable materials.
- Adequate precautions shall be provided to prevent spillage during the filling of any tank.

- Soil contaminated by oil, fuel or chemicals shall be removed and disposed of at a registered Hazardous Waste Disposal Site or rehabilitated *in-situ*.
- If larger capacity tanks are required then an acceptable rational design based on a relevant national or international code or standard shall be submitted to the Directorate Energy, Petroleum and Downstream (Ministry of Mines and Energy).

2.4.2 Ablution facilities

Washing, whether of the person or of personal effects and acts of excretion and urination are strictly prohibited other than at the designated facilities provided. Provision shall thus be made for ablution and washing facilities. The exact location of the facilities shall be approved by the Engineer prior to establishment. All temporary portable toilets shall be secured to the ground to the satisfaction of the Engineer to prevent them toppling due to wind or any other cause.

Toilets supplied by the Contractor for the workers shall occur at a maximum ratio of 1 toilet per 30 workers (preferred 1:15) and be within walking distance of the staff. These facilities shall be maintained in a hygienic state and serviced regularly. Toilet paper shall be provided. The Contractor shall ensure that toilets are emptied regularly, as well as before the builders' holidays. The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from Site. Discharge of waste from toilets into the environment is prohibited.

2.4.3 Eating area

The Contractor shall provide bins with lids at the eating areas for his staff, which shall be emptied on a daily basis. The waste may be temporarily stored inside the Contractor's Camp in a facility that is weatherproof and scavenger-proof and which has been approved by the Engineer. The feeding or discarding of food for animals is strictly prohibited.

2.4.4 Solid waste management

No burying or dumping of any waste materials, rubble, vegetation or refuse shall occur on Site. Special attention must be paid not to create a favourable environment for wild animals posing a potential threat to workers and residents. The Contractor shall set up a solid waste control and removal system and a Method Statement is required. The accumulation of construction waste materials must be avoided as far as possible. The system shall comply with the following detailed requirements:

Dumping

- Receipts for hazardous waste disposal shall be copied to the Engineer.
- Any proposal to dispose of waste materials, rubble, vegetation or refuse shall require a Method Statement.
- Refuse shall be disposed of into scavenger- (baboons, dogs, rodents, etc.) and weather-proof bins. The Contractor shall then remove the refuse collected from the working areas, from Site at least once a week or depending on necessity.
- Refuse must be disposed of at an authorised landfill acceptable to the DEA.
- The Contractor shall make provision for workers to clean up the Contractor's Camp and working areas at least once a week.

Recycling

- Wherever possible, materials used or generated by construction shall be recycled.
- Containers for glass, paper, metals and plastics shall be provided (a four bin recycling system). Office and camp areas are particularly suited to this form of recycling process.
- Where possible and practical, such as at stores and offices, waste shall be sorted for recycling purposes.

2.4.5 Waste water management

The Contractor shall set up a contaminated water management system, and a Method Statement is required in this regard. The Method Statement shall state the collection facilities, which are to be used to prevent pollution, as well as the method of disposal of the contaminated water. The Contractor shall notify the Engineer immediately of any pollution incidents on Site.

The Engineer’s approval will be required prior to the discharge of contaminated water into a municipal sewer system. The Contractor shall prevent discharge of any pollutants, such as cement, concrete, lime, chemicals and fuels into the canal or any other water sources. Water from kitchens, showers, sinks, etc. shall be discharged into a conservancy tank for removal from Site. Runoff from fuel depots/workshops/truck washing areas and concrete swills shall be directed into a conservancy tank and disposed of at a site approved by the Engineer and ESM.

Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas are not polluted. A Method Statement shall be required for all wash areas where hydrocarbon and hazardous materials, and pollutants are to be used. This includes, but is not limited to, concrete

batching areas, vehicle washing, workshop wash bays, paint wash and cleaning. Wash areas for domestic use shall ensure that the disposal of contaminated water is sanctioned by the Engineer.

2.4.6 Workshop, equipment maintenance and storage

Where practical, all maintenance of plant and equipment on Site shall be performed in the workshop. If it is necessary to do maintenance outside of the workshop area, the Contractor shall obtain the approval of the Engineer prior to commencing activities.

All plant and equipment shall be kept in good working order and serviced regularly. Leaking equipment shall be removed immediately from the Site and repaired. When the Contractor carries out emergency plant maintenance it is essential that there is no pollution to the environment. This will be overseen by the Engineer.

The workshop shall have a smooth impermeable (concrete or thick plastic covered with sand) floor, which is bunded and sloped towards an oil trap to contain any spillages. When servicing equipment, drip trays shall be used to collect the waste oil and other lubricants. Drip trays shall also be provided in construction areas for stationary plant and for "parked" plant.

All washing shall be restricted to a minimum. If essential, washing must be undertaken in the workshop or maintenance areas. The use of detergents for washing shall be restricted to low phosphate and nitrate containing and low sussing-type detergents. Runoff should be collected, contained and disposed of at an approved waste site.

<u>Contractor's Camp maintenance</u>

The Contractor's Camp shall be kept neat and clean at all times. Waste and litter shall be disposed of into designated containers, which shall be emptied regularly by the Contractor. Waste materials shall be transported off the Site according to acceptable standards and procedures.

<u>Drip trays and bunding</u>

- All plant or machinery, which includes but is not limited to generators, pumps, compressors, drill rigs, static plant, shall have drip trays strategically placed to catch incidental spills.
- Drip trays shall be inspected and emptied daily, and serviced when necessary. Drip trays shall be closely monitored during rain events to ensure that they do not overflow.
- All repairs done on machinery using hydrocarbons as fuels or lubricants shall have a drip tray placed strategically to avoid incidental spillage.
- All static plant (stationary >6 months) shall be located within a bunded area. The bunded area should have a smooth impermeable surface with an earth bund.

2.4.7 Noise

Construction activities can cause environmental noise pollution. A disturbing noise is one that exceeds the zone sound level or the ambient sound level by 7 dB or more. A noise nuisance is defined as meaning "any sound that disturbs or impairs or may disturb or impair the convenience or peace of persons". This includes the use of power tools, movement of vehicles, etc.

The Contractor shall limit noise levels (e.g. install and maintain silencers on machinery). Appropriate directional and intensity settings are to be maintained on all hooters and sirens. No amplified music shall be allowed on Site. The use of radios, tape recorders, compact disc players and television sets shall not be permitted unless the volume is kept sufficiently low. The Contractor shall not use sound amplification equipment on Site unless in emergency situations.

The following specific measures must therefore be adhered to:

- Limit construction times to the following hours:
    - 07:00 to 18:00 during the week (Monday to Friday);
    - 08:00 to 17:00 on Saturdays, and
    - No noisy activities on a Sunday.
- Should blasting be required during the construction phase, the necessary permits must be obtained from the local authority and any other relevant authority.
    - The contractor must comply with all applicable occupational health and safety requirements.
    - Blasting times must be limited to the hours from 08:00 to 17:00 during weekdays only.
    - Screen construction activities from residential, social and business entities with soil berms to limit noise.

2.4.8 Dust

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 and ESM. Removal of any vegetation shall be avoided as far as possible, while handling and transport of erodible materials shall be avoided under high wind conditions.

During high wind conditions, the Engineer 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. Where possible, stockpiles shall be located in sheltered areas.

Where erosion of stockpiles becomes a problem, erosion control measures shall be implemented at the discretion of the Engineer.

Appropriate dust suppression measures shall be used when dust generation is unavoidable, e.g. straw, brush packs and chipping, particularly during prolonged dry periods in summer. Such measures shall also include the use of temporary stabilising measures (e.g. chemical soil binders and dustex).

2.4.9 Groundwater

The abstraction of groundwater for use during the construction phase should precede an approval from Water Affairs with the Ministry of Agriculture, Water and Forestry.

2.5 POST CONSTRUCTION

2.5.1 Ripping of compacted soil

All areas where soil has been compacted due to construction activities must be ripped in two perpendicular directions to a depth of 0.15m.

2.5.2 Site rehabilitation

The site must be cleared of all construction equipment, waste and associated materials by the end of the construction phase of the project.

Areas that were cleared for construction purposes such as the contractor's camp should be restored to its original condition.

Stockpiled topsoil and indigenous vegetation should be used for all rehabilitation purposes.

All burrow pits that were utilised for the abstraction of building materials should be rehabilitated to the minimum requirements of the Department of Minerals and Energy.

The rehabilitation plan must ensure that erosion by runoff water does not occur.

2.6 TOLERANCES

Environmental management is concerned not only with the final results of the works but also with the control of how those operations are carried out. Tolerance with respect to environmental matters applies not only to the finished product but also to the standard of the day-to-day operations required to complete the works. It is thus required that the Contractor shall comply with the environmental requirements on an ongoing basis and any failure on his part to do so will entitle the Engineer to certify the imposition of a fine subject to the details set out below. Moneys from fines/penalties will be managed and allocated at the discretion of the RE and ESM.

Spot fines

- Spot fines shall be issued per incident and per individual at the discretion of the RE and ESM.
- Spot fines shall be issued in addition to any remedial costs incurred as a result of non-compliance with the environmental specifications.
- The Engineer shall inform the Contractor of the contravention and the amount of the fine, and will deduct the amount from monies due under the Contract.
- Spot fines of between N$100.00 and N$2,000.00, including but not limited to those activities detailed below, shall be imposed by the Engineer on the Contractor for contraventions of the environmental specifications by individuals or operators employed by the Contractor and/or his subcontractors. Where there are ranges, the amount shall depend on the severity and extent of the damage done to the environment:

o	An individual walking outside the demarcated boundaries of the Site or within a 'no-go' area	N$ 100.00
o	An individual operating any plant outside the boundaries of the Site	N$ 500.00 to N$ 2,000.00
o	An individual driving off earmarked roads, outside the boundaries of the Site or within a 'no-go' area	N$ 2,000.00
o	A plant operator ignoring a verbal warning to have an oil leak from his machinery repaired	N$ 200.00
o	An individual littering on Site	N$ 100.00
o	An individual not making use of the ablution facilities	N$ 100.00
o	An individual making an illegal fire on Site	N$ 1,500.00
o	An individual polluting the environment due to poor waste management, cement mixing on bare ground, paint washing, etc.	N$ 1,000.00 to N$ 2,000.00

- For each subsequent similar offence committed by the same individual, the fine shall be doubled in value to a maximum value of N$ 4,000.00. Repeat offenders may also face disciplinary and/or legal action and/or dismissal.

Penalty fines

- 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.
- The Contractor is deemed NOT to have complied with these specifications if:
    - within the boundaries of the Site, site extensions and access routes there is evidence of contravention of these specifications;
    - environmental damage ensues due to negligence;
    - the Contractor fails to comply with corrective or other instructions issued by the Engineer within a specific time; and
    - the Contractor fails to respond adequately to complaints from the public.
- The amount of penalty shall be determined by the Engineer in consultation with the ESM.
- Payment of any fines in terms of the contract shall not absolve the offender from being liable from prosecution in terms of any law.
- The following penalties are suggested for transgressions:

Erosion and siltation	A penalty equivalent in value to the cost of rehabilitation plus 20%.
Unnecessary damage to vegetation outside the demarcated works area (no-go areas)	A penalty equivalent in value to the cost of rehabilitation plus 20%.
Unnecessary damage to archaeological material	A penalty to a maximum of N$10,000.00 shall be paid for any damage to archaeological material without permission.
Injuring or killing of wildlife	A penalty to a maximum of N$10,000.00 shall be paid for any wildlife injured or killed. The Contractor shall also be liable for all the costs of rehabilitation to all wildlife if they become injured as a direct result of neglect at the Site.

2.7 MEASUREMENT AND PAYMENT

No separate measurement and payment will be made to cover the costs of complying with the EMP and such costs shall be deemed to be covered by the rates tendered for the items in the Schedule of Quantities completed by the Contractor when submitting his tender.

2.8 MITIGATION MEASURES AND PROPOSED MANAGEMENT PROGRAMME

Issue	Objective	Mitigation Measure	Responsibility	Compliance Notes
PLANNING & DESIGN				
Contractor Requirements	Ensure that the Contractor is aware of his/her responsibility.	Provide the contractor with the EMP.	Client	
Environmental Site Manager	Ensure that activities on site are compliant with the requirements of the EMP.	Appoint an independent Environmental Site Manager to oversee environmental aspects of the development.	Client	
Visuals & Aesthetics	Ensure that the visual aspects of construction are taken into consideration to lessen impacts on neighbouring activities.	Screen construction areas with shade cloth or other suitable material from adjacent properties.	Contractor	
Waste Management	Ensure the effective and efficient separation, storage and removal of waste from the site.	Develop a Waste Management Plan for the construction phase which will detail: - Schedules for collection - Responsible parties for collection - Details regarding waste separation (hazardous vs. general) - Provision of facilities	Engineer	

Issue	Objective	Mitigation Measure	Responsibility	Compliance Notes
		for the separation and storage of waste - Details regarding the disposal of the waste (hazardous and general) - Assigns responsibilities for these activities		
Loss of habitat/eco-systems	Conserve tall indigenous trees.	Indigenous trees should be preserved to recreate and improve some important habitats.	Contractor	
SITE ESTABLISHMENT				
Construction activities	Ensure that there is no unnecessary disturbance to areas on the site and that construction activities take environmental considerations into account.	A layout plan for construction activities needs to be developed and approved by the Environmental Site Manager.	Engineer Contractor Environmental Site Manager	
Contractor's Camp	Ensure that the contractor's camp does not pollute the environment and is not located on a sensitive site.	Staff facilities, ablutions, chemical toilets, potable water must be provided for the staff.	Contractor	

Issue	Objective	Mitigation Measure	Responsibility	Compliance Notes
Contractor's Camp	Ensure that camp does not infringe on adjacent property owners.	Locate the camp away from immediately adjacent property owners.	Contractor	
Soil	Ensure preservation of the top soil.	Top soil stockpiles must be established in disturbed zones.	Contractor	
Soil	Ensure that erosion impacts and siltation is kept under control.	Areas scheduled for construction should be cleared only 1 week prior to construction.	Contractor	
Training	Improve the awareness of all construction personnel with regard to environmental matters.	Develop and implement a training programme to address environmental issues and responsibilities.	Environmental Site Manager Contractor	
CONSTRUCTION				
Archaeological Evidence	Ensure the protection of archaeological sites.	Construction must be stopped and a professional archaeologist consulted should any archaeological remains be uncovered.	Contractor Environmental Site Manager Archaeologist	
Borrow Pits	Ensure that the soil resources are not over exploited.	No borrow pit may be excavated from any sensitive or open space areas.	Contractor & Environmental Site Manager	
Blasting	Ensure blasting does not pose a danger to workers or staff, or	Authorisation to undertake blasting activities must be obtained from the relevant	Contractor	

Issue	Objective	Mitigation Measure	Responsibility	Compliance Notes
	neighbouring activities.	authority.		
Blasting	Ensure blasting does not pose a danger to workers or staff.	All conditions relating to blasting and the Occupational Health & Safety Act must be complied to.	Contractor	
Cleaning of equipment	Ensure that spillages are minimised and that where these occur, that they are appropriately managed.	Proper cleaning trays should be used for the cleaning of cement mixing and handling equipment.	Contractor	
Communication	Ensure that interested and affected parties are provided with a medium through which to lay complaints with regard to activities on site.	A complaints register should be kept in the site office. The Environmental Forum needs to be informed of all complaints and corrective action must be taken where required.	Contractor	
Contaminated Soil	Ensure that soils that are contaminated do not pollute the environment.	All soils that have been contaminated by fuel spills, paints spills, etc. must be appropriately removed from the site.	Contractor	
Contractor's camp	Ensure that the contractor's camp is secure.	All materials and equipment that can be moved must be stored overnight in the contractor's camp.	Contractor	
Dust	Ensure dust does not cause nuisance to neighbouring	Wet all exposed sand areas such as roadways, stockpiles and working areas that give rise	Contractor	

Issue	Objective	Mitigation Measure	Responsibility	Compliance Notes
	activities.	to dust. This must ensure adequate dust suppression.		
Environmental Site Manager and ER	Ensure that there is compliance with the EMP on site.	An Environmental Site Manager may inspect the site at any time during the construction phase.	Environmental Site Manager	
Effect of the EMP	Ensure that the EMP is enforced on all contractors.	Each contractor and subcontractor must be notified on the content of this EMP.	Engineer & Environmental Site Manager	
Effect of the EMP	Ensure that the EMP is enforced on all contractors	All contractors and subcontractors must be bound by the content and requirements in this EMP.	Engineer & Environmental Site Manager	
Ground Water	Prevent the contamination of groundwater resources.	Vehicles must be equipped with drip trays to prevent spillages of oils and fuels.	Contractor	
Loss of surrounding habitat and sensitive species	Prevent the destruction of protected, medicinal or sensitive plant species.	Protected, medicinal and/or sensitive plants that are likely to be destroyed or affected by construction activities should be relocated to more suitable areas.	Contractor	
Installation of Services	Ensure that all points for water provision are regularly inspected for erosion impacts.	Implement adequate mitigating measures to curtail any erosion impacts.	Contractor	
Installation of	Ensure that water used to wash	Provide a wash bay with an	Contractor	

Issue	Objective	Mitigation Measure	Responsibility	Compliance Notes
Services	machinery and any other "grey" water does not pollute the site.	impermeable floor to contain such water.		
Litter	Ensure that the site remains clean and clear of litter.	All litter must be collected into rubbish bins located on the site. These bins must be regularly (i.e. weekly) collected and transported to a registered waste disposal facility.	Contractor	
Noise	Ensure that nuisance noise from construction activities does not disrupt the surrounding landowners.	Limit construction time to the following hours: 07:00 to 18:00 during week; 08:00 to 15:00 on Saturdays, and no noisy activities on Sundays.	Contractor	
Noise	Ensure that nuisance noise does not disrupt the surrounding land owners.	Jack hammering and blasting, if required, must take place between the hours of 08:00 and 17:00 during the week only.	Contractor	
Noise	Ensure that nuisance noise from construction vehicles does not disrupt the surrounding landowners.	No heavy vehicles may be permitted to move on site on Sundays.	Contractor	
Road Works and Traffic	Ensure that soil does not erode from culverts or similar structures.	All culverts or similar structures must be stabilised with gabions and/or indigenous grasses.	Contractor	

Issue	Objective	Mitigation Measure	Responsibility	Compliance Notes
Road Works and Traffic	Ensure that local residents are not inconvenienced by the movement of construction vehicles off-site.	The movement of heavy vehicles from the site must occur outside of peak traffic hours (after 08h30 and before 16h30).	Contractor	
Road Works and Traffic	Ensure that local residents are not inconvenienced by the movement of construction vehicles off-site.	Spillages on the roads should be avoided. When these occur, they should be cleaned immediately.	Contractor	
Road Works and Traffic	Ensure that local residents are not inconvenienced by the movement of construction vehicles off-site.	Notices should be placed on the B1 Road during the construction period indicating that heavy vehicles are using the road.	Contractor	
Safety & Security	Ensure the safety and security of staff and the public.	All local authority by-laws must be adhered to.	Contractor	
Safety & Security	Ensure the safety and security of staff and the public.	All contractors must take cognisance of and abide by the Occupational Health and Safety Act.	Contractor	
Safety & Security	Ensure the safety and security of staff and the public.	Trenches to a depth greater than 1.5 m must be supported or appropriate warning must be provided.	Contractor	
Safety & Security	Ensure the safety and security of staff and the public.	Provided fencing needs to be checked and maintained.	Contractor	

Issue	Objective	Mitigation Measure	Responsibility	Compliance Notes
Safety & Security	Ensure the safety and security of staff and the public.	The movement of construction workers through the neighbouring area should be restricted wherever possible.	Contractor	
Soil	Ensure that storm water cannot erode the top soil stockpile.	Construct and maintain a berm around top soil stockpiles.	Contractor	
Storage Facilities	Ensure that hazardous materials are stored according to legislative requirements.	Specifically designed storage facilities need to be provided and used for hazardous materials.	Contractor	
Storage Facilities	Ensure that fuel stored on site does not pose a pollution and fire hazard.	Fuels stored on site shall be bunded to 110% of the capacity of the largest container.	Contractor	
Storage Facilities	Ensure that fuel stored on site does not pose a pollution hazard.	The fuel storage area must not be located less than 100m from any water resource.	Contractor	
Storm Water Run-off	Ensure that run-off does not contribute to erosion & siltation.	Construct and maintain berms on the site to contain storm water run-off or establish riffle beds or retention ponds, as appropriate.	Contractor	
Vehicle repairs	Ensure that spillages are minimised and that where these occur, that they are appropriately managed.	Minor vehicle repairs on an appropriate work surface may only take place within the provided area in the contractors	Contractor	

Issue	Objective	Mitigation Measure	Responsibility	Compliance Notes
		camp		
Waste	Ensure the adequate removal of solid waste.	All wastes (hazardous or general) must be collected and disposed of at an appropriate registered facility.	Contractor	
Waste	Ensure the adequate management of waste	Refuse shall be disposed of into scavenger- (baboons, dogs, rodents, etc.) and weather-proof bins. The Contractor shall then remove the refuse collected from the working areas, from Site at least once a week or depending on necessity. Refuse must be disposed of at an authorised landfill acceptable to the DEA.	Contractor	
Waste	Ensure the adequate management of waste.	No waste should be burnt on site.	Contractor	
POST CONSTRUCTION				
Site Rehabilitation	Ensure the site is left clean, orderly and free of rubble after construction activities.	Remove all rubble, rubbish, litter, unused building equipment, contaminated soils or any other relevant articles from the site following the end of the construction phase.	Contractor	

Issue	Objective	Mitigation Measure	Responsibility	Compliance Notes
Soil	Promote the rehabilitation of the site back to its original condition as far as possible.	Soil that has been compacted during construction activities must be ripped in two perpendicular directions.	Contractor	
Soil	Ensure the re-use of top soil for rehabilitation.	Top soil that is stockpiled on site must be used to rehabilitate the disturbed areas.	Contractor	
MONITORING				
Audit Reports	Ensure adequate reporting of progress with the development	Regular reports, monthly and construction end are proposed, and should be forwarded to the DEA.	Environmental Site Manager	
Monitoring	Ensure compliance with the requirements of the EMP.	Undertake monitoring activities on a monthly basis.	Environmental Site Manager	

APPENDIX A

ENVIRONMENTAL MONITORING REPORT

ESM ENVIRONMENTAL MONITORING REPORT

Report No:..... **Date:.....**

Method Statements	**Contractor:**	**Date received:**

Environmental Education	**Contractor:**	**Date undertaken:**

Issue	**Observation**	**Remedial action**	**Compliance**
1 Construction			
1.1 All plant, personnel, etc. restricted to works area?			
1.2 Contractor's Camp located in area of low environmental sensitivity as indicated by the Engineer?			
1.3 Where needed, sensitive areas adequately fenced off?			
1.4 Fencing well maintained?			

	Observation	Remedial action	Compliance
1.5 No unauthorised entry, stockpiling, etc. outside work areas?			
1.6 All vehicles and plant remain on designated routes?			
1.7 Information posters put up and maintained where needed?			
1.8 No smoking in hazardous areas?			
1.9 Basic firefighting equipment available on Site?			
1.10 No burning of wastes as a means of disposal?			
1.11 Staff aware of procedures in the event of spills/leaks?			
1.12 Materials for dealing with spills/leaks available?			

	Observation	Remedial action	Compliance
1.13 Emergency contact numbers displayed at Contractor's office?			
1.14 Complaints Register up to date?			
1.15 Archaeological material found on Site mitigated?			
1.16 No animals trapped or harmed?			
1.17 No flora removed or damaged outside work areas?			
1.18 Adequate drainage and retaining works in place to control erosion/siltation?			
1.19 Restricted traffic over stabilised areas?			
1.20 No concrete mixing on bare ground?			

	Observation	Remedial action	Compliance
1.21 Concrete batching restricted to area of low environmental sensitivity?			
1.22 All wastewater from concrete mixing area disposed of via wastewater management system?			
1.23 Concrete mixing area kept neat and clean?			
1.24 Suitable screening and containment of cement silos?			
1.25 All visible remains of excess concrete removed on completion of concrete work?			
1.26 No pollution from drilling operations?			
1.27 Location and rescue of plants undertaken by suitably qualified contractor?			

	Observation	Remedial action	Compliance
1.28 Rescued plants moved to nursery if direct transplantation not possible?			
1.29 After vegetation clearance, all unstable areas are properly stabilised?			
1.30 Cleared vegetation properly disposed of?			
1.31 All wastes removed from cleared area and disposed of?			
1.32 Mulched vegetation stored in bags?			
1.33 Fertilisers containing phosphates not used?			
1.34 No planting undertaken where construction works have not yet been finished?			
1.35 No unauthorised traffic on revegetated areas?			

	Observation	Remedial action	Compliance
2 Materials			
2.1 Construction materials adequately secured to ensure safe deliveries?			
2.2 All materials being stored inside Contractor's Camp?			
2.3 All imported materials free of weeds, litter, etc.?			
2.4 Stockpile areas approved?			
2.5 Topsoil stripped and stockpiled at a suitable site prior to earthworks?			
2.6 No spoil stockpiled outside agreed areas?			
2.7 Spoil stockpiles correctly shaped and protected?			
2.8 All plants used for landscaping/rehabilitation listed in the approved plant list?			

	Observation	Remedial action	Compliance
2.9 Plants adequately protected during transit and at storage facilities?			
2.10 Plants healthy and free from diseases and pests?			
3 Plant			
3.1 Fuel/oil storage facilities adequately secured and protected against leakage?			
3.2 Safety signage provided at fuel storage areas?			
3.3 All electrical/petrol pumps suitably equipped and placed not cause any danger of ignition?			
3.4 Fuel storage areas comply with fire safety regulations?			
3.5 Necessary authorisations obtained for temporary above ground fuel tanks?			

	Observation	Remedial action	Compliance
3.6 Capacity of a fuel tank does not exceed 9000 ℓ?			
3.7 Fuel tanks erected at least 3.5 m away from buildings, boundaries or other flammable materials?			
3.8 Adequate toilet facilities provided for staff (min. 1 toilet per 30 workers)?			
3.9 Toilets adequately maintained?			
3.10 All workers use toilets?			
3.11 Scavenger-proof bins with lids provided at eating areas?			
3.12 Waste temporarily stored inside Contractor's Camp in weather- and scavenger-proof bins?			
3.13 No burying or dumping of wastes on site?			

	Observation	Remedial action	Compliance
3.14 Waste management system in place?			
3.15 Refuse disposed of at licensed landfill?			
3.16 Adequate waste-water management system in place?			
3.17 Approval for discharge of contaminated water into municipal sewer system?			
3.18 Runoff from workshops, fuel depots, etc. directed into conservancy tanks for disposal at approved site?			
3.19 Wash areas placed and built in such a way that does not cause any pollution?			
3.20 All maintenance of plant and equipment takes place in workshop?			
3.21 All plant is well maintained (no leaking)?			

	Observation	Remedial action	Compliance
3.22 Workshop has a bunded, impermeable floor sloping towards oil trap?			
3.23 Contractor's Camp tidy?			
3.24 All plant and machinery have drip trays, which are checked and emptied daily?			
3.25 All repairs on machinery using fuels or lubricants done over a drip tray?			
3.26 Static plant located within a bunded area?			
3.27 Measures in place to minimise dust generation?			
3.28 No handling/transport of erodible materials under high wind conditions?			

EMP Transgressions	Contractor:	Date:	Fine issued:

Complaints	Date received:	Action taken:

Other issues	

APPENDIX B

ENVIRONMENTAL EDUCATION MATERIAL

Workers & equipment must stay inside the demarcated site boundaries at all times	Use the toilet facilities provided Report full or leaking toilets
Do not swim in or drink from streams or any ponds Do not throw oil, petrol, diesel, concrete or rubbish in any water body or dry river bed Do not work in the dry river beds without direct instruction Do not damage the banks or vegetation of the dry river beds	Only eat in demarcated eating areas Put packaging & leftover food into rubbish bins Report full or overflowing rubbish bins
Protect animals on the site Ask your supervisor or Contractor's Manager to remove animals found on site	Do not litter – put all rubbish (especially cement bags) into the bins provided Report full bins to your supervisor The responsible person should empty bins regularly
Do not damage or cut down any trees or plants without permission Do not pick flowers	Always keep to the speed limit Drivers – check & report leaks Ensure loads are secure & do not spill
Put cigarette butts in allocated rubbish bin Do not smoke near gas, refuelling points or petrol Do not light any fires without permission Know the positions of firefighting equipment Report all fires Do not burn rubbish or vegetation without permission	
Work with petrol, oil & diesel in areas marked for this Report any petrol, oil & diesel leaks or spills Use a drip tray under vehicles & machinery Empty drip trays after rain & do not throw this	Know all the emergency phone numbers

water into a river or any other place than the allocated facility	
Try to avoid producing dust – wet dry ground & soil	Spot fires of between N$ 200.00 and N$ 2,000.00 Fines will be deducted from wages Removal from site is considered for continues offences Construction may be stopped in the event of large scale destruction and ignorance
Do not make loud noises around the site, especially near schools and homes Report or repair noisy vehicles	Report any breaks, floods, fires, leaks and injuries to your supervisor Track discipline – i.e. speed limits& tracks to use and those areas to avoid driving in, etc. Ask questions!
CONSTRUCTION PERSONNEL INFORMATION BOARD: DO'S AND DON'TS	

APPENDIX C

PRO-FORMA METHOD STATEMENT

METHOD STATEMENT

CONTRACT: ..... **DATE**: .....

WHAT WORK IS TO BE UNDERTAKEN? (give a brief description of the works)

WHERE ARE THE WORKS TO BE UNDERTAKEN? (where possible, provide an annotated plan and a full description of the extent of works)

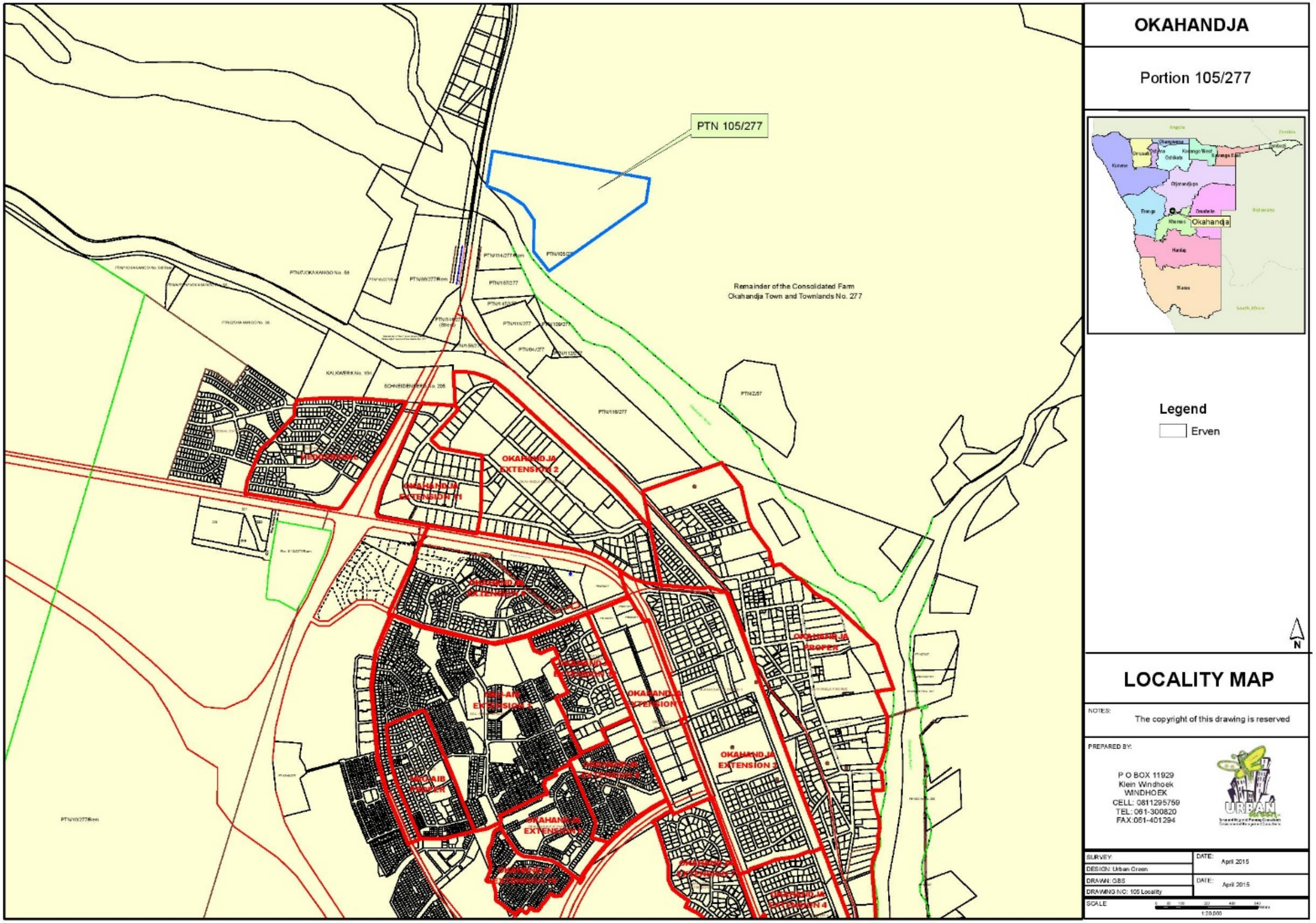
START AND END DATE OF WORKS FOR WHICH THE METHOD STATEMENT IS REQUIRED

Start Date:	End Date:

HOW ARE THE WORKS TO BE UNDERTAKEN? (provide as much detail as possible, including annotated sketches and plans where possible) *Note: please attach extra pages if more space is required.

APPENDIX D

THE SITE


OKAHANDJA
Portion 105/277
PTN 105/277
Okahandja
Remainder of the Consolidated Farm
Okahandja Town and Townlands No. 277
OKAHANDJA EXTENSION 2
OKAHANDJA EXTENSION 11
OKAHANDJA PROPER
OKAHANDJA EXTENSION 3
OKAHANDJA EXTENSION 4
Legend
Erven
N
LOCALITY MAP
NOTES:
The copyright of this drawing is reserved
PREPARED BY:
P O BOX 11929
Klein Windhoek
WINDHOEK
CELL: 0811295759
TEL: 061-300820
FAX:061-401294
SURVEY:
DESIGN: Urban Green
DRAWN: GBS
DRAWING NO: 105 Locality
DATE: April 2015
DATE: April 2015
SCALE
1:20,000

A Service Station
B Town House Complex
C HOSPITAL
D SHOPPING / LIFESTYLE / RESTAURANT
E TOWN HOUSE COMPLEX / HIGH DENSITY
F PRIME (BIGGER) ERVEN
G GREEN SPACE

APPENDIX E

LIST OF APPROVED PLANT SPECIES (CUNNINGHAM, 2015)

All the indigenous trees occurring in the proposed development area could / should be used in the landscaping of the area as this would:

i) not detract from the overall ambiance of the area,
ii) be ecologically prudent & sound,
iii) best suited to the local environment,
iv) require least water and maintenance,
v) require the least financial input.

The following table indicates the indigenous trees/shrubs that could/should be used in the landscaping as they make outstanding features.

Species: Scientific name	**Status**	**Sensitivity**
Acacia erioloba	Protected (F)	High
Acacia hereroensis		Low
Acacia karroo		Low
Acacia nebrownii		Low
Acacia reficiens		Low
Acacia tortilis		Low
Adenium boehmianum		Low
Albizia anthelmintica	Protected (F)	High
Aloe litoralis	NC, C2	High
Boscia albitrunca	Protected (F)	High
Boscia foetida		Low
Catophractes alexandri		Low
Combretum apiculatum		Low
Combretum imberbe	Protected (F)	High
Commiphora africana		Low
Commiphora angolensis		Low
Commiphora glandulosa		Low
Commiphora glaucescens		Low

Species: Scientific name	Status	Sensitivity
Commiphora pyracanthoides		Low
Commiphora tenuipetiolata		Low
Cordia sinensis		Low
Dombeya rotundifolia		Low
Euphorbia avasmontana	C2	Medium
Euphorbia guerichiana	C2	Medium
Euphorbia virosa	C2	Medium
Faidherbia albida	Protected (F)	High
Ficus cordata	Protected (F)	High
Ficus sycomorus	Protected (F)	High
Maerua schinzii	Protected (F)	High
Moringa ovalifolia	NC	High
Mundulea sericea		Low
Olea europaea		Low
Ozoroa crassinervia	Protected (F)	High
Parkinsonia africana	Protected (F)	High
Rhus lancea	Protected (F)	High
Rhus marlothii		Low
Rhus pendulina		Low
Rhigozum brevispinosum		Low
Steganotaenia araliacea		Low
Sterculia africana	Protected (F)	High
Tarchonanthus camphoratus		Low

Species: Scientific name	Status	Sensitivity
Ximenia americana		Low
Ziziphus mucronata	Protected (F)	High

There are a variety of other tree species indigenous to southern Africa (including other parts of Namibia) that could be used as ornamental plants in the landscaping although not found in the immediate area and include:

- *Acacia* species – e.g. *A. galpinii*, *A. nigrescens*, *A. sieberiana*, *A. xanthophloea*
- *Adansonia digitata*
- *Albizia* species – e.g. *Albizia versicolor*
- *Bauhenia* species – e.g. *B. galpini*
- *Combretum* species – e.g. *C. erythrophyllum*
- *Diospyros mespiliformis*
- *Hyphaene petersiana*
- *Kigelia africana*
- *Peltophorum africanum*
- *Phoenix reclinata*
- *Philenoptera nelsii*
- *Schinziophyton rautanenii*
- *Sclerocarya birrea*
- *Securidaca longependunculata*

APPENDIX F

DECLARED INVASIVE ALIEN SPECIES (CUNNINGHAM, 2015)

No known or potential invasive alien tree / shrub / grasses, although even in cases naturalized species, should be used in the landscaping. The threats they pose are unacceptable and using these species in landscaping would compromise the environmental commitment that should be shown to this project.

The following list – although not comprehensive and exclusively so – is some of the more problematic invasive alien species found in Namibia and that should not be incorporated in the landscaping.

Scientific name	**Common name**
Caesalpinia gilliesii	Yellow Bird of Paradise
Schinus mole	Brazilian Peppertree
Datura sp.	Stink weed
Dodonaea viscose & *D. angustifolia*	Purple Hop-bush/Hopseed bush
Eucalyptus sp.	Blue gum species
Euphorbia tirucalli	Pencil Euphorbia
Jatropha curcas	Physic nut
Lucena leucocephala	Lucena
Lantana camara	Lantana or Spanish Flag
Melia azedarach	Chinaberry tree
Nicotiana glauca	Brazilian Tree Tobacco
Opuntia sp.	Prickly Pear sp.
Parkensonia aculeatea	Jerusalem Thorn
Pennisetum setaceum	Fountain Grass
Pinus sp.	Pine tree sp.
Prosopis sp.	Mesquite sp.
Ricinus communis	Castor oil plant
Tecoma stans	Yellow Trumpetbush

Source: Cunningham (2008), Cunningham, Joubert & Adank (2004), Curtis & Mannheimer (2005), Joubert & Cunningham (2002), Shipaka, Joubert & Cunningham (2008)