

**DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME  
FOR THE PROPOSED  
DULLSTROOM WATER TREATMENT WORKS (WTW) UPGRADE**

**Prepared for:**

**Nkangala District Municipality**  
2A Walter Sisulu Street  
Middelburg



**Submitted to:**

**Mpumalanga Department of Economic Development, Environment and Tourism**  
18 Jones Street,  
Nelpruit  
1200

**Prepared by:**

**Strategic Environmental Focus (Pty) Ltd**  
CSIR Campus  
Building 4, 2nd Floor  
MBARing Naude Street  
Brummeria, Pretoria  
Tel. No.: +27 12 349 1307  
Fax No.: +27 12 349 1229  
Website: [www.sefsa.co.za](http://www.sefsa.co.za)  
E-mail: [sef@sefsa.co.za](mailto:sef@sefsa.co.za)



**March 2014**

**MDEDET REF NO: 17/2/3N-338  
SEF REF NO: 505504**

---

COPYRIGHT WARNING-

With very few exceptions the copyright of all text and presented information is the exclusive property of Strategic Environmental Focus (Pty) Ltd. It is a criminal offence to reproduce and/or use, without written consent, any information, technical procedure and/or technique contained in this document. Criminal and civil proceedings will be taken as a matter of strict routine against any person and/or institution infringing the copyright of Strategic Environmental Focus (Pty) Ltd.

---

## TABLE OF CONTENTS

---

TABLE OF CONTENTS .....	2
LIST OF ABBREVIATIONS.....	3
GLOSSARY OF TERMS.....	5
REFERENCES.....	7
SECTION 1: INTRODUCTION AND BACKGROUND .....	8
1.1 INTRODUCTION.....	8
1.2 SCOPE.....	8
1.2.1 Principles of this EMPr .....	9
1.2.2 Site specific information .....	9
1.2.3 Summary of impacts associated with the project.....	11
1.2.4 Interpretations .....	11
1.2.5 Project phase .....	11
1.2.6 Role players and responsibility matrix.....	11
1.2.7 Enforcement, monitoring and auditing .....	16
1.2.8 Non-Compliance.....	16
1.2.9 Measurement and payment .....	17
1.2.10 General guidelines .....	17
1.2.11 Awareness training.....	17
1.2.12 Contractor environmental Method Statements .....	18
1.2.13 Site documentation.....	18
1.2.14 Pro forma documentation.....	19
1.2.15 National and Provincial Acts and guidelines .....	19
SECTION 2: CONSTRUCTION PHASE EMPr- IMPLEMENTATION.....	20
2.1 PREAMBLE.....	20
2.2 STRUCTURE AND CONTENTS OF TABLES .....	21

## LIST OF ABBREVIATIONS

ADDF	Average Annual Daily Flow
ADDWF	Average Daily Dry Weather Flow (Ml/day)
ASP	Activated Sludge Process
BNR	Biological Nutrient Removal Reactor
COD	Chemical Oxygen Demand
CSIR	Council for Scientific and Industrial Research
COT	City of Tshwane
DAF	Dissolved Air Flotation
DEA	Department of Environmental Affairs, the then DEAT
DEAT	Department of Environmental Affairs and Tourism
DWA	Department of Water Affairs
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act, 1989 (Act No. 73 of 1989)
ECO	Environmental Control Officer
E.Coli	Escherichia coli, also known as E. coli is a bacterium that is commonly found in the gut of endotherms (warm blooded organisms like humans).
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMP	Environmental Management Programme
GIS	Geographical Information Systems
GN	Government Notice
GNR	Government Notice Regulation
GPS	Global Positioning System
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IWWMP	Integrated Waste Water Management Plan
IWULA	Integrated Water Use License Application
Kl	Kilolitres ( 1 kl of water = 1000 litres of water)
Ml	Megalitre ( 1 Ml water = 100 0000 litres of water)
Ml/ d	Megalitres per day
Ml / s	Mega litres per second
m/s	Metres per second
mamsl	Metres Above Mean Sea Level
ME	Mitigation Efficiency
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended
NWA	National Water Act, 1998 (Act No. 36 of 1998)
OHSA	Occupational Health and Safety Act
PoS	Plan of Study
PPE	Personal Protective Equipment
PST	Primary Settling Tanks
RAS	Return Activated Sludge
SAHRA	South African Heritage Resources Agency
SAR	Sodium Absorption Rate
S&EIR	Scoping and Environmental Impact Reporting
SEF	Strategic Environmental Focus (Pty) Ltd
SFM	Significance Following Mitigation
SS	Suspended Solids
TDS	Total Dissolved Solids
TS	Total Solids
TWQR	Target Water Quality Range
VS	Volatile Solids

WM	With Mitigation
WAS	Waste Activated Sludge
WOM	Without Mitigation
WUL	Water Use License
WTW	Water Treatment Works

## GLOSSARY OF TERMS

Applicant	Any person who applies for an authorisation to undertake an activity or to cause such activity to be undertaken as contemplated in section 22 (1) of the Environment Conservation Act, 1989.
Arable potential	Land with soil, slope and climate components where the production of cultivated crops is economical and practical.
Chemical Oxygen Demand (COD)	The standard method for indirect measurement of the amount of pollution (that cannot be oxidized biologically) in a sample of water. The higher the chemical oxygen demand, the higher the amount of pollution in the test sample ( <a href="http://www.businessdictionary.com">http://www.businessdictionary.com</a> )
Cholera	An infection in the small intestine caused by the bacterium <i>Vibrio cholerae</i>
Chlorophyll	Also called chlorophyll is a green pigment found in chloroplasts of all cyanobacteria, algae, and plants
Ecology	The study of the interrelationships between organisms and their environments.
Ecosystem	A ecosystems consists of an ecological community together with its abiotic environment, interacting as a system
Environment	All physical, chemical and biological factors and conditions that influence an object.
Environmental Impact Assessment:	Assessment of the effects of a development on the environment.
Environmental Management Programme	A working document on environmental and socio-economic mitigation measures, which must be implemented by several responsible parties during all the phases of the proposed project.
Eutrophication	The process by which water (streams, rivers, dams) gets a high concentration of nutrients, especially phosphates and nitrates from human related activities (i.e. fertiliser from farming, industrial activities, waste water treatment works etc.). These promote excessive growth of algae. As the algae die and decompose, high levels of organic matter and the decomposing organisms diminish the water of available oxygen, causing the death of other organisms, such as fish. Eutrophication is a natural, slow-aging process for water resources, but human activity greatly speeds up the process.
Interested and affected party	Any person or groups of persons who may express interest in a project or be affected by the project, positively or negatively.
Key stakeholder	Any person who acts as a spokesperson for his/her constituency and/or community/organization, has specialized knowledge about the project and/or area, is directly or indirectly affected by the project or who considers himself/herself a key stakeholder

Pathogens	An agent that causes disease, especially a living microorganism such as a bacterium or fungus
Phosphorous	Phosphorous is a multivalent non-metal of the nitrogen group. It is found in nature in several forms, and is an essential element for the life of organisms. Phosphorus can be found in the environment most commonly as phosphates. Phosphorus is one of the key elements necessary for growth of plants, humans and animals. They are therefore not toxic unless they are present in very high levels.
Phosphates	Phosphates are commonly found in detergents, baking powders, toothpastes, cured meats, evaporated milk, soft drinks, processed cheeses, pharmaceuticals, and water softeners and therefor enters the effluent stream flowing into a Waste Water Treatment Works (sewerage systems, grey water from basins, baths, washing machines etc.). Phosphate imbalance causes excess algae blooms in water systems.
Nitrates	Nitrates are a form of nitrogen, which is found in several different forms in the environment. Nitrates are essential plant nutrients, but in excess amounts they can cause significant water quality problems. Together with phosphorus, nitrates in excess amounts can accelerate eutrophication, causing dramatic increases in aquatic plant growth and changes in the types of plants and animals that live in the stream
Stakeholder	Any person or group of persons whose live(s) may be affected by a project.
Study area	Refers to the entire study area encompassing all alternatives
Waste	As per the National Environmental Management Waste Act, 2008 (Act No. 59 of 2008) (NEMWA), any substance, whether or not that substance can be reduced, re-used, recycled and recovered.
Hazardous Waste	Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics (NEMWA, 2008)
Target Water Quality Range	The TWQR for a particular water use is defined as the range of concentrations or levels at which the presence of the constituent would have no known adverse or anticipated effects on the fitness on the water assuming long-term continuous use ( <a href="http://www.waternet.co.za/policy/g_wq.html">http://www.waternet.co.za/policy/g_wq.html</a> )
Water Treatment Works	Treatment of raw water and removal of unwanted constituents without affecting or altering the water molecules themselves, so that treated water are safe for drinking purposed.

---

## REFERENCES

---

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

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

CITY OF CAPE TOWN: ENVIRONMENTAL MANAGEMENT PROGRAMME (2002) Specification EM – 02/07: ENVIRONMENTAL MANAGEMENT, Ver 5 (03/2002)

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.

Republic of South Africa. 1998. National Environmental Management Act 107 of 1998 (NEMA).

---

## SECTION 1: INTRODUCTION AND BACKGROUND

---

### 1.1 INTRODUCTION

Strategic Environmental Focus (Pty) Ltd (SEF), as independent environmental managers and impact assessors, has been appointed by the Nkangala District Municipality to compile and submit an Environmental Management Programme (EMPr) to the decision making authority; Mpumalanga Department of Economic Development Environment and Tourism (MDEDET) for the proposed Dullstroom Water Treatment Works upgrade.

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 [NEMA] (Act No. 107 of 1998). 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 EMPr.

The IEM guidelines encourage 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, which has repealed a number of the provisions of the Environment Conservation Act, 1989 [ECA] (Act No. 73 of 1989), and is focussed primarily on co-operative governance, public participation and sustainable development.

### 1.2 SCOPE

The general principles contained within this document apply to all **CONSTRUCTION** activities (during the duration of the upgrade and extensions phase).



### 1.2.1 Principles of this EMPr

This EMPr 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 EMPr to be successful and effective.
- Flexible and responsive. The implementation of the EMPr must respond to new and changing circumstances, i.e. rapid short-term responses to problems or incidents. The EMPr is a dynamic “living” document and thus regular planned review and revision of the EMPr must be carried out.
- Integration across operations. This EMPr 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 mind-set 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

#### *Proposed activity and local context*

The Nkangala District Municipality proposes to upgrade the Water Treatment Works (WTW) on portion 36 of the farm Grootsuikerboschkop. The proposed site falls under the jurisdiction of Emakhazeni local municipality, in the Nkangala Region of Mpumalanga and is located adjacent to the municipal Caravan Park on the outskirts of Dullstroom. Refer to **Error! Reference source not found.** for the Locality Map.

The Dullstroom Water Treatment Works abstracts water from the adjacent Dullstroom Municipal dam and distributes the purified water to the Town. The objective of this project is to upgrade the capacity of the existing Water Treatment Plant from 2MI/d (mega litre per day) to 5MI/d (therefor 1,825MI per annum). The work will be undertaken in Phases. The project aims is to ensure a sustained water supply to the ever-expanding community of Dullstroom.



Figure 1: Locality Map



The following detailed upgrades and extension are applicable to this EMPr.

### **1.2.3 Summary of impacts associated with the project**

#### ***Bio-physical Impacts***

- An increase in the volume of abstraction of a surface water resource that may lead to drought in the dry season;
- Surface water run-off (viz. increased soil erosion) associated with the establishment of hard surfaces and vegetation clearing for the construction of the access road;
- Potential impacts on ground and surface water quality due to hydrocarbon spillages during the construction and operational phase of the development;
- Destruction of flora within the proposed area, stemming from activities such as vegetation clearing and topsoil stripping for the proposed access road; and
- Faunal displacement due to increased level of activity and associated noise.

#### ***Socio-Economic Issues***

- Noise, dust and disturbance during the construction phase;
- Job creation during the construction and operational phases of the proposed project, and
- Ensuring basic service delivery by providing drinking water to residents of Dullstroom and Sakhelwe.

### **1.2.4 Interpretations**

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

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

### **1.2.5 Project phase**

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

### **1.2.6 Role players and responsibility matrix**

In order for the EMPr 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.

**[Pre-EA]** 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.

**[Post-EA]** These role players or the project team 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.

**Table 1: Standard Functions and Responsibilities of the Project Team (list to be refined upon receiving Environmental Authorisation)**

KEY	FUNCTION	RESPONSIBILITY
D	Developer (COT)	Proponent ultimately accountable for ensuring compliance to the EMPr and conditions contained in the Environmental Authorisation (EA). The ECO must be contracted by the COT (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 Environmental Authorisations (EA's), and the EMPr 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 of the project team.
CE	Consulting Engineer (SSI & PDNA Naidoo)	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 Project Manager on the proponent's behalf (See PM).
PM	Project Manger	The Project Manager has over-all responsibility for managing the project, contractors, and consultants and for ensuring that the environmental management requirements are met. The CE may also act as the PM. All decisions regarding environmental procedures must be approved by the PM. The PM has the authority to stop any construction activity in contravention of the EMP in accordance with an agreed warning procedure.
ER	Engineers Representative (SSI & PDNA Naidoo)	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.
EO/EM	Environmental Officer /Environmental manager	Appointed by the Consulting Engineers as their environmental representative on site. The EO is not independent but must rather act on behalf of the consulting engineers with the mandate to enforce compliance under the project contract, which must include the EMPr. The EO has the directive to issue non-conformance and hazard certificates. Further, in terms of accepted industry practice the EO could issue the equivalent of a "cease works" instruction only in exceptional circumstances where serious environmental harm has been or is about to be caused i.e. in cases of extreme urgency and then only when the ER is absent. The EO must form part of the project team and be involved in all aspects of project planning that can influence environmental conditions on the site. On certain types of projects, such as linear developments (fences, pipelines, etc), the EO must also be the liaison between the contractor and landowners.

		<p>The EO must attend relevant project meetings, conduct daily inspections to monitor compliance with the EMPr, 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 EMPr 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 Environmental Authorisations (EA's), and the EMPr 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 botanists, 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 EA, and the EMP for the project. The size and sensitivity of the development, based on the EIA, will determine the frequency at which the ECO will be required to conduct audits. (A minimum of a monthly site inspection must be undertaken).</p> <p>The ECO must be the liaison between the relevant authorities and the project team.</p> <p>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 EMPr and conditions of the EA's, contract and relevant environmental legislation. The Contractor must ensure that all sub-contractors have a copy of and are fully aware of the content and requirements of this EMP.</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>	<p>The ESO is employed by the Contractor as his/her environmental representative to monitor, review and verify compliance with the EMPr by the contractor. This is not an independent appointment; rather the ESO must be a respected member of the contractor's management team.</p> <p>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</p>

		involved at <b>all phases</b> of the construction (from site clearance to rehabilitation).
<b>A</b>	<b>Lead Authority (MDEDET)</b>	The authorities are the relevant environmental department that has issued the Environmental Authorisation. The authorities are responsible for ensuring that the monitoring of the EMPr 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 (DWA)</b>	Other authorities are those that may be involved in the approval process of an EMPr. Their involvement may include reviewing EMPr'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 EMPr. 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 <i>"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"</i> .

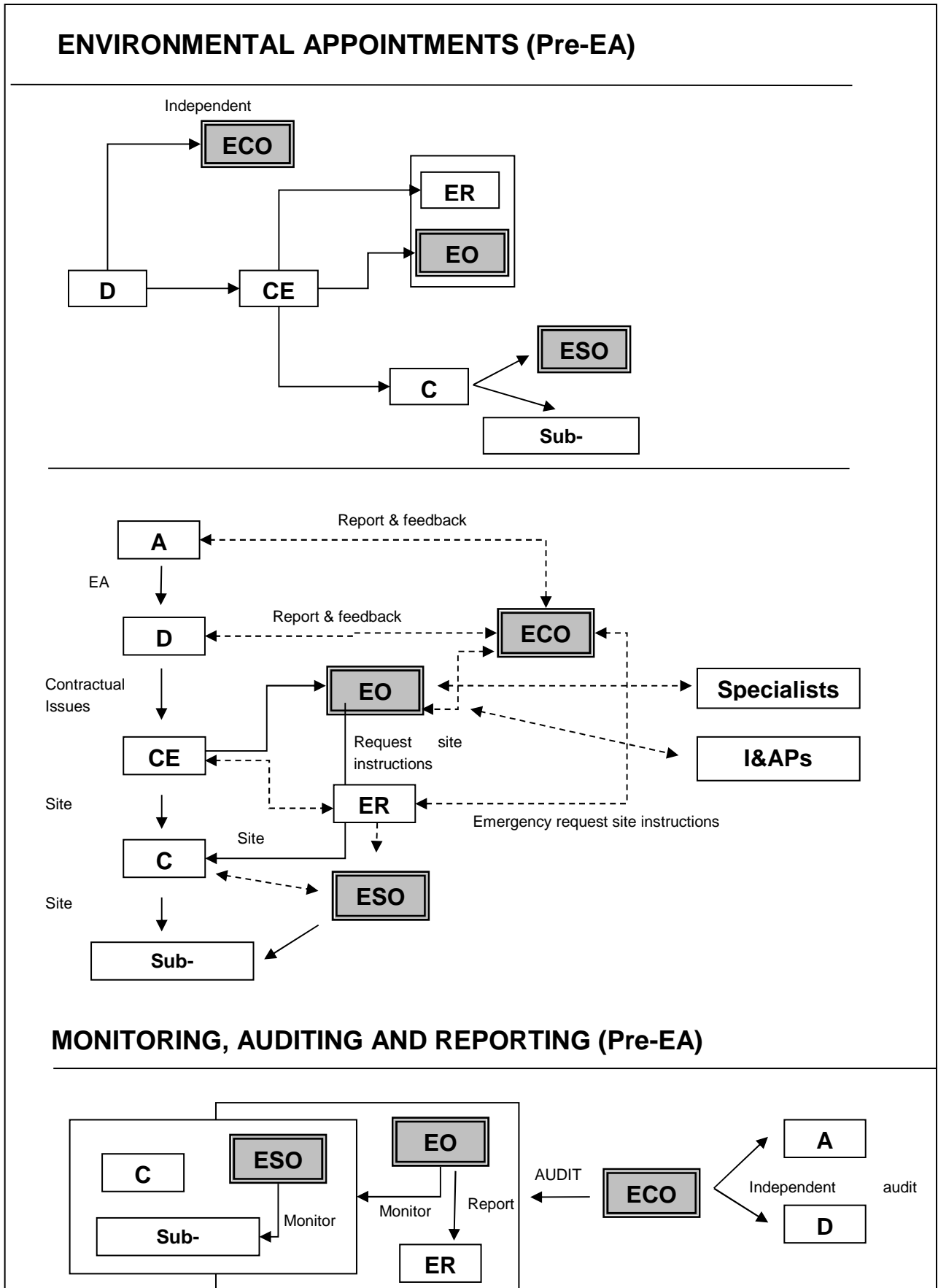


Figure 2: Recommended lines of communication, reporting and monitoring

### 1.2.7 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 Environmental Authorisation (EA), and the EMPr for the project. The ECO must conduct, at a **frequency of once a week** (or as determined by the MDEDET in the Environmental Authorisation) undertake independent environmental audits. The audits are to verify the projects compliance with the EMPr and conditions of the Environmental Authorisation (EA).

Before any construction activities commence, the ECO must compile, for the approval by the MDEDET, an audit checklist based on the contents of this EMPr and conditions of the Environmental Authorisation (EA). The ECO must at the request of the MDEDET period forward audit reports to the Department at a frequency determined by the Department which must be stipulated in the Environmental Authorisation (EA).

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

1. Complaints received from adjacent farm owners or 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.

### 1.2.8 Non-Compliance

#### *Fines*

An Environmental Performance Guarantee of 5% of monthly invoices from the principle contractor will be retained by the client. Re-imburement of guarantees will be paid to the principle contractor yearly (or on completion and handover) following review of compliance and issuing of a clearance certificate by the ECO.

**Each non-conformance (in terms of this EMPr) not addressed within 2 weeks of being reported in ECO audit reports, will constitute a fine.**

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

1. within the boundaries of the site, site extensions and access roads there is evidence of contravention of the EMPr confirmed and verified by the ECO;
2. environmental damage ensues due to non-compliance of EMPr requirements including the spillages of sewerage or untreated effluent which is left to run down into the Dullstroom Dam and Lower Dam.
3. the Contractor fails to comply with corrective or other instructions issued by the Engineer within a specific time, and
4. the Contractor fails to respond adequately to complaints from the public in line with requirements of this EMPr.



### 1.2.9 Measurement and payment

It is understood that environmental requirements included in this EMPr 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 EMPr.

### 1.2.10 General guidelines

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

1. 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, National Environmental Management Act [NEMA] (Act No. 107 of 1998) as amended
2. All workforce members and other construction personnel are not to go beyond the fenced footprint.
3. Relevant landowners and businesses must be informed of the starting date of construction as well as the phases in which the construction shall take place.
4. The Contractor must adhere to all conditions of contract including this EMPr.
5. Proper planning of the construction process must be undertaken to allow for disruptions due to rain and very wet conditions.
6. 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.
7. Proper site management and regular monitoring of site works.
8. Proper documentation and record keeping of all complaints and actions taken.
9. Regular site inspections and good control over the construction process throughout the construction period.
10. 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).
11. An ESO, on behalf of the Contractor, is to be appointed to implement this EMPr. The EO and not the Contractor or his/her ESO is to deal with any landowner related matters.
12. Environmental Audits to be carried out during and upon completion of construction at intervals stipulated by the MDEDET.

### 1.2.11 Awareness training

The EO or ESO, or ECO A are responsible for ensuring everyone on site is 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 EMPr as a management tool to protect the environment. As part of this training, the health and safety aspect of working with

sewerage/effluent and the associated health risks needs to be understood by the contractors. This has to comply fully with the provisions of the Occupational Health and Safety Act.

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.

### **1.2.12 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 EMPr. 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 EMPr.

The ***pro forma Method Statements*** attached must be used and method statements for the following activities must be submitted to the EO, ECO and Engineer for approval before construction commences. These include *inter alia*:

- Solid waste management;
- Crew camps and construction lay down areas;
- Workshop and maintenance/cleaning;
- 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; and
- Rehabilitation of crew camp and other disturbed areas.

### **1.2.13 Site documentation**

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

- Site daily diary /instruction book/ Incident reports;
- Records of all remediation / rehabilitation activities;
- Copies of EO reports (management and monitoring);
- Environmental Management Programme (EMPr);

- Complaints register; and
- Method statements.

### **1.2.14 Pro forma documentation**

#### ***Prior to the commencement of construction activities***

The following attached *pro forma* documentation is to be filled out and is binding to the EMPr and project contract and includes *inter alia*:

- Declaration of understanding by the CoT
- Declaration of understanding by the Engineer;
- Declaration of understanding by the Contractor;
- Method statements; and
- ECO / Engineer approval for method statements;

#### **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 *inter alia*:

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

### **1.2.15 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.

1. Animals Protection Act No. 71 of 1962
2. National Environmental Management Act No. 107 of 1998
3. Hazardous Substances Act No. 15 of 1973
4. Health Act No. 63 of 1977
5. National Building Regulations and Standards
6. National Heritage Resources Act No. 25 of 1999
7. National Water Act No. 36 of 1998
8. Water Services Act No. 108 of 1997
9. Occupational Health and Safety Act No. 85 of 1993

---

## SECTION 2: CONSTRUCTION PHASE EMPr-IMPLEMENTATION

---

### 2.1 PREAMBLE

The point of departure for this EMPr 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 EMPr is to provide management measures that must be implemented by the Nkangala District Municipality Engineers and Contractors alike to ensure that the potential impacts of the extension and upgrades works are minimised.

It must also be ensured that the EMPr 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 Dullstroom WTW is an 18 hour operational plant and the upgrading and extension works will have to be properly planned in order for the plant to remain functional during this time. A schedule should be prepared and agreed with by all parties to ensure that the process is streamlined. Contractors should be closely monitored and be made aware of the detrimental effects that errors can have on not only their personal health but on the environment. The following main mitigation measures are proposed:

- Construction activities during the extension phase should to be monitored to reduce the probability of irresponsible activities resulting in the spillages etc.
- Construct temporary berms to divert any possible spillages away from the Dullstroom Dam and Lower Dam during the construction phase.
- Stormwater shall not be allowed to flow through the construction area. Any possible sewage spillage will be collected as quickly as possible and returned to the system for treatment

The following tables (from page 29 onwards) 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 EMPr, 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. dust, accidental spills). 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 EMPr contains specific mitigation requirements and requested contractor method statements stipulated where required.

## 2.2 STRUCTURE AND CONTENTS OF TABLES

The table consists of seven 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>	<b>NOTES</b>
<p><b>A1 Project contract and programme</b></p> <p>i. The EMPr 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 EMPr 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 EMPr.</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. The contact details for the ECO, ER, EO, Contractor and ESO must be completed on the attached pro-forma and a copy 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 to their role in the implementation of this EMPr as indicated in 1.2.6 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 EMPr.</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	NOTES
<p><b>A3 Method statements</b></p> <p>i. As required in 1.2.14, 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 Environmental Authorisation (EA) must be complete and clearly demarcated</p> <p>ii. “No-go” areas such as sensitive areas identified during the BA process, topsoil stockpiles, the Dullstroom Dam and Lower Dam riparian areas. must be clearly demarcated (e.g. warning tape) prior to the commencement of construction activities.</p> <p>iii. <u>All relevant ‘general’ and ‘specific’ conditions contained in the Environmental Authorisation (EA) an Water Use License (WUL) must be included in the space provided below and included as part of this EMPr when the “declaration of understanding” is signed by the Developer, Engineer and Contractor. The proponent is to sign the space provided.</u></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	

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<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 surface water resources from spills; contamination of soils from spills; and fire.</p> <p>ii. Communication in emergencies must follow the suggested lines of communication as stipulated Section 1.2.6, Figure 1.</p> <p>iii. The contractor understands that failure to adhere to the requirements of the EMPr will result in fines as stipulated in Section 1.2.8 'Tolerances', over and above the costs incurred for any remediation required as result of the specific non-compliance.</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>Method statements</li> </ul>	As and when required	



<b>Phase of development</b>	<b>GENERAL PLANNING</b>	<b>EA reference numbers</b>		<b>WUL reference number</b>	
<b>Impact / issue</b>	<b>EA Conditions (B) WUL Conditions</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>
To be inserted upon issuing of the EA and amended WUL	•	•		
	•	•		

<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>
<b>Handling</b>				
<p><b>C1 Stockpiles</b></p> <p>i. All stockpiled material must be easily accessible without any environmental damage.</p> <p>ii. All temporarily stockpiled material must be stockpiled in such a way that the spread of materials are minimised.</p> <p>iii. The stockpiles may only be placed within the demarcated areas the location of which must be approved by the ER, EO or ECO.</p> <p>iv. The contractor must avoid vegetated areas that will not be cleared.</p> <p>v. Storm water run-off from the stockpile sites and other related areas must be directed into the storm water system with the necessary pollution prevention measures such as silt traps and may not run freely into the immediate and surrounding environments.</p> <p>vi. Stockpiles are to be stabilised if signs of erosion are visible.</p> <p>vii. Soils from different horizons must be stock piled such that topsoil stockpiles do not get contaminated by sub-soil material.</p> <p>viii. Topsoil stockpiles must be monitored for invasive exotic vegetation growth. Contractors must remediate as and when required in consultation with the EO, ER and ECO.</p> <p>ix. No plant, workforce or any construction related activities may be allowed onto the topsoil stockpiles.</p> <p>x. Topsoil stockpiles must be clearly demarcated as no-go areas.</p>	<ul style="list-style-type: none"> <li>• Minimise scaring of the soil surface and land features</li> <li>• Minimise disturbance and loss of soil</li> <li>• Minimise construction footprint</li> <li>• Minimise sedimentation of nearby drainage lines</li> <li>• Maintain the integrity of topsoil's for landscaping and rehabilitation</li> <li>• Containment of invasive plant growth</li> <li>• Minimise contamination of storm water run-off</li> </ul>	<ul style="list-style-type: none"> <li>• No visible erosion scars once construction is completed</li> <li>• The footprint has not exceeded the agreed site in terms of EA, etc.</li> <li>• Minimal invasive weed growth</li> <li>• No signs of sedimentation and erosion</li> </ul>	Daily	

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
xi. Stock piles must not be higher than 2m to avoid compaction thereby maintaining the soil integrity and chemical composition.				
<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 that stand for more than 24 hours. Vehicles 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 must be large enough to catch any hydrocarbons that may leak from the vehicle while standing.</p> <p>v. The depth of the drip tray must be determined considering the total amount / volume of oil in the vehicle. The drip tray must be able to contain the volume of oil in the vehicle.</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</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;APs</li> <li>• Method statements</li> </ul>	Daily	

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
containers for removal to a licensed hazardous waste site, (this includes contaminated soils, and drenched spill kit material).				
<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 rocky outcrops, streams 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 ER, EO or ECO to ensure residues are contained and that the proposed location does not fall within sensitive areas such as drainage lines, storm water channels and runoff towards the Dullstroom Dam or Lower Dam. The batching areas must be levelled areas and not the more sloped areas on site.</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></p> <p><b>(Provision of storage facilities)</b></p> <p>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.</p> <p>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.</p> <p>iii. In the case of pollution of any surface or groundwater, the Regional Representative of the Department of Water Affairs (DWA) must be informed immediately.</p> <p>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.</p> <p>v. The contractor must supply a method statement for the storage of hazardous materials at tender stage.</p> <p>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.</p> <p>vii. Construction should preferably take place during the dry season.</p> <p>viii. All construction and operational vehicles and equipment should be kept in good working condition.</p> <p>ix. All construction and operational vehicles should be parked in demarcated areas when not in use and drip trays should be placed under vehicles to collect any spillages/ leaks.</p>	<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	

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p>x. All hydrocarbons (oils, diesel etc.) must be banded to 110% capacity of its volume.</p>				
<p><b>C5 Bulk storage of fuels and oils</b></p> <p>i. The contractors must provide and maintain a method statement for “Diesel tanks and refuelling procedures”.</p> <p>ii. Bulk fuel storage tanks on the site must be on an impervious surface that is banded and able to contain at least 110% of the volume of the tanks. The filler tap must be inside the banded area where possible and the bund wall must not have a tap or valve.</p> <p>iii. A Flammable Liquid License must be obtained for diesel volumes greater than 200 litres.</p> <p>iv. Environmental Authorisation is required for volumes greater than 80 000 litres</p> <p>v. Bulk fuel storage tanks must be located in a portion of the site where they do not pose a high risk in terms of water pollution.</p> <p>vi. Bulk fuel storage tanks must be placed so that they are out of the way of traffic, so that the risk of the tanks being ruptured or damaged by vehicles is minimised.</p> <p>vii. Bulk fuel storage areas should be covered during the rainy season.</p>	<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> <li>• Method statement</li> </ul>	Once off, as required	
<p><b>C6 Use of dangerous and toxic materials</b></p> <p>i. The contractor must keep the necessary materials and equipment on site to deal with spills/ fire of the materials present should they occur.</p> <p>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</p>	<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	

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
developed with consultation and approval by the appointed EO. iii. A record must be kept of all spills and the corrective action taken.				

<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> <ul style="list-style-type: none"> <li>i. The contractors must provide and maintain a method statement for “Crew camps and construction lay down areas” if they will be permitted on site</li> <li>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.</li> <li>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.</li> <li>iv. The feeding, or leaving of food, for stray or other animals in the area is strictly prohibited.</li> <li>v. Camp followers/informal traders must not be allowed to congregate on pavements or outside the construction site. However, at the contractors discretion facilities can be made available within the designated eating area.</li> <li>vi. Litter (even if originating outside the camp) and concrete bags, etc. must be picked up daily and put into suitably closed bins.</li> </ul>	<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;APs</li> </ul>	Once off, monitor daily	



MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p><b>D2 Toilets and ablution facilities</b></p> <p>i. The contractor is responsible for providing all sanitary arrangements for his and the sub-contractors team. A minimum of one chemical toilet must be provided per 15 persons.</p> <p>ii. Sanitary arrangements must be to the satisfaction of the ECO and the local authority. Toilets must be of the chemical type. The contractor must keep the toilets in a clean, neat and hygienic condition. The contractor must supply toilet paper at all toilets at all times. Toilet paper dispensers must be provided in all toilets.</p> <p>iii. Toilets provided by the contractor must be easily accessible and a maximum of 50m from the works area to ensure they are utilised. All toilets will be located within the contractor's camp. Should toilets be needed elsewhere, their location must first be approved by the ER, EO or ECO.</p> <p>iv. The contractor (who must use reputable toilet-servicing company) must be responsible for the cleaning, maintenance and servicing of the toilets. The contractor (using reputable toilet-servicing company) must ensure that all toilets are cleaned and emptied before the builders' or other public holidays.</p> <p>v. Toilets out on site must be secured to the ground and have a sufficient locking mechanism operational at all times. They may not be allowed to be within a close vicinity to the Dullstroom Dam or Lower Dam.</p>	<ul style="list-style-type: none"> <li>• Ensure proper sanitation is achieved which will encourage the workforce to utilise toilets provided and not the surrounding habitat</li> <li>• Minimise potential of diseases on site</li> <li>• Minimise potential to pollute soils, water resources and natural habitats</li> </ul>	<ul style="list-style-type: none"> <li>• Workforce use toilets provided</li> <li>• No complaints received from I&amp;APs as well as members of the workforce</li> <li>• No visible or measurable signs pollution of the environment (soils, ground and surface water)</li> </ul>	As and when required	

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 into recyclable and non-recyclable waste, and must be separated as follows:</p> <ul style="list-style-type: none"> <li>• Hazardous waste: including (but not limited to) old oil, paint, etc,</li> <li>• General waste: including (but not limited to) construction rubble,</li> <li>• Reusable construction material. Recyclable waste must preferably be deposited in separate bins. The contractor is advised that “Collect-a-Can” collect tins, including paint tins, chemical tins, etc. and “Consol” collect glass for recycling.</li> </ul> <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.</p> <p>v. All refuse bins must have a lid secured so that animals cannot gain access.</p> <p>vi. 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>vii. 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>	<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;APs</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>	Daily	
MDEDET REF NO: 17/2/3N-338				Page No. 34

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 during dry and windy conditions to control dust fallout.</p> <p>iv. Dust production must be controlled by regular watering of roads and works area, should the need arise. <u>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.</u></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. 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>vii. Excessive dust conditions must be reported to the ECO.</p> <p>viii. Regular monitoring of dust fallout must be carried out and the records kept on site. Baseline dust measures must be sampled and approved by the ER and ECO prior to the commencement of construction activities.</p> <p>ix. All forms of dust pollution must be managed in terms of the National Environmental Air Quality Act, 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	

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p><b>D5 Workshop equipment, maintenance and storage</b></p> <p>i. The contractors must provide and maintain a method statement for “workshop maintenance and cleaning of plant”.</p> <p>ii. All maintenance and washing of vehicles and equipment must take place in the workshop area that is equipped with a bund wall and grease trap oil separator. During servicing of vehicles or equipment, a suitable drip tray must be used to prevent spills onto the soil, especially where emergency repairs are done outside the workshop area. Leaking equipment must be repaired immediately or be removed from site to facilitate repair. All potentially hazardous and non-degradable waste must be collected and removed to a registered waste site.</p> <p>iii. Workshop areas must be monitored for oil and fuel spills and such spills must be cleaned and remediated to the satisfaction of the EO or ER. Cleaning and remediation must be done with products that are in line with best environmental practice i.e. SUNSORB</p> <p>iv. A method statement is required from the Contractor, tendering for the project to show procedures for dealing with possible emergencies that can occur, such as fire and accidental leaks and spillage.</p> <p>v. The Contractor must be in possession of an emergency spill kit that is complete and available at all times on site. The Contractor must ensure that senior and other relevant members of the workforce are trained in dealing with spills by using emergency spill kits.</p> <p>i. The following must be applied:</p> <ul style="list-style-type: none"> <li>• All contaminated soil / yard stone shall be removed and disposed of as hazardous waste at a registered facility or placed in containers to be taken to one central point where bio-remediation can be done. (Bio-remediation should only be an option if an Environmental Authorisation has been issued)</li> </ul>	<ul style="list-style-type: none"> <li>• Prevent pollution of the environment</li> <li>• Minimise chance of transgression of the acts controlling pollution</li> <li>• Disposal of hazardous substances in an appropriate manner</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>• Method statement</li> </ul>	Monitor daily	

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p><b>D6 Noise</b></p> <ul style="list-style-type: none"> <li>i. Regular monitoring of noise levels must be conducted during construction and the records kept on site.</li> <li>ii. All construction vehicles must be in a good working order to reduce possible noise pollution.</li> <li>iii. Work hours during the construction phase must be strictly enforced unless permission is given. Permission must not be granted without consultation with the local residents and businesses by the EO.</li> </ul>	<ul style="list-style-type: none"> <li>• Maintain noise levels below “disturbing” as defined in the National Noise Regulations</li> <li>• Minimise the nuisance factor of the development</li> </ul>	<ul style="list-style-type: none"> <li>• No complaints from surrounding landowners or I&amp;APs</li> </ul>	<p>As and when required</p>	

<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. Accommodation for members of the workforce is not permitted on site</p> <p>iii. Dedicated wash areas must be situated away from the Dullstroom Dam and Lower Dam (lower reaches of the site).</p> <p>iv. 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>v. The contractor’s camp, offices and storage facilities must be located within the site boundaries. No person must be allowed to stay on neighbouring sites</p> <p>vi. 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>vii. 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;APs</li> <li>• No visible signs of litter</li> <li>• Method statements</li> </ul>	Monitor daily	

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p><b>E2 Fires</b></p> <p>i. Absolutely no burning of waste is permitted.</p> <p>ii. 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	
<p><b>E3 Erosion and sedimentation</b></p> <p>i. The disturbance of steep slopes, for example by the removal of vegetation, may result in slope instability and erosion by rain and surface run-off. All slopes that are disturbed during construction must <u>immediately be stabilised to prevent erosion</u>. Where re-vegetation of slopes is undertaken, this must be done in accordance with the EAP</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. All disturbed areas will require rehabilitation must be mulched to encourage vegetation re-growth. Mulch used must be free from alien seed.</p> <p>iv. These areas must be cordoned off so that vehicles or construction personnel cannot gain access to these areas.</p> <p>v. Utilise structures e.g. gabions to halt erosion advance, capture sediments and raise water level where necessary.</p> <p>vi. Stabilise eroding stream banks: Sloping and re-vegetation of banks to reduce erosion hazard.</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	

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p>vii. Increase surface roughness around access road by re-vegetating as soon as possible.</p> <p>viii. The ground should be compacted, stabilised and re-vegetated after construction is complete so as to prevent excessive erosion of loose soil.</p>				
<p><b>E4 Fauna</b></p> <p>i. An independent Environmental Control Officer (ECO) should be appointed to oversee all construction and mining activities;</p> <p>ii. Construction activities should commence during the winter months to minimise the impacts on breeding fauna;</p> <p>iii. Any faunal species located on the site, which cannot relocate themselves (e.g. burrowing mammals and reptiles), should be moved in an ecologically acceptable manner to a more suitable location. This should be undertaken by a faunal relocation expert;</p> <p>iv. No fires should be allowed on site, especially during the dry season; and</p> <p>v. Access roads must be formalised and use of existing roads and tracks where feasible must be made, rather than creating new routes through naturally vegetated areas.</p> <p>vi. All activities on site must comply with the regulations of the Animal Protection Act</p> <p>vii. 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</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>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>viii. Environmental induction training and awareness must include aspects dealing in safety with wild animals into and 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>				
<p><b>E5 Flora</b></p> <p>i. An independent Environmental Control Officer (ECO) should be appointed to oversee all construction and mining activities;</p> <p>ii. 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 not be removed, painted for benchmarks or otherwise damaged, even for survey purposes. Any feature defaced by the contractor must be reinstated to the satisfaction of the ECO and penalties/fines may be imposed by the ER.</p> <p>iii. Any corridors to surrounding natural areas must be maintained and protected; these must be demarcated as no-go areas.</p> <p>iv. Locally indigenous plants must be used in the re-vegetation of disturbed area, problem plants or noxious weeds must be removed immediately, should they occur on site.</p> <p>v. The contractor must rehabilitate/re-vegetate 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>vi. Once construction is complete, rehabilitation of un-built areas must be undertaken. Active re-vegetation must take place with locally</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>indigenous vegetation under the supervision of the ECO.</p> <p>vii. Limit vegetation clearance to only those areas affected by the construction activities. This will also prevent the activity footprint from expanding outside the site boundaries</p> <p>viii. An ecological management plan must be implemented for the construction phase</p> <p>ix. The maintenance manager must monitor the landscaped/vegetated areas to prevent alien plant invasion.</p> <p>x. All threatened and protected plants must be cordoned off as no-go areas during the construction period</p> <p>xi. Implement an alien invasive monitoring plan to prevent the colonisation and spread of alien invasive plant species into the disturbed soils</p> <p>xii. Plant rescue and relocation should be conducted by a suitably qualified botanist with proven relocation experience</p> <p>xiii. No open fires should be allowed in areas containing natural vegetation, especially during the dry season;</p> <p>xiv. Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas;</p> <p>xv. Stripped topsoil must be protected for re-use.</p> <p>xvi. Seeds from existing surrounding vegetation must be collected and used for re-vegetation of cleared areas.</p>				
<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 heritage agency should they come across any findings of heritage resources within 24 hours.</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</li> </ul>	<ul style="list-style-type: none"> <li>• No destruction of or damage to known archaeological sites</li> </ul>	Monitor Daily	

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<ul style="list-style-type: none"> <li>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.</li> <li>iii. Upon receipt of such notification, the ECO will arrange for the excavation to be examined by an Archaeologist.</li> <li>iv. Under no circumstances must archaeological artefacts be removed, destroyed or interfered.</li> <li>v. Any archaeological sites exposed during demolition or construction activities must not be disturbed prior to authorisation by the South African Heritage Resources Agency on the appropriate provincial heritage resource agency.</li> </ul>	<p>new archaeological finds should these be discovered during construction</p>			
<p><b>E7 No-go / sensitive areas</b></p> <ul style="list-style-type: none"> <li>i. All construction activities must remain within the boundaries of the property, as demarcated at the start of construction.</li> <li>ii. The construction footprint must be kept to a minimum must be clearly demarcated (e.g. warning tape)</li> <li>iii. No-go areas must be demarcated with fencing/warning tape and signs before any construction activities commence. These areas and the type of fencing/demarcation must be approved by the relevant specialist involved in the EIA process. The EO and ECO must be on site in order to make sure the correct areas are fully demarcated.</li> </ul>	<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>	<p>Monitor daily</p>	
<p><b>E8 Access routes</b></p> <ul style="list-style-type: none"> <li>i. Existing roads and access must be utilised</li> <li>ii. No unauthorised access is permitted. Any authorised clearing for access roads must be done under the supervision of the ECO.</li> <li>iii. Any damaged or degradation will be investigated and fines issued, the affected areas must be immediately rehabilitated.</li> </ul>	<ul style="list-style-type: none"> <li>• Minimise loss of topsoil and enhancement of erosion</li> <li>• Minimise fauna and flora displacement by destruction of natural habitats</li> </ul>	<ul style="list-style-type: none"> <li>• No erosion on access roads after completion of construction</li> <li>• No loss of topsoil due to run-off water on access roads</li> </ul>	<p>As required, monitor daily</p>	

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p>iv. Access roads for earthmoving-equipment must be clearly designated and be positioned as close as possible to the proposed development site. No driving off from the marked roads is permitted and designated parking areas must be identified and demarcated with applicable signage.</p> <p>v. Any work or access near the Dullstroom Dam or Lower Dam may have implications in terms of the National Water Act, 1998 (Act No. 36 of 1998), and therefore may well require application for a water use licence.</p> <p>vi. Neither the site nor its access roads must be allowed to be utilised for recreational activities, this includes but is not limited to quad bikes, 4x4's and dirt bikes. Security personnel must be informed and ensure that this is enforced.</p>				
<p><b>E9 Crime, safety and security</b></p> <p>i. No site staff, other than security personnel and skeleton staff will be housed on site unless otherwise stipulated in the Environmental authorisation. Security personnel and skeleton staff must be supplied with adequate protective clothing, ablution facilities, water and refuse collection facilities, facilities for cooking and heating so that open fires are not necessary.</p> <p>ii. A boundary fence must be erected; this will serve to prevent public access to the site, for public safety and security reasons. The access to the site must be controlled so as to restrict unauthorised personnel from entering the site. The workers on site must retain some means of identification. The ESO and the contractor are responsible for ensuring that only authorised personnel are on site at all times.</p> <p>iii. The site and crew are to be managed in strict accordance with the</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	

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p>Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) and the National Building Regulations.</p> <p>iv. The contractor must ensure that all <u>emergency procedures are in place prior to commencing work</u>. 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>v. 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>vi. 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>				
<p><b>E10 Visual impact</b></p> <p>i. The buildings that are to be erected must be aesthetically pleasing and blend into the area as far as possible.</p> <p>ii. 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>	<ul style="list-style-type: none"> <li>Minimise visual impact</li> </ul>	<ul style="list-style-type: none"> <li>No complaints from I&amp;APs</li> </ul>	As and when required	
<p><b>E11 Geotechnical</b></p> <p>i. Founding conditions for individual structures must be confirmed by a qualified Geotechnical Engineer / Structural Engineer / Geologist.</p> <p>ii. All trenches and excavation works must be properly backfilled and compacted according to specifications given in sub-clause 5.2.4. Of</p>	<ul style="list-style-type: none"> <li>Minimise potential structural faults</li> <li>Minimise trench collapse</li> </ul>	<ul style="list-style-type: none"> <li>No visible signs of backfill deterioration or trench collapse</li> </ul>	As and when required	

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
SABS 1200DA.  iii. Mechanical methods of rock breaking will have noise and dust impacts that must be managed. Method Statements for chemical breaking must be provided by the ER.				

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p><b>E12 Hydrology</b></p> <p>i. Regular sampling must be carried at identified points to determine deviations from the current baseline data.</p> <p>ii. 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>iii. 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) <u>is be responsible for all costs incurred by organisations called to assist in pollution control and/or to clean up polluted areas.</u></p> <p>iv. The contractor must ensure that excessive quantities of sand, silt and silt-laden water do not enter the storm water system. 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 the Dullstroom Dam and Lower Dam must be taken. These measures must be reviewed and audited by the ECO.</p> <p>v. No wastewater may run freely into the Dullstroom or Lower Dam of situated on the lower section of the site</p> <p>vi. <u>Should piping and couplings be tampered with during the construction phase; the contractor should ensure that a drip tray is placed in such a way that it captures any possible sewage spillage.</u></p> <p>vii. <u>The contractor should ensure that all connection to pipes and couplings that are being worked on are sealed off, to avoid any possible spillage of sewage during the construction phase.</u></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>	Monitor daily	

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<ul style="list-style-type: none"> <li>viii. Run-off containing high sediment loads must not be released into natural or municipal drainage systems or nearby watercourses. If this becomes a problem it is recommended that an attenuation pond be constructed to allow solids to settle prior to run-off leaving the site.</li> <li>ix. 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).</li> <li>x. A relevant specialist must be consulted prior to the demarcation of drainage lines and wetlands.</li> <li>xi. No vehicular access is allowed in permanently wet areas.</li> <li>xii. It must be ensured that all equipment to be used is not the cause irreparable damage to wet areas. The contractor must, where required, use alternative methods of construction in such areas.</li> <li>xiii. "NO ENTRY" signs must be strategically placed along the construction site.</li> <li>xiv. Raise awareness to save water amongst residents of Dullstroom and Sakhelwe;</li> <li>xv. Conduct regular monitoring of the water supply infrastructure to ensure that there are no leakages or wastage;</li> <li>xvi. Return treated waste water (from Dullstroom and Sakhelwe) to the Dullstroom Dam; and</li> <li>xvii. Ensure that the proposed maximum abstraction capacity of 5MI/d is not exceeded.</li> </ul>				



MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p><b>E13 Soil</b></p> <p>i. The contractors must provide and maintain a method statement for “management of topsoil”.</p> <p>ii. Topsoil must be stripped from all areas that are to be utilized during the construction period and where permanent structures and access is required. These areas will include the permanent works, pipeline trenches, stockpiles, access roads, construction camps and laydown areas.</p> <p>iii. Topsoil must be deemed to be the top layer of soil containing organic material, nutrients and plant seeds. For this reason it is an extremely valuable resource for the rehabilitation and vegetation of disturbed areas.</p> <p>iv. Ripping must be done to a depth of 250 mm in two directions at right angles. Topsoil must be placed in the same soil zone from which it has been stripped.</p> <p>v. At the beginning of the construction phase, topsoil removed for vegetation clearance must be stripped to a minimum depth of 150 mm and stockpiled on the demarcated topsoil stockpile areas.</p> <p>vi. All topsoil must be removed and stockpiled on the site.</p> <p>vii. However, the use of topsoil for rehabilitation contaminated by the seed of alien vegetation (e.g. blackjacks, etc.) must not be permitted unless a programme to germinate the seed and eradicate the seedlings is drawn up and approved, or some other mitigatory feature is found. This must be approved by the ECO.</p> <p>viii. Single handling is recommended. Stock piles must not be higher than 2m to avoid compaction.</p> <p>ix. Dust suppression is necessary for stockpiles older than a month –</p>	<ul style="list-style-type: none"> <li>• Minimise scaring of the soil surface and land features</li> <li>• Minimise disturbance and loss of soil</li> <li>• Minimise construction footprint</li> <li>• Minimise sedimentation of nearby drainage lines</li> <li>• Maintain the integrity of topsoil’s for future landscaping and rehabilitation</li> <li>• Containment of invasive plant growth</li> </ul>	<ul style="list-style-type: none"> <li>• No visible erosion scars once construction is completed</li> <li>• The footprint has not exceeded the agreed site in terms of EA, etc.</li> <li>• Minimal invasive weed growth</li> <li>• No signs of sedimentation and erosion</li> <li>• Method statement</li> </ul>	Daily	

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p>with either water or a biodegradable chemical binding agent.</p> <ul style="list-style-type: none"> <li>x. Backfilling must be undertaken in such a way that the final contours blend with the surrounding environment.</li> <li>xi. Remediated slopes must be graded to preferably 1:2</li> <li>xii. Slopes can then be capped with topsoil. This requires a minimum layer of 100 mm in most areas.</li> <li>xiii. Disturbed surfaces to be rehabilitated must be ripped and the area must be backfilled with excavated material from the site.</li> </ul>				

<b>Phase of development</b>	<b>CONSTRUCTION</b>	<b>EAP</b>	
<b>Impact / issue</b>	<b>Specialist requirements</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>
To be populated once the EA and amended WUL has been issued	•	•		
	•	•		

**ANNEXURE 1 (SAMPLE)**

---

**DECLARATION OF UNDERSTANDING BY THE COT (PROPONENT)**

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: \_\_\_\_\_

Witness 2: \_\_\_\_\_

**ANNEXURE 2 (SAMPLE)**

---

**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: \_\_\_\_\_

**ANNEXURE 3 (SAMPLE)**

---

**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 A (SAMPLE)-TO BE COMPLETED FOR EACH MANAGEMENT MEASURE**

---

**METHOD STATEMENT: Solid Waste Management**

**CONTRACT:**.....

**DATE:**.....

**WHAT WORK IS TO BE UNDERTAKEN?** [give a brief description of the works to be undertaken on site that will generate waste (hazardous and non-hazardous wastes)]: \* Note: please attach extra pages if more space is required.

\*Insert additional pages as required

**WHERE ARE THE WORKS TO BE UNDERTAKEN?** (where possible, provide an annotated plan and a full description of the extent of the works): \* Note: please attach extra pages if more space is required

\*Insert additional pages as required

**METHOD STATEMENT: Solid Waste Management (contd.)**

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

**Start Date:**.....

**End**

**Date:**.....

**HOW IS WASTE TO BE MANAGED ON SITE?** (provide as much detail as possible, including annotated sketches and plans where possible): \* Note: please attach extra pages if more space is required

\*Insert additional pages as required



**DECLARATIONS for Method Statement**

**Solid Waste Management**

**(contd.)** (SAMPLE)

**1) ENGINEER**

The work described in this Method Statement, if carried out according to the methodology described, is satisfactory to prevent or control environmental harm and is thus approved:

\_\_\_\_\_  
(Signed)

\_\_\_\_\_  
(Print name)

Dated: \_\_\_\_\_

**2) ECO**

The work described in this Method Statement, if carried out according to the methodology described, is satisfactory to prevent or control environmental harm and is thus approved:

\_\_\_\_\_  
(Signed)

\_\_\_\_\_  
(Print name)

Dated: \_\_\_\_\_

**2) CONTRACTOR**

I understand the contents of this Method Statement and the scope of the works required of me. I further understand that this Method Statement may be amended on application to and with approval by the Engineer, and that the SHE Coordinator, Construction Manager and ECO will audit my compliance with the contents of this Method Statement

\_\_\_\_\_  
\_\_\_\_\_  
(Signed)

(Print name)

Dated: \_\_\_\_\_

---

described in this Method Statement, if carried out according to the methodology described, is satisfactory to prevent or control environmental harm and is thus approved:

\_\_\_\_\_  
(Signed)

\_\_\_\_\_  
(Print name)

Dated: \_\_\_\_\_

**2) CONTRACTOR**

I understand the contents of this Method Statement and the scope of the works required of me. I further understand that this Method Statement may be amended on application to and with approval by the Engineer, and that the SHE Coordinator, Construction Manager and ECO will audit my compliance with the contents of this Method Statement

\_\_\_\_\_  
\_\_\_\_\_  
(Signed)

(Print name)

Dated: \_\_\_\_\_

**ANNEXURE 5 (SAMPLE)**

**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>