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# CONSTRUCTION PHASE ENVIRONMENTAL MANAGEMENT PLAN

## PROPOSED HARTENBOS LANDGOED PHASE II DEVELOPMENT ON A PORTION OF THE REMAINDER OF THE FARM VAALEVALLEY 219, MOSSEL BAY

HARTENBOS LANDGOED

| | |
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| **PREPARED FOR:** | Hartenbos Landgoed II (Pty) Ltd |
| **DATE:** | March 2008 |
| **SHARPLES REF.NO:** | EIR/MSB/MS/36/SD/3/8 |
| **DEA&DP REF.NO:** | EG12/2/1 - AM18 - Farm Valle Valley 219/10 (5382) |

# ACTIVITY DETAILS

**Development:** **Proposed Hartenbos Landgoed Phase II**

**Location:** Portion of a Remainder of the Farm Vaalevalley 219, Mossel Bay

All staff members at *Sharples Environmental Services cc* worked together on this project. Each member specialises in a different field of expertise and has a unique contribution to make to every project. This report was co-authored by all the *Sharples Environmental Services cc* personnel.

**Lead author:** Mr. W. Kriel

**Expertise:** Mr Kriel completed a Bachelors degree in Conservation from the Nelson Mandela Metropolitan University (Saasveld Campus) and has working experience in landscaping, rehabilitation and earthworks management

**Secondary EAP & co-author:** Ms M Schaaf

**Expertise:** Ms M Schaaff completed her studies at the University of the Free State which included Bachelor of Science, Bachelor of Science (Honours) and a Masters in Environmental Management after which two years of practical experience in environmental management was gained.

**Rest of the team:** Mr J Sharples, Mr D van Rensburg, & Ms C Jackson

**Expertise:** Mr J Sharples obtained a Masters in Environmental Management from the University of the Free State as well as a B degree in Conservation. He has consulted for ten years and prior to this gained twelve years of experience working for environmental organizations.
Mr van Rensburg studied at the University of Cape Town, first completing two undergraduate degrees and then post-graduate studies. He has two years and six months practical experience in environmental management. Ms Jackson is an experienced personal assistant, responsible for the day-to-day administrative and office maintenance duties.

**Activities in terms of the Environmental Conservation Act (ECA):**

**Schedule 1.2(c)** – The change of land use from Agriculture to any other;
**Schedule 1.1(m)** – The construction or upgrading of public or private resorts and associated infrastructure;
**Schedule 1.1(d)** – The construction or upgrading of roads and associated structures, and;
**Schedule 1.1(c)** – The construction or upgrading with regard to the storage of any substance which is dangerous;
**Schedule 1.1(k)** – The construction or upgrading of reservoirs for public water supply;
**Schedule 1.1(n)** – The construction or upgrading of sewage treatment plants and associated infrastructure, and;
**Schedule 10** – The cultivation or any other use of virgin ground.

**Activities in terms of G.N. R.386:**

**1(k)(i)** – Bulk transportation of sewage and water in pipelines with internal diameter of 0,36 m or more.
**1(n)** – Off-stream storage of water, including dams and reservoirs, with capacity of 50 000$m^3$ or more.
**1(s)** – Treatment of effluent, wastewater / sewage with annual throughput of 2 000 $m^3$ to 15 000 $m^3$.
**7** – Above ground storage of dangerous goods with capacity of 30 $m^3$ to 1 000 $m^3$ at any one location or site.
**12** – Transformation of indigenous vegetation of 3 ha or more.
**15** – Construction of road wider than 4 m or that has a reserve wider than 6 m.
**16 (b)** – Transformation of undeveloped land to any other where such development does not constitute infill and is bigger than 1 ha.
**18** – Subdivision of portions of land 9 ha or larger into portions of 5 ha or less.

**Activities in terms of G.N. R.387:**

**2** - Any development activity, including associated structures and infrastructure, where the total area of the development area is, or is intended to be, 20 ha or more.

# Chapter 1 Introduction

*Sharples Environmental Services cc* has been appointed by Hartenbos Landgoed II (Pty) Ltd, the Applicant, to compile the Construction Phase Environmental Management Plan (CEMP) in terms of Environmental Conservation Act (Act 73 of 1989). This CEMP is for the proposed Hartenbos Landgoed Phase II on a Portion of the Farm Vaalevalley 219 which is hereafter referred to as the "Property". The property is situated in the magisterial district of Mossel Bay.

This EMP has been compiled to ensure compliance with the requirements of the Department of Environmental Affairs and Development Planning (DEA&DP) and the environmental principles of "duty to care", while also minimizing the impact of construction phase activities on the environment.

# Chapter 2 Commitment to the EMP

The EMP is to form part of the contract identifying and specifying the procedures to be followed by the contractor and other stakeholders to ensure that the adverse impacts of construction activities are either eliminated or reduced. Should an employee of the contractor persistently fail to observe provisions of the EMP, the Environmental Control Officer (ECO) / compliance monitor should then recommend that either a penalty is implemented or that the work is stopped.

A copy of the EMP will be issued to each contractor by the developer and it will then be the responsibility of the ECO to ensure the implementation of all the pertinent principles. This will be done in liaison with the resident engineer. A copy of the contractor's Employment 'Code of Conduct Principles' should also be read in conjunction with the EMP.

# Chapter 3 Context and Background

This construction phase EMP is therefore designed around the environmental issues and concerns identified during the environmental process as well as the site specific constraints to a development of this nature. The EMP is therefore formulated to ensure that the construction activities are environmentally manageable and that potentially harmful or destructive activities are averted or minimized before otherwise preventable environmental degradation sets in.

## Section 3.1 Location and description of Property

The Property is located approximately 2-km northeast of Hartenbos and about 2-km south west of Little Brak River township. Access to the Property entails taking the N2 Road and traveling in a southwesterly direction over the Little Brak River, until approximately 3-km further when the Hartenbos off-ramp is taken. The point of entry entails a Northwest (left) turn at the T-junction and an ensuing Northeast (right) turn at the next turning opportunity, into the old Hartenbos-Little Brak River road. This road is followed for about 1-km before turning

Southeast (right) at the next available opportunity. The subsequent track leads under the N2 Road and straight to the Property. The Property is approximately 370 hectares in extent.

The railway line serves as the southeastern boundary of the Property, with the ocean beyond that. The N2 National Road serves as the northwestern boundary, with the old Hartenbos-Little Brak River road and tracts of zoned agricultural land on the other side of the N2 Road. The Little Brak River serves as the northeastern boundary. Further north is the informal residential area of Power Town and the residential area of Little Brak River.

The Hartenbos Landgoed Phase I development serves as the southwestern boundary, with a host of smallholdings and the Hartenbos River. Beyond that, further south, is the residential area of Hartenbos.

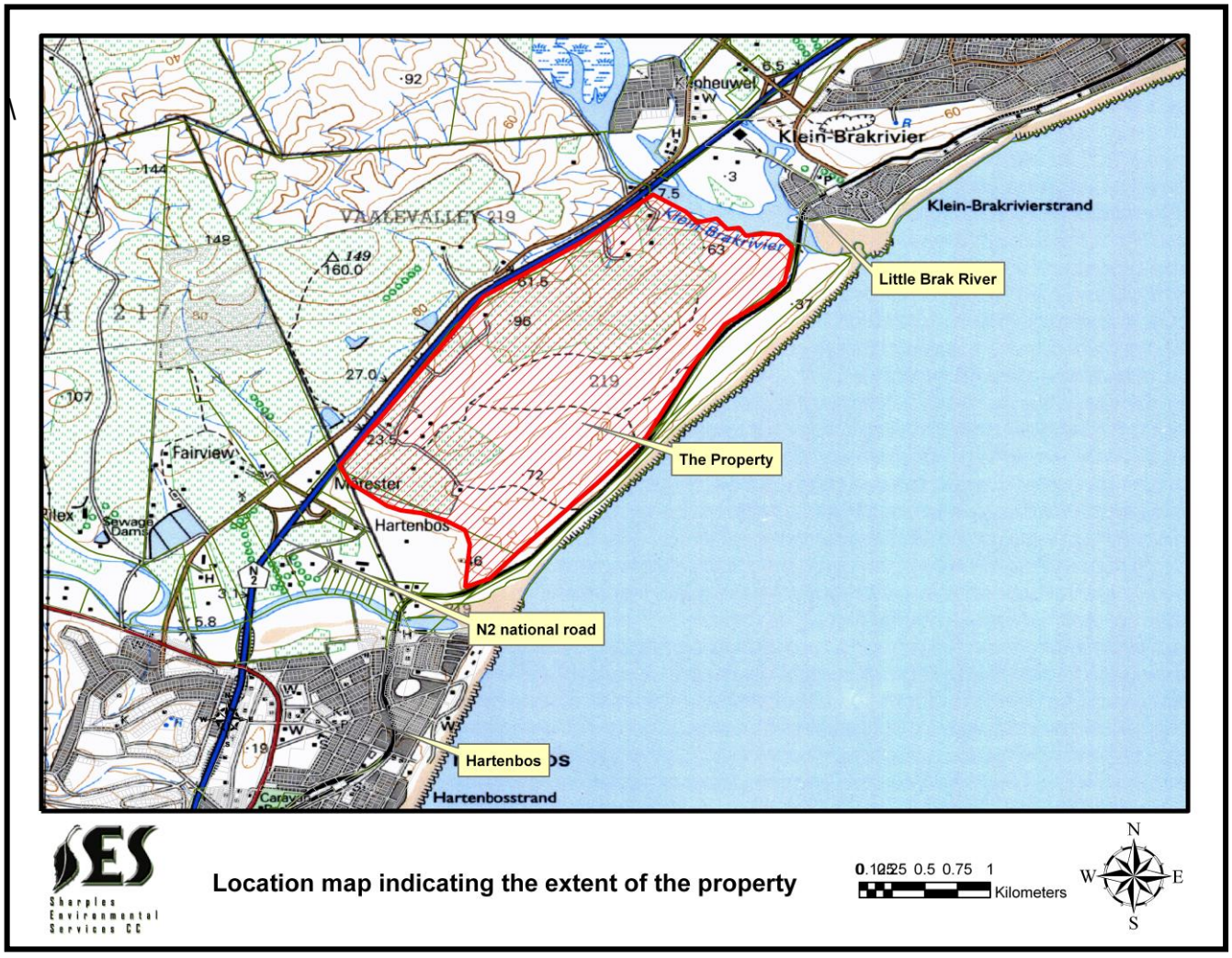



**Figure 1: Enlarged part of 1: 50 000 scale map indicating the location of the Property**

Section 3.2

## Description of proposed activity

The Applicant is applying for a change in the zoning of the Property from Agricultural Zone I to Residential Zones I, II, & III, Resort Zone II and Open Space II in terms of sections 17(1) and 24(1) of the Land Use Planning Ordinance, of 1985 (Ordinance 15 of 1985).

The proposed application includes the following:

- 1 057 Residential Zone I dwelling house erven;
- 1 Residential Zone II Group Housing erf;
- 2 Residential Zone III Town Housing erven, and;
- 106 Resort Zone II Holiday Housing erven.

This application includes Open Space II and the establishment of roads. The area set aside for private roads includes the construction of a gatehouse, reception area and administration facilities. According to the layout, the average erf size is approximately 850 m² and the maximum slope of streets is 1:6 over 54 m. The Applicant would also need to establish an access road on the Property.

Most of the development is planned to take place on the agricultural pasturelands with small pockets of resort development penetrating the indigenous vegetation. The recreational activities proposed are likely to include a clubhouse, restaurant and bar, tennis courts, swimming pool, trampolines etc. Game species, predominantly antelope, may also be introduced on the Property in the Open Space and naturally vegetated areas nearest the coastline.

Section 3.3

## Layout Plan

A copy of the layout plan, the EMP as well as all appendices to this report should be available at all times at the site office for inspection by the consulting engineers, contractors and other members of the Developer's team. The EMP should also be available for scrutiny by the relevant stakeholders and authorities. The layout plan is attached herewith (See Appendix 1).

# Chapter 4 Description of Receiving Environment

Section 4.1

## Biophysical Environment

*According to Conservation Management Services*, who compiled a Vegetation and Vertebrate Fauna Sensitivity Analysis for the entire property as part of the environmental assessment process, the vegetation of the property can be broadly differentiated into transformed and un-transformed habitats. According to *Conservation Management Services* the un-transformed areas consist largely of Thicket and Fynbos / renosterveld vegetation. In the report it is noted that Vlok & Euston-Brown (2002) described the vegetation, in terms of the STEP project, as Herbertsdale Renoster Thicket. This is actually a mosaic of Gouritz Valley Thicket within a Renosterveld matrix. In terms of the CAPE project (Cape Action Plan for the Environment), the vegetation of the area is mapped as Riversdale Coast Renosterveld and Stilbaai Fynbos / Thicket mosaic.

In terms of detailed on-site investigation, it is noted that the vegetation of the study area appears to be most accurately described as a Fynbos / Thicket mosaic. There is no clear

distinction between Renosterveld and Fynbos in this area, but the vegetation matrix in which the Thicket is located is clearly more of a Coastal Fynbos than Renosterveld.

### 4.1.1. Vegetation Sensitivity Analysis

According to *Conservation Management Services*, the general sensitivity of the dominant natural vegetation type (Fynbos / thicket) lies in the fact that the sands of the area overlie limestone, which are limited on the study area. Two species indicative of lime-rich soils are *Agathosma muirii*, and *Euchaetis burchelli*. Both of these plant species, although not yet Red Data Book species, are threatened. *Otholobium fruticans*, a Red Data Book plant which is listed as vulnerable, is also as widespread on the study area. Another very rare plant identified by the Report is *Delosperma virens*, and the small population of no more than 100 plants is notable.

*Conservation Management Services* indicated that another critically endangered plant of the study area is *Diosma aristata*. The population found on the property is of great significance for the conservation of this species. *Hawarthias parksiana* was also noted, and this too is a listed Red Data species (endangered).

### 4.1.2. Vertebrate Fauna Survey

*Conservation Management Services* indicated that the fauna of the study area is typical of the thicket and fynbos covered South Cape coastal areas. The fauna is relatively intact, with the exception that many of the original larger mammal species were eradicated by the end of the 19th Century.

The following description of the fauna is per vertebrate faunal group:

- **Amphibians** - The disturbed pasture area, thicket and Fynbos habitats and earth dams provide a limited range of suitable habitats for amphibians. Of the 16 species listed to occur in the area, *Conservation Management Services* could not confirm that the species were currently present.

- **Reptiles -** The following is likely to occur in the study area: 3 Tortoises; 1 Chameleon; 21 Snakes; 5 Geckos, and; 11 Lizards. According to the Conservation Management Services, of the 43 species predicted to occur, 16 are endemic to the sub-region, most with small distribution ranges. Only 2 of the predicted species were confirmed.

- **Mammals -** The pasture, thicket and Fynbos habitats potentially provide habitat for:
  - 8 Insectivores (shrews, moles);
  - 13 Chiroptera (bats);
  - 2 Primates (monkeys);
  - 1 Lagomorph (rabbits, hares);
  - 16 Rodents (rats, mice);
  - 9 Carnivores (cats, mongooses, otters), and;
  - Ungulates (hoofed animals).

  Only 5 of the 59 species were confirmed.

- **Birds -** Birds are comparatively more mobile, than other animals and their presence does not necessarily indicate permanent residence or occupation. The earth dams on

the study area support occasional water and wetland birds. The thicket habitats of the general area are important bird habitats and may contain: Chorister robin; Forest buzzard; Forest canary; Knysna warbler, and; Knysna woodpecker. The thicket habitats of the study area may also contain elements of bird fauna typical of coastal forest, Afromontane forest and thicket / fynbos ecotones. Of the 153 bird species predicted to occur in the general area, only 16 are confirmed.

# Chapter 5 Terms of Reference

A number of standard conditions must be adhered to, to ensure that the EMP remains valid. The general Terms of Reference, upon which this EMP is based, are encapsulated in various Authority requirement lists and guidelines, which govern the compilation of Management Plans.

These conditions are designed to ensure that the Applicant is bound to a particular construction regime. This ensures that the environmental concerns associated with "Duty of Care" with regard to the construction phase are carried through the installation to the completion of the project.

The general and site-specific requirements include:

- The EMP must be approved by the relevant decision-making authority prior to any construction activities commencing.
- The EMP must be included in all contract documentation for the duration of the construction phase of the development.
- The Applicant is responsible and is accountable for ensuring compliance with the conditions contained in the EMP.
- An integrated waste management approach must be used that is based on waste minimisation and must incorporate reduction, recycling, re-use and disposal where appropriate. Any solid waste shall be disposed of at a landfill licensed in terms of section 20 of the Environment Conservation Act, 1989 (Act No. 73 of 1989).
- Chemical ablution facilities must be available for the use by construction staff at all times during the construction period. These facilities must be removed from the site when the construction phase is completed as well as the associated waste to be disposed of at a registered waste site.
- The area to be disturbed by construction activities must be clearly demarcated. All areas outside of the demarcated area must be regarded as "no-go" areas for construction personnel and vehicles.
- Disturbance to the natural environment must be kept to a minimum or as far as possible be avoided. Rehabilitation must be undertaken where disturbance to the natural environment is unavoidable.

- The Applicant should appoint a suitable experienced ECO to ensure that the mitigation/rehabilitation measures and recommendations referred to in the EMP are implemented.

- No unsupervised fires or blasting must be permitted on the development site.

- The applicant should submit an Environmental Audit to the relevant authority six months after construction has been completed:
    - The audit report should indicate the date on which the construction was completed and detail compliance with the mitigation/rehabilitation measures and recommendations referred to in the EMP.
    - The relevant stakeholders may require remedial action should the audit report reflect that rehabilitation is inadequate.

- All relevant sections and regulations contained in the National Water Act, Act 38 of 1998, regarding water pollution must be adhered to.

- The relevant authorities shall be given access to the site for the purpose of assessing and/or monitoring compliance with the mitigation/rehabilitation measures and recommendations referred to in the EMP, at all reasonable times.

- All the conditions contained in this EMP must be adhered to.

The Environmental Authorization, if and when issued, will also have a number of conditions that must be adhered to in order to ensure that the Environmental Authorization remains valid. This Terms of Reference will therefore also need to encapsulate the conditions of the Environmental Authorization that will be issued by the DEA&DP. This will ensures that the findings of the Environment Impact Assessment are carried through to the execution and completion of the project.

# Chapter 6 How to use this Document

This document should be seen as a working document to be used by the Applicant and all contractors and labourers operating on site in order to arrive at a common goal. That goal is to ensure that the construction phase activities take place in such a manner that positive environmental impacts are maximized and negative impacts are minimized as far as possible.

It is essential that this EMP be carefully studied, understood, implemented and adhered to as far as possible. The Applicant must retain a copy of this EMP, and another copy of this EMP should be kept on the site at all times during the construction phase.

## Section 6.1 Caveat to this Report

This EMP has been prepared with the help of and with reference to the “Guidelines for Environmental Management Plans” produced by the DEA&DP and prepared by the CSIR. It is important to note that the EMP is not designed to be a tool used to manage the physical construction of the development per se but rather an effective tool, which must be used to

manage the environmental impacts of the development. In the past, some developments have had a devastating impact on the environment even though they have had management plans while others have had a low impact even though no management plans have been compiled.

The attitude of the construction team plays an integral part in the impact the development will have on the environment, with the developer playing a big role. The ECO needs to ensure that the all role-players are “on board” with regard to the constraints the EMP places on the development and construction team. The end result relies on cooperation and mutual respect and understanding of all parties involved. The EMP is a “living document” and should be used as a guideline.

## Section 6.2 Legal Framework

This EMP should be seen as binding to the Applicant and any person acting on his behalf, including but not limited to, an agent, servant, employee or any person rendering a service to the development site.

The Applicant will be responsible for ensuring that contractors and labourers do not contravene provisions of the following pieces of legislation:

- Constitution of South Africa, Act No. 106 of 1996, Section 24.
- Environmental Conservation Act (Act No. 73 of 1989).
- National Environmental Management Act (Act No. 107 of 1998), as amended.
- National Heritage Resources Act (Act 25 of 1999).
- National Water Act (Act 38 of 1998).
- National Forest Act (Act 84 of 1998).

Furthermore, *SES* strives to incorporate principles from:

- National Environmental Management: Biodiversity Act (2003).
- National Environmental Management: Protected Areas Act (2003).

The Applicant should also ensure compliance to the Occupational Health and Safety Act (Act 85 of 1993). This act stipulates that every employer must provide and maintain, as far as is reasonably practicable, a working environment that is safe and without risk to the health of its employees. This EMP does not detract from any other legal requirements.

# Chapter 7 Purpose of this Environmental Management Plan

The purpose of this EMP is to define the parameters for the construction phase of the proposal. The EMP also provides guidelines, which set out steps and actions and when taken, will ensure that the environment degradation is kept to an absolute minimum.

The EMP describes mitigatory measures in detail and is prescriptive; identifying specific individuals to undertake specific tasks. As an open-ended document, information gained during the ongoing construction phase could lead to changes in the recommendations and specifications of this document.

Aspects that will be included in this EMP include:

- Competency and duties of the ECO.
- Demarcation of no-go areas.
- Adequate signage for demarcated traffic routes.
- Demarcation and erection of a site camp.
- Refuse and waste management.
- Establishment of working and storage areas.
- Vehicle Maintenance.
- Maintenance of Equipment.
- Access to the site during the construction phase.
- Environmental Education.
- Accommodation of staff on site.
- Discovery and Protection of Heritage Resources.
- Fire prevention measures, Safety and Security.
- Excavations.
- Topsoil conservation.
- Dust, Noise and Pollution control.
- Stormwater and Erosion control.
- Vegetation clearing.
- Final Rehabilitation.
- Preference to Local Labour.
- Monitoring and reporting.
- Environmental Auditing.
- Penalties, claims and damages.
- Inclusion into contract documentation.

# Chapter 8 Impacts anticipated during the Construction Phase

The following impacts (listed below in Table 1) were highlighted in the Environmental Impact Report (EIR) as possible construction phase impacts that could occur during the construction of the proposed development. These impacts, although considered possible can be prevented, reduced or mitigated by implementing the principles contained in this EMP:

**TABLE 1: LIKELY ENVIRONMENTAL IMPACTS**

| **Impact** | *Mitigation* |
|---|---|
| Increase in stormwater run-off and possible erosion as a result of the reduction in plant life along steep areas, an increase in hardened surfaces and the disturbance of existing dune system. | ▪ Appropriate erosion and stormwater management measures will be implemented throughout the construction process (Please refer to Chapter 20). |
| The increase in noise levels associated with the proposed development should not result in a significant disturbance to the surrounding areas. | ▪ Given the spatial separation factor and the fact that the Property is surrounded by fairly significant boundary features (N2 Road, Hartenbos River, Little Brak River, Ocean), it is unlikely that noise generated on the Property during the construction or operational phases will significantly affect the surrounding areas (Please refer to Chapter 23) |
| Conservation Management Services has indicated through vegetation studies done on the property that the occurring vegetation is fire prone and any accidental fire could lead to a run away veld fire which | ▪ No open fire will be allowed on site during the construction phase on the development. The appointed ECO must ensure the “no-fire” policy is implemented. |

| | |
|---|---|
| in turn could drastically affect the vegetation and associated ecology of the property. | |
| Protection and rehabilitation of the occurring natural indigenous vegetation on site. | ▪ All sensitive areas must be demarcated during the construction process (Please refer to Chapter 11). All alien vegetation must be removed during the construction process (Please refer to Chapter 28) with maintenance procedures encapsulated in the OEMP. |
| Protection of occurring fauna and flora encountered on site. | ▪ Before construction commences a search and rescue programme should be conducted as per Chapter 10 of this report. |
| Control and eradication of alien plant species occurring on the proposed site. | ▪ All alien plants occurring on the development site should be removed during the construction process. The control of alien plants during the operational phase of the development should be dealt with in the OEMP. |

# Chapter 9 Competency & Duties of the Applicant, Contractor & ECO

If the development is approved by the DEA&DP, then it may be a condition of approval that an ECO be appointed. The appointed ECO will need to undertake awareness training and monitor initial implementation of the EMP. The ECO will also be responsible for ongoing monitoring of the site and the implementation of the EMP's recommendations.

The Applicant / appointed representative will be responsible for the remuneration of the ECO and any other expenses stemming from environmental monitoring and management of the project. The ECO must, amongst other duties, ensure that demarcation of all areas, where certain construction activities may or should not take place, has been completed. The ECO must also ensure compliance with the EMP and must work in close co-operation with the resident engineer and contractors in order to identify problems before they occur.

The ECO selected will have to be suitably qualified and be able to demonstrate he / she is of sufficient competency to undertake the required task. The appointed ECO should have had previous experience of environmental control of similar construction sites, have working experience with contractors and have intimate knowledge of the particular development and expected areas of concern. The ECO should preferably be a resident in the South Cape to ensure quick response if required. The ECO must be acceptable to the DEA&DP.

The ECO will need to be appointed before construction of the development commences and must be fully aware of what is required.

The ECO's duties should include the following:

- Ensuring that the environmental specifications, as per the environmental authorization and the EMP, are adhered to throughout the construction phase;
- Ensure compliance with all of the mitigatory measures proposed in the conditions of authorization listed in the environmental authorization;

- Assist in finding environmentally acceptable solutions to construction problems;
- Establishing an environmental awareness program to educate contractors and labourers;
- Inspecting all aspects of the construction process;
- Keeping detailed records of all site activities that may pertain to the environment;
- Must ensure that all labour has attended environmental training sessions, which cover the basic requirements of sound environmental practices on construction sites;
- Liaise with site contractors, engineers and other members of the Developer's team with regard to the requirements of the EMP;
- Inspect the construction site on a regular basis;
- With approval of the Developer, furnish contractors with verbal warnings in case of contravention of the EMP or the environmental authorization.
- Recommend that the DEA&DP furnish errant contractors with pre-determined fines, when verbal and / or written warnings are ignored;
- Examining method statements, and;
- Recommend additional environmental protection measures, should this be necessary.

The ECO should visit the site regularly during the construction phase. Frequent visits (at least every second day) may be required during the initial site establishment period and the ECO is to be available at all times, as required by the contractors or resident engineer. The ECO would have the discretion to undertake additional visits if he / she feels this is justified due to the actions of the contractors and to make ad hoc visits in order to ensure compliance. The ECO should ensure that the correct earthwork practices are adhered to.

It must be noted that the ECO would have the authority to suspend work on site or any action being undertaken, that does not comply with the environmental requirements of the site. The ECO should produce compliance-monitoring reports for submission to the DEA&DP at regular intervals during the construction phase or as dictated by the environmental authorization.

It is the responsibility of the applicant to ensure that the contractors on the site and the labourers are capable of complying with all statutory requirements of this EMP.

# Chapter 10 Search and Rescue Program

Conservation Management Services, through conducting a vegetation and vertebrate fauna sensitivity analysis, indicated that 17 threatened plants species were present on the property. It will therefore by important to conduct a thorough search and rescue programme before each phase of land clearing activities. Such a search and rescue programme should be

conducted under the supervision of a suitably qualified ecologist or botanist. Plants collected during the search and rescue programme should be relocated to suitable locations on site where further disturbance is unlikely.

The ECO must be present throughout the entire relocation process.

# Chapter 11 Identification & Demarcation of Sensitive Areas

The following section details the demarcation of areas that are deemed sensitive and should be protected from major construction activities.

## Section 11.1 Sensitive Areas

All sensitive areas, which must not be disturbed, must be demarcated using with a 1.2m high fence constructed of shade cloth netting (or similar product), staked at regular intervals of between two and three meters. Two strands of wire, one along the top of the fence and one along the bottom should be sufficient to keep the fence rigid. “No-Go” signs should be erected along the fence at prominent locations. Where a fence is considered impractical No- Go signs should be erected at frequent intervals along the edge of the no-go areas in consultation with the ECO.

“No-Go” signs should be of a minimum size of 200mm x 150mm with red letters on a white background displaying the words “No-Go Area”. Demarcation put in place to protect sensitive areas should be left in position until construction has been completed. The areas must be clearly delineated to ensure that no unnecessary disturbance of the environment takes place.

The sensitive areas include all areas that are deemed to be of a high or very high sensitivity with regard to slope steepness, soil stability, vegetation cover, etc. As per the findings of Conservation Management services’ report dated June 2005 and later findings by Synecology in their report dated January 2008 the areas indicated below in figure >>> must be considered No-Go areas.

Map will change with final layout


**Figure >>> Indicating No-Go areas on the property.**

Care should be taken to ensure that a buffer area of at least three meters are implemented around afore mentioned sensitive areas to further limit construction materials or activities with construction activities near these areas.

All sensitive areas must be identified and marked in consultation with the ECO. Other sensitive areas may include areas that are stripped of, or lose their vegetation as a result of the construction. The marking of these areas will be at the discretion of the ECO.

It must be impressed upon contractors that no one should enter these demarcated areas. This will minimize the effect of trampling which could lead to erosion and other environmental impacts. The demarcated areas must make allowance for reasonable space for construction activities like stockpiling of material etc, to the satisfaction of the ECO.

Before any of the work commences, the ECO must address all the contractors and their workers to ensure that they are all well informed as to where the “no-go” areas are.

It must be impressed upon the contractors and labourers that no one may cross into these lines of demarcation and move into the demarcated areas. If any contractor or their employees transgress any of the conditions of approval, the ECO will have the right to demand that the resident engineer institute action against the contractor. Work is to be halted until the problem has been resolved between the ECO, resident engineer and the contractor.

Any financial loss that may derive from such a cessation of the work will be to the cost of the contractor. If this action does not have the desired effect, the ECO may appeal to DEA&DP for further action to be taken. The contractor should be fined and must pay for reinstatement or rehabilitation of damaged areas and features.

## Section 11.2 Vehicular Access Point & Haulage Route demarcation

Where construction activities needs to be in close proximity to public roads and vehicular traffic, attention must be paid to ensure that all construction activities are properly demarcated in addition to on-site restrictions to the minimum space needed. Uncontrolled and unnecessary vehicular movements have the potential adversely impact the sensitive areas.

Demarcation of access points and haulage routes would also be important and need to remain in place for the full duration of the construction phase. This demarcation would also serve the purpose of informing and warning passing vehicular traffic of the construction activities taking place.

The demarcation measures would therefore need to be clearly visible. Sight-distance would be especially important for vehicular traffic, in terms of getting approaching vehicles to slow down and exercise caution. Typical bright hazard / warning colours should be used on demarcation and the marking out of the working area should be done with orange barrier netting (or a similar product).

Accompanying the demarcation of the access points and haulage routes would need to be adequate signage, which is both informative and cautionary to passing traffic. Signage would need to be clearly visible and need to include, among others, the following:

- Identifying working area as a construction site;
- Cautioning against relevant construction activities;
- Prohibiting access to construction site;
- Clearly specifying possible detour routes and / or delay periods;
- Possible indications of time frames attached to the construction activities, and;
- Listings of which contractors are working on the site.

# Chapter 12 Office / Site Camp

The following section details the establishment, maintenance, removal and rehabilitation of the area selected to function as an office / site camp.

## Section 12.1 Establishment & Operation of Office / Site Camp

The area chosen for the office and / or site camp must be the minimum reasonably required, which will involve the least disturbance to the environment. The camp / office may not be located within sensitive existing open space areas and / or areas with low pedestrian and vehicular traffic volumes. The favoured site should be decided upon in consultation with the ECO and should ideally be within an area, which would ultimately comprise a section of the development layout.

The total area of the intended site camp should be striped of all topsoil (as may be present) before any of the contractor's infrastructure or machinery is stored within the site camp. Topsoil that is removed should be dealt with as per this EMP.

The site camp would need to be adequately fenced off along the boundary and secured to prevent non-construction staff wandering around the site camp and possibly getting injured or posing a safety and security risk. Adequate signage needs to be in place, designating the site office / camp as a restricted area to non-construction people.

Lighting and noise disturbance or any other form of disturbance must also be kept to a minimum.

The site camp must provide adequate space for building material storage, construction vehicle parking, office location, vehicle and machinery maintenance and cleaning as well as temporary accommodation (as may be required) as well as ablution and cooking facilities for staff and security personnel. The establishment of separate vehicle maintenance and storage areas is discussed in the succeeding sections.

The ECO should be consulted with regard to the ablution, cooking and sanitation facilities proposed for the site camp, especially in regard of disposal of waste and effluent.

## Section 12.2 Toilet facilities, Wastewater, Effluent and Refuse Disposal

Chemical toilet facilities or other approved toilet facilities (1 for every 15 workers) must be used and located on the site in such a way that the toilets do not cause any form of pollution of the site. The toilets must be easily accessible and shall be secured to prevent them from blowing over or being pushed over. Toilets should be placed within the site camp as well as within the demarcated working areas where construction teams are operating.

The contractor shall ensure that no spillage occurs when chemical toilets are cleaned. The toilet shall be placed on level, bare ground. Performing ablutions outside toilet facilities are strictly prohibited. The toilets must be serviced regularly and kept in an orderly state. The ECO would need to regularly inspect the state of the chemical toilets.

Any effluents containing oil, hydraulic fluid, cement wash, grease, non-biodegradable chemicals or other industrial substances must be collected in a suitable receptacle and removed from site, either for resale or for appropriate disposal at a recognized waste facility capable of dealing with this type of waste.

The ECO must be notified of any spillage, contamination or pollution. Spills should be cleaned up immediately to the satisfaction of the ECO by removing the spillage together with the polluted soil / sediment (if applicable) and disposing them of at a recognized facility.

A waste minimization approach should be adopted and implemented on the site. Non-biodegradable refuse such as glass bottles, plastic bags, metal scrap, etc., must be stored in a container at a collecting point and collected on a regular basis and disposed of at a recognized disposal facility. No refuse must be dumped within the development site for extended periods of time, unless inside waste collection receptacles like bins and skips.

Biodegradable refuse generated from the office / site camp, construction areas, vehicle yard, storage area or any other area shall be handled as indicated above. Adequate waste receptacles, bins and skips should be available for the collection and removal of waste. Where recycling facilities are available, recycling bins for the various categories should be

implemented. Any waste, like rubble, cement, soil or bricks, which could be reused should be stockpiled in an area agreed upon with the ECO.

Refuse bins shall be water tight, wind-proof and scavenger-proof and be clearly marked for the purpose of waste disposal. Any solid waste shall be disposed of at a landfill licensed in terms of Section 20 of the Environment Conservation Act, 1989 (Act No. 73 of 1989). Given the proximity to the town and an existing vehicular traffic routes, it is essential to mitigate unsightly waste piles with the associated unpleasant odours and flies.

The appointed ECO must regularly inspect the waste storage and removal facilities to guarantee that the waste levels are acceptable and that adequate waste management is ensuing.

## Section 12.3 Rehabilitation of the Office / Site Camp

On completion of the construction operations, the site camp / office areas must be cleared of any contaminated materials and soil. This contaminated material must be disposed of as described in this EMP. All areas within the site camp / office area that have become devoid of vegetation or where soils have been compacted due to construction activities should be scarified or ripped. This only applies to areas that will not be covered by development infrastructure at a later stage.

Topsoil that was removed during the establishment of the site camp can then be put back, spreading it evenly over the entire site camp area. The site could then be seeded with a vegetation seed mix adapted to reflect the local indigenous flora and should not involved the planting of any potential alien invasive species. This should be done in consultation with the ECO.

# Chapter 13 Vehicle Maintenance Yard & Secured Storage Area

The object of storing the vehicles and materials in a central storage area is to contain any contamination and improve management of the stores and vehicles to ensure any potentially harmful impact is limited to a specific area. This is necessary if the construction vehicles, materials and equipment are not stored in the designated site camp, as discussed in the preceding section.

## Section 13.1 Establishment of the Vehicle Maintenance Yard & Storage Area

The area chosen for the vehicle maintenance yard and secured storage area must be the minimum reasonably required and involve the least disturbance to the environment. The vehicle maintenance yard and storage areas should be located with similar consideration to that of the office / site camp. It should also be situated in an area that is identified in consultation with the ECO.

The storage area must be securely fenced and all hazardous substances and stocks such as diesel, oils, detergents etc. must be stored in this area. Tanks of hazardous substances should be situated in a bunded area large enough to accommodate the total capacity of the tank in question. The floor of bunded area must be made impermeable by either providing the area with a cement floor or lining the entire area with plastic sheeting. If plastic sheeting is used to line the bunded area care must be taken to ensure it is not punctured in any way during the course of the construction period. No hazardous materials of any kind are to be stored anywhere on site, other than the predetermined storage area, for any duration of time. Any container which at one stage contained a hazardous material or potential pollutant must be removed from site as soon as such a container are emptied and be disposed off in a responsible manner as indicated in Chapter 12 of this report.

The contractor shall identify all fuels and hazardous substances to be stored on site and shall ensure that he knows the effects of these substances on his staff and the environment. Drip pans, a thin concrete slab or a facility with PVC lining must be installed, if necessary, in the storage area to prevent soil and water pollution. The necessary chemicals and materials may also need to be stored under-roof in a weather-proof housing.

Section 13.2

## Maintenance of Vehicles & Equipment

No vehicle may be extensively repaired anywhere on the site, other than areas specifically designated for such actions. The above also applies to the washing of vehicles. This maintenance and washing must preferably take place within the confines of the site camp / vehicle maintenance yard.

Emergency repairs to equipment used for any purpose during the construction phase should ideally also only take place only in the maintenance yard area or designated area within the site camp. Where emergency repairs take place on vehicles or machinery outside the maintenance yard / site camp, it is the responsibility of the contractor to ensure that all waste (e.g. spare parts and oils) are removed from site as soon as possible. Such waste needs to be adequately disposed of. Whenever practical a tarpaulin must be laid down, prior to emergency repairs taking place, to protect the spillage from contaminating the environment.

Equipment used in construction activities must be adequately maintained so that during operations it does not spill oil, diesel, fuel or hydraulic fluid. Machinery or equipment used must not constitute a pollution hazard in respect of the above. The ECO may order such equipment to be repaired or withdrawn from use if he / she considers the equipment or machinery to be a pollution risk or irreparable. The health and safety consultant (if available) should also be consulted in this regard.

Any polluted soil (concrete, fuel, oil spills and other chemicals) must also be cleaned up and removed to an acceptable disposal site. If a significant amount of soil has to be removed fresh soil must be imported and the site rehabilitated. The clean up of spills and any damage caused by the spill shall be for the contractor's account.

Section 13.3

## Rehabilitation of Vehicle Maintenance Yard & Storage Area

On completion of the construction operations, the vehicle maintenance yard and secured storage areas must be cleared of any contaminated materials and soil. This contaminated material must be disposed of as described in this EMP. Rehabilitation of the area will be similar that of the site camp area and again will be dependent on the end-use of the land but must be done in consultation with the ECO.

# Chapter 14 Access to the Site

Existing roads should be used as far as possible to access the construction site. Any access for heavy machinery, earth-moving equipment and vehicles or delivery vehicles to any part of the construction site must therefore be via the existing road network. All construction vehicles therefore need to adhere to traffic laws.

The speed of construction vehicles and other heavy vehicles must be strictly controlled to avoid dangerous conditions for other road users (vehicular & pedestrian). As far as possible care should be taken to ensure that the local traffic flow pattern is not be too significantly disrupted and all vehicle operators therefore need to be educated in terms of “best-practice” operation to minimize unnecessary traffic congestion or dangers.

Construction vehicles should therefore not unnecessarily obstruct the access point or traffic lanes used to access the site. Construction vehicles also need to consider the load carrying capacity of road surfaces and adhere to all other prescriptive regulations regarding the use of public roads by construction vehicles. Existing road surfaces damaged by construction vehicles may need to be repaired, if deemed necessary.

The access locations should be discussed with the ECO. Only delivery, construction, maintenance and supervising personnel may have access to the site during the construction phase, unless approved and supervised by the construction team.

Where the access routes are in close proximity to sensitive areas or there is little / no road infrastructure present, access routes should as far as possible be as close to the existing building footprint as possible. Special attention should also be paid to the following:

- The access route selected must ensure that a minimum number of bushes or trees are felled.
- Water courses and steep gradients must be avoided as far as is possible.
- Adequate drainage and erosion protection in the form of berms or trenches must be provided where necessary.

The maintenance of access roads will be the responsibility of the contractor. Newly constructed roads must be adequately maintained so as to minimize dust, erosion and undue surface damage. The liberation of dust into the surrounding environment must be effectively controlled by the spraying of water or other dust allaying agents. Any temporary route used to access the construction site must, once the development has been completed, be subject to a rehabilitation process to restore the area used for the route to its former state.

## Chapter 15 Environmental Awareness Training / Education

The Contractor should make allowance for all site staff, including all subcontractor staff, to attend environmental awareness training sessions (undertaken by the ECO) before commencing any work. During this training, the ECO will explain the EMP and the conditions contained therein. Attention will be given to the construction process and how the EMP fits into this process. Do's and don'ts of the site will also be highlighted. Other issues that will be discussed include the following:

- The demarcated "No-Go" areas.
- Littering.
- Making of fires.
- Use of the toilets provided.
- Use of waste receptacles provided.
- Use and control of building materials and equipment, etc.
- Control and maintenance of vehicles
- Methods for cleaning up any spillage.
- Access and road safety.
- General "best practice" principles.

Follow up training sessions will be organised when and if deemed necessary by the ECO.

## Chapter 16 Staff Accommodation

It is not foreseen that staff will be accommodated on the site, except for security personnel, if deemed necessary. In the unlikely event that staff will be accommodated on site, adequate provision should be made in terms of health and safety. The staff must be accommodated within the fenced site office area. Cooking screens should always be used when food is prepared with a fire. If an open fire is needed, an adequate enclosure of corrugated iron must be erected in a site designated by the ECO.

A portable toilet and potable water source must be available to those who will be accommodated on site. It is the responsibility of the applicant to ensure that the contractor on the site and the employees are capable of complying with all statutory requirements, which includes the implementation of this EMP.

## Chapter 17 Fire Management, Safety & Security

The following section deals with the safety and security of people, machinery and equipment on the site.

Section 17.1

## Fire Prevention

No unsupervised and uncontrolled open fires should be made on development site during the construction phase. Any fire that is needed must be attended at all times and only be undertaken in suitable areas designated by the ECO. Adequate safety measures must similarly be in place. In the case of small fires a corrugated iron structure should be erected to encircle the fire, thereby preventing cinders from possibly blowing away and causing fires elsewhere. No burning or burial of waste is permitted on the site or any other not designated as an accredited disposer of waste.

Working fire extinguishers and fire fighting equipment must be available at all times on site. It is recommended that the labourers be trained in fire fighting techniques. The health and safety consultant (if available) should be consulted in this regard. In the case of any welding, grinding or other “hot” work, this shall only be allowed inside designated working areas and only where there is no danger of fires starting as a result of sparks produced during these operations.

In the case of accidental fires the contractor shall alert the Local Authority’s Fire Department as soon as a fire starts and not wait until he / she can no longer control it. The Contractor shall also take all the necessary safety precautions to ensure the safety of his / her staff and shall ensure that a first aid kit is available. All local authority regulations with regard to fire management apply on this site.

Section 17.2

## Safety

The safety of the contractors and labour on site is the responsibility of the contractors and developer as per the contractual agreements between these two parties. The safety of the contractors and labour must comply with all current safety legislation applicable to normal building sites. Labour and contractors must use the existing access route to access and vacate the site and in case of emergencies a dual access lane should be available to prevent road blockages from machinery or equipment. The necessary precautions in terms of emergency numbers and safety protocol must be displayed, preferably at the site camp / office, as per current legislation.

The attention of workers must be drawn to the fact that during the construction phase the site is accessed via a fairly major road that does have a relative volume of vehicular traffic with the potential for collisions if road safety protocols are not adhered to. Caution will therefore have to be taken by all workers, including contractors and sub-contractors, when accessing the site.

Section 17.3

## Security

The security of the site including that of labour, contractors and materials is the responsibility of the developer and other parties as per contractual agreement.

Storage of fuels and other hazardous materials must be kept and stored as per national legislation governing these materials. A company providing 24-hour security for the site and

the equipment on the site should monitor the site, if the need arises. Fencing is to be erected depending on the security requirements and the difficulties experienced in securing the site.

# Chapter 18 Excavations & Earthworks

Any major earthworks with heavy machinery must be under constant supervision and operators are to be aware of all the environmental obligations, as there is always the potential to inflict damage to the sensitive areas. Any unnecessary or excessive heavy machinery movement around sensitive vegetated or stormwater drainage areas must be kept to a minimum.

## Section 18.1 Undertaking Excavations & Earthworks

Areas to be excavated must be clearly demarcated. It may even be necessary to demarcate excavations or earthworks along busier haulage routes with orange barrier netting (or a similar product), since the excavated area would need to be as visible as possible to passing vehicular traffic. Any area to be excavated should also be discussed with the ECO prior to any excavation commencing. Areas, which have already been excavated and entail fairly significant earthworks, should similarly be demarcated to avoid the spreading of construction activities into sensitive areas.

As a first step to any earth works or excavations the contractor must remove the occurring topsoil and ensure it is stored as per Chapter 19 of this report.
It must be borne in mind that the orange barrier netting (or a similar product) does not always last for very long on site and tends to be vandalized, impacted by construction activities or blown away in the wind. The point to note is that it is important to be continually vigilant to ensure that any deep trenches or excavations are clearly demarcated to warn passing vehicular and pedestrian traffic as well as construction labourers.

## Section 18.2 Storage of Excavated Material

All excavated material must be stored on a flat surface away from any drainage line or area susceptible to erosion due to the flow of runoff. The location should be decided upon in consultation with the ECO. To ensure as little as possible of occurring topsoil are contaminated by the material to be stored, it will be important to remove all topsoil from the storage area material beforehand. Removed topsoil should be stored as indicated under Chapter 19 of this document.

Stored materials must be protected from wind and water erosion by covering the material with suitable shade cloth material where necessary. The shade cloth must be weighted down by logs (or similar material) in such a manner that any stream flow is directed away from the stockpile, reducing the risk of erosion.

# Chapter 19 Topsoil Management

Excavated topsoil can be used for landscaping and rehabilitation. Topsoil should therefore be removed from any area where physical disturbance of the surface will occur, but only after consultation with the ECO.

Topsoil which has been removed and stored separately must be left in position until used for landscaping and / or rehabilitation ventures. Shade cloth can be used to temporarily stabilize the topsoil until it is reused. The extent of this stabilization should be dictated by the ECO.

# Chapter 20 Stormwater & Erosion Control

The management of stormwater is crucial to preventing erosion on exposed areas, both during the construction and operational phases. Accelerated erosion needs to prevented at all costs, especially when the area is already degraded with signs of erosion.

It is important to provide the ECO and contractors with a range of tools to enable them to prevent and control erosion and manage stormwater on a daily basis. It is for this reason that this EMP proposes a three-tier approach to the issue of stormwater management. This combination of the systems will be used to ensure that while one system is used to decelerate the speed of the overland flow of stormwater, another system will be used to dissipate the energy of the stormwater.

The proposed stormwater control system therefore entails a small-, medium- and large-scale approach to the management of stormwater, each with differing erosion control structures. The ECO should be consulted on the scale of situation in order to decide on the most appropriate stormwater management measure.

For the purpose of continuity, stormwater management measures are discussed for both the construction and operational phases.

## Section 20.1 Small-Scale Erosion and Stormwater Control Measures

These control measures will entail brush packing and brush wattling (brush bound into cylindrical bundles) as well as mulching and the use of shade netting barriers (or similar) or geo-fabric barriers in areas where no brush is available. These stormwater control measures are usually placed directly across the path of flow of stormwater. Poles and logs, staked in along the contours of a slope susceptible to erosion may also be used. Seeding exposed slopes with a suitable fast-growing grass (or other) mix may also be undertaken to provide additional stability.

## Section 20.2 Medium-Scale Erosion and Stormwater Control Measures

Small berms and benches cut into the slope as well as poles and logs, placed along the contours of the slope can be used for medium-scale erosion and stormwater control.

## Section 20.3 Large-Scale Erosion and Stormwater Control Measures

Large-scale erosion control is mainly accomplished with the use of temporary retention dams and large berms. The mode of operation is to construct the development while bearing in mind the possibility that a heavy rainfall event could occur at any moment. There are therefore always a number of retention dams and larger berms to ensure that water does not have an unobstructed run from the top of a drainage line to the bottom.

## Section 20.4 Roles & Responsibilities with Erosion Control

Which ever stormwater and erosion control measure is employed; the aim is to take care at all times to prevent erosion of soils on the site. Where there is a possibility of erosion occurring, the contractor is to apply the necessary approved stabilization method, as per consultation with the ECO.

It is the responsibility of the contractor to ensure that the erosion control measures are in place throughout any period of risk. It is the responsibility of the contractor to ensure that the works are protected from damage that may be caused by the runoff of stormwater. Where possible, no materials that would be susceptible to erosion should be place near drainage lines. Any concentrated flows of stormwater should, where possible, be dissipated to avert any erosion.

Please note that erosion control methods might need to be supplemented or improved during the construction phase. Such additional erosion control measures should be implemented in consultation with the ECO.

# Chapter 21 Management of Faunal Movement

The trapping of any animal or picking of any plants is strictly prohibited.

Should any animals be encountered during the construction or rehabilitation phases, then these animals are not to be killed or harmed in anyway. If animals such as snakes are within the high-risk areas, where they are likely to be injured by vehicles or work on site, they are to be relocated to an area where they will not be harmed. This would need to be undertaken by a suitably experienced individual.

In the case of dwellings and human activities in close proximity to possible wildlife movement, it is important to prevent conflict and to rather operate in harmony with nature. It is important during the construction phase to take care to employ construction techniques that are not

harmful or destructive to perceived “problem” animals. In this regard the ECO should monitor and advise.

# Chapter 22 Dust, Noise and Pollution Control

The following section discusses the construction-related disturbances that are common to most development sites.

## Section 22.1 Dust

Dust (if an issue) must comply with health and safety regulations (administered by the Department of Labour) regarding dust levels. The contractors would need to put in place reasonable and effective measures to reduce the liberation of dust into the atmosphere during excavations and landscaping activities. Dust suppression measures such as wetting down of sand heaps as well as roads should be implemented if and when required. Brush packing and the use of woodchip could also be employed to allay the generation of dust. The ECO must advise when this is necessary.

## Section 22.2 Noise

Noise levels must comply with health and safety regulations (administered by the Department of Labour) regarding noise levels. The health and safety consultant (if available) should ensure compliance with legal limits. Vehicles’ exhaust systems must also be in working order to limit noise pollution.

## Section 22.3 Pollution

The pollution of the environment (natural and anthropogenic), substrate and drainage network must be prevented at all costs. It is therefore necessary to adequately manage any potential sources of such pollution, including spillage and contamination from oil, hydraulic fluid, sewage (from portable toilets), construction chemicals, concrete, cement, tar, bitumen, polluted water or any other substance with the potential to pollute.

Adequate storage of construction phase materials and chemicals is therefore very important and needs to be undertaken inside the site camp or suitably designated and demarcated area. Materials and chemicals need to be stored according to their specific product-storage requirements. This may include an undercover, waterproof and bunded housing structure. The health and safety consultant (if available) should be involved in this storage process.

The correct use and application of materials and chemicals is also important, and it is essential that labourers and the construction team operating with these materials and chemicals and suitably educated and trained to do so. Staff must also be familiar with disposal techniques and “best-practice” in terms of preventing and containing spillage and pollution. The health and safety consultant (if available) should be approached and involved in

the education and training of labour as well as the development of a suitable emergency management plan in case of contamination and pollution.

The following could serve as a general guideline / basic method statement for a containment procedure for a severe spillage (may vary, depending on severity of spillage):

- Contact the ECO.
- Contact regional fire chief / fire department.
- Unless specified differently by the ECO and / or fire chief:
    - Contain the contamination in a bundled and / or leak-proof area. Sand berms or sandbags can be used to contain spillage in a temporary catchment pit.
    - Pump spilled substance into leak-proof drums for removal and disposal.
    - Make use of wood chip and / or sawdust to absorb the remainder of the spillage. This contaminated material similarly must be stored for removal and disposal.
    - Other contaminated materials or soils must also be removed and stored for removal and disposal.
    - It may also be necessary to procure an approved chemical agent to break down any hydrocarbons into a biodegradable form.
    - Ensure that haz-chem sheets are available for all chemicals or substances used on site, as well as understanding the application and management of each chemical / pollutant.
    - Drip trays or plastic tarpaulin sheets must be used when vehicles and machinery are being worked on or repaired.
    - Large diesel tanks should be placed in a small bundled housing; although a plastic tarpaulin sheet is considered sufficient for smaller mobile tanks.

## Chapter 23 Clearing of Sensitive and Protected Vegetation

The ECO must be informed in advance if any protected plants or trees need to be removed or if any plants may be impacted that are located in sensitive areas (please also refer to Chapter 11 of this report). Where possible it is advised that any mature and established indigenous trees (as may be present), be left in place until it can be relocated (if deemed necessary by the ECO).

It is important for the contractor to use judgement and attempt to undertake construction activities in a manner that is least destructive and disruptive to any existing indigenous vegetation. The appointed ECO should be called upon to offer guidance on possible route variations (for service infrastructure like sewage / water pipelines) or minor relocations of development infrastructure around potentially sensitive vegetated areas.

## Chapter 24 Discovery & Protection of Potential Heritage Resources

An Archaeological Heritage Impact Assessment was conducted by MAPCRM cc and noted a number areas and artefacts considered sensitive from a heritage and archaeological point of view. It will important to for the contractor to ensure that all recommendations included in the report compiled by MAPCRM cc dated 28 September 2005 are implemented. The necessary permits as stipulated in the afore mentioned report, obtainable from Heritage Western Cape,

must be applied for in advance and the relevant authorizations made available to the ECO prior to construction activities commencing.

If any heritage resources are unearthed or discovered, work in that area is to be suspended immediately. These heritage resources may include, among others, features of previous human activity, such as:

- Human remains;
- Fossil bones;
- Stone tools / artefacts;
- Coins;
- Rock art & engravings;
- Pottery & ceramics;
- Shell middens / marine shell heaps; and
- Old structural remains.

The ECO must be notified immediately and a competent and qualified heritage specialist and / or archaeologist must be contacted to make an assessment of the feature and to give further advice and instructions.

## Chapter 25 Emergency Plans

The onus is on the contractor to assess potential risks to the environment as a result of the construction and must subsequently draw up suitable emergency plans. For example, accidental spillage of materials may pollute the soil or water body. Emergency plan and procedures must be taught to all the workers on site, so that everyone is prepared to cope in the case of an emergency. The ECO and the health and safety consultant (if available) could be involved in drawing up these emergency plans and training labourers accordingly.

The contractor must record any emergency situation that impacts upon the environment along with the action that was taken to rehabilitate and remediate the site.

## Chapter 26 Preference to Local Labour

Where possible, preference should be given to local labour during the employment of contractors and labour. It is recommended that a skills building programme be implemented for both skilled and unskilled labour to be trained to a level of competency which will give them skills which they can use in the future. Remuneration and employment conditions must also be in line with existing labour legislation.

# Chapter 27 Final Rehabilitation and Landscaping

Waste material of any description, including containers, construction rubble and scrap must be removed entirely from the construction area and disposed of at a recognized landfill facility. Under no circumstances is it permitted for these materials to be buried or burned on the site.

## Section 27.1 Using Existing Topsoil

Topsoil that was stored (as per above description) should be used during landscaping and rehabilitation. All areas which are not relatively level should be covered with a layer of stockpiled topsoil as soon as possible. This topsoil will then enable landscaping and the planting of vegetation for greening purposes.

Any soil that needs to be removed from the site must be disposed of at a Municipal-approved disposal site. To ensure alien plant species are not introduced into the area, topsoil brought onto the site should be inspected by the ECO before it is used for any rehabilitation work.

## Section 27.2 Stabilization of Topsoil

Areas which have been covered with topsoil from the stockpiles and which may be subject to erosion should be stabilized as per the succeeding description. This section should be read in conjunction with the preceding section on erosion and stormwater control measures, especially regarding the use of brush-layering, brush-packing and mulching.

### 27.2.1 The use of logs

This method will only be practical if there are enough logs, poles or stakes which can be sourced from the development site itself. If logs, poles or stakes are too large it would make them cumbersome and difficult to manoeuvre and thereby difficult to secure in place. On the other hand, if logs, poles or stakes are too small, it could mean that stream-flow or stormwater from heavy rainfall events could simply overtop or undercut the logs, poles or stakes, rendering their stabilization purpose useless. logs, poles or stakes of approximately 200mm - 350mm in diameter are considered ideal.

It is important to ensure that logs, poles or stakes are placed along the contours of the slope in order to ensure drainage lines or erosion gullies are not created running down the slope, along which the water can erode and undermine the slope stability. Instead stream-flow and stormwater velocity should be controlled to encourage the pooling of water and filtration of stormwater into the soil.

The logs, poles or stakes should form continues rows along the contours of the slope at regular intervals, spaced approximately 1.5m - 2.0m apart. The distance between log berms can vary, depending on the steepness of the slope; with steeper slopes requiring more logs, poles or stakes.

To ensure the water does not erode through underneath the logs it is important that the logs are sunk into the ground up to a depth of 100mm.

In the absence of logs, poles or stakes, it is possible to create small stormwater deflection berms, using excess soil from the stockpile.

### 27.2.2 Silt fences

Furthermore, if there are no logs, poles or stakes available and a shortage of soil then it is possible to employ silt fences / shade cloth / shade netting to stabilize the slope. Refer to the preceding section illustrating the use of silt fences to stabilize a slope.

Silt fences can be placed at regular intervals along the contours of the slopes. Silt fences should have a minimum above-ground height of 400mm with approximately 200mm dug into the ground. Silt fences should be constructed of shade netting (or a similar product) and staked in place at regular intervals of 1.0m -1.5m. The silt fences should be spaced at regular intervals of 2.0m - 3.0m apart.

It is important to note that these silt fences will need to be regularly maintained and will need to be removed once the vegetation cover is established and the bank has sufficiently stabilised.

## Section 27.3 Brush-Packing & Mulching

Brush-packing or mulching, is done by covering the exposed surface with organic plant material such as branches, plant cuttings and leafy material. This method should be employed on all steep exposed slopes or where an area is vulnerable to either wind or water erosion. Brush-packing or mulching is a valuable soil erosion control method due to the following:

- It assists with the retention of moisture in the soil.
- It protects the exposed soil from wind erosion while at the same time trapping wind blown sand particles.
- Traps wind blown seeds.
- It functions as a protection against rain splash erosion.
- It eventually decays and contributes to the organic content of the topsoil

Mulched material should be spread on the entire site to be treated up to a depth 50mm. If mulch material is too thinly spread out it will be ineffective in protecting the area, but if it is too dense it will suppress plant growth.

## Section 27.4 Vegetation Re-Establishment

Re-seeding is encouraged on all exposed areas where there is minimal potential for other vegetation to re-sprout and / or the threat of alien species invading the area is high. The seed could be mixed with topsoil before it is sown to ensure an even spread is achieved.

No alien vegetation should be planted, especially those species with the potential to become invasive. It is important that if woody species are introduced, individual plants be watered regularly until the plants are fully established.

# Chapter 28 Control of Alien & Invasive Plant Species

All vegetation clearance must be undertaken with utmost care to ensure that only that vegetation, which needs to be removed, is removed.

Eradication of alien plants must be completed in such a manner that indigenous vegetation is not damaged.

It is important to remove both young plants (saplings) and old trees that are seed bearing. Different strategies can be employed to remove different species, but all methods will involve manual labour as mechanical means other than chain saws and brush cutters, should be used where necessary. It is important to tackle the smaller, more dispersed plants first, and then the larger stands of alien vegetation.

To ease the removal of the alien plants present on the site, it is recommended that all alien plants be removed during the initial site clearing activities at the start of the construction process rather than during the operational phase of the development.

Maintenance and follow-up sessions should be scheduled at least two years in advanced and such a schedule included as part of the OEMP. The alien plant removal and rehabilitation schedule must be audited on a regular basis by the Environmental Liaison Committee (ELC) to ensure compliance.

## Section 28.1 Clearing of small alien plants

The best method of clearing small plants is by hand pulling them. They must then be stacked for removal to a recognised waste site, or alternatively mulched on site. Mulched material can be use as a ground cover as per Chapter 27 above.

## Section 28.2 Clearing of alien trees

Alien trees must be cut down with chain saws and then chopped into smaller portions. Some species of alien plants like Black Wattle trees are coppicing species and will re-grow from roots and stumps. This means that a chemical such as Roundup or Garlon will need to be used to prevent the trees from re-sprouting. These chemicals can either be sprayed onto the stump with a knapsack sprayer or painted on with a paintbrush. Another alternative to prevent re-growth is to strip the bark from the remaining part of the stump.

## Section 28.3 Methods for controlling alien vegetation

Biological control, chemical control, mechanical clearing, and burning have all been used with varying results. Each method has been successful but nearly all require follow-up control. The most successful clearing projects have included an integrated approach to account for initial clearing and continued management.

### 28.3.1 Mechanical control:

- Mature non-coppicing trees must be cut as low as possible and no herbicide treatment is needed on the cut stumps.
- Debris may be removed immediately from site to be burned in a safe area, mulched or used as firewood.
  - Large branches should be used as firewood.
  - Smaller branches should be mulched.
  - Alien material containing seed must be removed from the site and burned.
- Should debris be left on site:
  - In sparser areas, where felled debris will not hinder follow-up operations, plants can be felled and left *in situ*.
  - In dense areas, stack debris in rows five metres apart parallel to the contours to facilitate follow-up operations.
- Removal of debris to a distance of 20 m from urban fringe to reduce fire hazard.
- Low density seedling regeneration must be hand pulled.
- Hand pulling around pockets of indigenous vegetation (1m swathe around clumps)

### 28.3.2 Chemical control:

- Follow-up visitation no later than three months after initial operation.
- Follow-up control will be needed because soil stored seed may stay dormant in soil for up to 50 years.
- Follow-up control will involve a combination of hand pulling and foliar spraying.
- Seedlings, saplings and coppice can be foliar sprayed.
- Follow-up spray operation when sufficient regeneration has taken place.
- Blanket or foliar spray.

### 28.3.3 Tools

- Loppers, bow saws and chainsaws
- 12 –15 litre back pack spray units
- Flat fan nozzles or solid cone and 1 bar constant flow valves

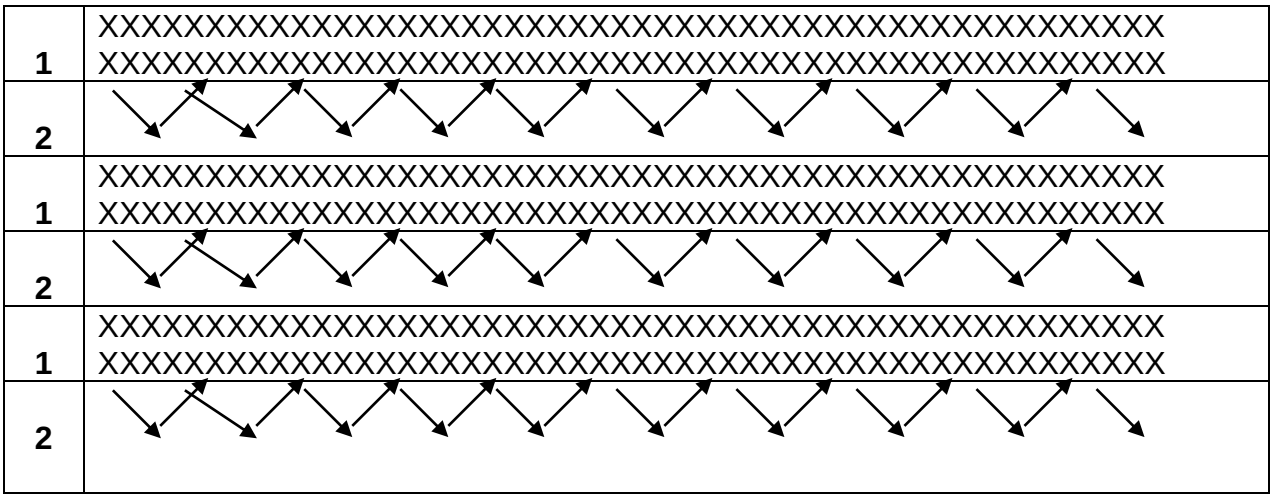
### 28.3.4 Herbicide

- Triclopyr Ester 480 (Selective herbicide).
- Triclopyr Ester 480 at 1% solution.
- 0.5% Actipron and dye.

### 28.3.5 Team composition

- 6 persons, each being equipped with a lopping shear, bow saw and herbicide applicator, must first sweep through the area in individual lanes 5 metres apart. These persons target all plants less than 8 cm in basal diameter, felling, stacking and applying herbicide. De-branching should only be used to facilitate stacking of larger branches.
- 2 chainsaw operators thereafter follow through these lanes felling all plants more than 8 cm in basal diameter. Two assistants are responsible for stacking and herbicide application.
- For the denser areas, methodology must follow the illustration below. All rows are five metres wide. Swathes labelled 1 must be cut first and the debris placed back into these

swathes. Thereafter debris generated in swathes labelled 2, must be placed into swathes labelled 1.




### 28.3.6 Follow up

Once the source of the problem has been removed, namely the seed bearing trees, it is important to follow up on any seedlings and saplings that may have grown in the interim. If this is not done the effort of the removal of the adult trees will have been wasted, as the alien vegetation problem will intensify.

# Chapter 29 Environmental Monitoring and Reporting

The following section details the need for monitoring the implementation of the principles of this EMP as well as the level of monitoring required.

## Section 29.1 Environmental monitoring by the ECO

Regular monitoring of all the environmental management measures and components should be carried out by the ECO in order to ensure that the provisions of this EMP are adhered to. Ongoing and regular reporting on the progress and implementation of this program should be undertaken, as per the requirements of the environmental authorization. If reporting is required the key points of the construction phase must be identified by the ECO and a report on the compliance with conditions of this EMP should be submitted to the competent authority.

## Section 29.2 Monitoring by ELC/EMC

It is likely that as part of the conditions of approval the establishment of an Environmental Liaison Committee (ELC) be included. The ELC usually meet on a regular basis, co-ordinate and control activities and discuss issues of environmental concern.

The recommended terms of reference for the ELC are as follows:

- Monitor on a regular basis to ensure compliance with regulatory measures as stipulated in the EMP.

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- Monitor the implementation of various social and economic commitment to the local communities.
- Report any irregularities in operations to either the ECO, site engineer or both.
- Meet formerly (besides ad hoc inspections) once a month to discuss progress and to note and communicate issues of concern.
- Provide input for the monthly report of the ECO.
- The ELC shall be terminated upon the satisfactory completion of the activity and the rehabilitation and re-vegetation of all disturbed areas to the satisfaction of the relevant environmental authority.

The ELC will comprise of the following members who have all been contacted and have accepted their appointments and responsibilities as part of the ELC:

| |
|---|
| MOSSEL BAY MUNICIPALITY |
| WILDLIFE SOCIETY OF SA (WESSA) |
| LOCAL BUSINESS/SOCIAL - To be determined. |
| RESIDENT ENGINEER/DEVELOPER |
| POWER TOWN REPRESENTATIVE - To be determined |
| ECO APPOINTED Sharples Environmental Services cc |
| |
| |

A legal advertisement should be placed in a local newspaper, requesting anyone interested in being part of the ELC to contact the environmental consultant so that the necessary arrangements can be made.

It is recommended that the ECO co-ordinate the initial stage of operation, but that the chairmanship be later the responsibility of an NGO member (with their consent) in order to maintain objectivity throughout the activities.

The monitoring of works on site is necessary in order to demonstrate compliance with the specifications of the EMP, and to allow for problems or issues of non-compliance to be identified and appropriate corrective measures to be taken in order to minimize environmental damage. Monitoring will include visual checks by the site engineer or project manager on a daily basis as well as checks on particular requirements for site activities by the ECO in conjunction with the ELC on a systematic basis, as explained above.

## Section 29.3 Habitat monitoring

The condition of the sensitive vegetated areas must be monitored regularly in order to ensure that construction and management activities are not impacting negatively on the condition of the vegetation. This most effective way to achieve this is by means of a detailed photographic record. In this way, a record of any shift in habitat condition can be maintained and potential impacts be detected at an early stage.

# Chapter 30 Record Keeping

All the administrative procedures and minutes of meetings, construction site meetings with the ECO, liaison site meetings between the ECO and resident engineer, monthly monitoring reports and ECO observations should be clearly documented and filed on a master file off-site for safe keeping. A site register should also be kept on site in the construction site building for the recording of any observations which are contrary to the stipulations within the EMP and any other contravention deemed necessary to the attention of the resident engineer.

# Chapter 31 Environmental Auditing

An independent audit report, in terms of the EMP should be submitted to the DEA&DP six months after construction has been completed and after the sites have been rehabilitated.

The audit report should indicate the following:

- Detail the rehabilitation measures of the site including the removal of alien vegetation.
- Detail all incidents and mitigation measures implemented to address such incidents.
- Any measures that require follow-up.

The DEA&DP may require remedial action should the audit report reflect that rehabilitation is inadequate. If the audit report is not submitted, the DEA&DP may give 30 days written notice and may have such an audit undertaken at the expense of the applicant and may authorize any person to take such measures necessary for this purpose.

# Chapter 32 Penalties, Claims and Damages

The contractor will be responsible for all costs incurred in the rehabilitation of the site and for ensuring that all procedures required to rehabilitate the site are implemented. If third parties are called to the site to perform clean up and rehabilitation procedures, the contractor will be responsible for all costs. The DEA&DP, as per requirements stipulated in their legislation, may impose penalties on the developer or any of the contractors if conditions contained in this EMP are contravened.

## Section 32.1 Issuing of penalties and fines

Fines will be issued for the transgressions listed below. Fines may be issued per incident at the discretion of the ECO. Such fines will be issued in addition to any remedial costs incurred as a result of noncompliance with the specifications of the Environmental Management Plan.

The ECO will inform the Contractor of the contravention and the amount of the fine in writing and forward a copy to the ER. The ER will then deduct the amount from monies due under the Contract. Fines for the activities detailed below, will be imposed by the ER, on recommendation of the ECO, on the Contractor and/or his Subcontractors. All funds retained by the ER, as result of penalties or fines issued, will be retained and used specifically for rehabilitation. Areas to be rehabilitated will be at the discretion of the ECO.

Please note that payment of any fines in terms of this section of the EMP shall not absolve the offender from being liable from prosecution in terms of any law.

## Section 32.2 Procedure for issuing fines

Any avoidable non-compliance with the conditions of the EMP shall be considered sufficient ground for the issuing of a penalty or fine.

Possible offences, which should result in the issuing of a fine or contractual penalty, include, but are not limited to:

- Unauthorized entrance into no-go areas;
- Unauthorized damage to natural vegetation;
- Unauthorized camp establishment (including stockpiling, storage, etc.);
- Hydrocarbons / hazardous material: negligent spills / leaks and insufficient storage;
- Ablution facilities: non-use, insufficient facilities, insufficient maintenance;
- Late method statements or failure to submit method statements;
- Insufficient solid waste management (including clean-up of litter, unauthorized dumping etc.);
- Erosion due to negligence / non-performance;
- Excessive cement / concrete spillage / contamination'
- Insufficient fire control and unauthorized fires;
- Preventable damage to water courses or pollution of water bodies.

The Contractor shall comply with the environmental specifications and requirements on an ongoing basis and any failure on his part to do so will entitle the ECO to issue the contractor with penalty / fine as described in the following section. In the event of non-compliance the following recommended process shall be followed:

1. The ECO shall issue a notice of non-compliance to the Contractor and submit a statement to the ER stating the nature and magnitude of the contravention and motivating the need for a deduction

of payment to the contractor. Deductions in payments as a result of transgressions of this EMP shall be determined in accordance to the following fine structure.

I. Any person including the operator vehicle or plant, within the designated boundaries of a "no-go" area the contractor R500,00

II. Persistent and un-repaired oil leaks from machinery. The use of inappropriate methods of refueling resulting in spillage of fuels.

III. Litter on site R50,00

IV. Deliberate lighting of illegal fires on site R1,000. The site must be rehabilitated.

V. The eating of meals on site outside the defined eating area. Individual not making use of the site ablution facilities R100,00 per person or incident.

VI. Removal of any indigenous vegetation prior to obtaining written authorization from the ECO. Fines issued in this instance will be determined in accordance to the number of trees damaged, and individual sizes of each. Fines for individual trees removed will be calculated as follows:
(Girth of trunk measured 1m above ground level).

- 1 - 20 mm - R100.00
- 21 - 50 mm - R 500.00
- 51 - 75 mm - R1 000.00
- 76 -100 mm - R2 500.00
- 101 - 150 mm - R5 000.00
- 151 - 300 mm - R10 000.00
- Larger than 300 mm - R15 000.00

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

2. The Contractor shall provide the ER and the ECO with a written statement describing the actions to be taken to discontinue the non-conformance, the actions taken to mitigate its effects and the expected results of the actions.
3. The Contractor shall, once the intended action as described above (Point 2) has been approved by the ER as well as the ECO, act to correct the non-conformance within 24 hours of receipt of the notice, or within a period that may be specified within the notice.
4. In the case of the Contractor failing to remedy the situation within the predetermined time frame, the ER shall impose a monetary penalty based on the conditions of contract in accordance to the following: .

All funds accumulated as a result of penalties issued will be deposited into a fund dedicated to the rehabilitation as explained in the above section.

In the case of non-compliance giving rise to physical environmental damage or destruction, the ER shall be entitled to undertake or cause to be undertaken such remedial works as may be required to make good such damage and to recover from the Contractor the full costs incurred in doing so.

The ER and the ECO shall at all times have the right to stop work and/or certain activities on site in the case of non-compliance or failure to implement remediation measures.

# Chapter 33 Inclusion into Contract Documentation

This EMP should be included into all contracts compiled for contractors and sub-contractors employed by the applicant. The EMP should be available to all contractors on site.

# Chapter 34 Conclusion

It is likely that if the conditions, requirements and recommendations of the above EMP are implemented as described and the stakeholders adhere to the various mitigatory measures, then the project will be completed without unforeseen negative environmental impacts.