



ENVIRONMENTAL MANAGEMENT PROGRAMME FOR THE
CONSTRUCTION PHASE OF THE KUSILE-VULCAN LOOP
(DUHVA BY PASS)

DRAFT

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LIST OF TERMINOLOGY AND DEFINITIONS

Terminology	Explanation
Activity.	Any action needed for the design, construction and completion of a project.
Alien Species.	A species occurring in an area outside of its historically known natural range as a result of intentional or accidental dispersal by human activities.
Communication Register.	A register aimed at tracking all communication activities within the project.
Contaminated Water.	Water contaminated by pollutants from on- or off-site activities; e.g. concrete-laden water and runoff from plant / personnel wash areas. Contaminated water must be treated to ensure that water released into the receiving environment meets minimum standards and guidelines. Treated water should be recycled where possible (e.g. used for dust suppression).
Department of Environmental Affairs.	The authority responsible for the review and/or approval of an Environmental Management Programme.
Department of Water Affairs.	The authority responsible for water management.
Employer.	See Eskom
Environment.	The surroundings in which humans exist and which comprise: <ul style="list-style-type: none"> • the land, water and atmosphere of the earth; • micro-organisms, plant and animal life; • any part or combination and interrelationships; and • the physical, chemical, aesthetic, historical, cultural and economic properties and conditions of the foregoing that can influence human health and wellbeing.
Environmental Aspect.	A product's or production process's environmental impact or important issues in the environment that an organisation should take into consideration
Environmental Audit.	Systematic, documented, regular and objective evaluation to see how well an organisation or facility is operating in terms of the Environmental Management Programme and is complying with statutory requirements and the organisation's Environmental Policy.
Environmental Authorisation.	The authorisation by a competent environmental authority for commencement of listed activities in terms of the National Environmental Management Act (Act 107 of 1998).
Environmental Control Officer.	An independent person who is responsible for undertaking site inspections to audit and report on compliance with all phases of environmental specifications with the Environmental Management Programme.
Environmental Impact.	Any change to the environment, whether adverse or beneficial, wholly or partially that results from an organisation's environmental aspects.
Environmental Impact Assessment.	The process of collecting, organising, analysing, interpreting and communicating information in accordance with the environmental legal requirements set out in GNR. No 543, GNR. 544, GNR. 545 and GNR 546 as published in Government Gazette No. 33411 of 2 August 2010, promulgated in terms of Chapter 5 of the National Environmental Management Act (Act 107 of 1998), for the purposes of obtaining an environmental authorisation in accordance with Chapter 5 of the National Environmental Management Act.

Terminology	Explanation
Environmental Management Inspector.	A person designated as an environmental management inspector in terms of Section 31B or 31C of the National Environmental Management Act (Act 107 of 1998).
Environmental Management Programme.	A tool used to prescribe management mechanisms or methods for the prevention of undue or reasonably avoidable adverse environmental impacts and for the enhancement of the positive environmental benefits of a development.
Environmental Objectives.	The overall environmental goal arising from the Environmental Policy that an organisation sets itself to achieve, and is quantified where practicable.
Eskom.	Eskom is South Africa's electricity public utility company, established in 1922 as the Electricity Supply Commission (ESCOM) in terms of the Electricity Act (1922).
Fauna	All living biological creatures, usually capable of motion, including insects and predominantly of protein-based consistency.
Fire danger index	A relative number denoting an evaluation of rate of spread or suppression difficulty for specific combinations of fuel, fuel moisture and wind speed.
Fire hazard	The relative combination of fuel, oxygen and heat that will lead to the start and spread of a potential fire.
Fire Protection Association	An association registered in terms of the National Veld and Forest Fire Act for the purposes of predicting, preventing, managing and extinguishing veld fires.
Flood line	The line or mark to which a flood could rise every 50 (1:50 year flood line) or 100 (1:100 year flood line) years.
Flora	All living plants, grasses, shrubs, trees, etc. that are typically incapable of easy natural motion and capable of photosynthesis.
Groundwater	Water that fills the natural openings in below-surface rock or unconsolidated sands.
Hazardous waste	Waste that, because of its chemical reactivity, toxic, explosive, corrosive, radioactive or other characteristics, causes danger or is likely to cause danger to health or the environment.
Heritage resources	Any place or object of cultural, archaeological or paleontological significance in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999).
Induction training	The training provided to new / existing employees to (re)acquaint them with the company structure, their specific job requirements, practical or organisational issues and occupational health, safety and environmental considerations required on the project.
Integrated Environmental Management	<p>The promotion of the integration of the principles of environmental management as set out in Section 2 of the National Environmental Management Act (Act 107 of 1998) in making decisions that may have a significant effect on the environment.</p> <p>The identification, prediction and evaluation of the actual and potential impact on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities, with a view to minimising negative impacts and maximising benefits.</p> <p>Ensuring that the effects of activities on the environment receive adequate consideration before actions are taken in connection with them.</p> <p>Ensuring an adequate and appropriate opportunity for public</p>

Terminology	Explanation
	<p>participation in decisions that may affect the environment. Ensuring the consideration of environmental attributes in management and decision making, which may have a significant effect on the environment.</p> <p>Identifying and employing the modes of environmental management best suited to ensure that a particular activity is pursued in accordance with the principles of environmental management as set out in Section 2 of the National Environmental Management Act (Act 107 of 1998).</p>
Interested and Affected Parties (I&AP)	Any person or group of people concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, customers and consumers, environmental interest groups, and the general public (after the Environmental Impact Assessment Regulations of September 1997 and Guideline Document: Environmental Impact Assessment Regulations of April 1998).
Land Use	The arrangements, activities and inputs people undertake in a certain land cover type to produce, change or maintain it. This definition establishes a direct link between the land cover and the actions of people in their environment.
Materials	All kinds of items (other than Plant) intended to form or forming part of the Permanent Works, including the supply-only materials (if any) to be supplied by the Contractor under the Contract.
Mitigate	The implementation of practical measures to reduce any adverse impacts or to enhance the beneficial impacts of an action.
No-go area	An area where construction activities are prohibited.
Non-compliance	Failure to comply with the requirements of the EMP.
Non-conformance report	A report outlining a deviation from process, procedure or compliance specifications.
Plant	The apparatus, machinery and vehicles used during the Permanent Works.
Pollution	Any change in the environment caused by substances or noise, malodours, dust or heat emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, where that change has an adverse effect on human health or wellbeing or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future
Potentially hazardous substance	A substance that can have a deleterious effect on the environment. Hazardous chemical substances are defined in the Regulations for Hazardous Chemical Substances, published in terms of the Occupational Health and Safety Act, 1993 (Act 85 of 1993).
Precautionary principle	The basic principle that, when in doubt or when there is insufficient or unreliable information, actions must be undertaken that have minimum risk.
Quality management system	A set of interrelated or interacting elements that organisations use to direct and control how quality policies are implemented and quality objectives are achieved.
Rehabilitation	Re-establishment or restoration to a healthy sustainable capacity or state.
Resource recovery	Recycling of waste or the recovery of energy.
Sensitive receptors	Locations or areas that are likely to experience an impact more

Terminology	Explanation
	than other locations or areas; for example, schools and residential areas.
Solid waste	All solid waste, including construction debris, chemical waste, excess cement / concrete, wrapping materials, timber, steel, drums, wire, nails, food and domestic waste (e.g. plastic bags and wrappers).
Target	The detailed performance requirement, applicable to the organisation or parts thereof, that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives.
Waste minimisation	The reduction of the volume of waste during construction by means of different processes or clean technology.
Waste prevention	The prevention and avoidance of the production of a waste.
Wastewater	Water containing cement washings, oil, fuel or other contaminants.
Water resource	Includes a watercourse, surface water, estuary, or aquifer.
Wetland	Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which in normal circumstances supports, or would support, vegetation that is typically adapted to live in saturated soil (as defined in the National Water Act (Act 36 of 1998)).
Works	Means the Permanent Works and the Temporary Works, or either of them as appropriate.

LIST OF ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Explanation
DAFF	Department of Agriculture, Forestry and Fisheries.
DEA	Department of Environmental Affairs.
DWA	Department of Water Affairs.
EIA	Environmental impact Assessment.
EMPR	Environmental Management Programme.
EMS	Environmental Management System.
FDI	Fire Danger Index.
FPA	Fire Protection Association.
I&AP(s)	Interested and Affected Party(ies).
LAeq,T	Continuous A-weighted sound pressure level.
MSDS	Material Safety Data Sheet
NCTR	Non-Conformance Report
NEMA	National Environmental Management Act (Act 107 of 1998).
NHRA	National Heritage Resources Act, 1999 (Act 25 of 1999).
NWA	National Water Act, 1998 (Act 36 of 1998).
PCO	Pest Control Officer.
PPE	Personal Protective Equipment.
SAHRA	South African Heritage Resource Agency.
SAQA	South Africa Qualifications Authority.
SHE	Safety, Health, and Environment

EXECUTIVE SUMMARY

An Environmental Management Programme (EMP) is an environmental management tool that is used to prescribe management methods to prevent or reasonably avoid adverse environmental impacts, and strengthen the positive environmental benefits of a development. It also places a Duty of Care on those who cause, have caused or may in future cause significant pollution or degradation of the environment. This requirement is according to Section 28 (1) of the National Environmental Management Act (Act No. 107 of 1998).

Eskom plans to commence with the construction of the Kusile-Vulcan 400 kV Power line to loop from the existing Duhva-Kendal Power line to the existing Vulcan Substation. Associated activities include the construction of a 400 kV Power loop-in line from the existing Duhva-Kendal 400 kV Power line into the existing Vulcan Station for approximately 1 km; and demolishing of a small remaining portion. The line will be connected to the substation to form a new 400 kV Duhva-Vulcan Power line. The remaining part of the broken 400 kV Duhva-Kendal Power line will be joined to the existing Arnot – Vulcan 400 kV Power line to form a new Kendal – Arnot 400 kV Power line for approximately 1 km and demolishing of a small remaining portion. The project is located within the eMalahleni Municipality of Mpumalanga

Eskom appointed AECOM (Pty) Ltd (AECOM) to compile this EMP, thereby ensuring best management practices are implemented for the construction of the Kusile – Vulcan 400 kV Power loop-in line. This EMP, as a standalone document, shall be used to guide and regulate environmental performance on the project through the construction stage of the project.

This EMP sets conditions for the implementation of the environmental management component for all personnel involved with the project. As such, it outlines how the project will be managed through its construction lifecycle and is designed to mitigate negative environmental impacts. It also provides an institutional structure for the roles, responsibilities and reporting lines, impact identification and the mitigation of potential negative environmental impacts.

Figure 1 shows an outline of the structure of this EMP document.

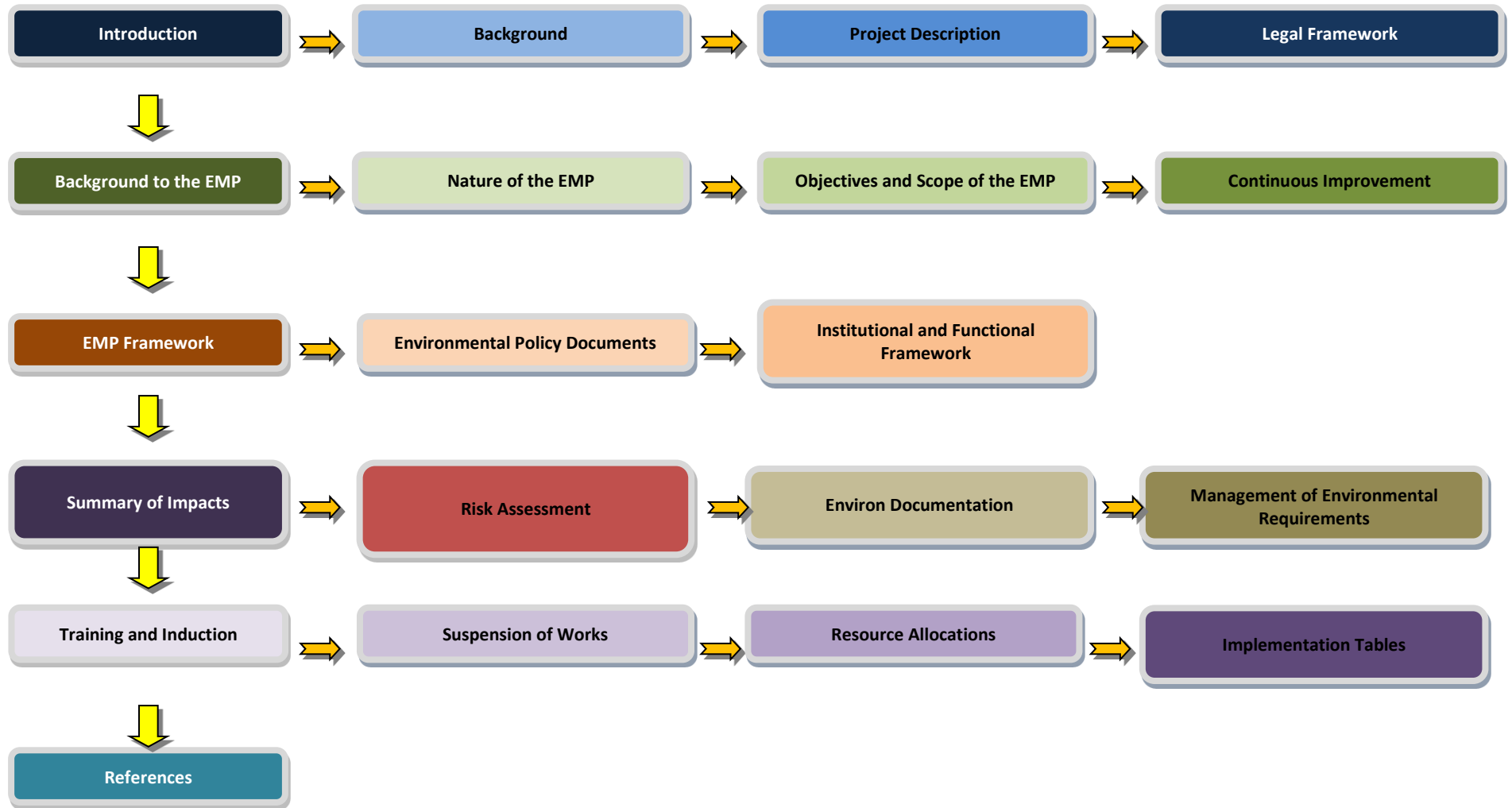


Figure 1: Report structure

1 INTRODUCTION

1.1 BACKGROUND TO THE EMP

An Environmental Management Programme (EMP) is an environmental management tool used to prescribe management mechanisms or methods for the prevention of undue or reasonably avoidable adverse environmental impacts and for the enhancement of the positive environmental benefits of a development. An EMP is generally based on the findings emanating from the environmental impact assessment (EIA) process, which is conducted in terms of the EIA Regulations (Government Notice No. R. 385, 386, 387 in the Government Gazette of 21 April 2006) of the National Environmental Management Act (Act No. 107 of 1998) (NEMA). Due to the subsequent amendment of the afore-mentioned EIA Regulations in 2010, the EMP is drafted in compliance with NEMA Sec 24N (Environmental Management Programme) requirements.

An EMP describes the measures that needs to be taken to ensure the Duty of Care is discharged by those who cause, have caused or may in future cause pollution or degradation of the environment, as per Section 28 (1) of NEMA. Section 28 (1) has been amended to include significant pollution or degradation that occurred before the commencement of NEMA, that arises or is likely to arise at a different time from the actual activity that caused the contamination or that arises through an act or activity of a person that results in a change to pre-existing contamination. Non-compliance to the Section 28 Duty of Care may lead to criminal prosecution and is a criminal offence.

The scope of this EMP is to set conditions for the implementation of the environmental management component for all personnel involved with the project. As such, the EMP outlines how the project will be managed through its operational and maintenance lifecycle and is designed to mitigate negative environmental impacts. The EMP also provides an institutional structure for the roles, responsibilities and reporting lines, impact identification and the mitigation of potential negative environmental impacts. This EMP would need to form part of the tender documentation to the Contractor(s) and becomes legally binding on the Contractor(s) and anyone acting on behalf of the Contractor(s) or the Applicant during construction, operation and decommissioning activities.

1.2 DETAILS OF THE AUTHORS

As per the requirements of the NEMA, the details and expertise levels of the persons who prepared the EMP are provided below.

Table 1: Authors’ Details

EMP Specialist	AECOM (Pty) Ltd		
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Fax	021 950 7502		
Email	robin.swanepoel@aecom.com		
Qualifications	B. Tech Nature Conservation B. Tech Environmental Management		
Expertise to Carry Out Preparation of EMP	<p>Robin has 16 years of experience and has been involved in the implementation of various EMPs during the construction of the following:</p> <ul style="list-style-type: none"> • <table border="1" style="margin-left: 20px;"> <tr> <td style="vertical-align: top;"> <ul style="list-style-type: none"> • Transmission power lines (275 kV, 400 kV and 765 kV) for Eskom: • Beta – Delphi • Mercury – Perseus • Mercury – Zeus • Duvha – Leseding • Majuba – Umfolozi • Hydra – Gama • Spencer – Tabor • Poseidon – Grassridge • Dedisa – Grassridge • Bravo </td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> Construction of substations for Eskom: • Omega • Gamma • Mercury • Perseus • Hydra • Zeus • Majuba • Umfolozi • Dedisa </td> </tr> </table> 	<ul style="list-style-type: none"> • Transmission power lines (275 kV, 400 kV and 765 kV) for Eskom: • Beta – Delphi • Mercury – Perseus • Mercury – Zeus • Duvha – Leseding • Majuba – Umfolozi • Hydra – Gama • Spencer – Tabor • Poseidon – Grassridge • Dedisa – Grassridge • Bravo 	<ul style="list-style-type: none"> Construction of substations for Eskom: • Omega • Gamma • Mercury • Perseus • Hydra • Zeus • Majuba • Umfolozi • Dedisa
<ul style="list-style-type: none"> • Transmission power lines (275 kV, 400 kV and 765 kV) for Eskom: • Beta – Delphi • Mercury – Perseus • Mercury – Zeus • Duvha – Leseding • Majuba – Umfolozi • Hydra – Gama • Spencer – Tabor • Poseidon – Grassridge • Dedisa – Grassridge • Bravo 	<ul style="list-style-type: none"> Construction of substations for Eskom: • Omega • Gamma • Mercury • Perseus • Hydra • Zeus • Majuba • Umfolozi • Dedisa 		

1.3 SPECIALIST INPUT

Table 2: Specialist Input

Name	Role on Team	Company
Betsie Le Roux	Ecological Investigation and Wetland Delineation.	AECOM (Pty) Ltd
Jaco van der Walt	Heritage.	HCAC (CC)

1.4 PROJECT DESCRIPTION

Eskom plans to commence with the construction of the Kusile-Vulcan 400 kV Power line to loop from the existing Duhva-Kendal Power line to the existing Vulcan Substation. Associated activities include the construction of a 400 kV Power loop-in line from the existing Duhva-Kendal 400 kV Power line into the existing Vulcan Station for approximately 1 km; and demolishing of a small remaining portion. The line will be connected to the substation to form a new 400 kV Duhva-Vulcan Power line. The remaining part of the broken 400 kV Duhva-Kendal Power line will be joined to the

existing Arnot – Vulcan 400 kV Power line to form a new Kendal – Arnot 400 kV Power line for approximately 1 km and demolishing of a small remaining portion. Please refer to Figure 2 on page 4 in this regard

The associated infrastructure includes:

- Erection of camp sites for the Contractors workforce.
- Negotiations for access roads to the servitude.
- Bush clearing to facilitate access, construction and the safe operation of the line.
- Establishing of access roads on the servitude.
- Transportation of materials, equipment and personnel to the site.
- Installation for foundations for the towers.
- Tower assembly and erection.
- Conductor stringing and regulation.
- Final inspection of line.
- Rehabilitation of disturbed areas.
- Operation and maintenance of the line.

The power line also crosses through various natural areas, including wetlands. These areas must be conserved as they perform an important ecological function within the project area.

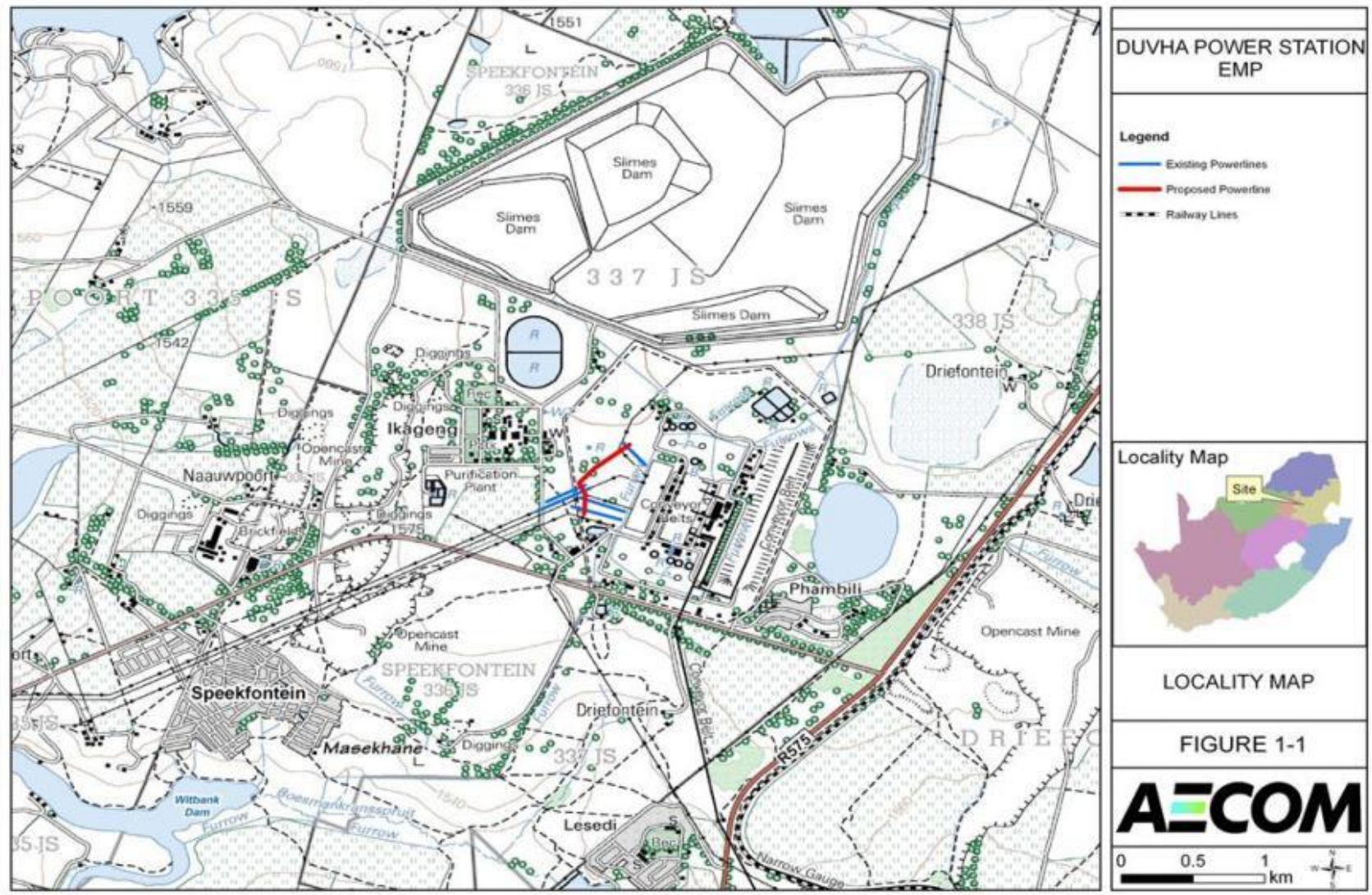


Figure 2: Power line route for the Kusile – Vulcan Loop

1.5 LEGAL FRAMEWORK

The project must be implemented within the framework of the NEMA and other relevant environmentally related legislation, including the following national acts, provincial ordinances and guideline documents.

Table 3: List of Applicable Legislation and Guidelines

Legislation	Sections	Relates to
The Constitution Act (No 108 of 1996).	Chapter 2	Bill of Rights.
	Section 24	Environmental rights.
	Section 25	Rights in property.
	Section 32	Administrative justice.
	Section 33	Access to information.
National Environmental Management Act (No 107 of 1998) as amended. ¹	Section 2	Defines the strategic environmental management goals, principles and objectives of the Government. Applies throughout the Republic to the actions of all organs of state that may significantly affect the environment.
	Section 24	Provides for the prohibition, restriction and control of activities which are likely to have a detrimental effect on the environment.
	Section 28	Duty of Care and remediation of environmental damage. The scheme owner has a general duty to care for the environment and to institute such measures as may be needed to demonstrate such care. The Duty of Care has been amended to include significant pollution or degradation that occurred before the commencement of NEMA that arises or is likely to arise at a different time from the actual activity that caused the contamination or that arises through an act or activity of a person that results in a change to pre-existing contamination.
	Section 30	Control of emergency incidents. Responsible person's duties relating to reporting and remediation actions regarding emergency incidents. A criminal sanction may be imposed on the responsible person for failure to comply with the reporting requirements and obligations to address any emergency incidents.
Environment Conservation Act (No 73)	The Act has been substantially repealed by NEMA. However, there are certain regulations under the Act which are still in operation	

¹ The NEMA 2010 EIA regulations R543, R544, R545, R546 may be relevant for certain construction and maintenance such as that may need to take place in or close to water resources.

Legislation	Sections	Relates to
of 1989) and regulations.		such as the National Noise Control Regulations.
National Environmental Management: Waste Act (No 59 of 2008) (NEMWA). ²	Section 16	General duty in respect of waste management.
	Section 17	Reduction, reuse, recycling and recovery of waste.
	Section 26	Prohibition of unauthorised disposal of waste.
	Section 27	Littering.
National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) (NEMBA).	Sections 65-69	These sections deal with restricted activities involving alien species; restricted activities involving certain alien species totally prohibited; and Duty of Care relating to alien species.
	Sections 71 and 73	These sections deal with restricted activities involving listed invasive species and Duty of Care relating to listed invasive species.
National Environmental Management: Air Quality Act (No 39 of 2004). ³	Section 32	Control of dust.
	Section 34	Control of noise.
	Section 35	Control of offensive odours.
	Schedule 2	Ambient air quality standards.
Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947) and regulations.	Sections 3 to 10	Control of the use of registered pesticides, herbicides (weed killers) and fertilisers. Special precautions must be taken to prevent workers from being exposed to chemical substances in this regard. Workers handling these remedies must also be registered in terms of the Act.
Conservation of Agricultural Resources Act (No 43 of 1983) and regulations.	Section 5, 6	Implementation of control measures for alien and invasive plant species.
National Heritage Resources Act (No 25 of 1999).	Section 35	No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site.
	Section 36	No person may, without a permit issued by the South African Heritage Resource Agency (SAHRA), or a provincial heritage resources authority destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority. "Grave" is widely defined in the Act to include the contents, headstone or other marker of such a place, and any other structure on or associated with such place.

² The Listed Activities in terms of the Waste Act should be included as R718 of GG32368 of 3 July 2009, as depending on throughput the effluent treatment plants may require waste licenses.

³ The National Ambient Air Quality Standards have been published and replace the SANS codes, R1210, GG 32816 of 24 December 2009.

Legislation	Sections	Relates to
	Section 38	This section provides for Heritage Impact Assessments (HIAs), which are not covered under the NEMA. The HIA will be approved by the authorising body of the provincial directorate of environmental affairs, which is required to take the provincial heritage resources authorities' comments into account prior to making a decision on the HIA.
Occupational Health and Safety Act (No 85 of 1993) and regulations.	General Administration Regulations GN R1449 (Section 7)	Material Safety Data Sheets must be made available at the request of any interested or affected person.
	Section 8	General duties of employers to their employees.
	Section 9	General duties of employers and self-employed persons to persons other than their employees.
National Water Act (No 36 of 1998) and regulations.	Section 19	Prevention and remedying the effects of pollution of a water body.
	Section 20	Control of emergency incidents
	Chapter 4	Use of water and licensing.
Hazardous Substances Act (No 15 of 1973) and regulations.	Provides for the definition, classification, use, operation, modification, disposal or dumping of hazardous substances.	
Minimum requirements for storage, handling and disposal of Hazardous Waste, DWAF guidelines, 1998.	Section 10	Temporary hazardous waste storage: time, volume and other requirements.
National Road Traffic Act (No 93 of 1996) and regulations.	Section 54	Transportation of dangerous goods.
Fencing Act (No 31 of 1963).	Section 17	Any person erecting a boundary fence may clean any bush along the line of the fence up to 1.5 metres on each side thereof and remove any tree standing in the immediate line of the fence. However, this provision must be read in conjunction with the environmental legal provisions relevant to the protection of flora.
National Veld and Forest Fires Act 101 of 1998.	Chapter 2	Promotes and regulates the formation of fire protection associations which aim to manage and coordinate fire protection and fire services in an area.
	Chapter 4, 5	Organisations are required to make and maintain firebreaks and fire fighting equipment and personnel should a risk exist that a fire may start or spread from the premises.
By-Laws.	Waste by law, 2006	
DEA Integrated Environmental	DEA Integrated Environmental Management Information Series: Environmental Management Plans: DEA Guideline on compiling EMPs.	

Legislation	Sections	Relates to
Management.		
SANS 1929.	Ambient air quality – limits for common pollutants ⁴	
SANS 10103.	The measurement and rating of environmental noise with respect to land use, health, annoyance and to speech communication.	
SANS 10128.	Bunding of fuel storage tanks.	

⁴ Replaced by R1210.

1.6 POTENTIAL AUTHORISATIONS / PERMITS / LICENCES REQUIRED PRIOR TO PROJECT COMMENCEMENT

Table 4 provides information on additional activities which may require authorisations / permits / licences from relevant government departments. The Contractor is to ensure that prior to the commencement of works, these authorisations / permits / licences have been obtained.

Table 4: Activities that could require an authorisation / permit / licence

Activity	Type of authorisation / permit/ license required	Requiring institution
Obstacle application form	Permit	Civil Aviation Authority
Obstacle application form	Permit	Air Traffic and Navigation Services Company
Use of treated wastewater (dust suppression)	Approval	DOH
Application for a licence regarding activities in state forest	Licence	DAFF
Search and rescue	Permit	MEDET
Veld and forest fire	Requirement for a fire management plan	DAFF
Archaeological and paleontological sites and meteorites	Permit	SAHRA
To destroy, damage, deface, alter, remove from its original position, subdivide or change the planning status of a National Heritage Site	Permit	SAHRA
Burial grounds and graves	Permit	SAHRA
Way leave applications for accesses to the provincial roads	Approval	DTPW
Health permits for hostels and sanitation	Permit	DOH
Commencement of construction activities	Notify one week before commencement	DEA
Radio equipment licence	Site radio submission	ICASA
Outdoor advertising of Activities	South African Manual for Outdoor Advertising Control	DEA & DT
Site establishment sewage disposal	Approval	ELM
Site Establishment storm water & pollution control	Separate report	ELM
Fuel storage	Permit	DEA/ ELM
Hazardous material route	Approval	DEA/DOT
Other Hazardous substances	Permit	DEA
Project commencement	Notify	DOL
Land use outside current	Special consent approval (LUPO)	ELM
Detail design (water, wastewater, roads design)	Approval	ELM
Way leave applications – design	Approval	SANRAL

2 BACKGROUND TO THE EMP

2.1 NATURE OF THE EMP

The EMP is a legally required document in the same manner as a license or environmental authorisation is required prior to undertaking an activity. The document is Eskom's response to ensure that they comply with the requirements of reasonable protection of the environment as imposed by NEMA, in particular Section 28 referring to the "Duty of Care". NEMA stipulates in Section 28 (1) that anyone who causes pollution or degradation of the environment is responsible for preventing impacts occurring, continuing or recurring and for the costs of repair of the environment. Any degradation, damage or pollution of the environment caused during operational activities will be the responsibility of Eskom. Criminal liability is also imposed for not complying with the section. The EIA Regulations 2010 is used to act as a guideline as to the content of the EMP.

a) Potential mitigation measures

The mitigation measures required in terms of Section 28, subsection (1) may include measures to:

- Cease, modify or control any act, activity or process causing the pollution or degradation.
- Contain or prevent the movement of pollutants.
- Eliminate any source of pollution or degradation.
- Inform and educate employees about the environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment.
- Investigate, assess and evaluate the impact on the environment.
- Remedy the effects of the pollution or degradation.

This EMP, as a standalone document, shall be used to guide and regulate environmental performance on the project through the operational stages of the project.

b) Elements of an EMP

The EMP contains the following elements:

- Assessment and management system.
- Community relations.
- Compliance management.
- Emergency preparedness and response.
- Goal setting and performance measurement.
- Incident reporting and investigation.
- Risk management.
- Roles, responsibilities and accountabilities.

c) The *what* and the *how*.

To achieve these environmental management requirements, a defined and implementable system must be in place. This system comprises:

- The **what**: The EMP indicates to Eskom what is required by setting objectives with measurable targets in place for the successful management of the scheme.
- The **how**: Eskom, in turn, is required to formulate procedures and guideline documents in compliance with its Quality Management System (QMS) requirements on how the objectives will be met.

2.2 OBJECTIVES OF THE EMP

The main objective of the EMP is to ensure the implementation of environmental practices that are aimed at the best form of environmental protection. The aim is to ensure that Eskom takes the reasonable measures to protect the environment and to remedy impacts to the environment as required by the Duty of Care introduced by NEMA Section 28. The EMP draws Eskom's attention to the monitoring, auditing and corrective actions needed during implementation of the project. Therefore, the other objectives⁵ of the EMP are to:

- Anticipate and prevent negative impacts on the environment and on people's environmental rights. Where impacts cannot be prevented, such impacts must be minimised and mitigated.
- Apply a risk-averse and cautious approach.
- Avoid or minimise waste, to reuse or recycle waste where possible and to dispose of waste in a responsible manner.
- Avoid, minimise or correct pollution and degradation of the environment.
- Avoid, minimise or correct the disturbance of ecosystems and loss of biodiversity.

2.3 SCOPE OF THE EMP

The EMP outlines the impacts and mitigation measures for the operation of the power line. The roles, responsibilities and reporting procedures have been identified in the EMP.

The EMP also contains a series of environmental specifications designed to avoid, minimise and ultimately manage the potential environmental impacts during the operation of the power line and ancillary infrastructure.

The EMP is for the operational phase of the power line. Due to the nature of the shortage of electricity requirements within South Africa, it is not envisaged that this system shall be decommissioned or closed in the foreseeable future. In the event of this occurring, Eskom shall be required to compile an EMP for the decommissioning and closure phase of the loop-in line.

⁵ As defined by the National Environmental Management Act (No. 107 of 1998).

2.4 THE CONTINUOUS IMPROVEMENT APPROACH

The approach adopted for this EMP is derived from the **Deming Cycle** (see **Figure 3**). The Deming Cycle is a cycle of continuous improvement entailing the reiterative actions of **plan, does, check and act**.

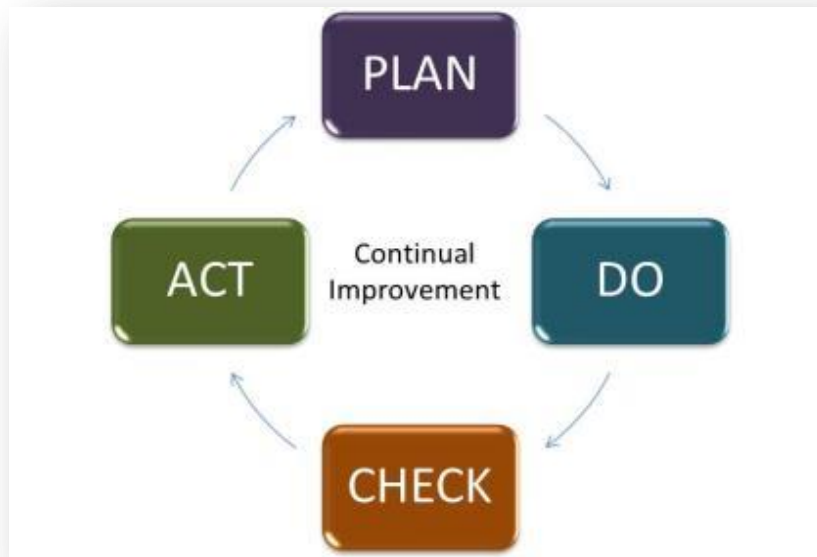


Figure 3: The Deming Cycle

In reference to Figure 3, the following:

2.4.1 PLAN

The EMP *communicates the Environmental Policy* and intended environmental governance of Eskom to all parties. The project will be implemented under this policy, and all parties acting for Eskom will adhere to this policy.

Project-specific planning for the project involved listing activities associated with the project and the environmental aspects that may be impacted on. This provided a starting point from which aspect-specific environmental management objectives were established.

Environmental performance indicators were determined for these objectives and measurable targets prescribed to monitor environmental performance of the project. Achieving the targets depends on compliance with this EMP and the legislative requirements that underpin it.

2.4.2 Do

Throughout operation, Eskom will be required to develop and maintain a QMS designed to ensure that best management practices are implemented during day-to-day operation of the power line. Such a QMS should include at least the following information:

- Associated activities, such as the transportation of people and equipment.
- Emergency/disaster incident and reaction procedures.

- Human resources used.
- Location and extent of associated infrastructure.
- Management actions.
- Materials and equipment to be used.
- Operational monitoring activities.
- Operational procedures.
- Rehabilitation procedures and continued maintenance of the impacted environment.
- Resources and experience required (staffing).

Including these information topics in Eskom's procedures and / or guideline documents will ensure that aspect-specific environmental management (based on this EMP) forms an integral part of the power line's management. It is therefore important for Eskom to integrate the environmental management requirements into the operational and maintenance activities by way of set procedures that are set out in its QMS.

The incorporation of the how and what will ensure Eskom understands what is required of it and that it allows systems to be put in place to ensure that the execution thereof is monitored. The Contractor should also develop a programme for monitoring aspect-specific indicators in terms of the targets provided in the EMP.

2.4.3 CHECK

A system of assessing monitoring results has been developed to check on the Eskom's environmental management performance. Continuous assessment facilitates proactive management of environmental issues. Mitigation measures can then be successfully implemented on an ongoing basis to keep environmental indicators within their target thresholds. Moreover, the assessment system also enables the assessment of the efficacy of the EMP.

Regular auditing of environmental performance is prescribed to prove and preserve accountability in a legislative context.

2.4.4 ACT

The assessments and monitoring of the results and findings of the regular audits must be documented within a reporting system. Precautionary mitigation measures and corrective actions will be prescribed and instructions will be given in order to carry these out in the field.

The findings of monitoring and auditing programmes can also be used to update the EMP. Although the EMP is a project-specific document, it is dynamic and should be updated regularly to address the changing circumstances of the power line.

2.5 ESKOM'S ENVIRONMENTAL MANAGEMENT SYSTEM

Eskom's Environmental Management System (EMS) is based on the ISO 14001 standard⁶. This EMP forms an integral part within the cyclical structure of the EMS, as shown in Figure 4.

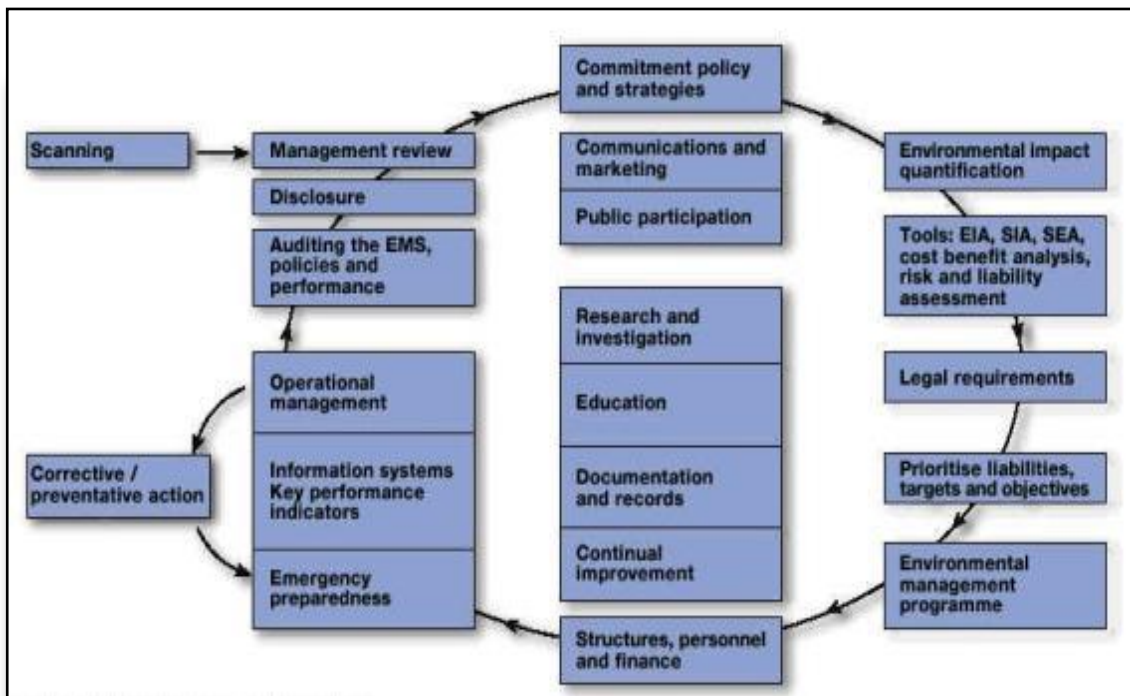


Figure 4: Eskom's EMS

3 EMP FRAMEWORK

3.1 ESKOM'S ENVIRONMENTAL POLICY

Eskom's Environmental Policy statement defines the principles by which the project will be guided. Eskom is committed to mitigating negative environmental effects associated with the construction of the Transmission power line, ensuring that activities are implemented in an environmentally responsible manner, and to promoting safe procedures for construction, operation and decommissioning.

Eskom will:

- Comply with all legislative and policy requirements and, in the absence of appropriate principles, set standards to meet the objectives of this policy.
- Contribute towards sustainable development through cost-effective resource use and efficient production, distribution, and use of energy.

⁶

<http://www.eskom.co.za/Enviro%20data%202002/report01/EMSdiagram.htm>

- Educate, train, motivate, and develop its employees in terms of occupational health, safety, and environmental issues.
- Establish appropriate management systems to address safety, occupational health, and environmental issues with a view to minimising risk and ensuring Duty of Care and the management of pollution and environmental degradation, performance monitoring, and continuous improvement.
- Promote open communication on Safety, Health and Environmental (SHE) issues with employees and all stakeholders.
- Provide and maintain a safe and healthy work environment and protect individuals against risk associated with occupational health and safety arising out of Eskom's business.

3.1.1 ENVIRONMENTAL MANAGEMENT SYSTEMS

Environmental management systems are used to establish appropriate management systems to address safety, occupational health, and environmental issues with a view to minimising risk and ensuring continual improvement. Aspects to consider include:

- Benchmarking performance against other utilities.
- Determining, managing, and measuring the SHE impacts of Eskom activities.
- Developing and reviewing SHE performance targets.
- Ensuring compliance with SANS ISO 14001 or other appropriate quality standards.
- Ensuring that compliance audits are conducted.
- Ensuring the thorough investigation of accidents and incidents and taking appropriate corrective actions in case of deviations to prevent recurrence of similar incidents.
- Establishing and implement procedures for identifying significant risks and impacts along the extended electricity value chain, as appropriate, in order to communicate and encourage continual improvement in SHE practices beyond the traditional boundaries of the Eskom group, for example, with Contractors.
- Including environmental and safety considerations in procurement processes.
- Integrating SHE issues into all aspects of the organisation.
- Monitoring, managing, and reporting incidents, accidents, and events.
- Reporting on performance in terms of this policy.
- Researching and instituting ways to improve SHE operations and impacts.

3.1.2 LEGISLATIVE AND POLICY REQUIREMENTS

Eskom will comply with all legislative and policy requirements and, in the absence of appropriate principles, set standards to meet the objectives of this policy. This will be achieved by:

- Applying Eskom best practice standards and policies while operating outside South Africa, if standards imposed by local legislation are lower than those specified by Eskom, without derogating from the local laws.
- Applying Eskom policy and South African legislative requirements , in the absence of local legislative requirements, while operating outside of SA.
- Applying local legislation or other mandatory standards where these exceed Eskom policy, without derogating from the local laws, while operating outside of South Africa,.
- Ensuring that the required statutory appointments are in place and that these appointees fulfil their duties in terms of the relevant legislation and standards.
- Reporting incidents and events to the necessary authorities as required by legislation and when appropriate.
- Taking best practice and local needs and conditions into account when setting standards.
- Taking into account all legally required occupational health and safety and environmental factors and modern practices in the design, construction, operation, and maintenance of all plant, machinery, equipment, and places of work.

3.1.3 COMMUNICATION

Promoting open communication on SHE issues with employees and other stakeholders is of critical importance. The communication process will be supported by:

- Communicating with employees, communities, and other concerned parties and stakeholders about Eskom’s SHE programmes and performance.
- Publishing verified SHE-related information, including major incidents or legal contraventions, in the Eskom Annual Report.

3.1.4 TRAINING

The education, training, motivating, and developing of awareness amongst employees about safety, occupational health, and environment issues is a core focus. This focus will be supported by:

- Communicating lessons learnt from incidents from a SHE perspective and revising procedures or policy where appropriate.
- Encouraging staff to develop a sense of SHE responsibility.
- Ensuring that employees are aware of safety, occupational health, and environmental standards, rules, procedures, regulations, codes, and guidelines.
- Giving due recognition to individuals and business units for exemplary occupational health, safety, and environmental performance.

3.1.5 HEALTH AND SAFETY

The provision and maintenance of a healthy and safe work environment, as well as the protection of individuals against occupational health and safety risks arising out of Eskom’s business is a key factor. This focus will be supported by:

- Ensuring that all the risks are identified and that measures are taken and implemented as may be reasonably practicable to eliminate or mitigate any hazard or potential hazard to employees before resorting to personal protective equipment.
- Ensuring that managers are accountable.
- Maintaining discipline.
- Providing, evaluating, and maintaining all operational procedures and methods of work in light of experience and new knowledge to proactively improve the management of occupational health, safety, and environmental risks.

3.1.6 SUSTAINABLE DEVELOPMENT

The following factors will contribute to sustainable development through efficient resource use and efficient production, distribution, and use of energy:

- Promoting the efficient use of materials, products, and services.
- Sharing lessons learnt and striving for continual improvement.
- Striving for cost-effective and efficient production, transport, and use of energy, by monitoring performance, setting targets, and highlighting the impact of inefficient operations.

3.2 INSTITUTIONAL AND FUNCTIONAL ARRANGEMENTS⁷

The institutional and functional arrangements indicate the role players and institutional linkages in the Kusile-Vulcan Power line. Please refer to Figure 5 (below) in this regard.

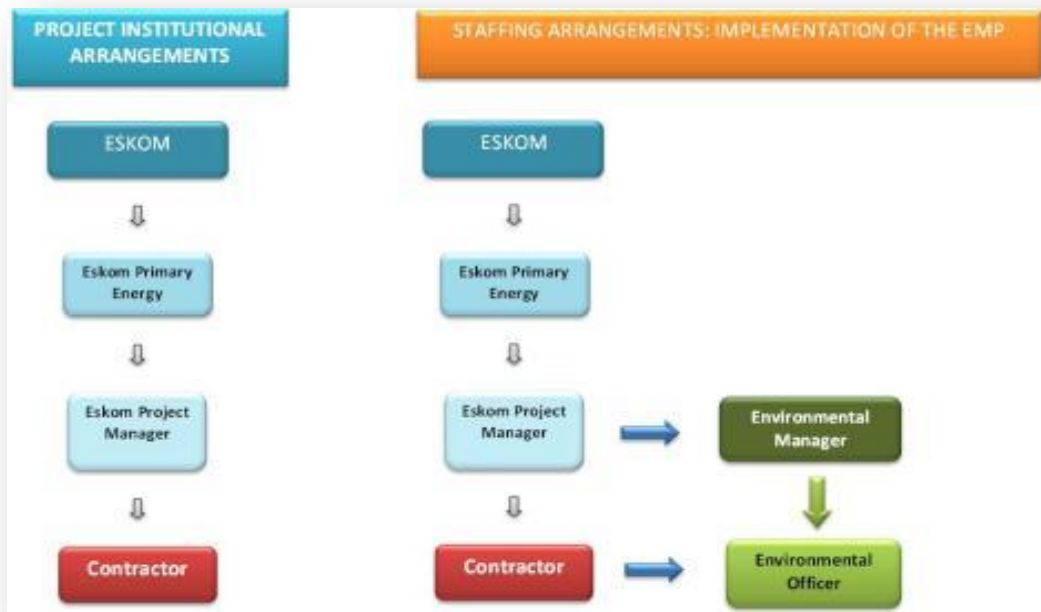


Figure 5: Institutional Arrangements

⁷

In the context of the Kusile-Vulcan Power line.

In reference to Figure 5, the following:

During the operational phase it is Eskom's responsibility to ensure that the Eskom Project Manager and any appointed Contractor involved in the operation of the power line receive a copy of the EMP and ensure compliance with it. The EMP is to be included as part of all tender documents. The appointed Contractor will be required to comply with the operational management regulations set out in this EMP. The Eskom Project Manager will be responsible for ensuring that all staff adhere to the EMP specifications. A copy of the EMP and EA from the DEA will be kept on site at the site office and made available to all Contractor staff, regulatory authorities and I&APs upon request.

The roles and responsibilities of all role players are presented below.

3.2.1 ESKOM

Eskom (the Applicant) will be responsible for overall environmental control on the power line during the operation, maintenance, decommissioning and rehabilitation phases. The Applicant's responsibilities will include:

- Appointing an independent Environmental Control Officer (ECO) for the duration of any construction related works.
- Being fully familiar with the EIA Report, EA conditions and the EMP.
- Ensuring compliance, by all parties, and the imposition of penalties for non-compliance through the Eskom Project Manager and ECO.
- Ensuring the activity does not commence within 30 days of the EA being issued.
- Forwarding monthly audit reports (prepared by the ECO) to the DEA.
- Implementing corrective and preventive actions, where required.
- Notifying the DEA 14 days prior to commencement of the operational phase.
- Notifying the DEA in writing within 24 hours if any condition in the EA cannot be or is not adhered to.
- Notifying the DEA of any change of address of the owner/developer.
- Notifying the DEA of changes in the developments that result in significant environmental impacts.
- Notifying the DEA within 30 days of change of ownership/Applicant.
- Preventing pollution and actions that will harm or may cause harm to the environment.
- The overall implementation of the EMP.

3.2.2 ESKOM PROJECT MANAGER

The Eskom Project Manager will be responsible for the implementation of the EMP throughout the operational phase and will report directly to Eskom (or its appointed representative). The responsibilities of the Eskom Project Manager will include:

- Being fully familiar with the EIA Report, EA conditions and the EMP.

- Ensuring that all Contractors and Subcontractors adhere to the EMP.
- Maintaining a register of complaints and queries.
- Maintaining an environmental incident book of all incidents occurring on site.
- Responding to any project related complaints.

3.2.3 CONTRACTOR

The Contractor will primarily be responsible for:

- Appointing an Environmental Officer (EO) and Social Officer (SO).
- Ensuring that all Subcontractors have a copy of and are fully conversant with the contents of the EMP.
- Ensuring that work conducted is done within the framework of the EA, EMP and applicable legislation.
- Monitoring construction related impacts upon the surrounding environment as per the Environmental Monitoring and other relevant method statements.
- The construction activities for the duration of the contract, as will any Subcontractors and contract workers.
- The provision of method statements setting out, in detail, how management actions contained in the EMP will be implemented.

3.2.4 ENVIRONMENTAL CONTROL OFFICER

Construction related activities must be monitored by an independent ECO. The ECO must be well versed in environmental matters and have a minimum of two years relevant on site construction experience. The ECO should have a relevant environmental degree or other relevant tertiary qualification. The ECO should be a mature, level-headed and firm person with above-average communication and negotiating skills, and be able to manage and address conflict.

The ECO's responsibilities include:

- Advising the Applicant and Eskom Project Manager about the interpretation, implementation and enforcement of the EMP.
- Ensuring environmental awareness training is offered to all site personnel.
- Inspecting and reporting on the efficiency of the method statements' management and mitigation programme.
- Liaising with an archaeologist or heritage resources practitioner in the case of unearthing of artefacts and/or graves.
- Maintaining an environmental incident book of all incidents occurring on site and ensuring that corrective measures have been undertaken.
- Maintaining the Communications Register and dealing with all complaints within 10 calendar days.

- Monitoring compliance with the environmental requirements set in the EMP and EA.
- Recommending rectification of non-compliances with the EMP before significant impacts occur.
- Reporting any significant environmental incidents to DEA or other relevant regulatory authorities as may be required.
- Reviewing and commenting on the environmental method statements.
- Reviewing the weekly environmental monitoring report that is submitted by the EO.

The ECO is responsible for providing an independent evaluation of compliance with the EMP. The Applicant is responsible for enforcing the conditions of the EMP. The Contractor and the EO are accountable to the ECO for non-compliance with the EMP. The ECO provides feedback to the Eskom Project Manager who, in turn, reports to Eskom and I&APs, as required. Issues of non-compliance raised by the ECO must be taken up by the Eskom Project Manager and resolved with the Contractor as per the conditions of his/her contract.

The ECO will remain employed for the full duration of the contract until all snag items have been resolved, rehabilitation measures have been completed, and the site is handed over to the Applicant, thereby indicating the start of the operational phase. The ECO shall compile and submit a final compliance audit report to the DEA upon final completion of construction related activities.

3.2.5 ENVIRONMENTAL OFFICER

The EO must be appointed by the Contractor and is responsible for managing the day-to-day on site implementation of the EMP, and for the compilation of weekly environmental monitoring reports. In addition, the EO must act as liaison and advisor on all environmental and related issues, seek advice from the ECO when necessary, and ensure that any complaints received from I&APs are duly processed and addressed and that conflicts are resolved in an acceptable manner and within 10 days. The EO shall be full time dedicated member of the Contractor's Team and must be approved by the Eskom Project Manager.

The following qualifications, qualities and experience are recommended for the individual appointed as the EO:

- A level-headed and firm person with above-average communication and negotiating skills. The ability to handle and address conflict management situations will be an advantage.
- A relevant environmental diploma or degree in natural sciences, as well as a minimum of three years' experience in construction site monitoring, excluding health and safety.
- Relevant experience in environmental site management and EMP compliance monitoring.

The EO's responsibilities include:

- Advising the Contractor on the rectification of any pollution, contamination or damage to the construction site, rights of way and adjacent land.
- Assisting the Contractor in drafting environmental method statements and/or the Environmental Policy where such knowledge/expertise is lacking.

- Attending site meetings (scheduled and ad hoc).
- Conducting site inspections during the defects liability period, and bringing any environmental concerns to the attention of the ECO and Contractor.
- Ensuring that a copy of the EA and the latest version of the EMP are available on site at all times.
- Ensuring that the Contractor is made aware of all applicable changes to the EMP that are approved by the DEA.
- Identifying and assessing previously unforeseen, actual or potential impacts on the environment.
- Keeping a register of compliance and non-compliance with the environmental specifications.
- Maintaining the following on site:
 - a weekly site diary,
 - a non-conformance register,
 - an I&AP's Communications Register and
 - a register of audits.
- Monitoring, on a daily basis, environmental specifications on site and compliance with the conditions of the EA, environmental legislation and EMP.
- Preparing a weekly environmental monitoring report for submission to the ECO.
- Presenting the environmental awareness training course to all staff, Contractors and Subcontractors and monitoring the environmental awareness training for all new personnel on site, as undertaken by the Contractor.
- Undertaking daily environmental monitoring to ensure the Contractor's activities do not impact upon the receiving environment. Such monitoring shall include dust, noise and water monitoring.

The EO will remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site is handed over to the Applicant.

3.2.6 SOCIAL OFFICER

The SO shall be employed by the Contractor and will be responsible for managing the day-to-day on site implementation of the social aspects of the EMP. The SO shall liaise with landowners and relevant I&APs regarding construction activities for the duration of construction and will ensure that any discussions and complaints received from the public are addressed and that conflicts are resolved in an acceptable manner within 10 days.

The SO shall be full time dedicated member(s) of the Contractor's Team and must be approved by the Eskom Project Manager. The SO shall report to the Contracts Manager, seeking advice from the ECO when necessary.

The following qualifications, qualities and experience are recommended for the individual appointed as the Contractor's SO:

- A relevant social diploma with 5 years of construction experience or a degree with 3 years of construction experience.
- Mature, level-headed and firm person with communication and negotiating skills.
- Report writing skills.

The responsibilities and functions of the Construction SO will include:

- Assist the Contractor in the drafting of social method statements where such knowledge/expertise is lacking.
- Attend site meetings (scheduled and ad hoc).
- Conduct site inspections during the defects notification period, and bring any social concerns to the attention of the Social Monitor and Contractor.
- Implement and manage the day-to-day social and communication aspects of the construction process according to the Specifications.
- Implement mitigation and corrective measures.
- Liaise and maintain good relations with I&APs.
- Maintain a filing system meeting the project's Quality Management Plan.
- Maintain the following on site:
 - a daily site diary;
 - a public complaints and Communications Register; and
 - a register of audits.
- Monitor social aspects in terms of the specifications.
- Remain employed until the end of the Defects Notification Period (DNP), not necessarily full time during the DNP.
- Submit a monthly environmental report to the Social Monitor.

4 SUMMARY OF CONSTRUCTION IMPACTS

All construction activities will be limited to the construction site, lay-down areas and construction site office / yard. All activities outside these areas need to be approved by the Eskom Project Manager prior to the commencement of construction works.

All interactions between the Contractor and I&APs will be via the Eskom Project Manager. The Contractor may not enter into agreements with I&APs or undertake work on private property in lieu of favours, payment or any other means where either party may benefit from the activities / permissions of the other party. If the Contractor requires changes to the construction programme, these must be communicated via the Eskom Project Manager to the affected I&APs.

The impacts from the construction of the proposed development will only be for the duration of the construction phase and should be limited to daylight hours. During the construction phase, overall activity within the project area will be increased. The placement of the construction site office will be within the site demarcated for the proposed development and access will be gained from designated routes only. Contractor employees shall be accommodated within existing accommodation and no placement of a construction camp to accommodate the construction workers shall be allowed. The Contractor(s) will need to comply with all security measures detailed by Eskom.

Activities during construction, such as driving on gravel roads, the clearing of vegetation, construction of access roads and the excavations for the towers will generate windblown dust. For all the afore-mentioned, however, the construction period is for a relatively short time and any potential impacts associated with construction will be temporary.

4.1 GEOLOGY

a) Potential impact

Potential impact related to removal of geological strata.

b) Mitigation measures

No blasting is undertaken on site without a suitable blast design, compiled in line with relevant SANS codes and approved by an appropriately qualified professional.

4.2 SURFACE WATER

a) Potential impact

Potential for impact upon isolated surface water in terms of inter alia waste generation and storm water.

b) Mitigation measures

- All hazardous materials inter alia paints, turpentine and thinners must be stored appropriately to prevent these contaminants from entering the environment.
- Care must be taken to ensure that in removing vegetation adequate erosion control measures are implemented.
- Construction should preferably occur during the dry winter months. In the event that construction occurs during summer, a soil causeway may be required to be constructed for vehicular access to wetlands. All damage must be rehabilitated upon completion of construction.
- Demarcated areas where waste can be safely contained and stored on a temporary basis during the construction phase should be provided at the hard park.
- Hydrocarbons should be stored in a bunded storage area.
- No construction vehicles or activities will be allowed to work within 50 m of any of the streams or wetlands on site.
- Spill-sorb or similar type product must be used to absorb hydrocarbon spills in the event that such spills should occur.

- Waste is not to be buried on site.
- When adequate volumes (not more than 1 month) have accumulated all waste is to be removed from site and disposed of at a licensed facility.

4.3 TOPOGRAPHY

No mitigation measures are proposed as no impact to topography was identified within the EIA of the proposed project.

4.4 SOILS, LAND CAPABILITY, LAND USE

a) Potential impact

Potential impact relating to the loss of soil due to the placement of pylon footings and access road placement.

b) Mitigation measures

- Avoid placement of pylon footings in the clay soils on site.
- Ensure that soil is stockpiled in such a way as to prevent erosion from storm water.
- If soils are excavated for the footing placement, ensure that the soil is utilised elsewhere for rehabilitation/road building purposes.
- Oil-contaminated soils are to be removed to a contained storage area and bio-remediated or disposed of at a licensed facility.
- Spread spill absorbent material on areas where oil spills are likely to occur, such as the refuelling area in the hard park.

4.5 FLORA

a) Potential impact

Potential impacts relating to vegetation clearance due access roads and pylon footing placement.

b) Mitigation measures

- Adhere to the Eskom vegetation management guideline.
- All alien invasive species on site should be removed and follow up monitoring and removal programmes should be initiated once construction is complete.
- All construction areas should be demarcated prior to construction to ensure that the footprint of the impacts are limited (including areas where vehicles may traverse).
- The sensitive vegetation unit should be avoided and construction limited to 50 m from the edge of the wetlands and streams.

4.6 FAUNA

a) Potential impact

Potential impact relates to avi-fauna collisions with power lines.

b) Mitigation measures

- Adhere to the Eskom vegetation management guideline.
- All alien invasive species on site should be removed and follow up monitoring and removal programmes should be initiated once construction is complete.
- All construction areas should be demarcated prior to construction to ensure that the footprint of the impacts are limited (including areas where vehicles may traverse).
- Install power lines according to the Eskom bird collision prevention guideline.
- The sensitive habitat should be avoided and construction limited to 50 m from the edge of the wetlands and streams.

4.7 VISUAL ASSESSMENT**a) Potential impact**

Potential for pylons impacting upon the skyline and landscape.

b) Mitigation measures

- Access roads should be minimised to prevent unnecessary dust.
- Dust suppression techniques should be in place at all times during the construction phase.
- Only the footprint of the proposed power line should be exposed. In all other areas, the natural vegetation should be retained.

4.8 SOCIAL IMPACTS

No social impacts were identified within the EIA process.

4.9 HERITAGE**a) Potential impact**

Possible impact upon known and unknown graves within the project footprint.

b) Mitigation measures

- Graveyards can be demarcated with brick walls or with fences and can be conserved in situ beneath power lines. Conserving graveyards in situ in mining areas create the risk and responsibility that they may be damaged, accidentally, that the mine remains responsible for its future unaffected existence, maintenance and that controlled access must exist for any relatives or friends who wish to visit the deceased.
- Graveyards can be exhumed and relocated. The exhumation of human remains and the relocation of graveyards are regulated by various laws, regulations and administrative procedures. This task is undertaken by forensic archaeologists or by reputed undertakers who are acquainted with all the administrative procedures and relevant legislation that have to be adhered to whenever human remains are exhumed and relocated. This process also includes social consultation with a 60 days statutory notice period for graves older than sixty years. Permission for the exhumation and relocation of

human remains have to be obtained from the descendants of the deceased (if known), the National Department of Health, the Provincial Department of Health, the Premier of the Province and the local police).

5 RISK ASSESSMENT

5.1 RISK ASSESSMENT APPROACH

The risk assessment identifies potential risks and uses qualitative measures to estimate the consequences or impact of the event, together with the estimate of its likelihood.

Each potential hazard was investigated to determine the consequence and likelihood of the hazard occurring. A simple assessment of L (Low), M (Medium) and H (High) was used for the assessment consequence. The occurrence potential of each hazard was also assessed using the simple assessment of L (Low), M (Medium) and H (High).

Table 5: Predicted Level of Risk

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Catastrophic
A (almost likely)	L	M	H	H	H
B (likely)	L	M	H	H	H
C (moderate)	L	M	H	H	H
D (unlikely)	L	L	L	M	H
E (rare)	L	L	L	M	M

5.2 ASPECTS, IMPACTS AND CONTROLS ASSOCIATED WITH THE OPERATIONAL PHASE

The following aspects, impacts and controls have been identified during the EIA process, site visit, desktop studies and best management practices.

Table 6: Aspects, Impacts and Controls associated with the Operational Phase

System Element	Aspect	Impacts	Risk	Operational Mitigation/Control Measures
Aesthetics	Nuisance factor through power line construction	Dust generation Noise generation	High	Refer to Error! Reference source not found.: Aesthetics Management for monitoring and mitigation measures.
Dust	Unprotected surfaces	Dust generation	Low	Refer to Table 11 and Table 20: Dust Management and Rehabilitation Plan for monitoring and mitigation measures.
Earthworks	Loss of fertile topsoil	Drop in agricultural capacity	Low	Refer to Table 11, Table 20 and Error! Reference source not found.: Earthworks Management, Rehabilitation Plan and Waste Management for monitoring and mitigation measures.
	Contaminated spoil	Ecological off-site impacts of contamination	Low	
Erosion	Maintenance works that require excavations	Sediment runoff into water courses	Low	Refer to Table 13 Erosion Management and Soil Management and Water Management for monitoring and mitigation measures.
Fauna and flora	Alien invasive plant control and removal	Spread of alien invasive plants.	Medium	Refer to Error! Reference source not found.: Fauna and Flora Management for monitoring and mitigation measures.
	Disturbance of riparian vegetation	Impact upon water resources.	Low	
	Avi-fauna power line collisions	Death or injury of avi-fauna.	High	
Fire	Restricting activities with a high fire risk	Loss of infrastructure, property or life.	Low	Refer to Error! Reference source not found.: Fire Management for monitoring and mitigation measures.
Hazardous substances	Containment of hazardous waste and spills	Soil and groundwater contamination.	High	Refer to Error! Reference source not found., Error! Reference source not found. and Error! Reference source not found.: Fire Management, Hazardous Substance Management and Waste Management for monitoring and mitigation measures.
	Accidental hydro carbon spillage		High	
	Uncontrolled use of hydro carbons	Uncontrolled fires.	High	
Heritage	Excavation of soils	Impact on artefact materials,	Low	Refer to Error! Reference source not found.: Heritage Management for monitoring and mitigation measures.
		Damage to chance finds.	Low	
Land use	Damage to utility services	Disruption to service.	Medium	Refer to Error! Reference source not found.: Land Use Management for monitoring and mitigation measures.
	Decrease in agricultural capacity	Non-removal of line and pylon components.	Medium	
	Topsoil destabilisation and loss	Incorrect storage and rehabilitation.	Low	

System Element	Aspect	Impacts	Risk	Operational Mitigation/Control Measures
	Incorrect use of gates	Movement of livestock from grazing paddocks into cultivated fields.	Medium	
	Open trenches	Safety of personnel and affected property owners.	Low	
		Repair works resulting in excess dust, noise and erosion.	Medium	
Noise	Impact on aesthetics	Increase in noise levels than 7dB above ambient noise levels.	Low	Refer to Error! Reference source not found.: Noise Management for monitoring and mitigation measures.
Rehabilitation	Not completing rehabilitation works after soil disturbance activities	Loss of species diversity.	Low	Refer to Table 11, 13 and Table 20: Dust Management, Erosion Management and Rehabilitation Plan for monitoring and mitigation measures.
		Dust generation.	Low	
Soil	Incorrect removal and storage of soil profiles		Medium	Refer to Table 11, Table 13 and: Dust, Erosion and Soil Management for monitoring and mitigation measures.
	Soil loss	Wind and water erosion.	Medium	
Traffic	Temporary road works	Delays, detours and restricted access.	Low	Refer to Traffic Management for monitoring and mitigation measures.
Training	Lack of and / or incorrect training	Potential injuries and / or loss of life and / or property.	Low	Refer to Training Management for monitoring and mitigation measures.
Waste	Incorrect use, handling, storage and disposal of hydrocarbons	Release of hydrocarbons in the receiving environment.	Medium	Refer to Waste Management for monitoring and mitigation measures.
	Waste management	Incorrect disposal of waste.	Low	
		Inefficient resource utilisation.		
Collection of waste across construction footprint	Pollution of the environment through <i>inter alia</i> incorrect disposal.			
Water	Stabilisation of soil stockpiles	Increased erosion and sedimentation of water resources.	Low	Refer to Erosion Management and Water Management for monitoring and mitigation measures.
	Incorrect re-internment of backfill	Water erosion.	Low	
	Ecological functioning of water courses	Potential of hydro carbon leakages and increased sedimentation levels into	Medium	

System Element	Aspect	Impacts	Risk	Operational Mitigation/Control Measures
		watercourses due to vehicular movement.		

6 ENVIRONMENTAL DOCUMENTATION, REPORTING AND COMPLIANCE

6.1 DOCUMENTATION

The following documentation must be kept on the project site for the full duration of the contract:

- Communications Register.
- Environmental Authorisation issued by the DEA.
- Environmental incident book.
- Environmental Management Plan approved by the DEA.
- Environmental method statements compiled by the Contractor.
- Environmental Policy of the Contractor.
- Minutes and record of attendance of all environmental meetings.
- Non-conformance reports.
- Register of audits.
- Relevant legislation.
- Waste manifests.
- Weekly environmental monitoring reports.

6.2 RESPONSIBILITY MATRIX AND ORGANOGRAM

The Contractor must have a Responsibility Matrix and Organogram, approved by the ECO and the Eskom Project Manager, displayed in an appropriate location. This will identify responsible parties, their contact details, and highlight their roles and responsibilities. This document must be updated on a regular basis to ensure that information is correct.

6.3 ENVIRONMENTAL INSPECTIONS AND AUDITS

Audits will be conducted to monitor compliance with the EMP and EA conditions. Photographic records of the site will support the visual assessment. The ECO will submit all audits to the Eskom Project Manager, who in turn shall submit the audits to the DEA. These findings will be kept on file on the project site.

External auditing may take place at unspecified times by the DEA and/or other relevant authorities. The DEA may, from time to time, also ask to view copies of audit reports drafted by the ECO.

6.4 WEEKLY ENVIRONMENTAL MONITORING REPORT

The EO will be required to provide the ECO with a weekly environmental monitoring report covering the events of the past week. This will highlight key performance areas and provide

feedback on corrective and preventive actions taken. The EO will have the weekly reports signed off by the Contractor's Manager prior to submission to the ECO.

6.5 ENVIRONMENTAL SITE MEETINGS

An Environmental Site Meeting shall take place on a bi-weekly basis. This meeting shall be chaired by a Senior Eskom Site Representative with the ECO, Contractor, the EO and SO in attendance.

6.6 NON-CONFORMANCE REPORT

A Non-Conformance Report (NCR) will be issued to the Contractor as a final step towards rectifying a failure in complying with a requirement of the EMP. This will be requested by the ECO and issued via the Eskom Project Manager to the Contractor in writing. Preceding the issuing of the NCR, the Contractor will be presented with an opportunity to rectify the outstanding issue.

Preceding requirements to the submitting of the NCR will entail an issue that has been highlighted to the Contractor in the audits for corrective action. Should this issue not be corrected or completed to the satisfaction of the Eskom Project Manager and ECO, the issue is escalated to an NCR.

Should the ECO assess an incident or issue and find it to be significant (e.g. non-repairable damage upon the environment), it will be reported to the DEA and immediately escalated to the level of an NCR. This will be done in consultation with the Eskom Project Manager.

The following information should be recorded in the NCR:

- Actions agreed to by all parties following consultation that should adequately address the identified non-conformance. This may take the form of specific control measures and should take the hierarchy of controls into account. This must accompany the NCR for filing purposes.
- Any chemicals or hazardous substances involved.
- Any other physical aspects.
- Any plant or equipment involved.
- Details of non-conformance.
- Nature of the risk.
- The agreed timeframe by which the Contractor should have implemented the actions documented in the NCR.
- The ECO should verify that the agreed actions have taken place on or soon after the agreed completion date. Where the actions are complete, the ECO and Contractor should sign the Close Out portion of the Non-Conformance Form and file it with the contract documentation.
- Work procedures not followed.

6.7 ENVIRONMENTAL EMERGENCY RESPONSE

The Contractor's environmental emergency procedures must ensure that there will be an appropriate response to unexpected or accidental actions or incidents that could cause environmental impacts. Such incidents may include:

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

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

- A list of key personnel and contact numbers.
- Actions to be taken in the event of different types of emergencies.
- Construction employees shall be adequately trained in terms of incidents and emergency situations.
- Details of emergency services (e.g. the fire department, spill clean up services) shall be listed.
- Details of the organisation (manpower) and responsibilities, accountability and liability of personnel.
- Incident recording, progress reporting and remediation measures 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.
- Internal and external communication plans, including prescribed reporting procedures.

The Contractor(s) will comply with the environmental emergency preparedness and incident and accident-reporting requirements, as required by the Occupational Health and Safety Act (Act No. 85 of 1993), the National Environmental Management Act (Act No. 107 of 1998), the National Water Act (Act No. 36 of 1998), and/or any other relevant legislation listed in Table 3.

6.8 METHOD STATEMENTS

It is a statutory requirement to ensure the wellbeing of employees and of the environment. Therefore, the Contractor must submit a method statement to the Eskom Project Manager and the ECO for approval prior to the commencement of construction works.

A method statement is a document detailing how a particular process will be carried out. It should detail the possible dangers/risks associated with the particular part of the project and the methods of control to be established and to show how the work will be managed in a safe and environmentally responsible manner. The method statement shall also include the following applicable information:

- Community infrastructure needs.
- Community/institutional arrangements.
- Conflicts between local residents and newcomers.
- Construction procedures.
- Emergency/disaster incident and reaction procedures (required to be demonstrated).
- How the equipment/material will be moved while on site.
- Identification of impacts that might result from the construction activity.
- Individual and family level impacts.
- Intrusion impacts.
- Location and extent of construction site office and storage areas.
- Materials and equipment to be used.
- Methodology and/or specifications for impact prevention or containment and for environmental monitoring.
- Population impacts.
- Rehabilitation procedures and continued maintenance of the impacted environment.
- The type of construction activity.
- Timing and location of the activity.
- Transportation of the equipment to and from site.

The Contractor will be accountable for all actions taken in non-compliance of the approved method statements. The Contractor shall keep all the method statements and subsequent revisions on file, copies of which must be distributed to all relevant personnel for implementation.

The Contractor will be required to submit, as a minimum, the method statements listed in Table 7 for approval by the Eskom Project Manager and the ECO prior to the start of construction activities.

Table 7: List of Method Statements required prior to Construction

Method Statement	Objective	Target	Criteria
Access	To institute adequate access agreements and measures to ensure the safety of landowners and integrity of the gates/fences.	No damage to existing gates and fences. All gates equipped with locks to prevent unauthorised access. No complaints about open gates. Compliance with regulatory requirements.	<ul style="list-style-type: none"> Access agreements between Contractor and landowner. Implementation of suitable access and fencing requirements.
Aesthetics	Reduce construction impacts upon the aesthetics of the surrounding environment.	No complaints from I&APs.	Implementation of measures to reduce impacts upon the aesthetics of the surrounding landscape.
Bunding	To contain and manage all hazardous substance releases into the environment.	Zero spills No environmental pollution occurring. Management according to agreed procedures.	Method of bunding and covering for static and mobile plant.
Construction site and office / yard establishment	To ensure site infrastructure, plant, materials and equipment are contained within a suitably secure locality that is adequately zoned and authorised in terms of regulatory requirements.	No complaints from landowners. No damage to private property. Compliance to regulatory requirements. No unplanned disturbance to construction related activities.	<ul style="list-style-type: none"> Site office/yard layout and preparation. Method of installing fences required for no-go areas, working areas and construction areas. Preparation of the working area. Removal of vegetation.
Cement mixing / Concrete batching Bentonite mixing	Provide measures to contain cementitious products impacting upon the surrounding environment.	All cementitious mixing to occur within demarcated localities. No indiscriminate spoiling of cementitious products in non-designated areas. No impacts upon receiving water resources.	Location, layout and preparation of cement / concrete batching facilities, including the methods employed for mixing concrete and the management of runoff water from such areas.
Construction in watercourses	Minimise the impact and maintain integrity of affected water resources.	Less than 10 % change between values measured 50 m upstream and within 300 m downstream of construction activities.	The construction methodology through watercourses.

Method Statement	Objective	Target	Criteria
Contaminated water	Ensure no contamination or pollution of water impacted upon by construction related activities.	All waste and contaminated water must be monitored and comply with regulatory requirements.	Contaminated water management, including the containment of runoff and polluted water.
Dust	Reduce construction related dust impacts on the surrounding environment. Prevent dust nuisance and health impacts on people and animals in the area.	No complaints from I&APs. Dust emissions must be monitored and comply with regulatory requirements.	Dust control and monitoring measures.
Environmental monitoring	Implement a programme whereby impacts upon the surrounding can be monitored and implement measures to mitigate such impacts.	Compliance with regulatory requirements. Ensure no incidents or accidents occur which negatively impact upon the surrounding environment.	Monitoring construction related impacts upon the surrounding environment is kept within the environmental specifications and applicable legislation. The following variables are to be monitored: <ul style="list-style-type: none"> • Dust (e.g. by using reused water). • Noise (increase of 7dB above ambient is considered disturbing noise). • Contaminated water (through dewatering operations, etc.). • Waste: waste manifests for waste disposal including waste sent for recycling.
Erosion control	Prevent erosion and reduce potential impacts upon the surrounding environment.	Slopes > 1:1 must have additional anti-erosion mechanisms. No evidence of erosion. No evidence of disturbance outside of project area.	Method(s) of erosion control, including erosion of spoil material.
Fire, hazardous and poisonous substances	Impose a “no fire” rule on the entire project unless otherwise indicated in writing by the Eskom Project Manager. Reduce potential impacts in the event of a fire incident.	Zero (0) fires. Proof of annual update and approval of the fire management Method Statement. Proof of management review of fire preparedness	Handling and storage of hazardous substances <ul style="list-style-type: none"> • Emergency spillage procedures and compounds to be used.

Method Statement	Objective	Target	Criteria
	To manage, mitigate and control the potential occurrence of an incident / accident involving hazardous and poisonous substances.	and response before onset of the fire season. Storage of hazardous/flammable materials and substances to comply with national, provincial and local regulatory requirements.	<ul style="list-style-type: none"> • Fire management plan and emergency procedures in case of fire. • Use of herbicides, pesticides and other poisonous substances. • Methods for the disposal of hazardous building materials. • Material Safety Data Sheets to be included where applicable.
Flora and fauna	Preserve fauna and flora through control of construction activities, particularly in sensitive environments, and through search and rescue operations. Reduce the impact of the project on the surrounding vegetation during construction. Prevent infestation of alien species during construction.	No evidence of disturbance outside of project area. All sensitive environments are to be demarcated as no-go areas unless otherwise indicated by the Eskom Project Manager. No construction related activities or facilities allowed within sensitive environments, unless prior approval is attained from the Eskom Project Manager. Proof of monthly removal of alien invasive species.	Implementation of measures to protect the flora and fauna identified within the project footprint.
Fuels and fuel spills	Manage and contain all refuelling activities to prevent and mitigate potential impacts	All refuelling to occur within designated areas. All hydro carbons to be contained within approved bunded facilities. Identified staff to undergo suitable spill clean up training	<ul style="list-style-type: none"> • Methods of refuelling vehicles. • Details of methods for fuel spills and clean up operations.
Heritage	Limit and mitigate potential heritage impacts on chance findings should they occur.	No damage to heritage structures, unless proof of consultation with a heritage specialist and approval from the SAHRA is in place. Records of chance finds must be kept. Where chance finds are unearthed, proof of work being stopped immediately and proof of consultation with a heritage specialist and the	Measures to be implemented to identify, manage and protect “chance finds” and known items of historical or cultural value.

Method Statement	Objective	Target	Criteria
		SAHRA must be kept on site.	
Noise	Reduce construction related noise affecting the surrounding environment.	Noise levels shall be monitored to ensure they comply with regulatory requirements. Noise generating activities shall not increase by more than 7dB above ambient noise levels. No complaints from I&AP's.	Implement measures to reduce noise impacts generated through construction related.
Rehabilitation	To rehabilitate impacted areas to a suitable land capability class similar to that of the surrounding environment. Rehabilitation will take existing land uses into consideration. Rehabilitation should start on sections immediately after work is completed.	Reinstatement of areas affected through construction related activities. Proof of monthly removal of alien invasive species re-establishing on cleared areas. The final placement of layers of soil on the wetland bed must match the pre-construction profile. Minimum of 60% mature vegetation cover being achieved during the first growth season. Minimum of 80% mature vegetation cover achieved at the end of the maintenance period.	Rehabilitation of disturbed areas and re-vegetation after completion of construction related activities.
Solid and liquid waste management	Implement measures to reduce, monitor and manage waste generation, whilst maximising recycling efficiency.	Ensure all waste products are disposed of at a registered waste landfill site designed to cater for said waste product. Proof of waste generated, reused, recycled and disposed of, including disposal certificates, must be kept on site. Contain all waste with in approved designated areas and stored in marked containers. Containers of hazardous waste and waste oils must be stored in a bunded, covered area. No evidence of contamination by waste. Bins provided at regular intervals.	<ul style="list-style-type: none"> • Solid and liquid waste control and removal of waste from site. • Methods for the disposal of vegetation, paper and plastics and/or building materials. • Methods for the recycling of oils etc.

Method Statement	Objective	Target	Criteria
		No evidence of litter.	
Social	Maximise social benefits and minimise negative social impacts.	No complaints from affected landowners No project delays due to landowner interference All landowners signing release forms within 1 month of completion of the contract.	Methods for avoiding danger and causing the least possible inconvenience to the public (including pedestrians), traffic and vehicle traffic.
Sources of materials	Source materials which have been legally mined or manufactured.	Provision of all Material Safety Data Sheets (MSDSs) for all products used on site.	Details of materials imported to the site. MSDS are to be included.
Topsoil and subsoil management	Manage the removal and stockpiling of topsoil and subsoil during the contract for use during rehabilitation.	Soil horizons (stockpile separately). Stockpiles should not be higher than 2 m. Stockpiles will be kept free of alien invasive species. No stockpiles shall be located within the 1:100 floodline. No stockpiles shall be located outside of areas indicated in the construction servitude diagrams.	<ul style="list-style-type: none"> • Removal of topsoil and subsoil. • Storage of topsoil and subsoil, including erosion prevention methods.
Traffic	Minimise the impacts and extent of construction related traffic on the surrounding road network and environment, whilst maximising road user safety.	No accidents or incidents. No complaints from the public. Proof of notification of landowner for closure of access roads. Alternative access roads always provided at partial road closures and other traffic disruptions. Compliance with regulatory requirements.	<ul style="list-style-type: none"> • To ensure construction related transport activities do not impact upon landowners and the surrounding environment. • Activities associated with the transport of materials and staff are not negatively upon by construction related requirements.

Method Statement	Objective	Target	Criteria
Training	Foster construction related skills transfer, environmental awareness, health and safety awareness, and materials and equipment skills.	Proof of training provided, including training materials that meet the requirements of the Eskom Project Manager. Proof of attendance of staff at training. Records of training evaluation results. Results must reflect that training has been effective.	Logistics for the environmental awareness course for all of the Contractor's employees and temporary labour, as well as for the Contractor's management staff.
Wash areas	To ensure plant and equipment used on site are kept clean whilst containing and preventing the release of potential contaminants into the receiving environment.	No contamination of the receiving environment through the washing and cleaning of equipment and plant. Compliance with regulatory requirements.	<ul style="list-style-type: none"> • Location, layout, preparation and operation of all wash areas, including vehicle washing, workshop washing, paint washing and clearing. • Method for the treatment of wastewater prior to discharge.

6.9 COMMUNICATIONS REGISTER

All complaints or communications that are received from I&APs or any other stakeholder must be recorded in a Communications Register. These complaints and communications will be brought to the attention of the Eskom Project Manager, whereupon it will be investigated and a response to the Complainant, I&APs or stakeholder will be given within 10 days.

6.9.1 INFORMATION REQUIREMENTS

The Communications Register shall include the following information:

- A detailed description of the complaint/communication.
- A written response to the Complainant indicating rectification of the complaint.
- Action and resources used to correct the complaint.
- Information regarding the relevant authority that was contacted or notified in writing (person, time and date).
- Photographic evidence of the complaint (where possible).
- Record the time and date of the complaint/communication.

6.9.2 THE RELEVANT AUTHORITIES

The relevant authorities include:

- Department of Agriculture, Forestry and Fisheries (e.g. uses of appropriate herbicides for eradication of alien invasive species, and permits for trees of special concern).
- Department of Agriculture, Rural Development and Land Administration.
- Department of Economic Development, Environment and Tourism.
- Department of Environmental Affairs (e.g. for any significant incident of pollution of the soil and air).
- Department of Health (e.g. for incidents such as contamination of water resources, accidental spill of hazardous substances).
- Department of Labour (e.g. for labour disputes).
- Department of Roads and Transport (e.g. for the diversion of traffic due to construction activities).
- Department of Water Affairs (e.g. for any incidents involving the contamination of water resources).
- eMalahleni Disaster Management Services (e.g. for fire prevention).
- eMalahleni Environmental Health Department (e.g. for control of nuisances).
- eMalahleni: Catchment, Storm water and River Management (e.g. issues pertaining to drainage and storm water management).
- eMalahleni: City Parks (impacts upon open spaces).

- eMalahleni: Electricity Department (e.g. impacts upon electricity provision).
- eMalahleni: Environmental Resources Management (e.g. issues pertaining to environmental management).
- eMalahleni: Solid Waste Management (e.g. waste derived from demolition activities).
- eMalahleni: Transport (e.g. road closures and diversions).
- eMalahleni: Water and Sanitation (e.g. impacts pertaining to reticulation services).

6.10 PHOTOGRAPHIC RECORD

The ECO, EO and SO will be required to compile a photographic record of all activities on site prior to construction related activities starting, during the construction process and on completion of construction related works. This will include photographs for:

- Corrective action.
- Monthly environmental audit reports.
- NCRs.
- Progress of environmental works.
- Weekly environmental monitoring reports.

6.11 WASTE MANIFESTS

The Contractor shall ensure that all solid (including any hazardous) waste removed from site is disposed of at a registered landfill site or nearby waste transfer station with capacity to accept the project generated waste. The waste manifest shall be kept on record for auditing purposes.

6.12 GOOD HOUSEKEEPING

The Contractor is to practice good housekeeping throughout the construction phase. This should eliminate disputes about responsibility, facilitate efficient and timeous running of the project. Over and above practising accepted construction methods in accordance with SANS 10120, this should include measures to preserve the environment inside the work area. Records of such actions taken to ensure the maintenance and management of housekeeping must be recorded.

6.13 FINAL ENVIRONMENTAL COMPLIANCE REPORT

A Final Environmental Compliance Report will be compiled by the ECO for submission to Eskom at the end of the construction phase. The report will include details of:

- A copy of all method statements (as an attachment).
- A copy of the Communications Register.
- A copy of the environmental Incident Book (as an attachment).
- All environmental incidents and completed corrective actions.
- All Monthly Environmental Monitoring Reports (as an attachment).
- An indication of the outcomes of the environmental monitoring conducted.

- Conclusions as to whether environmental constraints, guidelines, norms and stipulations have been met and, if not, reasons why they have not been met.
- The completion of all environmental conditions and mitigation measures listed in the EMP and the EA.
- The findings of the Environmental Audits.

7 MANAGEMENT OF ENVIRONMENTAL REQUIREMENTS

The Contractor shall record and report upon environmental management measures undertaken to mitigate assessed impacts upon the environment

7.1 MANAGEMENT AND CONTROL

The Contractor is to implement environmental management in a reasonable manner and should such management not prove effective, shall implement measures to the satisfaction of the Eskom Project Manager.

Appropriate measures shall include:

- Appointment of necessary resources to monitor and manage environmental requirements.
- Implement aspect-specific method statements to deal with emergency situations.
- Provision of adequate emergency response equipment to mitigate and manage an incident or emergency.
- Provision of specific training related to implementation of environmental management requirements.

7.2 RECORDING AND REPORTING

The Contractor shall maintain detailed records of parameters monitored. These detailed records shall demonstrate the effectiveness of the management actions implemented to mitigate potential impacts.

The Contractor shall submit a monthly database/report of management works implemented to the Eskom Project Manager, as part of the Contractors Monthly Report.

7.3 MONITORING

The Contractor shall submit an Environmental Monitoring Method Statement which details the scope, nature, process, schedule and templates for environmental monitoring.

The monitoring results shall be used to determine the effectiveness of the management programme.

All complaints, compliments or other comments relating to environmental management parameters are to be recorded in the site issues register of the Contractor for inclusion in the project issues register held by the Applicant.

Monitoring results and the associated required management and mitigation actions for the coming monitoring period are to be presented in the monitoring section of the Contractors Monthly Report.

The daily and weekly reports are to detail observations and information relating to requested management actions and their effectiveness.

The Contractor shall monitor and maintain the following on an on going basis:

- Access road condition.
- BBBEE compliance.
- Control of alien invasive vegetation.
- Dust generated from stockpiles.
- Employment Equity.
- Enterprise Development.
- Erosion prevention.
- Fire break requirements associated to construction related activities.
- Landscaping requirements for rehabilitation.
- Noise.
- Preferential Procurement.
- Skills Development.
- Spoil management.
- Storm water systems.
- Topsoil and backfill volumes.
- Validity of the Pest Control Officer certificate.
- Water Quality.

The Contractor shall submit a monthly database of *inter alia* the following works to the Eskom Project Manager. This data base is to include as a minimum:

- Extent of alien invasive clearing operations.
- Maintenance of chemical toilets.
- Stockpile volumes of chipped material, topsoil, fertile soil and sub soil.
- Volume of recyclable waste removed from site.
- Volumes of herbicide used on the project.
- Water volumes recycled and used for dust suppression.

All complaints, compliments or other comments relating to construction related works are to be recorded by the Contractor in the Communications Register of the receiving party for inclusion in the project issues register.

Site clearance monitoring results and /the associated required management and mitigation actions for the coming monitoring period are to be presented in the monitoring section of the Contractors Monthly Report.

The weekly report and daily reports are to detail observations and information relating to requested management actions and their effectiveness.

The Contractor must submit detailed terms of reference for the appointment of a professional service provider (PSP) to undertake the environmental monitoring programme for water quality, dust and noise monitoring. The PSP must meet minimum professional requirements for:

- Qualifications.
- Professional registration.
- Experience and track record.
- Demonstrated proficiency in use of relevant monitoring and sampling equipment.
- Equipment requirements and tolerances for detection limits.
- Reporting and analysis.
- Confirmation of laboratory accreditation, capacity, delivery and performance within reasonable timeframes.

8 TRAINING AND INDUCTION OF EMPLOYEES

The Eskom Project Manager and Contractor are to take responsibility for the management of staff on the project site during the construction phase and supervise them closely at all times. The onus is on the Eskom Project Manager and the Contractor to make sure that all staff and Subcontractors fully comprehend the contents of the EMP. The environmental awareness training programmes should, therefore, be targeted at the two levels of employment: management and labour. Environmental awareness training programmes need to be formulated for these levels and must comprise:

- A record of all names, positions and duties of staff to be trained.
- A framework for the training programmes.
- A summarised version of the training courses.
- An agenda for the delivery of the training courses.

Such programmes will set out the training requirements, which need to be conducted prior to any construction works occurring and will include:

- Acceptable behaviour with regard to flora and fauna.
- Environmental emergency procedures and incident reporting.
- General code of conduct towards I&APs.

- Maintenance of equipment to prevent the accidental discharge or spill of fuel, oil, lubricants, cement, mortar and other chemicals.
- Management and minimising of waste, including waste separation.
- Responsible handling of chemicals and spills.

The ECO may be requested to provide additional training (in a first language) on site regarding environmental aspects that are unclear to the construction personnel. A translator may be required and requested to assist in this additional training. The cost for the translator will be borne by the Contractor.

9 SUSPENSION OF WORKS

If the Contractor has not complied with one or more of the clauses of the EMP the ECO may recommend the withholding of the payment certificate or the suspension of construction works to the Eskom Project Manager and Eskom. This may be conducted after having served the Contractor with a NCR and until the Contractor complies with the clauses of the EMP. All delays resulting from such suspension shall be at the Contractor's expense.

10 RESOURCE ALLOCATIONS

Financial implications for items and activities mentioned in the EMP must be recognised by the Contractor (for the construction phase) and provision for these costs must be made. Such costs can include (but may not be limited to) mitigation actions, environmental awareness training, monitoring and auditing requirements and measures for rectification and rehabilitation, management of archaeological / heritage findings unearthed during construction, including any equipment or specialists required for these items.

11 IMPLEMENTATION OF THE EMP

The EMP provides an integrated approach to environmental management. This approach is designed to guide the appropriate allocation of human resources, assign responsibilities, develop procedures and ensure project compliance with regulatory and best practice requirements.

11.1 ESKOM GUIDELINE DOCUMENTS

The Contractor shall be required to implement the Eskom specific requirements contained within the guideline documents, as listed in Table 8 below.

Table 8: Eskom Guideline Documents

Guideline Document	Reference No#
Eskom Policy	ESKPBAAD4
Environmental Management Plan	EPC 32 - 96
SHE Policy	EPC 32 - 94
Transmission Environmental Policy	TPL 41 435

Guideline Document	Reference No#
Transmission Bird Perch Guideline	TGL41-332
Vegetation Management	TGL 41 334
Transmission Bird Collision Prevention Guideline	TGL41-335
Fire Protection Association Guideline	TGL 41 336
Soil Erosion Guideline	TGL 41 337
Transmission Servitude Gates Standard	TGL41-338
Bush Clearance Policy	ESKASA BG3
Herbicide Management Policy	ESKPBA D4
Safe Use of Herbicides and Pesticides	ESKASAA L0
Fire Risk Management	TLL 32 124
Access to Farms Guideline	TPC 41 340
Waste Management Policy	ESKPBAAC4
Transmission Power Line Towers and Line Construction	TRMSCAAC1

Where conflict exists between these guideline document and the environmental specifications in this EMP, the environmental specifications shall take precedence over these guideline documents because the EIA has identified site specific mitigation measures that are not included or may be in conflict with the measures in the guideline documents.

11.2 ASPECT AND ACTIVITIES MATRIX

Environmental aspects identified during the site visit and literature review, as well as aspects generally associated with construction related activities have been identified and listed in Table 9.

Construction related activities could have an impact on one or more of the aspects identified, as indicated by a tick mark in Table 9. Eskom will be required to check which aspects may be affected by which construction related activity and to put measures in place to mitigate or reduce the impacts on each aspect.

The Contractor will have to monitor, implement and demonstrate to Eskom its performance in environmental management and impact mitigation. Thus, aspect-specific performance measures (indicators and targets) have been provided in the implementation tables, to which the Contractor must adhere to.

Table 9: Aspects / Activities

ACTIVITY	Aesthetics	Dust	Earthworks	Erosion	Fauna and flora	Fire	Hazardous materials	Heritage	Land use	Noise	Power line infrastructure	Rehabilitation	Soil management	Traffic	Training	Waste management	Water management
Access roads			✓						✓		✓						
Alien invasive vegetation									✓		✓				✓		
Basic environmental awareness training	✓	✓	✓			✓		✓		✓	✓			✓			
Dust management	✓	✓	✓			✓			✓	✓	✓			✓	✓	✓	✓
Emergency response		✓	✓	✓	✓			✓	✓	✓	✓			✓	✓		
Erosion management	✓	✓	✓			✓			✓	✓	✓			✓	✓	✓	✓
Fire management		✓			✓				✓	✓	✓			✓	✓		
Hazardous substances	✓	✓	✓		✓	✓	✓			✓	✓		✓	✓	✓	✓	✓
Monitoring, auditing and incident reporting		✓	✓			✓	✓	✓	✓	✓	✓			✓	✓		
Noise management	✓	✓	✓	✓	✓						✓	✓			✓	✓	✓
Road and watercourse crossings		✓	✓		✓	✓	✓		✓	✓	✓	✓					
Rehabilitation	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
Social		✓	✓		✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Storm water management	✓		✓			✓	✓		✓		✓	✓	✓	✓	✓	✓	✓
Traffic management		✓	✓	✓			✓		✓		✓	✓			✓	✓	✓
Waste and effluent management	✓	✓	✓	✓	✓				✓		✓	✓	✓		✓	✓	✓
Water management			✓	✓	✓		✓		✓		✓	✓	✓		✓	✓	✓

11.3 IMPLEMENTATION TABLES

The Implementation Table describes the aspect-specific objectives for achieving environmental best practice. The tables present performance indicators for each aspect and give a target threshold (qualitative and/or quantitative) that must be met for each indicator.

Table 10: Aesthetics Management

DESCRIPTION	RESPONSIBILITY																			
Narrative	The Kusile-Vulcan Loop falls within an area heavily impacted upon by mining and agricultural activities where much landscape transformation has occurred. Visual impacts during construction shall be of short duration and limited to project footprint.																			
Objectives	Reduce construction related impacts upon the aesthetics of the surrounding environment.																			
Risks/impact	<table border="1"> <thead> <tr> <th data-bbox="400 336 934 367">Risk / impact:</th> <th data-bbox="934 336 2350 367">Mitigation measures</th> </tr> </thead> <tbody> <tr> <td data-bbox="400 367 934 525">Unightly camps or construction areas.</td> <td data-bbox="934 367 2350 525">Equipment and material to be neatly stored. All site offices are to be matt toned single storey buildings that emit no glare. No natural features may be defaced. Shade-cloth shall be placed on perimeter fencing to reduce visual impact of the camp site. Waste should be removed regularly to landfill.</td> </tr> <tr> <td data-bbox="400 525 934 556">Dust generation.</td> <td data-bbox="934 525 2350 556">Refer to Table 11: Dust Management</td> </tr> <tr> <td data-bbox="400 556 934 588">Scarring of landscape.</td> <td data-bbox="934 556 2350 588">Refer to Table 2020: Rehabilitation Plan</td> </tr> <tr> <td data-bbox="400 588 934 651">Insufficient soil stabilisation and rehabilitation resulting in erosion and subsidence.</td> <td data-bbox="934 588 2350 651">Refer to Table 13: Erosion Management</td> </tr> <tr> <td data-bbox="400 651 934 714">Infestation of alien invasive species because of ecological disturbances.</td> <td data-bbox="934 651 2350 714">Refer to Table 20 Rehabilitation Plan</td> </tr> <tr> <td data-bbox="400 714 934 777">Spread of litter</td> <td data-bbox="934 714 2350 777">Conduct daily litter patrols at the Contractors camp, pylon, footprints and bi-weekly along the line. Provide for waste collection and containment facilities within the Contractors camp.</td> </tr> <tr> <td data-bbox="400 777 934 840">Light pollution</td> <td data-bbox="934 777 2350 840">Lighting must face down, not into surrounding environment, to provide adequate lighting for Health and Safety requirements. Lights should not be mounted higher than 3m off ground level.</td> </tr> <tr> <td data-bbox="400 840 934 913">Stockpile management</td> <td data-bbox="934 840 2350 913">Stockpiles must be regularly and neatly maintained. Refer to Table 22: Soil Management.</td> </tr> </tbody> </table>	Risk / impact:	Mitigation measures	Unightly camps or construction areas.	Equipment and material to be neatly stored. All site offices are to be matt toned single storey buildings that emit no glare. No natural features may be defaced. Shade-cloth shall be placed on perimeter fencing to reduce visual impact of the camp site. Waste should be removed regularly to landfill.	Dust generation.	Refer to Table 11 : Dust Management	Scarring of landscape.	Refer to Table 2020: Rehabilitation Plan	Insufficient soil stabilisation and rehabilitation resulting in erosion and subsidence.	Refer to Table 13: Erosion Management	Infestation of alien invasive species because of ecological disturbances.	Refer to Table 20 Rehabilitation Plan	Spread of litter	Conduct daily litter patrols at the Contractors camp, pylon, footprints and bi-weekly along the line. Provide for waste collection and containment facilities within the Contractors camp.	Light pollution	Lighting must face down, not into surrounding environment, to provide adequate lighting for Health and Safety requirements. Lights should not be mounted higher than 3m off ground level.	Stockpile management	Stockpiles must be regularly and neatly maintained. Refer to Table 22 : Soil Management.	Contractor, Engineer, Eskom .
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Stockpile management	Stockpiles must be regularly and neatly maintained. Refer to Table 22 : Soil Management.																			
Performance indicators / Targets.	The development and implementation of an aesthetics management Method Statement by the Contractor should set out to achieve the following:	Contractor to draft and implement. Engineer to approve and supervise. Independent ECO to audit.																		
	Performance Indicator	Target	Contractor, Engineer, Eskom .																	
	Dust levels	Dust generation may not exceed dust monitoring targets (Refer to Table 8 for Dust Management).																		
	Rehabilitation of impacted works areas.	Rehabilitation of all areas impacted upon through construction related activities must be achieved (see Table 20 : Rehabilitation Plan).																		
	Stockpile management	Stockpiles are not to be higher than 2m.																		
	Visual impact of works areas on surrounding environment	No complaints from I&APs.																		
	Light pollution	No light shining into surrounding properties. No complaints from I&APs.																		
Litter	Record of daily and bi-weekly litter clean up. No litter to be found on site. No complaints from I&APs.																			

Table 11: Dust Management

DESCRIPTION		RESPONSIBILITIES
Narrative	The Kusile-Vulcan Loop is prone to dust due to the nature and extent of the land use activities such as farming and open cast mining within the surrounding area.	
Objectives	Preserve air quality levels to an extent that public health; safety and environmental protection are assured.	
Risks/Impacts	Risk/Impact:	Mitigation measures
	Potential loss of grazing value due to dust settlement on plants.	Clearance of indigenous vegetation should be kept to an absolute minimum. Immediate rehabilitation of disturbed areas.
	Impacts on biological functioning and productivity of vegetation.	Monitoring of dust fall out must be conducted (see below for Dust Management Targets).
	Potential health and nuisance impacts. Safety risks due to reduced visibility. Delays in construction related activities due to unsafe visual conditions.	Stockpile heights can be reduced where dust entrainment has been noted to be high. Dust suppression (wetting or other) must be used in and around the construction area, along haul roads, at stockpiles, crusher plants and cement batching plants and any additional area indicated by the Engineer. Dust generating materials to be transported must be covered when transported. All vehicles must travel at speeds that will not generate dust. Strict dust control to limit impacts on sensitive receptors Monitoring of dust should be conducted every 3 hours at areas where dust is being generated. Dust mitigation is required to prevent dust levels exceeding 600 mg/m ² /day. Monitoring of PM 10 and dust fall out must also be conducted
Performance Indicators / Targets	The development and implementation of a dust management Method Statement by the Contractor, which shall integrate Eskom’s Soil Erosion Guideline TGL 41 337 and Vegetation Management TGL 41 334 documents. This should set out to achieve the following:	
	Performance Indicator	Target
	PM10 inhalable particulates.	PM10 must be monitored at sensitive receptors when construction is occurring within 1 km of the receptors. PM10 must also be measured at active construction areas and at additional sites indicated by the Engineer. Monitoring should be conducted/undertaken on a monthly basis. PM10 levels should not exceed the following levels. Annual PM10 ≤ 40 µg/m ³ Daily PM10 ≤ 75 µg/m ³ .
	Dust nuisance levels.	Suspended (actual) dust levels must not exceed 600 mg/m ² /day. Respond to all complaints on dust and air quality.
	Dust fallout.	Indicative dust fallout (i.e. suspended dust concentrations that will result in fallout) shall be monitored. Actual dust fallout shall be verified through sampling at sites where such dust is generated and shall not exceed the below limits. Fallout (indicative and actual) is classified as: Slight: < 250 mg/m ² /day Moderate: 250 mg/m ² /day < 500 mg/m ² /day Heavy: 500 mg/m ² /day < 1200 mg/m ² /day Very heavy: 1200 mg/m ² /day The target, action and alert thresholds for dust fall out (indicative and actual) are as follows: Target: ≤ 300 mg/m ² /day Immediate action required: > 600 mg/m ² /day Authority alert threshold: >1200 mg/m ² /day.
		Contractor, Engineer, Eskom .
		Contractor, Engineer, Eskom .
		Contractor to draft and implement. Engineer to approve and supervise. Independent ECO to audit.
		Contractor, Engineer, Eskom .

Table 12: Earthworks Management

	DESCRIPTION		RESPONSIBILITIES
Narrative	Earthworks will be required during construction and are generally of low impact and short duration.		
Objectives	Minimise impacts on the receiving environment and disturbances to flora, fauna and affected landowners.		Contractor, Engineer, Eskom .
Risks / Impacts	Risk/Impact	Mitigation measures	Contractor, Engineer, Eskom .
	Loss of soil through contamination, wind and water erosion and inadequate stockpile handling.	Refer to Table 11 : Dust Management, Table 13 : Erosion Management, Table 25 : Waste Management and Table 26 : Water Management. Topsoil shall be stockpiled separately from subsoil with all soils being reinstated in the reverse order to that in which they have been removed in order to initiate rehabilitation. All stockpiles shall be stabilised, not be higher than 2m, and must blend in with the surrounding topography. Stockpiles shall be kept weed free for the duration of construction. Should additional bedding material or backfill be required, only material from an approved source free of alien invasive fauna and flora may be used. Topsoil shall only to be handled during removal and reinstatement activities.	
	Impacts on water resources.	All works must take cognisance of potential impacts upon water resources.	
	Disruption of natural areas and land use practices.	Topsoil removed from all areas impacted upon must be stockpiled for rehabilitation in terms of Table 20 Rehabilitation Plan. Soil horizons (e.g. topsoil, subsoil, bedrock and other layers such as clays etc.) to be kept separate during removal, stockpiling and reinstatement. Topsoil removed from agricultural lands must be collected and stockpiled. All stones and rocks shall be removed from the reinstated topsoil in agricultural areas. All stockpiles will be located within designated areas outside the 1:100 year flood line of rivers and streams and not within 100m of delineated wetlands. Stockpiles shall be windrowed within the servitude.	
	Prevention of soil contamination.	Refuelling and other activities with the potential to cause pollution shall not be allowed on or adjacent to a stockpile.	
	Excess material requiring spoiling.	Refer to Table 20 : Rehabilitation Plan and Table 25 : Waste Management. Inventory of topsoil requirements with extra 10% of topsoil kept in reserve. Spoil must be used as backfill to rehabilitate areas impacted upon by earthwork activities. Excess spoil material disposed of at the nearest registered landfill site as identified by Eskom.	
Performance Indicators / Target	The development and implementation of an earthworks management Method Statement by the Contractor, which shall integrate Eskom's Soil Erosion Guideline TGL 41 337 and Vegetation Management TGL 41 334 documents. This should set out to achieve the following:		Contractor to draft and implement. Engineer to approve and supervise. Independent ECO to audit. Contractor, Engineer, Eskom.
	Performance Indicator	Target	
	Topsoil and subsoil handling and management.	Soil horizons (stockpile separately) Stockpiles no higher than 2 m and kept weed free.	
	Water resource management	Refer to Table 26 : Water Management	
	Prevention of contamination.	Stockpiles free of contamination by oils/fuels and other harmful substances.	
	Reinstatement of previous land use practices.	Refer to Table 20 : Rehabilitation Plan for targets.	
	Placement of stockpiles within specifically demarcated areas.	No stockpiles within the 1:100 flood line or within 100m of delineated wetland. No stockpile outside of areas indicated in the construction servitude diagrams.	
	Spoil disposal.	No spoil disposed of anywhere other than designated spoil areas or at a registered landfill site as identified by Eskom. Refer to Table 25 : Waste Management for waste targets.	

Table 13: Erosion Management

	DESCRIPTION		RESPONSIBILITIES
Narrative	Construction activities will result in exposure of bare and unstable soil, which increases the potential of erosion and deposition of soil by wind and runoff water. After construction, landscape scarring may occur, the severity of which will depend on the success of rehabilitation efforts to restore the area to a state similar to that of the surrounding environment.		
Objectives.	Prevent erosion and reduce potential impacts upon the surrounding environment.		Contractor, Engineer, Eskom.
Risks/Impacts.	Risk/Impact:	Mitigation measure	Contractor, Engineer, Eskom.
	Contamination of water bodies through increased sediment load. Reduction in soil productivity due to loss of topsoil. Increased soil deposition to adjacent areas. Dust generation.	Changes in natural gradients due to construction activities should be avoided where possible or mitigated by levelling the slope to the original gradient. Access and servitude roads should be designed to drain efficiently through formalised storm water crossings comprising an earth berm and causeway. The placement of these should be assessed per road portion. Storm water must be directed to areas of high stability with the ability to reduce storm water velocity. Where the above is not possible, exposed slopes steeper than 1:2 (vertical: horizontal) should be stabilised and drainage directed to engineered structures. Exposed areas shall be seeded with a suitable grass seed mix within a week of their exposure. (Refer to Table 20 : Rehabilitation Plan). A 50% grass cover should be achieved within 1 month of the onset of the next growing season following seeding and 80% cover within 2 months thereafter. A minimum of 80% grass cover should be maintained until rehabilitation of the slope or affected area is initiated. Where slopes created are steeper than 1:1, additional anti-erosion mechanisms need to be implemented (such as knocking in stakes, installing gabions, geo textiles or similar). Monthly clearance of alien vegetation re-growth at disturbed areas must be conducted as per the requirements of the Conservation of Agricultural Resources Act (Act 43 of 1983) until rehabilitation in the area is initiated. No disturbance of soil may occur outside the servitude and pump station boundaries. Suspended solids within water leaving the scheme's footprint area should not contain significantly higher levels of suspended solids (>10%) than water within locally occurring water resources. (Refer to Table 26 : Water Management).	
Performance indicators / Targets.	The development and implementation of an erosion management Method Statement by the Contractor, which shall integrate Eskom's Soil Erosion Guideline TGL 41 337 and Vegetation Management TGL 41 334 documents. This should set out to achieve the following:		Contractor to draft and implement. Engineer to approve and supervise. Independent ECO to audit.
	Performance Indicator	Target	
	Erosion prevention.	All gradients > than 1:2 (vertical: horizontal) seeded with a suitable grass seed mix within a week of their exposure. Formalised storm water structures comprising a berm and causeway must be designed and implemented along roads susceptible to erosion. A 50% grass cover should be achieved within 1 month of the onset of the next growing season following hydro seeding and 80% cover within 2 months thereafter. A minimum of 80% grass cover should be maintained until rehabilitation of the slope or stockpile area is initiated. Slopes > 1:1 must have additional anti-erosion mechanisms (berms, silt fences or geo textiles). No evidence of erosion or damage to erosion control devices. No collapse/subsidence of banks at water crossings and scour valve localities. No significant changes to ground level, drainage patterns or vegetative cover as a result of erosion or sedimentation.	
	Control alien invasive species.	Records of monthly alien clearing.	
	Existing land use protection.	No evidence of disturbance outside of scheme footprint area.	
	Rehabilitation of impacted areas.	Refer to Table 20 : Rehabilitation Plan for targets.	
	Water quality as indicator of levels of soil erosion.	Refer to Table 26 : Water Management for suspended solids targets.	
	Storm water	Monitor and maintain storm water infrastructure and review storm water management initiatives, where applicable.	

Table 14: Fauna and Flora Management

DESCRIPTION		RESPONSIBILITIES																																										
Narrative	Agricultural and mining activities have transformed the landscape, with only a few natural areas remaining. The majority of these remaining natural areas are within private conservation areas																																											
Objectives	Preserve fauna and flora through control of construction activities. Prevent infestation of alien species during operational and maintenance activities.																																											
Risks/Impacts	Risks/Impacts	Mitigation Measures																																										
	Disturbance, degradation and pollution of the environment.	Reduce construction activities and vegetation clearance within the servitude during construction related activities where logistically possible. No construction related activities to impact upon areas outside of the servitude.																																										
	Removal of vegetation and thus loss of habitat and biodiversity. Disturbance to or removal of agricultural capacity.	A search and rescue operation to collect species for rehabilitation must be conducted and kept alive in a nursery for rehabilitation purposes. Each indigenous tree or shrub removed through search and rescue operations must be replanted in the area it came from. Trees from within the servitude shall be planted outside of the permanent servitude and within the temporary servitude.																																										
	Impacts on sensitive environments and rare/threatened/endangered species.	All areas where rare and/or endangered species could occur are to be identified and avoided where possible. No unauthorised clearing of vegetation. No introduction of alien invasive vegetation species as a result of construction related activities. Progressive rehabilitation of all disturbed areas to a state similar of the surrounding landscape. Rescued specimens are to be stored and cared for in a temporary nursery, and replanted once construction related activities have been completed. All disturbed areas must be rehabilitated with special attention paid to identified sensitive areas.																																										
	Bird flight diverters.	Bird flight diverters must be fitted on the earth wires and a standard type Eskom approved "bird perch" must be fitted at the top of the poles in order to prevent electrocution of birds.																																										
	Damage and/or death of rescued specimens due to ineffective search and rescue operations.	The Contractor must maintain the floral nursery to ensure survival of collected species. Individuals that die in the nursery must be replaced from a commercial source by the Contractor.																																										
	Unauthorised collection of fauna and flora for food, firewood, "muthi" or other uses.	No unauthorised collection of fauna and flora.																																										
	Incorrect operation of gates thereby allowing free movement of livestock and game.	Eskom shall manage gates in accordance to the requirements of the Fencing Act (Act 31 of 1963), whereby open gates shall be left open and closed gates be kept closed. Eskom should inform all landowners in the event of livestock movement into tilled lands due to incorrect gate usage.																																										
	Animals becoming trapped in construction areas and/or falling into excavations due to ineffective exclusion mechanisms (fencing, cattle grids etc.).	Open excavations must be adequately fenced to prevent access by wildlife or livestock. Corridors across the servitude for the passage of animals must be provided at appropriate sites determined by the Contractor and approved by the Engineer.																																										
	Spread of alien invasive species.	Monthly removal of alien invasive vegetation from all impacted areas. Herbicide use for the control of invasive species must be at supplier recommended application rates, and in accordance to Eskom policy (ESKPBAAD4). Herbicides used shall be biodegradable where possible. Smaller weeds such as <i>Bidens</i> species can alternatively be mowed or cut before seeds set, which will prevent distribution of the plants. This will have the added advantage of providing a mulch layer to cover the bare soil. If plants are cut down, all plant parts must be controlled, as these plants have the tendency to reproduce vegetatively. Disposed plants must be confined to certain waste dumps far from rivers and other natural vegetation. The following table indicates invasive species found in the area, which must be removed from disturbed and rehabilitated areas:																																										
<table border="1"> <thead> <tr> <th>Botanical name</th> <th>Common Name</th> <th>Country of origin</th> </tr> </thead> <tbody> <tr> <td colspan="3">Trees and shrubs</td> </tr> <tr> <td>Acacia mearnsii</td> <td>Black wattle</td> <td>Australia</td> </tr> <tr> <td>Pinus spp</td> <td>Pine</td> <td>Europe</td> </tr> <tr> <td>Eucalyptus spp</td> <td>Bluegum</td> <td>Australia</td> </tr> <tr> <td>Salix babylonica</td> <td>Weeping willow</td> <td>Asia</td> </tr> <tr> <td>Solanum mauritianum</td> <td>Bugweed</td> <td>South America</td> </tr> <tr> <td>Lantana camara</td> <td>Lantana</td> <td>North and South America</td> </tr> <tr> <td colspan="3">Grass</td> </tr> <tr> <td>Arundo donax</td> <td>Giant reed</td> <td>Spain</td> </tr> <tr> <td>Cortaderia selloana</td> <td>Pampas grass</td> <td>South America</td> </tr> <tr> <td colspan="3">Forbs</td> </tr> <tr> <td>Bidens bipinnata</td> <td>Spanish blackjack</td> <td>Eurasian origin</td> </tr> <tr> <td>Bidens pilosa</td> <td>Common blackjack</td> <td>Australia</td> </tr> </tbody> </table>		Botanical name	Common Name	Country of origin	Trees and shrubs			Acacia mearnsii	Black wattle	Australia	Pinus spp	Pine	Europe	Eucalyptus spp	Bluegum	Australia	Salix babylonica	Weeping willow	Asia	Solanum mauritianum	Bugweed	South America	Lantana camara	Lantana	North and South America	Grass			Arundo donax	Giant reed	Spain	Cortaderia selloana	Pampas grass	South America	Forbs			Bidens bipinnata	Spanish blackjack	Eurasian origin	Bidens pilosa	Common blackjack	Australia	Contractor, Eskom. Engineer, Eskom.
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Cirsium vulgare	Scottish thistle	Europe, Asia, North Africa																											
Datura stramonium	Thorn apple	North America																											
Succulents																													
Opuntia spp.	Prickly pear	North America																											
Performance indicators / Targets	The development and implementation of a fauna and flora Method Statement by the Contractor, which shall integrate Eskom's Bush Clearance Policy ESKASA BG3 Policy, Herbicide Management Policy ESKPBAA D4, Safe Use of Herbicides and Pesticides ESKASAA L0 and Vegetation Management TGL 41 334 documents. This should set out to achieve the following:		Contractor to draft and implement. Engineer to approve and supervise. Independent ECO to audit. Contractor, Engineer, Eskom.																										
	Performance Indicator	Target																											
	Reduction of extent of impacts.	No evidence of disturbance outside of project area.																											
	Identification and protection of ecologically sensitive areas.	All sensitive environments are to be identified and afforded appropriate protection.																											
	Identification and protection of species.	Proof of training of staff for identification and rescue and relocation of known conservation worthy species. No unauthorised collection of fauna and flora.																											
	Landowner requirements	No complaints from landowners. Landowners to be consulted to determine livestock movement requirements. Each indigenous tree or shrub removed through search and rescue operations must be replanted in the area it came from.																											
	Wildlife and livestock management along the servitude.	Access to individual land portions shall be controlled through the appropriate use of gates. All livestock injuries or fatalities shall be investigated, recorded and reported to Eskom and the respective landowner. Restrict vehicle speeds along the servitude to prevent faunal fatalities.																											
	Management of alien invasive species.	Proof of monthly removal of alien invasive vegetation. Chemical control of invasive species to be undertaken under the auspices of a Department of Agriculture, Forestry and Fisheries (DAFF) authorised Pest Control Officer (PCO). No sign of alien invasion in adjacent properties or downstream rivers.																											

Table 15: Fire Management

DESCRIPTION		RESPONSIBILITIES
Narrative	Construction related activities associated may pose a threat of damage to property, infrastructure, natural and cultivated vegetation within the project area, due to fire.	
Objectives	Restrict the occurrence of fires and ensure all role players can respond efficiently and effectively, thereby reducing potential impact.	
Risks/Impacts	Risk/Impact	Mitigation measures
	<p>Loss of fauna and flora and destruction of natural habitat.</p> <p>Loss of grazing lands and crops.</p> <p>Damage or destruction to infrastructure.</p> <p>Injury and/or death of humans and animals.</p>	<p>Join the local Fire Protection Association (FPA).</p> <p>Perimeter boundaries at the pump stations and reservoirs must have fire breaks in place.</p> <p>The daily Fire Danger Index (FDI), calculated in terms of the National FDI (www.weathersa.co.za), shall be displayed prominently at the pump stations at all times.</p> <p>Fire extinguishers must be available at all points of storage of flammable products.</p> <p>STP Dry Powder Fire Extinguishers must be used and at least one shall be provided per 50 m² floor surface area.</p> <p>The fire extinguishers must be checked on a monthly basis to ensure they have not been used/exceeded their yearly service intervals.</p> <p>Basic fire fighting equipment shall be kept and maintained at all construction fronts at all times.</p> <p>All staff are to undergo basic fire fighting training.</p> <p>Basic fire fighting equipment must be checked prior to the commencement of the winter fire season.</p> <p>The Contractor shall assign the position of Fire Officer to one of its senior staff members who shall be competent and adequately trained to fulfil the position of Fire Officer.</p> <p>The Fire Officer shall be responsible for ensuring immediate and appropriate actions in the event of a fire and shall ensure that employees are aware of the procedures to be followed. The Fire Officer will be responsible for contacting emergency services for assistance.</p> <p>Any fires that occur shall be reported to Eskom immediately and reported in turn to the relevant authority (district / local municipality, the local FPA and the Department of Agriculture, Fisheries and Forestry).</p> <p>Provision of formal training to all members of staff, who will be able to attend to fire fighting in the event of a fire, until emergency services arrive.</p> <p>All other staff shall receive training on fire prevention and fire fighting and safety in the event of a fire, as a part of the site induction training by Contractor before commencing work. Annual refresher courses shall be presented to all staff.</p> <p>Ensure that the necessary materials and equipment for dealing with oil, fuel and hazardous substance spills and leaks are available on site and up to date at all times.</p> <p>No open fires shall be permitted on or off-site, except for activities authorised by Eskom and the FPA. All authorised fires shall occur at designated fire places, which shall be suitably resourced to contain and suppress any potential run away fire.</p> <p>No on site burning of any waste materials, vegetation, litter or refuse shall be permitted.</p> <p>The disposal of cigarette butts into the surrounding environment shall not be permitted.</p> <p>Grass and other vegetation in the vicinity of infrastructure shall be cut at regular intervals to reduce fuel load and fire hazards</p> <p>Annual updating and approval of the fire management response plan before onset of fire season.</p> <p>Conduct management review of fire preparedness and response before onset of fire season.</p> <p>Conduct fire and emergency drills every six months with one coinciding with the onset of the fire season.</p>
Performance Indicators / Targets.	The development and implementation of a fire management Method Statement by the Contractor, which shall integrate Eskom's FPA Guideline TLL 41 336, Fire Risk Management TLL 32 124 and Vegetation Management TGL 41 334 documents. This should set out to achieve the following:	
	Performance Indicator	Target
	Number of fires.	Zero (0) fires.
	Adequate fire protection measures in place.	<p>Proof of annual update and approval of the fire management response plan.</p> <p>Proof of management review of fire preparedness and response before onset of fire season.</p> <p>Proof of six monthly fire and emergency drills every six months and effectiveness thereof audited.</p> <p>Fire extinguishers must be available at all points of storage of flammable products.</p> <p>STP Dry Powder Fire Extinguishers must be used and at least one shall be provided per 50m² floor surface area.</p> <p>Proof of examination of fire extinguishers on a continual basis.</p> <p>Fire breaks in place, in consultation with respective landowners, the width of which to be determined by the FPA.</p>
Compliance with regulatory and procedural requirements.	<p>Proof of membership/registration with the local FPA.</p> <p>Storage of hazardous/flammable materials and substances to comply with national, provincial and local regulatory requirements.</p> <p>Proof of reporting of fire incidences to authorities.</p> <p>Presentation of the FDI for the area.</p> <p>No uncontrolled fires along the servitude.</p> <p>No build-up of flammable material on or adjacent to Eskom property.</p>	

	DESCRIPTION		RESPONSIBILITIES
		Emergency response plan implemented. Safety management plan implemented.	
	Training and information sharing.	Proof of fire awareness training.	

Table 16: Hazardous Substance Management

	DESCRIPTION	RESPONSIBILITIES	
Narrative	The storage, handling, use and disposal of hazardous substances shall be managed and monitored to ensure these substances do not impact upon the receiving environment.		
Objectives	Minimise the impact of hazardous substance storage, handling and disposal on the receiving environment	Contractor, Engineer, Eskom.	
Risks/Impacts	Risks/Impacts	Mitigation measures	
	Contamination of the receiving environment	All hazardous substances to be kept under lock and key in a bunded fire proof facility. All staff to be trained in the safe handling and spill management of all substances used on site.	Contractor, Engineer, Eskom.
	Incorrect use of herbicide and pesticides.	All herbicides and pesticides to be used under the supervision of a PCO, in terms of the Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947) and its regulations.	
	Threat of fires	All reactive hazardous substances to be labelled and stored separately. Suitable fire fighting equipment must be stored in close proximity and all personnel must be made aware of the dangers of burning chemicals/smoke inhalation.	
	Personal injury	All staff are to be trained in the management of hazardous substances. All staff are to be provided with appropriate Personal Protective Equipment (PPE).	
Performance Indicators / Targets	The development and implementation of a hazardous substance management Method Statement by the Contractor should set out to achieve the following:		Contractor to draft and implement. Engineer to approve and supervise. Independent ECO to audit.
	Performance Indicator	Target	Contractor, Engineer, Eskom.
	Adequate measures implemented for the containment of hazardous substances.	All hazardous substance storage areas are equipped with spill kits and fire fighting equipment. To ensure all hazardous substances are stored in well ventilated secondary containers capable of 110% of the volume of the container. A tap-off system must be installed through which leakages and spills can be removed. All staff required to handle and use such hazardous substances have received adequate training. All necessary approvals with respect to hazardous substances shall be obtained from the appropriate authorities and shall comply with standard fire safety regulations. All chemicals will be stored in specifically designed, lockable storage areas where reactive substances are classed and segregated. Storage will comply with the manufacturers MSDS and local and national legislative requirements. Hazardous waste and waste fuels and oils must be stored in appropriate containers that will not corrode or leak. These containers must be properly marked to indicate contents.	
	Hazardous substance management.	All hazardous substances stored on site shall be recorded within a checklist All hazardous substances shall be labelled according to the chemical hazard rating and adequate signage must be displayed indicating the appropriate management measures to be implemented in the event of a spill/fire. Only specifically trained personnel will be permitted to use and handle the hazardous substances. Certificates of training must be provided to Eskom for final approval. Substances used must be the least environmentally harmful chemical available for the undertaking of specific duties/requirements.	
	Incident management	Ensure that the necessary materials and equipment for dealing with oil, fuel and hazardous substance spills, leaks and fires are available on site and up to date at all times. The following symbolic safety signs shall be depicted: "No Smoking", "No Naked Lights" and "Danger". These signs shall conform to the requirements of SANS 1186-1 and are to be prominently displayed in and around the storage area. The volume and contents of the tanks shall be displayed using the emergency information system detailed in SANS 10232-1. Signage containing clearly displayed emergency contact numbers must be provided.	
	Fire fighting	Suitable fire fighting equipment must be stored in close proximity and all personnel must be made aware of the dangers of burning chemicals/smoke inhalation.	
	Personnel protection	No smoking shall be permitted in the vicinity of the store/s and adequate fire fighting equipment shall be provided at hazardous substance storage and dispensing areas.	

Table 17: Heritage Management

DESCRIPTION		RESPONSIBILITIES
Narrative	Heritage features and grave sites have been identified within the greater project footprint. The unearthing of heritage, archaeological or cultural items (chance findings) during excavations works within the servitude is considered negligible.	
Objectives	Limit and mitigate potential heritage impacts and chance findings should they occur.	
Risks/Impacts	Risks/Impacts	Mitigation measures
	Damage to known heritage resources.	All heritage features encountered on the route must be avoided and protected unless otherwise instructed by Eskom (in consultation with a heritage specialist). Approval from South African Heritage Resource Agency (SAHRA) must be attained prior to the removal, damaging or alteration of any heritage resource.
	Damage or destruction of chance finds.	Personnel must be informed of what chance finds may be and what they may look like and instructed to be on the lookout for these items during excavation operations. In the event of a chance find, work at the find shall be stopped. A heritage specialist must be called in to investigate the find. The heritage specialist must provide management measures for the protection or removal of the find in consultation with SAHRA. Work can only recommence in area of the find once written permission from the South African Heritage Resources Agency (SAHRA), heritage specialist and Eskom has been obtained.
Performance Indicators / Targets	The development and implementation of a heritage management Method Statement by the Contractor should set out to achieve the following:	
	Performance Indicator	Target
	Protection of heritage features.	No removal, damaging or alteration to heritage resources, unless proof of consultation with a heritage specialist and approval from SAHRA is in place. All buildings and or structures older than 60 years shall be protected.
	Management of chance finds.	Records of chance findings must be kept. Where chance finds are unearthed, proof of work being stopped and proof of consultation with heritage specialist and SAHRA must be kept on site. The unearthing of graves must immediately be reported to Eskom, the South African Police Service and SAHRA. An archaeologist shall be notified and the area shall be cordoned off from all works until the archaeologist has completed an investigation and proposed recommendations, in consultation with SAHRA.

Table 18: Land Use

	DESCRIPTION	RESPONSIBILITIES		
Narrative	The predominant land uses surrounding the project are agriculture, mining and industry. Due to these practises altering the landscape and affecting access, the power line is contained within the servitude.			
Objectives	Minimise disturbances to landowners; land use rights and associated impacts upon commercial activities.	Contractor, Engineer, Eskom.		
Risks / Impacts	Risks / Impacts	Mitigation measures		
	Animosity of community members affected by the scheme.	Landowners must be actively engaged and be kept informed of new developments. Ensure effective communication channels are established and maintained.	Contractor, Engineer, Eskom.	
	Incident reporting structures	Initiate incident reporting structures. Contractor shall adhere to the following timeframes for dealing with Landowner concerns, unless otherwise approved by Eskom: Record concern within the Communications Register and verbally notify Eskom – immediate. Respond to the concern – within 1 day of concern being raised – this includes consulting with the Landowner. Rectify/mitigate concern – within 3 days of concern being raised. Respond in writing to landowner on “close out” of concern – within 5 days of concern being raised. Submit to Eskom a detailed report – within 7 days of concern being raised.		
	Construction schedules.	Where practical, construction related activities should be scheduled to lessen impacts upon existing land use practices.		
	Site creep	All development foot prints are to be surveyed and pegged prior to the commencement of construction related activities.		
	Land access protocols	Comply with Eskom’s Access to Farms procedure (TPC41-340). Basic Environmental Awareness Training to all scheme employees with annual refresher courses. Access to the site by people other than staff or those with project related business must be limited.		
	Site Camp	The Contractor will require a site office / yard for the duration of the contract period. The Contractor’s site office shall be located within the development footprint, or on a site appropriately zoned and/or authorised for such use and approved by the ECO. The Contractor shall select a location that has easy access and which has already been cleared or disturbed by previous human activity (e.g. previous construction camps or stockpile areas). All construction activities, materials, equipment and personnel will be restricted to within the area specified. The Contractor shall inform Eskom of the site camp localities prior to the commencement of construction related work.		
Performance Indicators / Targets	The development and implementation of a land use management Method Statement by the Contractor, which shall integrate Eskom’s Access to Farms Guideline TPC 41 340 and Vegetation Management TGL 41 334 documents. This should set out to achieve the following:			Contractor to draft and implement. Engineer to approve and supervise. Independent ECO to audit.
	Performance Indicator	Target		
	Communication with landowners	Communications Register must be kept at the Duhva Power Station. No reports of complaints not being dealt with promptly. Minutes of meetings held with local community members and other I&APs. Notify landowners in advance in the event of operational and maintenance activities likely to cause disruptions to current land use practices.	Contractor, Engineer, Eskom.	
	Safety of the work environment	PPE is available and worn by staff and visitors. All excavations shall be safe guarded. In addition, barriers and warning signs shall be placed around all excavations.		
	Landowner database	Maintain a database of landowners contact details. New landowners should be briefed on the construction schedule.		
	Provision of skills training	Refer to Table 24: Training Programmes.		

Table 19: Noise Management

	DESCRIPTION		RESPONSIBILITIES
Narrative	The power line passes through rural areas and past sensitive receptors where ambient noise levels are low. Noise sensitive receptors include inter alia farm houses, farm labourer's dwellings and tourist accommodation. Prevailing winds in the area, which can enhance noise downwind of a noise source, are from the north-west during the day and the south-east at night. Moreover, the landscapes the power line will cross are generally flat to undulating, thus offering no attenuation of noise that may be produced by the construction of the project.		
Objectives	Reduce construction related noise affecting the surrounding environment.		Contractor, Engineer, Eskom.
Risks/Impacts	Risk/Impact	Mitigation measure	Contractor, Engineer, Eskom.
	Hearing loss through exposure to extended and or high noise levels (at the pump stations). Disruption of sense of place due to noise nuisance. Noise nuisance to sensitive receptors.	Construction site yards, workshops, concrete batching plants and other noisy fixed facilities may not be located within distances of 250 m and 750 m away from the sensitive receptors in urban and rural areas respectively, unless with the approval of the Engineer. In such cases, the Contractor must notify affected parties prior to the commencement of the noisy activity. Employees working at the pump stations must be provided with adequate PPE. All construction related vehicles, plant and equipment must be properly maintained to avoid creation of unnecessary additional noise. Where possible, sensitive receptors should be forewarned before noisy operations commence. Maintenance activities are to be contained to reasonable hours during the day. Where possible, noisy operations should be combined so that they occur at the same time. Strict control of blasting operations, if required, with regard to the size and timing of explosions in order to minimise noise. The number of blasts per day shall be limited, blasting shall be undertaken at the same times each day and no blasting shall be allowed at night. Affected parties must be notified of blasting events.	
Performance Indicators / Targets	The development and implementation of a noise management Method Statement by the Contractor should set out to achieve the following:		Contractor to draft and implement. Engineer to approve and supervise. Independent ECO to audit. Contractor, Engineer, Eskom.
	Performance Indicator	Target	
	Notification of sensitive receptors.	Sensitive receptors shall be notified of the timing and duration of the maintenance and operational activities and the potential noise nuisance it may cause when taking place within 1 km of a sensitive receptor. Respond to all noise related complaints received from sensitive receptors and implement mitigation measures.	
	Noise levels at sensitive receptors.	Noise levels shall be monitored to comply with SANS 10103:2008 and Occupational Health and Safety Act requirements.	
	Deviations from normal construction related activity conditions.	All works that deviate from normal construction related conditions shall be reported and actions initiated to mitigate against to prevent recurrence of the incident.	

Table 20: Rehabilitation Plan

DESCRIPTION		RESPONSIBILITIES	
Narrative	The project falls within the Highveld grassland region of Mpumalanga. The area has been greatly transformed by mining and agricultural activities with overall environmental sensitivity low to moderate. Rehabilitation activities will need to take existing land uses into consideration and may therefore vary from one land portion to the next.		
Objectives	To rehabilitate impacted areas to a suitable land capability class similar to that of the surrounding environment. Rehabilitation will take existing land uses into consideration. Rehabilitation should start immediately after work is completed.		
Risks/Impacts	Risks/Impacts	Mitigation Measures	
	Incorrect placement of topsoil and reseeding with the incorrect species resulting in poor vegetation establishment and regeneration of vegetation and visual scarring of the landscape. Dust generation and erosion due to exposed surfaces. Loss of agricultural productivity due to poor vegetation establishment	After construction related activities have ceased, the site must be cleared of equipment and any other materials emanating from the works. Top and sub soil shall be replaced in the order they were removed. Disturbed areas shall be ripped and / or scarified to a depth of 450 mm. Topsoil must be reinstated at the minimum depths indicated below: Mining, riparian/wetland and grassland – topsoil replacement of 300 mm to achieve resultant depth of 150 mm. Agricultural (crop land) – topsoil replacement of 450 mm to achieve a resultant depth of 300 mm. Agricultural (pasture land) – topsoil replacement of 300 mm to achieve resultant depth of 150 mm. Topsoil must be placed such that the disturbed area is at a slightly higher level than the surrounding, undisturbed soil to account for soil levels dropping as soils settle over time After topsoil placement on disturbed areas must be re-vegetated using the seed mix provided below Landowners should be consulted to determine specific rehabilitation requirements.	Contractor, Eskom. Engineer, Eskom.
	Reduction in soil productivity due to the mixing of soil horizons during soil stripping, which causes dilution of fertility in topsoils.	Topsoil stored for longer than 6 months, must be vegetated. In cases like this, the biological viability of topsoil stockpiles shall be tested before placement during rehabilitation and where necessary amelioration such as microbial supplementation may be required. Refer to Table 22: Soil Management .	
	Infestation by alien invasive plant species.	Monthly removal of alien invasive species re-establishing on cleared areas and throughout rehabilitation.	
	Reduction in species diversity along the servitude after works.	During site clearance a search and rescue operation for naturally occurring plant species must be conducted. Individuals removed during site clearance operations should be relocated to a nursery and kept alive and replanted in the area from which they were removed. Disturbed areas should be reseeded using the seed mix provided below.	
	Drainage	All drainage lines are to be reinstated. All disturbed areas are to be re-profiled to original contours. Soils within drainage lines are to be stabilised to ensure no loss of capacity. Permanent erosion and sediment control measures shall be reinstated.	
	Loss of wetland/river integrity and functioning	Anti-erosion measures must be implemented to stabilise beds and banks of rivers and streams where these are disturbed. These measures should preferably be temporary in nature so they can be removed at a point where rehabilitation has been deemed to be successful. Permanent structures should be approved by Eskom before construction. The soil profile (type and thickness of soil) of rivers and wetlands must be recorded prior to excavations in these areas. Topsoil and soils removed from wetland and rivers must be stockpiled separately. Replacement of soil types must be done so as to match the baseline soil profile as closely as possible. Re-vegetation: species that was originally present in the wetland must be preferably be replanted in the wetland. Careful attention to this detail is required in order to restore the water resistant layers that help wetlands retain water, as well as to restore other wetland functions.	
	Erosion and wash-outs from disturbances on undulating terrain.	Minimal clearance of vegetation must be permitted and plants must be re-established as soon as possible. Anti-erosion measures to be implemented as a priority on all areas which feature undulating terrain. Formalised storm water crossings comprising of a berm and causeway should be placed on all roads on undulating terrain. Storm water shall be directed to an area capable of dissipating the energy of the water.	
Performance Indicators / Targets	The development and implementation of a rehabilitation management Method Statement by the Contractor, which shall integrate Eskom’s The Safe Use of Herbicide and Pesticides ESKASAALO, Soil Erosion Guideline 41 337 and Vegetation Management TGL 41 334 documents. This should set out to achieve the following:		
	Performance Indicator	Target	
	Restoration of soil profile at disturbed areas.	Disturbed areas shall be ripped and scarified to a depth of 450 mm and topsoil reinstated at the minimum depths indicated below: Mining, riparian/wetland, pastures and grassland –topsoil replacement of 300 mm to achieve resultant depth of 150 mm. Agricultural (crop land) –topsoil replacement of 450 mm to achieve a resultant depth of 300 mm.	Contractor, Eskom. Engineer, Eskom.
	Rehabilitation of steep slopes.	Stabilisation of steep slopes shall be a priority, with engineered solutions being investigated to ensure slope stabilisation.	
	Removal of alien invasive vegetation species.	Proof of monthly removal of alien invasive species re-establishing on cleared areas	

DESCRIPTION		RESPONSIBILITIES																																																																																																																								
Site specific rehabilitation requirements.	Proof of discussions with landowners about specific rehabilitation requirements. All vegetative matter removed during the search and rescue operation must be replanted in the area that they were rescued from.																																																																																																																									
Reinstatement of wetland soils.	The final placement of layers of soil on the wetland bed must match the pre-disturbance profile. Replaced soil must be compacted and at the same level as adjacent soil. Water resistant layers determined before disturbance must be reinstated.																																																																																																																									
Appropriate re-vegetation with correct seed mix.	The seed mix for use in rehabilitation must be an approved mix of indigenous grass species common to the area. The following mix is a guideline. Contractor shall inform Eskom to deviations from this seed mix prior to the purchase of seed.																																																																																																																									
	<table border="1"> <thead> <tr> <th>Species</th> <th>Common name</th> <th>Soil type</th> <th>Annual</th> <th>Perennial</th> <th>Rate kg/ha</th> </tr> </thead> <tbody> <tr> <td colspan="6">Pioneer</td> </tr> <tr> <td>Panicum schinzii</td> <td>Sweet buffalo grass</td> <td>Wet</td> <td></td> <td>X</td> <td>1</td> </tr> <tr> <td>Sporobolus festivus</td> <td>Red dropseed</td> <td>Dry/moist</td> <td></td> <td>X</td> <td>1</td> </tr> <tr> <td>Cynodon dactylon</td> <td>Couch grass</td> <td>Moist</td> <td></td> <td>X</td> <td>1</td> </tr> <tr> <td>Eragrostis curvula</td> <td>Weeping love grass</td> <td>Well-drained</td> <td></td> <td>X</td> <td>1</td> </tr> <tr> <td colspan="6">Sub-climax</td> </tr> <tr> <td>Stipagrostis uniplumis</td> <td>Silky Bushmans grass</td> <td>Sandy/Rocky</td> <td>X</td> <td></td> <td>2</td> </tr> <tr> <td>Eragrostis superba</td> <td>Weeping Love grass</td> <td>Clay/Sandy/ Loam/rocky</td> <td>X</td> <td></td> <td>2</td> </tr> <tr> <td>Eragrostis gummiflua</td> <td>Gum grass</td> <td>Well-drained</td> <td></td> <td>X</td> <td>1</td> </tr> <tr> <td>Chloris gayana</td> <td>Rhodes grass</td> <td>Moist</td> <td>X</td> <td></td> <td>3</td> </tr> <tr> <td>Eragrostis capensis</td> <td>Heart-seed love grass</td> <td>Moist</td> <td></td> <td>X</td> <td>2</td> </tr> <tr> <td>Eragrostis chloromelas</td> <td>Curly leaf</td> <td>Sandy/loamy</td> <td></td> <td>X</td> <td>3</td> </tr> <tr> <td>Andropogon eucomus</td> <td>Snowflake grass</td> <td>Moist</td> <td></td> <td>X</td> <td>2</td> </tr> <tr> <td colspan="6">Climax</td> </tr> <tr> <td>Melinis nerviglumis</td> <td>Bristle-leaved red top</td> <td>Stony</td> <td></td> <td>X</td> <td>1</td> </tr> <tr> <td>Schizachyrium sanguineum</td> <td>Red autumn grass</td> <td>Moist</td> <td></td> <td>X</td> <td>1</td> </tr> <tr> <td>Cenchrus ciliaris</td> <td>Foxtail buffalo grass</td> <td>Sandy</td> <td></td> <td>X</td> <td>3</td> </tr> <tr> <td>Digitaria eriantha</td> <td>Common finger grass</td> <td>Moist</td> <td></td> <td>X</td> <td>3</td> </tr> <tr> <td>Panicum maximum</td> <td>Guinea grass</td> <td>Moist</td> <td></td> <td>X</td> <td>1</td> </tr> </tbody> </table>		Species	Common name	Soil type	Annual	Perennial	Rate kg/ha	Pioneer						Panicum schinzii	Sweet buffalo grass	Wet		X	1	Sporobolus festivus	Red dropseed	Dry/moist		X	1	Cynodon dactylon	Couch grass	Moist		X	1	Eragrostis curvula	Weeping love grass	Well-drained		X	1	Sub-climax						Stipagrostis uniplumis	Silky Bushmans grass	Sandy/Rocky	X		2	Eragrostis superba	Weeping Love grass	Clay/Sandy/ Loam/rocky	X		2	Eragrostis gummiflua	Gum grass	Well-drained		X	1	Chloris gayana	Rhodes grass	Moist	X		3	Eragrostis capensis	Heart-seed love grass	Moist		X	2	Eragrostis chloromelas	Curly leaf	Sandy/loamy		X	3	Andropogon eucomus	Snowflake grass	Moist		X	2	Climax						Melinis nerviglumis	Bristle-leaved red top	Stony		X	1	Schizachyrium sanguineum	Red autumn grass	Moist		X	1	Cenchrus ciliaris	Foxtail buffalo grass	Sandy		X	3	Digitaria eriantha	Common finger grass	Moist		X	3	Panicum maximum	Guinea grass	Moist		X	1
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Climax																																																																																																																										
Melinis nerviglumis	Bristle-leaved red top	Stony		X	1																																																																																																																					
Schizachyrium sanguineum	Red autumn grass	Moist		X	1																																																																																																																					
Cenchrus ciliaris	Foxtail buffalo grass	Sandy		X	3																																																																																																																					
Digitaria eriantha	Common finger grass	Moist		X	3																																																																																																																					
Panicum maximum	Guinea grass	Moist		X	1																																																																																																																					
Timing of rehabilitation actions.	Seeding operations must coincide with rainfall events or as part of a managed watering schedule.																																																																																																																									
Vegetated cover of rehabilitated areas must correlate with the cover of the surrounding natural vegetation.	A 50% grass cover shall be achieved within 1 month of the onset of the next growing season following hydro seeding and 80% cover within 2 months thereafter. Minimum of 60% mature vegetation cover being achieved during the first growth season. Minimum of 80% mature vegetation cover achieved at the end of the maintenance period.																																																																																																																									

Table 21: Social Aspect

DESCRIPTION		RESPONSIBILITIES
Narrative	The project will affect various I&APs and stakeholders adjacent to the power line and in the surrounding area.	
Objectives	Maximise social benefits and minimise negative social impacts.	
Risks/Impacts	Risks/Impacts:	Mitigation measures
	Animosity of community members affected by the project.	I&APs must be actively engaged and be kept informed regarding construction related progress, requirements and meetings. Ensure effective social and environmental monitoring. The Contractor shall adhere to the following timeframes for dealing with landowner and I&AP concerns, unless otherwise approved by the Engineer: Record the concern within the Communications Register and verbally notify the Social Monitor immediately. Respond to the concern – within 1 day of the concern being raised – this includes consulting with the I&AP. Rectify/mitigate the concern – within 3 days of the concern being raised. Respond in writing to the I&AP on “close out” of the concern – within 5 days of the concern being raised. Submit to the Engineer a detailed report – within 7 days of the concern being raised.
	Cultural conflicts as a result of an influx of diverse population groups.	No accommodation at camp sites will be allowed. During work hours the Contractor should be vigilant of potentially negative interactions between staff and the surrounding communities. Trespassing on land adjacent to the project area is not allowed. Access by people not involved in the project should be controlled.
	Marginalisation of historically disadvantaged individuals (HDI's) due to inequitable employment. Economic impact of project closure.	Procurement policies specified in the tender documents must be adhered to, including (but not limited to): Employment of HDIs. Use of local labour. Use of local services.
	Potential increase in environmental degradation as a result of the influx of employees and potential work seekers.	Basic Environmental Awareness Training to all project employees with six monthly refresher courses. Access to the site by people other than staff or those with project related business must be limited.
	Neglect for worker health and safety, employment conditions. Poor skills development and training.	Safety training must be provided to all staff and visitors. PPE must be provided to all staff and visitors. The Contractor must ensure that the PPE is worn on site at all times. The Contractor must ensure a safe clean working environment, including (but not limited to): Sufficient and clean toilet and ablution facilities. Comfortable eating areas. Safe transport. Liaise with local emergency and health services on emergency response and preparedness procedures. Up to date contact list of all emergency services. Coordinate emergency evacuation procedures with the local emergency services, and conduct regular emergency drills (as per the requirements of the Health and Safety Plan). Refer to Table 24 : Training Programmes
Performance indicators / Targets	The development and implementation of a social management Method Statement by the Contractor should set out to achieve the following:	
	Performance Indicator	Target
	Communication with local community and I&APs.	Communications Register must be kept on site. No reports of concerns not being dealt with promptly. Minutes of meetings held with local community members and other I&APs.
	Representative workforce/equitable procurement.	Procurement policy targets provided by the Engineer must be met.
	Safety of the work environment.	PPE is available and worn by staff and visitors.
	Provision of skills training.	Refer to Table 24 : Training Programmes.
	Exit Strategy.	Proof of training for skills required in the greater area that can be used after construction has ended. Report detailing intentions for materials (for example wood and other building material) or structures no longer required that can be donated to the local community, with the approval of the Engineer.

Table 22: Soil Management

	DESCRIPTION		RESPONSIBILITIES
Narrative	Construction related activities have the ability to displace soil and this will require careful management to ensure viable stockpiles for rehabilitation and minimal loss through spoiling.		
Objectives	Manage the removal and stockpiling of topsoil and subsoil during the construction phase of the project for use during rehabilitation.		Contractor, Engineer, Eskom.
Risks/Impacts	Risk/Impact	Mitigation measures	Contractor, Engineer, Eskom.
	Loss of soil through contamination, wind and water erosion and inadequate stockpile handling.	Refer to Table 11 : Dust Management, Table 13 : Erosion Management, Table 25 : Waste Management and Table 26 : Water Management. All stockpiles shall be stabilised, not be higher than two meters and blend in with the surrounding topography. Stockpiles shall be kept weed free for the duration of the construction related activities.	
	Loss of biological viability of stockpiled topsoil due to poor handling.	Topsoil shall only to be handled during removal and reinstatement. Soil horizons (e.g. topsoil, subsoil, bedrock etc.) to be kept separate during removal, stockpiling and reinstatement. All soils shall be reinstated in the reverse order to that in which they have been removed.	
	Disruption of natural areas and land use practices.	Topsoil removed from riparian, wetland and grassland areas must be removed and stockpiled for rehabilitation in terms of Table 17 : Rehabilitation Plan. Soil horizons (e.g. topsoil, subsoil, bedrock and other layers such as clays etc.) to be kept separate during removal, stockpiling and reinstatement. Topsoil removed from agricultural lands must be collected and stockpiled. All stones and rocks shall be removed from the reinstated topsoil in agricultural areas. All stockpiles will be located within designated areas outside the 1:100 year flood line of rivers and streams and not within 100 meters of delineated wetlands. Topsoil shall be windrowed along the servitude.	
	Prevention of contamination.	Refuelling and other activities with the potential to cause pollution shall not be allowed on or adjacent to a stockpile.	
	Excess material requiring spoiling.	Refer to Table 20 : Rehabilitation Plan and Table 25 : Waste Management. Inventory of topsoil requirements with extra 10% topsoil kept in reserve. Spoil must be used as backfill to rehabilitate areas impacted upon by construction activities. Excess spoil material disposed of at locations as identified by Eskom.	
	Performance indicators / Target	The development and implementation of a soil management Method Statement by the Contractor, which shall integrate Eskom’s Soil Erosion Guideline 41 337 and Vegetation Management TGL 41 334 documents. This should set out to achieve the following:	
	Performance Indicator	Target	Contractor, Engineer, Eskom.
	Topsoil and subsoil handling and management.	Soil horizons (stockpile separately) Stockpiles shall be no higher than 2 m and kept weed free.	
	Prevention of contamination.	Stockpiles free of contamination by oils/fuels and other harmful substances.	
	Reinstatement of land use practices.	Refer to Table 20 : Rehabilitation Plan for targets.	
	Placement of stockpiles within specifically demarcated areas.	No stockpiles within the 1:100 flood line. No stockpile outside of areas indicated in the construction servitude diagrams.	
	Spoil disposal.	No spoil disposed of anywhere other than designated spoil areas or at a registered landfill. Refer to Table 25 : Waste Management for waste targets.	
	Construction programme.	In the event construction occurs during the rainfall season, a soil causeway may be constructed to minimise disruption of the soils in the wetland. This will have to be removed and re-vegetated within one growing season.	

Table 23: Traffic Management

	DESCRIPTION		RESPONSIBILITIES
Narrative	The Kusile – Vulcan Loop traverses Eskom owned property. Limited increase in project vehicle numbers are expected due to construction related requirements.		
Objectives	Minimise the impacts and extent of related traffic on the surrounding road network and environment, whilst maximising road user safety.		Contractor, Eskom. Engineer,
Risks/Impacts	Risks/Impacts	Mitigation measures	Contractor, Eskom. Engineer,
	Degradation of existing road conditions due to the use by construction vehicles.	Roads must be maintained in an acceptable condition for the safe travel of the public and project personnel. Access shall only be for activities essential for the continued safe construction of the power line. Access for the general public along the power line route shall be not be permitted.	
	Degradation of the surrounding environment.	No new roads may be constructed outside of the servitude. All vehicles must stick to designated routes. No soil compaction, erosion and sedimentation to land and water. Minimise disturbances to water resources flora and fauna.	
	Dust generation as a result of vehicle entrainment.	Refer to Table 11 : Dust management.	
	Increase in safety risks due to presence of additional vehicles and equipment on the local road network. Inconvenience and delays caused during road and or lane closures and traffic flow diversions.	The travelling public shall have the right of way on public roads. Full closure of existing roads will not be allowed. Where access to properties via the servitude needs to be closed, alternative access for the duration of the closure shall be provided. The Contractor must notify affected parties 48 hours before closure. Flagmen must be provided at partial road closures and other traffic disruptions to ensure the safety of the public Any accidents or incidents must be recorded and Eskom notified immediately. Investigation into the causes must be done.	
Performance Indicators / Targets	The development and implementation of a training management Method Statement by the Contractor, which shall integrate Eskom’s Access to Farms TPC41-340 document. This should set out to achieve the following:		Contractor to draft and implement. Engineer to approve and supervise. Independent ECO to audit
	Performance Indicator	Target	Contractor, Eskom. Engineer,
	Traffic management.	No accidents or incidents. No complaints from the public.	
	Landowners have access to properties.	Eskom to supply all landowners with access to their properties via the servitude.	
	Road traffic safety.	Road condition is acceptable on all routes. Appropriate signage provided, where applicable.	
	Prevention of environmental degradation.	No new roads outside of the construction servitude. No evidence of disturbance by vehicles outside of the servitude. No environmental degradation due to storm water runoff from access and servitude roads. The width of the access and servitude roads shall be kept to a minimum.	

Table 24: Training Programmes

	DESCRIPTION		RESPONSIBILITIES
Narrative	The project falls within the Nkangala District Municipality, with mining and agriculture being the two largest commercial activities. Opportunities for skills transfer are limited therefore personnel sourced from within the area may thus be unskilled for activities associated with construction requirements of the project. These individuals will require job specific training. All employees will require task specific training in terms of aspects such as the environment, health and safety and materials and equipment handling.		
Objectives	Foster skills transfer, environmental awareness, health and safety awareness and materials and equipment skills.		Contractor, Engineer, Eskom.
Risks/Impacts	Risks/Impacts	Mitigation Measures	Contractor, Engineer, Eskom.
	Risks to quality of workmanship. Private property and the health and safety of workers and the surrounding communities due to lack of skills and training.	All employees must receive general project related work skills training required to enable them to work safely and effectively, including: Health and safety. Emergency drills. Fire fighting. Disaster management. Heritage resource and grave identification. Specific task-related skills training must be SAQA accredited. A system of evaluation of the effectiveness of training must be developed by the Contractor.	
	Risk of environmental degradation due to workers being uninformed about the potential impacts of the project.	Provision of adequate training, including: Basic Environmental Awareness Training. Spill and emergency management.	
Performance Indicators / Targets	The development and implementation of a training management Method Statement by the Contractor, which shall integrate Eskom’s Environmental Policy PTL 41 435 documents. This should set out to achieve the following:		Contractor to draft and implement. Engineer to approve and supervise. Independent ECO to audit
	Performance Indicator	Target	Contractor, Engineer, Eskom.
	Provision of effective training.	Proof of training provided, including training materials that meets the requirements of Eskom. These materials shall set out the training requirements which need to be conducted prior to any works taking place and will include the following: Acceptable behaviour with regard to flora and fauna. Management and minimising of waste, including waste separation. Maintenance of equipment to prevent the accidental discharge or spill of fuel, oil, lubricants, cement, mortar, and other chemicals. Responsible handling of chemicals and spills. Environmental emergency procedures and incident reporting. General code of conduct towards I&APs (e.g. not to use I&AP toilets, water taps, bins, etc.). Proof of attendance of staff at training. Records of training evaluation results. Results must reflect that training has been effective.	

Table 25: Waste Management

	DESCRIPTION		RESPONSIBILITIES
Narrative	Waste management activities associated with the project will be dependent on the hazard rating of the waste. Appropriate measures will be required for disposal for various forms of waste. The following registered landfill sites can service the project: Hendrina Power Station G (General). Kriel Power Station – H:h (Hazardous). Kendal Power Station – G (General). Matla Power Station – G (General).		
Objectives	Implement measures to reduce, monitor and manage waste generation, whilst maximising recycling efficiency.		Contractor, Engineer, Eskom.
Risks/Impacts	Risk/Impact	Mitigation measure	Contractor, Engineer, Eskom.
	Reduced capacity at local landfill sites that need to accept waste generated by the scheme.	Wherever possible, materials should be reused or recycled to reduce amounts of waste that needs to be disposed of at a landfill.	
	Soil and water resource contamination due to incorrect storage of waste and illegal dumping.	General waste must be stored separately from hazardous waste. General waste must be stored in bins or skips or similar containers only. Hazardous waste must be stored in a bunded roofed area. Water from cleaning the bund must be collected and disposed of at an appropriate landfill. General waste that is not reused or recycled can only be disposed of at a registered landfill. Hazardous waste must be disposed of at a hazardous waste facility. Overburden/spoil must be disposed of at a registered landfill or at spoil areas approved by Eskom. Record must be kept of all wastes generated and what proportions are being reused or recycled. Records of waste disposed at landfills or spoil areas must also be recorded. Disposal certificates must be obtained from landfill sites to document waste delivered to the landfill.	
	Nuisances (litter, odours and aesthetics).due to poor housekeeping.	The project foot print must be kept clean and waste removed to the waste storage facility daily. Daily litter patrols must be conducted at the site camp and along the servitude. Scavenger and weather proof bins must be provided.	
Performance Indicators / Targets	The development and implementation of a soil management Method Statement by the Contractor, which shall integrate Eskom’s Waste Management Policy ESKPBAAC4. This should set out to achieve the following:		Contractor to draft and implement. Engineer to approve and supervise. Independent ECO to audit
	Performance Indicator	Target	
	Proper waste disposal.	Proof of waste generated, reused, recycled and disposed of, including disposal certificates, must be kept on site. No contamination of soil, air and water due to appropriate waste management. Disposal of hazardous waste to be conducted by a licensed contractor / professional service provider. Store and handle all hazardous materials and waste in accordance to their respective MSDSs.	
	Waste reduction.	Reduce disposal of recyclable or reusable materials to landfill sites by 90%. Such recyclable and reusable material shall include: steel; aluminium; paper; plastic; and oil. An approved recycling company shall be appointed to manage the respective collection and recycling and or reuse of waste materials.	
	Environmental contamination.	All waste stored in marked containers. Containers of hazardous waste and waste oils must be stored in a bunded, roofed area. No evidence of contamination by waste. All spills to be reported and included within reports to be submitted to Eskom.	
	Good housekeeping.	Bins provided at all points where waste is to be generated. No evidence of litter. Chemical ablution facilities at a ratio of 1:15 shall be placed within 50 m of	

Table 26: Water Management

DESCRIPTION		RESPONSIBILITIES
Narrative	Construction activities associated with the project may impact on aspects of natural surface and groundwater resources, such as drainage, infiltration and ground water quality and flow.	
Objectives	Minimise the impact and maintain integrity of affected water resources.	
Risks/Impacts	Risks/Impacts	Mitigation measures
	Destabilisation of wetland channel and loss of habitat due to alteration of the bed or banks of the watercourse. These actions could result in changes to wetland/river functioning.	Watercourse crossings should be formalised in order to protect the beds and banks of watercourses. Evaluation of wetland soils must be done before construction related activities commence to verify wetness zones and soil profiles in order to reinstate original conditions during rehabilitation. Stabilisation mechanisms and anti-erosion measures required as and where required. Protection of fauna and flora must be done in accordance with Table 14: Fauna and Flora . Rehabilitation must be done in accordance with Table 20: Rehabilitation Plan . During construction, all topsoil and subsoil stockpiles will be stored outside of wetland and riparian zones. A minimum distance of 100 m must separate the stockpiles with the start of the wetland and riparian zone. Construction related activities may require regulatory approvals to be obtained prior to the commencement of works within water resources.
	Pollution or loss of water due to operational or maintenance activities interfacing with ground water (ingress of ground water into trenches, thereby requiring dewatering) and unmanaged runoff of surface water through unstabilised areas.	Water to be released into the surrounding environment must be tested for water quality (in terms of the variables and limits in Table 24: Water Quality Variables) and treated where necessary before release. This includes all water other than river/wetland water, including water from dewatering operations. Water impacted upon by construction related activities may not be released directly into a water course. Water may only be released into the surrounding environment with the approval of Eskom and once it meets the minimum requirements of Table 27: Water Quality Variables . A storm water management plan must be developed to prevent erosion and the contamination of water. Storm water must be directed towards stabilised areas which can dissipate the energy of the water flow. Prevention of water contaminated through storm water attenuation works discharging into any storm water drain, river or stream. No handling of hazardous substances within close proximity to water resources.
	Decreased wetland water quality and increased water quantity used.	Water quality upstream and downstream of where construction related activities are to occur, must be monitored in terms of the variables and frequencies in Table 27: Water Quality Variables , before, during and after construction related works. Water must be reused wherever possible. Water to be reused must be tested for water quality (in terms of the variables and limits in Table 27: Water Quality Variables) and treated where necessary before reuse. All construction related activities must be excluded from wetlands, riparian ecosystems and all sensitive areas. During all works, no activity such as ablution, disturbance of natural habitat, storing of equipment or waste disposal may be permitted within any wetland, riparian. Implementation of anti-erosion and storm water works in areas susceptible to erosion.
	Non-compliance with regulatory requirements	Water license or water use registration (R1199) may be required for watercourse crossings by service roads. Water license or registration may be required for the discharge of the effluent if it is discharged to a water resource. Water use license shall be required for all construction related activities occurring within 500 m of a watercourse.
Performance Indicators / Targets	The development and implementation of a water management Method Statement by the Contractor should set out to achieve the following:	
	Performance Indicator	Target
	Wetland water quality: Variables and frequencies to be monitored as per Table 27: Water Quality Variables .	Less than 10% change between values measured 300 m upstream and within 50m downstream of where construction related activities are to occur.
	Contaminated water monitoring (including all water outputs other than river/wetland water). Variables and frequencies to be monitored as per Table 24: Water Quality Variables .	Values for variables measured must fall below the specific limits indicated in Table 27: Water Quality Variables , before release into the receiving environment.
Water management.	No storm water flowing through site (unless in a dedicated storm water channel). No storm water flowing onto areas of low / poor stabilisation. Control erosion on all construction areas.	

	DESCRIPTION	RESPONSIBILITIES
	<p>Prevent contamination of water resources. Obtain necessary regulatory approvals prior to commencement of works. Introduction of formalised anti-erosion and storm water management works within areas susceptible to erosion. These works shall be properly maintained. Construction related activities are to programme to occur during the dry winter months. No handling of hazardous substances without necessary personal protective and spill containment equipment and procedures in place.</p>	

11.4 WATER QUALITY VARIABLES

Recommended Water Quality Variables to be analysed during construction requirements where these activities impact upon water resources, based on DWA guidelines. Water quality monitoring to occur only when operational and maintenance activities impact directly upon a water resource.

Table 27: Water Quality Variables

Parameters and Variable	DWA Special Limits	Testing Frequency	Test Responsibility
COD (mg/ℓ)	30	Every 2 days when flow is present	Sample on site & laboratory analysis
Suspended Solids (TSS) (mg/ℓ)	10	Every 2 days when flow is present	Sample on site & laboratory analysis
Soaps, Oil And Grease (mg/ℓ)	0	Every 2 days when flow is present	Sample on site & laboratory analysis
Fecal Coliforms (Per 100mℓ)	0	Every 2 days when flow is present	Sample on site & laboratory analysis
Conductivity (mS/m)	50 to 100	Every 2 hours when flow is present	Sample on site using hand held meter
Dissolved Oxygen (% Saturation)	Min 75%	Every 2 hours when flow is present	Sample on site using hand held meter
pH	5,5 – 7,5	Every 2 hours when flow is present	Sample on site using hand held meter
Temperature	25° C max	Every 2 days when flow is present	Sample on site using hand held meter
Turbidity		Every 2 hours when flow is present	Sample on site using hand held meter

Note: In terms of Government R 1199 (Government Gazette 32805 of 2009), the wastewater limit value (Special) indicated above refers to “the mass expressed in terms of the concentration and/or level of a substance, which **may not be exceeded** at any time. Wastewater limit values shall apply at the last point where the discharge of wastewater enters into a water resource, dilution being disregarded when determining compliance with the wastewater limit values. Where discharge of wastewater does not directly enter a water resource, the wastewater limit values shall apply at the last point where the wastewater leaves the premises of collection and treatment”.

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