

Draft Environmental Management Programme for the Proposed Rehabilitation of the Rietspruit Dam near Ventersdorp, North West Province.

Client: National Department of Water and Sanitation

Date: November 2015

Document Title:

Draft Environmental Management Programme for the Proposed Rehabilitation of the Rietspruit Dam near Ventersdorp, North West Province.

Client:

National Department of Water and Sanitation

Compiled by:

Sibongile Gumbi

Reviewed and Approved by:

Mark Freeman

Copyright © Royal HaskoningDHV Ltd

All Rights Reserved

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, without the written permission from Royal HaskoningDHV.

Table of Contents

1	Introduction	1
1.1	Applicable Documents.....	1
2	Environmental Legislation	3
3	Environmental Management Programme	4
3.1	Purpose of the EMPr	4
3.2	Structure of the EMPr.....	4
3.3	Objectives of the EMPr.....	6
3.4	Environmental Monitoring.....	6
3.5	Checking and Corrective Action	7
3.6	Contractor Management.....	7
4	Environmental Management Procedures.....	9
4.1	Functions and Responsibilities	9
4.2	DWS Project Manager.....	10
4.3	The Contractor (including Sub-Contractors).....	10
4.4	Environmental Control Officer	11
4.5	Environmental Site Officer.....	11
4.6	Training and Environmental Awareness	12
4.7	Reporting Procedures	12
4.7.1	<i>Documentation</i>	12
4.7.2	<i>Public Complaints Register</i>	13
4.7.3	<i>Environmental Incidents Register</i>	13
4.7.4	<i>Non-Conformance Report</i>	14
4.7.5	<i>Environmental Emergency Response</i>	14
4.7.6	<i>Method Statements</i>	15
4.7.7	<i>Public Communication and Liaison with I&APs</i>	16
5	EMPR: Construction Phase.....	17
5.1	Site Clearing.....	17
5.2	Site Establishment.....	17
5.3	Construction Traffic and Access.....	18
5.4	Construction Camp.....	19
5.5	Soils	21
5.6	Ground and Surface Water Pollution.....	23

5.7	Wetlands	24
5.8	Stormwater	25
5.9	Air Quality	26
5.10	Flora and Fauna	27
5.11	Noise	29
5.12	Waste Management	30
5.13	Health and Safety	32
5.14	Security	35
5.15	Social Environment	35
5.16	Cultural and Heritage Artefacts	36
6	Decommissioning Phase of Construction Activities	37
7	EMPr: Operational Phase	39

List of Figures

FIGURE 1: LOCATION OF THE STUDY AREA	2
FIGURE 2: EXTENT OF THE CONSTRUCTION AREA	2
FIGURE 3: MAIN PHASES COVERED BY THE EMPr	5
FIGURE 4: DIAGRAM ILLUSTRATING THE CONTRACTOR MANAGEMENT PROCESS	8
FIGURE 5: PROJECT ORGANISATIONAL STRUCTURE	9

List of Tables

TABLE 1: ENVIRONMENTAL LEGISLATION	3
--	---

List of Tables

APPENDIX A : EXAMPLES OF THE ENVIRONMENT, HABITATS AND SPECIES FOUND ON SITE	
--	--

Glossary of Terms

TERM	DESCRIPTION
BUILDING AND DEMOLITION WASTE	Building and demolition waste means waste, excluding hazardous waste, produced during the construction, alteration, repair or demolition of any building or structure, and includes rubble, earth, rock and wood displaced during that construction, alteration, repair or demolition.
CONSTRUCTION PROJECT MANAGEMENT TEAM	The key team members for implementation of the Environmental Management Programme include a Project Manager, Site Engineer, Site Safety, Health and Environment Officer and an Environmental Control Officer.
CONSTRUCTION	Means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity, and includes any modification, alteration or expansion of such a facility, structure or infrastructure, but excludes the reconstruction of the same facility in the same location, with the same capacity and footprint.
CONTRACTOR OR SUB-CONTRACTOR	Companies and or individual persons appointed on behalf of the Client or Developer to undertake construction activities.
CORRECTIVE ACTION	A plan created by management to address, correct or eliminate a non-conformance that has occurred.
DEVELOPMENT	This means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the relevant Authority in any way result in a change to the nature, appearance or physical nature of a place or influence its stability and future well-being, including: <ul style="list-style-type: none"> • Construction, alteration, demolition, removal or change in use of a place or a structure at a place;

	<ul style="list-style-type: none"> • Carrying out any works on or over or under a place; • Subdivision or consolidation of land comprising a place, including the structures or airspace of a place; • Constructing or putting up for display signs or boards; • Any change to the natural or existing condition or topography of land; and • Any removal or destruction of trees, or removal of vegetation or topsoil.
DEGRADATION	The lowering of the quality of the environment through human activities e.g. river degradation, soil degradation, atmospheric degradation.
DEMOLITION	Demolition is the tearing-down of buildings and other structures, the opposite of construction. Demolition contrasts with deconstruction, which involves taking a building apart while carefully preserving valuable elements for re-use.
DOMESTIC WASTE	Domestic waste means waste, excluding hazardous waste, that emanates from premises that are used wholly or mainly for residential, commercial, institutional, educational, health-care, sport or recreation purposes generated directly by the consumption of products for domestic use.
ENVIRONMENT	Environment means the surroundings within which humans exist and that are made up of: <ul style="list-style-type: none"> • The land, water and atmosphere of the earth; • Micro-organisms, plants and animal life; • any part or combination of (i) of (ii) and the interrelationships among and between them; and • The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.
EMERGENCY	An undesired event that results in a probable significant environmental impact and requires the notification of the

	relevant statutory body such as a local, provincial or national authority.
ENVIRONMENTAL CONTROL OFFICER	An individual nominated through the Client or Developer to monitor and audit the implementation of the EMPr conditions on a regular basis or as prescribed by an Environmental Authorisation.
ENVIRONMENTAL IMPACT	A change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's activities, products or services.
ENVIRONMENTAL IMPACT ASSESSMENT REPORT	Document developed during the initial planning stages of a project. The document highlights specific environmental issues which may affect a project throughout its lifetime and includes the development of mitigation measures which must be implemented by the Contractor during the construction phase.
ENVIRONMENTAL SITE OFFICER	An individual appointed by the Contractor to be present on site, to act on behalf of the Contractor in matters concerning the implementation of and day to day monitoring of the EMPr.
ENVIRONMENTAL MANAGEMENT PROGRAMME	A detailed plan of action prepared to ensure that recommendations for enhancing or ensuring positive environmental impacts and limiting or preventing negative environmental impacts are implemented during the life-cycle of the project. This EMPr focuses on the construction phase, operational (maintenance) phase and decommissioning phase of the project.
GENERAL WASTE	Refers to waste that does not pose an immediate hazard or threat to health or to the environment, and includes: <ul style="list-style-type: none"> (a) Domestic waste; (b) Building and demolition waste; (c) Business waste; and (d) Inert waste.

GROUNDWATER	All subsurface water that fills voids between highly permeable ground strata comprised of sand, gravel, broken rocks, porous rocks, etc. and moves under the influence of gravitation.
HAZARDOUS WASTE	Refers to any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment and includes hazardous substances, materials or objects within business or industrial waste, residue deposits and residue stockpiles.
HERITAGE RESOURCES	This means any place or object of cultural significance, including all human-made phenomena and intangible products that are the result of the human mind. Natural, technological or industrial features may also be part of heritage resources, as places that have made an outstanding contribution to the cultures, traditions and lifestyles of the people or groups of people.
IMPACT	A description of the potential effect or consequence of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space.
INCIDENT	An undesired event which may result in a significant environmental impact but can be managed through internal response.
INTEGRATED ENVIRONMENTAL MANAGEMENT (IEM)	This is a philosophy that prescribes a code of practice for ensuring that environmental considerations are fully integrated into all stages of the development and decision-making process. The IEM philosophy (and principles) is interpreted as applying to the planning, assessment, implementation and management of any proposal (project, plan, programme or policy) or activity - at local, national and international level - that has a potentially significant effect on the environment. Implementation of this philosophy relies on the selection and application of appropriate tools for a particular proposal or activity. These may include

	environmental assessment tools (such as strategic environmental assessment and risk assessment), environmental management tools (such as monitoring, auditing and reporting) and decision-making tools (such as multi-criteria decision support systems or advisory councils).
INTERESTED AND AFFECTED PARTY	A person, group of persons or organisation interested in or affected by a development.
METHOD STATEMENT	A method statement is a written submission by the Contractor to the Engineer in response to the specification or a request by the Engineer, setting out the plant, materials, labour and method the Contractor proposes using to carry out an activity, identified by the relevant specification or the Engineer when requesting a method statement. It contains sufficient detail to enable the Engineer to assess whether the Contractor's proposal is in accordance with the project specifications and/or will produce results in accordance with the specifications.
MITIGATION	Measures designed to avoid, reduce or remedy adverse impacts.
POLLUTION	Any change in the environment caused by – substances; radioactive or other waves; or noise, odours, dust or heat emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future.
PROJECT MANAGER	A person appointed by the Client or Developer to oversee the overall project management and the management of the professional project team.
RECYCLE	A process where waste is reclaimed for further use, this involves the separation of waste from a waste stream for further use and the processing of that separated material as a product or raw material.

REHABILITATION	Rehabilitation is defined as the return of a disturbed area to a state which approximates the state (wherever possible) which it was in before disruption.
RE-USE	To utilise articles from the waste stream again for a similar or a different purpose without changing the form of properties of the articles.
SCREENING	Is the process that determines whether or not a development proposal requires environmental assessment and the level of assessment required. Screening is therefore a decision-making process that is initiated during the early stages of the development of a proposal
SUSTAINABLE DEVELOPMENT	According to the World Commission on Environment and Development (1987), this is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
TOOLBOX TALK	Short talks that focus on a specific topic e.g. waste management, working at heights etc. It explores the risks of specific health, safety and environmental issues and ways to deal with them. It helps inform inexperienced workers and provide reminders to experienced workers of correct control measures.
WASTE	<p>Waste means any substance, whether or not that substance can be reduced, re-used, recycled and recovered -</p> <ul style="list-style-type: none"> • That is surplus, unwanted, rejected, discarded, abandoned or disposed of; • Which the generator has no further use of for the purposes of production; • That must be treated or disposed of; or • That is identified as a waste by the relevant Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sector, but a by-product is not considered waste; and any portion of waste, once re-used, recycled and recovered, ceases to be waste.

WASTE DISPOSAL FACILITY	Waste disposal facility means any licensed site or premise used for the accumulation of waste with the purpose of disposing of that waste at that site or on that premises.
WATERCOURSE	Can be a) a river or spring; b) a natural channel or depression in which water flows regularly or intermittently; c) a wetland, lake or dam into which, or from which, water flows; and/or d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse.
WETLAND	Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil
WORKFORCE	The entire project team including people employed by the Client or Developer directly, his/her Principal Agent or the Contractor, persons involved in activities related to the project, or persons present at or visiting the construction area, including permanent Contractors and casual labour.

Acronyms

DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation (previously known as Department of Water Affairs (DWA))
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESO	Environmental Site Officer
I&AP	Interested and/or Affected Party
IEM	Integrated Environmental Management
MSDS	Material Safety Data Sheet
NCR	Non-Conformance Reports
NEMA	National Environmental Management Act (Act No. 107 of 1998)

NEM:BA	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
NEM:AQA	National Environmental Management: Air Quality Act (Act No. 39 of 2004)
NEM:WA	National Environmental Management: Waste Act (Act No. 59 of 2008)
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NWA	National Water Act (Act No. 36 of 1998)
OHSA	Occupational Health and Safety Act (Act No. 85 of 1993)
PM	Project Manager
PPE	Personal Protective Equipment
RHDHV	Royal HaskoningDHV
SAHRA	South African Heritage Resources Agency

1 Introduction

The National Department of Water and Sanitation is proposing to rehabilitate the Rietspruit Dam situated on the farm Flakfontein IP 213 and 214 and located approximately 10 kilometres from Ventersdorp, in the North West Province (refer to Figure 1). The main purpose of the rehabilitation is to make the dam safe in terms of the Dam Safety Regulations and Chapter 12 of the 1998 National Water Act. The construction activities will take place in an area that is approximately 5 hectares in size (refer to Figure 2) and will entail the following activities:

- Infilling and deposition of approximately 10 000 cubic meters of borrow material to stabilise the downstream face of the dam embankment.
- Approximately 100 m³ of silt is to be dredged from the reservoir in order to open the river outlet valve's inlet.
- Widening the cross-section footprint of the dam by 3.5 to 7m along the length of the dam wall. The total increase in the footprint of the dam wall embankment will be approximately 4000 m².
- The footprint of the earth dam embankment will be increased by approximately 6 meters in width, but the length will be unaltered.
- The infill material will be sourced commercially from the Witpoort and Sandstone quarry which is approximately 20km away from the Rietspruit Dam. The quarry operates with all required environmental permits in place.

The EMPr for the proposed project has been undertaken in accordance with the Environmental Impact Assessment Regulations published in Government Notices R 543 to R546 of December 2014 in terms of National Environmental Management Act (NEMA, No 107 of 1998).

1.1 Applicable Documents

The following documentation is applicable to the project, and should be read in conjunction with this EMPr:

- Basic Assessment Report; and
- The Environmental Authorisation, once issued by the Department of Environmental Affairs (DEA).



FIGURE 1: LOCATION OF THE STUDY AREA



FIGURE 2: EXTENT OF THE CONSTRUCTION AREA

2 Environmental Legislation

Table 1 outlines pieces of legislation that the proposed project will need to comply with.

TABLE 1: ENVIRONMENTAL LEGISLATION

Name of Act or Regulation	Area of Application	Responsible Authority
Constitution of the Republic of South Africa Act (No 108 of 1996)	The Constitution of South Africa.	National, Provincial and Local Government.
National Environmental Management, Act (No 107 of 1998)	Control/prevention of pollution; combating of noise; activities which may have a detrimental effect on the environment, preparation and contents of environmental impact reports.	National and Provincial Departments of Environmental Affairs.
National Environment Management: Waste Management Act (No 59 of 2008)	Regulation of waste management and disposal.	National Department of Environmental Affairs
National Environmental Management: Air Quality Act (No 39 of 2004)	Control and prevention of odour and dust.	National Department of Environmental Affairs and Local Authorities
National Environment Management: Biodiversity Act (10 of 2004)	Control and protection of biodiversity, species and ecosystems.	National and Provincial Department of Environmental Affairs.
National Water Act (36 of 1998)	To ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner for the benefit of all.	National and Provincial Departments of Water and Sanitation.
National Heritage Resources Act (No 25 of 1999)	Provides general principles for governing heritage resources management throughout South Africa including national and provincial heritage sites, burial grounds and graves; archaeological and palaeontological sites, and public monuments and memorials.	South African Heritage Resources Agency (SAHRA).
Conservation of Agricultural Resources Act (No 43 of 1983)	Control and prevention of veld fires, soil conservation, control, control of weeds and invader plants.	Department of Agriculture.
Occupational Health and Safety Act (No 85 of 1993)	Controls the exposure of employees and the public to dangerous and toxic substances or activities.	Department of Labour.
White Paper on the Conservation and	Sets out the government's policy towards	White Paper on the Conservation and

Name of Act or Regulation	Area of Application	Responsible Authority
Sustainable Use of South Africa's Biological Diversity	and strategy for achieving the objectives of the United Nation's Convention on Biological diversity (or biodiversity)	Sustainable Use of South Africa's Biological Diversity.
All relevant Provincial regulations, Municipal by-laws and ordinances.	The Constitution of South Africa.	National, Provincial and Local Government.

3 Environmental Management Programme

3.1 Purpose of the EMPr

An Environmental Management Programme (EMPr) is a stand-alone document used to prescribe management mechanisms/methods for the prevention of undue or reasonably avoidable adverse environmental impacts and for the enhancement of the positive environmental benefits of a development. An EMPr bestows a 'Duty of Care' on those who cause, have caused or may in future cause pollution or degradation of the environment. It should be noted that this EMPr is a dynamic document which should be updated as required on a continuous basis. This may be of particular importance once the preferred final alternative has been authorised and a Contractor has been appointed, as at this stage it may be possible to add more 'site specific' management measures. Any amendments made must be submitted to the Environmental Control Officer, the Project Manager and the Competent Authority (DEA) for approval prior to implementation.

3.2 Structure of the EMPr

The EMPr provides mitigation and management measures for two main development phases, namely construction and operation as depicted in Figure 3. The Basic Assessment Report, EMPr and the Environmental Authorisation will also inform the final design phase. Decommissioning of the dam is not foreseen at this stage.

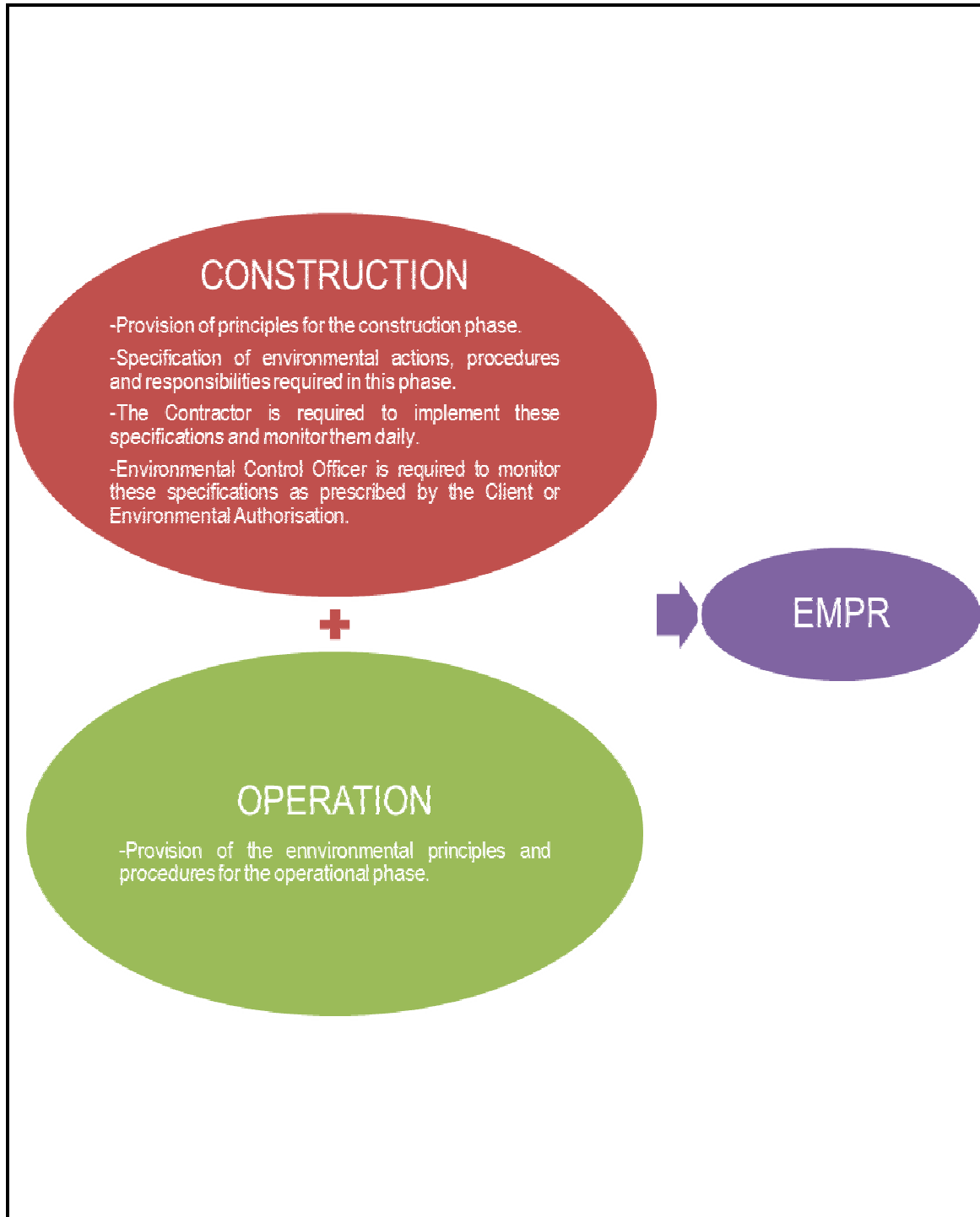


FIGURE 3: MAIN PHASES COVERED BY THE EMPR

3.3 Objectives of the EMPr

The EMPr has been compiled to provide recommendations and guidelines for environmental monitoring throughout the construction and operational phases of the proposed project. This is done to ensure that all relevant factors are considered, and to ensure for environmentally responsible development. This EMPr informs all relevant parties: the DWS, the Contractor, the Environmental Control Officer (ECO) and all other staff employed for the project as to their duties in the fulfilment of their environmental legal requirements for the construction and operational phases of the project, with particular reference to the prevention and mitigation of anticipated potential environmental impacts. The objectives require the following actions:

- Identifying construction activities that might have detrimental impacts on the environment;
- To outline mitigation measures and environmental specifications which are required to be implemented for all phases of the project in order to minimise the extent of environmental impacts, and to manage environmental impacts associated with the proposed project;
- Detailing specific actions deemed necessary to assist in mitigating the environmental impact of the project;
- To identify measures that could optimize beneficial impacts;
- To create management structures that addresses the concerns and complaints of Interested and Affected Parties with regards to the development;
- To establish a method of monitoring and auditing environmental management practices during all phases of the development;
- Ensuring that the construction and operational phases of the project proceeds within the principles of Integrated Environmental Management (IEM);
- Ensuring that safety recommendations are complied with;
- Providing an outline of the key environmental legal requirements;
- To assign roles and responsibilities to parties involved regarding the implementation of this EMPr;
- To identify measures that could optimize beneficial impacts;
- Detailing specific actions deemed necessary to assist in mitigating the environmental impact of the project; and
- Specifying time periods within which the measures contemplated in the EMPr must be implemented, where appropriate.

3.4 Environmental Monitoring

A monitoring programme should be in place, not only to ensure compliance with the EMPr through the construction phase, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are, or could result in, significant environmental impacts for which corrective action is required. A monitoring programme should be implemented for the duration of the construction phase of the project. This programme must include:

- Daily site visits and monitoring must be conducted by the Environmental Site Officer to ensure daily implementation of the EMPr conditions and provide corrective actions where required;

-
- Monthly site audits, if required by the Environmental Authorisation, that must be conducted by an external Environmental Control Officer (ECO) for the duration of the construction phase; and
 - If required, compilation of a monthly audit report by the ECO which must document findings and recommend corrective action to be taken. Subsequent audit reports will provide feedback on whether previous non-conformances raised have been resolved, thereby ensuring continual improvement of the site's environmental performance.

3.5 Checking and Corrective Action

Checking and corrective action form part of the environmental management function and are aimed at ensuring that the necessary environmental management activities are being implemented and that the desired outcomes are achieved.

3.6 Contractor Management

During the procurement process, an environmental briefing is required that alerts the Contractor to the environmental management expectations for the project (Figure 4). A copy of the EMPr must be provided to the Contractors who will be bidding for the construction work for the project. This is to ensure that the Contractors are made aware of the EMPr requirements and budget accordingly in their bids. The appointed Contractor is required to develop construction method statements indicating how s/he is going to implement and ensure compliance with the conditions of the EMPr. The method statement documents must be approved by the Engineer and DWS Project Manager before the Contractor mobilises. When the construction activities have been completed the Engineer and DWS Project Manager are required to conduct a site inspection in order to sign-off the site prior to the Contractor leaving the site. Such sign-off should include full compliance with the conditions of the EMPr.

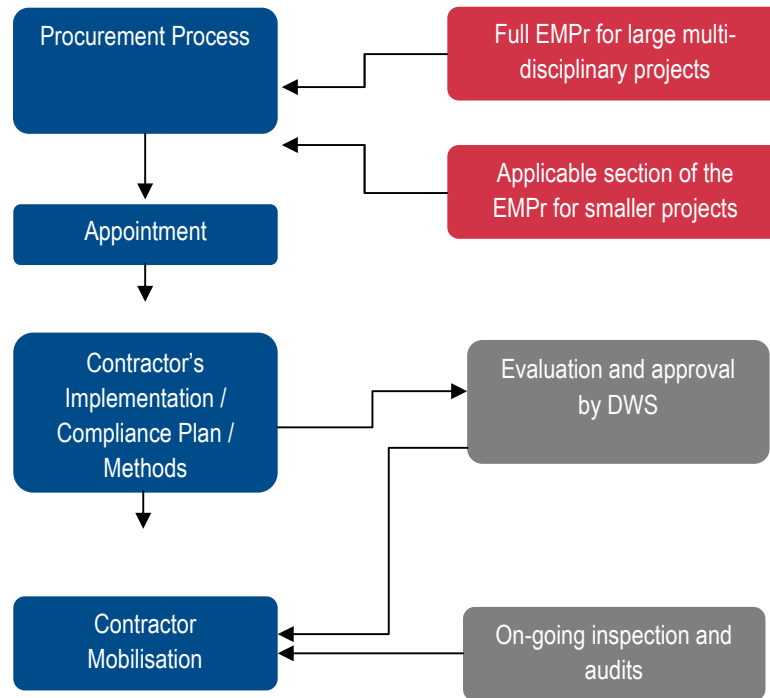


FIGURE 4: DIAGRAM ILLUSTRATING THE CONTRACTOR MANAGEMENT PROCESS

4 Environmental Management Procedures

4.1 Functions and Responsibilities

Figure 5 below provides an indication of the organisational and team structure for the project.

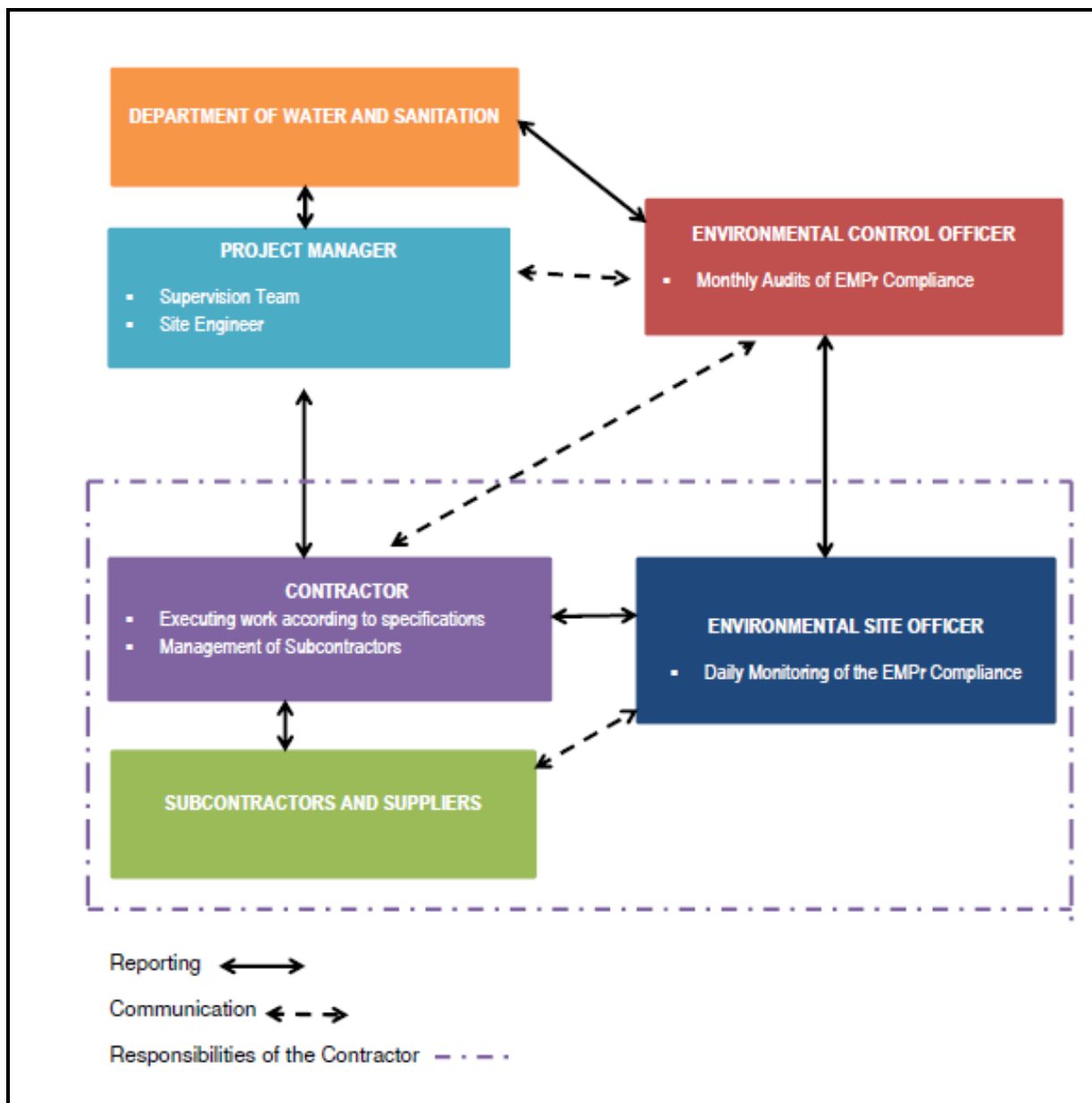


FIGURE 5: PROJECT ORGANISATIONAL STRUCTURE

4.2 DWS Project Manager

The DWS Project Manager is ultimately responsible for ensuring compliance with the environmental specifications and upholding the commitment to 100% compliance with all legislation and standards that relate to management of the environment. The following responsibilities are to be fulfilled by the Project Manager and his delegated project team members, including the Engineer and Contractor.

- Arrange information meetings, if required, for consultations with stakeholders and interested and affected parties about the impending construction activities;
- May, on the recommendation of the Environmental Control Officer, order the Contractor to suspend any or all works on site if the Contractor or his Sub-Contractor/Supplier repeatedly fails to comply with the said environmental specifications;
- Maintain a register of complaints and queries by members of the public at the site office;
- Enforce the environmental specification on site;
- Monitor compliance with the requirements of the specifications;
- Assess the Contractor's environmental performance in consultation with the Environmental Control Officer from which a brief monthly report of environmental performance is drawn up for record purposes and that can be reported on at project meetings; and
- Ensure the documentation, in conjunction with the Contractor, regarding the state of the site prior to construction activities commencing. This documentation will be in the form of a photographic record.

4.3 The Contractor (including Sub-Contractors)

The Contractor is required to:

- Provide information on previous environmental management experience in terms of the bidding process and any relevant forms contained in the Contract Documentation;
- Supply construction method statements timeously for all activities requiring special attention as specified and/or requested by the Engineer and Environmental Site Officer for the duration of the Contract;
- Be conversant with the requirements of this EMPr and brief all his/her staff about the requirements of the environmental specification;
- Comply with requirements of the Environmental Site Officer and the project specifications, as applicable, within the time period specified;
- Ensure any Sub-Contractors/Suppliers who are utilised within the context of the Contract comply with the environmental requirements of the project, in terms of the specifications. The Contractor will be held responsible for non-compliance on their behalf;
- Bear the costs of any damages/compensation resulting from non-adherence to the said specifications or written site instructions;
- Comply with all applicable legislation; and
- The Contractor will conduct all activities in a manner that minimizes disturbance to the natural environment as well as directly affected residents and the public in general.

4.4 Environmental Control Officer

The ECO will:

- Be fully conversant with the EMPr;
- Be familiar with the recommendations and mitigation measures of the associated EMPr for the project;
- Monitor the implementation of the EMPr during the construction and rehabilitation phases;
- Ensure site protection measures are implemented on site;
- Monitor that the Contractor, Sub-Contractors, construction teams and the DWS are in compliance with the EMPr at all times during the construction and rehabilitation phases of the project;
- Monitor all site activities monthly for compliance;
- Conduct monthly audits of the site according to the EMPr, and report findings to the Project Manager and Contractor;
- Recommend corrective action for any environmental non-compliance at the site;
- Compile a monthly report highlighting any non-compliance issues as well as progress and compliance with the EMPr conditions;
- Conduct once-off training with the Contractor on the EMPr and general environmental awareness.

It must be noted that the responsibility of the ECO is to monitor compliance and give advice on the implementation of the EMPr and not to enforce compliance. Ensuring compliance is the responsibility of the Contractor and the Environmental Site Officer.

4.5 Environmental Site Officer

The ES Officer will be responsible for undertaking of the following:

- Compilation of a comprehensive project Environmental Risk Assessment;
- Compilation of environmental specifications based on risks identified;
- Reviewing and approval of construction method statements submitted by appointed Contractor(s);
- Conducting daily inspections;
- Compiling daily reports and monthly environment audit reports;
- Assisting the Contractor in the investigation of any major accident/incidents;
- Monitoring of site activities for compliance to the EMPr conditions;
- Monitoring the Contractor(s') environmental performance;
- Be fully conversant with the EMPr and all relevant environmental legislation applicable to the project, and ensure compliance with these;
- Assisting the Contractor with environmental procedures and training that will specify how potential environmental impacts in line with the requirements of the EMPr will be managed, and where relevant environmental best practice, and how they will practically ensure that the objectives of the EMPr are achieved;

-
- Convey the contents of this EMPr to the construction site staff and discuss the contents in detail with the Contractor;
 - Take appropriate action if the specifications contained in the EMPr are not followed;
 - Ensuring that the list of any transgressions issued by the ECO is available on request; and
 - Maintaining an environmental register which keeps a record of all environmental incidents which occur on the site during construction.

4.6 Training and Environmental Awareness

It is important to ensure that the Contractor has the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm. Training needs should be identified based on the available and existing capacity of site personnel (including the Contractors and Sub-Contractors) to undertake the required EMPr management actions and monitoring activities. It is vital that all personnel are adequately trained to perform their designated tasks to an acceptable standard. The environmental training is aimed at:

- Promoting environmental awareness;
- Informing the Contractor of all environmental procedures, policies and programmes applicable;
- Providing generic training on the implementation of environmental management specifications; and
- Providing job-specific environmental training in order to understand the key environmental features of the construction site and the surrounding environment.

Training will be done in a verbal format and be facilitated by the Environmental Control Officer. The training will be a once-off event; however, the Contractor should make provision for weekly training or Toolbox Talks which can be correlated with construction activities undertaken in a particular week. In addition to training, general environmental awareness must be fostered among the project's workforce to encourage the implementation of environmentally sound practices throughout its duration. This ensures that environmental accidents are minimised and environmental compliance maximized.

4.7 Reporting Procedures

4.7.1 Documentation

The following documentation must be kept on site in order to record compliance with the EMPr:

An Environmental File which includes:

- Copy of the EMPr;
- Copy of Environmental Authorisation;
- Copy of all other relevant licences/permits;
- Copy of all rehabilitation plans;

-
- Copy of any Stormwater Management Plan;
 - Construction and Environmental Method Statements compiled by the Contractor;
 - Non-conformance Reports;
 - Environmental register, which shall include:
 - Communications Register – including records of complaints, and minutes and attendance registers of all environmental meetings;
 - Monitoring Results – including environmental monitoring reports, register of audits, non-conformance reports etc; and
 - Incidents book – including copies of notification of emergencies and incidents; this must be accompanied by a photographic record.
 - Safe disposal certificate for all types of waste disposed off site;
 - Environmental training records;
 - Waste disposal receipts;
 - Material Safety Data Sheets for all hazardous substances;
 - Dust suppression register;
 - Water Quality Monitoring reports (if necessary); and
 - Written corrective action instructions.

4.7.2 Public Complaints Register

- Contains environmental complaints and correspondence received from the public to the Contractor;
- Nature of complaint;
- Cause of complaint;
- Party/parties responsible for complaint;
- Immediate actions undertaken to stop/reduce/contain the causes of the complaint;
- Additional corrective or remedial action taken and/or to be taken to address and to prevent re-occurrence of the complaint;
- Timeframes and the parties responsible for the implementation of the corrective or remedial actions.

4.7.3 Environmental Incidents Register

- Nature of incident;
- Causes of incident;
- Party/parties responsible for causing incident;
- Immediate actions undertaken to stop/reduce/contain the causes of the incident;
- Additional corrective or remedial action taken and/or to be taken to address and to prevent reoccurrence of the incident;

-
- Timeframes and the parties responsible for the implementation of the corrective or remedial actions; Copies of all correspondence received regarding incidents; and
 - Detail the control measures which will be implemented to ensure sound environmental management.

4.7.4 Non-Conformance Report

A Non-Conformance Report (NCR) will be issued to the Contractor as a final step towards rectifying a failure to comply with a requirement of the EMP. This will be issued by the ECO to the Contractor in writing. Preceding the issuing of an NCR, the Contractor must be given an opportunity to rectify the non-conformance issues.

Should the ECO assess an incident or issue and find it to be significant (e.g. non-repairable damage to the environment), it will be reported to the relevant Authorities, if required, and immediately escalated to the level of a NCR. The following information should be recorded in the NCR:

- Details of non-conformance;
- Any plant or equipment involved;
- Any chemicals or hazardous substances involved;
- Work procedures not followed;
- Any other physical aspects;
- Nature of the risk;
- Actions agreed to by all parties following consultation to adequately address the non-conformance in terms of specific control measures and should take the hierarchy of controls into account;
- Agreed timeframe by which the actions documented in the NCR must be carried out; and
- ECO should verify that the agreed actions have taken place by the agreed completion date, when completed satisfactorily; the ECO and Contractor should sign the Close-Out portion of the Non-Conformance and file it with the Contract and Environmental File documentation.

4.7.5 Environmental Emergency Response

The Contractor's environmental emergency procedures must ensure appropriate responses to unexpected/accidental actions/incidents that could cause environmental impacts. Such incidents may include:

- Accidental discharges to water (i.e. into the watercourse/dam) and land;
- Accidental spillage of hazardous substances (typically oil, petrol, and diesel);
- Accidental toxic emissions into the air; and
- Specific environmental and ecosystem effects from accidental releases or incidents.

The Environmental Emergency Response Plan is separate to the Health and Safety Plan as it is aimed at responding specifically to environmental incidents and must ensure and include the following:

- Construction employees shall be adequately trained in terms of incidents and emergency situations;
- Details of the organisation (i.e. manpower) and responsibilities, accountability and liability of personnel;
- A list of key personnel and contact numbers;
- Details of emergency services (e.g. the fire department / on-site fire detail, spill clean-up services) shall be listed;
- Internal and external communication plans, including prescribed reporting procedures;
- Actions to be taken in the event of different types of emergencies;
- Incident recording, progress reporting and remediation measures to be implemented; and
- Information on hazardous materials, including the potential impact associated with each, and measures to be taken in the event of accidental release.

The Contractor and their Sub-Contractor(s) must comply with the environmental emergency preparedness and incident and accident-reporting requirements as per the relevant legal requirements.

4.7.6 Method Statements

It is a statutory requirement to ensure the well-being of employees and the environment. To allow the mitigation measures in this document to be implemented, task-specific construction method statements should be developed for each set of tasks. A method statement details how and when a process will be carried out, detailing possible dangers/risks, and the methods of control required. As a minimum the following information need to be included in the method statement:

- Type of construction activity;
- Timing and location of the activity;
- Construction procedures;
- Materials and equipment to be used;
- Transportation of the equipment to/from site;
- How equipment/material will be moved while on site;
- Location and extent of construction site office and storage areas;
- Identification of impacts that might result from the construction activity;
- Methodology and/or specifications for impact prevention/containment;
- Methodology for environmental monitoring;
- Emergency/disaster incident and reaction procedures (required to be demonstrated); and
- Rehabilitation procedures and continued maintenance of the impacted environment.

The Contractor will be accountable for all actions taken in non-compliance of the approved method statements and the following method statements may need to be generated:

- Bunding;
- Blasting (if required);
- Construction site and off-site yard establishment;
- Cement mixing/concrete batching/bentonite mixing;
- Contaminated water;
- Dust management ;
- Environmental awareness course(s);
- Environmental monitoring;
- Erosion control;
- Fire, hazardous and/or poisonous substances management including their storage;
- Personnel, public and animal safety;
- Rehabilitation of modified environment(s);
- Solid and liquid waste management;
- Sources of materials (including MSDSs);
- Top-soil and stockpile management;
- Stormwater management; and
- Wash areas.

4.7.7 Public Communication and Liaison with I&APs

The DWS must ensure that the adjacent landowners are informed and updated throughout the construction phases. Sufficient construction signage should be erected around the site (including at the entrance), informing the public of the construction activities taking place. The signboards should include the following information:

- The name of the Contractor; and
- The name and contact details of the site representative to be contacted in the event of emergencies or complaint registration.

5 EMPR: Construction Phase

5.1 Site Clearing

Site clearing must take place in a phased manner, as and when required. Areas which are not to be constructed on within two months of time must not be cleared to reduce erosion risks. The area to be cleared must be clearly demarcated and this footprint strictly maintained. Spoil that is removed from the site must be removed to an approved spoil site or licensed landfill site. The necessary silt fences and erosion control measures must be implemented in areas where these risks are more prevalent, viz steep areas.

5.2 Site Establishment

Site establishment shall take place in an orderly manner and all required amenities shall be installed at the camp site before the main workforce move onto site. The construction camp shall have the necessary ablution facilities at the commencement of construction activities. The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed other than in supplied facilities.

The Contractor shall supply waste collection bins and skips where such is not available and all solid waste collected shall be disposed of at a licensed landfill site. A certificate of disposal shall be obtained by the Contractor and kept on file. Under no circumstances may solid waste be burnt on site.

5.3 Construction Traffic and Access

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
<p>CONSTRUCTION TRAFFIC AND ACCESS</p> <p>Impact that construction traffic and access has on the site and surrounds</p>	<p>Construction traffic</p> <ol style="list-style-type: none"> 1. Construction routes must be clearly defined. 2. Access of all construction and material delivery vehicles should be strictly controlled, especially during wet weather to avoid compaction and damage to the topsoil structure. 3. Wheel washing and damping down of un-surfaced roads must be implemented to reduce dust. 4. Vehicles and equipment shall be serviced regularly to avoid the contamination of soil from oil and hydraulic fluid leaks etc. 5. Servicing must be done off-site. 6. Oil changes must take place on a concrete platform or on a drip tray. 7. Soils compacted by construction shall be deep ripped to loosen compacted layers and re-graded to even running levels. <p>Access</p> <ol style="list-style-type: none"> 1. Temporary access roads that might be required must be rehabilitated prior to the Contractor leaving the site. 2. Strategic positioning of entry and exit points to ensure as little impact/ effect as possible on the traffic flow and local communities. 3. The main routes to the site must be clearly signposted. <p>Road maintenance</p> <ol style="list-style-type: none"> 1. Contractors should ensure that access and haul roads are maintained in good condition by attending to potholes, corrugations and stormwater damage as soon as these develop. 2. If necessary, staff must be employed to clean surfaced roads adjacent to construction sites where materials have spilt. 	Contractor, ES Officer	Daily

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
	<p>General</p> <ol style="list-style-type: none"> 1. The Contractor shall meet safety requirements under all circumstances. All equipment transported shall be clearly labelled as to their potential hazards according to specifications. All the required safety labelling on the containers and trucks used shall be in place. 2. The Contractor shall meet these safety requirements under all circumstances. All equipment transported shall be clearly labelled as to their potential hazards according to specifications. All the required safety labelling on the containers and trucks used shall be in place. 3. The Contractor shall ensure that all the necessary precautions against damage to the environment and injury to persons are taken in the event of an accident. 		

5.4 Construction Camp

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
<p>CONSTRUCTION CAMP</p> <p>Impacts relating to the construction camp</p>	<p>Site of construction camp</p> <ol style="list-style-type: none"> 1. Choice of site for the Contractor's camp requires the ECO's permission and must take into account location of local residents and / or ecologically sensitive areas, including flood zones and slip / unstable zones. A site plan must be submitted to the ECO and Project Manager for approval. 2. The construction camp may not be situated within the 1:100 year flood line or on slopes greater than 1:3. 3. The Contractor must obtain a prior permission from both the Project Manager and the landowner for construction camp. 4. The size of the construction camp should be minimized (particularly where natural vegetation or grassland has had to be cleared for its construction). <p>Site of construction camp</p> <ol style="list-style-type: none"> 1. The Contractor must attend to drainage of the camp site to avoid standing water and / or sheet erosion. 2. Suitable control measures over the Contractor's yard, plant and material storage to mitigate any visual impact of the construction activity must be implemented. 3. No development, or activity of any sort associated with camp, is allowed below the 1:100 year flood line of 	Contractor, ES Officer	Daily

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
	<p>any water system.</p> <p>Storage of materials (including hazardous materials)</p> <ol style="list-style-type: none"> 1. Choice of location for storage areas must take into account prevailing winds, distances to water bodies, general on site topography and water erosion potential of the soil. 2. Storage areas must be designated, demarcated and fenced. 3. Storage areas should be secure so as to minimize the risk of crime. They should also be safe from access by unauthorised persons. 4. Fire prevention facilities must be present at all storage facilities. 5. Proper storage facilities for the storage of oils, paints, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the temporary storage area(s). These pollution prevention measures for storage should include a bund wall high enough to contain at least 110% of any stored volume, and this should be sited away from drainage lines in a site with the approval of the ECO. 6. These storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of storm water from surrounding areas in order to ensure that accidental spillage does not pollute local soil or water resources. 7. Clear signage must be placed at all storage areas containing hazardous substances / materials. 8. Staff dealing with these materials / substances must be aware of their potential impacts and follow the appropriate safety measures. 9. The Contractor must ensure that its staff is made aware of the health risks associated with any hazardous substances used and has been provided with the appropriate protective clothing/equipment in case of spillages or accidents and have received the necessary training. 10. All excess cement and concrete mixes are to be contained on the construction site prior to disposal off site. 11. Any spillage, which may occur, shall be investigated and immediate action must be taken. This must also be reported to the ECO and DEA, as well as local authorities if so required. <p>Drainage of construction camp</p> <ol style="list-style-type: none"> 1. Run-off from the camp site must not discharge into neighbours' properties or into adjacent watercourses. 		

5.5 Soils

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
<p>SOILS</p> <p>Impact that construction activities will have on soil</p>	<p>Topsoil</p> <ol style="list-style-type: none"> 1. The Contractor should, prior to the commencement of earthworks determine the average depth of topsoil, and agree on this with the ECO. The full depth of topsoil should be stripped from areas affected by construction and related activities prior to the commencement of major earthworks. This should include the building footprints, working areas and storage areas. Topsoil must be reused where possible to rehabilitate disturbed areas. 2. Care must be taken not to mix topsoil and subsoil during stripping. 3. Removed polluted topsoil should be transported to a licensed landfill site. 4. Remove and store topsoil separately in areas where excavation/degradation takes place. Topsoil should be used for rehabilitation purposes in order to facilitate re-growth of species that occur naturally in the area. <p>Soil stripping</p> <ol style="list-style-type: none"> 1. No soil stripping must take place on areas within the site that the Contractor does not require for construction works or areas of retained vegetation. 2. Subsoil and overburden should, in all construction and lay down areas, be stockpiled separately to be returned for backfilling in the correct soil horizon order. 3. Construction vehicles must only be allowed to utilise existing tracks or pre-planned access routes. <p>Erosion:</p> <ol style="list-style-type: none"> 1. No vehicles should be allowed to cross rivers or streams in any area other than an approved crossing, designated to prevent any impact (particularly erosion) in a surrounding habitat. <p>Stockpiles</p> <ol style="list-style-type: none"> 1. Stockpiles should not be situated such that they obstruct natural water pathways and drainage channels. 2. Stockpiles should not exceed 2 m in height. 3. If stockpiles are exposed to windy conditions or heavy rain, they should be covered either by vegetation or cloth. Stockpiles may further be protected by the construction of berms or low brick walls around their bases. 	<p>Contractor, ES Officer</p>	<p>Daily</p>

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
	<p>4. Stockpiles should be kept clear of weeds and alien vegetation growth by regular weeding.</p> <p>5. Where contamination of soil is expected, analysis must be done prior to disposal of excess soil to determine the appropriate disposal route.</p> <p>Fuel storage</p> <ol style="list-style-type: none"> 1. Topsoil and subsoil to be protected from contamination. 2. Fuel and material storage must be away from stockpiles. 3. Cement, concrete and chemicals must be mixed on an impermeable surface and provisions should be made to contain spillages or overflows into the soil. 4. Any storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material. 5. Contaminated soil must be contained and disposed of site at an approved landfill site. <p>Concrete mixing (if required)</p> <ol style="list-style-type: none"> 1. Concrete mixing must only take place within designated areas. 2. Ready mixed concrete must be utilised where possible. 3. No vehicles transporting concrete to the site may be washed on site. 4. If a batching plant is necessary, run-off should be managed effectively to avoid contamination of other areas of the site. Untreated run-off from the batch plant must not be allowed to get into the stormwater system or any other watercourses. <p>Earthworks</p> <ol style="list-style-type: none"> 1. Soils compacted during the construction phase should be deeply ripped to loosen compacted layers and re-graded to even running levels. Topsoil should be re-spread over landscaped areas. 		

5.6 Ground and Surface Water Pollution

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
<p>GROUNDWATER POLLUTION</p> <p>Impact that construction activities could have on groundwater</p>	<p>Sanitation</p> <ol style="list-style-type: none"> 1. Adequate sanitary facilities and ablutions must be provided for construction workers. 2. The facilities must be regularly serviced and emptied to reduce the risk of surface or groundwater pollution. <p>Hazardous materials</p> <ol style="list-style-type: none"> 1. Use and or storage of materials, fuels and chemicals which could potentially leak into the groundwater must be controlled. 2. All storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund wall must be high enough to contain 110% of the total volume of the stored hazardous material with an additional allocation for potential stormwater events. 3. Any hazardous substances must be stored at least 20 m from any of the water bodies on site. 4. The ES Officer should be responsible for ensuring that potentially harmful materials are properly stored in a dry, secure, ventilated environment, with concrete or sealed flooring and by means of preventing unauthorised entry. 5. Contaminated wastewater must be managed by the Contractor to ensure existing water resources on the site are not contaminated. All wastewater from general activities in the camp shall be collected and removed from the site for appropriate disposal at a licensed commercial facility. <p>Cement mixing</p> <ol style="list-style-type: none"> 1. Cement contaminated water must not enter the water system as this disturbs the natural acidity of the soil and affects plant growth. <p>Public areas</p> <ol style="list-style-type: none"> 1. Food preparation/consumption areas should be provided at the construction camp with adequate washing facilities and food refuse should be stored in sealed refuse bins which should be removed from site on a regular basis. 2. The Contractor should take steps to ensure that littering by construction workers does not occur and persons 	Contractor, ES Officer	Daily

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
	<p>should be employed on site to collect litter from the site and immediate surroundings, including litter accumulating at fence lines.</p> <p>3. No washing or servicing of vehicles on site.</p> <p>Water resources</p> <p>1. Site staff shall not be permitted to use any other open water body or natural water source adjacent to or within the designated site for the purposes of washing of construction tools or for any construction or related activities.</p> <p>2. Municipal water (or another source approved by the ECO) should instead be used for all activities related to construction such as washing of equipment or, dust suppression, concrete mixing, compacting, etc.</p>		

5.7 Wetlands

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
<p>WETLANDS</p> <p>Impacts include the potential clearing and compaction of wetland vegetation and soil for the construction of temporary accesses / haulage roads.</p>	<ol style="list-style-type: none"> The construction footprint must not extend into the boundary of the wetland, as delineated. This applies to wetland areas on either side of the canal. The fence that marks the current boundary of the wetland must be retained intact in order to avoid movement of people and machinery into the wetland. The wetland must clearly be designated and signed as a sensitive no-go area. No cement batching or any other similar activities that could result in pollutants entering the wetland must be conducted within 50m of the wetland boundary, as delineated. No stockpiling of any material must be undertaken within the works area adjacent to the wetland. Stockpiling of excavated or other material must occur no closer than 50m to the boundary of the wetland. All portable machinery (such as moveable pumps) that could leak oil into the wetland must operate on drip trays to avoid the spillage of oil into the wetland. Spill kits must be retained on site in the event of a fuel spillage. Machinery must be inspected on a daily basis to check for oil leaks. No water or any other silt from dewatering activities that may need to be undertaken must be discharged into the wetland, as this water is likely to contain silt in suspension or other potential pollutants. If such water is to be discharged into the environment it must first be passed through silt trap and discharged outside of the 	Contractor, ES Officer	Daily

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
	<p>wetland area.</p> <p>9. Under no circumstances must the wetland or surrounding veld (pastureland) be burnt, and no open fires must be allowed on the construction site.</p> <p>10. Although it is recognised that construction activities are inherently noisy, an attempt to reduce the noise disturbance factor must be made.</p> <p>11. Stormwater management must be practiced on the construction site. It is recommended that a low earthen berm or silt fence be erected along the edge of the wetland boundary where it is located adjacent to the works area to prevent stormwater from the construction area from entering the wetland.</p>		

5.8 Stormwater

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
<p>STORMWATER</p> <p>Impact that construction activities could have on hydrology</p>	<ol style="list-style-type: none"> 1. No stormwater attenuation facilities must be located within a buffer. 2. Measures must be taken to ensure that stormwater is controlled as far as possible and that all silt and other foreign materials are prevented from entering any surface water feature located adjacent to the construction area during the construction phase. 3. The site must be managed in order to prevent pollution of drains, downstream watercourses or groundwater, due to suspended solids, silt or chemical pollutants. 4. Temporary cut of drains and berms may be required to capture stormwater and promote infiltration. 5. Promote water saving mind set with construction workers in order to ensure less water wastage. 6. New stormwater infrastructure construction must be developed strictly according to specifications from ES Officer and ECO in order to ensure efficiency. 7. Hazardous substances must be stored at least 20 m away from the buffer area surrounding any water bodies on site to avoid pollution. 8. The installation of the stormwater system must take place as soon as possible after commencement of the construction activities, to attenuate stormwater from the construction as well as the operational phase. 9. Earth, stone and rubble is to be properly disposed of so as not to obstruct natural water path ways over the site. (i.e. these materials must not be placed in stormwater channels, drainage lines or rivers). 10. There should be a periodic checking of the site's drainage system to ensure that the water flow is 	<p>Contractor, ES Officer</p>	<p>Daily</p>

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
	unobstructed.		

5.9 Air Quality

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
AIR POLLUTION Vehicle activities associated with the transport of equipment to the site; preparation of the surface areas which may be required prior to the set up of new infrastructure; and the removal of construction equipment from site after the set up of new equipment	<p>Dust control</p> <ol style="list-style-type: none"> 1. Frequent and effective dust-suppression is advised, particularly along dirt roads. Dust must be suppressed on the construction site during dry periods by the regular application of water. Water used for this purpose must be used in quantities that will not result in the generation of run-off. 2. Retention of vegetation in areas where construction activities are not place will reduce dust travel. 3. Excavations and other clearing activities must only be done during agreed working times and permitting weather conditions to avoid drifting of sand and dust into neighbouring areas. 4. The Contractor shall be responsible for dust control on site to ensure no nuisance is caused to the landowner or neighbouring communities. 5. A speed limit of 40 km/h must not be exceeded on dirty roads, particularly the vehicles which will be transporting construction material from the quarry. Where possible trips of these construction vehicles need to be coordinated accordingly to minimise the dust impacts. 6. Any complaints or claims emanating from the lack of dust control shall be attended to immediately by the Contractor. <p>Odour control</p> <ol style="list-style-type: none"> 1. Regular servicing of vehicles in order to limit gaseous emissions (to be done off-site). 2. Regular servicing of on site toilets to avoid potential odours. 3. Construction workers must bring their own lunch boxes to avoid cooking on site. <p>Rehabilitation</p> <ol style="list-style-type: none"> 1. The Contractor should commence rehabilitation of exposed soil surfaces as soon as practical, after completion of earthworks. 	Contractor, ES Officer	Daily

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
	<p>Fire prevention</p> <ol style="list-style-type: none"> 1. The Contractor must ensure that any grass left in a natural state during construction should be cut in order to prevent veld fires, especially during the dry months. 2. No open fires shall be allowed on site under any circumstance. 3. The Contractor shall have operational fire-fighting equipment available on site at all times. The level of fire fighting equipment must be assessed and evaluated through a typical risk assessment process. It may be required to increase the level of protection, especially during the winter months. 		

5.10 Flora and Fauna

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
<p>FLORA & FAUNA</p> <p>Impacts on flora relating to the destruction of threatened and protected flora species and destruction of sensitive pristine habitat types</p>	<ol style="list-style-type: none"> 1. An initial assessment of the relevant area by a qualified avifaunal specialist should be conducted prior to the commencement of the construction process, also corresponding to the onset of the breeding season (late February to March) in order to establish: <ul style="list-style-type: none"> ▪ The presence and persistence of Grass-owls within the Imperata cylindrica patch adjacent to the rehabilitation site; ▪ To establish/ confirm potential breeding patterns of African Grass-owls within the demarcated area; 2. All evidence of Grass-owl occupancy (including confirmed individuals or nests) should be noted (by means of a GPS) and mapped accordingly along with the date of the observation, photographic evidence (e.g. roosting site, nests, feathers and regurgitated pellets) and the name of the observer. 3. The data should be stored into a database and will be used to estimate local movements of owl individuals, density and nesting behaviour. In the event that a nest is located, the observer should record the number of eggs, nestlings and the date of the observation. 4. During the construction phase, monthly visits are recommended to monitor the status of birds within the demarcated area until construction/ rehabilitation is completed. 5. It is highly recommended that potentially suitable sites in the immediate surrounds (app. 10 km radius) of the study region be screened for suitable breeding and roosting habitat as well as the potential presence of Grass-owls. 	Contractor , ES Officer	Daily

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
	<p>6. The monitoring protocol should evaluate the status of the vegetation structure and composition which entails the following:</p> <ul style="list-style-type: none"> ▪ Species richness, ▪ Species composition, ▪ Species dominance, ▪ Cover abundance, ▪ Vegetation height and presence of invasive weeds ▪ Degree of moribundness of the graminoid cover. <p>7. The information will be correlated with the occupancy and frequency of owl records at the site to make informed decisions regarding burning and grazing frequency.</p> <p>8. Monitoring should be continued for at least two additional surveys subsequent to the completion of rehabilitation/ construction activities.</p> <p>9. It is highly recommended that potentially suitable sites in the immediate surrounds (app. 10 km radius) of the study region be screened for suitable breeding and roosting habitat as well as the potential presence of Grass-owls. It is possible that additional areas could be available for colonisation of Grass-owls.</p> <p>10. Where possible, construction activities should not overlap with the peak breeding season of the owls.</p> <p>11. Allowing approximately one month for incubation and another month to six weeks for chicks to fledge (at about six weeks), the peak breeding season can be estimated to be a four month period between March and June.</p> <p>12. Avoid any surface disturbances within areas of African Grass-Owl habitat.</p> <p>13. All construction activities must be limited to daylight hours to mitigate the impacts on Grass-owls.</p> <p>14. Signage should be applied to the fences to inform the public and contractors that the fenced area is set aside as breeding habitat for Grass-owls. Therefore, the information should portray a general message that the area is classified as "sensitive" and access to the area is "restricted" in order to keep disturbances to a minimum;</p> <p>15. A collaborative conservation effort between the proponent and the farmers should be investigated so that these areas will be managed as exclusion areas (as areas where grazing and agricultural activities are prohibited) for the sole purpose to benefit the long-term survival of Grass-owls in the area;</p> <p>16. No grazing should be allowed within sensitive areas, especially at areas where Grass-owls are roosting or breeding. Grazing is only allowed prior to the burning of the area (depending on the outcome monitoring results, the breeding status of owls and the vegetation structure and composition – see section dealing with the monitoring programme below).</p>		

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
	<p>17. Fencing and delineation of exclusion zones – demarcated Grass-owl habitat must be permanently fenced to prevent livestock access to these areas. The top wire of the fence should not be of the barbed-type to prevent accidental collisions/mortalities when individual birds attempt to fly over the fence structure. An additional allowance of approximately 15 m should be allowed wherever possible;</p> <p>18. No grazing should be allowed within sensitive areas, especially at areas where Grass-owls are roosting or breeding. Grazing is only allowed prior to the burning of the area (depending on the outcome monitoring results, the breeding status of owls and the vegetation structure and composition – see section dealing with the monitoring programme below).</p> <p>19. No fires, laydown or construction camps are allowed within proximity of any suitable breeding/roosting habitat;</p> <p>20. Road calming structures (e.g. speed humps) should be applied to roads in close proximity to optimal breeding or roosting habitat (e.g. where the road is within 50 m of the habitat);</p> <p>21. Continual dust supersession is advised to control the possible settling of dust on optimal breeding/roosting habitat.</p> <p>22. Vegetation must be removed in a phased manner to minimise soil erosion and dust impacts. The clearance of vegetation must take place in areas affected by construction activities.</p>		

5.11 Noise

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
<p>NOISE</p> <p>Construction activities (excavating and site clearing); construction vehicles; and construction staff</p>	<p>1. The construction phase must aim to adhere to the relevant noise regulations and limit noise to within standard working hours in order to reduce disturbance of residential areas in close proximity to the development.</p> <p>2. Construction site yards, workshops, and other noisy fixed facilities should be located well away from noise sensitive areas. Once the proposed final layouts are made available by the Contractor(s), the sites must be evaluated in detail and specific measures designed into the system.</p> <p>3. Truck traffic should be routed away from noise sensitive areas, where possible.</p> <p>4. Construction noise levels must be kept within acceptable limits.</p> <p>5. Noisy operations should be combined so that they occur where possible at the same time.</p>	<p>Contractor, ES Officer</p>	<p>Daily</p>

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
	<ol style="list-style-type: none"> 6. Construction activities are to be contained to reasonable hours during the day and early evening (07H00-17H00). 7. With regard to unavoidable very noisy construction activities in the vicinity of noise sensitive areas, the Contractor and ES Officer should liaise with local residents on how best to minimise impact, and the local communities should be kept informed of the nature and duration of intended activities. 8. As construction workers operate in a very noisy environment, it must be ensured that their working conditions comply with the requirements of the Occupational Health and Safety Act (Act No 85 of 1993). 9. Noisy activities to take place during allocated construction hours only as per the Noise Control Regulations of the Environment Conservation Act, 1989 (Act No. 73 of 1989). 10. Noise from labourers must be controlled. 11. Noise suppression measures must be applied to all construction equipment. Construction equipment must be kept in good working order and where appropriate fitted with silencers which are kept in good working order. Should the vehicles or equipment not be in good working order, the Contractor may be instructed to remove the offending vehicle or machinery from site. 12. The Contractor must take measures to discourage labourers from loitering in the area and causing noise disturbance. Where possible labour shall be transported to and from the site by the Contractor or his Sub-Contractors by the Contractors own transport. 		

5.12 Waste Management

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
WASTE MANAGEMENT Waste produced during construction includes: general construction	<p>Construction rubble</p> <ol style="list-style-type: none"> 1. Construction rubble shall be disposed of in pre-agreed, demarcated spoil dumps that have been approved by Ventersdorp Local Municipality. <p>Litter management</p> <ol style="list-style-type: none"> 1. Refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction site. 	Contractor, ES Officer	Daily

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
<p>rubble, hazardous waste (used oil, cement and concrete etc.)</p>	<ol style="list-style-type: none"> 2. If possible and feasible, all waste generated on site must be separated into glass, plastic, paper, metal and wood and recycled. An independent Contractor can be appointed to conduct this recycling. 3. Littering by the employees of the Contractor shall not be allowed under any circumstances. The ES Officer shall monitor the neatness of the work sites as well as the Contractor campsite. 4. Skip waste containers should be maintained on site. These should be kept covered and arrangements made for them to be collected regularly from the site by the local municipality. 5. All waste must be removed from the site and transported to a landfill site as approved by the Ventersdorp Municipality. 6. Waybills providing disposal at each site shall be provided to the ES Officer and ECO's inspection. <p>Hazardous waste</p> <ol style="list-style-type: none"> 1. All waste hazardous materials must either be stored in a bunded or lined area or as otherwise advised by the ES Officer and ECO, and then disposed of off at a licensed landfill site. Hazardous waste may not be stored on site in excess of a 90 calendar day period. 2. Contaminants to be stored safely to avoid spillage. 3. Machinery must be properly maintained to keep oil leaks in check. 4. Labelled containers must be provided to store used oils, as well as hazardous waste containers for oily rags, oil filters etc. and must be disposed of at a suitable approved register dumpsite. <p>Sanitation</p> <ol style="list-style-type: none"> 1. The Contractor shall install mobile chemical toilets on the site. 2. No indiscriminate sanitary activities on site shall be allowed. 3. Ablution facilities shall be within 100 m from workplaces but not closer than 50 m from any natural water bodies or boreholes. There should be enough toilets available to accommodate the workforce. Male and females must be accommodated separately where possible. 4. Toilets should be no closer than 100 m or above the 1:100 year flood line from any natural or manmade water bodies or drainage lines or alternatively located in a place approved of by the ES Officer and ECO. 5. Potable water must be provided for all construction staff. <p>Remedial actions</p> <ol style="list-style-type: none"> 1. Depending on the nature and extent of the spill, contaminated soil must be either excavated or treated on- 		

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
	<p>site using oil absorbents.</p> <ol style="list-style-type: none"> Excavation of contaminated soil must involve careful removal of soil using appropriate tools/machinery to storage containers until treated or disposed of at a licensed hazardous landfill site. The ES Officer and ECO must determine the precise method of treatment of polluted soil. This could involve the application of soil absorbent materials as well as oil-digestive powders to the contaminated soil. If a spill occurs on an impermeable surface such as cement or concrete, the surface spill must be contained using oil absorbent materials. If necessary, oil absorbent sheets or pads must be attached to leaky machinery or infrastructure. Materials used for the remediation of petrochemical spills must be used according to product specifications and guidance for use. Contaminated remediation materials must be carefully removed from the area of the spill so as to prevent further release of petrochemicals to the environment, and stored in adequate containers until appropriate disposal. 		

5.13 Health and Safety

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
<p>HEALTH AND SAFETY (Safety of workers and the public exposed to construction activity hazards)</p>	<p>Worker safety</p> <ol style="list-style-type: none"> Implementation of safety measures, work procedures and first aid must be implemented on site. A health and safety plan in terms of the Occupational Health and Safety Act (Act No. 85 of 1993) must be drawn up to ensure worker safety. Workers should be thoroughly trained in using potentially dangerous equipment. Contractors must ensure that all equipment is maintained in a safe operating condition. A record of health and safety incidents must be kept on site. Any health and safety incidents must be reported to the Project Manager immediately. First aid facilities must be available on site at all times. Workers have the right to refuse work in unsafe conditions. A record shall be kept of drugs administered or precautions taken and the time and dates when this was done. 	DWS, Contractor, ES Officer	Daily

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
	<p>10. Material stockpiles or stacks, such as, pipes must be stable and well secured to avoid collapse and possible injury to site workers.</p> <p>Worker facilities</p> <ol style="list-style-type: none"> 1. Eating areas should be regularly serviced and cleaned to ensure the highest possible standards of hygiene and cleanliness. 2. Fires are not to be allowed. <p>Protective gear</p> <ol style="list-style-type: none"> 1. Personal Protective Equipment (PPE) and clothing must be made available to all construction staff and must be compulsory. Hard hats and safety shoes must be worn at all times and other PPE worn where necessary i.e. dust masks, ear plugs etc. 2. No person is to enter the site without the necessary PPE. <p>Site safety</p> <ol style="list-style-type: none"> 1. The construction camp must remain fenced for the entire construction period. 2. Potentially hazardous areas such as trenches are to be demarcated and clearly marked 3. Adequate warning signs of hazardous working areas. 4. Uncovered manholes and excavations must be clearly demarcated 5. Emergency numbers for local police and fire department etc. must be placed in a prominent area. 6. Fire fighting equipment must be placed in prominent positions across the site where it is easily accessible. This includes fire extinguishers, a fire blanket as well as a water tank. 7. Suitable visible warning must be placed at all entrances to the site. 8. All speed limits must be adhered to (40km/h) <p>Hazardous Material Storage</p> <ol style="list-style-type: none"> 1. Staff that will be handling hazardous materials must be trained to do so. 2. Any hazardous materials (apart from fuel) must be stored within a lockable store with a sealed floor. 3. Storage areas containing hazardous substances / materials must be clearly sign-posted. 4. All storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous 		

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
	<p>material.</p> <ol style="list-style-type: none"> 5. Oil Spill Clean-up and Rehabilitation Standards prescribed by statutory requirements must be maintained and adhered to at all times. 6. The provisions of the Hazardous Chemical Substances Regulations promulgated in terms of the Occupational Health and Safety Act 85 of 1993 and the SABS Code of Practise must be adhered to. This applies to solvents and other chemicals possibly used in the construction time. <p><i>Procedure in the event of a petrochemical spill</i></p> <ol style="list-style-type: none"> 1. The individual responsible for or who discovers the petrochemical spill must report the incident to the Project Manager, ES Officer or Contractor. 2. The problem must be assessed and the necessary actions required undertaken. 3. The immediate response must be to contain the spill. 4. The source of the spill must be identified, controlled, treated or removed. <p><i>Fire management</i></p> <ol style="list-style-type: none"> 1. Fire fighting equipment should be present on site at all times as per Occupational Health and Safety Act 85 of 1993. 2. All construction staff must be trained in fire hazard control and fire fighting techniques. 3. All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances. 4. Open fires are prohibited on site. 		

5.14 Security

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
SECURITY Issues associated with security during construction for workers and surrounding land users.	<ol style="list-style-type: none"> Access to the construction site should be strictly controlled. No person shall enter the site unless authorised to do so by the Contractor, Project Manager and ES Officer. If any fencing interferes with the construction process, such fencing shall be deviated until construction is completed. The deviation of fences shall be negotiated and agreed with the landowner in writing. Trespassing on private / commercial properties adjoining the site is forbidden. Secure the site in order to reduce the opportunity for criminal activity in the locality of the construction site. 	Contractor, ES Officer	Daily

5.15 Social Environment

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
SOCIAL ENVIRONMENT Social impacts of construction activities will have on the site and surrounds)	<ol style="list-style-type: none"> All contact with the affected parties by the project team shall be courteous at all times. The rights of the affected parties shall be respected at all times. A complaints register should be kept on site. Details of complaints should be incorporated into the audits as part of the monitoring process. This register is to be tabled during monthly site meetings. No interruptions other than those negotiated shall be allowed to any essential services. Damage to infrastructure shall not be tolerated and any damage shall be rectified immediately by the Contractor. A record of all damage and remedial actions shall be kept on site. <p>Employment Opportunities</p> <ol style="list-style-type: none"> Employment opportunities should be afforded to the local community to transfer the skills by the appointed 	Project Manager, Contractor, ES Officer	Daily

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
	Contractor.		

5.16 Cultural and Heritage Artefacts

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
CULTURAL AND HERITAGE ARTEFACTS Impact that the construction has on potential heritage and archaeological artefacts that could be found in the study area	<ol style="list-style-type: none"> Any finds must be reported to the nearest National Monuments office to comply with the National Heritage Resources Act (Act No 25 of 1999) Local museums as well as the South African Heritage Resource Agency (SAHRA) should be informed if any artefacts are uncovered in the affected area. The Contractor must ensure that his workforce is aware of the necessity of reporting any possible historical or archaeological finds to the ES Officer and ECO so that appropriate action can be taken. Any discovered artefacts shall not be removed under any circumstances. Any destruction of a site can only be allowed once a permit is obtained and the site has been mapped and noted. Permits shall be obtained from the South African Heritage Resources. If anything is noticed, work in that area should be stopped and the findings be reported to a museum, preferably one at which an archaeologist is available. The archaeologist should then investigate and evaluate the find. Any discovered artefacts shall not be removed under any circumstances. Any destruction of a site can only be allowed once a permit is obtained and the site has been mapped and noted. Permits must be obtained from the South African Heritage Resources Agency. 	Contractor, ES Officer	Daily

6 Decommissioning Phase of Construction Activities

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
DECOMMISSIONING	<p>End of construction</p> <ol style="list-style-type: none"> Once construction has been completed on site and all excess material has been removed, the storage area shall be rehabilitated. If the area was badly damaged, re-seeding shall be done. Such areas shall be rehabilitated to their natural state. Any spilled concrete shall be removed and soil compacted during construction shall be ripped, levelled and re-vegetated. Only designated areas must be used for storage of construction materials, soil stockpiles, machinery and other equipment. Specific areas must be designated for cement batching plants. Sufficient drainage for these plants must be in place to ensure that soils do not become contaminated. The construction camp must be kept clear of litter at all times. Spillages within the construction camp need to be cleaned up immediately and disposed of in the hazardous skip bin for correct disposal. <p>Removal of equipment</p> <ol style="list-style-type: none"> All structures comprising the construction camp are to be removed from site. The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc., and these shall be cleaned up. All hardened surfaces within the construction camp area should be ripped, all imported materials removed, and the area shall be top soiled and regressed. <p>Temporary services</p> <ol style="list-style-type: none"> The Contractor must arrange the cancellation of all temporary services. A copy of all waste disposal certificates from waste disposal service providers are to be presented to the Project Manager. Temporary roads must be closed and access across these, blocked. 	Contractor, Project Manager, ES Officer	Daily

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
	<p>4. All areas where temporary services were installed are to be rehabilitated to the satisfaction of the Project Manager.</p> <p>Associated infrastructure</p> <ol style="list-style-type: none"> 1. Surfaces are to be checked for waste products from activities such as concreting and cleared in a manner approved by the ES Officer and ECO. 2. All surfaces hardened due to construction activities are to be ripped and imported material thereon removed. 3. All rubble is to be removed from the site to an approved disposal site as approved by the ES Officer and ECO. Burying of rubble on site is prohibited. 4. The site is to be cleared of all litter. 5. The Contractor is to check that all watercourses are free from building rubble, spoil materials and waste materials. 6. Fences, barriers and demarcations associated with the construction phase are to be removed from the site. 7. All residual stockpiles must be removed to spoil or spread on site as directed by the ES Officer and ECO. 8. All leftover building materials must be returned to the depot or removed from the site. 9. The Contractor must repair any damage that the construction works has caused to neighbouring properties, specifically, but not limited to, damage caused by poor storm water management. <p>Waste disposal</p> <ol style="list-style-type: none"> 1. Disposal of waste must be in accordance with relevant legislative requirements. 2. Waste must be disposed of in the appropriate manner at a licensed disposal site. <p>Erosion</p> <ol style="list-style-type: none"> 1. Rehabilitation of areas affected by construction activities should ideally commence at the start of the raining season (September-October). 2. Recommended rehabilitation is in the form of active re-vegetation of affected areas, including areas where surface disturbances resulted from construction. 3. All areas of incomplete construction should be completed and prepared for final rehabilitation and re-vegetation; 4. All areas where topsoil was removed or placing of mono poles should be landscaped in order to reflect surrounding conditions. 		

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
	5. Erosion monitoring and control should be conducted. This should be in the form of inspections subsequent to rains. Topsoil should be replaced in all areas that were eroded. It is critical that adequate topsoil remains in construction areas, implying that topsoil might need to be supplemented in some areas until such time that a layer of vegetation has stabilised the soil.		

7 EMPr: Operational Phase

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
MAINTENANCE OF THE RIETSPRUIT DAM	<ol style="list-style-type: none"> All applicable environmental standards, legislation, policies and procedures must be adhered to during operation. Emergency numbers must be visibly displayed at the dam site in case of an emergency and the community need to be educated around any risks that may exist. Any waste or hazardous substance spillages that might occur should be removed as soon as possible and disposed of at an appropriate hazardous landfill site. Regular inspection of the dam must take place to monitor the operating status. 	Project Manager	Annually
ACCESS ROADS Access roads used for maintenance might impact on vegetation and water bodies.	<ol style="list-style-type: none"> Use should be made of existing roads as far as possible, ensuring proper maintenance/upgrade. Alternative methods of construction / access near sensitive areas are recommended. No vehicles should be allowed to cross rivers/wetlands or streams in any area other than at an approved crossing, taking care to prevent any impact (particularly erosion) on the surrounding habitat. Vehicular traffic shall not be allowed in permanently wet areas, no damage shall be caused to wet areas. Where necessary, alternative methods of construction shall be used to avoid damage to wet areas. 	Project Manager	Annually
FAUNA AND FLORA Disturbance of	<ol style="list-style-type: none"> Indigenous vegetation must be maintained on site on a regular basis and all exotics removed as they appear, and disposed of appropriately. No faunal species must be harmed by maintenance staff during any routine maintenance. 	Project Manager	Annually

ASPECT / IMPACT	MITIGATION	RESPONSIBILITY	MONITORING FREQUENCY
vegetation and animals.			
WASTE Waste generation will have a negative impact on the environment, if not controlled adequately.	<ol style="list-style-type: none"> 1. Disposal of waste must be in accordance with relevant legislative requirements. 2. Burning of waste material will not be permitted. 	Project Manager	Annually
SAFETY There is the potential risk of electrocution (people and livestock) if access to the site is not controlled.	<ol style="list-style-type: none"> 1. Safety and security issues should be addressed as a priority by DWS. It is recommended that the landowners and affected community members be contacted in advance to ensure that they are forewarned of the construction and maintenance activities planned in the area. 	Project Manager	Annually

APPENDIX A

EXAMPLES OF SPECIES FOUND ON SITE



Photo 1: Artificial habitat below the dam wall (road servitude)



Photo 2: Example of a deteriorated Grassland habitat near the dam wall



Photo 3: Example of an *Imperata cylindrica* grassland patch, critical habitat for the Grass-owl



Photo 4: Another example of *Imperata cylindrica* grassland patch, critical habitat for the Grass-owl



Photo 5: Extent of the *Imperata cylindrica* grassland area, view from the dam wall



Photo 6: Example of artificial habitat on the dam wall, note *Phragmites* reedbeds to the right



Photo 7: Example of *Phragmites* reedbeds near the dam wall



Photo 8: Example of the declining population of *Crinum bulbispermum*



Photo 9: Example of the wetland habitat types below the dam wall



Photo 9: Photograph of a Grass-owl in flight