



**ENVIRONMENTAL MANAGEMENT PROGRAMME FOR THE PROPOSED KENDAL POWER STATION
CONTINUOUS ASH DISPOSAL FACILITY AND ASSOCIATED INFRASTRUCTURE (LOW-PRESSURE
SYSTEM (LPS) PIPELINE; 11kV POWERLINE) IN MPUMALANGA PROVINCE
AUGUST 2022**



TITLE:	ENVIRONMENTAL MANAGEMENT PROGRAMME FOR THE PROPOSED KENDAL POWER STATION CONTINUOUS ASH DISPOSAL FACILITY AND ASSOCIATED INFRASTRUCTURE (LOW-PRESSURE SYSTEM (LPS) PIPELINE; 11KV POWERLINE) IN MPUMALANGA PROVINCE
AUTHORS:	NOLWAZI NXUMALO
REVIEWED BY:	ZAMANDABA SIBIYA
STATUS OF REPORT:	DRAFT
FIRST ISSUE:	AUGUST 2022

Approved by:



Nonkanyiso Zungu, Pr. Nat.Sci (Reg. No. 400194/10)

Specialist Ecologist/Wetland specialist

Date: August 2022

Contents

ABBREVIATION	vii
DEFINITION OF TERMS	viii
1. INTRODUCTION	1
1.1. THE PURPOSE OF THE EMPR.....	1
1.2. STRUCTURE OF THE EMPR	2
1.3. LEGAL REQUIREMENTS.....	4
2. DETAILS OF THE ENVIRONMENTAL ASSESSMENT TEAM.....	10
2.1. Environmental Consulting Company	10
2.2. Details of EAP.....	10
3. PROPOSED ACTIVITY.....	11
3.1. Project Location	11
3.2. Project Description.....	12
3.2.1 Project Components.....	13
3.3. Description of Baseline Environment	14
3.3.1. Biophysical And Biological Environment	14
3.3.1.1. Infrastructure	14
3.3.1.2. Climate	14
3.3.1.3. Topography, Geology, And Soils	0
3.3.1.4. Land Use	0
3.3.1.5. Rivers And Wetlands (Hydrology)	2
3.3.1.6. Vegetation And Landscape Features	3
3.3.1.7. Mpumalanga Conservation Plan	4
3.3.2. Social And Economic Environment	5
4. SCOPE OF THE EMPR	9
4.1. Layout of the EMPr	9
5. MITIGATION AND/ MANAGEMENT MEASURES	11
6. ENVIRONMENTAL MONITORING	0
7. ROLES AND RESPONSIBILITIES.....	2

8.	COMPLIANCE WITH THE EMPr	6
8.1.	Non-conformance	6
8.2.	Emergency preparedness	7
8.3.	Incident reporting and remedy	8
8.4.	Penalties	8
9.	REPORTING	10
9.1.	Administration	10
9.2.	Good housekeeping	10
9.3.	Record keeping	10
9.4.	Document control	11
10.	ENVIRONMENTAL AWARENESS	12
10.1.	Monitoring of environmental training	13
11.	CLOSURE PLANNING	14
11.1.	Post-construction audit	14
11.2.	General review of EMPr	14
12.	CONCLUSION	15
	REFERENCES	16

Indemnity

This report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken. The findings, results, observations, conclusions, and recommendations given in this report are based on the author's best scientific and professional knowledge as well as information available at the time of the study. Therefore, the author reserves the right to modify aspects of the report, including the recommendations, if and when new information may become available from ongoing research or further work in this field, or pertaining to this investigation.

Although the author exercised due care and diligence in rendering services and preparing documents, she accepts no liability, and the client, by receiving this document, indemnifies the author against all actions, claims, demands, losses, liabilities, costs, damages, and expenses arising from or in connection with services rendered, directly or indirectly by the author and by the use of this document.

ABBREVIATION

BA	Basic Assessment
BAR	Basic Assessment Report
CARA	Conservation Agricultural Resource Act
CBA	Critical Biodiversity Areas
DFFE	Department of Forestry, Fisheries, and the Environment
DWS	Department of Water and Sanitation
IEA	Integrated Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
EMS	Environmental Management Section
GNR	Government Notice Regulations
I&AP	Interested and Affected Parties
LED	Local Economic Development
NBR	National Building Regulations
NFEPA	National Freshwater Ecosystem Priority Areas
NEMA	National Environmental Management Act, 1998
NWA	National Water Act, 1998
SAHRA	South African Heritage Resource Agency
SDF	Spatial Development Framework
WUL	Water Use Licence
GA	General Authorization

DEFINITION OF TERMS

Affected environment: Those parts of the socio-economic and biophysical environment impacted on by the development.

Alien species: The alien species are species which originated from foreign country.

Alternatives: A possible course of action, in place of other, that would meet the same purpose and need.

Biodiversity: The variety of life in an area, including the number of different species, the genetic wealth within each species, and the natural areas where they are found.

Contractor: Means the principal person or company undertaking the construction of the development appointed by the developer, including subcontractors appointed by the contractor.

Cumulative Impact: An action that in itself is not significant but is significant when added to the impact of other similar actions.

Development: The act of altering or modifying resources in order to produce potential benefits.

Disposal: Means the burial, deposit, discharge, abandoning, dumping, placing, or release of any waste into, or onto land.

Duration: The period of time during which something continues.

Ecosystem: Organisms together with their biotic environment, forming an interacting system, inhabiting an identifiable space.

EMS representative: Shall mean the Environmental management section (EMS) manager, his/her representative, or an environmental officer (EO).

Environmental Control Officer: Means the individual or company appointed by the Developer to ensure the implementation of the EMPr and suitable environmental management practices on-site for the duration of the construction phase of the Project.

Environment:

Means the surroundings within which humans exist and that are made up of:

- ❖ Microorganisms, plant and animal life;
- ❖ The land, water, and atmosphere of the earth;

The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well - being

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

Environmental Management Program: A system that provides a structured process for continual improvement and which enables an organization to achieve and systematically control the level of environmental performance that it sets itself. In general, this is based on a dynamic cyclical process of "plan, implement, check and review"

The EMP aims at:

- ❖ Minimizing impacts by limiting aspects of an action.
- ❖ Minimizing impacts by optimizing processes, structural elements, and other design features.
- ❖ Avoiding impacts by not performing certain actions.
- ❖ Compensating for impacts by providing substitute resources or environments.
- ❖ Any part or combination of the above and inter-relationships among and between them.

Environmental Resources: Goods, services, or environmental conditions that have the potential to enhance social well-being.

General Waste: Means waste that does not pose an immediate hazard or threat to health or the environment and includes - domestic waste; building and demolition waste; business waste; and inert waste.

Hazardous Waste: Means any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical, or toxicological characteristics of that waste, have a detrimental impact on health and the environment.

Impacts: A description of the potential effect or consequence of an aspect of the development on a specified component of the biophysical, social, or economic environment within a defined time and space. The outcome of an action, whether considered desirable or undesirable".

Fence: A physical barrier in the form of posts and barbed wire or any other concrete construction, ("palisade"- type fencing included), constructed with the purpose of keeping humans and animals within or out of defined boundaries.

Interested and Affected Parties (I&APs): Individuals and groups concerned with or affected by its consequences. These include the authorities, local communities, investors, workforce, customers and consumers, environmental interested groups, and the general public.

Local economic development: Means a locally-driven process, designed to identify harness, and utilise resources to stimulate the economy and create new job opportunities.

Mitigation: Measures designed to avoid, reduce or remedy adverse impacts.

Plan: A purposeful, forward-looking strategy or design often with coordinated priorities, options, and measures that elaborate and implement policy.

Policy: A general course of action or proposed overall direction that is being pursued and which guides ongoing decision - making.

Pre- cautionary Principle: “This involves applying a risk-averse and cautious approach that recognises the limits of current knowledge about the environmental consequences of decision making or action.”

Programme: "A coherent, organised agenda or schedule of commitments, proposal instruments and activities that elaborate and implement policy ".

- ❖ Provide ongoing monitoring and management of environmental impacts of a development and documenting of any digressions /good performances.
- ❖ Rectifying impacts through rehabilitation, restoration, etc. of the affected environment.
- ❖ The EMP is a legally binding document that all parties involved in the project must be aware of.

Red Data: A list of fauna and flora species that require environmental protection.

Rehabilitation: Is defined as the return of a disturbed area to a state which approximates the state, as far as possible, which it was before disruption. Rehabilitation should aim to accelerate the natural succession processes so that the plant community develops in the desired way

Reinstatement: Is defined as the initial soil works that replace soil levels back to the original state as far as possible. It may include an initial light temporary grassing.

Spatial Development Framework: Means a framework that seeks to guide the overall spatial distribution of current and desirable land uses within a municipality to give effect to vision, goals, and objection of the municipal IDP, as contemplated in spatial planning and land use management Act 16 of 2003.

Waste: Means any substance, whether or not that substance can be reduced, reused, recycled and recovered – that is surplus, unwanted, rejected, discarded, abandoned or disposed of; which the generator has no further use of for the purposes of production; that must be treated or disposed of; or that is identified as a waste by the relevant Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sectors, but - a by-product is not considered waste; and any portion of waste, once re-used, recycled and recovered, ceases to be waste.

Waste Disposal Facility: Means any site or premise used for the accumulation of waste with the purpose of disposing of that waste at that site or on that premises

Watercourse: A watercourse as defined in the National Water Act:

- a) A river or spring
- b) A natural channel in which water flows regularly or intermittently
- c) A wetland, lake, or dam in which or from which, water flows; and
- d) 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 bank.

1. INTRODUCTION

Sazi Environmental Consulting cc was appointed by Eskom Holdings SOC Limited to undertake a basic assessment with an objective to obtain an Environmental Authorisation and Water Use Licence in support of the proposed construction of a Low-Pressure System (LPS) pipeline and the 11kV powerline in Mpumalanga, South Africa.

The Environmental Management Programme (EMPr) is an important integration document between the various approvals, authorisations, and permits issued for specific components and/ or activities of the undertaking. This EMPr outlines the contents of construction, operation and decommissioning phases. It constitutes a contract document for use in the field by the contractor(s) and their personnel during construction as well as by the personnel of Eskom Holdings SOC Limited during all phases of the project.

The EMPr for the proposed project has been undertaken in accordance with the Environmental Impact Assessment Regulations published in Government Notices Regulation No. 324 to 327 of April 2017 in terms of the National Environmental Management Act (NEMA, No. 107 of 1998).

1.1. THE PURPOSE OF THE EMPr

This EMPr has been compiled to provide recommendations and guidelines according to which compliance monitoring can be done during the planning, assessment, construction, operational and decommissioning phases of the Low-Pressure System (LPS) pipeline and the 11kV powerline of Eskom Holdings SOC Limited to comply with the relevant environmental legislation, regulations, and guidelines. The objective of the EMPr is also to ensure that all relevant factors are considered to ensure an environmentally responsible development. The purpose of the EMPr is to provide specifications for "good environmental practice" for application during these phases.

This EMPr informs all relevant parties, which are in this case, the Project Coordinator, the Contractor, the Environmental Control Officer (ECO) and all other staff employed by Eskom Holdings SOC Limited at the site as to their duties in the fulfilment of the legal requirements for the construction and operation of the Low-Pressure System (LPS) pipeline and the 11kV powerlines with reference to the prevention and mitigation of anticipated potential environmental impacts.

All parties should note that obligations imposed by the EMPr are legally binding in terms of the environmental authorisation granted by the relevant environmental permitting authority.

The objectives of an EMPr are to:

- Ensure compliance with regulatory authority stipulations and guidelines which may be local, provincial, national and/or international;
- Ensure that there is sufficient allocation of resources on the project budget so that the scale of EMPr-related activities is consistent with the significance of project impacts;
- Verify environmental performance through information on impacts as they occur;
- Respond to unforeseen events;
- Provide feedback for continual improvement in environmental performance;
- Identify a range of mitigation measures which could reduce and mitigate the potential impacts to minimal or insignificant levels;
- Detail specific actions deemed necessary to assist in mitigating the environmental impact of the project;
- Identify measures that could optimize beneficial impacts;
- Create management structures that address the concerns and complaints of I&APs with regards to the development;
- Establish a method of monitoring and auditing environmental management practices during all phases of the activity;
- Ensure that safety recommendations are complied with; and
- Specify time periods within which the measures contemplated in the final environmental management programme must be implemented, where appropriate.

1.2. STRUCTURE OF THE EMPR

An EMPr is focused on sound environmental management practices, which will be undertaken to minimise adverse impacts on the environment through the lifetime of a development. In addition, an EMPr identifies what measures will be in place or will be actioned to manage any incidents and emergencies that may occur during operation of the project.

As such the EMPr provides specifications that must be adhered to in order to minimise adverse environmental impacts associated with the construction and operation of the proposed development. The content of the EMPr is consistent with the requirements as set out in Appendix 4 of the EIA regulations stated in Table 1 below, for the construction and operation phases.

Table 1:

According to APPENDIX 4 of GN R 982, an environmental management programme must include:

- (a) Details of –
 - (i) The EAP who prepared the environmental management programme; and
 - (ii) The expertise of the EAP to prepare an environmental management programme, including a curriculum vitae;
- (b) A detailed description of the aspects of the activity that are covered by the draft environmental management programme as identified by the project description;
- (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;
- (d) Information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by these Regulations, including environmental impacts or objectives in respect of –
 - (i) Planning and design;
 - (ii) Pre-construction;
 - (iii) construction activities;
 - (iv) Rehabilitation of the environment after construction and where applicable post closure; and
 - (v) where relevant, operation activities;
- (e) a description and identification of impact outcomes required for the aspects contemplated in (d).
- (f) a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) 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;
 - (iv) Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;
- (g) The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);
- (h) The frequency of monitoring the implementation of the impact management actions contemplated in (f);
- (i) An indication of the persons who will be responsible for the implementation of the impact management actions;
- (j) The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;
- (k) The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);
- (l) A program for reporting on compliance, taking into account the requirement as prescribed by the regulations;
- (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; and
- (n) Any specific information that may be required by the competent authority

1.3. LEGAL REQUIREMENTS

Construction must be according to the best industry practices, as identified in the project documents. This EMPr, which forms an integral part of the contract documents, informs the Contractor as to their duties in the fulfilment of the project objectives, with particular reference to the prevention and mitigation of environmental impacts caused by construction activities associated with the project. The Contractor should note that obligations imposed by the approved EMPr are legally binding in terms of environmental statutory legislation and in terms of the additional conditions to the general conditions of contract that pertain to this project. In the event that any rights and obligations contained in this document contradict those specified in the standard or project specifications then the latter must prevail.

South African environmental law chronicles, the legal rules in South Africa concerning the philosophical, economic, and social, and statute issues raised by the pursuit to protect and conserve the environment in the country. The environmental law in South Africa incorporates natural resource conservation and utilisation as well as development and land use planning. Enforcement issues are also considered. The primary acts that relate to the proposed development are described below:

1.3.1. The Constitution of The Republic of South Africa (Act No. 106 Of 1996)

Section 24 of the Constitution enshrines the right to – the Environment Everyone has the right —

- to an environment that is not harmful to their health or well-being; and
- to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that —
 - I. prevent pollution and ecological degradation;
 - II. promote conservation; and
 - III. Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

1.3.2. National Environmental Management Act, 1998 (Act No. 107 Of 1998)

The NEMA Act itself furthermore provides for cooperative, environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote cooperative governance, and procedures for co-ordinating environmental functions exercised by organs of state; and to provide for matters connected therewith. This Act formulates a set of general principles to serve as guidelines for land development through the Environmental Impact Assessment (EIA) regulations as amended, 2014. The EIA listing

notices 1, 2, and 3 identify activities that would require environmental authorizations prior to the development commencement, they also identify competent authorities in terms of sections 24 (2), 24 (5), and 24 (D).

Environmental Impact Assessments (EIAs) are required in South Africa in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA) and its' associated EIA Regulations. Developments likely to have a major impact require scoping and EIA, and those likely to have a lesser impact require a Basic Assessment.

If natural vegetation will be affected by a proposed development, a specialist botanical survey should be commissioned as part of the environmental assessment process. If a sub-population of a species of conservation concern is found to occur on the proposed development site, it would be one indicator that the proposed activity is likely to result in loss of biodiversity, bearing in mind that loss of sub-populations of these species will either increase their extinction risk or may result in their extinction. The detection of a threatened species on a site during an environmental assessment should result in an Environmental Authorisation from the competent authority that avoids, mitigates, remedies, or offsets the loss of habitat for the species in question. The competent authority may also refuse authorization for the proposed activity. In practice, the mitigation requirements that allow the proposed development to proceed, including the amount of habitat set aside differ widely depending on the environmental assessment practitioner's recommendations and the policies of the competent authority.

This Act will be relevant as the proposed development trigger the following listings (Table 3):

Table 1: NEMA, EIA Regulations triggered activities

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
Listing Notice 1, Activity 9	The construction of facilities or-infrastructure exceeding. 1 000 metres in length for the bulk transportation of water, sewage, or storm water – (i) with an internal diameter of 0,36 metres or more; or	The proposed Low-Pressure System pipeline is about 13 kilometres long and the diameter is 0.355 metres which is equivalent to 0.36 metres.

	(ii) with a peak throughput of 120 litres per second or more.....	
Listing Notice 1, Activity 19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles, or rock from (i) a watercourse. (ii) the sea.....	The proposed Low-Pressure System pipeline will be buried underground, and the pipeline will be crossing water resources resulting in excavation within a watercourse that exceeds 10 cubic metres.

1.3.3. The National Environmental Management Biodiversity Act, 2004 (Act No. 10 Of 2004)

The purpose of the National Environmental Management Biodiversity Act (NEMBA) is to provide for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act (107 of 1998). This includes the protection of species and ecosystems; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources; and the establishment of a South African National Biodiversity Institute.

1.3.4. National Environmental Management: Waste Act (Act No. 59 Of 2008)

To reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management measures; to provide for the licensing and control of waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement, and to provide for matter connected therewith.

1.3.5. National Environmental Management: Air Quality Act, 2004 (Act No. 39 Of 2004)

The National Environmental Management: Air Quality Act, 2004 (NEM: AQA) classifies waste in accordance with the Global Harmonised System (SANS 10234). The National

Environmental Management (NEM): Air Quality Act (No 39 of 2004) (as amended) has shifted the approach of air quality management from source-based control to receptor-based control.

The main objectives of the Act are to:

- Give effect to everyone's right 'to an environment that is not harmful to their health and well-being.
- Protect the environment by providing reasonable legislative and other measures that (i) prevent pollution and ecological degradation, (ii) promote conservation, and (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

The NEM: AQA makes provision for the setting and formulation of national ambient air quality standards for 'substances or mixtures of substances which present a threat to health, well-being or the environment. More stringent standards can be established at the provincial and local levels. The control and management of emissions in the NEM: AQA relates to the listing of activities that are sources of emission and the issuing of emission licenses. Listed activities are defined as activities which 'result in atmospheric emissions and are regarded as having a significant detrimental effect on the environment, including human health'. Listed activities have been identified by the Minister of the Department of Environmental Affairs and atmospheric emission standards have been established for each of these activities. These listed activities now require an Atmospheric Emission Licence (AEL) to operate.

1.3.6. THE NATIONAL WATER ACT, 1998 (Act No. 36 Of 1998)

The purpose of this Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed, and controlled in ways that take into account, amongst other factors, the following:

- Meeting the basic human needs of present and future generations,
- Promoting equitable access to water,
- Promoting the efficient, sustainable, and beneficial use of water in the public interest,
- Reducing and preventing pollution and degradation of water resources,
- Facilitating social and economic development, and
- Providing for the growing demand for water use.

In terms of Section 21 of the National Water Act, the developer must obtain water use licenses if the following activities are taking place:

- a) Taking water from a water resource,
- b) Storing water,
- c) Impeding or diverting the flow of water in a watercourse,

- d) Engaging in a stream flow reduction activity contemplated in section 36,
- e) Engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1),
- f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall, or another conduit,
- g) Disposing of waste in a manner that may detrimentally impact a water resource,
- h) Disposing of in any manner of water which contains waste from, or which has been heated in any industrial or power generation process,
- i) Altering the bed, banks, course, or characteristics of a watercourse,
- j) Removing, discharging, or disposing of water found underground if it is necessary for the efficient continuation of an activity or the safety of people, and
- k) Using water for recreational purposes.

Any development that takes place within a 500m radius of a watercourse requires a Water Use Licence. The National Water Act also required that the 1:50 and 1:100 year flood line be indicated on all the development drawings that are being submitted for approval.

1.3.7. Summary Of Environmental Legal Frameworks

Table 4 below demonstrates a summary of the environmental legal frameworks applicable to the proposed development.

Table 2: Environmental legal frameworks

Title of legislation, policy, or guideline:	Administering authority:	Promulgation Date:
Section 24 of the constitution of the Republic of South Africa (Act No. 108 of 1996)	Department of Justice; national, provincial, and local government	18 December 1996
National Environmental Management Act, 1998 (Act No. 107 of 1998 as amended).	Department of Forest, Fisheries and the Environmental (DFFE)	27 November 1998
National Water Act, 1998 (Act No. 36 of 1998)	Department of Water and Sanitation (DWS)	20 August 1998
National Environmental Management: Waste Act, 2008 (Act No 59 of 2008)	National Department of Environmental Affairs (hazardous waste)	10 March 2009
National Environmental Management: Air Quality Act No. 39 of 2004)	National Department of Environmental Affairs	24 February 2005

National Environmental Management: Protected Areas Act (Act No. 57 Of 2003) (NEMPAA)	National Department of Environmental Affairs	11 February 2004
Occupational Health and Safety Act (Act No. 85 of 1993)	Department of Labour (DoL)	1993
National Heritage Resources Act (Act No 25 Of 1999) NHRA	Department of Arts and Culture.	28 April 1999
National Environmental Management: Biodiversity Act, 2004 Act No. 10 of 2004) NEMBA	Department of Forest, Fisheries and the Environmental (DFFE)	07 June 2004
Environmental Conservation Act (Act No. 73 of 1989)	National Department of Environmental Affairs Gauteng Department of Agriculture and Resources Development Local authorities	09 June 1989

2. DETAILS OF THE ENVIRONMENTAL ASSESSMENT TEAM

According to APPENDIX 4 of GN R 982, an environmental management programme must include:

(a) Details of –

- (i) The EAP who prepared the environmental management programme; and
- (ii) The expertise of the EAP to prepare an environmental management programme, including a curriculum vitae.

2.1. Environmental Consulting Company

Sazi Environmental Consulting cc
57 Pretorius Street,
President, Midrand 1685
Tel: +27 (0) 10 442 4795
email: info@sazienvironmental.co.za

2.2. Details of EAP

Table 3: Details of EAP

Specialist	Nonkanyiso Zungu
Qualifications	MSc Environmental Management
Affiliation	South African Council for Natural Scientific Professions (SACNASP, Cand.Nat. Sci. (Reg no. 400194/10): Ecological Science.
Company	Sazi Environmental Consulting cc
Physical Address	57 Pretorius Street, President Park, Midrand. 1685
Postal Address	P O Box 1410, Halfway House, 1685
Telephone	087 898 0849
Cellphone	073 1619 8350/ 079 446 9319
Email	nzungu@sazienvironmental.co.za

The Curriculum Vitae of the EAP is attached as Appendix I

3. PROPOSED ACTIVITY

According to APPENDIX 4 of GN R 982, an environmental management programme must include:

- (b) A detailed description of the aspects of the activity that are covered by the draft environmental management programme as identified by the project description;
- (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;

3.1. Project Location

The proposed Kendal Power Station Continuous Ash Disposal Facility and associated infrastructure) is situated within Ogies town. The site is boarded by R555 and R545 and located on the farm Schoongezicht 218 IR and Leeuwfontein 219 under eMalahleni Local Municipality, Nkangala District Municipality, Mpumalanga. Figure 1 demonstrates the location of the proposed development site.

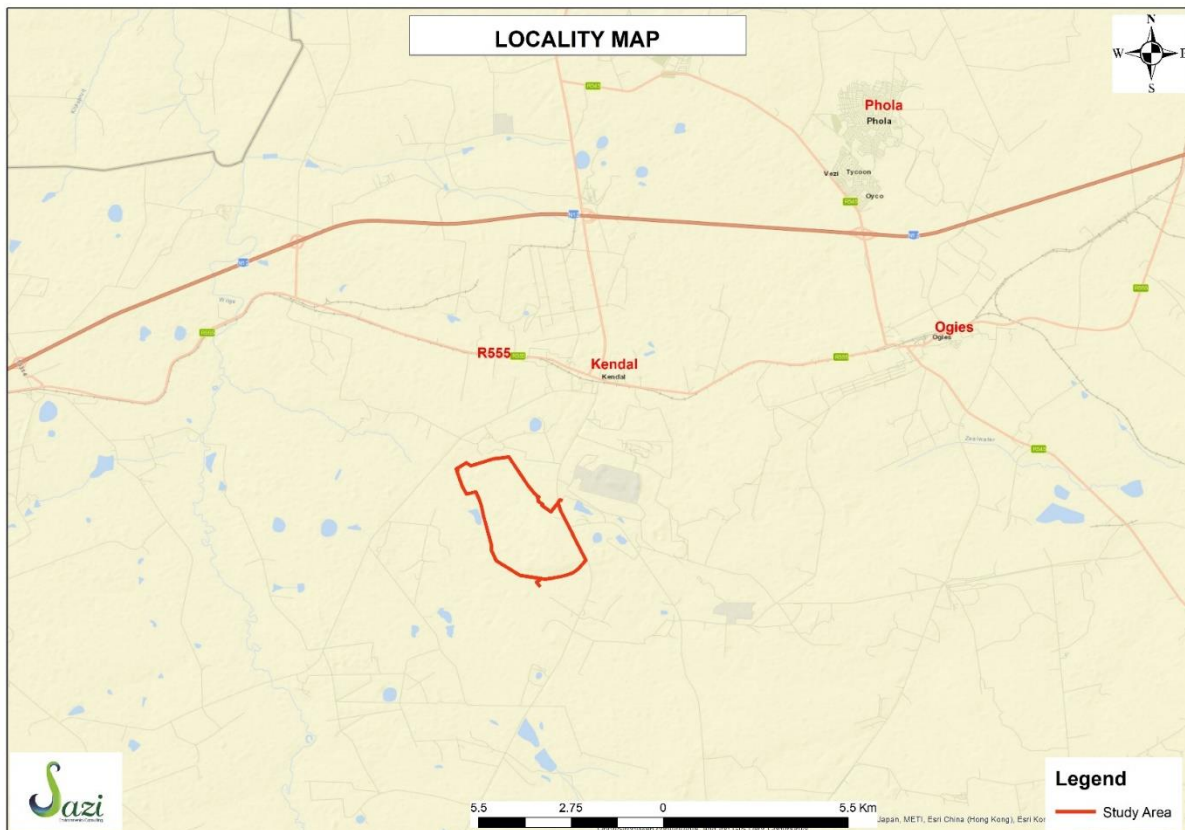


Figure 1: Locality map of the LPS pipeline and 11kV powerline

The development site/land has been surveyed therefore there is a 21-digit Surveyor General (SG) code available for each cadastral land parcel, Table 2 below outlines some of the land descriptions within which the project will be commenced.

Table 4: Proposed development property details

Province	Mpumalanga
Municipality	EMalahleni Local Municipality
Ward Number (s)	28
Farm Name and Number	Schoongezicht 218 and Leeuwfontein 219
21-digit SG Code	T0IR00000000021800000 and T0IR00000000021900000
Proposed site Coordinates	26° 5'6.98"S 28°55'51.59"E
Land use Zoning	Industrial

3.2. Project Description

An Integrated Environmental Authorisation (IEA) for the Kendal Continuous Ash Disposal Facility (ADF) project was received on 28 July 2015 from the Department of Forestry, Fishers and Environment (DFFE). The Water Use Licence (WUL) for the Kendal Continuous ADF project was received on 8 August 2015 from the Department of Water and Sanitation (DWS). The Project WUL and Integrated Environmental Authorisation have, however, omitted some critical water uses and environmental authorizations that are needed for the execution of the project. The following activities are proposed to support the functioning of the ash dam, and may require an Environmental Authorisation and Water Use Licence, prior to implementation:

- Water from some of the facilities on site will be taken and used for dust suppression and for construction activities. The facilities for these uses include the farm dam, clean water dam, and dirty water dam.
- Some water will be stored in silt traps in order to capture runoff rainwater and prevent release into the natural watercourse, while the construction of the dams have not yet been completed, together with reticulation system structures.
- A farm dam wall on site was raised by the owner of the property and this caused the water in the dam to mix with dirty water from the adjacent mine void. The Kendal Power Station now intends to lower the farm dam wall to ensure that the dirty water does not mix with the clean water from the farm dam. During the lowering of the farm dam wall, water will be required to be released temporarily into a natural watercourse, once authorised.
- During construction, it is anticipated that water seeping from underground and rainwater runoff will need to be removed from the construction trenches. This will be done by pumping the water out of the trenches and discharge water into the natural environment for the continuation of the works. If the water displays any physical contamination, it will be used for dust suppression in dirty areas. If the water displays no physical contamination, it will be used for dust suppression in clean areas. If the

above is not implemented, the water will be released to the environment after silt trap control measures implemented.

- A Low-Pressure System pipeline will be constructed to form a connection network between the dams that ensures efficient use of water on site for dust suppression and irrigation. A water balance has been established to support the system. The LPS pipeline has been designed in a such a way that clean water will be separated from the dirty water. Furthermore, the LPS is vital for the functionality of the ADF and it will prevent the over spilling of the Pollution Control Dam.

There is an existing Environmental Authorisation and a Water Use Licence for all the facilities mentioned above including: Ash dam facility, PCD, clean water dams, and farm dam. The current application is for support services to these facilities, including: using water for dust suppression, connecting the dam facilities with a pipe network and installing a powerline.

3.2.1 Project Components

The Low-Pressure System consists of five dams of which two are Pollution Control Dams the remaining three are Clean Water Dams (CWD). Each dam is comprised of two compartments, each compartment has an intake structure that allows the pumps to draw suction. Individually, the dams have a dedicated pump to supply water to the sprinkler network located at the ash dump. The water from the clean water dams will be used for irrigation for the rehabilitated areas or dust suppression of clean areas and the water from the pollution control dams will be used for dust suppression in areas more susceptible to ash mobilization. The pumps' discharge lines connect to a ring main (355mm), the proposed pipeline, which has isolated take offs every after 300 meters. From the take off a removable 100 mm rising piping can be attached which in turn supplies a lateral piping connected to 38 flexible hoses complete with sprinklers.

Three 11/0.42 kV Type B mini substations, supplied by the 11 kV overhead powerline, shall supply power to the five 400 V ac MCC switchboards located at each of the five pump stations. The mini substations shall be connected in a ring configuration using an 11 kV overhead line and XLPE cable combination. The 400 V ac MCC switchboard shall supply the dust suppression irrigation pump motor and additional equipment for the pump station which includes: a sump pump motor, control valve, C&I equipment, UPS and small power and lighting.

3.3. Description of Baseline Environment

3.3.1. Biophysical And Biological Environment

3.3.1.1. Infrastructure

The intension of the LPS pipeline is to carry clean water and dirty water for irrigation at the ash dam facility.

❖ Road Access: Access to the development site can be obtained from R555 (Figure 3).

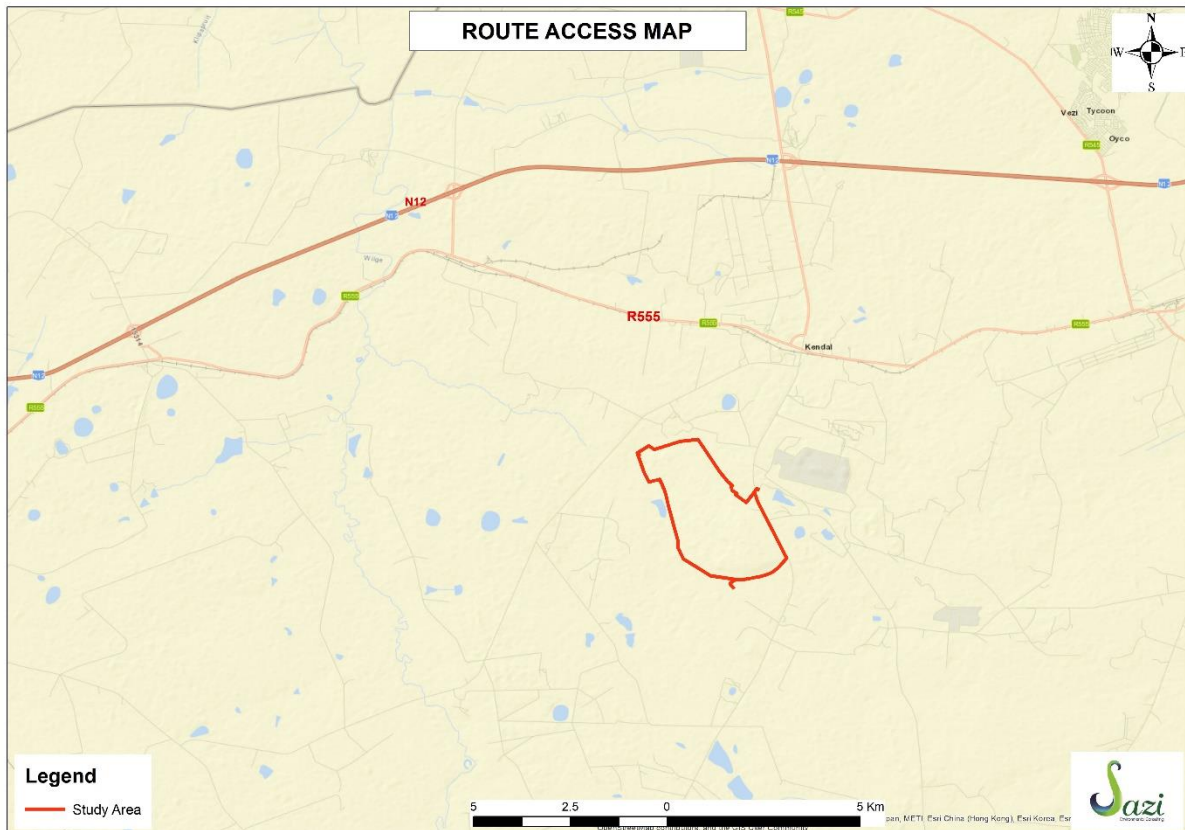


Figure 2: Proposed development Route Access Map

3.3.1.2. Climate

Strongly seasonal summer-rainfall, warm-temperate region, with very dry winters. MAP is 654 mm, ranging between 570 mm and 730 mm, slightly lower in the western regions. The coefficient of variation of MAP is 28% in the west and 26–27% in the east and varies only slightly from 25% to 29% across the unit. The incidence of frost is higher in the west (30–40 days) than in the east (10–35 days). Figure 3 below shows the climate diagram for Gm 11 Rand Highveld Grassland (Mucina and Rutherford, 2006).

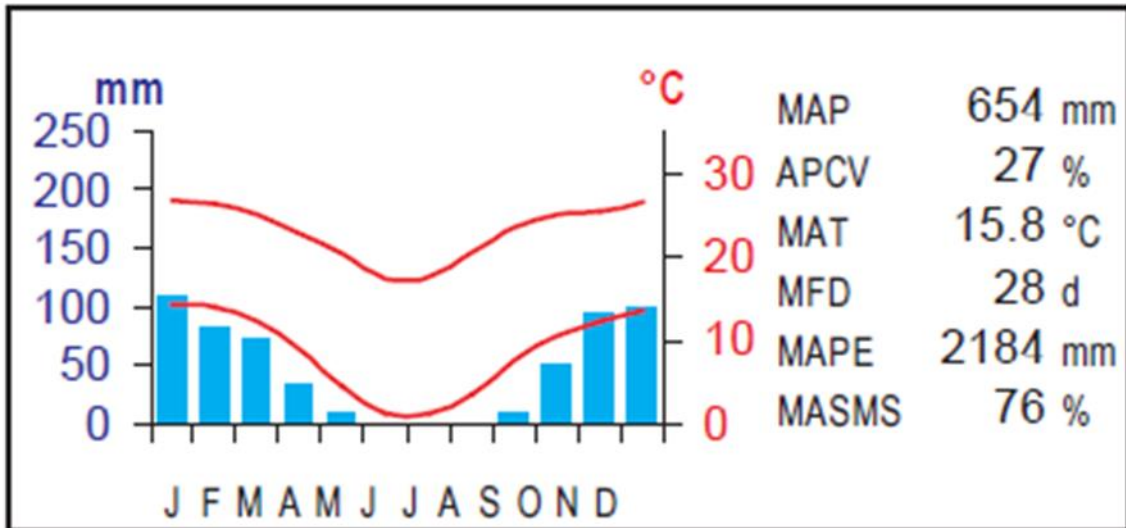


Figure 3: Climatic diagram (Mucina and Rutherford, 2006)

3.3.1.3. Topography, Geology, And Soils

The study area consists mainly of Shale, Arenite, and Coal of the Vryheid Formation, Ecca Group, and the Karoo Supergroup. The area also consists of a network of dolerite sills, sheets, and dykes, mainly intrusive into the Karoo Supergroup. The Karoo Supergroup sediments were deposited in valleys and basins that existed in the pre-Karoo topography in the region. The Karoo Supergroup rocks overlie unconformably the older Waterberg Group and Transvaal Supergroup rocks (Johnson et al. 2009). The Vryheid Formation was formed when glacial and fluvio-glacial sediments were deposited in shallow marine to fluvial-deltaic environments approximately 280 Ma ago. In places, coal seams are associated with these fluvial valley deposits. The coal seams formed in peat swamps which originated on alluvial plains or more rarely in back swamps (Johnson, et al., 2009).

3.3.1.4. Land Use

The proposed development site is situated in a mining and cultivated land. The site is surrounded by mines, cultivated land, urban areas and dams. Figure 5 below shows the land uses within the development area.

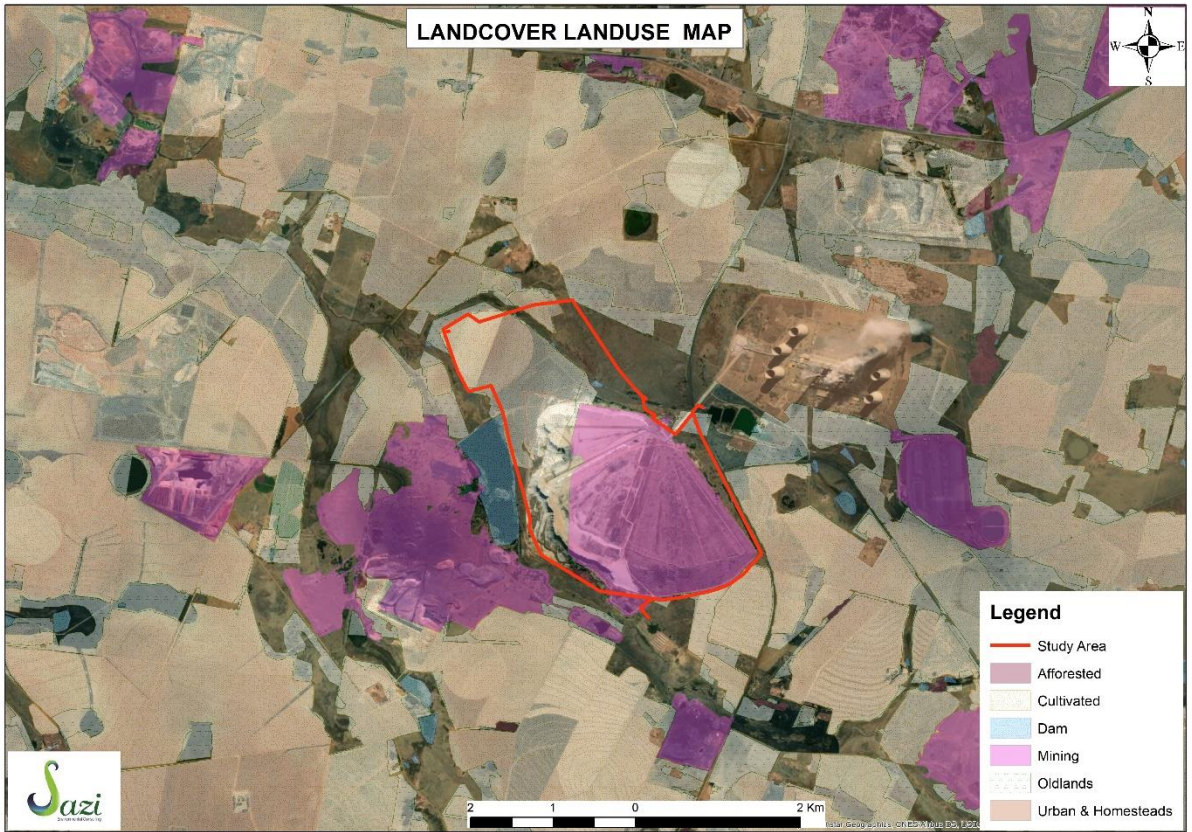


Figure 4: Proposed development of land use map

3.3.1.5. Rivers And Wetlands (Hydrology)

The proposed development site falls within quaternary catchment B20E. B20E quaternary catchment is drained by the Wilge River. The Wilge river is the main river that runs through the catchment with two tributaries running directly adjacent to the proposed development activities. The proposed development is within a 500-metre radius of a watercourse. Figure 5 below shows the site's water resource map.

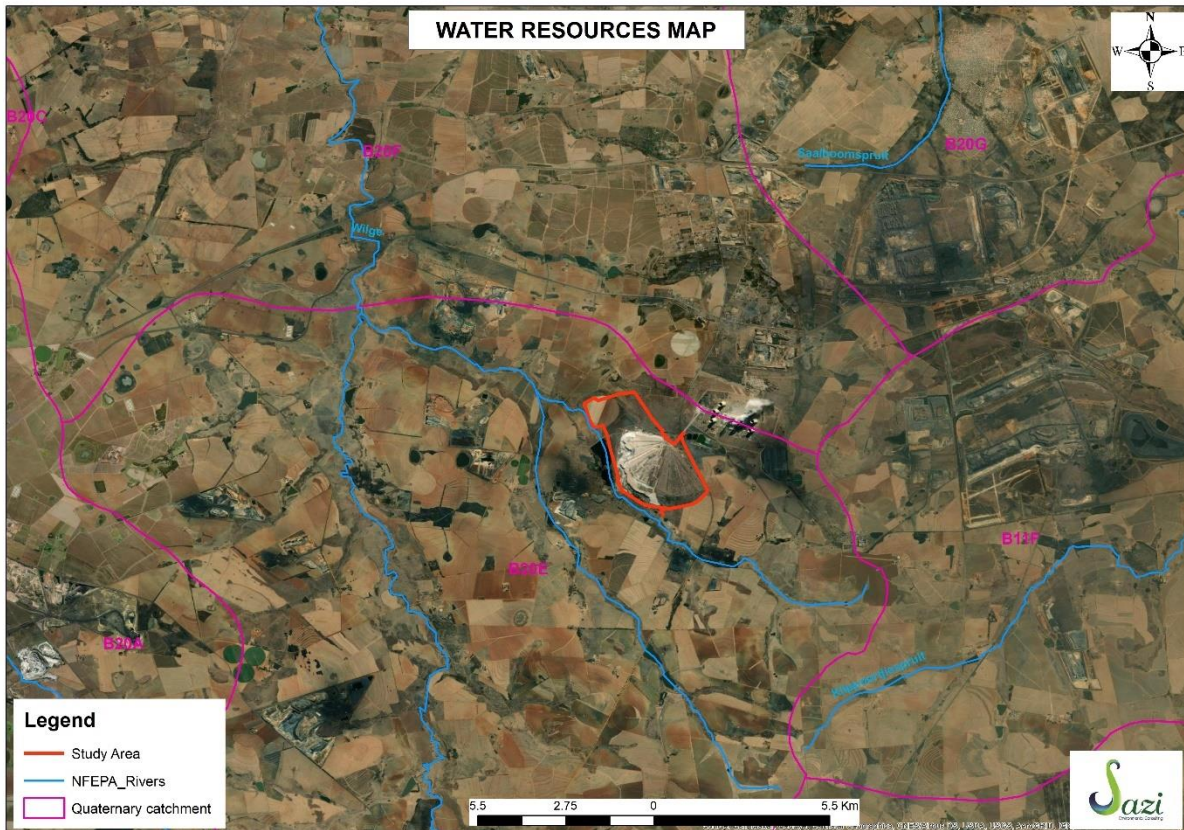


Figure 5: Water Resources Map for the proposed development

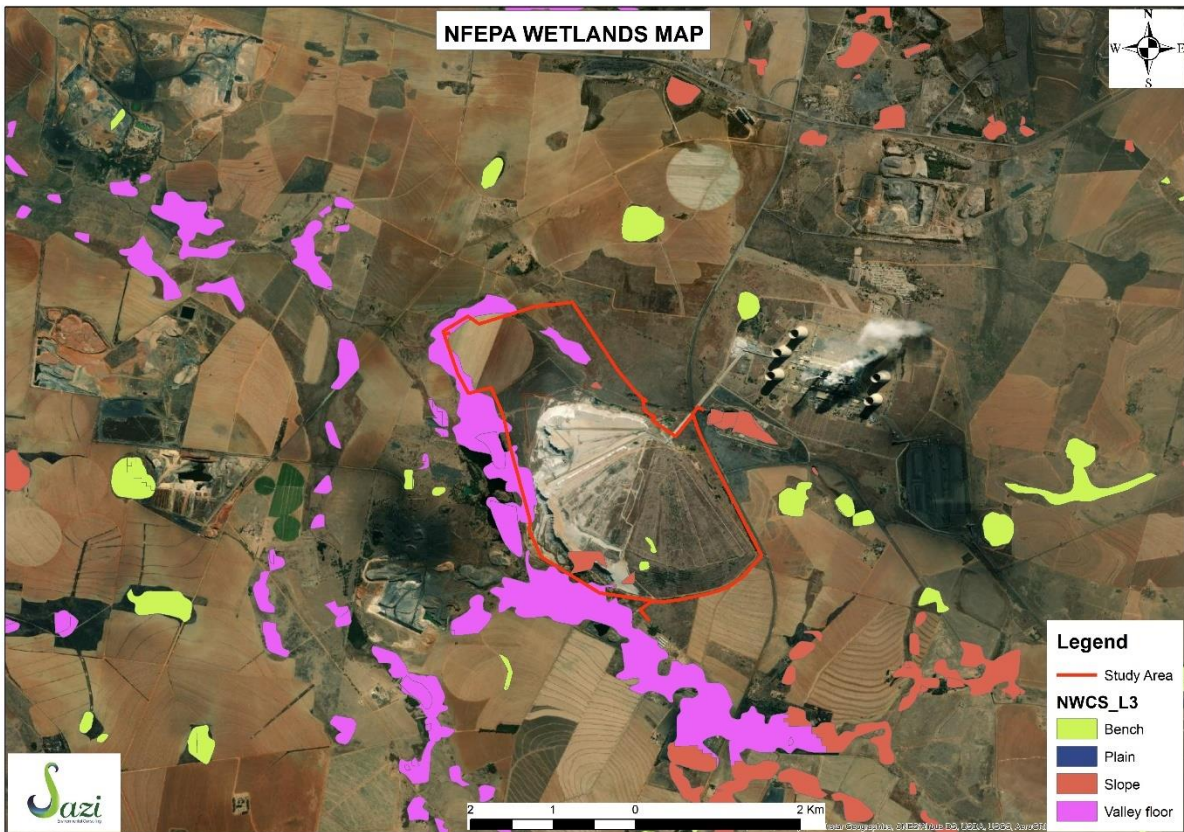


Figure 6: Study area NFEPA (2011) Map

3.3.1.6. Vegetation And Landscape Features

The study area is located in the Rand Highveld Grassland (Gm 11) vegetation type on the border with the Eastern Highveld Grasslands in the grassland biome (Mucina & Rutherford, 2006). The vegetation type occurs on a highly variable landscape with extensive sloping plains and a series of ridges slightly elevated over undulating surrounding plains. The vegetation is species-rich, wiry, sour grassland alternating with low, sour shrubland on rocky outcrops and steeper slopes. There is a high diversity of herbs. Rocky hills and ridges carry sparse (savannoid) woodlands accompanied by a rich suite of shrubs. Poorly conserved, only small patches protected. Almost half has been transformed mostly by cultivation, plantations, urbanization, or dam-building. Figure 8 below shows the study area vegetation type distribution.

Important taxa found in the Rand Highveld Grassland (Gm 11) includes the following:

Graminoids

Ctenium concinnum (d), *Cynodon dactylon* (d), *Digitaria monodactyla* (d), *Diheteropogon amplexans* (d), *Eragrostis chloromelas* (d), *Heteropogon contortus* (d), *Loudetia simplex* (d), *Monocymbium cerasiiforme* (d), *Panicum natalense* (d), *Schizachyrium sanguineum* (d), *Setaria sphacelata* (d), *Themeda triandra* (d), *Trachypogon spicatus* (d), *Tristachya biseriata*

(d), *T. rehmannii* (d), *Andropogon schirensis*, *Aristida aequiglumis*, *A. congesta*, *A. junciformis* subsp. *galpinii*, *Bewsia biflora*, *Brachiaria nigropedata*, *B. serrata*, *Bufbostylis burchellii*, *Cymbopogon caesius*, *Digitaria tricholaenoides*, *Elionurus muticus*, *Eragrostis capensis*, *E. curvula*, *E. gummiflua*, *E. plana*, *E. racemosa*, *Hyparrhenia hirta*, *Melinis nerviglumis*, *M. repens* subsp. *repens*, *Microchloa caffra*, *Setaria nigrirostris*, *Sporobolus pectinatus*, *Trichoneura gran-diglumis*, *Urelytrum agropyroides*.

Herbs

Acanthospermum australe (d), *Justicia anagaloides* (d), *Pollichia campestris* (d), *Acalypha angustata*, *Chamaecrista mimosoides*, *Dicoma anomala*, *Helichrysum caespititium*, *H. nudifolium* var. *nudifolium*, *H. rugulosum*, *Ipomoea crassipes*, *Kohautia amatymbica*, *Lactuca inermis*, *Macledium zeyheri* subsp. *argyrophyllum*, *Nidorella hottentotica*, *Oldenlandia*.

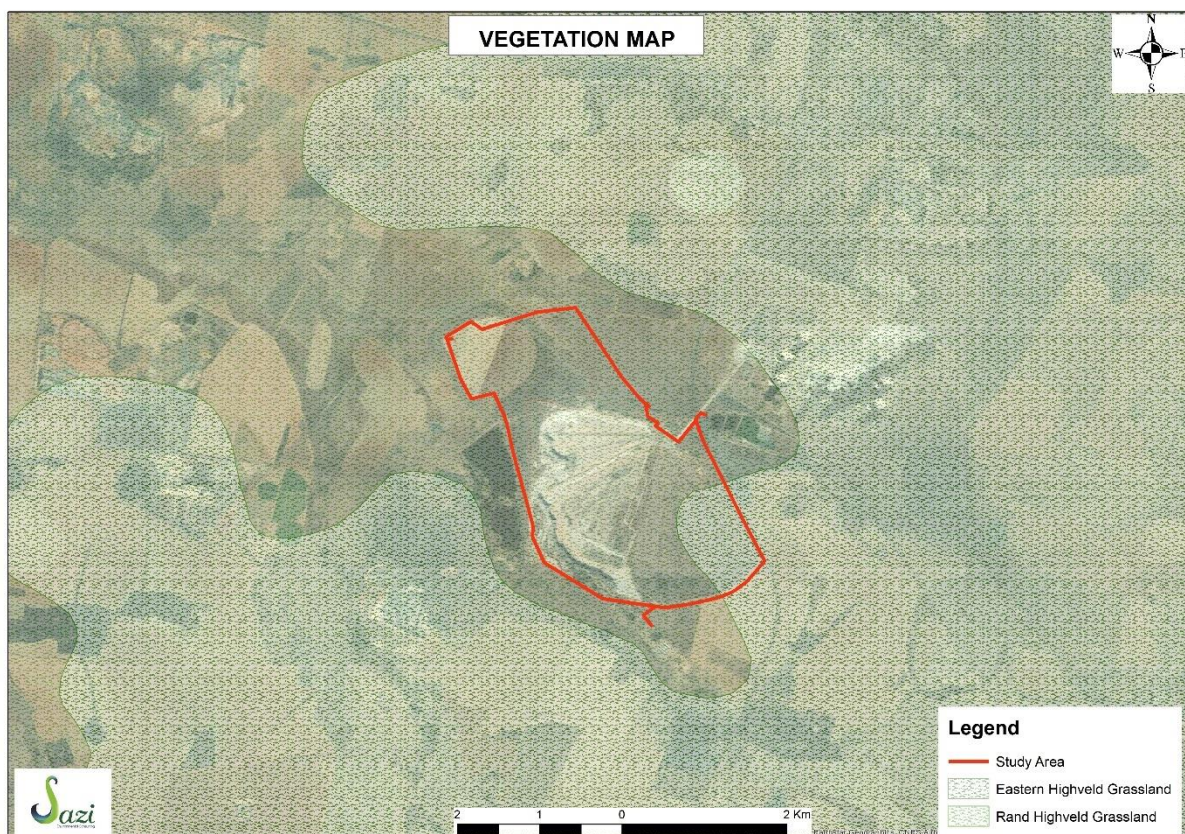


Figure 7: Proposed Development Vegetation Map

3.3.1.7. Mpumalanga Conservation Plan

According to the Mpumalanga Critical Biodiversity Areas Ecological Supported Areas (ESA) (2010), the proposed development area is situated in an Ecological Support Area (Figure 8). This means that even though no red data or threatened species were observed during the

time of assessment, due diligence and care must be undertaken during the development, to identify species of importance that may occur in this area.

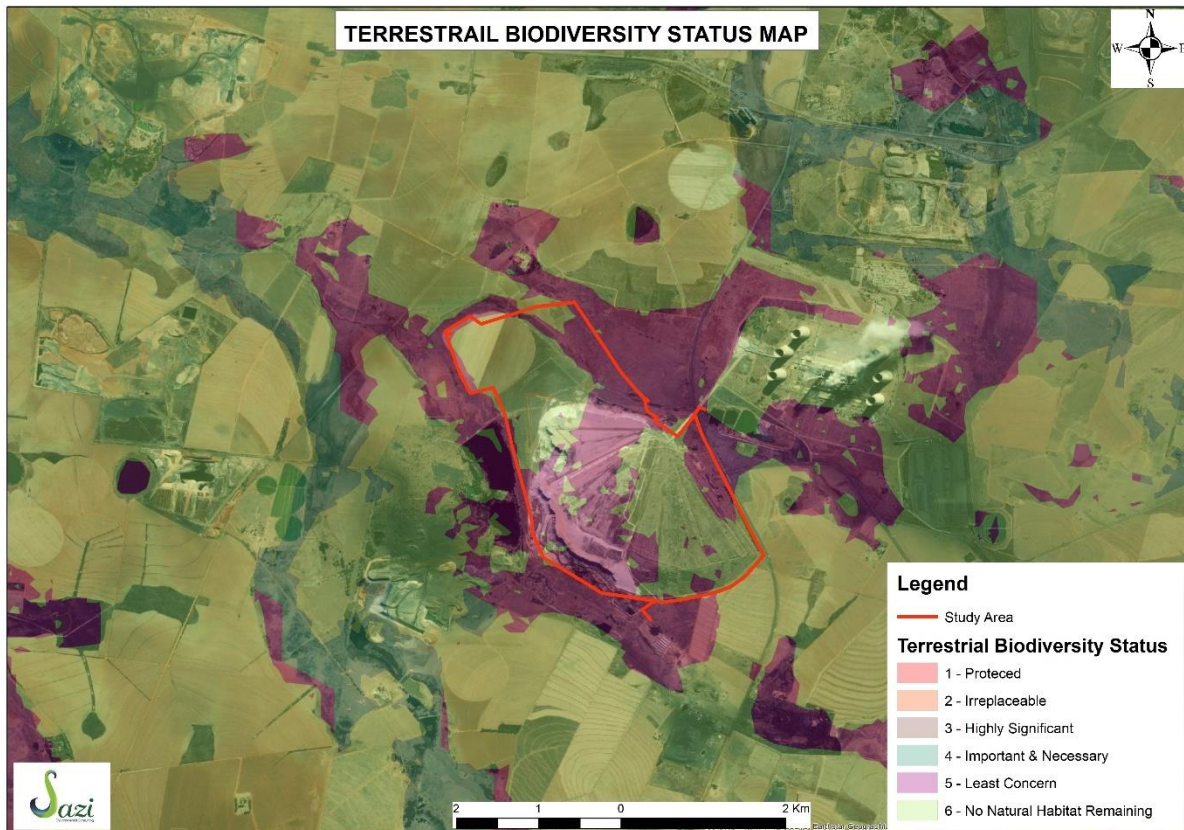


Figure 8: Proposed Development Ecological Supported Areas Map

3.3.2. Social And Economic Environment

The proposed development area is located within Ward 28 of the eMalahleni Local Municipality, in the Mpumalanga Province.

3.3.2.1. Population and Education

Population group for eMalahleni is composed of all racial groups with 391,982 Black African, which shows an increase since 2011; Coloured 5 450; Indian or Asian 3 762 and White 54 033. The tables below show an increase in both African/Black and Indian/Asian and decrease in both Coloured and White population since 2011. The population of eMalahleni is predominantly youth (15-34 years) at 43.1% of the total population. The challenges that are posed by the youthful population in the main are socio-economic. It means that the municipality should grow the economy to meet employment needs of the youth, which at present is estimated to grow at less than 0.9% between 2018 and 2023. This implies that the

LED Strategy of the municipality should prioritize skilling youth so that they could participate in the mainstream economy.

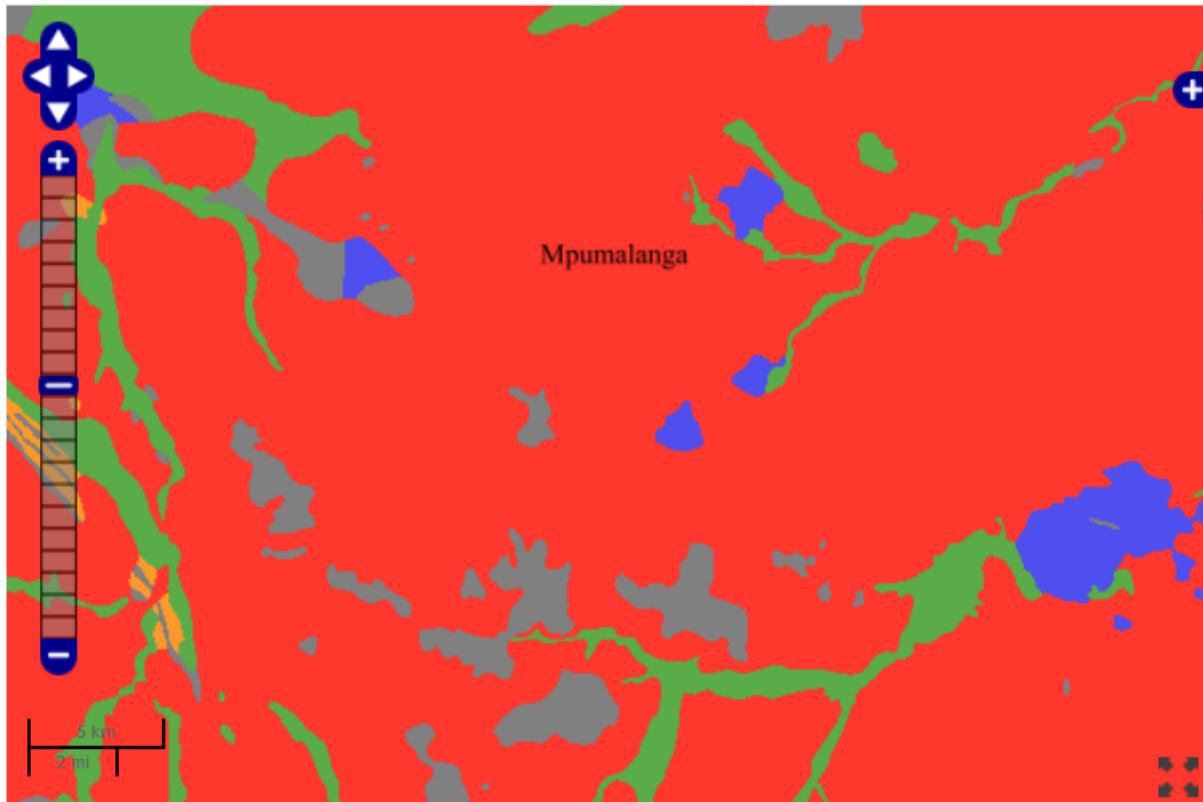
Educational attainment is a key indicator of development in a population of any country, especially for Human Development Index. Emalahleni registered good improvements in education. To evaluate long term provision of education, it is important to disaggregate educational attainment for persons older than 20 years. Statistics South Africa generated a measure of educational attainment for persons over age 20. This group is expected to have completed educational enrolment and therefore giving a good measure for completed level of education. According to the 2016 CS of StatsSA, the population in eMalahleni aged 20+ completed grade 12, increased from 117 021 in 2011 to 146 952 (increase of 29 931) in 2016, an increase of 25.6% in the relevant period.

3.3.2.2. Employment and Income

The unemployment rate in the metro was approximately 69% in 2001 and it has dropped by 47,1% according to Census 2011.

3.3.2.3. Cultural, Historical and Archaeological Resources

The proposed development site is considered to be of very high in terms of the presence of heritage and paleontological resources (Figure 10). According to Fourie (2014), the study area is mainly underlain by Vaalian and Mokolian aged igneous rocks of the Transvaal Sequence and Bushveld Complex, with three small outlying areas, including the E-dump area, underlain by Permian Vryheid Formation sediments of the Karoo Supergroup. The damage and/or loss of these fossils due to inadequate mitigation would be a highly negative palaeontological impact. The exposure and subsequent reporting of fossils (that would otherwise have remained undiscovered) to a qualified palaeontologist for excavation, will be a beneficial palaeontological impact. It is therefore recommended that: If deep excavation into the Vryheid Formation is envisaged, a Palaeontologist must be appointed as part of the Environmental Construction Team for the identified medium sensitivity areas (Fourie, 2014).



Colour	Sensitivity	Required Action
RED	VERY HIGH	field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	desktop study is required
BLUE	LOW	no palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	no palaeontological studies are required
WHITE/CLEAR	UNKNOWN	these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

Figure 9: Palaeosensitivity map of the study area and surroundings (SAHRA, 2021)

If an exceptionally fossil-rich layer of shale or sandstone is exposed during construction, it is advised that the Contractor will inform the developer and ECO of the find and must follow the Chance Palaeontological Find Procedure as stipulated below and the developer will contact a palaeontologist for further advice.

PROCEDURE FOR CHANCE PALAEOLOGICAL FINDS:

Extracted and adapted from the National Heritage Resources Act, 1999 Regulations Reg No. 6820, GN: 548.-

The following procedure must be considered in the event that previously unknown fossils or fossil sites are exposed or found during the life of the project:

1. Surface excavations should continuously be monitored by the ECO and any fossil material be unearthed the excavation must be halted.
2. If fossiliferous material has been disturbed during the excavation process it should be put aside to prevent it from being destroyed.
3. The Contractor then has to take a GPS reading of the site and take digital pictures of the fossil material and the site from which it came.
4. The Developer then should contact a palaeontologist and supply the palaeontologist with the information (locality and pictures) so that the palaeontologist can assess the importance of the find and make recommendations.
5. If the paleontologist is convinced that this is a major find an inspection of the site must be scheduled as soon as possible to minimize delays to the development.
6. From the photographs and/or the site visit the palaeontologist will make one of the following recommendations:
 - a. The material is of no value so development can proceed, or:
 - b. The fossil material is of some interest and a representative sample should be collected and put aside for further study and to be incorporated into a recognized fossil repository after a permit was obtained from SAHRA for the removal of the fossils, after which the development may proceed, or:
 - c. The fossils are scientifically important, and the paleontologist must obtain a SAHRA permit to excavate the fossils and take them to a recognized fossil repository, after which the development may proceed.
7. If any fossils are found, then a schedule of monitoring will be set up between the developer and paleontologist in case of further discoveries.

4. SCOPE OF THE EMPr

In order to ensure a holistic approach to the management of environmental impacts during the construction and operation of the proposed Low-Pressure System (LPS) pipeline and an 11kV powerline, this EMPr sets out the methods by which proper environmental controls are to be implemented by the Contractor and all other parties involved.

The EMPr is a dynamic document subject to influences and changes as are wrought by variations to the provisions of the project specification.

4.1. Layout of the EMPr

The EMPr is divided into five phases of development. Each phase has specific issues unique to that period of the construction and operation. The impacts are identified and given a brief description. The phases of the development are identified as below:

4.1.1. Pre-construction (Planning)

The EMPr offers an iDFFEI opportunity to incorporate pro-active environmental management measures with the goal of attaining sustainable development.

Pro-active environmental measures in this stage/phase will minimize the chance of impacts taking place during the construction and operational phase. Even though there is still a chance of accidental impacts taking place; however, through the incorporation of contingency plans, the necessary corrective action can be taken to further limit potential environmental impacts.

4.1.2. Construction phase

The majority of impacts during this phase will have an immediate effect on the project. If the site is monitored on a continual basis during the construction phase; it is possible to identify these impacts as they occur. These impacts will then be mitigated through the contingency plans identified in the planning phase, together with a commitment to sound environmental management from the developer; mainly an Environmental Control Officer (ECO).

4.1.3. Rehabilitation phase

Environmental impacts emitted during the construction phase will have to be mitigated in the rehabilitation phase. However, the concept of progressive rehabilitation is to be implemented throughout the life of the project. The Project Manager in consultation with the Environmental Compliance Officer will be responsible for the monitoring of rehabilitation.

4.1.4. Operational and maintenance phase

By taking pro-active measures during the planning and construction phases, potential environmental impacts emanating during the operational phase will be minimised. This, in turn, will minimise the risk and reduce the monitoring effort, but it does not make monitoring obsolete.

4.1.5. Decommission Phase

All impacts constituted in this phase will possibly have an immediate impact on the environment. Most of these impacts do not require frequent check-up but it is important to maintain a standard monitoring system of them. If the site is monitored on a continual basis during the decommissioning phase; it is possible to identify these impacts as they occur. These impacts will then be mitigated through the contingency plans identified in the planning phase, together with a commitment to sound environmental management from the developer;

The Environmental Management Programme will guide the pre-construction, construction, operation, and maintenance phases of the proposed project. It is a dynamic guideline document that will be updated regularly as the project proceeds once approval has been granted.

The mitigation and management measures described in the Environmental Management Programme should be incorporated into the contract agreements with the contractors to ensure their environmental compliance and becomes legally binding.

5. MITIGATION AND/ MANAGEMENT MEASURES

According to APPENDIX 4 of GN R 982, an environmental management programme must include:

- (d) Information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by these Regulations, including environmental impacts or objectives in respect of –
 - (i) Planning and design;
 - (ii) Pre-construction;
 - (iii) Construction activities;
 - (iv) Rehabilitation of the environment after construction and where applicable post closure; and
 - (v) where relevant, operation activities;
- (e) a description and identification of impact outcomes required for the aspects contemplated in (d).
- (f) a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) 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;
 - (iv) Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
1.	PLANNING AND DESIGN				
No specific management and mitigation measures have been identified which will be applicable for the planning and design phase.					
2.	CONSTRUCTION				
2.1	Site establishment and layout	<ul style="list-style-type: none"> • The location of the construction camp must be approved by the ECO. No person shall be allowed to stay on the construction site. restricted to the construction camp. The fencing will include that of a 20 m buffer zone between the site and the 1:100 year flood line of any watercourse and the farm dam. • The riparian areas and the zone to 100m from the watercourse, which ever is greatest must be pegged and declared as no go areas for all project activities including establishment of site office and storage facilities or areas, servicing and movement of vehicles and machinery, except where authorised under the National Water Act, 1998 (Act 36 of 1998) (NWA). • The contractor must ensure that the construction site is enclosed with a fence for the duration of the construction period. The mesh size must be small enough for the fence to act as a catch net for wind-blown debris and as a demarcation of the site, as well as to reduce the visibility into the construction area. 	Sign off during planning and design phases	Visual observation that all facilities are contained in construction camp.	Applicant/ Contractor EMPR Checklist

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<ul style="list-style-type: none"> • The fence will serve to prevent public access to the camp, for public safety and security reasons. Fencing shall be placed around the identified sensitive sites and hydrological features, buffer zones and no-go areas. Damage to fencing must be repaired as soon as possible and should be done to the satisfaction of the relevant landowner. Where fencing is damaged, temporary security measures must be provided overnight and weekends if requested by the landowner. • Fencing, hard and soft landscaping elements (lawns, ornamental plants and garden features) as well as other property damaged by construction activities, must be repaired or replaced to its original condition or better. Fencing not intended to be cut through or damaged but which were nevertheless damaged by accident or to gain access or during materials offloading activities must be replaced if proof exist that construction workers damaged the fencing. • Site security should be sufficient to prevent trespassing where applicable, to ensure that construction workers obey to site rules, and, where applicable, to provide additional 			

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<p>surveillance in the study area. The site should be kept neat at all times. All construction workers (including workers of contractors and subcontractors) should be easily identifiable by means of clearly visible identity cards as well as marking or colour-coding of clothing. No animals may be kept on-site by construction workers.</p>			
2.2	Site Clearance	<ul style="list-style-type: none"> • Detailed, colour photographs must be taken of the proposed site before any clearing may commence. These records are to be kept by the ECO to aid in the rehabilitation of the site. • Prior to site clearance, the ECO must be informed, with 14 days' notice, in order to identify and demarcate any indigenous trees or plants, nesting sites or heritage sites that require protection or translocation. • The contractor, in collaboration with the ECO must ensure that the necessary rescue and translocation of plants and animals is undertaken prior to the commencement of construction. • Protected trees and plants should be avoided as far as possible. However in the event of avoidance being impossible, the Contractor should obtain agreement from the Applicant 	Daily	Visual observation that no habitat is cleared unnecessarily and that no clearing has occurred outside the approved construction area footprint.	Applicant/ Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<p>and the ECO for removal. The ECO must identify these trees in consultation with a suitably qualified botanist before construction commences.</p> <ul style="list-style-type: none"> • No vegetation clearing must be undertaken within riparian areas. • Minimize the extent of vegetation removal to the construction footprint only. • Avoid unnecessary impacts on natural vegetation • Impacts should be contained, as much as possible, within the servitude of the proposed development. • The removal, damage or disturbance of any flora and fauna within or outside the construction area is not permitted unless specifically authorised by the ECO. Vegetation clearing shall take place in a phased (if possible) manner in order to retain vegetation cover for as long as possible. No areas may remain cleared (bare soil exposed) for longer than 3 weeks and invasive species must be controlled effectively within the servitude. • Topsoil is to be stripped, together with grass, groundcover and sedges from all areas where permanent or temporary structures are to be 			

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<p>constructed. Conservation and handling of topsoil must be undertaken as per the conditions of this document (section ###)</p> <ul style="list-style-type: none"> Rehabilitation and re-vegetation of the disturbed areas should be done immediately after completion of a particular section of construction with indigenous species and should be done to the satisfaction of the ECO and the DFFE. The Applicant Kendal Continuous Ash Disposal Facility (ADF) Conservation Plan Ref No.: 240-146267001 should be implemented. It is understood that this phase will be short, temporary and localised in its impacts. It is recommended that a “walk down” take place to address any infrastructure sitting issues that may occur. 			
2.3	Existing Infrastructure	<ul style="list-style-type: none"> A construction site layout plan showing the positions and extent of all permanent and temporary site structures must be compiled prior to commencement and approved by the Project Manager and ECO. Identify existing services requirements and related sources prior to commencement of construction. 	Once off (prior to commencement)	Service report Relevant permission Proof of water source WCMP Layout plan	Contractor Applicant

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<ul style="list-style-type: none"> • Where new access is required off an existing road, permission must be obtained from the relevant authority (e.g., provincial/ local roads agency). • Water for the purposes of construction must be obtained from approved and, where relevant, licensed sources (e.g., eMalahleni Local Municipality). • Permission from the relevant land user and DWS must be obtained prior to abstracting water from any watercourse where the volumes abstracted require registration or licensing in terms of the National Water Act, 1998 (Act No. 36 of 1998) and any general authorisation in terms of Section 39(1) of the National Water Act. • A water conservation and management plan (WCMP) must be prepared prior to commencement of construction. • 		Proof of submission to relevant parties	
2.4	Heritage Sites and Features	<ul style="list-style-type: none"> • A professional archaeologist must be appointed to be on standby should any heritage remains be found on site during construction. • Should any heritage objects be exposed during excavation, work on that area must cease 	Fortnightly	Visual observations that the EMPR is complied with	Applicant/ Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<p>immediately and the historian be informed immediately.</p> <ul style="list-style-type: none"> All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting on advice from specialists, the Environmental Control Officer will advise the necessary actions to be taken. Under no circumstances shall any artefact be removed, destroyed or interfered with by anyone on the site. 			
2.5	Discovery of subsurface archaeological finds	<ul style="list-style-type: none"> Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or paleontological artefacts as set out in the NHRA (Act No 25 of 1999) Section 51 (1). Screening of construction activities as per usual construction requirements is recommended. Monitoring of excavation activity by a palaeontologist may be necessary, depending on the size and depth of the footprint of the pylons to be used. A person or entity e.g. the Environmental Control Officer must be tasked to take responsibility for any heritage sites that may be uncovered and should be held accountable for 	Fortnightly	Visual observations that the EMPR is complied with	Applicant/ Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<p>any damage. This person must take responsibility to contact the heritage practitioner on standby to assess any sites uncovered during the project.</p>			
2.6	Site offices, camp, and construction activity sites	<ul style="list-style-type: none"> • The contractor must establish a construction camp and laydown area as agreed with the ECO. • Ensures that all building and structures including the construction camp and laydown area is in accordance with the approved site layout plan. • The Contractors Camp must be fenced and have gated access. • The site for the construction camp must not be in an environmentally sensitive area such as in close proximity to a watercourse. • The contractor must provide adequate ablution facilities • Toilets are to be emptied regularly throughout the construction phase. • The construction site layout plan must at least display the following as a minimum <ul style="list-style-type: none"> - Construction camp - Existing infrastructure - Laydown area - Site offices 	Daily	Site layout plan	Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<ul style="list-style-type: none"> - Ablution facilities - Chemical/ hazardous storage area - Workshop - Waste storage area and disposal sites - Topsoil and subsoil stockpile area - Wash bays - Sensitive environmental features • Access roads and routes (including entry and exit points) 			
2.7	Access Roads	<ul style="list-style-type: none"> • Access to the construction area and works area shall utilise existing roads or tracks. Any temporary access routes (if required) shall be rehabilitated to the satisfaction of the ECO. 	Fortnightly	No soil erosion present, road surface not damaged, delivery made during office hours	Applicant/ Contractor
2.8	Ablution Facilities	<ul style="list-style-type: none"> • The contractor will be responsible for provision of sanitation for his and the sub-contractor's staff. Toilets (a minimum of one chemical toilet shall be provided per 15 persons) provided by the contractor must be easily accessible. Should toilets be needed elsewhere, their location must first be approved by the ECO. • No toilets may be placed within 50 m or the 1:100 floodline of any watercourses. The contractor is responsible for ensuring that any toilets placed are suitably situated and comply with requirements stated below. 	Fortnightly	Visual observation that enough toilets are provided and maintained as per EMPR requirements.	Applicant/ Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<ul style="list-style-type: none"> • The toilets shall be of a neat construction and shall be provided with doors and locks and shall be secured to prevent them from falling over. The contractor shall supply toilet paper at all toilets at all times. Toilet paper dispensers shall be provided in all toilets. The contractor (or reputable toilet-servicing company) shall be responsible for the cleaning, maintenance and servicing of the toilets. • The contractor shall ensure that no spillage occurs when chemical toilets are cleaned and emptied. Any accidental spillage must be reported to the ECO and the Applicant and cleaned up immediately. The contractor shall ensure that the toilets are protected from vandals. • If the contractor (or reputable toilet-servicing company) fails to provide and/or maintain all site sanitation facilities in a clean and hygienic condition, the ECO may require the contractor to suspend work until the requirements have been met. 			
2.9	Water Supply	<ul style="list-style-type: none"> • Where possible water should be supplied from the local municipal supply. 	Continuous	Water supply from legal and approved sources.	Applicant/ Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
2.10	Waste	<ul style="list-style-type: none"> • Receptacles with suitable covers shall be provided and conveniently placed. A waste receptacle must be available on the construction vehicles at all times for general litter. All the receptacles will be removed from the site for disposal at a commercial facility licensed for this purpose. They are then to be returned to their positions. Used oils, grease or hydraulic fluids shall be placed therein and removed on a regular basis. • A Waste Management Plan (WMP) must be prepared and implemented throughout construction. This Plan must include measures for waste sorting for the purpose of recycling where feasible. The WMP must include a water conservation and management plan which should aim to reduce, and re-use water where possible. A dedicated waste collection and storage facility must be prepared and this should be emptied and collected wastes disposed of on a regular basis. Wastes must be disposed of at suitably licenced waste disposal facilities. • Contaminated water, and effluents must be prevented from entering the local environment (soil and water), adequately stored in protected 	Continuous	Waste collection and Disposal receipts Inspection of vehicles and sites	Contractor EO

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<p>and where necessary banded areas, and disposed of at a suitably licenced disposal facility.</p> <ul style="list-style-type: none"> No wastes are to be disposed of directly in the local environment. Adequate refuse facilities (with closable lids to protect against scavengers) must be placed at all active construction areas and these must be serviced on a regulator basis. Each active construction site must be checked on a daily basis to ensure that the site is free from litter and unnecessary wastes. 			
2.11	Waste Management	<ul style="list-style-type: none"> No waste is to be left on site whether it is biodegradable or not. Unutilised, construction materials are to be removed once construction has ended, e.g. crushed stone may not be left or randomly strewn around the site. The materials may be left if they are to be removed from the site to be used by the local people or suitably used for road maintenance with the approval of the ECO, and must be removed prior to the Contractor vacating site. No waste shall be left in the veld or anywhere around the site. A Waste Management Plan (WMP) must be prepared and implemented throughout 	<p>Continuous</p> <p>Continuous and prior to construction</p>	<p>Waste collection and disposal receipts</p> <p>No uncontained wastes on sites.</p> <p>WMP and WCMP Compliance with WMP</p> <p>Waste collection and disposal receipts</p>	<p>Contractor</p> <p>EO</p>

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<p>construction. This Plan must include measures for waste sorting for the purpose of recycling where feasible. The WMP must include a water conservation and management plan which should aim to reduce, and re-use water where possible.</p> <ul style="list-style-type: none"> Wastes must be disposed of at suitably licensed waste disposal facilities. 			
2.12	Storage and handling of hazardous substances	<ul style="list-style-type: none"> Compliance with all regional and local legislation must be ensured with regard to the storage, transport and use of harmful and hazardous substances and materials. The contractor must provide a register of hazardous substances to be used on site and must provide proof to the Project Manager that relevant authorisation to store such substances has been obtained from the relevant authority. Furthermore, hazard signs indicating the nature of the stored material must be clearly displayed on the storage facility or containment structure. Any hazardous substances must be stored at least 100m from any of the water bodies on site. Hazardous substances may only be stored under controlled conditions (in a secured, appointed area that is fenced, has restricted entry, has waterproofed facilities and is 	daily	<p>Proof of ECO approval.</p> <p>Record of site establishment costs</p>	<p>Contractor</p> <p>ECO</p>

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<p>underlain by a bunded concrete slab to protect against soil and water pollution).</p> <ul style="list-style-type: none"> • Controlled loading and unloading areas must be provided which are underlain by an impervious paving or PVC sheet to protect against soil and water pollution. • All waste generated must be disposed of to a registered landfill site. Ensure there is adequate spill kits on site and keep a detailed log of all the spills on site. • The responsibility for spill treatment lies with the Contractor. The individual responsible for, or who discovers a hazardous waste spill must report the incident to the ECO. The ECO must assess the situation in consultation with the Project Manager and act as required. In all cases, the immediate response shall be to contain the spill. The exact treatment of polluted soil/water must be determined by the ECO in consultation with the Project Manager. Areas cleared of hazardous waste must be re-vegetated according to the ECOs' instructions. • Should the spill be serious and constitute an emergency, an emergency procedure must be applied. 			

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<ul style="list-style-type: none"> All parked vehicles and plant machinery to have drip drays at all times. Washing of machinery or equipment within wetland areas adjacent to the development is prohibited. 			
2.14	Construction vehicles	<ul style="list-style-type: none"> Construction vehicles are only permitted within the demarcated construction site, as required, to complete their specific task. Such vehicles should be clearly identifiable and marked with appropriate signs. All construction vehicles should be in a good working order to reduce possible noise pollution. All maintenance of construction vehicles that could cause harm to the environment must be done off-site. No servicing of construction vehicles is allowed on site, with the exception of minor repairs to prevent further environmental pollution or damage. On-site vehicles must be limited to approved access routes and areas (including turning circles and parking) on the site so as to minimise excessive environmental disturbance to the soil and vegetation on site. Servicing and maintenance of vehicles on-site shall be avoided as far as possible. 	Fortnightly	Visual observation that condition has been complied with.	Applicant/ Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<ul style="list-style-type: none"> All construction vehicles, trucks and other vehicles including vehicles of contractors and sub-contractors should be road worthy, well maintained (to prevent oil leaks). Where oil leaks are identified, drip trays must be used immediately, never overloaded, and drivers should be properly trained and licensed. Speed limits should be set and speeding by construction vehicles should be strictly monitored, not only on-site but also to and from the site. In areas where movement of construction vehicles is likely to generate dust, dust suppression measures must be implemented to prevent excessive dust. 			
2.15	Stormwater Control	<ul style="list-style-type: none"> Appropriate drainage measures must be taken to ensure that excessive run-off, and as a result, soil erosion, does not occur from the construction site. Where directed by the ECO, embankments must be grassed to minimise erosion. Runoff must not be canalised or concentrated in areas where sheet flow may occur, or where highly erodible soils occur. All stormwater channels and cut-off drains must have slope of <1% to reduce the surface water 	Continuous	Visual observation that there is no ponding of runoff, sedimentation of surrounding water resources and erosion.	Applicant/Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<p>flow velocity downslope to encourage infiltration.</p> <ul style="list-style-type: none"> Storm water diversions must be constructed above the construction campsite to direct run-off away from the site. Drainage systems must be kept as natural as possible. Natural drainage must be retained, and normal flow ensured at all times. 			
2.16	Oil Spillages	<ul style="list-style-type: none"> All working fronts must be provided with a spill containment kit to contain and collect spills. All spills must be reported to the appointed ECO. 	Continuous	Service record. Excessive noise and gaseous emissions. Spill containment kits Proof of notification. Spill/incident register.	Contractor EO
2.17	Spill procedures	<ul style="list-style-type: none"> In the event of spillage or a leak of fuel, the respondent should attempt to isolate the flow of the leak or spill. This may involve closing a safety valve or plugging a hole that has been formed. All people and traffic must be kept away from the spill area. All possible sources of ignition must be removed from the area. The spill must be immediately reported to the ECO and Eskom. 	Daily	Visual observation that spill kits are present and that staff is trained to use them and that a spill procedure exists, including emergency contact details.	Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<ul style="list-style-type: none"> • Procedures for site clean-up and remediation must be developed in consultation with the ECO as well as any other necessary services required (such as remediation companies). • Before any clean-up or remediation has taken place, the project manager and the ECO must be consulted regarding the clean-up procedures. • If a spill occurs within an area with a bund, the fuel can then be cleaned up either manually or using a pump. Whichever means are utilised for the clean-up; any waste material must be disposed of at a hazardous waste disposal facility. Spills that occur on a natural surface can be cleaned up manually. If the spill is quite large, techniques such as bioremediation must be utilised in order to remove any fuel that has seeped into the ground or entered any hydrological features. • The contractor shall keep the necessary materials and equipment on site to deal with spills of the materials present, should they occur. The clean-up of spills caused as a result of the construction activities, and any damage to the environment, shall be for the contractor's own account. 		Visual observation that spills have been recorded.	

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<ul style="list-style-type: none"> A record must be kept of all spills and the corrective action taken. 			
2.18	Air and noise control	<ul style="list-style-type: none"> Dust and noise during construction must be monitored so as not to cause a nuisance to any adjacent landowners their facilities. Factors such as wind can often affect the intensity to which these impacts are experienced. Drilling and other noise and dust creating construction activities should be restricted to normal working hours unless there is a written and signed agreement expressing the permission of the potentially affected parties in the nearby proximity to the contrary. Dust suppression techniques must be implemented on all exposed surfaces during periods of high wind. Noise suppression measures must be applied to all construction equipment, such as fitting some equipment with silencers, where possible. Vegetation clearance must be kept to a minimum and exposed soils must be regularly sprayed. All construction vehicles must be serviced regularly to control gaseous exhaust emissions and noise. 	Continuous	No complaints regarding dust / noise	Contractor EO

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<ul style="list-style-type: none"> • Working hours to be restricted to 07h00 to 18h00 weekdays and 09h00 to 16h00 on weekends. • Vegetation clearance must be kept to a minimum and exposed soils must be regularly sprayed with water. • Revegetate verges and cuttings once all construction is completed and when the construction camp is vacated. • The ambient air quality standard of the national Environmental Management: Air Quality Act must be complied with (GNR 1210 of December 2009), specifically pertaining to particulate matter (PM10). Where topsoil's and sub-soils are removed these must be protected from excessive wind erosion. • The regulatory noise requirements must be complied with. With regards to noise, the provisions of Section 25 of the Environment Conservation Act (Act 73 of 1989); the related noise control regulations (Noise Regulations (GNR 154 of 1992)); and the provisions of SANS 10103, must be complied with. 			
2.19	Increased risk of fire	<ul style="list-style-type: none"> • All personnel on site must be trained with regards to fire hazards and adhere to the fire safety guidelines. 	Daily	Visual observation that EMPR provisions and method	/ Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<ul style="list-style-type: none"> • All regulatory requirements and relevant standards must be complied with for necessary fire prevention, detection, and response at the station and along the powerlines. The station as well as maintenance vehicles must be provided with adequate fire control equipment. In the event that an uncontrolled fire occurs the relevant authorities (e.g. Fire Protection Officers and Fire Protection Associations) as well as the relevant landowners representatives (Incl. neighbouring landowners) must be informed immediately. • The construction camp must be equipped with adequate firefighting equipment (this includes at least rubber beaters when working in agricultural areas, and at least one fire extinguisher in each vehicle of the appropriate type, irrespective of the site). • Fuel or chemicals must not be stored under trees. • Gas and liquid fuel must not be stored in the same storage area. • Smoking must not be permitted within 3 m of any fuel or chemical storage area, or refuelling area. 		<p>statements are complied with. Training records.</p>	

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<ul style="list-style-type: none"> A suitable fire break must be maintained around the site. All other regulatory provisions must be complied with (including provisions of the National Veld and Forest Fire Act-(Act 101 of 1998). The site must be demarcated as a no-smoking area. Necessary powerline clearances must be maintained to prevent flashovers and faulting. 			
2.20	Health, Safety and Security, Courtesy and worker conduct	<ul style="list-style-type: none"> Applicant, Applicant's contractors and their Employees shall at all times be courteous towards landowners, tenants and the local community. Activities that may cause conflict with landowners, tenants, the local work force or the local community shall be avoided. Should conflict arise it shall be immediately reported to the Applicant project manager or co-ordinator. The speed limit on the access roads must be set to 40 km/hr throughout the site and residential areas. Construction workers must be made aware of their specific responsibilities in terms of the environmental impacts i.e., controlling noise levels, reducing dust, not poaching. Construction workers must be made aware that no alcohol/drugs on site and no workers under the influence permitted on site. 	Daily	<p>Minimum records on the complaints register</p> <p>Induction Training</p> <p>Minimum records on the complaints register</p> <p>Visible identification</p> <p>Proof of waste disposal.</p>	Applicant/ Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<ul style="list-style-type: none"> • Construction workers must be made aware that firearms or traditional weapons will not be allowed on site unless is for use by approved security. • Construction workers must be made aware that no harvesting of firewood or other vegetation and no poaching will be permitted anywhere within and around the proposed site. • Construction workers must be made aware that no fires will be permitted on site. • Site staff shall not be permitted to use any stream, river, other open water body or natural water source adjacent to or within the designated site for the purpose of bathing, washing of clothing or for any construction or related activities. Municipal water (or another source approved by the Engineer) should instead be used for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting etc. • Construction teams must be clearly identified by wearing uniforms and/or wearing identification cards that should be exhibited in a visible place on their body. 		Adequate on-site waste management.	

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<ul style="list-style-type: none"> Ensure refuse management and removal is undertaken regularly. 			
2.21	Protection of watercourses and drainage lines	<ul style="list-style-type: none"> The Contractor must not cause any physical damage to any aspect of a watercourse, other than that necessary to complete the works as specified and in accordance with the accepted method statement. No excavation of alternative channels to re-route any river/stream may be done (to avoid unnecessary erosion). All excavation of hydric soils for the laying of the pipeline and installation of the pylons for the powerline must be done by hand using spades and picks as far as possible to avoid unnecessary disturbance of the watercourse by heavy machinery. The hydric soil removed must be placed in a designated spoil site in sequence and replaced in inverted sequence directly after each section has been laid. Short lengths of concrete encasement must be utilised to avoid erosion of the pipe fill material. The Contractor must repair the existing drainage systems and augment these where applicable with additional drainage or increased capacity so as to accommodate normal, as well as flood conditions. 	Continuous	Visual observation that EMPR provisions and method statements are complied with.	Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<ul style="list-style-type: none"> The Contractor must ensure that uncovered soil and stockpiles are not eroded and material washed away. 			
2.22	Wetland Crossings	<ul style="list-style-type: none"> The ECO and Contractor must ensure that all wetlands likely to be intersected by the project have been identified, delineated, photographed and clearly marked by the ECO prior to any construction work on the pipeline and powerline route. Any wetland crossings that may occur along the route must be monitored to ensure no nick-point erosion develops in disturbed soils and that no undue sedimentation occurs downstream. Where possible, construction within or adjacent to any watercourse should take place within the dry season (i.e April to mid-September) to reduce the risk of erosion and sedimentation of the downstream systems during construction. The Contractor must avoid unnecessary compaction on sensitive wetland and riparian soils. The pipeline and powerline crossings must be positioned at a right angle (perpendicular) to the longitudinal flow-path of the watercourses. This will limit the area of direct disturbance and may avoid scouring and undercutting from occurring. The pipeline should be lain under the hydric soils in areas where the infrastructure will be constructed 	Daily/ Continuous	Visual observation that EMPR provisions and method statements are complied with.	Applicant/ Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<p>within watercourses to avoid flow impediment. An estimated recommended depth below the surface is 1,200mm.</p> <ul style="list-style-type: none"> • No construction materials may be stockpiled in any wetland and riparian areas. • Watercourses must be crossed with an open cut trench through the stream, with the pipe buried sufficiently deep not to interfere with the backfilled stream bed. • Concrete encasement and other pipe protection measures should be used where the structural integrity of the pipe may be compromised. • To avoid unnecessary erosion, no excavation of alternative channels to re-route any stream is allowed. • Replanting of wetland and riparian vegetation must be undertaken immediately after surface reinstatement is complete. • Where possible, plants must be replanted in wetland areas from which they were removed. • The pre-construction profile of the wetland and/or stream must be returned to one similar as before construction. • Wetlands must have no created “ridge or channel” features present to ensure that no depressions remain, which could act as channels for preferential 			

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		water flow thereby affecting the hydrological regime of the wetland.			
2.23	Protection of Fauna	<ul style="list-style-type: none"> • Wildlife species (if encountered) may not be killed or otherwise deliberately disturbed in the areas where construction is not taking place. Although highly unlikely, construction workers must be encouraged not to catch or kill any wild animals in the area, including snakes. The trapping, poisoning or shooting of any wild animal (including reptiles, amphibians, birds, etc.) or removal of any flora outside of the demarcated construction area is strictly prohibited. • The construction site must be kept clean, tidy and free of litter/rubbish that would attract animal pests. • No pesticides of any description may be used during the construction phase. Pesticides must also be discouraged from use during the operational phase of the project. No rat poison for vermin may be used and appropriate sanitation to prevent vermin on site must be enforced as owls could be poisoned by eating poisoned rats. • If any wild animals are found during construction or where construction activities pose danger to animals, the animal shall be moved to a suitable area. This shall be done in a manner causing the least possible trauma to 	Fortnightly	Visual observations that the EMPR is complied with	Applicant/ Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<p>the animal, by or under the supervision of the ECO.</p>			
2.24	Defacement of natural features	<ul style="list-style-type: none"> Trees and natural vegetation, or any other natural features outside the work area, which will not be cleared for construction purposes, shall not be defaced, painted for benchmarks, or otherwise damaged, even for survey purposes. Related features in areas that are close to the working site should be barricaded and marked off or declared as No-go areas. Transgression in this regard will be subject to a fine. The latter can only be done if agreed to by the ECO. Any feature defaced by the contractor shall be reinstated to the satisfaction of the ECO. Should any Red Data or protected species be encountered, and in situ conservation is not considered a possibility, it is recommended that a specialist be consulted for possible relocation and that the relevant Plant Relocation Permits be obtained from the DFFE. In addition, any bird nests encountered should not be interfered with, and if unable to be avoided, should be relocated by a suitably qualified individual. 	Fortnightly	<p>Visual observation that no natural vegetation was cleared unnecessarily, and no features defaced. Permit obtained for affected protected trees.</p>	Applicant/ Contractor EMPR Checklist
2.25	Loss of vegetation and associated	<ul style="list-style-type: none"> Prior to construction, all areas designated for vegetation clearing should be clearly marked 	Daily	Visual observation that vegetation	Applicant/ Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
	habitat	<ul style="list-style-type: none"> Minimize the extent of vegetation removal to the construction footprint only. Rehabilitate areas cleared of vegetation with indigenous species. 		clearance occurs within reason and is not cleared unnecessarily and EMPR complied with.	EMPR Checklist
2.26	Vegetation clearance	<ul style="list-style-type: none"> Use existing service roads / access roads. Keep impacts within servitude of the 11kV powerline and LPS pipeline Rehabilitate disturbed areas as soon as possible During future maintenance activities, vegetation clearance must be kept to a minimum. Minimize the extent of vegetation removal to the construction footprint only. Avoid unnecessary impacts on natural vegetation Impacts should be contained, as much as possible, within the servitude of the proposed development. The removal, damage or disturbance of any flora within or outside the construction area is not permitted unless specifically authorised by the ECO. 	Daily	Visual observation that the	Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<ul style="list-style-type: none"> • Vegetation clearing shall take place in a phased (if possible) manner in order to retain vegetation cover for as long as possible. • Search and rescue activities for bulbous plants and other sensitive areas identified during the Impact Assessment process. These plants are to be stored in a designated nursery until they can be re-introduced to the area. All plants must be well documented throughout the search and rescue to enable correct relocation. • License application is required for the removal and destruction of protected species through the provincial DFFE. • Rehabilitation and re-vegetation of the disturbed areas should be done immediately after completion of a particular section of construction with indigenous species and should be done to the satisfaction of the ECO and the DFFE. • Clearing should be undertaken when it is necessary and only within the development footprint. 			
2.27	Disturbance of important ecological process areas	<ul style="list-style-type: none"> • Limit construction and the removal of vegetation to the construction footprint. 	Fortnightly	Visual observations that the EMPR is complied with	Applicant/ Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
2.28	Spread of alien invasive plant species	<ul style="list-style-type: none"> • Rehabilitation within the construction footprint. • The Contractor is responsible for the control of weeds and invader plants within the construction area for the duration of construction. • This control involves killing the plants present, killing the seedlings, which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. Weeds and invader plants will be controlled in the manner prescribed for that category by the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (as amended) or in terms of Working for Water guidelines. • The ECO must identify alien plants (terrestrial and aquatic species) that should be removed by the Contractor. • In the event that chemical herbicides are used, a Pest Control Officer (PCO) must be employed to ensure the use of herbicides is carried out correctly. • The use of herbicides is not permitted within identified sensitive areas. The removal of weeds and invader plants within these areas must be undertaken mechanically or by hand. 	Fortnightly	Visual observations that the EMPR is complied with	Applicant/ Contractor EMPR Checklist

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<ul style="list-style-type: none"> • The ECO must monitor all sites disturbed by construction for colonisation by weeds, exotic or invasive plants, to be removed by the contractor as they emerge. • Areas disturbed due to construction activities must be reinstated and rehabilitated as quickly as possible. • Soil stockpiles must not be translocated from areas with alien plants into the site and within the site alien plants on stockpiles must be controlled so as to avoid the development of a soil seed bank of alien plants within the stock-piled soil. • Any alien plants must be immediately controlled to avoid establishment of a soil seed bank. • An ongoing monitoring programme must be implemented to detect and quantify any aliens that may become established and provide information for the management of aliens. This should form part of an alien management programme 			
2.29	Removal of alien vegetation	<ul style="list-style-type: none"> • Prior to construction the contractor shall ensure that invasive alien vegetation is cleared from the entire site. Species that are declared invasive species (according to the Conservation of Agricultural Resources Act (Act 	Fortnightly	Visual observations that the EMPR is complied with	Applicant/ Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<p>43 of 1983) must be removed from site. Follow up clearing may be necessary if the species re-establish following the initial clearing. No trees within the environmentally sensitive areas may be removed, whether alien species or not, unless permitted by the ECO.</p> <ul style="list-style-type: none"> Other alien species (non-listed) occurring on site may not be used in the landscaping and should be removed from site where possible. Weeds growing on topsoil must be slashed before seeding. 			
2.30	Soil and Water Pollution	<ul style="list-style-type: none"> Pollution of the surface water and aquifer is to be prevented at all costs. Streams, rivers, pan, wetlands dams and their catchments must be protected from erosion, and direct or indirect spillage of pollutants A spill response procedure must be prepared and applied. Concrete, cement and other hazardous substances required during construction must be stored and where applicable mixed on an impermeable laver acting as a barrier to direct contact with the soils. Spillages and excess water from these areas must not be discharged into the environment but contained, collected and disposed of at a suitably licensed facility. 	Continuous	<p>No pollution</p> <p>Spill response procedure. Spill/ incident register</p> <p>Adequate storage and application. No spills/ pollution</p> <p>Waste collection and Disposal receipts</p>	Contractor EO

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<ul style="list-style-type: none"> • All contaminated effluents, wastes, soils, must be collected and disposed of at a suitably licensed facility. • Storage and application of hazardous substances must be done in accordance with best practice standards, and where necessary a bund must be provided. • Hazardous substances must be stored in a secure location isolated from direct contact with the soils and covered where necessary. Pollution of the surface water and aquifer is to be prevented at all costs. • Existing pollution control features (oil control dam, bunding, liners, etc) at the substations must be assessed and upgraded to accommodate the new transformer to ensure adequate capacity for the proposed upgrade. • A spill response procedure must be prepared and applied. • Concrete, cement and other hazardous substances required during construction must be stored and where applicable mixed on an impermeable layer acting as a barrier to direct contact with the soils. • Spillages and excess water from these areas must not be discharged into the environment 			

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<p>but contained, collected and disposed of at a suitably licensed facility.</p> <ul style="list-style-type: none"> • Ablution facilities (chemical toilets, septic tanks, French drains, etc) must be installed according to the relevant manufacturers' specifications, outside of the 1:100 year floodline/drainage lines/ wetlands, and best environmental practice must be maintained to ensure that no pollution from effluents occurs. • All contaminated effluents, wastes, and soils must be collected and disposed of at a suitably licensed facility. • Vehicles must be maintained to proactively prevent unnecessary spills (fuels, lubricants, etc). • All working fronts must be provided with a spill containment kit to contain and collect spills. All spills must be reported to the appointed ECO. • A suitable stormwater management plan must be prepared for the construction camp and any facilities utilised for the storage of hazardous substances must be approved by the ECO and the relevant engineer. • Vehicles must be maintained to proactively prevent unnecessary spills (fuels, lubricants, etc). 			

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
2.31	Excavations, trenches and cutting platforms	<ul style="list-style-type: none"> The movements of the construction vehicles must be confined to the immediate vicinity of the tower location. Only the immediate area of the platform that is to be cut should be cleared and grubbed of topsoil. Excavations must be undertaken carefully, incorporating appropriate drainage. For significant trees identified by the ECO, trenching must be outside the drip line of the tree as specified by the ECO. The pipeline must be constructed with the dig and lay method where pipes are laid length by length. Excavate and backfill trenches on a progressive basis. The Contractor must not have more than 500 m of trench open at any one time. Excavations must not stand open for longer than two days, where possible (maximum of four days). Excavations should preferably be opened and closed on the same day. Excavation must be programmed to take place once the required materials are on site. This facilitates the immediate laying of services and/or construction of subsurface infrastructure and minimises open trench time. 	Continuous	<p>No construction vehicles away from tower location</p> <p>Topsoil stockpiled upslope of excavation only & separate from other cleared material</p> <p>Soil erosion prevention measures in place</p> <p>Rehabilitation plan available</p> <p>Only rocks not topsoil utilized as fill</p>	Contractor ECO

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<ul style="list-style-type: none"> Where trenching through wetlands and drainage lines is required (as per the approved site layout plan), the Contractor must return the profile of the wetland/drainage line to one similar to the pre-construction profile. No ridge or channel feature may remain. Topsoil is to be stockpiled upslope of the excavation. Rocks and debris are to be stockpiled at some other point and used as fill where necessary. Rocks should be stacked as walls to prevent soil washing away on cut or fill banks. Ideally banks should not be steeper than 1:3 and cut back where the ECO deems necessary. Once construction is complete the topsoil is to be re-spread over the site and reseeded or replanted with grass sods if specified by the ECO. Berms may be specified depending on the gradient and length of slope affected. Topsoil must not be used as fill. 			
2.32	Erosion Control	<ul style="list-style-type: none"> The disturbance of steep slopes, for example by the removal of vegetation, may result in slope instability and erosion by rain and surface runoff. All slopes that are disturbed during construction shall immediately be stabilised to prevent erosion. The contractor shall be 	Fortnightly	Visual observation that erosion control measures are effective	Applicant / Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<p>responsible for rehabilitating all eroded areas in such a way that the erosion potential is minimised after construction has been completed.</p> <ul style="list-style-type: none"> • Sediment traps must be erected downslope of all construction activities. • Keep disturbance of indigenous vegetation to a minimum. Rehabilitate disturbed areas as quickly as possible following completion of construction activities in an area. Shoring must occur where excavation is in loose sand and/or wet areas. • Erosion donga crossings must be addressed as watercourse crossings, applying soil erosion control and bank stabilisation procedures as specified by the RE and ECO. • Erosion problems must be repaired on a progressive basis throughout the contract. • Slopes steeper than 1(V):3(H) or slopes where the soils are by nature dispersive or sandy must be stabilised (in consultation with the ECO) • Impacts should be contained, as much as possible, within the servitude of the infrastructure. Any topsoil's removed from construction must be conserved, separate from 		<p>Visual observation that stormwater is contained and managed, i.e.no rill or Gulley formation.</p>	

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<p>the sub-soils for use in the rehabilitation process.</p> <ul style="list-style-type: none"> After the topsoil has been stripped, it will be stored separate from subsoil, in the following manner: To prevent the development of anoxic conditions, soil compaction and loss of soil biota, stripped topsoil will be placed/stored on temporary stockpiled not exceeding 1.5 meter in height, and storage will be for the shortest period possible (not longer than 6 months). To prevent compaction and loss of soil structure, no vehicles or machines will be allowed to drive over or being parked on the topsoil stockpiles. To prevent erosion of topsoil, the stockpile will not be placed within the 1:100 year floodline of a water course, and will not be placed within the path of a stormwater channel, and if necessary, will be provided with a silt fence around the perimeter of the foot of the stockpile. To prevent the establishment of seed bank or accumulation of other propagules of alien invasive plants within/on the topsoil stockpile, the growth of weed species on the stockpile will be controlled. Areas with existing erosion and stability issues must be avoided. Wind screening and 			

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<p>stormwater control should be undertaken to prevent loss of topsoil from the site.</p> <ul style="list-style-type: none"> All erosion control mechanisms need to be regularly maintained to ensure efficacy. In the event that new access tracks are required, adequate stormwater control must be implemented to prevent erosion and excessive ponding. Rehabilitation and if necessary, revegetation (with a suitable local seed mix) of disturbed surfaces should occur as soon as possible after completion of construction activities. Rehabilitation of cleared areas with indigenous vegetation 			
3.	REHABILITATION				
3.1	Site Rehabilitation	<p>Should the contractor not comply with this requirement either upon completion of the work or within 14 days of a written request from Applicant to do so, Applicant shall be entitled to employ other persons to carry out this work. All expenses consequent thereon or incidental thereto shall be borne by the contractor and shall be recoverable</p> <ul style="list-style-type: none"> from him by Applicant, or may be deducted by Applicant from any moneys due, or which may become due, to the contractor 	Continuous	Implementation of Rehabilitation measures.	Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
3.2	Land Rehabilitation	<ul style="list-style-type: none"> All exposed surfaces hardened / compacted due to construction activities are to be ripped and imported materials thereon removed. All rubble is to be removed from site to a licensed landfill site. Burying of rubble on site is prohibited. The site is to be cleared of all litter. Surfaces are to be checked for waste products such as concreting, oil or fuel spills and to be cleared from the site and disposed of at a licensed Landfill under the advice of the ECO & Project Manager. All embankments are to be trimmed, shaped and replanted to the satisfaction of the ECO. The contractor in association with the ECO is to check that all watercourses associated with the construction sites are free from building rubble, spoil materials and waste materials. Should these be present, the ECO must be consulted on the appropriate manner of removal from the water course and disposal thereafter. 	Continuous	Proof of adequate waste disposal records and receipts.	Contractor
3.3	Rehabilitation and re-vegetation	<ul style="list-style-type: none"> Rehabilitation will be required within the development footprint. Once construction of a particular section of the development is complete, rehabilitation (e.g. the planting of indigenous vegetation) must be undertaken in order to restore the aesthetic and ecological 	Fortnightly and on completion of construction	Visual observations that the EMPR is complied with	Applicant/ Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<p>value of the area. Only indigenous vegetation should be utilised for the rehabilitation of disturbed areas. Rehabilitation should be undertaken according to the following schedule:</p> <ul style="list-style-type: none"> - Infilling of all excavation work, ensuring that subsoil is filled in first, to ensure that topsoil is present on the surface in order to ensure a suitable plant growth medium. Substrate that is not suitable for plant growth should not be used for infilling of excavations. - Removal of all construction rubble from the site, including substances that cannot be used for infilling of excavations must be undertaken. • The exposed ground should be seeded and mulched with an appropriate stabilising grass mixture. It is recommended that higher seeding density grass mix 			
3.4	Site rehabilitation infrastructure	<ul style="list-style-type: none"> • After construction, any area cleared or disturbed (as a result of the activity) within and outside the boundaries of the construction site shall be rehabilitated to the pre-construction state. • All construction equipment and excess concrete, temporary fencing and the like shall 	On completion of construction	Visual observation That rehabilitation measures have been complied with.	Applicant/ Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<p>be removed from the site upon completion of the work. No discard materials of whatsoever nature shall be buried on the site, or on any vacant or open land in the area and may only be disposed of at the appropriate registered waste disposal site. All road and roadside surfaces and other infrastructure (e.g. electricity supply lines, water supply lines, telecommunication lines, etc.) shall be reinstated as per the conditions of the relevant landowner or service provider.</p> <ul style="list-style-type: none"> • Access roads utilised during construction (which are not earmarked for closure and rehabilitation) must be returned to a usable state and/or a state no worse than prior to construction. • Unless otherwise directed by the Project Manager and Applicant, all temporary access roads earmarked for closure must be ripped, scarified, top soiled and seeded. • All stockpiles and surplus material must be transported to an approved location off site. • After the stockpiled material has been removed, the site must be re-instated and rehabilitated. • The site must be cleared of all inert waste and rubble, including surplus rock and foundations. 			

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<ul style="list-style-type: none"> Excess spoil and inert rubble must be transported to waste sites as approved by the Project Manager and Applicant. All domestic waste must be removed and disposed at a licensed waste disposal site. Disposal certificates must be provided to the ECO. 			
3.5	Hazardous waste and Pollution Control	<ul style="list-style-type: none"> All fuel stores, hazardous substance stores, hazardous waste stores and pollution control sumps must be removed from site. Pollution containment structures must be removed from site. All sanitation infrastructure and wastewater disposal systems must be removed from site. 	On completion of construction	Visual observation That rehabilitation measures have been complied with. Implementation of Rehabilitation measures.	Contractor
3.6	Site Rehabilitation: Landscaping and preparation for planting	<p>Rehabilitation with indigenous grasses (which in all likelihood were removed during construction) must be planted in areas that will not be disturbed in future due to maintenance activities.</p> <p><i>Topsoil Replacement</i></p> <ul style="list-style-type: none"> Topsoil must be replaced prior to the rainy season or any expected wet weather conditions. Stockpiled topsoil must be replaced and redistributed, together with herbaceous vegetation, overlying grass and other fine organic matter in all disturbed areas of the construction site, including temporary access 	On completion of construction	Visual observation That rehabilitation measures have been complied with.	Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<p>routes and roads. Topsoil must be replaced to the original depth (i.e. as much as was removed prior to construction). Topsoil must be replaced 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 area (this must be approved by the ECO and Project Manager). Topsoil suspected to be contaminated with the seed of alien vegetation must not be used. Imported topsoil must be sprayed with specified herbicides (approved by the Environmental Manager). Topsoil not utilised must be shaped in an acceptable manner to blend in with the local surrounding area. After topsoil placement is complete, available stripped vegetation must be spread randomly by hand over the top-soiled area. In the event that no topsoil is available on site prior to construction, and thus no topsoil is available for rehabilitation, the following ameliorative action must be undertaken (in consultation with the Environmental Manager):</p> <ul style="list-style-type: none"> -The soil must be sampled to a depth of 200 mm in all areas allocated for grass planting and the 			

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<p>samples sent for soil analysis to determine the type of fertiliser and rate thereof to be applied.</p> <p>-The necessary soil ameliorants as indicated by soil tests must be added to and worked into the soil.</p> <p>-After the application of fertilisers, a waiting period of six to eight weeks is required prior to the execution of planting and/or grassing.</p> <p><i>Ripping and Scarifying</i></p> <ul style="list-style-type: none"> Following the application of topsoil, all areas must be ripped and/or scarified to facilitate mixing of the upper most layers. The ECO will specify whether ripping and/or scarifying is necessary. All disturbed and compacted areas of the construction site must be ripped and/or scarified, including the site offices, stockpile areas, temporary access routes and roads. Ripping and/or scarifying must be done along the contour to prevent the creation of down-slope channels. Ripping and/or scarifying must be done at 300 mm intervals (not more than 400 mm intervals). Ripping and/or scarifying must not be done under wet conditions (the soil will not break up). 			

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
	Planting and Grassing	<ul style="list-style-type: none"> • All planting and grassing work must be undertaken by a suitably qualified Sub-contractor. • The sourcing of seed or other plant material used for vegetation establishment must be from within 50 km radius of the site and within the bio-climatic region. • The reinstatement of disturbed areas with locally indigenous herbaceous vegetation must be conducted progressively. • In moist areas, re-vegetation must include hygrophilous grassland or reed bed, and in dry areas indigenous runner grasses must be used. • The use of fertilisers must be carefully controlled by the ECO. No fertiliser must be used in the re-vegetation process near or in watercourses and wetlands areas. • If possible, reseeding and replanting must occur just prior to or during the wet season. If planting and reseeding occurs in a dry period, it may be necessary to irrigate plants to ensure their successful establishment. • Sodding may be done at any time of the year but seeding must be done during summer when the germination rate is better. 	On completion of construction	Visual observation That rehabilitation measures have been complied with.	Applicant, Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<ul style="list-style-type: none"> Hydro-seeding with a winter mix will only be specified where regrassing is urgent and cannot wait for the summer. Within terrestrial, non-wetland areas, indigenous runner grasses, such as <i>Stenotaphrum secundatum</i>, <i>Dactyloctenium australe</i> and <i>Cynodon dactylon</i> must be used. Exotic invasive grasses, such as <i>Kikuyu</i> (<i>Pennisetum clandestinum</i>) must not be used. In wet areas, hygrophilous grassland or reed bed must be encouraged as the final vegetation cover depending on the degree of local wetness (temporary/seasonal/permanent wetland). 			
	Weed and Invader Control	<ul style="list-style-type: none"> The Contractor is responsible for the control of weeds and invader plants within the construction site for the duration of the rehabilitation phase. The control involves killing the plants present, killing the seedlings, which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. Weeds and invader plants will be controlled in the manner prescribed for that category by the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (as amended) or in terms of Working for Water guidelines. 	On completion of construction	Visual observation That rehabilitation measures have been complied with.	Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<ul style="list-style-type: none"> • Removed vegetation must be disposed at a licensed waste disposal facility. • Only properly trained people must handle and make use of chemical herbicides. Workers must wear protective clothing when applying the herbicides. • Spraying must not take place in windy conditions, when the herbicide may drift onto healthy indigenous plants. • The use of herbicides is not permitted within identified sensitive areas. The removal of weeds and invader plants within these areas must be undertaken by hand. • Affected areas must be reinstated and rehabilitated as soon as practically possible. 			
3.7	Monitoring of Rehabilitated areas	<ul style="list-style-type: none"> • Upon completion of all work, the ECO and Project manager (may be in consultation with Applicants internal Environmental manager) must survey all rehabilitated areas to ensure compliance with specifications. • A monitoring and alien weed control programme must be implemented (by the Employer) for a minimum of one year to ensure no nick-point erosion develops in disturbed soils, wetland vegetation re-establishes and that alien weeds are controlled. 	On completion of construction	Visual observation That rehabilitation measures have been complied with.	Contractor

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<ul style="list-style-type: none"> • A photographic record must be maintained. • Monitoring should be done quarterly each year, for the minimum of one year, or until the rehabilitated areas are well established. • Alien weed control and soil erosion will be the main items that require monitoring. 			
4.	OPERATION				
4.1	General operation and management	Monitoring and inspection of the service infrastructure should be conducted regularly. Monitoring should also include any on-going rehabilitation measures initiated in the construction phase.	Immediately before and after maintenance activities within the servitude	Visual observation that the EMPR is being complied with.	Applicant/ Contractor
4.2	Spread of alien invasive plant species	Alien clearing should be implemented by Applicant.	Immediately before and after maintenance activities within the servitude	Visual observation that the EMPR is being complied with.	Applicant/ Contractor
4.3	Impact to heritage features	<ul style="list-style-type: none"> • Should any heritage objects be exposed during excavation, work on that area should cease immediately and the archaeologist be informed immediately. • All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting on advice from specialists, the Environmental Control Officer will advise the necessary actions to be taken. 	Immediately before and after maintenance activities within the servitude	Visual observation that the EMPR is being complied with.	Applicant

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
		<ul style="list-style-type: none"> • Under no circumstances shall any artefact be removed, destroyed or interfered with by anyone on the site. • Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or paleontological artefacts as set out in the NHRA (Act No 25 of 1999) Section 51 (1). • A person or entity e.g. the Environmental Control Officer/ Eskom should be tasked to take responsibility for any heritage sites that may be uncovered and should be held accountable for any damage. This person must take responsibility to contact the heritage practitioner to assess any sites uncovered during the project. 			
4.4	Discovery of subsurface archaeological finds	<ul style="list-style-type: none"> • If during future maintenance activities any possible finds are made, the operations must be stopped, and a qualified archaeologist be contacted for an assessment of the find. • Any substantial fossil remains (e.g. vertebrates, petrified wood) encountered during excavation should be reported to SAHRA for possible mitigation by a professional palaeontologist 	Immediately before and after maintenance activities within the servitude	Visual observation that the EMPR is being complied with.	Applicant/ Contractor
5.	DECOMMISSIONING				

ID	Activity/ Aspect	Mitigation	Monitoring Frequency	Indicator/Target	Responsible party for
5.1	Decommissioning And Rehabilitation	Prior to the decommissioning, a detailed decommissioning plan must be prepared. This plan should aim to follow the waste management hierarchy (reuse, recycle, reduce and dispose) in order to prevent unnecessary wastes. All waste which requires disposal must be disposed of at a suitably licensed facility. An inventory of infrastructure and wastes together with the ultimate destination (e.g. recycler, waste disposal) should be kept for future records. A rehabilitation plan must be prepared by a suitably qualified specialist prior to commencement. The sites must be rehabilitated to the pre-construction condition or alternatively to align with the surrounding land-uses at the time. The rehabilitated site must be protected	Continuous	Approved Decommissioning plan. Compliance with Decommissioning plan. Completion of Rehabilitation plan. Post decommissioning landscape must be consistent with surroundings	Applicant
5.2	Site closure	Should the activity ever cease or become redundant, the applicant shall undertake the required actions as prescribe by legislation at the time and comply with all relevant legal requirements administered by any relevant and competent authority at that time.	Prior to decommissioning	Compliance with relevant requirements.	Applicant

6. ENVIRONMENTAL MONITORING

According to APPENDIX 4 of GN R 982, an environmental management programme must include:

- (g) The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);
- (h) The frequency of monitoring the implementation of the impact management actions contemplated in (f);

A monitoring programme should be implemented for the duration of the construction phase of the project to ensure compliance with the EMPr. This programme must include:

- Bi-monthly site audits that will be conducted by the Environmental Control Officer for the duration of the construction phase.
 - Compilation of the audit report which will document findings and recommend corrective action to be taken. Subsequent reports will provide feedback on whether previous nonconformance raised has been resolved, thereby ensuring continual improvement of the site's environmental performance; and
 - Daily and regular site visits will be conducted by the Contractor EO, Environmental Officer/ Advisor and ECO to ensure daily implementation of the EMPr conditions and provide corrective actions.
- **Post Construction/ Rehabilitation Independent Audit:** An environmental audit report must be submitted to the DFFE within 30 days of completion of the Construction Phase (i.e. within 30 days of site handover) and within 30 days of completion of rehabilitation activities. This report must:
 - Be compiled by an independent environmental auditor;
 - Indicate the date of the audit, the name of the auditor and the outcome of the audit;
 - Evaluate compliance with the requirements of the approved EMPR and the EA;
 - Include measures to be implemented to attend to any non-compliances or degradation noted;
 - Include copies of any approvals granted by other authorities relevant to the development for the reporting period;
 - Highlight any outstanding environmental issues that must be addressed, along with recommendations for ensuring these issues are appropriately addressed;
 - Include a copy of the EA and the approved EMPR;
 - Include all documentation such as waste disposal certificates, hazardous waste site licences etc, pertaining to the EA; and

- Include evidence of adherence to the conditions of the EA and the EMPR where relevant, such as training records and attendance records.

The Applicant must use the audit report findings to continually ensure that environmental protection measures are working effectively on site through a system of self-checking. The EMPR should be viewed as a dynamic document aimed at continual environmental performance improvement.

Changes to the EMPR, which are environmentally defensible, must be submitted to the DFFE for acceptance before such changes can be affected. Furthermore, the DFFE reserves the right to request amendments to the EMPR should any impacts that were not anticipated or covered in the BAR be discovered

All employees and the Applicant shall at all times have access to the EMPR in their respective locations. The EMPR will form part of the contract and will therefore be a legally binding document. In the event of discrepancy with regard to environmental matters or environmental specifications this document shall take precedence- unless there is conflict with environmental legislation. The Applicant or his delegated representative is responsible for ensuring compliance with the EMPR. Periodic EMPR compliance reports (audits) are compiled by the ECO and submitted to the Applicant for his review and correction of non-compliance issues. It is the responsibility of the ECO to report any non-compliance, which is not correctly rectified.

During the operational phase, monitoring against the EMPR should be done immediately before, during and after any future maintenance activities are undertaken. The findings of the monitoring should be made available to the relevant local competent environmental authorities.

7. ROLES AND RESPONSIBILITIES

According to APPENDIX 4 of GN R 982, an environmental management programme must include:

- (i) An indication of the persons who will be responsible for the implementation of the impact management actions;

ROLE	RESPONSIBILITIES	REPORTING
<p>Environmental Control Officer (ECO)</p>	<ul style="list-style-type: none"> - An independent ECO is appointed by the Applicant and is responsible for communicating environmental issues associated with the site to the Contractor/EO and the Project Manager. -Review and approve Method Statements produced by the Contractor, in conjunction with the PM - Monitor the implementation of the EMPr during the construction phase of the LPS pipeline and 11kV powerline - Monitor all site activities on a daily basis for compliance - Conduct bi-monthly audits of the site according to the EMPr, and report findings to the Project manager/Contractor - Recommend corrective action for any environmental non-compliance noted on site; - Review complaints received and make instructions as necessary - Attend regular site meetings - Compile a monthly compliance report highlighting any non-compliance issues as well as progress and compliance with the EMPr prescriptions. These monthly reports are to be submitted to the competent authority; <p>Applicant</p>	<p>Applicant/ Competent Authority</p>

<p>Contractor</p>	<p>-The Contractor is responsible for the overall execution of the activities envisioned in the construction phase including the implementation and compliance with recommendations and conditions of the EMPr.</p> <p>- The contractor (as agreed with the Applicant) will be responsible for ensuring compliance with the conditions of the EMPr during construction and must ensure that all his employees and subcontractors appointed by him are familiar with the EMPr. The legal accountability for correct implementation of the relevant requirements of the EA and EMPR must be contractually assigned to the appointed contractor.</p> <p>- Prepare method statements</p> <p>- Ensure that all subcontractors and other workers appointed by the Contractor are complying with and implementing the EMPr.</p> <ul style="list-style-type: none"> - The contractor will designate a suitable qualified Environmental Officer (EO) who will preferably be a senior member of staff that will be responsible to oversee day to day compliance with the EMPr by the contractor's staff and sub-contractors and their staff. - The contractor EO will also be responsible for correct implementation of the EMPr requirements - Advise the PM of any incidents or emergencies on site, together with a record of action taken; - Provide all employees and subcontractors with induction on the contents of this EMPr and the conditions of the - Environmental Authorisation. Proof of attendance registers to be provided to the ECO. 	<p>ECO/ Contractor/ Applicant</p>
-------------------	--	-----------------------------------

<p>Project Manager (PM)</p>	<ul style="list-style-type: none"> - The PM is the individual responsible for the overall implementation of the project in respect of time, cost and legal provisions. This role is usually fulfilled by the Applicant. Be familiar with the contents of the EMPr, and his role and responsibilities as defined therein; - Reviewing and approve Method Statements produced by the Contractor in connection with the EMPr - Ensuring that the EMPr is included in the Contractor's contract; - Communicate to the Contractor, verbally and in writing, the advice of the ECO and the contents of the ECO reports; - Review and approve drawings produced by the Contractor or professional team in connection with, for example, the construction site layout, access/haul roads, etc.; - Issue site instructions giving effect to the ECO requirements where necessary; - Keeping a register of all complaints and emergency incidents Implement recommendations of possible audits; - Implement Temporary Work Stoppages as advised by the ECO, were serious environmental infringements and non-compliances have occurred. - Facilitate proactive communication between all role-players in the interests of effective environmental management; and - Ensure that construction staff is trained in accordance with requirements of the EMPr. - Appoint a suitably qualified Environmental Officer / Environmental Advisor that will manage all environmental 	<p>Applicant</p>
-----------------------------	---	------------------

	<ul style="list-style-type: none"> - aspects on behalf of the PM and the Applicant. 	
Applicant (Applicant)	<p>The Applicant is the person who is legally responsible for ensuring compliance with the conditions contained in the EA and EMPr. This includes any person acting on behalf the Applicant, including but not limited to, an agent, servant, contractor, sub-contractor, employee, consultant or person rendering a service to the holder of the authorization.</p> <ul style="list-style-type: none"> - Appoint or designate a suitably qualified Project Manager to manage the implementation of the proposed project on behalf of Applicant SOC Limited - Ensure the EMPr is frequently updated, amended and approved by the Competent Authority 	Competent Authority
Environmental Officer/ Environmental Advisor	<ul style="list-style-type: none"> - The Environmental Officer/ Environmental Advisor will be responsible for managing all environmental aspects on behalf of the PM and the Applicant. - Undertake regular inspections on site to monitor compliance on the EMPr and generate weekly inspection reports. 	Project Manager

8. COMPLIANCE WITH THE EMPR

According to APPENDIX 4 of GN R 982, an environmental management programme must include:

- (j) The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;
- (k) The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);

A copy of the EMPr must be kept on site at all times during the construction period. The EMPr will be binding on all contractors operating on the site and must be included within the Contractual Clauses. It should be noted that in terms of Section 28 of the National Environmental Management Act (No. 107 of 1998): those responsible for environmental damage must pay the repair costs both to the environment, human health and the preventative measures to reduce or prevent further pollution and/or environmental damage (The 'polluter pays' principle).

8.1. Non-conformance

The contractors must act immediately when a notification of non-conformance is received and take corrective action. Complaints received regarding activities on the construction site pertaining to the environment must be recorded in a dedicated register and the response(s) noted with the date and action taken. The ECO should be made aware of any complaints.

Any non-conformance with the agreed procedures of the EMPr is a transgression of the various statutes and laws that define the manner by which the environment is managed. Failure to redress the cause must be reported to the competent authority for them to deal with the transgression, as it deems fit.

Non-compliances (NC) will be recorded in a register with details of date, location, NC or Incident, applicable EMPr aspect, corrective action taken, adequacy of corrective action, date rectified, photographic record etc. (refer to Table below).

Table 5: RECORDING KEEPING: NON-CONFORMANCE REGISTER TEMPLATE

NON-CONFORMANCE REGISTER	
DETAILS OF NON-CONFORMANCE / INCIDENT	CORRECTIVE ACTION
Reference number	Suggested Corrective Action
NC/Incident	Actual Corrective Action Taken

Date of occurrence	Suggested Due Date
Environmental Aspect Type	Corrective Action Status (Pending / Complete / Overdue)
Time	Actual Date Corrected

The Contractor is deemed not to have complied with the EMPr if, inter alia:

- There is evidence of contravention of the EMPr specifications within the boundaries of the construction site and site extensions;
- There is contravention of the EMPr specifications which relate to activities outside the boundaries of the construction site;
- Environmental damage ensues due to negligence;
- Construction activities take place outside the defined boundaries of the site; and/or
- The Contractor fails to comply with corrective or other instructions issued within a specific time period.

It is recommended that the Applicant institute penalties for the following less serious violations and any others determined during the course of work, as detailed below:

- Littering on site and mixing of waste.
- Lighting of illegal fires on site.
- Persistent or unrepaired fuel and oil leaks.
- Any persons, vehicles or equipment related to the Contractor's operations found within the designated "no-go" areas.
- Excess dust or excess noise emanating from site.
- Possession or use of intoxicating substances on site.
- Any vehicles being driven in excess of designated speed limits.
- Removal and/or damage to fauna, flora, cultural or heritage objects on site.
- Urination and defecation anywhere except at designated facilities.

8.2. Emergency preparedness

The Contractor must compile and maintain environmental emergency procedures to ensure that there will be appropriate responses to unexpected or accidental actions or incidents that will cause environmental impacts, throughout the construction period. Such activities may include, inter alia:

- Accidental wastewater discharges to water and land.
- Accidental fires.
- Accidental spillage of hazardous substances.
- Accidental exposure of employees to hazard substances.
- Specific environmental and ecosystem effects from accidental releases or incidents.

- Natural disasters (e.g., flooding)

These plans should include:

- Emergency organisation (manpower) and responsibilities, accountability, and liability.
- A list of key personnel and contact details.
- Details of emergency services available (e.g., the fire department, spill clean-up services, ambulance services etc.).
- Internal and external communication plans, including prescribed reporting procedures where required by legislation.
- Actions to be taken in the event of different types of emergencies.
- Incident recording, progress reporting and remediation measures required to be implemented.
- Information on hazardous materials, including the potential impact associated with each, and measures to be taken in the event of accidental release.
- Training plans, testing exercises and schedules for effectiveness.

The Contractor must comply with the emergency preparedness and incident- and accident-reporting requirements, as required by the Occupational Health and Safety Act (No. 85 of 1993), the NEMA (No. 107 of 1998) and the National Water Act (No. 36 of 1998) as amended and/or any other relevant legislation.

8.3. Incident reporting and remedy

If a leakage or spillage of hazardous substances occurs on site, the local emergency services must be immediately notified of the incident. The following information must be provided:

- the location;
- the nature of the load;
- the extent of the impact; and
- the status at the site of the accident itself (i.e. whether further leakage is still taking place, whether the vehicle or the load is on fire).

Written records must be kept on the corrective and remedial measures decided upon and the progress achieved therewith over time. Such progress reporting is important for monitoring and auditing purposes. The written reports may be used for training purposes in an effort to prevent similar future occurrences. An incident report similar to Table 5 can be used.

8.4. Penalties

Where environmental damage is caused or a pollution incident, and/or failure to comply with any of the environmental specifications contained in the EMP, Applicant and/or the Contractor will be liable.

The following violations, and any others determined during the course of work, should be penalised:

- Hazardous chemical/oil spill and/or dumping in non-approved sites.
- Damage to sensitive environments.
- Damage to cultural and historical sites.
- Unauthorised removal/damage to indigenous trees and other vegetation, particularly in identified sensitive areas.
- Uncontrolled/unmanaged erosion.
- Unauthorised blasting activities (if applicable).
- Pollution of water sources.
- Unnecessary removal or damage to trees.

The following steps will be followed by the ECO, on behalf of Applicant, when observing a transgression:

1. Transgression observed: Give a warning to the Contractor, with time to remedy the situation. Report transgression and agreed remedial action to Applicant.
2. Transgression not remedied: Report the Contractor directly to the Applicant and issue a financial penalty to the Contractor with an agreed time period to remedy the situation with the assistance of Applicant (if necessary).
3. Failure to remediate: Depending on the severity and impact significance of the transgression, which must be assessed and discussed with Applicant prior to reporting to the competent authority, the ECO may report directly to DFFE (Compliance) recommending that for:
 - HIGH impact: DFFE to issue a notice to cease construction.
 - MEDIUM impact: DFFE to issue a notice instructing Applicant Holdings SOC Limited to implement recommended remedial action; and/or
 - LOW impact: ECO to notify, but up to discretion of DFFE to apply sanction.

In all cases, however, non-compliance must be reported to DFFE in the monthly audit reports. However, the ECO will also report on corrective actions proposed and implemented.

9. REPORTING

According to APPENDIX 4 of GN R 982, an environmental management programme must include:

- (l) A program for reporting on compliance, taking into account the requirement as prescribed by the regulations;

9.1. Administration

Before the construction activities commence, the Contractor must provide the ECO and Applicant with a written method statement setting out the following:

- Details of the construction activities.
- Location where the activity will take place.
- Identification of impacts that might result from the activity.
- Identification of activities that may cause impacts.
- Methodology and/or specifications for impact prevention for each activity or aspect.
- Methodology and/or specifications for impact containment for each activity or aspect.
- Emergency/disaster incident and reaction procedures.
- Treatment and continued maintenance of the impacted environment.

The Contractor should provide such information in advance of any or all construction activities provided that new submissions are given to the ECO whenever there is a change or variation to the original.

The ECO should provide comment on the methodology and procedures proposed by the Contractor, but they will not be responsible for the Contractor's chosen measures of impact mitigation and emergency/disaster management systems.

9.2. Good housekeeping

The Contractor must undertake "good housekeeping" practices during construction. This will help avoid disputes on responsibility and allow for the smooth running of the contract as a whole. Good housekeeping extends beyond the wise practice of construction methods to include the care for and preservation of the environment within which the construction is situated.

9.3. Record keeping

The ECO must continuously monitor the Contractor's adherence to the approved impact prevention procedures and the ECO must issue the Contractor with a notice of non-compliance whenever transgressions are observed. The ECO should document the nature and magnitude of the non-compliance in a designated register, the action taken to discontinue the non-compliance, the action taken to mitigate its effects and the results of the actions. The

non-compliance should be documented and reported to Applicant in the monthly report. These reports must be made available to DFFE when requested.

9.4. Document control

The Contractor is responsible for establishing a procedure for electronic document control.

The document control procedure should comply with the following requirements:

- Documents must be identifiable by organisation, division, function, activity and contact person.
- Every document should identify the personnel and their position(s), who drafted and compiled the document(s), who reviewed and recommended approval, and who finally approved the document for distribution.
- All documents should be dated, provided with a revision number and reference number, filed systematically, and retained for a five year period.

The Contractor must ensure that documents are periodically reviewed and revised, where necessary, and that current versions are available at all locations where operations essential to the functioning of the EMPr are performed. All documents must be made available to the ECO and other independent external auditors.

10. ENVIRONMENTAL AWARENESS

According to APPENDIX 4 of GN R 982, an environmental management programme must include:

- (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; and

The Contractors must ensure that their employees and any third party, who carries out all or part of the Contractors' obligations, is adequately trained with regard to the implementation of the EMPr and the general environmental legal requirements and obligations. Training should be conducted by the ECO where necessary.

Environment and health awareness training programmes should be targeted at three distinct levels of employment, i.e. the executive, middle management and labour. Environmental awareness training programmes should contain the following information:

- The names, positions and responsibilities of personnel to be trained.
- The framework for appropriate training plans.
- The summarised content of each training course.
- A schedule for the presentation of the training courses.

The ECO must ensure that records of all training interventions are kept in accordance with the record keeping and documentation control requirements as set out in this EMPr. The training records must verify each of the targeted personnel's training experience.

The Developer must ensure that adequate environmental training takes place. All employees must be given an induction presentation on environmental awareness and the content of the EMPr. The presentation needs to be conducted in the language of the employees to ensure it is understood. The environmental training must, as a minimum, include the following:

- The importance of conformance with all environmental policies.
- The environmental impacts, actual or potential, of their work activities.
- The environmental benefits of improved personal performance.
- Their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirement of the Agency's environmental management systems, including emergency preparedness and response requirements.
- The potential consequences of departure from specified operating procedures;

- The mitigation measures required to be implemented when carrying out their work activities.
- Environmental legal requirements and obligations.
- Details regarding floral/faunal species of special concern and protected species, and the procedures to be followed should these be encountered during the construction of approach roads or construction camps.
- The importance of not littering.
- The importance of using supplied ablution facilities.
- The need to use water sparingly.
- Details of and encouragement to minimise the production of waste and re-use, recover and recycle waste where possible.
- Details regarding archaeological and/or historical sites which may be unearthed during construction and the procedures to be followed should these be encountered.

10.1. Monitoring of environmental training

The Contractor must monitor the performance of construction workers to ensure that the points relayed during their introduction have been properly understood and are being followed. If necessary, the ECO and / or a translator should be called to the site to further explain aspects of environmental or social behaviour that are unclear. Toolbox talks are recommended.

11. CLOSURE PLANNING

Final site cleaning - the contractor must clear and clean the site and ensure that all equipment and residual materials not forming part of the permanent works is removed from site before issuing the completion certificate or as otherwise agreed.

Rehabilitation - the contractor (landscape architect/horticulturist) must be responsible for rehabilitating and re-vegetation of all areas disturbed/areas earmarked for conservation during construction to the satisfaction of the employer and ECO.

11.1. Post-construction audit

A post-construction audit must be carried out and submitted to DFFE at the expense of Applicant. Objectives should be to audit compliances with the key components of the EMPr, to identify main areas requiring attention and recommend priority actions. The audit should be undertaken annually and should cover a cross section of issues, including implementation of environmental controls, environmental management and environmental monitoring.

Results of the audits should inform changes required to the specifications of the EMPr or additional specifications to deal with any environmental issues which arise on site and have not been dealt with in the current document.

11.2. General review of EMPr

The EMPr will be reviewed by the ECO on an on-going basis. Based on observations during site inspections and issues raised at site meetings, the ECO will determine whether any procedures require modification to improve the efficiency and applicability of the EMPr on site. Any such changes or updates will be registered in the ECO's record, as well as being included as an annexure to this document. Annexures of this nature must be distributed to all relevant parties.

12. CONCLUSION

All foreseeable actions and potential mitigations and/or management actions are contained in this document; the EMPr should be seen as a day-to-day management document. The EMPr thus sets out the environmental and social standards, which would be required to minimise the negative impacts and maximise the positive benefits of the construction activities. The EMPr could thus change daily, and if managed correctly lead to a successful construction and operation phases.

All attempts should be made to have this EMPr available, as part of any tender documentation, so that the Contractors are made aware of the potential cost and timing implications needed to fulfil the implementation of the EMPr, thus adequately costing for these.

REFERENCES

Department of Water Affairs: National Water Resource Strategy, Second Edition (June 2013)
Web: <http://www.dwa.gov.za/nwrs2013>

Department of Water Affairs: National Water Resource Strategy, Second Edition (2013),
Annexure A: Perspectives per Water Management Area

Environomics and MetroGIS, Environmental Management Framework Report. (2009).
Environmental Management Framework for the Olifants and Letaba Rivers Catchment Areas.
Retrieved from https://www.environment.gov.za/sites/default/files/docs/olifant_vegetation.pdf.

Fourie, L., 2014. Proposed Extension of the Continuous Ash Facility and Emergency Ash
Dump for the Kendal Power Station, Mpumalanga Province.

Garin, E.H., Diaz, L.N., Mu, W., Wasserfall, C., Araya, C., Segal, M. and Johnson, R.J., 2009.
Urinary CD80 excretion increases in idiopathic minimal-change disease. *Journal of the
American Society of Nephrology*, 20(2), pp.260-266.

Government Gazette Notice: No 26187 (339) published 26 March 2004: Revision of General
Authorisations in terms of Section 39 of the National Water Act, 1998 (Act no. 36 of 1998)
Mindat.org (2018). *Subtropical highland climate or temperate oceanic climate with dry winters*.
Retrieved from <https://www.mindat.org/climate-Cwb.html>.

Mucina, L., and Rutherford, M.C. (eds.) (2006). *The Vegetation of South Africa, Lesotho &
Swaziland, Strelitzia 19*. South African National Biodiversity Institute. Pretoria University
Press.

Nel, J.L., Smith-Adao, L., Petersen, C., Mbona, N., Skowno, A. and Van Deventer, H., 2018.
Review of available data for a South African Inventory of Inland Aquatic Ecosystems
(SAIIAE). *Water SA*, 44(2), pp.184-199.

The IUCN species survival Commission: 2007 IUCN Red list of threatened species
Woodford, A.C., and Chevallier, L. (eds) 2002. *Hydrogeology of the Main Karoo Basin:
Current Knowledge and Future Research Needs*. Accessed on 10 March 2020. Retrieved from
<http://www.wrc.org.za/wp-content/uploads/mdocs/TT179-02.pdf>.