APPENDIX I

ENVIRONMENTAL MANAGEMENT PROGRAMME

VAAL GAMAGARA REGIONAL WATER SUPPLY SCHEME PHASE 2:
UPGRADING OF THE EXISTING SCHEME

ENVIRONMENTAL MANAGEMENT PROGRAMME

FEBRUARY 2019

FINAL

DEFF REFERENCE: 14/12/16/3/3/1/2062

PREPARED FOR: SEDIBENG WATER

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Title and Approval Page

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Amendments Page

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LIST OF ACRONYMS & ABBREVIATIONS

BAR	Basic Assessment Report
CRE	Chief Resident Engineer
DEFF	Department of Environment, Forestry and Fisheries
DENC	Department of Environment and Nature Conservation
DHSWS	Department of Human Settlements, Water and Sanitation
DM	District Municipality
DMRE	Department of Mineral Resources and Energy
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EM	Environmental Monitor
EMC	Environmental Monitoring Committee
EMPr	Environmental Management Programme
EO	Environmental Officer
GN	Government Notice
IAPs	Interested and Affected Parties
LM	Local Municipality
MLD	Million litres per day
MPRDA	Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)
MSDS	Material Safety Data Sheet
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NEM:AQA	National Environmental Management: Air Quality Act (Act No. 39 of 2004)
NEM:BA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NEM:PAA	National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
NEM:WA	National Environmental Management: Waste Act (Act No. 59 of 2008)
NFA	National Forests Act (No. 84 of 1998)
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NWA	National Water Act (Act No. 36 of 1998)
OHS	Occupational Health and Safety
SAHRA	South African Heritage Resources Agency
SANS	South African National Standard
SAPS	South African Police Services
SM	Social Monitor
SO	Social Officer
VGRWSS	Vaal Gamagara Regional Water Supply Scheme
VGRWSS-II	Vaal Gamagara Regional Water Supply Scheme Phase 2

UNITS OF MEASUREMENT

dBA	Decibel (expression of the relative loudness of the A-weighted sound level in air)
ha	Hectare
km	Kilometre
km^2	Square kilometre
km/h	Kilometres per hour
l	Litres
m	Metre
m^3	Cubic metre
m^3/a	Cubic metre per annum
m^3/s	Cubic metre per second
MVA	Megavolt-ampere
PM_{10}	Particulate matter smaller than 10 µm
t	Tons
%	Percentage

DEFINITION OF KEY TERMS

Auditing	*A systematic and objective assessment of an organisation's activities and services conducted and documented on a periodic basis.*
Construction Area	*Immediate site influenced by specific construction activities, as approved by the Engineer.*
Construction Domain	*Entire footprint required for the construction of the overall project components.*
Environment	*The surroundings in which humans exist and which comprise:* • *The land, water and atmosphere of the earth.* • *Micro-organisms, plant and animal life.* • *Any part or combination of a) and b) and the interrelationships among and between them.* • *The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that can influence human health and well-being.*
Environmental Aspect	*Those components of the company's activities, products and services that are likely to interact with the environment.*
Environmental Feature	*Elements and attributes of the biophysical, economic and social environment.*
Environmental Impact	*The change to the environment resulting from an environmental aspect, whether desirable or undesirable. An impact may be the direct or indirect consequence of an activity.*
Environmental Management Programme (EMPr)	*A detailed plan of action prepared to ensure that recommendations for enhancing positive impacts and/or limiting or preventing negative environmental impacts are implemented during the life-cycle of a project.*
Environmental Objective	*Overall environmental goal pertaining to the management of environmental features.*
Environmental Target	*Performance requirement that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives.*
Monitoring	*A systematic and objective observation of an organisation's activities and services conducted and reported on regularly.*
Project Area	*The greater area within which the project is executed. Extends beyond the construction domain.*
Sensitive environmental features	*Environmental features protected by legislation (e.g. heritage resources), or identified during the EIA process as sensitive through specialists' findings and input received from Interested and Affected Parties.*
Watercourse	*A geomorphological feature characterized by the presence of a streamflow channel, a floodplain and a transitional upland fringe seasonally or permanently conveying surface water. According to the National Water Act (Act 36 of 1998), a watercourse constitutes a river or spring, a natural channel in which water flows regularly or intermittently, a wetland, lake or dam into which, or from which, water flows, and any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.*

1 PURPOSE OF THE DOCUMENT

Nemai Consulting was appointed by Sedibeng Water to undertake the Basic Assessment (BA) Process for the proposed **Vaal Gamagara Regional Water Supply Scheme Phase 2 (VGRWSS-II): Upgrading of the Existing Scheme** in the Northern Cape, in terms of Government Notice (GN) No. R. 982 of 4 December 2014 (as amended). This document serves as the **Final Environmental Management Programme (EMPr)** for the proposed project.

This EMPr provides performance criteria required to address potential environmental impacts during the pre-construction, construction and operational phases of the VGRWSS-II. This report must be read in conjunction with the VGRWSS-II: Upgrade of Existing Scheme Basic Assessment Report (BAR).

The scope of the EMPr is as follows:

- Establish management objectives during the pre-construction, construction and operational phases in order to enhance benefits and manage (i.e. prevent, reduce, rehabilitate and/or compensate) adverse environmental impacts;
- Provide targets for management objectives, in terms of desired performance;
- Describe actions required to achieve management objectives;
- Outline institutional structures and roles required to implement the EMPr; and
- Provide the legislative framework.

2 DOCUMENT ROADMAP

As a minimum, the EMPr aims to satisfy the requirements stipulated in Appendix 4 of GN No. R 982 of 4 December 2014 (as amended). **Table 1** presents the document's composition in terms of the aforementioned regulatory requirements.

Table 1: Document Roadmap

Chapter	Title	Correlation with Appendix 4 of G.N. No. R982	
1	**Purpose of the Document**	N/A	
2	**Document Roadmap**	N/A	
3	**Project Overview**	N/A	
4	**Environmental Assessment Practitioner**	1(a)	Details of – (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including curriculum vitae.
5	**Legislation and Guidelines Considered**	N/A	
6	**Roles & Responsibilities**	1(i)	An indication of the persons who will be responsible for the implementation of the impact management actions.
7	**Monitoring**	1(g)	The method of monitoring the implementation of the impact management actions contemplated in paragraph (f).
		1(h)	The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f).
		1(k)	The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f).
		1(l)	A programme for reporting on compliance, taking into account the requirements as prescribed by the Regulations.
8	**Environmental Training & Awareness Creation**	1(m)	An environmental awareness plan describing the manner in which - (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment.
9	**EMPr Review**	N/A	
10	**Environmental Activities, Aspects and Impacts**	1(b)	A detailed description of the aspects of the activity that are covered by the final environmental management plan.
11	**Sensitive Environmental Features**	1(c)	A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.

Chapter	Title	Correlation with Appendix 4 of G.N. No. R982	
12	**Impact Management**	1(d)	A description of impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including – (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities.
		1(f)	A description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to - (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable.
		1(j)	The time periods within which the impact management actions contemplated in paragraph (f) must be implemented.
		1(l)	A programme for reporting on compliance, taking into account the requirements as prescribed by the Regulations.
N/A		1(n)	Any specific information that may be required by the competent authority
N/A		2	Where a government notice gazetted by the Minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.

3 PROJECT OVERVIEW

The Vaal Gamagara Regional Water Supply Scheme (VGRWSS) is a water supply scheme located in the Northern Cape Province that was completed in 1968 by the Department of Water Affairs, now Department of Human Settlements, Water and Sanitation (DHSWS), and transferred to Sedibeng Water in 2008.

The Scheme currently supplies approximately 22 million m^3/a to domestic consumers, mines and farmers. The Scheme transfers water from Delportshoop on the Vaal River (60km to the north west of Kimberley) via Postmasburg to the iron ore mines at Kathu. From Kathu, a pipeline continues to the manganese mines at Hotazel and finally terminates at Black Rock.

The existing VGRWSS consists of a water treatment works (WTW) that can treat 13.27 million m^3/a (36 MLD) water, pumps, 11 reservoirs and 370km of pipes that deliver potable water to users. The pipeline has the capacity to convey approximately 15 million m^3/a into the D41J and D41K catchments. The 13.27 million m^3/a water is augmented to 28 million m^3/a by dewatering activities of the Kolomela, Beeshoek and Sishen mines to lower the groundwater table to ensure safe mining conditions. As shown in the locality map in **Figure 1**, the VGRWSS-II starts at the Delportshoop WTW and runs past the towns of Ulco, Lime Acres and Postmasburg before ending at Olifantshoek.

The current scheme is operating at capacity and is not able to supply the increasing future water demands, and deal with the increasing water supply interruptions. The major driving force of the increased water demand is the iron ore and manganese mining operations. Secondary to the expected increased water demand are water supply interruptions that are amplified due to the aging infrastructure. The infrastructure, being 50 years old, is nearing the end of its useful life. Due to the condition of the pipelines, the full design capacity can no longer be supplied through this infrastructure. Total collapse in water supply will probably happen in the next 5 years if the infrastructure is not replaced/rehabilitated.

Feasibility studies were undertaken to determine the best option to rehabilitate and increase the capacity of the scheme to cater for increased water demands. Sedibeng Water subsequently proposed the upgrading of the VGRWSS via the following two phases:

- Phase I – upgrading the scheme from the Roscoe Reservoir to Blackrock (already in construction phase); and
- **Phase II – upgrading the scheme from Delportshoop to Olifantshoek** (focus of this application).

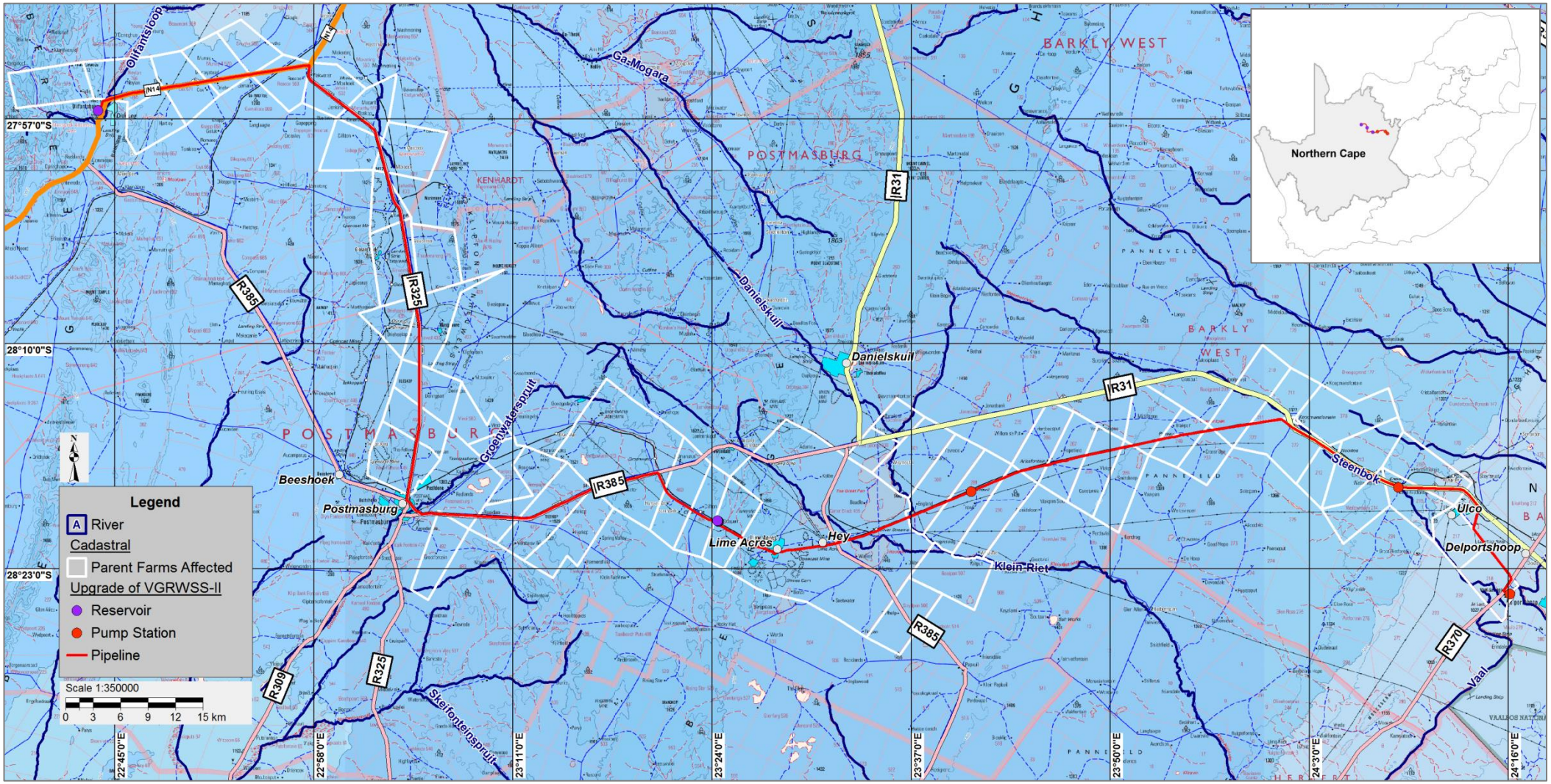

Figure 1: VGRWSS-II Locality Map

4 ENVIRONMENTAL ASSESSMENT PRACTITIONER

Nemai Consulting was appointed by Sedibeng Water as the independent Environmental Assessment Practitioner (EAP) to undertake the environmental assessment for the proposed project.

In accordance with Appendix 4, Section 1(a) of GN No. R 982 of 4 December 2014 (as amended), this section provides an overview of Nemai Consulting and the company's experience with BAs and EIAs, as well as the details and experience of the EAPs that form part of the BA Process team.

Nemai Consulting is an independent, specialist environmental, social development and Occupational Health and Safety (OHS) consultancy, which was founded in December 1999. The company is directed by a team of experienced and capable environmental engineers, scientists, ecologists, sociologists, economists and analysts. The company has offices in Gauteng and KwaZulu-Natal (KZN). The core members of Nemai Consulting that were involved with compiling the EMPr for the project are captured in **Table 2** below, and their respective Curricula Vitae are contained in in the body of the BAR.

Table 2: EMPr Core Team Members

Name	Qualifications	Experience
Mr D. Henning	MSc (River Ecology)	• 18 years' experience. • Prepared Environmental Management Plans and EMPrs for various bulk water related projects, including: o 80 km bulk water pipeline from Randfontein to Rustenburg, North-West; o Ncwabeni Off-Channel Storage and associated infrastructure, KZN; o Mokolo Crocodile West Water Augmentation Project Phase 1 and 2, Limpopo; and o Foxwood Dam and associated infrastructure, Eastern Cape. • Acted as the Environmental Control Officer (ECO) on various projects, including: o Construction of the Spring Grove Dam, as part of the Mooi-Mgeni Transfer Scheme (Phase 2), KZN; and o 40 km bulk water pipeline from the De Hoop Dam to a pumping station in Steelpoort, for the Olifants River Water Resources Development Project - Phase 2C.
Ms D. Naidoo	BSc Eng (Chem)	• 22 years' experience. • Project Manager for various bulk water related projects, including: o Raising of Hazelmere Dam, KZN; o Empangeni Bulk Outfall Sewer, 40 km pipeline, KZN; o Mtwalume Dam, Vulamehlo Cross Border Water Scheme in KZN; and o Foxwood Dam and associated infrastructure, Eastern Cape.
Mr C. v. d. Hoven	BSc (Hons) (Environmental Studies)	• 3 years' experience. • Prepared EMPrs for various projects, including: o Lerome Bulk Water Supply Scheme, North-West; o Lanseria Outfall Sewer pipeline, Gauteng; o Eldorado Park water pipeline upgrade, Gauteng; and o Mokolo Crocodile West Water Augmentation Project Phase 2, Limpopo.

5 LEGISLATION AND GUIDELINES CONSIDERED

5.1 Overview of Legislation

Activities during the pre-construction, construction and operational phases will be undertaken according to recognised best industry practices and will include measures prescribed within this EMPr. The EMPr shall form part of the contract documents, and informs the Contractor about his duties in the fulfilment of the project objectives, with particular reference to the mitigation of environmental impacts that may potentially be caused by construction activities associated with the project. The Contractor will note that obligations imposed by the EMPr are legally binding in terms of environmental legislation.

All project activities must comply with all relevant South African legislation and regulations. All environmental statutory requirements should be included in the Contractors' conditions. Some of the pertinent environmental legislation that has bearing on the proposed development is captured in **Table 3** below.

Table 3: Environmental legislative Framework

Legislation	Relevance
Constitution of the Republic of South Africa (Act No. 108 of 1996)	• Chapter 2 – Bill of Rights; and • Section 24 – environmental rights.
National Environmental Management Act (Act No. 107 of 1998) (NEMA)	• Section 24 – Environmental Authorisation (control of activities which may have a detrimental effect on the environment). • Section 28 – Duty of care and remediation of environmental damage; and • Environmental management principles.
GN No. R 982 of 4 December 2014 (as amended)	• Purpose - regulate the procedure and criteria as contemplated in Chapter 5 of NEMA relating to the preparation, evaluation, submission, processing and consideration of, and decision on, applications for environmental authorisations for the commencement of activities, subjected to EIA, in order to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts, and for matters pertaining thereto.
GN No. R. 983 of 4 December 2014 (as amended) (Listing Notice 1)	• Purpose - identify activities that would require environmental authorisations prior to commencement of that activity and to identify competent authorities in terms of sections 24(2) and 24D of NEMA; and • The investigation, assessment and communication of potential impact of activities must follow a Basic Assessment process, as prescribed in regulations 19 and 20 of GN No. R 982 of 4 December 2014 (as amended). However, according to Regulation 15(3) of GN No. R 982, a Scoping and Environmental Impact Reporting Process (S&EIR) must be applied to an application if the application is for two or more activities as part of the same development for which

Legislation	Relevance
	S&EIR must already be applied in respect of any of the activities.
GN No. R. 984 of 4 December 2014 (Listing Notice 2)	• Purpose - identify activities that would require environmental authorisations prior to commencement of that activity and to identify competent authorities in terms of sections 24(2) and 24D of NEMA; and • The investigation, assessment and communication of potential impact of activities must follow a S&EIR, as prescribed in regulations 21 - 24 of GN No. R 982 of 4 December 2014 (as amended).
GN No. R. 985 of 4 December 2014 (Listing Notice 3)	• Purpose - list activities and identify competent authorities under sections 24(2), 24(5) and 24D of NEMA, where environmental authorisation is required prior to commencement of that activity in specific identified geographical areas only; and • The investigation, assessment and communication of potential impact of activities must follow a Basic Assessment process, as prescribed in regulations 19 and 20 of GN No. R 982 of 4 December 2014 (as amended). However, according to Regulation 15(3) of GN No. R 982, S&EIR must be applied to an application if the application is for two or more activities as part of the same development for which S&EIR must already be applied in respect of any of the activities.
National Water Act (Act No. 36 of 1998) (NWA)	• Chapter 3 – Protection of water resources; • Section 19 – Prevention and remedying effects of pollution; • Section 20 – Control of emergency incidents; and • Chapter 4 – Water use.
National Environmental Management: Protected Areas Act (Act No. 57 of 2003) (NEM:PAA)	• Protection and conservation of ecologically viable areas representative of South Africa's biological diversity and natural landscapes.
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA)	• Management and conservation of the country's biodiversity; and • Protection of species and ecosystems.
National Environmental Management: Air Quality Act (Act No. 39 of 2004) (NEM:AQA)	• Air quality management; • Section 29 – pollution prevention plans (Notice 172 of 2014: Greenhouse gases as priority air pollutants); • Section 32 – dust control; • Section 34 – noise control; and • Section 35 – control of offensive odours.
National Environmental Management: Waste Act (Act No. 59 of 2008) (NEM:WA)	• Chapter 4 – Waste management measures; and • Chapter 5 – licensing requirements for listed waste activities.
National Forests Act (No. 84 of 1998) (NFA)	• Section 15 – Authorisation required for impacts to protected trees.
Hazardous Substances Act (Act No. 05 of 1973)	Provisions for the control of substances which may cause injury or ill-health to or death of human beings.
Occupational Health & Safety Act (Act No. 85 of 1993)	• Provisions for Occupational Health & Safety; and • Major Hazardous Installation Regulations.

Legislation	Relevance
National Heritage Resources Act (Act No. 25 of 1999) (NHRA)	• Section 34 – protection of structure older than 60 years; • Section 35 – protection of heritage resources; • Section 36 – protection of graves and burial grounds; and • Section 38 – Heritage Impact Assessment for e.g. linear development exceeding 300m in length; development exceeding 5 000 m^2 in extent.
Conservation of Agricultural Resources Act (Act No. 43 of 1983)	• Control measures for erosion; and • Control measures for alien and invasive plant species.
National Forestry Act (Act No. 84 of 1998) (NFA)	• Section 15 – authorisation required for impacts to protected trees.
Minerals and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA)	• Permit required for borrow pits will be required for the project.
NEM:BA Alien and Invasive Species Regulations (GN No. R 598 of 1 August 2014)	• Prevention the introduction and spread of alien and invasive species across South Africa.
Northern Cape Conservation Act (Act No. 9 of 2009)	• Protected and Specially Protected Species.

Refer to **Section 8** of the BAR for an overview of the relationship between the proposed project and certain key pieces of environmental legislation.

5.2 Method Statements

The Contractor shall provide detailed method statements on how the performance criteria in the EMPr will be met. These methods are to be reviewed and approved by the Engineer to ensure that they are adequate.

The method statements must be project- and site specific and should explain in detail the following:

1. The manner in which the work is to be undertaken;
2. The estimated schedule for the works (timing);
3. The area where the works will be executed (location);
4. The materials and plant / equipment needed for the works;
5. The necessary mitigation measures that need to be implemented to adequately safeguard the environment, construction workers and the public (where applicable);
6. Training of employees;
7. Roles and responsibilities; and
8. Monitoring and reporting requirements.

The list of method statements required to assist in the implementation of this EMPr includes at least the following (where applicable):

- Method Statement for site clearing;
- Method Statement for establishing the construction camp(s);
- Method Statement with regard to waste and wastewater management;
- Method Statement to show procedures for dealing with possible emergencies that can occur, such as fire and accidental leaks and spillage of carbon fuels and oils;
- Method Statement for dust control;
- Method Statement for the storage and handling of hazardous substances;
- Method Statement for management of concrete and batching plants;
- Method Statement for river diversions;
- Method Statement for managing spoil material;
- Method Statement for controlling alien invasive species and noxious weeds;
- Method Statement for the decommissioning of the construction works area;
- Method Statement for rehabilitation of construction footprint; and
- Method Statement for the management of stormwater and erosion.

Note that the method statements are contractual requirements between the proponent and the Contractor and therefore not subject to approval by DEFF.

6 ROLES & RESPONSIBILITIES

6.1 Introduction

A high-level outline of the institutional arrangements for the implementation of the EMPr during the pre-construction and construction phases of the project, as well as the conditions of the Environmental Authorisation, is provided in **Figure 2** below.

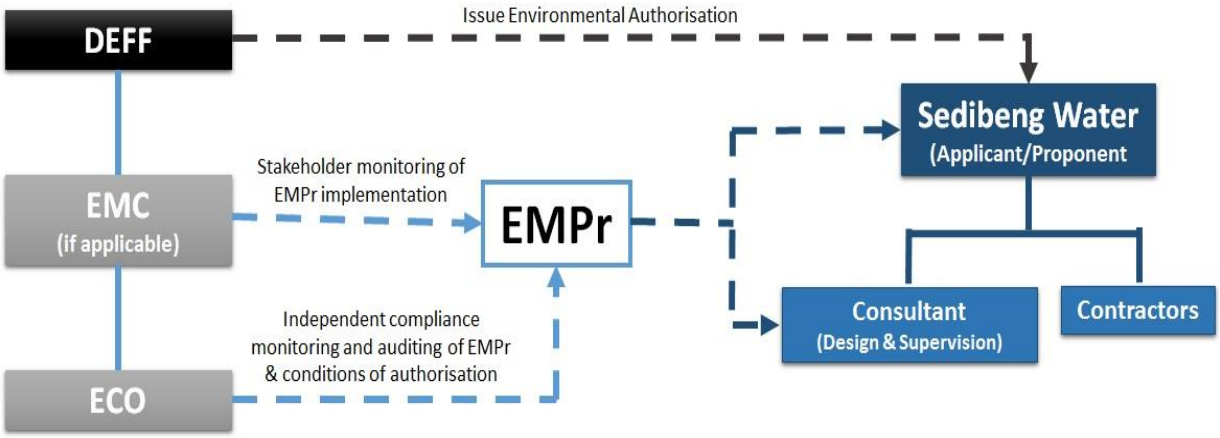

Figure 2: Institutional Arrangements: Roles & Responsibility

6.2 Department of Environmental Affairs

The Department of Environment, Forestry and Fisheries (DEFF) is the mandated authority in terms of NEMA that determines whether authorisation can be issued for the project, following a decision-making process conducted as part of the BA Process. Conditions are included in the Environmental Authorisation, which need to be complied with by the project applicant (Sedibeng Water).

DEFF also fulfils a compliance and enforcement role with regards to the authorisation. This Department may perform random inspections to check compliance. DEFF will also serve as an active member of the Environmental Monitoring Committee (EMC) (if applicable) and will review the monitoring and auditing reports compiled by the Environmental Control Officer (ECO).

Amendments may be required to the EMPr or the Environmental Authorisation, based on adaptive management to the site conditions and the technical requirements of the project. It will need to be confirmed whether any amendments will require approval by DEFF.

6.3 Sedibeng Water

Sedibeng Water is the applicant in terms of NEMA. Sedibeng Water is also referred to as the project proponent and is ultimately responsible for the development and implementation of the EMPr and ensuring that the conditions in the Environmental Authorisation are satisfied. The liability for non-compliance thus rests with Sedibeng Water.

6.4 The Contractor

The Contractor(s) is appointed by the proponent to undertake construction of the works, as specified in the Contract. In order to carry out the requirements of this EMPr, the Contractor must make sure that he/she has a clear understanding of all environmental matters relating to the project.

The responsibilities of the Contractor will, as a minimum, include the following:

- The implementation of and adherence to the Contract Specifications in accordance with the requirements of the EMPr;
- To ensure all sub-contractors under his/her supervision adhere to the applicable environmental contract specifications in accordance with the requirements of the EMPr;
- Report any non-compliance to the Chief Resident Engineer (CRE) within 12 (twelve) hours of the event occurring;
- Report any non-compliance event that constitutes an emergency immediately and in line with the protocol applicable to that particular emergency event;
- To ensure that all employees and sub-contractors attend the Environmental Awareness Training and subsequent refresher training, and are familiar with or made aware of the contents of the Environmental Authorisation and EMPr; and
- To conduct any remedial work required in terms of the EMPr and Environmental Authorisation as a result of environmental negligence, mismanagement and/or non-compliance.

6.5 The Environmental Control Officer

The role of the ECO is primarily to act as an independent monitor on behalf of DEA and the EMC (if established) for the implementation of the proposed VGRWSS-II upgrading of the existing scheme, in accordance with the requirements of the Environmental Authorisation and the approved EMPr. The ECO must be competent, with a minimum of 5 years' experience.

It is recommended that the ECO undertake weekly inspections of the site, monthly monitoring and bi-annual full compliance auditing, including an audit at the end of construction and one at the end of the defects notification period. The aforementioned reports will be submitted to the project proponent, EMC (if applicable) and DEFF for their records.

The role and function of the ECO is to:

- Conduct third-party monitoring and auditing;
- Regularly monitor and review the progress towards achieving the specific strategies, objectives and performance targets of the EMPr;
- Independently verify that mitigation measures and conditions in the EMPr are being applied.
- Conduct regular site inspections and issue inspection reports;
- Review monitoring data and evaluate against performance targets;
- Provide independent reporting to DEFF on compliance with the Environmental Authorisation and EMPr;
- After consultation with the proponent and the EMC (if established), inform DEFF when there is non-compliance with conditions of approval;
- Undertake periodic formal auditing of the EMPr compliance;
- If an EMC is to be established, then the ECO will:
  - Act as the Secretariat to the EMC by providing logistical and organisational support;
  - Prepare minutes of EMC meetings and distribute to members; and
  - Provide independent professional advice to the EMC in the execution of its functions.

As an independent Consultant, the ECO is not responsible for:

- EMPr implementation;
- Primary environmental data collection, monitoring and analysis; and
- Resolving complaints from Interested and Affected Parties (IAPs).

The ECO is not accountable for the implementation of the Environmental Authorisation and the EMPr and is also not linked to the project authorities, Engineer or Contractor. Therefore, the ECO does not have the authority to:

- Make project-related decisions;
- Issue instructions to either the Engineer or the Contractor;
- Stop the construction works; and
- Demand the implementation of specific mitigation and/or corrective measures to the Engineer or Contractor.

6.6 Environmental Monitoring Committee

If applicable, an EMC will be established before commencement of any construction activities and will serve as an additional mechanism for monitoring the implementation of the EMPr and compliance with the Environmental Authorisation, as well as for improving communication amongst key stakeholders. The committee will have an advisory, monitoring and “watch-dog” role for the duration of the construction phase of the project. This committee will report to DEFF.

If an EMC is established then appropriate Terms of Reference (ToR) will need to be prepared that must address *inter alia* the following:

- Mandate of the EMC;
- EMC membership;
- EMC meetings;
- Chairperson's responsibilities;
- Purpose of the EMC;
- Principles for effective functioning of the EMC;
- Consent;
- Communication channels;
- Amendment of the ToR of the EMC;
- Conflict of interest;
- Code of ethics; and
- Adoption.

6.7 The Engineer

The Engineer is appointed to design the works and supervise construction. The Engineer will be represented on site for the duration of construction by the CRE. The Engineer carries a direct responsibility for the effective implementation of the environmental management requirements detailed in this EMPr.

The Engineer is required to have an Environmental Monitor and Social Monitor responsible for daily monitoring on his team.

6.8 The Chief Resident Engineer

The CRE is a member of the Engineer's staff and responsible for ensuring that the Contractor complies with the construction contract, the design specifications, the Environmental Authorisation and the EMPr. The Contractor may only take instructions from the CRE. All decisions affecting programme or costs which are influenced by the specifications, procedures or protocols must be approved by the CRE. The CRE also has the authority to stop any construction activity which is in contravention of the relevant specifications. The CRE must make the findings of internal audits available to the proponent and the ECO.

6.9 The Engineer's Environmental Monitor and Social Monitor

The Environmental Monitor (EM) and Social Monitor (SM) are part of the Engineer's staff, and are responsible for the day-to-day monitoring of the construction activities in relation to their compliance with the EMPr and other relevant specifications. The EM and SM should ensure that any complaints related to the physical and social environment received from the public, are recorded and dealt with appropriately.

The EM and SM must:

- Be well versed in matters pertaining to environmental management;
- Understand all relevant environmental legislation and processes;
- Understand the hierarchy of environmental compliance reporting and the implications of non-compliance;
- Know and understand the background of the project and the implementation programme;
- Identify issues and make recommendations in terms of the environmental management requirements;
- Undertake internal audits (on a monthly basis) to gauge compliance with environmental legislation, conditions of the EA, EMPr and the specifications;
- Submit the findings of internal audits to the CRE;
- Keep accurate and detailed records of all EMPr-related activities on site;
- Check that the Contractor keeps all the permits and certificates on site as required by the EMPr;
- Advise on the rectification of any pollution, contamination or damage to the project site, rights of way or adjacent land; and
- Ensure that the CRE is informed of all applicable DEFF-approved changes to the EMPr

More specifically, the EM should maintain the following on site:

- A daily site diary;
- A non-conformance register;
- A register of audits;
- Copies of all Method Statements;
- Monitoring reports of the Contractor;
- Compliance and audit reports; and
- Copies of the Environmental Authorisation, EMPr and all permits required during the construction phase.

The SM is responsible for all interaction with landowners, land users and IAPs and must maintain and manage any public complaints and issues register.

6.10 The Contractor's Environmental Officer and Social Officer

The Environmental Officer (EO) and Social Officer (SO) are part of the Contractor's staff and are responsible for all activities related to the day-to-day on-site implementation of the EMPr. They are also responsible for the compilation of regular (daily, weekly and monthly) Monitoring Reports for the Engineer.

The EO and SO must liaise with the Engineer on all environmental and related issues (when necessary) and ensure that any complaints received from the public are recorded and dealt with appropriately and expeditiously. The Contractor must ensure that all his employees, visitors and sub-contractors receive Environmental Awareness Training as specified.

The EO and SO should:

- Be well versed in environmental and social matters;
- Understand the relevant environmental legislation, international best practices and processes;
- Understand the hierarchy of environmental compliance reporting, and the implications of non-compliance;
- Know the background of the project and understand the implementation programme;
- Be able to resolve conflicts and make recommendations (to the Contractor) in terms of the requirements of the EMPr;
- Keep accurate and detailed records of all EMPr-related activities on site;
- Keep the following on file:
  - Material Safety Data Sheets (MSDSs) for all hazardous material stores;
  - Waste disposal certificates;
  - Training registers;
- Arrange the presentation of environmental awareness training courses/toolbox talks to all site staff, Contractors and sub-contractors, and monitor the environmental awareness training for all new site personnel employed by the Contractor; and
- Advise on the rectification of any pollution, contamination or damage to the project site, rights of way and adjacent land.

7 MONITORING

Monitoring is required to ensure that the receiving environment is suitably safeguarded against the identified potential impacts, and to ensure that the environmental management requirements are adequately implemented and adhered to during the execution of the project.

7.1 Baseline Monitoring

7.1.1 General

Baseline monitoring aims to determine the pre-construction state of the receiving environment and serves as a reference to measure the residual impacts of the project by evaluating the deviation from the baseline conditions and the associated significance of the adverse effects.

7.1.2 Preconstruction (walk-down) Survey

A pre-construction survey needs to be conducted for all areas that are to be affected by construction activities. The survey needs to include the following:

- Site investigations by appropriate members of the project team and specialists (as relevant);
- Generate records from survey which include site details, photographs, explanatory notes, etc. (as required);
- Record the condition of existing structures and infrastructure on the site; and
- Identify site-specific mitigation measures.

The records from the pre-construction survey must be used to establish and inform the reinstatement and rehabilitation requirements for the affected areas.

Note that separate provision is made for Specialist Environmental Investigations in **Section 12.3.1** that need to take place prior to construction activities.

7.1.3 Wetland Assessment

A suitably qualified specialist will be required to assess the wetlands that will be impacted by construction activities. This is required to establish specific rehabilitation requirements.

7.1.4 Environmental Parameters

The environmental parameters to be included in the baseline monitoring, which is to be undertaken by Sedibeng Water, are shown in **Table 4**.

Table 4: Baseline Monitoring

Environmental Parameter	Monitoring Locations	Requirements	
Aquatic Health	• All major watercourses to be affected by the pipeline. Sites to be located at suitable spots up- and downstream of the construction sites and in-stream works, to be determined in consultation with the ECO. • *In situ* water quality monitoring and biomonitoring to be conducted.	• Comply with relevant standards - SANS 5667. • Water Quality variables to be tested include:	
		○ Chemical oxygen demand ○ Total ammonia ○ Copper ○ Iron ○ Lead ○ Nitrite/Nitrate ○ Orthophosphate	○ Zinc ○ Faecal coliform bacteria ○ Sodium (Na) ○ Soap, oil and grease ○ Manganese ○ Fluoride
Air Quality	• Dust fallout units to be located taking into consideration significant sources of air pollution, sensitive receptors, and dominant wind direction. Dust fallout to be measured at / around the following sites (as a minimum) – ○ Batching plant; ○ Aggregate stockpiles; ○ Crusher area; ○ Borrow areas and quarries; ○ Sensitive features – • Particulate matter (PM_{10}) – strategic monitoring point(s) to be selected.	• Dust fallout – comply with ASTM D1739; SANS 1929, SANS 69. • Particulate matter (PM_{10}) – comply with the National Ambient Air Quality Standards.	
Noise & Vibration	Noise and vibration monitoring sampling sites to be located taking into consideration significant sources of noise, sensitive receptors and dominant wind direction. Sites to coincide with dust fallout sites (where relevant).	Comply with SANS 10103:2008.	
Traffic	Implement traffic monitoring which includes baseline traffic monitoring, at least 6 months ahead of construction, to confirm the traffic status quo on the road links that are to be worst affected.	Requirements of the roads authority.	

7.2 Environmental Monitoring

Environmental monitoring entails checking, at pre-determined frequencies, whether thresholds and baseline values for certain environmental parameters are being exceeded. The parameters and sampling localities used during the baseline monitoring will form the basis of the environmental monitoring programme.

The environmental parameters to be included as part of the environmental monitoring programme, which is to be undertaken by the Contractor during the construction phase, include the following (based on receptors and impact sources):

1. Air Quality –

- Dust fallout;
- Particulate matter (PM_{10});

2. Noise;
3. Vibration (as required);
4. Water quality and biomonitoring; and
5. Traffic.

The following requirements need to be incorporated into the programme:

- ❖ Monitoring during normal operations, abnormal situations and emergency situations (e.g. unexpected spillage of hazardous substance);
- ❖ Measuring equipment must be accurately calibrated;
- ❖ Adequate quality control of the sampling must be ensured;
- ❖ Analysis is to be undertaken at a SANS 17025 certified laboratory;
- ❖ Certified methods of testing must be employed;
- ❖ Where legal specifications exist for testing and sampling methods, these must be taken into account; and
- ❖ Establish a process for identifying and implementing corrective measures.

7.3 Compliance Monitoring and Auditing

Compliance monitoring will commence in the pre-construction phase, where those conditions in the Environmental Authorisation that need to be adhered to prior to project implementation will need to be checked and recorded, as well as to check compliance with the provisions in the EMPr. Compliance monitoring will be completed at the end of the defects liability period to check the performance of rehabilitation measures and whether the related objectives have been met.

It is recommended that the ECO undertake weekly inspections of the site, monthly monitoring and bi-annual full compliance auditing, including an audit at the end of construction and one at the end of the defects notification period.

Auditing of compliance with the Environmental Authorisation and EMPr must be conducted in accordance with Regulation 34 of GN No. R 982 (4 December 2014) in terms of the following:

1. The holder of the Environmental Authorisation must, for the period during which the Environmental Authorisation and EMPr remain valid -
   a. Ensure that the compliance with the conditions of the Environmental Authorisation and EMPr is audited; and
   b. Submit an environmental audit report to DEFF.
2. The environmental audit report must -

a. Be prepared by an independent person with the relevant environmental auditing expertise;
b. Provide verifiable findings, in a structured and systematic manner, on-
   i. The level of performance against and compliance of an organization or project with the provisions of the requisite Environmental Authorisation and EMPr; and
   ii. The ability of the measures contained in the EMPr to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity;
c. Contain the information set out in Appendix 7 of GN No. R. 982 of 4 December 2014 (as amended); and
d. Be conducted and submitted to DEFF at intervals as indicated in the Environmental Authorisation.

3. The environmental audit report must determine-
   a. The ability of the EMPr to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity on an ongoing basis and to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the closure of the facility; and
   b. The level of compliance with the provisions of Environmental Authorisation and EMPr.

A document handling system must be established to ensure accurate updating of EMPr documents, and availability of all documents required for the effective functioning of the EMPr.

Supplementary EMPr documentation could include:

- Method Statements;
- Site instructions;
- Emergency preparedness and response procedures;
- Record of environmental incidents;
- Non-conformance register;
- Training records;
- Site inspection reports;
- Monitoring reports;
- Auditing reports;
- Public complaints register; and
- Grievance Mechanism/Process for public and contractor/employees.

8 ENVIRONMENTAL TRAINING & AWARENESS CREATION

Training aims to create an understanding of environmental management obligations and prescriptive measures governing the execution of the project. It is generally geared towards project team members that require a higher-level of appreciation of the environmental management context and implementation framework for the project.

Awareness creation strives to foster a general attentiveness amongst the construction workforce to sensitive environmental features and an understanding of implementing environmental best practices.

The various means of creating environmental awareness during the pre-construction and construction phases of the project may include:

- Induction course for all workers before commencing work on site;
- Refresher courses (as and when required);
- Daily toolbox talks, focusing on particular environmental issues (task- and area specific);
- Courses must be provided by suitably qualified persons and in a language and medium understood by the workers;
- Erect signage and barricading (where necessary) at appropriate points in the construction domain, highlighting sensitive environmental features (e.g. grave sites, protected trees); and
- Place posters containing environmental information at areas frequented by the construction workers (e.g. eating facilities).

Training and awareness creation will be tailored to the audience, based on their designated roles and responsibilities. Records will be kept of the type of training and awareness creation provided, as well as containing the details of the attendees.

The Contractor must compile a project-specific Environmental Training and Awareness Programme, taking into consideration the abovementioned factors, to be approved by the Engineer/ECO.

9 EMPR REVIEW

Due to its dynamic nature, this EMPr will be reviewed and revised when necessary to ensure continued environmental improvement.

Following detailed design and planning, the EMPr may need to be revised to render the management actions more explicit and accurate to the final project specifications. Changes to the EMPr shall also be required where the existing system:

- Does not make adequate provision for protecting the environment against the pre-construction, construction and/or operational activities;
- Needs to be modified to meet conditions of statutory approval;
- It is not achieving acceptable environmental performance;
- Requires changes due to the outcome of a monitoring or auditing event or management review;
- Provides redundant, impracticable or ineffective management measures; and
- Based on provisions in Regulation 34 of GN No. R. 982 of 4 December 2014 (as amended), as amended.

The amendment of the EMPr will be undertaken in terms of Regulation 34 – 37 of GN No. R. 982 of 4 December 2014 (as amended), as applicable. For minor amendments, an EMPr Amendment Register should be maintained in discussion with the ECO and EMC (if appointed), however, significant changes will require formal approval from DEFF.

10 ENVIRONMENTAL ACTIVITIES, ASPECTS AND IMPACTS

10.1 Environmental Activities

10.1.1 Pre-construction Phase

The main project activities and high-level environmental activities to be undertaken in the pre-construction phase are listed in **Table 5** below.

Table 5: Activities associated with Pre-Construction Phase

PRE-CONSTRUCTION PHASE
Project Activities
• Applicant to appoint ECO
• Negotiations and agreements with the individual affected landowners and stakeholders
• Detailed engineering design
• Detailed geotechnical design
• Site survey
• Procurement of contractors
• Mark construction servitude
• Registration of the servitude
• Pre-construction photographic records
• Development and approval of method statements
• Development and approval of construction plans
• Development of employment strategy
• Construction site planning, access and layout
Environmental Activities
• Diligent compliance monitoring of the EMPr, Environmental Authorisation and other relevant environmental legislation
• Search, rescue and relocation of red data, protected and endangered species, heritage resources and graves (based on area of influence of the construction activities). Develop Search, Rescue and Relocation Management Plan, based on findings of specialist walk through survey
• Develop Environmental Monitoring Programme (air quality, water quality, noise, traffic, social)
• Conduct further baseline environmental studies for Environmental Monitoring Programme
• Barricading of sensitive environmental features (e.g. wetlands and graves)
• Obtain permits for impacts to fauna and flora Species of Conservation Concern
• Obtain permits if heritage resources are to be impacted on and for the relocation of graves
• Establish EMC (if required)
• On-going consultation with IAPs

10.1.2 Construction Phase

The main project activities and high-level environmental activities to be undertaken in the construction phase are listed in **Table 6** below.

Table 6: Activities associated with Construction Phase

CONSTRUCTION PHASE
Project Activities
• Site establishment (including site camp and labour camp)
• Fencing of the construction area
• Pegging of central line and overall footprint
• Site clearing
• Delivery of construction material
• Transportation of equipment, materials and personnel
• Storage and handling of material
• Cut and cover activities
• Stockpiling (sand, crushed stone, aggregate, etc.)
• Stormwater control mechanisms
• Management of topsoil and spoil
• Waste and wastewater management
• Traffic control measures
• Bulk earthworks
• Site security
• Electrical supply
• Construction of the proposed infrastructure
• Install final Cathodic Protection measures and AC mitigation measures, as required
• Road surface finishes
• Concrete works
• Temporary river diversions for pipeline crossings
• Landscaping
Environmental Activities
• Diligent compliance monitoring of the EMPr, Environmental Authorisation and other relevant environmental legislation
• Ongoing search, rescue and relocation of red data, protected and endangered species, medicinal plants, heritage resources and graves (based on area of influence of the construction activities) – permits to be in place
• Implement Environmental Monitoring Programme (air quality, water quality, noise, traffic, social)
• Reinstatement and rehabilitation of construction domain (as necessary)
• Convene EMC Meetings (if required)
• On-going consultation with IAPs
• Other activities as per EMPr

10.1.3 Operation Phase

The main project activities and high-level environmental activities to be undertaken in the operational phase are listed in **Table 7** below.

Table 7: Activities associated with Operation Phase

OPERATIONAL PHASE
Project Activities
• Operation and maintenance of VGRWSS
• Servitude access arrangements and requirements
Environmental Activities
• Ongoing consultation with landowners and affected parties
• Other activities as per EMPr for Operational Phase, such as: o Erosion monitoring programme o Management of sensitive areas or buffered areas o Management of vegetation clearance o Stormwater management o Pollution control measures o Control of invasive plant species

10.2 Environmental Aspects

Environmental aspects are regarded as those components of an organisation's activities, products and services that are likely to interact with the environment and cause an impact.

10.2.1 Pre-construction Phase

The environmental aspects listed in **Table 8** below have been identified for the proposed project during the pre-construction phase, which are linked to the project activities (note that only high level aspects are provided).

Table 8: Environmental aspects associated with Pre-Construction Phase

Project Phase: Pre-construction
Environmental Aspects
• Inadequate consultation with landowners / tenants / occupiers of land
• Inadequate environmental and compliance monitoring
• Site-specific environmental issues not fully understood
• Poor construction site planning and layout
• Land occupancy by temporary buildings, provisional on-site facilities and storage areas
• Inaccurate pre-construction environmental walk through survey (including search and rescue)
• Absence of relevant permits (e.g. for protected trees, heritage resources)
• Lack of barricading of sensitive environmental features
• Poor waste management
• Absence of ablution facilities

10.2.2 Construction Phase

The environmental aspects listed in **Table 9** below have been identified for the proposed project during the construction phase, which are linked to the project activities (note that only high level aspects are provided).

Table 9: Environmental aspects associated with Construction Phase

Project Phase: Construction
Environmental Aspects
• Inadequate consultation with landowners / tenants / occupiers of land
• Inadequate environmental and compliance monitoring
• Lack of environmental awareness creation
• Indiscriminate site clearing
• Poor site establishment
• Poor management of access and use of access roads
• Inadequate provisions for working on steep slopes
• Poor transportation practices
• Poor fencing arrangements
• Erosion
• Disruptions to existing services
• Disturbance of topsoil
• Poor management of excavations
• Inadequate storage and handling of material
• Inadequate storage and handling of hazardous material
• Poor maintenance of equipment and plant
• Poor management of labour force
• Pollution from ablution facilities
• Inadequate management of construction camp
• Poor waste management practices – hazardous and general solid, liquid
• Wastage of water
• Disturbance to landowners / tenants / occupiers of land
• Poor management of pollution generation potential
• Damage to significant flora (if encountered)
• Damage to significant fauna (if encountered)
• Environmental damage where watercourses / drainage lines are crossed
• Environmental damage of sensitive areas
• Disruption of archaeological and cultural features (if encountered)
• Poor reinstatement and rehabilitation

10.2.3 Operation Phase

The environmental aspects listed in **Table 10** below have been identified for the proposed project during the operation phase, which are linked to the project activities (note that only high level aspects are provided).

Table 10: Environmental aspects associated with Operation Phase

Project Phase: Operation
Environmental Aspects
• Inadequate consultation with landowners / tenants / occupiers of land
• Inadequate environmental and compliance monitoring
• Inadequate management of access, routine maintenance and maintenance works
• Inadequate management of vegetation
• Inadequate management of offtakes

10.3 Potentially Significant Environmental Impacts

Environmental impacts are the change to the environment resulting from an environmental aspect, whether desirable or undesirable.

10.3.1 Construction Phase

Refer to **Table 11** below for the potentially significant impacts associated with the activities and environmental aspects for the construction phase.

Table 11: Potentially significant environmental impacts for Construction Phase

Feature	Impact
Land Use	• Temporary loss of land used for agriculture. • Servitude restrictions. • Reduced access to land/structures – all structures located in the servitude. Structures identified as part of this study are: Postmasburg dwelling, The Ranch, Langeberg Stene and Olifantshoek Cemetery. • Construction related disturbances (dust and noise generation).
Geology and Soil	• Impacts associated with the sourcing of construction material and loss of topsoil • Soil erosion (land clearance and construction activities) • Soil pollution e.g. hydrocarbon and cement spillages • Compaction and erosion of removed and stockpiled soils • Soil contamination from incorrect storage/handling/disposal of hazardous waste • Soil contamination through spillages and leakages • Soil contamination due to mismanagement and/or incorrect storage of hazardous chemicals • Poor stormwater management during construction
Topography	• Visual impacts during construction • Crossing topographic features (watercourses) • Erosion of affected areas
Geohydrology	• Groundwater pollution due to spillages and poor construction practices
Flora	• Loss of sensitive vegetation and habitat • Damage and loss of vegetation of conservation significance • Proliferation of exotic vegetation in disturbed areas • Damage to vegetation in surrounding areas • Destruction of potential Red Data Listed and protected flora species during site clearing and construction • Disturbance of sensitive plant species if relocated

Feature	Impact
Fauna	• Loss of habitat through site clearing and construction • Illegal killing or hunting of mammals • Killing of snakes during construction phase due to poor environmental education procedures • Potential harm to and/or death of fauna due to pollution, littering and/or vehicle movement on site. • Damage / clearance of habitat of conservation importance • Loss of fauna species of conservation significance • Obstruction to animal movement corridors
Air Quality	• Excessive dust levels. • Greenhouse gas emissions (use of construction vehicles, machinery/equipment, and diesel generators)
Transportation	• Construction-related traffic • Increase in traffic on the local road network • Damage to roads by heavy construction vehicles • Risks to road users
Noise	• Localised noise increase • Noise nuisance
Agriculture	• Disruptions to farming entrances and operations as a result of construction-related use of existing access roads. • Temporary loss of grazing land within construction domain. • Loss of existing farm infrastructure within construction domain.
Existing Structures and Infrastructure	• Risk of damaging existing services, infrastructure and structures during construction. • Disruptions to traffic on local road network during construction. This is associated with road crossings, where the pipeline route follows existing road alignments and as a result of general use of the roads by construction vehicles.
Aesthetics	• Reduction in visual quality of area.
Safety and Security	• Safety risk to landowners and surrounding communities.
Waste Management	• Waste generated from site preparations (e.g. plant material) • Domestic waste • Surplus and used building material • Hazardous waste (e.g. chemicals, oils, soil contaminated by spillages, diesel rags) • Disposal of excess spoil material (soil and rock) generated as part of the bulk earthworks • Land, air and water pollution through poor waste management practices
Socio – Economic	• Generation of employment opportunities for local people and SMME's (positive). • Contribution to local economy (positive). • Conflicted land uses. • Nuisance from noise, dust and increased traffic. • Safety and security. • Damage to property or equipment
Historical and Cultural Resources	• Damage to heritage resources.
Watercourses	• Damage to the structure and functioning of watercourses due to construction activities • Direct loss, disturbance and degradation of wetlands • Increased bare surfaces, runoff and potential for erosion • Degradation of wetland and riparian zone vegetation and the introduction and spread of alien and invasive vegetation • Increased sediment loads to downstream reaches

Feature	Impact
	• Contamination of watercourses with hydrocarbons due to leaks and spillages from machinery, equipment & vehicles • Disruption of wetland soil profile and alteration of hydrological regime

10.3.2 Operation Phase

Refer to **Table 12** below for the potentially significant impacts associated with the activities and environmental aspects for the operational phase.

Table 12: Potentially significant environmental impacts for Operational Phase

Feature	Impact
Land Use	• Servitude restrictions and inspections. • Operation and maintenance functions.
Topography	• Visual impacts from disturbed areas and permanent infrastructure • Crossing topographic features (watercourse crossings) • Erosion of affected areas
Flora	• Encroachment by exotic species through inadequate eradication programme
Aesthetics	• Visibility of pipeline servitude and associated infrastructure • Inadequate reinstatement and rehabilitation of construction footprint
Socio – Economic	• Improved water supply to local towns and communities (positive) • Generation of employment opportunities for local community (positive) • Safety and security issues through improper access control during inspections and maintenance activities • Use of local road network for operation and maintenance purposes
Existing Structures & Infrastructure	• Servitude restrictions.

11 SENSITIVE ENVIRONMENTAL FEATURES

Within the context of the project area, cognisance must be taken of the following sensitive environmental features for which mitigation measures are included in the BAR and EMPr:

- All watercourses situated within the project area, including the Vaal River, Steenbok River, Klein Riet River, Groenwaterspruit and Olifantsloop and their tributaries, as well as all wetlands and pans, are regarded as sensitive and require suitable protection from the construction and operational activities.
- Heritage and archaeological sites, as identified through the Heritage Impact Assessment, that are situated in relative close proximity to the project infrastructure, are protected in terms of the NHRA and shall be suitably safeguarded. The specialist indicated that graves were found at two localities close to the proposed route, the first at 28^0 23' 35.8"S; 24^0 16' 13.2" E which is approximately 45 meters from the new proposed route, at a turn pipe near an open valve. The second was at 28^0 17' 34.0" S; $23^0$20' 26.3" E, an old cemetery, which lies beyond the proposed route, but noted here for precautionary measures to be put in place. Under NHRA 25 (1999) a permit is required to remove or destroy a grave or headstone marker outside a formal cemetery. A buffer of at least 30 m is recommended, with fencing to protect such graves.
- Flora and fauna Species of Conservation Concern that are known to naturally occur in certain areas of the project footprint were identified during the Terrestrial Ecological Impact Assessment. The proposed pipeline also traverses CBA 1, CBA 2, ESAs and other natural areas. All project activities that may impact on Species of Conservation Concern shall comply with NEM:BA (and associated Regulations), National Forest Act (Act No. 84 of 1998), Northern Cape Conservation Act (Act No. 9 of 2009), as well as the mitigation measures identified as part of the Terrestrial Ecological Impact Assessment.
- The dominant land use in the study area is animal grazing. Irrigated land is situated at Ulco and is a maximum of 1,3 hectares. There is an uncultivated strip of 25m between the pipeline and the irrigated lands and construction vehicles shall remain in this strip to prevent impacts to the irrigated land. Agricultural / farming infrastructure types, such as buildings, poultry, reservoirs and dams are located in close proximity to the pipeline construction servitude. Specific mitigation measures for managing impacts to farming practices are provided in the Agricultural Impact Assessment, which shall be adhered to.
- Specific measures shall be implemented to prevent erosion at all steep areas, such as the low mountains encountered from Lime Acres to Postmasburg, and to avoid or minimise impacts to koppies that occur at the end of the pipeline route, at the Olifantshoek reservoir in Olifantshoek.
- The safety and security of the public is of paramount importance and shall not be compromised by the activities associated with the construction and operational phases.
- Measures provided in the EMPr shall be implemented to safeguard all traffic and pedestrians on the public and private roads.

- All existing infrastructure and structures along the proposed pipeline shall be safeguarded from construction activities until they have been relocated, where avoidance is not possible. This shall take place in consultation with the owners or custodians of the infrastructure.

The sensitivity map shown in **Figure 3** below need to be made available to the implementation team (including the Project Manager, ECO and Contractor) in GIS format to allow for further consideration and adequate interpretation at an appropriate scale.

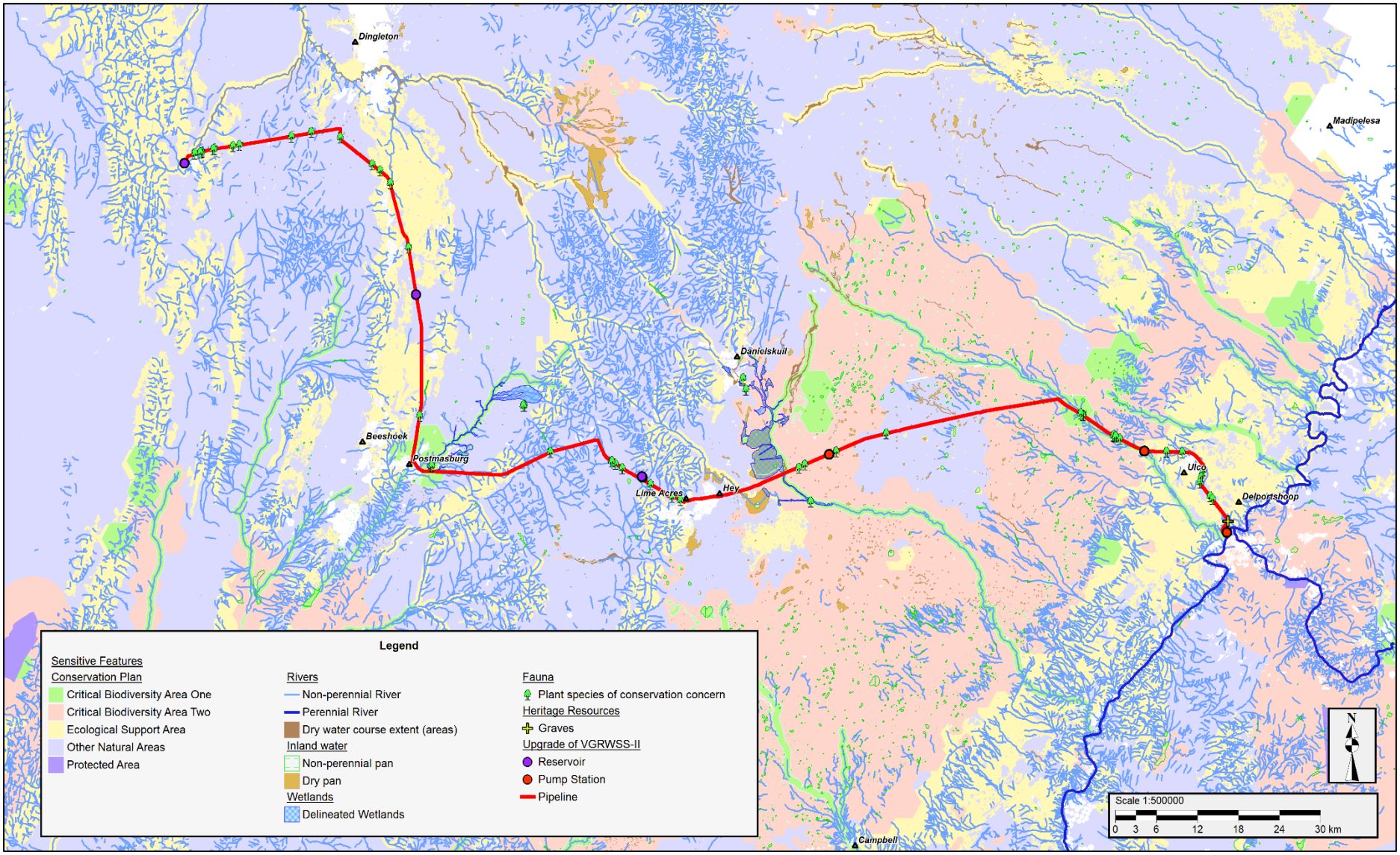

Figure 3: Overall Sensitivity Map

12 IMPACT MANAGEMENT

12.1 Introduction

The framework for the subsequent management measures consists of the following:

- **Management objectives** – i.e. desired outcome of management measures for mitigating negative impacts and enhancing the positive impacts related to project activities and aspects (i.e. risk sources);
- **Targets** – i.e. level of performance to accomplish management objectives;
- **Management actions** – i.e. practical actions aimed at achieving management objectives and targets;
- **Responsibilities**; and
- **Monitoring requirements**.

12.2 General Environmental Requirements

General environmental requirements during the remainder of the project life-cycle (excluding decommissioning) include the following:

- The design needs to consider and incorporate environmental requirements and sensitive environmental features.
- Define and communicate roles and responsibilities for the implementation of the EMPr;
- Undertake negotiations and confirm arrangements with landowners and/or land users regarding:
  - Use of all private roads, with associated traffic arrangements;
  - Land occupancy (construction facilities);
  - Domestic animals (avoiding impacts to livestock);
  - Wildlife;
  - Protocol for lodging complaints/grievances;
  - Possible loss of access;
  - Existing structures and infrastructure (including temporary and permanent water management structures and infrastructure);
  - Fencing and gate dimensions for traversing servitude;
  - Traversing patterns of game and livestock;
  - Access to game and livestock drinking points;
  - Security;
  - Opening and closing of gates and access to private property; and
  - Claims' procedure for damage to property and assets (including game and livestock).
- Ensure that all existing structures within the construction area are identified and recorded.

- Properties may not be accessed for construction purposes unless consent has been granted by the landowner, or until the land acquisition process has been concluded
- Apart from the planned crossings, the project components shall avoid watercourses (as far as possible), with suitable buffers (minimum of 32 m) and mitigation measures in place.

12.3 Pre-construction Phase

The planning or pre-construction phase largely entails conducting the necessary specialist studies, determining the site layout and carrying out the requisite environmental processes to obtain authorisation. This phase will also include conducting environmental baseline studies for various parameters for management of impacts and record purposes.

12.3.1 Specialist Environmental Investigations

Management Objective:

Identify sensitive and protected environmental features in addition to those that have been identified as part of the BA Process.

Target:

1. All sensitive and protected environmental features to be identified in the construction domain (all the components of the project).
2. All relevant approvals to be obtained prior to relocation of red data, protected and endangered flora and fauna species, medicinal plants, heritage resources and graves.

Management Actions:

- As far as possible, avoid disturbance to plant Species of Conservation Concern and protected species along the pipeline servitude, such as *Olea europea* subsp. *africana*, *Boscia albitrunca*, *Vachellia (Acacia) erioloba*, *Boophone disticha, Lithops spp.* and *Nymania capensis* etc.).
- Permits from DAFF and Northern Cape Department of Environment and Nature Conservation (DENC) are required before construction commences in order to cut, disturb, destroy or remove the several protected trees (noted within the project area), namely *Boscia albitrunca* and *Vachellia (Acacia) erioloba*.
- It is recommended that a suitably qualified Ecologist (or a similarly qualified individual) be appointed to undertake a pre-construction walk-down to identify plant Species of Conservation Concern and protected species (such as *Boophone disticha, Lithops spp.* and *Nymania capensis* etc.) and oversee the rescue and relocation of these species. For flora species, the following factors need to be considered amongst others) as part of this process:
  - Detailed plan of action (including timeframes, methodology and costs);
  - Site investigations;
  - Consultation with authorities and stakeholders;

- Marking of species to be relocated;
- Applying for permits (Northern Cape DENC);
- Identification of suitable areas for relocation;
- Aftercare; and
- Monitoring (including targets and indicators to measure success).

- In order to protect animal species under Schedule 1 *specially protected species* and Schedule 2 *protected species* of Northern Cape Nature Conservation Act (Act 9 of 2009) on or around the site, prior to construction, these species must be removed and relocated to natural areas in the vicinity. This remedial action requires the engagement of a herpetologist/ecologist or a suitably qualified environmental officer to oversee the removal of any fauna during the initial ground clearing phase of construction (i.e. initial ground-breaking by earthmoving equipment).
- A walk down survey needs to be conducted prior to construction in order to identify possible burrowing animals.
- Graves were found at two localities close to the proposed route, the first at 28^0 23' 35.8"S 24^0 16' 13.2" E which is approximately 45 meters from the new proposed route, at a turn pipe near an open valve. The second was at 28^0 17' 34.0" S $23^0$20' 26.3" E, an old cemetery, which lies beyond the proposed route, but noted here for precautionary measures to be put in place. A buffer of at least 30 m is recommended, with fencing to protect these graves.

Responsibilities:

- Sedibeng Water to appoint suitably qualified specialists.
- Specialists to execute the management actions.

Monitoring Requirements:

Approvals, permits and licences shall be in place with due consideration to the project programme.

Implementation Timeframe:

Prior to any construction activities.

12.3.2 Approvals, Permits and Licensing Requirements

Management Objective:

Compliance with applicable legislation to prevent unauthorised activities and negative impacts to protected environmental features.

Target:

Obtain requisite approvals for the relevant protected environmental features.

Management Actions:

- Apply for permit from DEFF in terms of the NFA, and a permit from DENC for protected trees that are to be cut, disturbed, damaged, destroyed or removed. Applications must be submitted at least 2 months prior to construction to allow sufficient time for the processing of such applications.
- Apply for permit from SAHRA/Ngwao-Boswa Jwa Kapa Bokone if heritage resources are to be impacted on (relocated or destroyed), and for the removal of graves.
- Seek approval from the Department of Mineral Resources (DMR) in terms of the NEMA and the MPRDA for all required borrow pits.
- Seek authorisation from DWS for water uses in terms of Section 21 of the NWA.
- Seek all other approvals, permits and licenses required for the project, in accordance with the protocols prescribed by the governing bodies.
- Approvals are to be in place prior to the potential impacts to the protected environmental features.

Responsibilities:

- Sedibeng Water to appoint suitably qualified specialists.
- Specialists to seek and obtain relevant approvals.

Monitoring Requirements:

Approvals, permits and licences are to be in place with due consideration to the project programme.

Implementation Timeframe:

Prior to any potential adverse impacts to protected environmental features, based on legal provisions and requirements of mandated authorities.

12.3.3 Administrative Requirements

Management Objective:

Ensure that all administrative measures and arrangements associated with the compliance with the Environmental Authorisation and EMPr are in place.

Target:

- Administrative measures and arrangements are confirmed, checked and maintained.
- Document control procedure is in place, in accordance with the Environmental Management System to be employed on site.

Management Actions:

- Adequate financial provision is made for the implementation of the conditions of the Environmental Authorisation and the mitigation measures contained in the EMPr. Differentiate between those requirements that relate to the Proponent, Contractor, environmental team and other responsible parties.
- Document control procedure shall be provided and adhered to.
- Filing system shall be provided and maintained.

Responsibilities:

- Proponent – administrative provisions for compliance.
- Engineer and ECO - to monitor compliance.
- Contractor – administrative provisions for compliance.

Monitoring Requirements:

- Document control procedure.
- Filing systems.
- Financial provisions (e.g. bill of quantities, budgets, etc.).

Implementation Timeframe:

Throughout the duration of the construction period.

12.3.4 Construction Site Planning and Layout

Management Objective:

Proper planning and layout of the construction domain to ensure protection of sensitive environmental features. Refer to sensitive features highlighted in **Section 11**, findings from pre-construction survey, further environmental studies, etc.

Target:

1. No negative impacts to sensitive environmental features as a result of poor construction site planning and layout.
2. The entire construction footprint shall be included in the pre-construction survey.

Management Actions:

- Conduct a pre-construction survey of the area to be affected by construction activities. This shall include site investigations with photographic records.
- Suitable specialist(s) shall identify sensitive environmental features (including fauna, flora, watercourses and heritage sites) where special care needs to be taken, and implement the required suitable mitigation measures to safeguard these features (e.g. barricading, signage

and awareness creation). Refer to the findings of the specialist studies contained in Appendix G of the Basic Assessment Report.

- A suitable specialist shall identify protected plants and trees. Any protected plants or trees in proximity to the construction domain that will remain, must be marked clearly (danger tape, fencing, etc.) and must not be disturbed, defaced, destroyed or removed, unless otherwise specified by the Engineer. Acquire the necessary permits under the NFA if avoidance of protected trees is not possible.
- Access to mining properties along the pipeline route must be arranged in terms of the Mine Health and Safety Act (Act. No. 29 of 1996) and the MPRDA. It is thus recommended that engagement is carried out with the directly and adjacently affected individual mines, at the earliest opportunity where construction is required on or near the mine premises, so that site specific access requirements, in compliance to prevailing mining safety requirements, may be established and adhered to from the outset.
- The Contractor shall produce a site plan for the approval of the Engineer prior to the establishment of the site, which aims to identify construction activities, facilities and structures in relation to sensitive environmental features. This plan will serve as a spatial tool that facilitates the execution of the construction phase with due consideration of sensitive environmental features. The plan shall show the following (as relevant):
    - Buildings and structures;
    - Contractors' camp and lay down areas;
    - Site offices;
    - Site laboratories;
    - Batching plants;
    - Crusher plants;
    - Access/haul routes;
    - Gates and fences;
    - Essential services (permanent and temporary water, electricity and sewage);
    - Solid waste storage and disposal sites;
    - Site toilets and ablutions;
    - Hazardous waste storage and disposal sites;
    - Firebreaks;
    - Excavations and trenches;
    - Cut and fill areas;
    - Topsoil stockpiles;
    - Spoil areas;
    - Construction material stores;
    - Vehicle and equipment stores;
    - Workshops;
    - Wash bays;
    - Fuel stores;
    - Hazardous substance stores;
    - Sensitive environmental features; and

- Any other activities, facilities and structures deemed relevant.

Responsibilities:

- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Photographic record as part of the pre-construction survey of areas to be affected by construction activities.
- Approved site plan.
- Barricading and signage.
- Records of awareness creation.

Implementation Timeframe:

Prior to the establishment of any construction site for the overall project.

12.3.5 Environmental Awareness Creation

Management Objective:

Ensure that the Contractor, construction workers and site personnel are aware of the relevant provisions of the EMPr, sensitive environmental features and agreements made with the affected landowners and community members.

Target:

1. All construction workers and employees are to have completed appropriate environmental training before being allowed on the construction site.
2. A record of environmental training undertaken shall be kept on site.

Management Actions:

- Environmental Training and Awareness Programme shall be developed, which is to be approved by the Engineer/ECO.
- The Contractor shall arrange that all of his employees and those of his sub-contractors go through the project specific environmental awareness training courses before the commencement of construction and as and when new staff or sub-contractors are brought on site.
- The environmental training is compulsory for all employees and structured in accordance with their relevant rank, level and responsibility, as they apply to the works and site.

Responsibilities:

- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Records of environmental training and awareness creation.

Implementation Timeframe:

Throughout the duration of the construction period.

12.3.6 On-going Consultation with Community and Affected Parties

Management Objective:

- Establish and maintain a record of all complaints and claims against the project and ensure that these are timeously and effectively verified and responded to.
- Adhere to agreements made with Local Authorities, individual landowners and community members regarding communication.

Target:

1. All complaints and claims shall be acknowledged within 5 working days and shall be responded to within 10 working days of receipt, unless additional information and / or clarification are required.
2. No deviations from agreements made with individual landowners and community members.

Management Actions:

- Establish lines of communications with landowners and community members.
- Existing communication channels shall be duly respected and adhered to when engaging with communities.
- Establish processes and procedures to effectively verify and address complaints and claims received.
- Complaints or liaison with landowners and community members with regard to environmental aspects, compensation or disturbance to activities or animals, shall be recorded, reported to the correct person and a record of the response shall be entered in the complaints register.
- Provide the relevant contact details to landowners and community members for queries / raising of issues or complaints.
- Inform the directly and adjacently affected landowners of the construction programme in relation to the affected properties.

- Agreements made prior to construction with respect to property access, the duration of construction and the impacts on the land shall be adhered to by both the landowner and the contractor.
- All negotiations and payments relating to compensating affected landowners for the permanent servitude, shall be conducted and concluded before construction begins.
- The loss of productive land or of business value shall be handled in terms of prevailing RSA legislation.
- Provide all information, especially technical findings, in a language that is understandable to the general public.
- Promptly deal with any raised expectations amongst communities regarding perceived benefits associated with the project, through a process of communication and consultation.
- Where necessary always provide prompt and clear feedback to communities.

Responsibilities:

- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.

Implementation Timeframe:

Throughout the duration of the construction period.

12.4 Construction Phase

12.4.1 Management of Security

Management Objective:

The safety and security of the public is of paramount importance and shall not be compromised by the activities associated with the construction phase.

Target:

- No security related incidents associated with the labour force and construction activities.

Management Actions:

- Involve the local Community Policing Forums or other security associations (i.e. Olea Safety Group / Veiligheidsgroep).
- Ensure suitable management of the labour force to prevent security-related issues or disturbance to landowners and community members.
- A security policy shall be developed which amongst others requires that permission be obtained prior to entering any property and provisions controlling trespassing by contractor staff.
- Only security staff shall be allowed to reside at contractor camps.
- The camp sites for the project and the non-longitudinal construction sub-site components shall be fenced for the duration of construction.
- The Contractor shall establish crime awareness programmes at the site camps.
- See requirements in EMPr for *Management of Labour Force* and *Management of Health and Safety*.
- See requirements in EMPr for *Management of Access* and *Fencing Arrangements*.

Responsibilities:

- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Intact fencing along construction servitude.
- Public complaints register.
- Contractor's method statement.

Implementation Timeframe:

Throughout the duration of the construction period.

12.4.2 Site Clearing

Management Objective:

- Manage environmental impacts associated with site clearing.
- Ensure that only areas that are specifically required for the construction purposes are cleared.

Target:

No damage shall be caused to sensitive environmental features outside of the demarcated construction areas, including marked and barricaded heritage resources, protected trees, watercourses, cultivated areas, structures and infrastructure.

Management Actions:

- A Method Statement shall be developed, which will provide the details of how site clearing will be executed.
- Restrict site clearing activities to the construction area / domain.
- Maintain barricading around sensitive environmental features until the cessation of construction works.
- Avoid any disturbance to demarcated sensitive environmental features.
- Suitably experienced personnel (relevant to the potentially affected environmental features) shall monitor the clearing activities, with particular focus on heritage resources and graves, as well as protected fauna and flora species.

Responsibilities:

- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- No clearing outside of construction domain.
- Intact fencing for construction servitude.
- Intact barricading of sensitive environmental features.
- Public complaints register.
- Approved Contractor’s method statement.

Implementation Timeframe:

Prior to and during clearing of any construction site.

12.4.3 Site Establishment

Management Objective:

Minimise negative environmental impacts associated with site establishment.

Target:

1. No deviations from agreements made with individual landowners and community members.
2. No damage to sensitive environmental features outside demarcated construction areas during site establishment.
3. Site layout approved by Engineer.
4. No access or encroachment into no-go areas.
5. No justifiable complaints regarding general disturbance and nuisance received from the affected landowners and community members.

Management Actions:

- The Contractor shall produce a site plan for the approval by the Engineer prior to the establishment of the site, which aims to identify construction activities, facilities and structures in relation to sensitive environmental features. This plan will serve as a spatial tool that facilitates the execution of the construction phase with due consideration of sensitive environmental features (based on specialist studies and findings from walk-down survey).
- Locate construction camps in areas as agreed with the affected landowners and where sensitive environmental features will not be impacted on.
- Facilities and structures shall be located with due cognisance of the terrain and geographical features of the project site.
- Positioning of the storage and lay-down areas shall aim to minimise visual impacts.
- Maintain barricading around sensitive environmental features until the cessation of construction works.
- Control the movement of all vehicles and plant (including suppliers), such that they remain on designated routes and comply with relevant agreements.
- Ensure noise levels of construction activities and equipment are within their lawfully acceptable limits as per SANS 10103.
- Minimise public disturbance from lighting of the construction camp and site. For example, proper design of the placing (zones), height, type, direction (inward rather than outward) and intensity of floodlights, without compromising safety.
- Land required for the construction servitude shall be acquired in accordance with prevailing statutory requirements
- See requirements in EMPr for *Management of Flora*.

Responsibilities:

- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Intact barricading of sensitive environmental features.
- Intact fencing for construction servitude.

- Public complaints register.
- Contractor's method statement.
- Secured construction servitude.

Implementation Timeframe:

Prior to and during site establishment.

12.4.4 Management of Existing Services and Infrastructure

Management Objective:

- Prevent impacts to existing services.
- Adhere to agreements made with owners/custodians of the services.

Target:

1. No unwarranted complaints regarding adverse impacts to existing services and infrastructure.
2. No adverse impacts to existing services and infrastructure.
3. All relevant approvals shall be obtained prior to working within existing servitudes (including roads, railway line, power lines, telephone lines, etc.).

Management Actions:

- Identify and record all existing services.
- Conform to requirements of relevant service providers. Agreements to be in place prior to construction in affected areas.
- Implement cathodic protection and AC mitigation measures, where necessary.
- Ensure access to infrastructure is available to service providers at all times.
- Immediately notify service providers of disturbance to services. Rectify disturbance to services, in consultation with service providers. Maintain a record of all disturbances and remedial actions on site.
- Notify landowners of any disruptions to essential services.
- Relocate landowners' existing services (e.g. reticulation, irrigation lines, power lines), where possible, to accommodate construction activities.
- Land acquisition and compensation shall adhere to prevailing legal framework and international guiding principles.
- Liaise with property owners to ensure that existing infrastructure is recorded and any damage repaired satisfactorily or compensated for.
- Adequate reinstatement and rehabilitation of affected environment.
- If there is a risk of damage taking place on a property as a result of construction, a condition survey shall be undertaken prior to construction and record maintained.
- The contractor shall make good and acknowledge any damage that occurs on any property as a result of construction work.

- Provide a channel through which communities can route grievances or concerns regarding service disruption as a result of the project.
- Regularly monitor the effect that the project has had on existing infrastructure facilities and social services within the host community.
- See requirements in EMPr for *Management of Waste*, and *Management of Access and Traffic*

Responsibilities:

- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Contractor's method statement.
- Agreements with owners of services.

Implementation Timeframe:

Throughout the duration of the construction period.

12.4.5 Management of Access and Traffic

Management Objective:

- Ensure that all construction vehicles use only dedicated access routes to construction sites.
- Ensure proper access control.
- Prevent unlawful access to the construction domain.
- Adhere to agreements made with individual landowners, community members and mines regarding access.
- Ensure the safety of all road users by implementing proper signage and traffic control measures.
- Limit construction-related nuisance to service nodes.

Target:

1. No reports of construction vehicles using other unauthorised routes.
2. No complaints regarding blocking of access to properties.
3. No direct harm to livestock/game/wild animals due to inadequate access control.
4. No transporting of unsafe loads. Permits are to be obtained for abnormal loads.
5. No speeding.
6. No accidents.

Management Actions:

- Ensure compliance with biosecurity protocols (as relevant) of affected properties, in relation to the construction on the related properties.

- Temporary access roads must follow existing tracks and farms roads, as far as possible.
- Investigate and consult farmers and local communities on the need to provide suitable access points around the construction sites for people and animals.
- Undertake negotiations and confirm arrangements with the private landowners regarding the use of private roads and associated traffic arrangements.
- Ensure compliance with the Mine Health and Safety Act (Act. No. 29 of 1996) and MPRDA, and adherence to individual arrangements and site specific access requirements of mining properties along pipeline route.
- Selective upgrade of the relevant access roads shall ensure that they are capable of accommodating the type of vehicles and/or mechanical plant using these roads.
- Obtain the necessary approvals from the Northern Cape Department of Roads and Public Works, and any other Roads Authority, as required.
- Temporary access roads constructed shall be suitably rehabilitated.
- All possible efforts must be made to avoid slow growing protected trees for the construction of temporary facilities, especially large *Boscia albitrunca* trees and impacts on the woodland of provincially protected Wild Olive *Olea europaea* subsp. *africana* trees must be avoided/minimised as far as possible.
- Ensure temporary accommodation of traffic where any public or private roads are to be affected by construction activities.
- Ensure that, at all times, people have access to their properties as well as to social facilities such as schools, churches, transport, shops, etc.
- Strict adherence to speed limits by construction vehicles on the public and private access roads. Appropriate speed limits shall be posted on all access roads according to the geometric design and limitations of heavy vehicles.
- The access roads shall provide sufficient width for heavy vehicles to navigate around curves in the road.
- Ensure appropriate traffic safety measures are implemented to make provision for blind rises and sharp bends on relevant roads to be used by construction vehicles in the construction domain.
- The payloads delivered by heavy vehicles shall be recorded and audited to prevent overloading of heavy vehicles.
- Abnormal load permits shall be acquired for the transport of abnormal loads.
- Traffic shall be accommodated according to the South-African Road Traffic Signs Manual standards where any construction affects an existing road.
- Time restrictions for delivery vehicles through built-up and socially sensitive areas.
- Access roads shall be maintained in a suitable condition.
- Clearly mark pedestrian-safe access routes within the construction areas.
- Suitable erosion protective measures shall be implemented for access roads during the construction phase.
- Traffic safety measures (e.g. traffic warning signs, flagmen) shall be implemented where applicable.
- Clearly demarcate all construction access roads.

- Proper access control shall be maintained to prevent livestock from accessing construction areas.
- Consult with property owners, local authorities, communities and affected mining properties to ensure that all affected parties are informed of the timing and extent of any disruptions.
- A continuous condition survey of the local roads to be used during the construction phase must be made.
- Delivery routes shall be defined and adhered to during the construction phase.
- Maintenance of local roads shall take place during the construction phase, ensuring that the local roads used by the contractor are left in the same or better condition than they were prior to the start of construction.
- See requirements in EMPr for *Fencing Arrangements*.
- See requirements in EMPr for *Construction Site Planning and Layout*

Responsibilities:

- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Signage displayed and maintained.
- Contractor's method statement.
- Maintenance of access control to construction sites.
- Maintenance of private and public access roads.

Implementation Timeframe:

Throughout the duration of the construction period.

12.4.6 Fencing Arrangements

Management Objective:

- Protect and maintain existing fences.
- Fencing arrangements to adequately protect livestock/game animals from construction activities.
- Adhere to agreements made with individual landowners and/or land users regarding fencing.
- Minimise disturbance to animals.

Target:

1. No deviations from agreements made with individual landowners and/or land users regarding fencing.
2. No direct harm to public / livestock / game animals due to inadequate fencing arrangements.

3. Disturbed or damaged fencing to be reinstated / replaced to meet pre-existing conditions.

Management Actions:

- Any damaged fencing shall be replaced to meet pre-existing conditions.
- All fences erected for construction purposes (e.g. fences around camp sites, fencing around trenches, fence along construction servitude, etc.) shall be inspected on a daily basis to detect whether any damage has occurred. Damaged fences / barricading shall be repaired immediately.
- On farms or in areas where livestock / game occur, erect fences according to appropriate specifications (depending on the type on animals that occur on the farms) for the construction camps and construction servitude to protect animals from construction-related activities.
- Fences to be constructed over dongas or streams shall meet specific requirements as fences over such features can become insecure and lead to the escape of valuable animal or provide access to predators.
- Where necessary, game screens shall be erected to minimise construction-related impacts (e.g. noise) to animals on game farms.
- Fence failure and escape of wildlife into the construction corridor during the construction phase shall be reported to the relevant rancher/farmer immediately.
- Fence failures during the construction phase shall be fixed immediately.

Responsibilities:

- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Agreements with landowners.
- Fencing register.

Implementation Timeframe:

Throughout the duration of the construction period.

12.4.7 Management of Labour Force

Management Objective:

- Ensure suitable management of the labour force to prevent security-related issues or disturbance to landowners and community members.
- Optimise the use of local labour.
- Provide a work environment that is conducive to effective labour relations.

Target:

1. No complaints from landowners and community members regarding trespassing or misconduct by construction workers.
2. All unskilled labour to be sourced from local area.

Management Actions:

- Prohibit trespassing of construction workers on private property.
- Workers shall be provided with identity cards and must wear identifiable clothing.
- Creating nuisances and disturbances in or near communities shall be prohibited.
- Machine / vehicle operators shall receive clear instructions to remain within demarcated access routes and construction areas.
- Ensure that operators and drivers are properly trained and make them aware, through regular toolbox talks, of any risk they may pose to the community. Place specific emphasis on the vulnerable sector of the population such as children and the elderly.
- Designated smoking areas shall be provided, with special bins for discarding of cigarette butts.
- Establish a 'labour and employment desk' in consultation with local authorities, which shall not to be situated at the site.
- Promote equal job opportunities for women and men during the construction and operational processes.
- Develop a grievance procedure, which also needs to address gender matters.
- Local SMMEs shall be given an opportunity to participate in the construction of the project through the supply of services, material or equipment.
- A procurement policy promoting the use of local business where possible shall be put in place and applied throughout the construction and operational phases of the project.
- The main contractor must employ non-core labour from the sub-places as far as possible during the construction phase.
- The principles of Expanded Public Works Programme can be used during construction.
- Prioritise and articulate gender inclusivity and equity in the project documents by including specific strategies and guidelines for implementation.
- Where possible use labour-intensive methods of construction.
- Use local labour as far as possible.
- Implement applicable training of labour to benefit individuals beyond the completion of the project.
- Liaise with the South African Police Services (SAPS) and Community Policing Forums to ensure that construction sites are monitored.
- Prevent loitering within the vicinity of the construction camp as well as construction sites.
- Communicate the limitation of opportunities created by the project through the Ward Councillors.

- Draw up a recruitment policy in conjunction with the Ward Councillors of the area and ensure compliance with this policy.
- Liaise with the appropriate local authorities to ensure that they are aware of the increase of population.
- Include a section in the induction programme for incoming construction workers that cover local traditions and practices.
- Ensure the infrastructure and social facilities within the host communities will not be compromised with the arrival of additional people into the area.
- All employment of locally sourced labour shall be controlled on a contractual basis. If possible, and if the relevant Ward Councillors deem it necessary, the employment process must include the affected Ward Councillors.
- People in search of work may move into the area, however, the project will create a limited number of job opportunities. Locally based people must be given opportunities and preferences over others.
- No staff accommodation must be allowed on site (except for security personnel).
- Spaza shops may open next to the site as a consequence of construction. These must be controlled by the contractor to limit their footprint and to ensure that the Local Municipality – Informal Trading By-Laws, are complied with.

Responsibilities:

- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Labour-related targets.

Implementation Timeframe:

Throughout the duration of the construction period.

12.4.8 Management of Construction Camps

Management Objective:

Minimise environmental impacts associated with construction camp and eating areas.

Target:

1. No environmental contamination associated with construction camp and eating areas.
2. Minimise visual impact associated with construction camp and eating areas.
3. Prevent socio-economic impacts associated with the construction camp.

Management Actions:

- Erect suitable fencing around the construction camp.
- The construction camp shall not be situated within 100 meters of any water body or within the 1:100 year flood line.
- Provide essential services (including showers, appropriate sanitation and drinking water facilities) at the construction camp. Maintain essential services in a functional state.
- Provide safe potable water for food preparation, drinking and bathing.
- Provide adequate parking for site staff and visitors.
- Open uncontrolled fires will be forbidden at the site camp. Rather, 'contained' cooking mechanisms shall be used (e.g. gas stoves or an enclosed braai facility).
- The cooking area shall be positioned such that no vegetation is in close proximity thereto, including overhanging trees. An area around the cooking area shall be cleared such that any escaping embers will not start an uncontrolled fire.
- Eating areas shall be designated and demarcated.
- The feeding, or leaving of food for animals, is strictly prohibited.
- Allow areas for social interaction.
- Sufficient vermin / weatherproof bins shall be present in this area for all waste material.
- Dish washing facilities shall be provided.
- Ensure that wastewater is appropriately disposed of.
- Locate all storage areas and material laydown sites within predetermined zones as per the approved site plan.
- Keep the camp and all its storage and laydown areas secure and neat at all times.
- Employ appropriate access control measures.
- Suitable security shall be provided at the construction camp at all times.
- Manage storm water from construction camp to avoid environmental contamination and erosion.
- Failure to comply with the general code of conduct, or the rules and procedures implemented at the construction camp will result in disciplinary actions.
- Prohibit the felling of trees for firewood.
- Provide medical and first aid facilities at the camp area.
- Prepare de-establishment plan for construction camp for approval by the Engineer.
- Provide firefighting equipment at the camp area.
- See requirements in EMPr for *Management of Waste, Management of Water, Management of Labour Force, Management of Ablution Facilities, Management of Storage and Handling of Non-Hazardous Material, Management of Workshop and Equipment, Management of Flora, and Management of Fauna etc.*

Responsibilities:

- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.

- Contractor's method statement.
- Waste disposal certificates.
- Service agreements with affected District and Local Municipalities, and other relevant service providers.

Implementation Timeframe:

Period from when the construction camp is created up to de-establishment.

12.4.9 Management of Ablution Facilities

Management Objective:

Minimise environmental impacts associated with ablution facilities.

Target:

1. No environmental contamination associated with ablution facilities.
2. Minimise visual impact associated with ablution facilities.

Management Actions:

- Provide sufficient ablution facilities (e.g. mobile / portable / VIP toilets) at the construction camp and along construction sites, which shall conform to all relevant health and safety standards and codes.
- No pit latrines, french drain systems or soak away systems shall be allowed. Install and maintain conservancy tanks for any site offices, which must comply with any relevant local by-laws and must be serviced by a suitable contractor, as appropriate. The location of conservancy tanks shall be approved by the Engineer.
- Toilets shall not be situated within 50 meters of any water body.
- A sufficient number of toilets shall be provided to accommodate the number of personnel working in any given area. Toilets may not be further than 100 m from any working area. Toilet facilities supplied by the Contractor for the workers shall occur at a maximum ratio of 1 toilet per 15 workers. There must be separate toilets for men and women.
- All temporary / portable / mobile toilets shall be secured to the ground to prevent them from toppling over due to wind or any other cause.
- Ensure the proper utilisation, maintenance and management of toilet, wash and waste facilities.
- The entrances to the toilets shall be adequately screened from public view.
- Ablution facilities shall be maintained in a hygienic state and serviced regularly.
- Toilet paper shall be provided.
- The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that a licensed service provider removes the contents from site. Disposal of such waste is only acceptable at a licensed waste disposal facility (proof of disposal to be provided).
- Should shower facilities be provided for use by staff on site, the following controls shall be imposed:

- Proper positioning of the shower, and specifically its discharge point, shall be carried out to ensure that erosion and build-up of detergents does not occur;
- All discharge from the shower and other washing facilities shall be managed to prevent environmental contamination; and
- Use of the shower facilities shall be limited to staff or authorised persons only.

Responsibilities:

- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Maintenance register for ablution facilities.
- Waste disposal certificates.
- Contractor's method statement.

Implementation Timeframe:

Throughout the duration of the construction period.

12.4.10 Management of Visual Aspects

Management Objective:

- Minimise impacts to the aesthetics / visual quality.
- Ensure that the visual appearance of the construction site is not an eyesore the adjacent areas.

Target:

No verified complaints regarding impacts to visual quality.

Management Actions:

- Advertising and lighting shall be in accordance with relevant standards.
- Lighting shall not constitute an eyesore / hazard to users of the road and the surrounding community.
- Lighting shall be sufficient to ensure security but will not constitute 'light pollution' to the surrounding areas.
- The site will be shielded /screened to minimise the visual impact, where practicable.
- Undertake on-going housekeeping to maintain a tidy construction area.
- After the construction phase, the areas disturbed that are not earmarked for operational purposes (part of infrastructure footprint) shall be suitably rehabilitated.
- See requirements in EMPr for *Management of Reinstatement and Rehabilitation*.

Responsibilities:

- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Contractor's method statement.

Implementation Timeframe:

Throughout the duration of the construction period.

12.4.11 Management of Water

During the construction stage, water will be required for various purposes, such as concrete batching, washing of plant and equipment in dedicated areas, dust suppression, potable use by construction workers, etc.

Management Objective:

- Minimise environmental impacts associated with stormwater as well as water services for construction workers.

Target:

1. No visual evidence of erosion caused by wastewater or stormwater practices.
2. No environmental contamination associated with wastewater or stormwater practices.
3. No water wastage (water conservation).

Management Actions:

- All construction activities to comply with the NWA.
- Water for construction purposes will be sourced from the existing VGRWSS, watercourses or groundwater (boreholes). Water tankers will also supply water to the site. Any water to be sourced directly from natural watercourses or groundwater will require the necessary authorisation in terms of Section 21 of the NWA, as relevant.
- Prevent leakages from pipes or taps.
- Establish a dedicated vehicle maintenance area and wash-bay, where suitable storm water management measures are in place to prevent pollution.
- Manage stormwater from construction site to avoid environmental contamination and erosion.
- Stormwater runoff from workshops, vehicle maintenance area, wash-bay and other potential pollution sources shall be collected and treated in hydrocarbon separation pits/tanks before being discharged in to drains and/or waterways.
- All wastewater discharges shall comply with legal requirements associated with the NWA.
- Wastewater discharges shall form part of water monitoring programme.

- Prevent erosion on access roads due to construction traffic.

Responsibilities:

- Engineer and ECO – to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Water monitoring programme – water use and discharges.
- Contractor's method statement.

Implementation Timeframe:

Throughout the duration of the construction period.

12.4.12 Management of Topsoil

Management Objective:

Ensure suitable removal, storage and transportation of topsoil for re-use during rehabilitation.

Target:

1. At least 95% of recovered topsoil from disturbed areas is to be stored for future use.
2. No visual evidence of erosion from topsoil stockpiles.
3. No visual evidence of erosion from areas where topsoil has been reinstated.

Management Actions:

- Determine the average depth of the topsoil prior to excavations.
- Topsoil from the construction activities shall be stored for post-construction rehabilitation work.
- Identify suitable areas to store topsoil.
- Remove topsoil from areas to be affected by construction activities.
- Establish and demarcate topsoil stockpiling areas, in order to prevent the mixing of topsoil with subsoil and spoil material.
- Topsoil shall be adequately protected from contamination from construction activities and material.
- Protect stored topsoil from compaction.
- Topsoil shall be stored in such a way that does not compromise its plant-support capacity.
- Wind and water erosion-control measures shall to be implemented to prevent loss of topsoil.
- Following the construction phase, the topsoil shall be placed as the final soil layer prior to seeding.
- An ecologically-sound stormwater management plan shall be implemented during construction and appropriate water diversion systems shall be put in place.

- During site preparation, topsoil and subsoil are to be stripped separately from each other.
- Topsoil must be stripped to at least 150mm depth, and stockpiles must not exceed 1.5m in height.
- Topsoil must be stored separately from subsoil and spoil material for use in the rehabilitation phase.
- Stockpiles must be protected from wind and rain related erosion, compaction, as well as contamination from diesel, cement, concrete, wastewater, or any other waste or hazardous substance.
- Records of all environmental incidents must be maintained and a copy of these records must be made available to authorities on request throughout the project execution.
- Topsoil stripped must be stored in such a way that it can be replaced at the same location to limit the mixing of plant species between habitats.
- See requirements in EMPr for *Management of Flora,* and *Management of Reinstatement and Rehabilitation*.

Responsibilities:

- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Condition of topsoil stockpiles.
- Dust and erosion monitoring.
- Rehabilitated areas.
- Contractor's method statement.

Implementation Timeframe:

Prior to site clearing up to when topsoil is used for rehabilitation.

12.4.13 Management of Excavations

Management Objective:

Minimise environmental impacts associated with excavations.

Target:

1. No damage to sensitive environmental features outside construction area during excavations.
2. No harm to people or animals as a result of excavations.

Management Actions:

- Construction activities shall remain within the designated construction area.

- Subsoil and overburden shall be stockpiled separately to be returned for backfilling in the correct soil horizon order.
- Suitable barricading shall be erected around open excavations / trenches, as per the Construction Regulations (2014) or the prevailing legislation. Provide signage as a warning of open excavations.
- Divert runoff away from excavations, where necessary.
- Trench lengths shall be kept as short as practically possible.
- Trench walls shall be stabilised using battering, shoring and bracing or similar techniques depending on the stability of the trench sides.
- Inspect open trenches at least daily to ensure that animals have not become trapped. Such animals will be safely removed and released, where possible. Special equipment for handling of venomous snakes shall be available on site to ensure safe removal.
- Make adequate provision for subsidence.

Responsibilities:

- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Barricading of excavations.
- Excavation register.
- Contractor's method statement.

Implementation Timeframe:

Prior to excavations and up to reinstatement.

12.4.14 Management of Storage and Handling of Non-Hazardous Material

Management Objective:

Effective and safe management of materials on site, in order to minimise the impact of non-hazardous materials on the environment.

Target:

1. No pollution due to handling, use and storage of non-hazardous material.

Management Actions:

- Materials shall be suitably stored to prevent environmental contamination and visual impacts. Storage requirements to be determined based on chemical qualities of material and MSDSs.

- Where required, stored material shall be protected from rain and run-off to avoid environmental contamination.
- Materials shall be appropriately transported to avoid environmental contamination.
- Loose loads (e.g. sand, stone chip, refuse, paper and cement) shall be covered when vehicles travel on public roads.
- Suitable remedial measures, depending on the nature of the contaminant and the receiving environment, shall be instituted for spillages.
- Materials shall be suitably used to prevent environmental contamination.

Responsibilities:

- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Evidence of spillages.
- MSDS register.
- Contractor's method statement.

Implementation Timeframe:

Period during which materials are stored and handled on site.

12.4.15 Management of Storage and Handling of Hazardous Material

Management Objective:

Ensure the protection of the natural environment and the safety of personnel on site, by the correct management and handling of hazardous substances.

Target:

1. No pollution due to handling, use and storage of hazardous material.
2. In the event of a spill, appropriate containment, clean up and disposal of contaminated material. Spills to be cleaned within 24 hours or sooner (depending on the nature of the spill).

Management Actions:

- Hazardous substances shall be stored and handled in accordance with the appropriate legislation and standards, which include the Hazardous Substances Act (Act No. 15 of 1973), Occupational Health and Safety Act (No. 85 of 1993), relevant associated Regulations and applicable SANS and international standards.
- Storage and use of hazardous materials will be strictly controlled to prevent environmental contamination, and will adhere to the requirements stipulated on the MSDSs.
- Appropriate signage shall be displayed at storage areas for hazardous substances.

- Where flammable liquids are being used, applied or stored the workplace will be effectively ventilated.
- No person shall smoke in any place in which flammable liquid is used or stored.
- Install an adequate number of fire-fighting equipment in suitable locations around the flammable liquids store.
- Where flammable liquids are decanted, the metal containers shall be bonded or earthed.
- No flammable material (e.g. paper, cleaning rags or similar material) shall be stored together with flammable liquids.
- Staff that will be handling hazardous materials will be trained to do so.
- Any hazardous materials (apart from fuel) shall be stored within a lockable store with a sealed floor. Suitable ventilation shall be provided.
- All storage tanks containing hazardous materials shall be placed in bunded containment areas with impermeable surfaces. These bunded areas must be able to contain 110% of the total volume of the stored hazardous material.
- MSDSs, which contain the necessary information pertaining to a specific hazardous substance, shall be present for all hazardous materials stored on the site.
- Spill kits will be available for the cleanup of hazardous material spillages.
- Provide secondary containment where a risk of spillage exists.
- Drip trays shall be placed under parked heavy vehicles, equipment and other receptacles of hazardous material to prevent spillages.
- In the event of spillages of hazardous substances the appropriate clean up and disposal measures shall be implemented. Any major incidents to be reported to the DEFF as per the requirements of Section 30 of NEMA.
- Spill reporting procedures shall be displayed at all locations where hazardous substances are being stored.
- Hazardous materials will be disposed of at registered sites or handed to registered hazardous waste disposal facilities for disposal / recycling. Proof of adequate disposal shall be provided.
- Proper and timeous notification will be undertaken of any pollution incidents associated with hazardous materials.

Responsibilities:

- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Evidence of spillages and appropriate reporting.
- MSDS register.
- Training register.
- Waste disposal certificates.
- Contractor’s method statement.

Implementation Timeframe:

Period during which hazardous materials are stored and handled on site.

12.4.16 Management of Waste

Management Objective:

- Minimise negative environmental impacts associated with waste.
- Apply waste management principles to prevent, minimise, recycle or re-use material, with disposal as a last option.

Target:

1. No littering on construction site.
2. Maintain a clean and tidy construction site.
3. A 100% record of all waste generated and disposed of at waste disposal facilities.
4. Valid disposal certificates for all waste disposed.
5. Provision of adequate waste containers that are easily accessible and maintained.
6. Waste bins to be removed and cleaned weekly.

Management Actions:

- Waste management activities shall comply with the NEM:WA.
- The storage of general or hazardous waste in a waste storage facility shall comply with the norms and standards in GN No. R. 926 of 29 November 2013.
- Vermin / weatherproof bins shall be provided in sufficient numbers and capacity to store domestic waste. These bins shall be kept closed to reduce odour build-up and emptied regularly to avoid overfilling and other associated nuisances.
- Where possible, waste shall be separated at source (e.g. containers for glass, paper, metals, plastics, organic waste and hazardous wastes).
- Establish and monitor recycling targets.
- Provide waste skips at the construction areas. These skips shall be sufficient in number, the skip storage area shall be kept clean, and skips shall be emptied and replaced before overflowing or spillage occurs.
- Ensure suitable housekeeping.
- The Contractor shall ensure that no burying, dumping or burning of waste materials, vegetation, litter or refuse occurs. All waste will be disposed of at suitable licensed disposal sites, based on the waste type (general versus hazardous).
- Ensure that waste is transported so as to avoid waste spills *en-route*.
- Asbestos may be encountered during the construction phase. All asbestos material shall be disposed of according to the Asbestos Regulations of 2001. Asbestos shall only be removed by an approved asbestos contractor.

Responsibilities:

- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Waste register.
- Recycling targets.
- Disposal certificates.
- Contractor's method statement.

Implementation Timeframe:

Throughout the duration of the construction period.

12.4.17 Management of Blasting

Management Objective:

Minimise environmental impacts associated with blasting.

Target:

1. Compliance with blasting-related legislation and standards.
2. No blasting-related impacts to existing structures and infrastructure, private property, livestock, wildlife or human health.
3. Blasting operations to be controlled to ensure sound pressure levels are kept below the generally accepted 'no damage' level of 140 decibels.

Management Actions:

- Prior to commencing with blasting activities, the blasting Contractor shall submit a Method Statement which shall comply with the Explosives Regulations (2003) and all relevant SANS standards and health and safety standards for mitigating blasting.
- The Contractor shall employ industry standard methods to control the impact of blasting and limit the risk of damage to buildings and structures by reducing blast vibrations induced in the rock mass, eliminating fly rock and limiting air-blast and noise to acceptable levels.
- Blast mats shall be used wherever there is a risk that fly-rock may result in damage to any infrastructure or where it could result in death or injury of animals, livestock, game, or where damage could be caused to sensitive environmental features.
- Blasting operations shall be controlled to ensure sound pressure levels are kept below the generally accepted 'no damage' level of 140 decibels.
- All explosives shall be transported, stored and handled in accordance with applicable laws and good design engineering and constructions practices.

- Communicate blasting and after-hours construction work on farms where tourism and hunting takes place.

Responsibilities:

- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Noise and vibration levels.
- Public complaints register.
- Contractor's method statement.

Implementation Timeframe:

Prior to blasting up to safe completion of blasting.

12.4.18 Management of Workshop and Equipment

Management Objective:

Minimise environmental impacts associated with workshops and equipment use.

Target:

1. No environmental contamination associated with workshops and equipment use.

Management Actions:

- Maintenance of equipment and vehicles will be performed in such a manner so as to avoid any environmental contamination (e.g. use of drip trays).
- No washing of plant may occur on the construction site. Plant to be washed in dedicated areas.
- Drip trays will be provided for the stationary plant and for the "parked" plant.
- All vehicles and equipment shall be kept in good working order and serviced regularly. Leaking equipment will be repaired immediately or removed from the site.
- Suitable storage and disposal of hydraulic fluids and other vehicle oils (see section on *Management of Storage and Handling of H*azardous *Material*).
- Wastewater from workshop shall be disposed in accordance with the EMPr section on *Management of Water*.

Responsibilities:

- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Evidence of spillages.
- Water monitoring programme – discharges.
- Training register.
- Contractor's method statement.

Implementation Timeframe:

- Period from when the workshop is created up to de-establishment.
- Period during which equipment is utilised.

12.4.19 Management of Pollution Generation Potential

Management Objective:

Ensure that all possible causes of pollution are mitigated as far as possible to minimise impacts to the surrounding environment.

Target:

1. No verified complaints regarding pollution.
2. No measurable signs of pollution.
3. Dust fallout -
    a. Fence line sites = Industrial Band (600 to 1200 mg/m^2/day);
    b. Community sites = Residential Band (< 600 mg/m^2/day);
    c. Comply with ASTM D1739; *SANS 1929, SANS 69.*
2. Particulate matter (PM_{10}) -
    a. 24 hr = 120 µg/m^3 (more than four times a year);
    b. Annual = 50 µg/m^3;
    c. Comply with the National Ambient Air Quality Standards.
3. Noise -
    a. L_{Aeq} (equivalent continuous sound level) during daytime hours (06:00 to 22:00) = 45 dBA;
    b. L_{Aeq} during night-time hours (22:00 to 06:00) = 35 dBA;
    c. Comply with SANS 10103:2008.
4. Blasting operations to be controlled to ensure sound pressure levels are kept below the generally accepted 'no damage' level of 140 decibels.
5. Water quality – construction activities may not cause an adverse impact that results in more than a 10% change in baseline values.
6. All water discharges to comply with legal requirements associated with the NWA, including GN No. 399.

Management Actions:

- **Noise** -
  - The remote nature of the construction domain shall be factored in to the mitigation of noise-related aspects.
  - The provisions of SANS 10103:2008 will apply to all areas at the perimeter of the site, within audible distance of residents. Noise shall be monitored at the nearest sensitive receptor and where the noise is generated.
  - Construction work shall take place during working hours – defined as dawn to dusk on weekdays and dawn to 15:00 on Saturdays. Should overtime work be required that will generate noise, consultation with the affected community or landowner shall take place.
  - No amplified music will be allowed on the site. The use of radios, tape recorders, compact disc players, television sets etc. will not be permitted unless at a level that does not serve as an intrusion to adjacent land-owners.
  - The Contractor will implement preventative measures (e.g. screening, muffling, timing, pre-notification of affected parties) to minimise complaints regarding noise and vibration nuisances from sources such as power tools.
  - Proper design and maintenance of silencers on diesel-powered equipment, systematic maintenance of all forms of equipment, training of personnel to adhere to operational procedures that reduce the occurrence and magnitude of individual noisy events.
  - Where possible material stockpiles shall be placed so as to protect site boundaries from noise from individual operations. If a stockpile is constructed, it shall be at a position and of such a height as to effectively act as a barrier to site noise at any sensitive area, if line of sight calculations show this to be practicable.
  - Environmental noise monitoring shall be carried out regularly to detect deviations from pre-construction noise levels and to enable corrective measures to be taken, where warranted.

- **Dust** -
  - Appropriate dust suppression measures or temporary stabilising mechanisms shall be used when dust generation is unavoidable (e.g. dampening with water, chemical soil binders, straw, brush packs, chipping, etc.), particularly during prolonged periods of dry weather. Dust suppression shall be undertaken for all bare areas, including construction area, access roads, borrow pits, site yard, etc.
  - Note that all dust suppression requirements shall be based on the results from the dust monitoring and the proximity of construction activities to sensitive receptors.
  - The Contractor will take preventative measures to minimise complaints regarding dust nuisances (e.g. screening, dust control, timing, pre-notification of affected parties).

- **Lights** -
  - Prior to construction the position and type of lighting will be planned to ensure that unnecessary light pollution will be eliminated.
  - All lighting installed on site must not lead to unacceptable light pollution to the surrounding community and natural environment (e.g. use of down-lighters).

- **Erosion** -
  - Protect areas of the construction site that are susceptible to erosion (e.g. steep sections), through suitable measures (e.g. watering, planting, retaining structures, commercial anti-erosion compounds, etc.).
  - Any erosion channels caused by construction activities shall be suitably stabilised and rehabilitated.
  - Reasonable efforts must be made to prohibit ponding on surface and to ensure stormwater runoff is channelled from the site. The method used will be appropriate to the expected stormwater flows and the topography and geology of the site.

- **Cement and Concrete Batching** -
  - Cement mixing shall take place on an impervious surface (e.g. cement mixing pit).
  - Batching operations shall take place in a designated area, which will be kept clean at all times.
  - The location of batching plant will be approved by the Engineer, with due consideration of the relevant management measures contained in the EMPr (see EMPr sections on *Site Clearing*, *Site Establishment*, *Management of Water*, *Management of Waste*, etc.).
  - Ensure separation of clean and dirty water from batching plant.
  - Wastewater from batching operations shall be disposed in accordance with the EMPr section on *Management of Water*. Contaminated water will not be discharged to the environment. Prevent overflow from contaminated wastewater storage area.
  - Waste concrete and cement sludge shall be removed on a regular basis (to prevent overflowing) and shall be disposed of at a suitable facility.
  - Unused cement bags will be stored in an area not exposed to the weather and packed neatly to prevent leakage of cement.
  - Used cement bags will be stored so as to prevent windblown dust and potential water contamination. Used bags will be disposed of adequately at a licenced waste disposal facility.
  - Concrete transportation will not result in spillage.
  - Cleaning of equipment and flushing of mixers will not result in pollution, with all contaminated wash water entering the waste water collection system.
  - To prevent spillage onto roads, ready mix trucks will rinse off the delivery shoot into a suitable sump prior to leaving the site.
  - Suitable screening and containment will be in place to prevent windblown contamination from cement storage, mixing, loading and batching operations.
  - All contaminated water and fines from exposed aggregate finishes will be collected and stored in sumps and will be adequately disposed of.
  - All visible remains of excess concrete will be physically removed on completion of the plastering or concrete pouring and disposed of in an acceptable manner.

Responsibilities:

- Engineer and ECO - to monitor compliance.

- Contractor to implement management actions.
- Contractor to conduct environmental monitoring for air quality (dust and PM_{10}), noise and water quality.

Monitoring Requirements:

- Public complaints register.
- Evidence of pollution.
- Review periodic results from environmental monitoring (water quality, noise, vibration, air and dust).
- Contractor's method statement.

Implementation Timeframe:

Throughout the duration of the construction period.

12.4.20 Management of Flora

Management Objective:

- Manage impacts to red data and protected flora species within the construction domain.
- Preserve red data and protected flora species outside of the construction domain.
- Control alien plants and noxious weeds.

Target:

1. No unpermitted disturbance to red data and protected flora species.
2. Ongoing eradication of alien plants and noxious weeds.

Management Actions:

- Comply with the requirements of the Northern Cape Conservation Act (Act No. 9 of 2009), NEMA, NEM:BA, NFA and National Veld and Forest Fire Act (No. 101 of 1998).
- **Loss of CBA and ESAs habitats** -
  - Stockpiling of topsoil, soil, construction material, or establishment of construction camps must take place in previously disturbed areas.
  - The most significant way to mitigate the loss of habitat is to limit the construction footprint within the natural habitat areas remaining. Disturbance of vegetation must be limited to the servitude acquired for the project.
  - Where possible, sensitive habitats must not be cleared and encouraged to grow.
  - Disturbance of vegetation must be limited only to areas of construction.
  - Areas cleared of vegetation must be re-vegetated and re-established prior to contractor leaving the site.

- Removal of alien and invasive plants must be continuous. Removal of plants must be undertaken before they flower or set seed.
- All stockpiles, construction vehicles, equipment and machinery must be situated away from the natural vegetation.
- Prevent contamination of natural areas by any pollution.
- Although it is unavoidable that parts of the project footprint will need to traverse areas of potential high sensitivity, the clearing of vegetation must be limited to the servitude area acquired for the project.
- Topsoil stripped must be stored in such a way that it can be replaced at the same location to limit the mixing of plant species between habitats.

- **Destruction of indigenous flora during site establishment**
  - Vegetation clearing must be kept to a minimum, and this must only occur where it is absolutely necessary and the use of a brush-cutter is highly preferable to the use of earth-moving equipment.
  - Ensure that all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm and this can be achieved through provision of appropriate awareness to all personnel.
  - Disturbance of vegetation must be limited only to areas of construction.
  - Prevent contamination of natural vegetation by any construction activities.
  - Areas cleared of vegetation must be re-vegetated and re-established prior to contractor leaving the site.
  - Proliferation of alien and invasive species is expected within the disturbed areas and they must be eradicated and controlled to prevent further spread.
  - Avoid translocating stockpiles of topsoil from one place to another in order to avoid translocating soil seed banks of alien species.
  - Rehabilitation of all disturbed areas must be an ongoing process and areas must be rehabilitated as soon as construction is completed in that area (i.e. that rehabilitation of the whole pipeline route is not only undertaken once all construction is completed, but rather in incremental sections as construction progresses).

- **Loss of habitat and habitat fragmentation** -
  - The most significant way to mitigate the loss of habitat is to limit the footprint within the natural habitat areas remaining.
  - No structures must be built outside the area demarcated for the development.
  - Where possible, the proposed linear infrastructure must be aligned with existing linear infrastructure or routed through already transformed/degraded areas.
  - Any protected plants close to the site that will remain in place must be clearly marked and may not be defaced, disturbed, destroyed or removed. They must be cordoned off with construction tape or similar barriers and marked as a no-go areas.
  - During construction, the ECO must monitor vegetation clearing on site. Any deviations from the approved plans which will result in the removal of vegetation from additional areas must

first be checked for protected species by the ECO/suitably qualified person. Any protected species present which are able to survive translocation must be translocated to a safe site.
- The ECO/suitably qualified person must translocate any listed species observed within the development footprint which were missed during the pre-construction vegetation walk-through.

- **Encroachment and proliferation of weeds and alien invasive plant species** -
  - Invasive plants (listed in the Terrestrial Ecological Impact Assessment) can be removed manually or with the help of simple tools. This entails damaging or removing the plant by physical action. Different techniques could be used, e.g. uprooting, felling, slashing, mowing, ring-barking or bark stripping. These control options are only really feasible in sparse infestations or on small scale, and for controlling species that do not coppice after cutting. Species that tend to coppice, need to have the cut stumps or coppice growth treated with herbicides following the mechanical treatment. It would be preferable to uproot alien vegetation to limit regrowth after cutting.
  - Topsoil stockpiles, in particular, must be kept free of alien and alien invasive vegetation.
  - Seedlings of many invasive plants continuously appear during construction and when they appear, they must be removed as soon as possible to eliminate costly removal at a later stage. It is easier to remove seedlings when the soil is moist.
  - A 'Tree Popper' can be used to remove shrubs and smaller trees or alternatively, the top growth can be cut off and then the stem and roots can be removed from the soil.
  - For large stands of trees on site should they be too large for physical removal, ring-barking the tree must be considered.
  - A monitoring and eradication programme for invasive alien plants and noxious weeds needs to be developed by a suitably qualified person.
  - Promote awareness of all personnel.
  - Chemical control should only be used as a last resort, since it is hazardous for natural vegetation. It should not be necessary if regular monitoring is undertaken, which must be effective for controlling invasive alien plants.

- **Loss of habitat due to construction activities** –
  - Indigenous plants naturally growing within the project area, but that would be otherwise destroyed during clearing for development purposes, must be incorporated into rehabilitation areas.
  - All areas to be affected by the project will be rehabilitated after construction and all waste generated by the construction activities will be stored in a temporary demarcated storage area, prior to disposal thereof at an approved landfill site. All waste and construction material must be removed post construction prior to rehabilitation.
  - When rehabilitating the construction footprint site, it is imperative that as far as possible the habitat that was present prior to disturbances is recreated or improved, so that faunal species that were displaced by vegetation clearing and construction activities are able to recolonize the rehabilitated area.

  - As much vegetation growth as possible must be promoted within the servitude in order to protect soils and to reduce the percentage of the surface area which is left as bare ground. In this regard special mention is made of the need to use the same indigenous plant species which were destroyed (in the same densities) during construction activities as the first choice during landscaping. In terms of the percentage of coverage required during rehabilitation and also the grass mix to be used for rehabilitation, the EMPr will be consulted for guidance. However, the plant material to be used for rehabilitation must be similar to what is found in the surrounding area.
  - Return topsoil to the same location where it was removed from. Do not mix topsoil between different areas with different species composition.
  - Clear the area of all waste (including inert waste) and contaminated soil in preparation for rehabilitation.
  - Scarify areas to loosen compacted soil.
- All possible efforts must be made to avoid slow growing protected trees for construction of temporary facilities, especially large *Boscia albitrunca* trees known to be hundreds of years old in the Lime Acres and Postmasburg districts, in the Ghaap Plateau vegetation type. Impacts on the woodland of provincially protected Wild Olive *Olea europaea* subsp. *africana* trees must be avoided/minimised as far as possible.
- Where trees can be avoided within the construction servitude, such trees must be barricaded.
- Promote awareness of all personnel.
- See requirements in EMPr for additional control measures for the protection of flora –
  - *Specialist Environmental Investigations*;
  - *Approvals, Permits and Licensing Requirements*;
  - *Construction Site Planning and Layout*;
  - *Environmental Awareness Creation*;
  - *Site Clearing*;
  - *Site Establishment*;
  - *Management of Topsoil*;
  - *Management of Flora*; and
  - *Management of Reinstatement and Rehabilitation*.

Responsibilities:

- Proponent - acquire permits.
- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Permits.
- Targets and objectives established as part of the search, rescue and relocation efforts.
- Barricading of protected flora species.
- Encroachment of invasive alien plants and noxious weeds.

- Successful rehabilitation.
- Contractor's method statement.

Implementation Timeframe:

From pre-construction phase up to end of defects liability period (as relevant for specific management actions).

12.4.21 Management of Fauna

Management Objective:

- Ensure the protection of animals (including wildlife and livestock).
- Adhere to agreements made with landowners and community members regarding animals.

Target:

1. No direct / indirect harm to animals from construction activities.
2. No deviations from agreements made with individual landowners and community members regarding animals.

Management Actions:

- Comply with the requirements of the Northern Cape Nature Conservation Act (Act 9 of 2009), NEM:BA and the Animal Protection Act (No. 71 of 1962).
- **Loss of fauna under Schedule 1 specially protected species and Schedule 2 protected species of Northern Cape Nature Conservation Act (Act 9 of 2009)** -
  - Any lizards, geckoes, agamids, monitors or snakes encountered must be allowed to escape to suitable habitat away from the disturbance. No reptile must be intentionally killed, caught or collected during any phase of the project.
  - Vegetation clearance must, ideally, start during the non-breeding season of fauna populations (i.e. winter).
  - Prior to and during vegetation clearance, any larger fauna species noted must be given the opportunity to move away from the construction machinery.
- **Loss of animal Species of Conservation Concern (Black-footed cat and Southern African Hedgehog)** -
  - All personnel working on the project must participate in an environmental awareness program and this program must include appropriate wildlife avoidance methodologies, such as impact minimisation procedures. Information about the importance and purpose of protecting wildlife must be described in the program.
  - No animals must be intentionally killed.
  - Poaching and hunting must not be permitted in the project site or surrounding areas.
  - Any animals found within excavations must not be harmed, and a suitably qualified person must be called to assist in safely removing the animal from the excavation.

- Any animals found on the servitude must be allowed to leave freely, or a suitably qualified person must be called to assist in moving the animal off-site safely.
- Include mitigation measures identified as part of environmental sensitivity walk down survey.

- **Loss of faunal habitat** –
  - Vegetation outside of the construction servitude is not to be cleared. Construction activities to be limited to the construction servitude only.
  - As far as possible, the existing road network must be utilised to access the construction sites.
  - Revegetation of disturbed areas must be carried out in order to restore habitat availability and minimise soil erosion and surface water runoff whilst re-instating faunal habitat.
  - A suitable rescue and relocation plan must be developed and overseen by a suitably qualified specialist in order to ensure that species loss during pre-construction activities is kept to a minimum.
  - Spills and/or leaks from construction equipment must be immediately remedied and cleaned up so as to ensure that these chemicals/hydrocarbons do not contaminate the soils.
  - Should any smaller animals which are less mobile be observed in the construction site during clearing and construction activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. Construction personnel are to be educated about these species and the need for their conservation.
  - No hunting/trapping or collecting of faunal species is allowed.
  - No fires are allowed on site.
  - Reptiles and amphibians that are exposed during the clearing operations must be captured for later release or translocation by a qualified expert.
  - Any person found deliberately disturbing any animal in any way must face disciplinary measures, following the possible dismissal from the site.

- **Loss and displacement of animals on site** -
  - Regular training of construction workers to recognise threatened animal species will reduce the probability of fauna being harmed unnecessarily.
  - Regular training of construction workers to recognise threatened animal species will reduce the probability of fauna being harmed unnecessarily.
  - The contractor must ensure that no faunal species are disturbed, trapped, hunted or killed during the construction phase.
  - All construction and maintenance vehicles must use properly demarcated and prepared roads. Off-road driving must be strictly prohibited.
  - Strict adherence to speed limits by construction vehicles on the public and private access roads. Appropriate speed limits need to be posted on all access roads according to the geometric design and limitations of heavy vehicles.
  - No fires are allowed on site.
  - No dogs or other domestic pets are allowed on site.

- Fauna species such as frogs and reptiles that have not moved away must be carefully and safely removed to a suitable location beyond the extent of the development footprint by a suitable qualified personnel trained in the handling and relocation of animals.
- It is recommended that, while trenches are open during the construction phase, an appropriately sloping section is made available to allow any trapped animals to escape.
- Inspect open trenches at least daily to ensure that animals have not become trapped. Such animals will be safely removed and released, where possible. Special equipment for handling of venomous snakes must be available on site to ensure safe removal.

- **Disturbance to animals** –
  - Animals residing within the construction area shall not be unnecessarily disturbed.
  - During construction, refresher training must be conducted to construction workers with regards to littering and poaching.
  - The Contractor and his/her employees shall not bring any domestic animals onto site.
  - Toolbox talks must be provided to contractors regarding disturbance to animals. Particular emphasis must be placed on talks regarding dangerous animals such as snakes. Information regarding snake handlers in the region must be displaced on construction camp walls.
- See requirements in EMPr for additional control measures for the protection of fauna –
  - *Specialist Environmental Investigations*;
  - *Approvals, Permits and Licensing Requirements*;
  - *Construction Site Planning and Layout*;
  - *Environmental Awareness Creation*;
  - *Site Clearing*;
  - *Site Establishment*;
  - *Management of Access and Traffic*;
  - *Management of Topsoil*; and
  - *Management of Reinstatement and Rehabilitation*.

Responsibilities:

- Proponent - acquire permits.
- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Permits.
- Contractor's method statement.

Implementation Timeframe:

From pre-construction phase up to end of defects liability period (as relevant for specific management actions).

12.4.22 Management of Watercourses

Management Objective:

- Ensure that the watercourses (rivers and their tributaries, natural channels, drainage lines, wetlands) are protected and incur minimal negative impact to their resource quality (flow, water quality, habitat and aquatic biota).
- Structure and functions of watercourses affected by construction activities to be returned to pre-construction state as part of reinstatement and rehabilitation.

Target:

1. Unaltered downstream flow regime for watercourses affected by construction activities.
2. Downstream water quality to remain within acceptable ranges, as determined through baseline monitoring.

Management Actions:

- **General** -
  - Include mitigation measures identified as part of environmental sensitivity walk down survey.
  - Construction areas shall be demarcated and watercourses marked as “restricted” in order to prevent the unnecessary impacts to these systems.
  - Stormwater channels and preferential flow paths shall be filled with aggregate and/or logs (branches included) to dissipate and slow flows and to limit erosion, as deemed necessary by the Engineer.
  - See requirements in EMPr for additional measures to manage impacts to watercourses, including -
    - *Specialist Environmental Investigations*;
    - *Approvals, Permits and Licensing Requirements*;
    - *Construction Site Planning and Layout*;
    - *Management of Water;*
    - *Management of Pollution Generation Potential*; and
    - *Management of Reinstatement and Rehabilitation.*

- **Site Clearing and Preparation** –
  - Restrict the disturbance footprint to within 25 m on either side of the proposed pipeline route at watercourse crossings.
  - Mark out the positions where the pipeline will enter and exit the 32 m buffer on the boundary of wetlands. Try to reduce the 25 m disturbance footprint and the unnecessary clearing of vegetation on either side of the trench as far as possible when traversing wetlands.
  - Clearly demarcate 32 m buffer on the boundary of wetlands. Apart from the construction works related to watercourse crossings, no other material or equipment shall be stored in the buffer areas.

- Signpost the area beyond the construction footprint in watercourses as environmentally sensitive areas and keep all excavation, soil stockpiling, general access and construction activities out of there areas.
- Limit construction activities at watercourses to the dry season when storms are least likely to wash concrete and sand into wetlands.
- Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash.
- Mixing of concrete must under no circumstances take place in any wetland/watercourse or their buffers. Scrape the area where mixing and storage of sand and concrete occurred to clean once finished.
- Landscape and lightly till (no deeper than 30 cm) denuded areas to encourage vegetation establishment as soon as possible.
- Promptly remove all alien and invasive plant species that may emerge during construction (i.e. weedy annuals and other alien forbs). The use of herbicides is not recommended in or near wetlands or watercourses (opt for mechanical removal).

- **Installation of infrastructure –**
  - At all crossings install sandbags (or other suitable measures) on downstream side of the footprint to trap sediment until construction is completed and vegetation has re-established.
  - Ensure all excess consumables and building materials / rubble is removed from site and deposited at an appropriate waste facility.
  - Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) or construction materials on site (e.g. concrete) in such a way as to prevent them leaking and entering the north-western seep.
  - Mixing of concrete must under no circumstances take place within the permanent or seasonal zones of the wetland or watercourse.
  - Document the soil profile on removal and check the order in which soil is replaced.
  - Ensure that topsoil is appropriately stored and re-applied during trench backfilling.
  - Make sure that the soil is backfilled and compacted to accepted geotechnical standards to avoid flow canalisation along the trench and the potential for sinkhole formation.

Responsibilities:

- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Review periodic results from water quality monitoring and biomonitoring.
- Erosion monitoring.
- Contractor’s method statement.
- Conditions of water use entitlement issued by DWS.

Implementation Timeframe:

- Measures pertaining to the general protection of water resources - throughout the duration of the construction period.
- Measures pertaining to working within the riparian zones of watercourses / wetlands - prior to watercourse crossings up to reinstatement and rehabilitation of affected watercourses.

12.4.23 Management of Heritage and Palaeontological Features

Management Objective:

Comply with legislative requirements with regards to archaeological and cultural resources, as well as graves.

Target:

1. No archaeological, palaeontological, cultural resources or graves to be damaged during construction.

Management Actions:

- Include mitigation measures identified as part of environmental sensitivity walk down survey.
- If fossil remains are discovered during any phase of construction, either on the surface or exposed by new excavations the Chance Find Protocol (see **Section 13**) must be implemented by the ECO in charge of these developments. These discoveries ought to be secured (if possible, in situ) and the ECO ought to alert SAHRA so that appropriate mitigation (documented and collection) can be undertaken by a palaeontologist.
- Should unexpected finds be made (e.g. precolonial burials; ostrich eggshell container cache; or localised Stone Age sites with stone tools, pottery, ash midden with bone/pottery; military remains), reporting by the developer to relevant heritage authority should be immediate.
- Contact: SAHRA (Ms N. Higgins, 021 462 4502) or NC Heritage Resources Authority (Mr Andrew Timothy, 079 036 9294).
- Permits to be obtained in terms of the NHRA if heritage resources are to be impacted on and for the removal of graves.
- Should any remains be found on site that are potentially human remains, apply the chance find procedure as described above. SAPS must also be contacted.
- Additional recommendations provided by SAHRIS, are specified below and must be complied with:
  - No go buffer zone of 30 m must be maintained around the two identified burial grounds of high significance and the four Stone Age sites of medium significance;
  - If it is not possible to avoid the Stone Age sites, a permit in terms of section 35 of the NHRA and Chapter II and III of the NHRA Regulations must be applied for from SAHRA prior to construction occurring. No construction may occur without a permit issued in this regard;
  - If it is not possible to avoid the burial grounds, a social consultation process in terms of section 36 of the NHRA and Chapter XI must be undertaken;

- If relocation of the burials is found to be feasible, along with a full Phase 2 relocation application process including the application of a permit from SAHRA in terms of section 36 and Chapter II and IX of the NHRA must be adhered to in this regard. No relocation of burials may occur without a permit issued in this regard;
- The grave site marked as “Kim Graves 2” is located approximately 70 m from the edge of the proposed development area. The distance of 70 m from the grave site must be maintained and no encroachment of the development may occur;
- If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted as per section 35(3) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule;
- If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule;
- If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA;

Responsibilities:

- Proponent - acquire permits.
- Proponent - appoint Palaeontologist and Heritage Specialist.
- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Permits.
- Contractor’s method statement.
- Officials from relevant heritage authorities (National, Provincial or Local) to be permitted to inspect the site at any time in relation to the heritage component of the management plan.

Implementation Timeframe:

Throughout the duration of the construction period.

12.4.24 Management of Emergency Procedures

Management Objective:

Minimise environmental impacts associated with emergency procedures.

Target:

1. Approved emergency response procedures, where relevant.
2. No site fires to be caused by construction activities and workers.

Management Actions:

- **Fire** -
  - Comply with the National Veld and Forest Fire Act (No. 101 of 1998) and National Veld and Forest Fire Bill (B122B of 1998).
  - Work closely with the local Fire Protection Association. Determine requirements and add to list of emergency telephone numbers. Keep a fire danger index displayed on site and comply with requirements. Fire breaks will be agreed with neighbours and the local Fire Protection Association.
  - Proper emergency response procedure shall be in place for dealing with fires.
  - Burning of waste is not permitted.
  - Suitable precautions will be taken (e.g. suitable fire extinguishers, water bowsers, welding curtains) when working with welding or grinding equipment.
  - All fire control mechanisms (fire-fighting equipment) will be routinely inspected by a qualified investigator for efficacy thereof and shall be approved by local fire services.
  - All staff on site will be made aware of general fire prevention and control methods, and the name of the responsible person to alert to the presence of a fire. The contact details of the emergency services must be displayed and easily accessible on site.
  - No fires are allowed on site.
  - Firebreaks shall be made for construction areas, as required. Dedicated smoking areas to be provided.

- **Accidental Leaks and Spillages** -
  - Proper emergency response procedure shall be in place for dealing with spills and leaks.
  - Ensure that the necessary materials and equipment for dealing with spills and leaks are available on site, where practicable.
  - Remediation of the spill areas will be undertaken to the satisfaction of the Engineer.
  - In the event of a hydrocarbon spill, the source of the spillage will be isolated and contained. The area will be cordoned off and secured. The Contractor will ensure that there is always a supply of an appropriate absorbent material readily available to absorb, breakdown and where possible, encapsulate a minor hydrocarbon spillage.
  - All staff on site will be made aware of actions to be taken in case of a spillage.

- Provide contact details of person and emergency services to be notified in a case of spillages – signage to be displayed at strategic points within the construction domain (e.g. workshop, fuel storage area, hazardous material containers).
- All Major incidents (i.e. uncontrolled release of a hazardous substance, including from a major emission, fire or explosion, that causes, has caused or may cause significant harm to the environment, human life or property) to be reported to DEFF and/or other relevant authorities.

- **Loss of vegetation due to fuel and chemical spills**
  - Appropriate measures must be implemented in order to prevent potential soil pollution through fuel, oil leaks and spills.
  - Ensure construction vehicles are maintained and serviced to prevent oil and fuel leaks.
  - An emergency response contingency plan will be implemented to address clean-up measures should a spill and/or a leak occur.
  - All plant and machinery must be inspected every day, serviced and maintained regularly, and any leaking plant/machinery must be removed from site for repair.
  - Implement measures to avoid leakages and spillages on to bare ground.
  - Emergency on-site maintenance must be done over appropriate drip trays and all oil or fuel must be disposed of according to regulatory requirements. Safe disposal certificates must always be obtained from the registered waste disposal site, and proof of disposal kept on site.
  - Drip-trays must be placed under vehicles and equipment when not in use.
  - Washing and cleaning of equipment must be done within bunded areas, in order to trap any cement and prevent excessive soil erosion. These sites must be re-vegetated after construction has been completed.
  - Spill prevention and emergency spill response plan, as well as dust suppression, and fire prevention plans will be implemented during the construction phase.
  - Spill kits will be made available on site for clean-up of spills and leaks of contaminants.
  - The site must have a suitable area for the safe cleaning of cement contaminated tools and equipment. Cleaning such tools/equipment results in water contaminated with cement, which is hazardous to the environment. Cement contaminated water must not be released or otherwise disposed of into the environment, including stormwater drains. The contaminated water must be contained and allowed to evaporate. The remaining residue can be disposed of as building rubble once dry.
  - Plant and machinery must be issued with a drip tray on site. The drip tray must be placed underneath the plant/machinery when it has shutdown. Drip trays must be in good working order and must be able to hold liquid adequately if/when needed.
  - The contents of drip trays, including rainwater, must not be disposed of into the environment, but decanted into suitable, sealable, containers. These containers must be labelled and the contents disposed of as hazardous waste. Proof of disposal at a licenced waste disposal site must be obtained.

- See requirements in EMPr for *Management of Construction Camp, Management of Labour Force, Management of Storage and Handling of Non-Hazardous Material, Management of Workshop and Equipment*, etc.

Responsibilities:

- Engineer and ECO - to monitor compliance.
- Contractor to implement management actions.

Monitoring Requirements:

- Approved Emergency Response Plan.
- Training and awareness creation records.
- Signage displayed.
- Contractor's method statement.
- Incident Register and Report.

Implementation Timeframe:

Throughout the duration of the construction period.

12.4.25 Management of Health and Safety

Management Objective:

Provide a safe working environment to construction workers and the public.

Target:

1. Approved Health and Safety Plan.
2. No incidents.
3. Compliance with the Occupational Health and Safety Act (Act No. 85 of 1993), Construction Regulations (2014) and other relevant regulations.

Management Actions:

- Contractor to submit a Health and Safety Plan, prepared in accordance with the Health and Safety Specification, for approval prior to the commencement of work. These requirements are aligned with the Construction Regulations (2014).
- Fencing and barriers will be in place in accordance with the Occupational Health and Safety Act (Act No. 85 of 1993).
- Applicable notice boards and hazard warning notices will be put in place and secured.
- Night hazards will be suitably indicated (e.g. reflectors, lighting and traffic signage).
- Emergency contact details will be prominently displayed.
- Two-Way Radio Systems shall be used where cell phone coverage is poor.

- All construction personnel shall be clearly identifiable. All employees will also be issued with employee cards for identification purposes.
- All workers will be supplied with the required Personal Protective Equipment as per the Occupational Health and Safety Act (Act No. 85 of 1993).
- Maintain access control to prevent access of the public to the construction areas, as far as practicable.
- Use approved communication channels to inform the community of Occupational Health and Safety measures to prevent incidents involving community members.
- Contractors shall establish HIV/AIDs awareness programmes at their site camps.
- Put in place a monitoring system to monitor health risks throughout the life of the project.

Responsibilities:

- Engineer and ECO - to monitor compliance.
- Dedicated Occupational Health and Safety system to be implemented by Contractor's Safety Officer. To be monitored and audited by the Client's Safety Agent, in terms of the Construction Regulations (2014).
- Contractor to implement management actions.

Monitoring Requirements:

Occupational Health and Safety system – checked by Safety Agent.

Implementation Timeframe:

Throughout the duration of the construction period.

12.4.26 Management of Reinstatement and Rehabilitation

Management Objective:

- Adequate reinstatement and rehabilitation of construction areas.
- Conduct concurrent or progressive rehabilitation of areas affected by construction activities.

Target:

1. Complete site clean-up.
2. Reinstate and rehabilitate areas disturbed by construction activities.

Management Actions:

- Rehabilitation Management Plan to be developed, which will include additional measures identified during construction to supplement the reinstatement and rehabilitation provisions included in the EMPr. Targets to be specified for re-growth.
- Ensure that rehabilitation is in line with the surrounding natural environment and pre-construction state of the affected area.

- Cordon off areas that are under rehabilitation as no-go areas.
- **Removal of structures and infrastructure** -
  - Clear and completely remove from site all construction plant, equipment, storage containers, temporary fencing, temporary services and fixtures.
  - Ensure that all temporary access roads utilised during construction and which are not earmarked for use during the operational phase, are returned to a usable state and/or a state no worse than prior to construction.
- **Inert waste and rubble** -
  - Clear the site of all inert waste and rubble, including surplus rock, foundations and batching plant aggregates. After the material has been removed, the site shall be re-instated and rehabilitated.
  - Load and haul excess spoil and inert rubble to fill in borrow pits/dongas or to dump sites indicated/approved by the Engineer.
  - All remaining combustible biomass from bush clearing operations must be removed from the area, unless it is to be used in rehabilitation measures.
- **Domestic waste** -
  - Remove from site all domestic waste and dispose of in the approved manner at a registered waste disposal site.
- **Hazardous waste and pollution control** -
  - Remove from site all pollution containment structures.
  - Remove from site all temporary sanitary infrastructure and waste water disposal systems. Take care to avoid leaks, overflows and spills and dispose of any waste in the approved manner.
  - Comply with relevant provisions under the following EMPr sections –
    - *Management of Storage and Handling of* H*azardous Material*;
    - *Management of Water*;
    - *Management of Waste*; and
    - *Management of Pollution Generation Potential.*
- **Final shaping** -
  - Make safe all dangerous excavations by backfilling and grading, as required.
  - In general, no slopes steeper than 1(V):3(H) are permitted in cut-and-fill areas, unless otherwise specified by the Engineer. Steeper slopes require protection. New slopes must mimic the natural slopes and topography, where possible.
  - Programme the backfill of excavations so that subsoil is deposited first, followed by the topsoil. Compact in layers for best results.
  - Monitor backfilled areas for subsidence (as the backfill settles) and fill depressions using available material.
  - Shape all disturbed areas to blend in with the surrounding landscape, where possible.
  - Ensure that no excavated material or stockpiles are left on site and that all material remaining after backfill is landscaped to blend in with the surrounding landscape.

- **Topsoil replacement and soil amelioration** -
  - Execute top soiling activity prior to the rainy season or any expected wet weather conditions.
  - Execute topsoil placement only after all construction work has ceased.
  - Contractor to test top 15 cm soil at predetermined distances for fertilizer requirements. All testing to occur at a SANS 17025 approved laboratory.
  - Replace and redistribute stockpiled topsoil together with herbaceous vegetation, overlying grass and other fine organic matter in all disturbed areas of the construction site, including temporary access routes. Replace topsoil to the original depth.
  - Place topsoil in the same area from where it was stripped. If there is insufficient topsoil available from a particular soil zone to produce the minimum specified depth, topsoil of similar quality may be brought from other areas of similar quality. The soil brought in must not come from areas infested by alien and invasive plant species.
  - The suitability of substitute material will be determined by means of a soil analysis addressing soil fraction, fertility, pH and drainage.
  - Do not use topsoil suspected to be contaminated with the seed of alien vegetation. Alternatively, the soil is to be appropriately treated.
  - Ensure that stormwater run-off is not channelled alongside the gentle mounding, but that it is taken diagonally across it.
  - Shape remaining stockpiled topsoil not utilised elsewhere in an acceptable manner so as to blend in with the local surrounding area.
  - After topsoil placement is complete, spread available stripped vegetation randomly by hand over the top-soiled area.
- **Ripping and scarifying** -
  - Rip and/or scarify all areas following the application of topsoil to facilitate mixing of the upper most layers. Whether ripping and/or scarifying is necessary it will be based on the site conditions immediately before these works commence.
  - Rip and/or scarify all disturbed (and other specified) areas of the construction site, including temporary access routes and roads, compacted during the execution of the works.
  - Rip and/or scarify along the contour to prevent the creation of down-slope channels.
  - Do not rip and/or scarify areas under wet conditions, as the soil will not break up.
- **Planting** -
  - All plant species for use by the project must be reviewed and approved by qualified specialists prior to use on site.
  - Revegetation must match the vegetation type which previously existed, unless otherwise indicated by a suitable specialist.
  - Although the use of indigenous vegetation is promoted, where there is a risk of soil erosion (e.g. steep slopes) a suitable specialist must be consulted to determine the most appropriate stabilisation measures.
  - Transplanted plants -

  - All planting work is to be undertaken by suitably experienced personnel, making use of the appropriate equipment.
  - Transplanting entails the removal of plant material and replanting the same plants in another designated position.
  - Transplant trees and shrubs into designated positions.
  - Establish further specifications for transplanted plants.
- Nursery plants -
  - All planting work is to be undertaken by suitably experienced personnel, making use of the appropriate equipment.
  - Plant all trees, shrubs and individual plants in designated positions.
  - Planting should preferably be done during the rainy season.
  - After planting, each plant must be well watered, adding more soil upon settlement if necessary.
  - Establish further specifications for nursery plants.
- Seeds and seedlings -
  - All planting work is to be undertaken by suitably experienced personnel, making use of the appropriate equipment.
  - Tree seedling material must be fresh and of local origin. Resist using plants from far afield as they may not be best suited to local climatic or soil conditions.
  - Small seedlings are likely to transplant more successfully than will large ones. These must be potted and kept under nursery conditions until they are large enough to plant out.
  - Establish further specifications for seeds and seedlings.

- **Grassing** -
  - Suitably trained personnel must undertake grassing by making use of the appropriate equipment and indigenous grass species, as specified by the qualified specialists.
  - Sodding may be done at any time of the year, but seeding must be done by sowing appropriate seed mixtures at the most suitable time under the guidance of a qualified specialist.
  - Establish further specifications for sods, runners and hand seeding.

Implementation Timeframe:

Throughout the duration of the construction period, as relevant to the concurrent or progressive reinstatement and rehabilitation of affected areas. Up to end of defects liability period.

12.5 Operational Phase

Where relevant, all management actions are to be carried forward from the construction phase to the operational phase. Specific management measures for the operational phase follow:

12.5.1 Management of Access, Routine Maintenance Inspections and Maintenance Works

Management Objective:

- Manage environment impacts associated with operation and maintenance activities.
- Restrict operation and maintenance activities to permanent pipeline servitude and areas acquired for the VGRWSS.
- Safeguarding of sensitive environmental features and existing services.
- Ensure proper access control.
- Adhere to agreements made with individual landowners and community members regarding access.

Target:

1. No damage to be caused to sensitive environmental features (including heritage resources, protected flora and fauna, watercourses, cultivated areas, existing structures and infrastructure, etc.) outside of the pipeline servitude.
2. Prior notification of affected landowners of operation and maintenance activities.
3. No reports of operation and maintenance vehicles using unauthorised access points and routes.
4. No verified complaints regarding poor practices during operation and maintenance.

Management Actions:

- Restrict operation and maintenance activities to the pipeline servitude. Where this is not possible, the landowners need to be notified and adequate arrangements made in advance.
- Affected landowners must be notified in advance or operation and maintenance activities.
- During maintenance related activities, damage to access gates, access roads, fencing and/or private property, will be restored to its original condition.
- Maintain access control to the permanent servitude.
- All access gates must be closed and locked as per the instruction of the landowner.
- Strict adherence to speed limits by operation and maintenance vehicles. On private farm roads, maintenance vehicles may not exceed a speed of 40 km/h.
- All roads and tracks used for maintenance inspections and maintenance works shall be maintained and repaired where necessary.
- Monitoring to be conducted to detect erosion (e.g. steep sections along access roads and pipeline, crossing of drainage lines, tie-ins at river banks, etc.).
- Protect all areas susceptible to erosion resultant from operation and maintenance activities. In general, slopes steeper than 1(V):3(H) or slopes where the soils are by nature dispersive or sandy, must be stabilised.

- Should maintenance or repair work be required on site, the landowner will be notified well in advanced. Maintenance work shall be undertaken as per the provisions of the EMPr for the pre-construction and construction phases, as relevant.
- See requirements in EMPr for the *Management of Flora and Fauna*
- See requirements in EMPr for the *Management of Reinstatement and Rehabilitation*

Responsibilities:

- Applicant / Operator - to monitor compliance and implement management actions.

Monitoring Requirements:

- Public complaints.
- Unauthorised access to private property.
- Verified damage to private property.
- Evidence of erosion.

12.5.2 Management of Leaks

Management Objective:

Ensure leaks are detected and repaired.

Target:

Timeous detection and repairing of leaks.

Management Actions:

- Routine inspection to include detection and timeous repairs of leaks.

Responsibilities:

- Applicant / Operator - monitor compliance and implement management actions.

Monitoring Requirements:

- Leak detection and repair system.

12.5.3 Management of Flora and Fauna

Management Objective:

- Control alien invasive plant species within the permanent servitude.
- Ensure the protection of animals (including wildlife and livestock).

Target:

1. No direct / indirect harm to animals from operation and maintenance activities.
2. No deviations from agreements made with individual landowners and community members regarding animals.

Management Actions:

Loss and/or degradation of floral habitat –

- Compliance with the monitoring and eradication programme for invasive alien plants and noxious weeds.
- Prevent contamination of natural vegetation by any maintenance activities.
- All waste generated will be stored in a temporary demarcated storage area, prior to disposal thereof at a licensed registered landfill site.
- No waste may be left on site after maintenance visits have been completed.
- During maintenance works where excavations are made, the following must be undertaken:
  - Topsoil must be stripped to depth of 150mm and stored separately to subsoil and spoil;
  - Maintenance work footprint must be kept to a minimum;
  - Soil must be returned in the same order it was removed, ending with topsoil;
  - The affected areas must be monitored and alien vegetation removed and erosion remediated.
- As much vegetation growth as possible must be promoted post construction within the permanent servitude in order to protect soils and to reduce the percentage of the surface area which is left as bare ground. In this regard, special mention is made of the need to use indigenous vegetation species as the first choice during rehabilitation. The plant material to be used for rehabilitation must be similar to what is found in the surrounding area.
- The areas affected by operation and maintenance activities must be reinstated and rehabilitated.
- Incorporate findings of specialists from walk-down survey (if applicable).
- Any action taken to control and eradicate a listed invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment.

Disturbance of faunal species –

- Animals residing within the designated area shall not be unnecessarily disturbed.
- When accessing the pipeline servitude, vehicles are to utilise the existing roads.
- Ensure that no unnecessary clearing of faunal habitat occurs.
- No hunting/trapping/snaring or collecting of faunal species is allowed.
- No fires by maintenance personnel are allowed.
- Following heavy rains, access roads and areas of disturbance are to be inspected for signs of erosion, which, if found, must be immediately rectified through appropriate erosion control measures.

Responsibilities:

- Applicant / Operator - monitor compliance and implement management actions.

Monitoring Requirements:

- Encroachment of alien invasive plants and noxious weeds into the construction area.
- Successful rehabilitation.
- Evidence of erosion.

12.5.4 On-going Consultation with Affected Parties

Management Objective:

- Establish and maintain a record of all complaints and claims against the project and ensure that these are timeously and effectively verified and responded to.
- Adhere to servitude's terms and conditions.

Target:

1. No justifiable complaints.
2. No deviations from servitude terms and conditions.

Management Actions:

- Establish lines of communications with landowners.
- Establish processes to effectively verify and address complaints and claims received from landowners.

Responsibilities:

- Applicant / Operator - monitor compliance and implement management actions.

Monitoring Requirements:

- Public complaints register.
- Agreements with landowners.

13 CHANCE FIND PROTOCOL

A following procedure will only be followed if fossils are uncovered during excavation.

13.1 Legislation

Cultural Heritage in South Africa (includes all heritage resources) is protected by the National Heritage Resources Act (Act No. 25 of 1999) (NHRA). According to Section 3 of this Act, Heritage resources include "all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens".

Palaeontological heritage is unique and non-renewable and is protected by the NHRA and are the property of the State. It is thus the responsibility of the State to manage and conserve fossils on behalf of the citizens of South Africa. Palaeontological resources may not be excavated, broken, moved, or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.

13.2 Background

A fossil is the naturally preserved remains (or traces) of plants or animals embedded in rock. These plants and animals lived in the geologic past millions of years ago. Fossils are extremely rare and irreplaceable. By studying fossils it is possible to determine the environmental conditions that existed in a specific geographical area millions of years ago.

13.3 Introduction

This informational document is intended for workmen and foremen on construction sites. It describes the actions to be taken when mining or construction activities accidentally uncovers fossil material. It is the responsibility of the ECO to train the workmen and foremen in the procedure to follow when a fossil is accidentally uncovered. In the absence of the ECO, a member of the staff must be appointed to be responsible for the proper implementation of the chance find protocol as not to compromise the conservation of fossil material.

13.4 Chance Find Procedure

- If a chance find is made the person responsible for the find must immediately stop working and all work must cease in the immediate vicinity of the find.
- The person who made the find must immediately report the find to his/her direct supervisor which in turn must report the find to his/her manager and the ECO or site manager. The ECO must report the find to the relevant Heritage Agency (South African Heritage Research Agency, SAHRA). (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape

Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS co-ordinates.

- A preliminary report must be submitted to the Heritage Agency within **24 hours** of the find and must include the following: 1) date of the find; 2) a description of the discovery and a 3) description of the fossil and its context (depth and position of the fossil), GPS co-ordinates.
- Photographs (as many as you can) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found.

Upon receipt of the preliminary report, the Heritage Agency will inform the ECO/site manager whether a rescue excavation or rescue collection by a palaeontologist is necessary.

- The site must be secured to protect it from any further damage. No attempt should be made to remove material from their environment. The exposed finds must be stabilized and covered by a plastic sheet or sand bags. The Heritage agency will also be able to advise on the most suitable method of protection of the find.
- In the event that the fossil cannot be stabilized the fossil may be collected with extreme care by the ECO/site manager. Fossils finds must be stored in tissue paper and in an appropriate box while due care must be taken to remove all fossil material from the rescue site.
- Once Heritage Agency has issued the written authorization, the developer may continue with the development.