

NATIONAL RESEARCH FOUNDATION

## ENVIRONMENTAL MANAGEMENT PROGRAMME

### MeerKAT (KAROO ARRAY TELESCOPE) IN THE KAREEBERG MUNICIPAL AREA, NORTHERN CAPE PROVINCE

Prepared for:



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## ABBREVIATIONS

DEA .....	Department of Environmental Affairs
DWA .....	Department of Water Affairs
EA .....	Environmental Authorisation
EAP .....	Environmental Assessment Practitioner
ECA .....	Environmental Conservation Act
ECO .....	Environmental Control Officer
EIA .....	Environmental Impact Assessment
EMP .....	Environmental Management Plan
EMS .....	Environmental Management System
EO .....	Environmental Officer
ESO .....	Environmental Site Officer
HIA .....	Heritage Impact Assessment
I&AP .....	Interested and Affected Parties
IEM .....	Integrated Environmental Management
NEMA .....	National Environmental Management Act
SKA .....	Square Kilometre Array
WML .....	Waste Management License

## DEFINITIONS

**Alien species** - Plants and animals which do not arrive naturally in an area - they are brought in by humans. Alien plants often force indigenous species out of the area.

**Alternative** - A possible course of action, in place of another, that would meet the same purpose and need defined by the development proposal. Alternatives considered in the EIA process can include location and/or routing alternatives, layout alternatives, process and/or design alternatives, scheduling alternatives or input alternatives.

**Auditing** - A systematic, documented, periodic and objective evaluation of how well the environmental management plan is being implemented and is performing with the aim of helping to safeguard the environment by: facilitating management control which would include meeting regulatory requirements. Results of the audit help the organisation to improve its environmental policies and management systems.

**Biodiversity** - The rich variety of plants and animals that live in their own environment. Fynbos is a good example of rich biodiversity in the Cape.

**Conservation** - Protecting, using and saving resources wisely, especially the biodiversity found in an area.

**Contamination** - Polluting or making something impure.

**Corrective (or remedial) action** - Response required to address an environmental problem that is in conflict with the requirements of the EMP. The need for corrective action may be determined through monitoring, audits or management review.

**Degradation** - The lowering of the quality of the environment through human activities, e.g. river degradation, soil degradation.

**Ecology** - The scientific study of the relationship between living things (animals, plants and humans) and their environment.

**Ecosystem** - The relationship and interaction between plants, animals and the non-living environment.

**Environment** - Our surroundings, including living and non-living elements, e.g. land, soil, plants, animals, air, water and humans. The environment also refers to our social and economic surroundings, and our effect on our surroundings.

**Environmental Impact Assessment (EIA)** - An Environmental Impact Assessment (EIA) refers to the process of identifying, predicting and assessing the potential positive and negative social, economic and biophysical impacts of a proposed development. The EIA includes an evaluation of alternatives; recommendations for appropriate management actions for minimising or avoiding negative impacts and for enhancing positive impacts; as well as proposed monitoring measures.

**Environmental policy** - Statement of intent and principles in relation to overall environmental performance, providing a framework for the setting of objectives and targets.

**Habitat** - The physical environment that is home to plants and animals in an area, and where they live, feed and reproduce.

**Hazardous waste** – Waste, even in small amounts, that can cause damage to plants, animals, their habitat and the well-being of human beings, e.g. waste from factories, detergents, pesticides, hydrocarbons, etc.

**Impact** - A description of the potential effect or consequence of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space.

**Indigenous species** - Plants and animals that are naturally found in an area.

**Infrastructure** - The network of facilities and services that are needed for economic activities, e.g. roads, electricity, water, sewerage.

**Integrated** - Mixing or combining all useful information and factors into a joint or unified whole. See Integrated Environmental Management.

**Integrated Environmental Management (IEM)** - A way of managing the environment by including environmental factors in all stages of development. This includes thinking about physical, social, cultural and economic factors and consulting with all the people affected by the proposed developments. Also called "IEM".

**Land use** - The use of land for human activities, e.g. residential, commercial, industrial use.

**Leaching** – The removal of mineral compounds from ground particles by direct contact with a solvent.

**Mitigation** - Measures designed to avoid, reduce or remedy adverse impacts

**Natural environment** - Our physical surroundings, including plants and animals, when they are unspoiled by human activities.

**Policy** - A set of aims, guidelines and procedures to help you make decisions and manage an organisation or structure. Policies are based on people's values and goals. See Integrated Metropolitan Environmental Policy.

**Process** - Development usually happens through a process - a number of planned steps or stages.

**Proponent** – Developer. Entity which applies for environmental approval and is ultimately accountable for compliance to conditions stipulated in the Waste Management License (WML) and requirements of the EMP.

**Recycling** - Collecting, cleaning and re-using materials.

**Resources** - Parts of our natural environment that we use and protect, e.g. land, forests, water, wildlife, and minerals.

**Stakeholders** - A subgroup of the public whose interests may be positively or negatively affected by a proposal or activity and/or who are concerned with a proposal or activity and its consequences. The term includes the proponent, authorities and all interested and affected parties.

**Storm water management** - Strategies implemented to control the surface flow of storm water such that erosion, sedimentation and pollution of surface and ground water resources in the

immediate and surrounding environments are mitigated. This is specifically important during the construction and decommissioning phases of a project.

**Sustainable development** - Development that is planned to meet the needs of present and future generations, e.g. the need for basic environmental, social and economic services. Sustainable development includes using and maintaining resources responsibly.

**Sustainability** - Being able to meet the needs of present and future resources.

**Waste Management** - Classifying, recycling, treatment and disposal of waste generated during construction and decommissioning activities.

**Wetlands** - An area of land with water mostly at or near the surface, resulting in a waterlogged habitat containing characteristic vegetation species and soil types e.g. vleis, swamps.

**Zoning** - The control of land use by only allowing specific type development in fixed areas or zones

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## SECTION 1: INTRODUCTION AND BACKGROUND

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### 1.1 INTRODUCTION

Strategic Environmental Focus (Pty) Ltd, as independent environmental managers and impact assessors, has been appointed by the **Northern Cape Department of Education** to compile and submit an Environmental Management Programme (EMP) for the construction of the Waste Water Treatment Plants (WWTPPs) and associated evaporation dams at the homesteads of the Farms Losberg (73) and Mey's Dam (68) to the decision making authority; National Department of Environmental Affairs (DEA). The MeerKAT project forms part of the greater SKA initiative.

This EMP compliments the existing approved EMPs for the MeerKAT project on the Farms Losberg (73) and Mey's Dam (68). Thus, this EMP has been condensed and only addresses the impacts associated with the construction of the WWTPPs and associated evaporation dams.

This document is compiled in accordance with the Integrated Environmental Management (IEM) philosophy which aims to achieve a desirable balance between conservation and development (DEAT, 1992). IEM is a key instrument of the National Environmental Management Act, 1998 (Act No. 107 of 1998) [NEMA]. NEMA promotes the integrated environmental management of activities that may have a significant effect on the environment, while IEM prescribes a methodology for ensuring that environmental management principles are fully integrated into all stages of the development process. It advocates the use of several environmental management tools that are appropriate for the various levels of decision-making. One such tool is an EMP.

The IEM guidelines intend encouraging a pro-active approach to sourcing, collating and presenting information in a manner that can be interpreted at all levels. The basic principles underpinning IEM are that there be:

- informed decision-making;
- accountability for information on which decisions are taken;
- accountability for decisions taken;
- a broad meaning given to the term environment (i.e. one that includes physical, biological, social, economic, cultural, historical and political components);
- an open, participatory approach in the planning of proposals;
- consultation with interested and affected parties;
- due consideration of alternative options;
- an attempt to mitigate negative impacts and enhance positive aspects of proposals;
- an attempt to ensure that the 'social costs' of development proposals (those borne by society, rather than the developers) be outweighed by the 'social benefits' (benefits to society as a results of the actions of the developers);
- democratic regard for individual rights and obligations;
- compliance with these principles during all stages of the planning, implementation and decommissioning of the proposals (i.e. from 'cradle to grave'); and
- the opportunity for public and specialist input in the decision-making process.

These principles are in line with NEMA and is focussed primarily on co-operative governance, public participation and sustainable development. The EIA Regulations that took effect in August



2010 regulate the procedures and criteria for the submission, processing, consideration and decision on applications for environmental authorisation of listed activities.

## 1.2 SCOPE

The general principles contained within this document apply to all **PRE-CONSTRUCTION AND CONSTRUCTION** activities.

### 1.2.1 PRINCIPLES OF THIS EMP

This EMP is compiled using the following concepts and implementation requirements so that the higher principles of sustainable development are realised:

- Continuous improvement. The project proponent (or implementing organisation) must commit to review and to continually improve environmental management, with the objective of improving overall environmental performance.
- Broad level of commitment. A broad level of commitment is required from all levels of management as well as the workforce in order for the development and implementation of this EMP to be successful and effective.
- Flexible and responsive. The implementation of the EMP must respond to new and changing circumstances, i.e. rapid short-term responses to problems or incidents. The EMP is a dynamic “living” document and thus regular planned review and revision of the EMP must be carried out.
- Integration across operations. This EMP must integrate across existing line functions and operational units such as health, safety and environmental departments in a company/project. This is done to change the redundant mindset of seeing environmental management as a single domain unit.
- Legislation. It is understood that any development project during its construction phase is a dynamic activity within a dynamic environment. The Developer, Engineer, Contractor and sub-contractor must therefore be aware that certain activities conducted during construction may require further licensing or environmental approval, e.g. river or stream diversions, bulk fuel storage, waste disposal, etc. The Contractor must consult the ER, EO and ECO on a regular basis in this regard.

### 1.2.2 SITE SPECIFIC INFORMATION

#### 1.2.2.1 PROPOSED ACTIVITY AND LOCAL CONTEXT

The farms of Losberg and Mey's Dam near Carnarvon in the Northern Cape together form the site for the MeerKAT (Karoo Array Telescope), and later Square Kilometer Array (SKA) project. The on-site complex, KAT 7, MeerKAT and PAPER arrays are located on the Farms Losberg and Mey's Dam.

The land adjacent to the homesteads on the farms Losberg and Mey's Dam will serve as construction camp sites for the construction phase of the MeerKAT array. In order to address the sanitation aspects of the construction teams, Lilliput WWTPs will be installed (above ground)

together with associated evaporation dams in which treated water will be discharge and allowed to evaporate.

#### 1.2.2.2 SUMMARY OF IMPACTS ASSOCIATED WITH THE PROPOSED ACTIVITY

The main impacts associated with the proposed WWTPs and associated evaporation dams include the following:

- Potential impacts on groundwater resources.

#### 1.2.3 INTERPRETATIONS

The implementation of the EMP is not an additional or “add on” requirement. The EMP is legally binding through NEMA and the relevant EA. The proponent is to ensure that through the project tender process the EMP forms part of the Project Construction Contract Document to be incorporated in line with:

- General project specifications; and
- SANS 1200 A or SANS 1200 AA, as applicable.

#### 1.2.4 PROJECT PHASE

This EMP is specifically compiled for the period of time prior to commencement of and activities associated with construction of the above mentioned activity.

#### 1.2.5 ROLE PLAYERS AND RESPONSIBILITY MATRIX

In order for the EMP to be successfully implemented, all the role players involved in the project need to co-operate. For this to happen, role players must clearly understand their roles and responsibilities in the project, must be professional, form respectful and transparent relationships, and maintain open lines of communication.

Potential role players or project teams will include the Authorities (A), Other Authority (OA), Developer/Proponent (D), Consulting Engineers (CE), Engineers Representative (ER), Environmental Officers (EO), Environmental Site Officer (ESO), Environmental Control Officer (ECO), Project Manager (PM), Contractors (C), Environmental Assessment Practitioner (EAP). Further; landowners, interested and affected parties and the relevant environmental and project specialists are also important role players.

**Please note:** this EMP, including the list of role players, is subject to the inclusion of any conditions and recommendations set out by the DTEC in the environmental authorisation.

**Table 1: Functions and Responsibilities of the Project Team**

KEY	FUNCTION	RESPONSIBILITY
D	Developer	Proponent ultimately accountable for ensuring compliance to the EMP and conditions contained in the WML. The ECO must be contracted by the developer (full time or part time depending on the size of the project) as an independent appointment to objectively monitor implementation of relevant environmental legislation, conditions of WML, and the EMP for the project. The developer is further responsible for providing and giving mandate to enable the ECO to perform responsibilities. The developer must ensure that the ECO is integrated as part

KEY	FUNCTION	RESPONSIBILITY
		of the project team.
<b>CE</b>	<b>Consulting Engineer</b>	Contracted by the developer to design and specify the project engineering aspects. Generally the engineer runs the works contract. The CE may also fulfil the role of PM on the proponent's behalf (See PM).
<b>PM</b>	<b>Project Manger</b>	The PM has over-all responsibility for managing the project, contractors, and consultants and for ensuring that the environmental management requirements are met. The CE may also act as the PM. All decisions regarding environmental procedures must be approved by the PM. The PM has the authority to stop any construction activity in contravention of the EMP in accordance with an agreed warning procedure.
<b>ER</b>	<b>Engineers Representative</b>	The consulting engineer's representative on site. Has the power/mandate to issue site instructions and in some instances, variation orders to the contractor, following request by the EO or ECO. The ER oversees site works, liaison with Contractor and ECO.
<b>EO/EM</b>	<b>Environmental Officer /Environmental manager</b>	<p>Appointed by the CE as their environmental representative on site. The EO is not independent but must rather act on behalf of the consulting engineers with the mandate to enforce compliance under the project contract, which must include the EMP. The EO has the directive to issue non-conformance and hazard certificates. Further, in terms of accepted industry practice the EO could issue the equivalent of a "cease works" instruction only in exceptional circumstances where serious environmental harm has been or is about to be caused i.e. in cases of extreme urgency and then only when the ER is absent.</p> <p>The EO must form part of the project team and be involved in all aspects of project planning that can influence environmental conditions on the site. On certain types of projects, such as linear developments (fences, pipelines, etc), the EO must also be the liaison between the contractor and landowners.</p> <p>The EO must attend relevant project meetings, conduct daily inspections to monitor compliance with the EMP, and be responsible for providing reports and feedback on potential environmental problems associated with the development to the project team and ECO.</p> <p>The EO must convey the contents of this EMP to the Contractor site team and discuss the contents in detail with the Contractor as well as undertake to conduct an induction and an environmental awareness training session prior to site handover to all contractors and their workforce.</p> <p>The EO must be suitably experienced with the relevant qualifications and preferably competent in construction related methods and practices.</p>
<b>ECO</b>	<b>Environmental Control Officer</b>	<p>An independent appointment to objectively monitor implementation of relevant environmental legislation, conditions of WML's, and the EMP for the project. The ECO must be on site prior to any site establishment and must endeavour to form an integral part of the project team.</p> <p>The ECO must be proactive and have access to specialist expertise as and when required, these include botanist's ecologists etc. Further the ECO must also have access to expertise such as game capture, snake catching, etc.</p> <p>The ECO must conduct audits on compliance to relevant environmental legislation, conditions of WML, and the EMP for the project. The size and sensitivity of the development, based on the EIA, will determine the frequency at which the ECO will be required to conduct audits. (A minimum of a monthly site inspection must be undertaken).</p> <p>The ECO must be the liaison between the relevant authorities and the project team. The ECO must communicate and inform the developer and consulting engineers of any changes to environmental conditions as required by relevant authoritative bodies. The ECO must ensure that the registration and updating of all relevant EMP documentation is carried out.</p> <p>The ECO must be suitably experienced with the relevant environmental management qualifications and preferably competent in construction related methods and practices.</p> <p>The ECO must handle information received from whistle blowers as confidential and must address and report these incidences to the relevant Authority as soon as possible.</p> <p>On small projects, where no EO is appointed, the ECO must convey the contents of this EMP to the Contractor site team and discuss the contents in detail with the Contractor as well as undertake to conduct an induction and an environmental awareness training session prior to site handover to all contractors and their workforce.</p>
<b>C</b>	<b>Contractor</b>	<p>The principle contractor, hereafter known as the 'Contractor', is responsible for implementation and compliance with the requirements of the EMP and conditions of the WML's, contract and relevant environmental legislation. The Contractor must ensure that all sub-contractors have a copy of and are fully aware of the content and requirements of this EMP.</p> <p>The contractor is required, where specified, to provide Method Statements setting out in detail how the management actions contained in the EMP will be implemented.</p>
<b>ESO</b>	<b>Environmental Site Officer</b>	The ESO is employed by the Contractor as his/her environmental representative to monitor, review and verify compliance with the EMP by the contractor. This is not an independent appointment; rather the ESO must be a respected member of the

KEY	FUNCTION	RESPONSIBILITY
		contractor's management team. Dependent on the size of the development the ESO must be on site one week prior to the commencement of construction. The ESO must ensure that he/she is involved at <b>all phases</b> of the construction (from site clearance to rehabilitation).
<b>A</b>	<b>Lead Authority</b>	The authorities are the relevant environmental department that has issued the WML. The authorities are responsible for ensuring that the monitoring of the EMP and other authorisation documentation is carried out, this will be achieved by reviewing audit reports submitted by the ECO and conducting regular site visits.
<b>OA</b>	<b>Other Authority</b>	Other authorities are those that may be involved in the approval process of an EMP. Their involvement may include reviewing EMP's to ensure the accuracy of the information relevant to their specific mandate. Other authorities may be involved in the development, review or implementation of an EMP. For example if a specific development requires a water use licence for the relevant national authority then that authority should review and comment on the content of the particular section pertaining to that mandate.
<b>EAP</b>	<b>Environmental Assessment Practitioner</b>	The definition of an environmental assessment practitioner in section 1 of NEMA is "the individual responsible for the planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management plans or any other appropriate environmental instruments introduced through regulations".

### 1.2.6 ENFORCEMENT, MONITORING AND AUDITING

The independent ECO is responsible on projects approved under NEMA for regular audits on compliance to relevant environmental legislation, conditions of the Waste Management License (WML), and the EMP for the project.

The ECO must conduct, at a frequency as determined by the Department and stipulated in the relevant WML for the project, independent environmental audits. The audits are to verify the projects compliance with the EMP and conditions of the WML.

Before any construction activities commence, the ECO must compile, for the approval by the Department, an audit checklist based on the contents of this EMP and conditions of the WLA. The ECO must at the request of the Department forward audit reports to the Department at a frequency determined by the Department which must be stipulated in the WML.

Evidence of the following as **key performance indicators**, must be included in the audit reports where required:

1. Complaints received from landowners and actions taken.
2. Environmental incidents, such as oil spills, concrete spills, etc. and actions taken (litigation excluded).
3. Incidents leading to litigation and legal contraventions.
4. Environmental damage that needs rehabilitation measures to be taken.

A copy of all ESO and EO monitoring reports, contractor method statements and pro forma documentation (see 1.2.11 & 1.2.12) must be held by the ESO and/or the EO on site and be made available to the Department and or the ECO upon request.

### 1.2.7 NON-COMPLIANCE

The Contractor is deemed NOT to have complied with the EMP if:

- a. within the boundaries of the site, site extensions and haul/ access roads there is evidence of contravention of the EMP confirmed and verified by the ECO;
- b. environmental damage ensues due to non-compliance of EMP requirements;
- c. the Contractor fails to comply with corrective or other instructions issued by the Engineer within a specific time; and
- d. The Contractor fails to respond adequately to complaints from the public in line with requirements of this EMP

### **1.2.8 MEASUREMENT AND PAYMENT**

It is understood that environmental requirements included in this EMP will entail costs over and above those of the civil requirements. These include provision for: mitigation and enhancement actions; training and environmental awareness requirements; monitoring; auditing; and corrective actions. The proponent must recognise this and make provision for it in the tender. Costing for management action should be done with inputs and advice from appropriate technical members of the project team and relevant EAP who have knowledge of the management actions being recommended as well as practical experience in implementing similar measures and techniques.

A lump sum must be allocated for the management of Environmental Specifications where it is not possible to cost requirements of the EMP.

### **1.2.9 GENERAL GUIDELINES**

The following measures provide guideline solutions to frequently anticipated issues on most development activities.

- The prevention of any site degradation due to non-compliance, administrative or financial problems, and inactivity during the construction phase, illegal activities, delays caused by archaeological finds etc. is ultimately the responsibility of the applicant/developer. Section 28 of NEMA (Duty of Care).
- The study area must be clearly defined, surveyed and fenced according to the project authorisation. All workforce members and other construction personnel are not to go beyond the fenced footprint. Landowners are not comfortable when strangers come on to their properties. They will look for reasons to interfere with the construction process and may therefore cause delays in the process that can be very costly to the Contractor.
- The Contractors must adhere to agreed and approved access points and haul roads.
- No camping is allowed on any private property.
- Damage to private or public property such as fences, gates and other infrastructure may occur at any time. All damage is to be repaired immediately and to the satisfaction of the owner.
- Relevant landowners/ occupiers must be informed of the starting date of construction as well as the phases in which the construction shall take place.
- The Contractor must adhere to all conditions of contract including this EMP.
- Proper planning of the construction process must be undertaken to allow for disruptions due to rain and very wet conditions.
- All private and public manmade structures near the project site must be protected against damage at all times and any damage must be rectified immediately.

- Proper site management and regular monitoring of site works.
- Proper documentation and record keeping of all complaints and actions taken.
- Regular site inspections and good control over the construction process throughout the construction period.
- A positive attitude towards Environmental Management by all site personnel must be motivated through regular and effective awareness and training sessions (see 1.2.10 below).
- Environmental Audits to be carried out during and upon completion of construction.

### **1.2.10 AWARENESS TRAINING**

The ECO is responsible for ensuring that key personnel from the Contractor and Sub-Contractor's team on site are given an environmental awareness induction session, which not only clearly defines what the environment is and gives specifics detailing the local environment but outlines the requirements of the EMP as a management tool to protect the environment.

Refresher courses must be conducted as and when required. The EO or ESO must ensure daily toolbox talks include alerting the workforce to particular environmental concerns associated with the tasks for that day or the area/habitat in which they are working. Awareness posters and a hand out must be produced to create awareness throughout the site.

### **1.2.11 CONTRACTOR ENVIRONMENTAL METHOD STATEMENTS**

Method Statements are written submissions to the Engineer by the Contractor, in collaboration with his/her ESO, in response to a request by the EO and or Engineer. The Method Statements set out the plant, materials, labour and method that the contractor proposes using to carry out an activity, identified by the EO and/or Engineer. The Method Statements contain the appropriate detail such that the EO and Engineer are able to assess whether the Contractor's proposal is in accordance with the requirements of the EMP. The contractor must sign each Method Statement along with the EO and Engineer to formalise the approved Method Statement.

All Method Statements including those which may be required as ad hoc or emergency construction method statements must be submitted to the Engineer for approval prior to the commencement of the activity.

Any changes to the method of works must be reflected by amendments to the original approved Method Statement. Any changes in this regard must be approved by the EO and Engineer on the understanding that such changes are environmentally acceptable and in line with the requirements of this EMP.

Method statements for the following activities must be submitted to the EO, ECO and Engineer for approval before construction commences.

- Solid waste management
- Crew camps and construction lay down areas
- Workshop and maintenance/cleaning of plant (if necessary)
- Cement and concrete batching
- Dust control

- Hydrocarbon and emergency spills procedures
- Diesel tanks and refuelling procedures
- Sourcing, excavating, transporting and dumping of fill and spoil material
- Topsoil management
- Fire
- Rehabilitation of crew camp and other disturbed areas

### **1.2.12 SITE DOCUMENTATION**

The following is a list of documentation that must be held on site and must be made available to the ECO and/or Approving Authority on request.

- Copy of the WML issued by DEA for the development
- Site daily diary /instruction book/ Incident reports
- Records of all remediation / rehabilitation activities
- Copies of EO reports (management and monitoring)
- Environmental Management Programme (EMP)
- Complaints register
- Method statements

### **1.2.13 PRO FORMA DOCUMENTATION**

#### *1.2.13.1 PRIOR TO THE COMMENCEMENT OF CONSTRUCTION ACTIVITIES*

The following attached *pro forma* documentation is to be filled out and is binding to the EMP and project contract and includes, but is not limited to the following:

- Declaration of understanding by the Developer
- Declaration of understanding by the Engineer
- Declaration of understanding by the Contractor

#### *1.2.13.2 DURING CONSTRUCTION ACTIVITIES*

The following attached *pro forma* documentation is to be filled out and maintained. These are binding to the EMP and project contract. They include, but are not limited to, the following:

- Amended Method Statements
- ECO / Engineer approval for amended method statements
- Environmental incidents
- Records of all remediation / rehabilitation activities

### **1.2.14 NATIONAL AND PROVINCIAL ACTS AND GUIDELINES**

The common list of legislative references contained herein is by no means exhaustive but is applicable to the general principals of this document.

#### *Provincial Authorities*

**Animals Protection Act No. 71 of 1962**

Provides for the protection of animals.

**Environment Conservation Act No. 73 of 1989****National Environmental Management Act No. 107 of 1998**

Control/prevention of pollution; combating of noise; activities which may have a detrimental effect on the environment, preparation and contents of environmental impact reports.

*Department of Environmental Affairs and Tourism, Department of Water Affairs and Forestry, Directorate: Environmental Management of the Provincial Department of Environmental and Cultural Affairs and Sport, Local Authorities*

**Hazardous Substances Act No. 15 of 1973**

Provides for the control of substances, which may cause injury or ill health to, or the death of human beings.

*National Department of Health. Local Authorities may be authorized*

**Health Act No. 63 of 1977**

Control of solid, liquid and gaseous wastes that may pose a health hazard.

*Department of Health and Local Authorities*

**National Building Regulations and Standards Act 103 of 1977 (SABS 0400)****National Heritage Resources Act No. 25 of 1999****National Road Traffic Act No. 93 of 1996**

Provides for road traffic matters which apply uniformly throughout South Africa.

*Department of Transport.*

**National Veldt and Forest Fires Act No.101 of 1998**

Fire Protection Associations. Building of fire breaks.

*Department of Water Affairs and Forestry*

**National Water Act No. 36 of 1998****Water Services Act No. 108 of 1997**

Diversion or impoundment of rivers. Conservation and use of water. Treatment and disposal of waste, wastewater and effluent. Pollution and pollution emergencies. Water Users & Associations.

Dam safety. Registration of boreholes.

*Department of Water Affairs and Forestry*

**Occupational Health and Safety Act No. 85 of 1993**

Controls the exposure of employees and the public to dangerous and toxic substances or activities.

*Department of Labour*

**Road Transportation Act No. 74 of 1977**

*Department of Transport*

**World Heritage Resource Act No 49 of 1999**

Conservation of national heritage and archaeological material.

South African Heritage Resources Agency.

*National Council for Heritage*



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## SECTION 2: EMP - IMPLEMENTATION

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### 2.1 PREAMBLE

The point of departure for this EMP is to ensure a pro-active rather than re-active approach to environmental performance by addressing potential problems before they occur. This will limit corrective measures needed during the construction phase of the project. Therefore the purpose of an EMP is to provide management measures that must be implemented by Developers, Engineers and Contractors alike to ensure that the potential impacts of a proposed development are minimised. It must also be ensured that the EMP is maintained and upheld as a dynamic document in order for the project team to add or improve on issues that might be considered left out or not relevant to the project. In such instances the approving authority may authorise the ECO to make such changes.

The following tables (see page 19) form the core mitigation measures appropriate to the pre-construction and construction phase. The tables present the objectives to be achieved and the management actions that need to be implemented in order to mitigate the negative impacts and enhance the benefits of the project. Associated responsibilities, criteria/targets and timeframes are clearly specified.

The '**pre-construction**' section of this EMP, refers to the period of time leading up to and prior to commencement of construction activities, and is included to ensure pro-active environmental management measures with the goal of identifying avoidable environmental damage at the outset and sustain optimal environmental performance throughout the construction phase. Most impacts will occur during the construction phase and must be mitigated through the contingency plans identified in the pre-construction phase.

The bulk of environmental impacts will have immediate effect during the '**construction**' phase (e.g. noise, dust, and water pollution). If the site is monitored on a continual basis during the construction phase, it is possible to identify these impacts as they occur. These impacts will then be mitigated through the measures outlined in this section, together with a commitment to sound environmental management from the project team.

The '**construction**' section refers to all construction and its operation-related activities that will occur within the approved area and access roads, until the project is completed. This 'construction' section is divided into three functional areas, namely "materials"; "plant"; and "construction". Each of these functional areas within the EMP contains specific mitigation requirements and requested contractor method statements stipulated where required.

### 2.2 STRUCTURE AND CONTENTS OF TABLES

The table consists of six parts as follows:

- **Phase of development** - This row will identify either pre-construction (planning) or actual construction phase.
- **Impact / issue** - This row will identify the issue being addressed, e.g. Materials, site demarcation, heritage, etc.

- **Mitigation Measure** - This column will include all the necessary mitigation measures for each impact/issue'.
- **Management objectives** - This column will indicate what the management objectives to be achieved for each mitigation measure are.
- **Measurable targets** - This column will indicate what evidence is to be used as an indication to whether or not the 'Management objectives' have been implemented and hence achieved.
- **Frequency of action** - These columns provide time guidelines for the 'Responsible party' by which he/she is to action or manage the required mitigation.

<b>Phase of development</b>	<b>PRE-CONSTRUCTION</b>
<b>Impact / issue</b>	<b>GENERAL PLANNING (A)</b>

<b>MITIGATION MEASURE</b>	<b>MANAGEMENT OBJECTIVES</b>	<b>MEASURABLE TARGETS</b>	<b>FREQUENCY OF ACTION</b>
<p><b>A1 Project contract and programme</b></p> <p>i. The EMP must be included as part of the tender documentation thereby making it part of the enquiry document to make the recommendations and constraints, as set out in this document, enforceable under the general conditions of contract.</p> <p>ii. A copy of this EMP must be available on site. The Contractor must ensure that all the personnel on site, sub-contractors and their team, suppliers, etc. are familiar with and understand the specifications contained in the EMP.</p>	<ul style="list-style-type: none"> <li>Contingencies for minimising negative impacts anticipated to occur during the construction phase</li> <li>Ensure environmental awareness and formalise environmental responsibilities and implementation</li> </ul>	<ul style="list-style-type: none"> <li>Contract records</li> <li>Signed declaration pro forma's</li> </ul>	-
<p><b>A2 Appointments and duties of project team</b></p> <p>i. A document containing the contact details for the ECO, ER, EO, Contractor and ESO must be kept on site. This document must be made available to the approving authority on request.</p> <p>ii. Before construction activities commence, role players must have a clear indication of their role in the implementation of this EMP as indicated in 1.2.5 Table 1.</p> <p>iii. Subcontractor(s) contracts with the principle contractor must contain a clause to the effect that the disposal of all construction-generated refuse / waste to an officially approved dumping site is the responsibility of the subcontractor in question and that the subcontractors are bound to the management activities stipulated in this EMP.</p>	<ul style="list-style-type: none"> <li>Contingencies for minimising negative impacts anticipated to occur during the construction phase</li> </ul>	<ul style="list-style-type: none"> <li>Contract records</li> <li>Signed declaration pro forma's</li> </ul>	-

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION
<p><b>A3 Method statements</b></p> <p>i. As required in 1.2.11, certain method statements must be provided by the contractor. All activities which require method statements may only commence once the method statements have been approved by the engineer and/or ECO as applicable.</p> <p>ii. Where applicable, the contractor will provide job-specific training on an ad hoc basis when workers are engaged in activities, which require method statements.</p>	<ul style="list-style-type: none"> <li>Contingencies for minimising negative impacts anticipated to occur during the construction phase</li> </ul>	<ul style="list-style-type: none"> <li>Approved method statements and relevant pro forma documents</li> <li>Training records</li> </ul>	As and when required
<p><b>A4 Site demarcation and development</b></p> <p>i. The surveys for the overall project area and construction footprint as approved in the WMLs must be complete and clearly demarcated and fenced before the contractors set up their crew camps or begin construction.</p> <p>ii. "No-go" areas such land not to be developed, topsoil stockpiles, and sensitive areas, etc. must be clearly demarcated (e.g. warning tape) and/or fenced prior to the commencement of construction activities.</p> <p>iii. All relevant 'general' and 'specific' conditions contained in the WML must be included in the space provided below and included as part of this EMP when the "declaration of understanding" is signed by the Developer, Engineer and Contractor. The proponent is to sign the space provided.</p> <p>iv. All relevant licences or permits in terms of other legislation (such as the National Water Act, 1998 (Act No. 36 of 1998)) must be in place prior to the commencement of construction activities.</p>	<ul style="list-style-type: none"> <li>Contingencies for minimising negative impacts anticipated to occur during the construction phase</li> </ul>	<ul style="list-style-type: none"> <li>Demarcated area's</li> <li>Filled in section of this document</li> </ul>	As and when required
<p><b>A5 Emergencies, non-compliance and communication</b></p> <p>i. The contractor must provide method statements on the protocols to be followed, and contingencies to be put in place for the following potential incidents before construction may begin: Contamination of natural water resources from spills; contamination of soils from spills; and fire.</p> <p>ii. The contractor understands that failure to adhere to the requirements of the EMP will result in fines as stipulated in 1.2.7 'Tolerances', over and above the costs incurred for any remediation required as result of the specific non-compliance.</p>	Contingencies for minimising negative impacts anticipated to occur during the construction phase	Method statements	As and when required

<b>Phase of development</b>	<b>GENERAL PLANNING</b>	<b>WML reference number</b>	
<b>Impact / issue</b>	<b>WML Conditions (B)</b>	<b>Proponents signature</b>	

<b>MITIGATION MEASURE</b>	<b>MANAGEMENT OBJECTIVES</b>	<b>MEASURABLE TARGETS</b>	<b>FREQUENCY OF ACTION</b>	<b>NOTES</b>
This section will be completed on receipt of a positive Waste Management License (WML) from the DEA.	•	•		
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<b>Phase of development</b>	<b>CONSTRUCTION</b>
<b>Impact / issue</b>	<b>Materials (C)</b>

<b>MITIGATION MEASURE</b>	<b>MANAGEMENT OBJECTIVES</b>	<b>MEASURABLE TARGETS</b>	<b>FREQUENCY OF ACTION</b>	<b>NOTES</b>
<p><b>C2 Oil and chemicals</b></p> <p>i. The contractor must provide method statements for the “handling &amp; storage of oils and chemicals”, “fire”, and “emergency spills procedures”.</p> <p>ii. These substances must be confined to specific and secured areas within the contractor’s camp, and in a way that does not pose a danger of pollution even during times of high rainfall. These areas must be imperviously bunded with adequate containment (at least 1.5 times the volume of the fuel) for potential spills or leaks</p> <p>iii. Drip trays (minimum of 10cm deep) must be placed under all vehicles and/or machinery (eg generators) that stand for more than 24 hours. Vehicles and/or machinery suspected of leaking must not be left unattended, drip trays must be utilised.</p> <p>iv. The surface area of the drip trays will be dependent on the vehicle and/or machine and must be large enough to catch any hydrocarbons that may leak from the vehicle and/or machine while standing.</p> <p>v. The depth of the drip tray must be determined considering the total amount / volume of oil in the vehicle and/or machine. The drip tray must be able to contain the volume of oil in the vehicle and/or machine.</p> <p>vi. Spill kits must be available on site and in all vehicles that transport hydrocarbons for dispensing to other vehicles on the construction site. Spill kits must be made up of material/product that is in line with environmental best practice (SUNSORB is a recommended product that is environmentally friendly).</p> <p>vii. All spilled hazardous substances must be contained in impermeable containers for removal to a licensed hazardous waste site, (this includes contaminated soils, and drenched spill kit material).</p>	<ul style="list-style-type: none"> <li>• Prevention of pollution of the environment</li> <li>• Minimise chances of transgression of the acts controlling pollution</li> </ul>	<ul style="list-style-type: none"> <li>• No pollution of the environment</li> <li>• No litigation due to transgression of pollution control acts</li> <li>• No complaints from I &amp; AP’s</li> <li>• Method statements</li> </ul>	Ongoing	

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p><b>C3 Cement</b></p> <p>i. The contractors must provide and maintain a method statement for “cement and concrete batching”. The method statement must provide information on proposed storage, washing &amp; disposal of cement, packaging, tools and plant.</p> <p>ii. The mixing of concrete must only be done at specifically selected sites on mortar boards or similar structures to contain run-off into soils, drainage lines and natural vegetation.</p> <p>iii. Cleaning of cement mixing and handling equipment must be done using proper cleaning trays.</p> <p>iv. All empty containers must be stored in a dedicated area and later removed from the site for appropriate disposal at a licensed facility.</p> <p>v. Any spillage that may occur must be investigated and immediate remedial action must be taken.</p> <p>vi. The visible remains of concrete, either solid, or from washings, must be physically removed immediately and disposed of as waste to a registered landfill site.</p> <p>vii. Cement batching areas must be located in consultation with the ECO to ensure residues are contained and that the proposed location does not fall within sensitive areas such as drainage lines, sensitive natural vegetation, etc.</p>	<ul style="list-style-type: none"> <li>• Minimise the possibility of cement residue entering into the surrounding environment</li> <li>• Minimise pollution of soil, surface and ground water resources</li> </ul>	<ul style="list-style-type: none"> <li>• No evidence of contaminated soil on the construction site</li> <li>• No evidence of contaminated water resources</li> <li>• Method statement</li> </ul>	Monitored daily	

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p><b>C4 DANGEROUS AND TOXIC MATERIALS</b> <b>(Provision of storage facilities)</b></p> <ul style="list-style-type: none"> <li>i. Materials such as fuel, oil, paint, herbicide and insecticides must be sealed and stored in bermed areas or under lock and key, as appropriate, in well-ventilated areas.</li> <li>ii. Sufficient care must be taken when handling these materials to prevent pollution. Training on the handling of dangerous and toxic materials must be conducted for all staff prior to the commencement of construction.</li> <li>iii. In the case of pollution of any surface or groundwater, the Regional Representative of the Department of Water Affairs a (DWA) must be informed immediately.</li> <li>iv. Storage areas must display the required safety signs depicting “no smoking”, No Naked lights” and “Danger” containers must be clearly marked to indicate contents as well as safety requirements.</li> <li>v. The contractor must supply a method statement for the storage of hazardous materials at tender stage.</li> <li>vi. Material Safety Data Sheets (MSDS) must be prepared for all hazardous substances on site and supplied by the supplier where relevant. MSDS’s must be updated as required.</li> </ul>	<ul style="list-style-type: none"> <li>• Prevention of pollution of soil, surface and ground water resources in the immediate and surrounding environments</li> <li>• Minimise chances of transgression of the acts controlling pollution</li> </ul>	<ul style="list-style-type: none"> <li>• No visible signs of pollution</li> <li>• No litigation due to transgression of pollution control acts</li> </ul>	Monitor daily	
<p><b>C6 Use of dangerous and toxic materials</b></p> <ul style="list-style-type: none"> <li>i. The contractor must keep the necessary materials and equipment on site to deal with spills/ fire of the materials present should they occur.</li> <li>ii. The contractor must set up a procedure for dealing with spills/ fire, which will include notifying the ECO and the relevant authorities prior to commencing with construction. These procedures must be developed with consultation and approval by the appointed EO.</li> <li>iii. A record must be kept of all spills and the corrective action taken.</li> </ul>	<ul style="list-style-type: none"> <li>• Prevention of pollution of soil, surface and ground water resources in the immediate and surrounding environments</li> <li>• Minimise chances of transgression of the acts controlling pollution</li> </ul>	<ul style="list-style-type: none"> <li>• No pollution of the environment</li> <li>• No litigation due to transgression of pollution control acts</li> </ul>	As required	



<b>Phase of development</b>	<b>CONSTRUCTION</b>
<b>Impact / issue</b>	<b>PLANT (D)</b>

<b>MITIGATION MEASURE</b>	<b>MANAGEMENT OBJECTIVES</b>	<b>MEASURABLE TARGETS</b>	<b>FREQUENCY OF ACTION</b>	<b>NOTES</b>
<p><b>D1 Eating areas and camp followers</b></p> <p>i. The contractors must provide and maintain a method statement for "Crew camps and construction lay down areas".</p> <p>ii. The Contractor must, in conjunction with the EO, designate restricted eating areas for eating during normal working hours. Adequate closed refuse bins must be provided and cleaned on a daily basis.</p> <p>iii. No fires are to be lit outside of a facility designed to contain fires. The adequacy and positioning of these structures must be determined in consultation with the EO and ECO.</p> <p>iv. The feeding, or leaving of food, for stray or other animals in the area is strictly prohibited.</p> <p>v. Litter (even if originating outside the camp) and concrete bags etc. must be picked up daily and put into suitably closed bins.</p>	<ul style="list-style-type: none"> <li>• Control potential influx of vermin and flies</li> <li>• Neat work place and hygienic environment</li> <li>• Minimise negative social impacts to local residents and businesses</li> </ul>	<ul style="list-style-type: none"> <li>• No visual sign of vermin and flies</li> <li>• No complaints from I &amp; AP's</li> </ul>	Once off, monitor daily	

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p><b>D3 Waste management</b></p> <p>i. The contractors must provide and maintain a method statement for “solid waste management”. The method statement must provide information on proposed licensed facility to be utilised and details of proposed record keeping for auditing purposes.</p> <p>ii. Waste must be separated as follows:                      · Hazardous waste: including (but not limited to) old oil, paint, etc,                      · General waste: including (but not limited to) construction rubble,                      · Organic waste.</p> <p>iii. Any illegal dumping of waste must not be tolerated, this action will result in a fine and if required further legal action will be taken. This aspect must be closely monitored and reported on; proof of legal dumping must be able to be produced on request.</p> <p>iv. Bins must be clearly marked for ease of management. All refuse bins must have a lid secured so that animals cannot gain access. Weekly litter collection must be conducted for the whole site.</p> <p>v. Sufficient closed containers must be strategically located around the construction site to handle the amount of litter, wastes, rubbish, debris, and builder’s wastes generated on the site.</p> <p>vi. Subcontractor(s) must contain a clause to the effect that the disposal of all construction-generated refuse / waste to an officially approved dumping site is the responsibility of the subcontractor in question and that the subcontractors are bound to the management activities stipulated in this EMP. Proof of this undertaking must be issued to the ECO.</p> <p>vii. All solid and chemical wastes that are generated must be removed and disposed of at a licensed waste disposal site. The contractor is to provide proof of such to the EO and ECO.</p> <p>viii. Chemical containers and packaging brought onto the site must be removed for disposal at a suitable site.</p> <p>ix. Skip facilities must be provided at convenient and regular locations (as determined by the ESO or ECO) to contain refuse from campsite bins, rubble and other construction material. Skips should be positioned at least 100 m away from drainage</p>	<ul style="list-style-type: none"> <li>• Sustainable management of waste by recycling</li> <li>• To keep the site neat and tidy</li> <li>• Minimise litigation and complaints by I&amp;AP’s</li> <li>• Reduce visual impact</li> <li>• Control potential influx of vermin and flies thereby minimising the potential of diseases on site and the surrounding environment</li> <li>• Minimise potential to pollute soils, water resources and natural habitats</li> </ul>	<ul style="list-style-type: none"> <li>• Disposal of rubble and refuse in an appropriate manner with no rubble and refuse lying on site</li> <li>• Site is neat and tidy</li> <li>• No complaints from surrounding residents and businesses</li> <li>• Sufficient containers available on site</li> <li>• No visible or measurable signs of pollution of the environment (soils, ground and surface water)</li> <li>• Method statement</li> </ul>	<p>Daily</p>	

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p>channels and sensitive areas.</p> <p>x. Absolutely no burning of waste is permitted.</p>				

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p><b>D4 Dust</b></p> <p>i. The contractors must provide and maintain a method statement for “dust control”. The method statement must provide information on the proposed source of water to be utilised and the details of the licenses acquired for such usage.</p> <p>ii. Potable water must not be used as a means of dust suppression, and alternative measures must be sourced. The use of ‘grey’ water must be investigated as an alternative. The contractor will be responsible to source this water and obtain the required approvals to utilise this water for the purpose of dust suppression.</p> <p>iii. The construction camp must be watered and/or sprayed with a dust suppressant chemical (environmentally friendly) during dry and windy conditions to control dust fallout.</p> <p>iv. Dust production must be controlled by regular watering and/or spraying of a dust suppressant chemical (environmentally friendly) of roads and works area, should the need arise. NB: Concrete dust is toxic and damages soil properties. Therefore watering to prevent dust spread must not be done where concrete dust has fallen or it will infiltrate into the soil. Concrete bags must not be allowed to blow around the site and spread cement dust.</p> <p>v. In addition to the standard dust suppression measures and where these measures are not sufficient, main access roads and site camps must be surfaced with a temporary surface such as gravel to assist with dust suppression.</p> <p>vi. At the end of construction, the site camp must be fully rehabilitated by removing the temporary surface, ripping the area to loosen the soil and the area must be re-vegetated with locally indigenous vegetation only, according to the landscape development plan for the project.</p> <p>vii. All vehicles transporting material that can be blown off (e.g. soil, rubble etc.) must be covered with a tarpaulin, and speed limits of 20 km/h must be adhered to.</p> <p>viii. Excessive dust conditions must be reported to the ECO.</p> <p>ix. All forms of dust pollution must be managed in terms of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004).</p>	<ul style="list-style-type: none"> <li>• Reduce dust fall out</li> <li>• Reduce visual impact</li> <li>• Minimise loss of valuable soil material</li> </ul>	<ul style="list-style-type: none"> <li>• No visible signs of dust</li> <li>• No complaints from interested and Affected parties</li> <li>• No incidences reported to ECO</li> <li>• No visible evidence of dust contamination on the surrounding environment</li> <li>• Method statement</li> <li>• Baseline targets not exceeded during regular monitoring of dust counts</li> </ul>	Monitored daily	

<b>Phase of development</b>	<b>CONSTRUCTION</b>
<b>Impact / issue</b>	<b>Construction (E)</b>

<b>MITIGATION MEASURE</b>	<b>MANAGEMENT OBJECTIVES</b>	<b>MEASURABLE TARGETS</b>	<b>FREQUENCY OF ACTION</b>	<b>NOTES</b>
<p><b>E1 Crew camps</b></p> <p>i. The contractors must provide and maintain a method statement for “Crew camps and construction lay down areas”.</p> <p>ii. The contractor’s camp must be monitored for dust fallout and dust suppression applied as required. This may include the laying of gravel. The use of grey water can be considered as an option if the required permits have been acquired.</p> <p>iii. The contractor must provide labourers plastic bags to clean up the contractor’s camp and construction site on a daily basis. These areas must then be inspected by the contractor or his/her ESO to ensure compliance with this requirement.</p> <p>iv. The contractor is responsible for cleaning the contractor’s camp and construction site of all structures, equipment, residual litter and building materials at the end of the construction period and, the topsoil restored in areas where landscaping is to take place.</p>	<ul style="list-style-type: none"> <li>• Minimise water pollution</li> <li>• Minimise dust fallout</li> <li>• Minimise unwarranted environmental damage outside the footprint</li> <li>• Maintain a clean and healthy working environment</li> <li>• Minimise impact to surrounding environment</li> </ul>	<ul style="list-style-type: none"> <li>• No signs of water or soil pollution</li> <li>• No complaints from surrounding landowners or I&amp;AP’s</li> <li>• No visible signs of litter</li> <li>• Method statements</li> </ul>	Monitor daily	
<p><b>E2 Fires</b></p> <p>i. The contractors must provide and maintain a method statement for “fires”, clearly indicating where and for what fires will be utilised plus details on the fuel to be utilised</p> <p>ii. Absolutely no burning of waste is permitted.</p> <p>iii. Fires will only be allowed in facilities especially constructed for this purpose within fenced Contractor’s camps. Wood, charcoal or anthracite are the only fuels permitted to be used for fires. The contractor must provide sufficient wood (fuel) for this purpose.</p> <p>iv. Fires within the designated areas must be small in scale so as to prevent excessive smoke being released into the air.</p> <p>v. No wood is to be collected, chopped or felled for fires from private or public property as well as from no-go or sensitive areas within the site and any surrounding natural vegetation.</p>	<ul style="list-style-type: none"> <li>• Minimise risk of veldt fires</li> <li>• Minimise destruction of natural fauna and flora</li> <li>• Maintain safety on site</li> </ul>	<ul style="list-style-type: none"> <li>• No veldt fires started by the contractor’s workforce</li> <li>• No claims from landowners for damages due to veldt fires</li> <li>• Method statement</li> </ul>	Monitor daily	

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p><b>E3 Erosion and sedimentation</b></p> <p>i. All slopes that are disturbed during construction must immediately be stabilised to prevent erosion. Where re-vegetation of slopes is undertaken, this must be done in accordance with the surrounding landscape.</p> <p>ii. To reduce the loss of material by erosion, the contractor must ensure that disturbance on site is kept to a minimum. The contractor is responsible for rehabilitating all eroded areas in such a way that the erosion potential is minimised after construction has been completed.</p> <p>iii. These areas must be cordoned off so that vehicles or construction personnel cannot gain access to these areas.</p>	<ul style="list-style-type: none"> <li>• Minimise erosion damage</li> <li>• Minimise impeding the natural flow of water</li> <li>• Minimise scarring of the soil surface and land features</li> <li>• Minimise disturbance and loss of topsoil</li> <li>• Re-growth of disturbed areas.</li> </ul>	<ul style="list-style-type: none"> <li>• No erosion scars</li> <li>• No loss of topsoil</li> <li>• No interference with the natural flow of water</li> <li>• No visible erosion scars once construction is completed</li> <li>• The footprint has not exceeded the agreed boundaries</li> <li>• All damaged areas successfully rehabilitated</li> </ul>	As and when required	
<p><b>E4 Fauna</b></p> <p>i. All activities on site must comply with the regulations of the Animal Protection Act, 1962 (Act No. 71 of 1962)</p> <p>ii. All construction workers must be informed that the intentional killing of any animal is not permitted as faunal species are a benefit to society. Poaching is illegal and it must be a condition of employment that any employee caught poaching will be dismissed. Employees must be trained on how to deal with fauna species as intentional killing will not be tolerated. In the case of a problem animal e.g. a large snake; a specialist must be called in to safely relocate the animal if the EO or ECO is not able to.</p> <p>iii. Environmental induction training and awareness must include aspects dealing in safety with wild animals into on site. Focus on animals such as snakes and other reptiles that often generate fear by telling workers how to move safely away and to whom to report the sighting. Workers should also be informed where snakes most often hide so that they can be vigilant when lifting stones etc.</p>	<ul style="list-style-type: none"> <li>• Minimise disturbance to animals</li> <li>• Minimise interruption of breeding patterns of birds</li> <li>• Minimise destruction of habitat</li> </ul>	<ul style="list-style-type: none"> <li>• No complaints from Nature Conservation</li> <li>• No litigation concerning applicable animal protection acts</li> <li>• No measurable or visible signs of habitat destruction</li> </ul>	Monitor daily	

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p><b>E5 Flora</b></p> <p>i. Trees and natural vegetation or any other natural features inside and outside the work area, which will not be cleared for construction purposes, must be clearly demarcated and not be defaced, removed, painted for benchmarks or otherwise damaged, even for survey purposes.</p> <p>ii. Any corridors to surrounding natural areas must be maintained and protected; these must be demarcated as no-go areas.</p> <p>iii. Locally indigenous plants must be used in the landscaping of the site. Plants that are proclaimed as problem plants or noxious weeds must be excluded from the landscaping plan and these must be removed immediately, should they occur on site.</p> <p>iv. The contractor must rehabilitate the construction camp and any other disturbed areas once construction activities have terminated. Compacted areas will be ripped and mulched in order to ensure recovery of the natural vegetation cover. A method statement must be provided and maintained by the contractor.</p> <p>v. Once construction is complete, rehabilitation of un-built areas must be undertaken in order to restore the aesthetic &amp; ecological value of the area. It is recommended the ECO be consulted with regard to the most appropriate rehabilitation vegetation and structures. Active re-vegetation must take place with locally indigenous vegetation under the supervision of the ECO.</p> <p>vi. No open fires shall be allowed on site under any circumstances, fires will only be permitted in adequate facility within the crew camp, Forest Act, 1984 (Act No. 122 of 1984).</p>	<ul style="list-style-type: none"> <li>• Minimal disturbance to vegetation where such vegetation does not interfere with construction in terms of approvals from the relevant authority</li> <li>• Prevent litigation concerning removal of vegetation</li> <li>• Encourage natural habitat fauna</li> <li>• Minimise scarring of the soil surface and land features</li> <li>• Minimise disturbance and loss of topsoil</li> <li>• Minimise risk of veldt fires</li> <li>• Minimise risk of fauna and flora destruction</li> </ul>	<ul style="list-style-type: none"> <li>• No litigation due to removal of vegetation without necessary permission</li> <li>• No exotic plants used for landscaping</li> <li>• No visible erosion scars once construction is completed</li> <li>• The footprint has not exceeded the agreed boundaries</li> <li>• All damaged areas successfully rehabilitated</li> <li>• No veldt fires started by contractors work force</li> <li>• No claims from landowners for damages due to veldt fires</li> <li>• Method statement</li> </ul>	As and when required	

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p><b>E6 Heritage</b></p> <p>i. In terms of the National Heritage Act, 1999 (Act No. 25 of 1999), construction personnel must be alert and must inform the local Council should they come across any findings of heritage resources within 24 hours.</p> <p>ii. Should any archaeological artefacts be exposed during construction activities, work on the area where the artefacts were found must cease immediately and the ECO must be notified within 24 hours.</p> <p>iii. Upon receipt of such notification, the ECO will arrange for the excavation to be examined by an Archaeologist.</p> <p>iv. Under no circumstances must archaeological artefacts be removed, destroyed or interfered.</p> <p>v. Any archaeological sites exposed during construction activities must not be disturbed prior to authorisation by the South African Heritage Resources Agency on the appropriate provincial heritage resource agency.</p>	<ul style="list-style-type: none"> <li>• Limit the destruction of the country's heritage resources</li> <li>• The preservation and appropriate management of new archaeological finds should these be discovered during construction.</li> </ul>	<ul style="list-style-type: none"> <li>• No destruction of or damage to known archaeological sites</li> </ul>	Monitor Daily	
<p><b>E7 No-go / sensitive areas</b></p> <p>i. The construction footprint must be kept to a minimum must be clearly demarcated (e.g. warning tape) prior to the commencement of construction activities thus reducing the infringement of the development on surrounding habitats.</p> <p>ii. No-go areas must be demarcated with fencing/warning tape and signs before any construction activities commence. The EO and ECO must be on site in order to make sure the correct areas are fully demarcated.</p>	<ul style="list-style-type: none"> <li>• Minimise the potential for the spread of the of the construction footprint</li> <li>• Reduce loss of fauna and flora habitat</li> <li>• Minimise the potential for loss of protected and or endangered fauna and flora species</li> </ul>	<ul style="list-style-type: none"> <li>• No sign of movement through "no go" areas.</li> <li>• Containment of footprint</li> </ul>	Monitor daily	



MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p><b>E9 Crime, safety and security</b></p> <p>i. The site and crew are to be managed in strict accordance with the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) and the National Building Regulations.</p> <p>ii. The contractor must ensure that all emergency procedures are in place prior to commencing work. Emergency procedures must include (but not be limited to) fire, spills, contamination of the ground, accidents to employees, use of hazardous substances and materials, etc.</p> <p>iii. The contractor must ensure that lists of all emergency telephone numbers / contact persons are kept up to date and that all numbers and names are posted at relevant locations throughout the construction site.</p> <p>iv. The nearest emergency service provider must be identified during all phases of the project as well as its capacity and the magnitude of accidents it will be able to handle. The contact details of this emergency centre, as well as the police and ambulance services must be available at prominent locations around the construction site and the construction crew camps.</p>	<ul style="list-style-type: none"> <li>• Reduce the risk of potential incidences</li> <li>• Minimise the potential impact on the environment</li> </ul>	<ul style="list-style-type: none"> <li>• No incidences reported</li> </ul>	Monitor daily	
<p><b>E10 Visual impact</b></p> <p>i. Rubble and litter must be removed every two weeks or more often as the need arises and be disposed of at a registered landfill.</p> <p>ii. The ECO will comment on the visual impact as part of the ECO's monitoring requirements.</p>	<ul style="list-style-type: none"> <li>• Minimise visual impact</li> </ul>	<ul style="list-style-type: none"> <li>• No complaints from I &amp; AP's</li> </ul>	Monitor daily	

<p><b>E12 Hydrology</b></p> <p>i. Increased run-off during construction must be managed using berms and other suitable structures as required to ensure flow velocities are reduced; this must be done in consultation with the Resident engineer as well as the ECO. Storm water, wherever possible, should be allowed to soak into the land in the area on which the water fell e.g. retention ponds</p> <p>ii. In the event of pollution caused as a result of construction activities, the contractor, according to section 20 of the National Water Act, 1998 (Act No. 36 of 1998) is be responsible for all costs incurred by organisations called to assist in pollution control and/or to clean up polluted areas.</p> <p>iii. Design of the storm water drainage system must ensure that the local and surrounding natural systems are not negatively impacted. Appropriate measures, e.g. erection of silt traps, or drainage retention areas to prevent silt and sand entering drainage lines must be taken. These measures must be reviewed and audited by the ECO.</p> <p>iv. No wastewater may run freely into any of the surrounding naturally vegetated areas. Runoff containing high sediment loads must not be released into natural drainage systems. If this becomes a problem it is recommended that an attenuation pond be constructed to allow solids to settle prior to runoff leaving the site.</p> <p>v. Approval must be obtained from DWA for any activities that require authorisation in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998), which includes extraction of water from a watercourse.</p>	<ul style="list-style-type: none"> <li>• Minimise pollution of soil, surface and ground water resources in the immediate and surrounding environments</li> <li>• Minimise impeding the natural flow of water</li> <li>• Minimise the impact on natural water flow dynamics</li> <li>• Minimise scarring of the soil surface and land features</li> <li>• Minimise damage to river and stream embankments</li> <li>• Minimise erosion of embankments and subsequent siltation of rivers and streams</li> <li>• Minimise damage to riverine habitats</li> </ul>	<ul style="list-style-type: none"> <li>• No visible signs of pollution</li> <li>• No signs of siltation of water courses</li> <li>• No visible erosion scarring once construction is completed</li> <li>• Minimum loss of topsoil</li> <li>• No access roads through river and stream banks</li> <li>• No visible erosion scars on embankments once construction is completed</li> <li>• No erosion or siltation downstream</li> <li>• No deviation from baseline data during regular sampling</li> </ul>	<p>As and when required, monitor daily</p>	
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**REFERENCES**

DEAT (1992) Integrated Environmental Management Guideline Series, Volumes 1-6, Department of Environmental Affairs and Tourism, Pretoria.

DEAT (2004a) Environmental Management Plans, Integrated Environmental Management, Information Series 12, Department of Environmental Affairs and Tourism (DEAT), Pretoria.

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Lochner, P. 2005. Guideline for Environmental Management Plans. CSIR Report No ENV-S-C 2005-053 H. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

National Environmental Management Act 107 of 1998 (NEMA).

**ANNEXURE 1**

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**DECLARATION OF UNDERSTANDING BY THE APPLICANT**

I, \_\_\_\_\_

Representing \_\_\_\_\_

Declare that I have read and understood the contents of the Environmental Management Plan for:

Contract \_\_\_\_\_

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: \_\_\_\_\_

Place: \_\_\_\_\_

Date: \_\_\_\_\_

Witness 1: \_\_\_\_\_

Witness2: \_\_\_\_\_

## **ANNEXURE 2**

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### **DECLARATION OF UNDERSTANDING BY THE ENGINEER**

I, \_\_\_\_\_

Representing \_\_\_\_\_

Declare that I have read and understood the contents of the Environmental Management Plan for:

Contract \_\_\_\_\_

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: \_\_\_\_\_

Place: \_\_\_\_\_

Date: \_\_\_\_\_

Witness 1: \_\_\_\_\_

Witness2: \_\_\_\_\_

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**ANNEXURE 3**

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**DECLARATION OF UNDERSTANDING BY THE CONTRACTOR**

I, \_\_\_\_\_

Representing \_\_\_\_\_

Declare that I have read and understood the contents of the Environmental Management Plan for:

Contract \_\_\_\_\_

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: \_\_\_\_\_

Place: \_\_\_\_\_

Date: \_\_\_\_\_

Witness 1: \_\_\_\_\_

Witness2: \_\_\_\_\_

**ANNEXURE 4****INCIDENT AND ENVIRONMENTAL LOG**

<b>ENVIRONMENTAL INCIDENT LOG</b>				
<b>Date</b>	<b>Env. Condition</b>	<b>Comments</b> <i>(Include any possible explanations for current condition and possible responsible parties. Include photographs, records etc. if available)</i>	<b>Corrective Action Taken</b> <i>(Give details and attach documentation as far as possible)</i>	<b>Signature</b>