
ESKOM 132/11KV OLIFANTSHOEK SUBSTATION AND POWER LINE, NORTHERN CAPE PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME

Submitted as part of the
Basic Assessment Report

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PROJECT DETAILS

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DEFINITIONS AND TERMINOLOGY

Alien species: A species that is not indigenous to the area or out of its natural distribution range.

Alternatives: Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.

Ambient sound level: The reading on an integrating impulse sound level meter taken at a measuring point in the absence of any alleged disturbing noise at the end of a total period of at least 10 minutes after such meter was put into operation.

Assessment: The process of collecting, organising, analysing, interpreting and communicating information which is relevant.

Biological diversity: The variables among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes they belong to.

Commence: The start of any physical activity, including site preparation and any other activity on site furtherance of a listed activity or specified activity, but does not include any activity required for the purposes of an investigation or feasibility study as long as such investigation or feasibility study does not constitute a listed activity or specified activity.

Cumulative impacts: Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

Direct impacts: Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.

Disturbing noise: A noise level that exceeds the ambient sound level measured continuously at the same measuring point by 7 dB or more.

Ecosystem: A dynamic system of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

Endangered species: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Endemic: An "endemic" is a species that grows in a particular area (is endemic to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.

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

- i. the land, water and atmosphere of the earth;
- ii. micro-organisms, plant and animal life;
- iii. any part or combination of (i) and (ii) and the interrelationships among and between them; and
- iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental Impact: An action or series of actions that have an effect on the environment.

Environmental impact assessment: Environmental Impact Assessment (EIA), as defined in the NEMA EIA Regulations and in relation to an application to which scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.

Environmental management: Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental Management Programme: A plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its on-going maintenance after implementation.

Environmental assessment practitioner: An individual responsible for the planning, management and coordinating of environmental management plan or any other appropriate environmental instruments introduced by legislation.

Habitat: The place in which a species or ecological community occurs naturally.

Hazardous waste: means any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment and includes hazardous substances, materials or objects within business waste, residue deposits and residue stockpiles

Indigenous Biological Resource:

(a) when used in relation to bioprospecting, means any indigenous biological resource as defined in section 80(2); or

(b) when used in relation to any other matter, means any resource consisting Of-

(i) any living or dead animal, plant or other organism of an indigenous

(ii) any derivative of such animal, plant or other organism; or

(iii) any genetic material of such animal, plant or other organism

Indigenous Species: means a species that occurs, or has historically occurred, naturally in a free state in nature within the borders of the Republic, but excludes a species that has been introduced in the Republic as a result of human activity

Indirect impacts: Indirect or induced changes that may occur as a result of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

Interested and Affected Party: Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups and the general public.

Pollution: means any change in the environment caused by-

(i) substances;

(ii) radioactive or other waves; or

(iii) noise, odours, dust or heat,

emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future;

Rare species: Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. This category was termed Critically Rare by Hall and Veldhuis (1985) to distinguish it from the more generally used word "rare".

Red data species: Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, and/or in terms of the South African Red Data list. In terms of the South African Red Data list, species are classified as being extinct, endangered, vulnerable, rare, indeterminate, insufficiently known or not threatened (see other definitions within this glossary).

Riparian: the area of land adjacent to a stream or river that is influenced by stream-induced or related processes. Riparian areas which are saturated or flooded for prolonged periods would be considered wetlands and could be described as riparian

wetlands. However, some riparian areas are not wetlands (e.g. an area where alluvium is periodically deposited by a stream during floods but which is well drained).

Significant impact: An impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.

Vulnerable species: A taxon is Vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future.

Waste: is defined as (a) any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to this Act; or (b) any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister by notice in the Gazette, but any waste or portion of waste, referred to in paragraphs (a) and (b), ceases to be a waste— (i) once an application for its re-use, recycling or recovery has been approved or, after such approval, once it is, or has been re-used, recycled or recovered; (ii) where approval is not required, once a waste is, or has been re-used, recycled or recovered; (iii) where the Minister has, in terms of section 74, exempted any waste or a portion of waste generated by a particular process from the definition of waste; or (iv) where the Minister has, in the prescribed manner, excluded any waste stream or a portion of a waste stream from the definition of waste.

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 under normal circumstances supports or would support vegetation typically adapted to life in saturated soil (Water Act 36 of 1998); land where an excess of water is the dominant factor determining the nature of the soil development and the types of plants and animals living at the soil surface (Cowardin et al., 1979).

Watercourse: as per the National Water Act means -

- (a) a river or spring;
- (b) a natural channel in which water flows regularly or intermittently;
- (c) a wetland, lake or dam into which, or from which, water flows; and
- (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks

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PROJECT DETAILS

CHAPTER 1

The Northern Cape, and in particular the north east, region as a whole has been earmarked for the development of various mining developments and operations. With an increase of such developments, the region of Olifantshoek has undergone rapid population expansion, and as a result there is greater pressure being placed on existing electrification networks and services to meet the current capacity demands of the region. Eskom Holdings SOC Limited (Eskom) is therefore proposing to establish a new 10MVA 132/11kV substation (Olifantshoek Substation) and 31km 132 kV power line between the existing Emil Substation and the new Olifantshoek Substation.

The proposed project will consist of the following activities and associated infrastructure:

- » The new 10MVA Olifantshoek 132/11kV substation (approximately 100m x 100m in extent) and ancillaries (including a metering station, control building, admin building, workshop and associated infrastructure).
- » The construction of a new 132kV single circuit overhead power line (31km long within a 32m wide servitude) from the new Olifantshoek Substation to the Emil Switching Station, and ancillaries (including access tracks/roads, laydown areas, operational and maintenance facilities).
- » Decommissioning of the existing 22/11kV 2.5MVA Olifantshoek Substation including all site rehabilitation and preservation

1.1. Project Alternatives

Two alternative substation sites and two alternative power line corridors are being considered within this Basic Assessment Report (Appendix A1). The majority of the length of the power line will run parallel to the existing Ferrum/Nieuwehoop 400kV and Ferrum/Lewensaar 275kV lines (refer to Figure 1). A corridor of 300m in width was assessed for the siting of the power line route. Within this corridor, a servitude of 32m will be negotiated with the affected landowners. Access roads (of up to 4m in width) will be constructed along the servitude, where required. Existing roads will be used as far as possible. The power line is proposed to be constructed, owned and operated by Eskom.

1.2. Site Location

The site for the proposed preferred and alternative Olifantshoek substation and ancillary infrastructure is located within the urban edge of the Town Olifantshoek situated approximately 35 km north east of Kathu (refer to **Figure 1**) and falls within the Gamagara Local Municipality. The power line route will be approximately 31km in length and will extend from the new Olifantshoek substation, turning-in at the Emil switching station just west of Kathu. The substation site at Olifantshoek can be accessed via the N14 in the town of Olifantshoek.

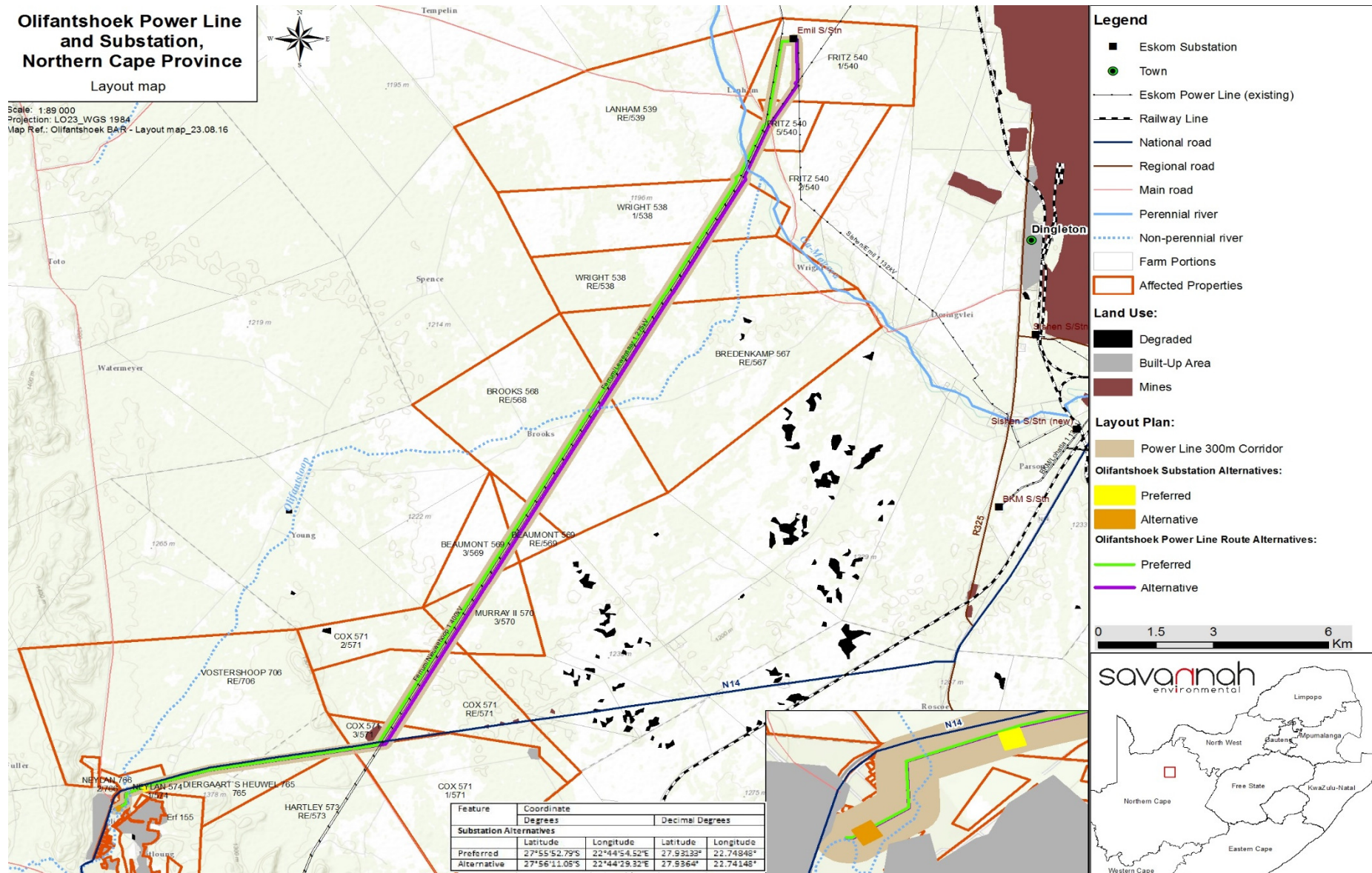


Figure 1.1: Locality map showing the location of the preferred substation and power line corridor to Emil switching Station

Table 1.1: Location of the study area

Province	Northern Cape Province	
District Municipality	John Taolo Gaetsewe	
Local Municipality	Gamagara Local Municipality	
Ward number(s)	Ward 3, Ward 4 and Ward 5	
Nearest town(s)	Olifantshoek	
	New substation is ~ 35km North-east of Kathu	
Farm Name/Portion	FARM NAME	PORTION NUMBER
	Frits 540	1/540
	Frits 540	2/540
	Frits 540	5/540
	Lanham 539	RE/539
	Wright 538	1/538
	Wright 538	RE/538
	Bredenkamp 567	RE/567
	Brooks 568	RE/568
	Beaumont 569	RE/569
	Beaumont 569	3/569
	Murray II 570	3/570
	Cox 571	2/571
	Cox 571	RE/571
	Vostershoop 706	RE/706
	Diergaard's Heuwel 765	765
	Hartley 573	RE/573
	Neylan 574	1/574
	Neylan 766	2/766
	Cox 571	1/571
	Cox 571	3/571
	Erf 155	
	Neylan 766	4/766
	FARM NAME	21 DIGIT SG CODE
	Frits 540	C04100000000054000001
	Frits 540	C04100000000054000002
	Frits 540	C04100000000054000005
	Lanham 539	C04100000000053900000
	Wright 538	C04100000000053800001
	Wright 538	C04100000000053800000
	Bredenkamp 567	C04100000000056700000
	Brooks 568	C04100000000056800000
	Beaumont 569	C04100000000056900000
	Beaumont 569	C04100000000056900003
	Murray II 570	C04100000000057000003
	Cox 571	C04100000000057100002
	Cox 571	C04100000000057100000
	Vostershoop 706	C04100000000070600000
	Diergaard's Heuwel 765	C04100000000076500000
	Hartley 573	C04100000000057300000
	Neylan 574	C04100000000057400001

	Neylan 574	C0410000000076600002
	Cox 571	C04100000000057100001
	Cox 571	C04100000000057100003
	Erf 155	C04100040000015500000
	Neylan 766	C04100000000076600004

The EMPr has been developed on the basis of the findings of the Basic Assessment Report, and must be implemented to protect sensitive on-site and off-site features through controlling preconstruction, construction, operation and decommissioning activities that could have a detrimental effect on the environment, and through avoiding or minimising potential impacts. This EMPr is applicable to all Eskom Holdings SOC Ltd employees and contractors working on the pre-construction, construction, and operation and maintenance phases of the proposed powerline and substation as well as decommissioning of the existing substation. The document will be adhered to and updated as relevant throughout the project life cycle

1.1. Potential impacts

Based on the findings of this Basic Assessment, the following conclusions can be made:

Ecology:

Overall and with the suggested mitigation measures applied, the impact of the proposed Olifantshoek 132 kV power line and substation would be of local extent and low significance. There are no impacts associated with the development of the power line and substation that are considered to be of high significance and which cannot be mitigated to a low level. The project is thus acceptable from an ecological perspective.

Visual:

On visual grounds, the Alternative Alignment for the 132kV power line is favoured due to the fact that it will assist to minimise impacts on rural homesteads. As the Preferred Alignment for the power line is likely to impact on local homesteads it is not favoured. If selected, it is suggested that more detailed alignment planning may be required in order to maximise distances between inhabited buildings and the power line. Additional consultation with landowners and inhabitants should also be undertaken to ensure that they are fully aware of the proposed location of structures relative to the buildings.

When considering the substation locations, the Preferred Location stands out as providing the largest potential to provide positive cumulative impacts for the urban area. The Alternative Location would be acceptable subject to adequate mitigation in the form of screen planting providing a buffer between the infrastructure and residents.

If the preferred power line avoids possible visual impacts on rural homesteads, and the correct consultation process is followed, project will be unlikely to have any negative and highly significant visual impact and thus can be considered acceptable from a visual perspective.

Avifaunal:

Both the power line corridor alternatives traverse the same habitat types and subsequently will likely have the same impacts on the avifaunal character of the area (low impact). Thus the preferred power line alternative can be selected as the preferred alternative. The preferred substation site is also deemed, from an avifaunal perspective as the preferred option as this will exclude any impacts within the *Acacia karroo* thicket as well as shorten the potential power line that may interfere with the movement of the water fowl and waders between the sewage works and the gravel dam.

Therefore, the proposed development is unlikely to have any long-term significant impacts on avifaunal species within the study area.

Hydrological:

Overall the development will have no significant impacts on the habitat types within the region. Furthermore the two power line corridor alternatives will have similar impacts on the environment, including the watercourses that will be crossed and the depression wetlands. As such the "preferred option" can be regarded as the final location of the power line. From the Surface Water & Hydrological Study no objections or motives for the project not to be allowed could be determined, and thus the development may occur within the proposed development boundaries.

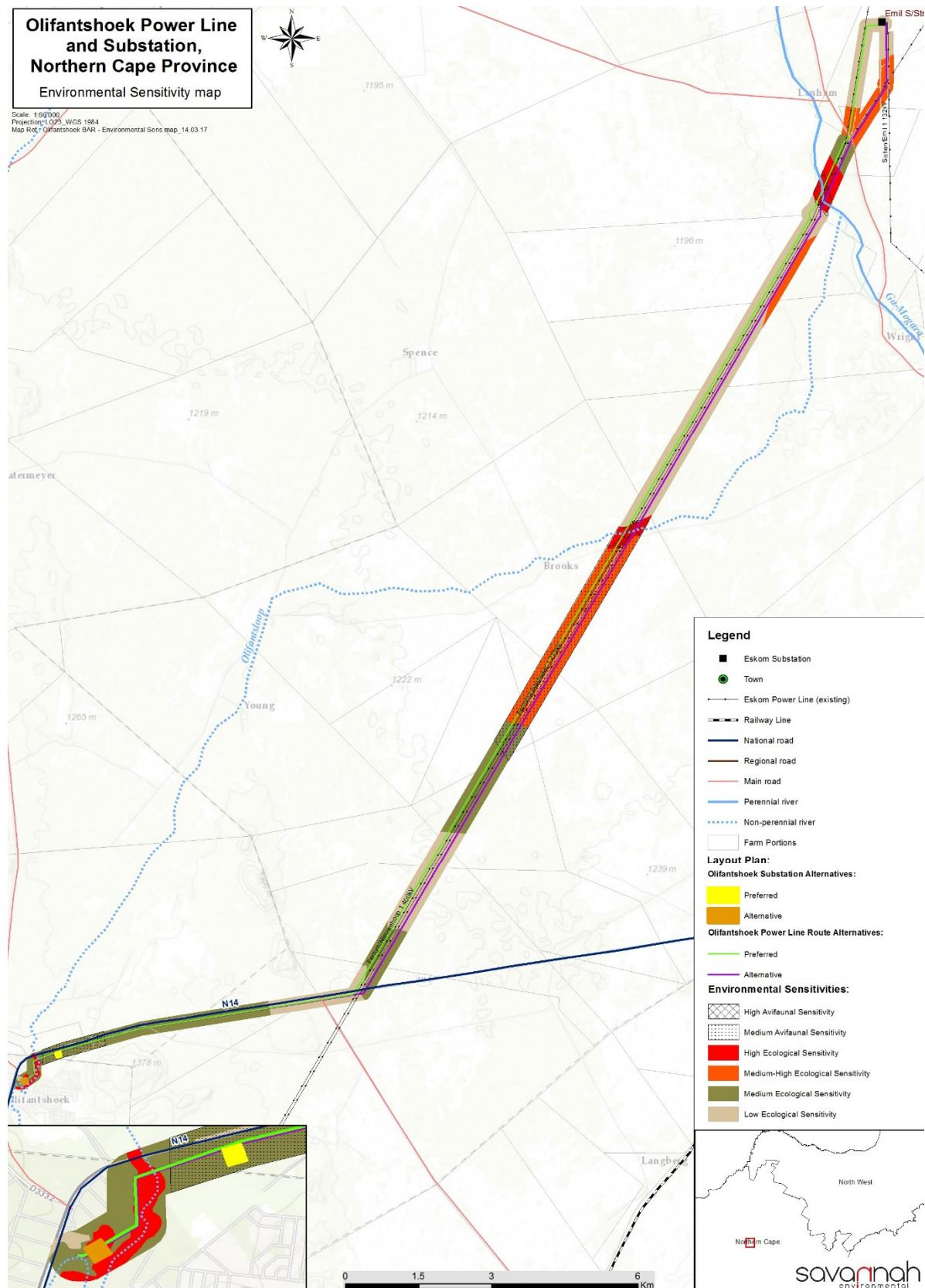


Figure 1.2: Environmental Sensitivity map for the proposed power line between the new Olifantshoek substation and the Existing Emil Switching Station

1.2. Activities and Components associated with the Development

1.2.1. Construction of the 132kV Single Circuit Overhead Power Line

Following completion of the Basic Assessment process, a final servitude of 32m will be negotiated with affected landowners within the nominated preferred corridor, taking cognisance of any identified environmental sensitivities. The activities associated with the construction of the power line will include site clearance and construction of access roads to facilitate access to the site (where existing access roads associated with the existing Eskom power line do not already exist). Power lines are constructed in the following simplified sequence:

Step 1: Survey of the route

Step 2: Determination of the conductor type

Step 3: Selection of best-suited conductor, towers, insulators, foundations

Step 4: Final design of line and placement of towers

Step 5: Issuing of tenders, and award of contract to construction companies

Step 6: Vegetation clearance and construction of access roads (where required)

Step 7: Stay pegging

Step 8: Assembly and erection of towers

Step 9: Stringing of conductors

Step 10: Rehabilitation of disturbed area and protection of erosion sensitive areas

Step 11: Testing and commissioning

The duration of the construction period will however depend on the season and climatic conditions on site, e.g. strong winds might affect stringing of conductors which could result in delays. The table below provides an overview of the technical details of the power line components to be constructed:

1.2. Construction of the Olifantshoek Substation

The substation (approximately 100m x 100m in extent) is to be constructed in the following simplified sequence:

Step 1: Conduct geotechnical investigations to determine founding conditions;

Step 2: Conduct site survey;

Step 3: Vegetation clearance and construction of access road;

Step 4: Site grading and levelling;

Step 5: Construction of foundations;

Step 6: Import of switching station components;

Step 7: Construction of substation;

Step 8: Rehabilitation of disturbed area and protection of erosion sensitive areas; and

Step 9: Testing and commissioning

The footprint of the substation may include a metering station, control building, admin building, workshop and associated infrastructure. The construction of ancillary infrastructure will follow a similar sequence as that of the substation described above.

The table below provides an overview of the technical details of the substation components to be constructed.

1.3.3. Operation and Maintenance of the Substation and Power line

The power line and substation will be operational for more than 20 years and will require routine maintenance work throughout this period. The power line servitude and substation site will be accessed using the access roads established during the construction phase. Access roads for the 400kV line (currently under construction) and those for the existing 220kV power line will be utilised as far as possible. During the operation and maintenance phase, vegetation within the power line servitude (32m), and around the substation will require management only if it impacts on the safety and operational objectives of the project. Operation and maintenance of the power line and substation will be undertaken by Eskom.

1.3.4. Decommissioning of the Existing Olifantshoek Substation, and future decommissioning of the proposed new substation and power line

The existing Olifantshoek substation (refer to Figure 3) has reached the end of its economic life, and therefore must be decommissioned. Currently, this substation only supplies 2MVA power to the surrounding community, which is no longer sufficient. The substation will be decommissioned only once the new substation and power line have been constructed. The following decommissioning activities are expected to be undertaken:

a) Site Preparation

Site preparation activities will include confirming the integrity of the access to the site to accommodate the required equipment and the mobilisation of decommissioning equipment.

b) Disassemble Components

The components would be disassembled, and reused and recycled (where possible), or disposed of in accordance with regulatory requirements.

c) Rehabilitation

Following decommissioning and removal of all project material from the site, the disturbed areas will be rehabilitated to pre-project land capability. Where possible, rehabilitation will be conducted concurrently with decommissioning. The following rehabilitation activities are relevant:

- » The existing profiles of the land affected will be improved and stabilised thereby leaving profiles compatible with the topography of the area, which is essentially flat.
- » Ripping of compacted soils will be done prior to adding topsoil, which will be done by mechanical means. It is expected that there will be a sufficient amount of topsoil and/or subsoil moved and stockpiled during the construction phase to facilitate rehabilitation. If required, areas or land for extracting topsoil

- or subsoil will be identified. The land capability characteristics of such areas should be similar to the affected soils (same texture, colour, permeability, etc.).
- » Vegetation will be re-established. The plant species to be used will match those naturally occurring in the area. This will be conducted in consultation with a biodiversity specialist.

It is expected that the same decommissioning sequences will be undertaken as-and-when the new substation and power line are no longer economically serviceable or required.

PURPOSE AND OBJECTIVES OF THE EMPr

CHAPTER 2

An EMPr is a set of guidelines and actions aimed at ensuring that construction and/or installation activities, and subsequent management of facilities, are undertaken in a manner that minimises environmental risks and impacts. An effective EMPr is concerned with both the immediate outcome as well as the long-term impacts of the project. The objective of this EMPr is to provide consistent information and guidance for implementing the management and monitoring measures established in the permitting process and help achieve environmental policy goals. The purpose of an EMPr is to ensure continuous improvement of environmental performance, reducing negative impacts and enhancing positive effects during the construction and operational phases of a project.

The EMPr provides specific environmental guidance for the construction, operational and decommissioning phases of a project, and is intended to manage and mitigate construction and operational activities so that unnecessary or preventable environmental impacts do not result. These impacts range from those incurred during start up (i.e. site clearing and site establishment), during the construction activities themselves (i.e. erosion, noise, dust, and visual impacts), during site rehabilitation (i.e. soil stabilisation, re-vegetation), during operation and during decommissioning (i.e. similar to construction phase activities).

This EMPr has been compiled in accordance with Appendix 4, Section 1 of the EIA Regulations of April 2017 (refer to Table 3.1) and will be further developed in terms of specific requirements listed in any authorisations or permit issued for the proposed project. The EMPr has been developed as a set of environmental specifications which are appropriately contextualised to provide clear guidance in terms of the on-site implementation of these specifications (i.e. on-site contextualisation is provided through the inclusion of expected impacts of activities and various monitoring and implementation tools for the management measures).

This EMPr has the following objectives:

- » Outline impact management objectives and environmental specifications which are required to be implemented for the planning, construction and rehabilitation, operation, and decommissioning phases of the Project in order to manage and minimise the extent of potential environmental impacts associated with the Project.
- » Ensure that all the phases of the project do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential positive environmental benefits are enhanced.
- » Identify entities responsible for the implementation of the measures and outline functions and responsibilities.
- » Propose mechanisms and frequency for monitoring compliance, and preventing long-term or permanent environmental degradation.
- » Facilitate appropriate and proactive responses to unforeseen events or changes in project implementation that was not considered in the BA process.

The management and mitigation measures identified within the BA process are systematically addressed in this EMPr, and ensure the minimisation of identified adverse environmental impacts to an acceptable level. This EMPr has been prepared as part of the environmental authorisation process for the proposed grid connection infrastructure.

This EMPr shall be binding on all the relevant parties and as contained in this EMPr, involved in the construction, operational and decommissioning phases of the project, and shall be enforceable at all levels of contract and operational management within the project.

The EMPr is a dynamic document, which must be updated to include any additional specifications as and when required. It is considered critical that this draft EMPr be updated to include site-specific information and specifications following the final walk-through survey by specialists of the proposed project as a whole. This will ensure that the construction and operation activities are planned and implemented considering sensitive environmental features. Any amendments must be approved by the Competent Authority (i.e. DEA) prior to implementation, unless these are required to address an emergency situation.

Eskom must ensure that the implementation of the project complies with the requirements of all environmental authorisations, permits, and obligations emanating from relevant environmental legislation. This obligation is partly met through the development and the implementation of this EMPr and through its integration into the contract documentation. Since this EMP is part of the BA process, it is important that this document be read in conjunction with the Basic Assessment Report compiled for this project. This will contextualise the EMPr and enable a thorough understanding of its role and purpose in the integrated environmental management process. Should there be a conflict of interpretation between this EMPr and the environmental authorisation, the stipulations in the environmental authorisation shall prevail over that of the EMPr, unless otherwise agreed by the authorities in writing. Similarly, any provisions in legislation overrule any provisions or interpretations within this EMPr.

STRUCTURE OF THIS EMPR

CHAPTER 3

The first two chapters provide background to the EMPr and the proposed project, while the chapters which follow consider the following:

- » Pre-construction, planning and design activities;
- » Construction activities;
- » Rehabilitation activities;
- » Operation activities; and
- » Decommissioning activities.

These chapters set out the procedures necessary for the construction, operation and decommissioning of the proposed power line and substation in order to minimise environmental impacts and achieve environmental compliance. For each of the phases of implementation, an over-arching environmental **goal** is stated. In order to meet this goal, a number of **objectives** are listed. The EMPr has been structured in a table format in order to show the links between the goals for each phase and their associated impact management objectives, activities/risk sources, mitigation actions and management statements, monitoring requirements and performance indicators. A specific EMPr table has been established for each environmental impact management objective. The information provided within the EMPr table for each objective is outlined below.

a). OBJECTIVE: Description of the objective, which is necessary to meet the overall goals; which take into account the findings of the BA specialist studies

Project Component/s	» List of project components affecting the objective.
Potential Impact	» Description of the potential environmental impact if objective is not met.
Activity/Risk Source	» Description of activities which could affect achieving the objective.
Mitigation: Target/Objective	» Description of the target and/or desired outcomes of mitigation.

Mitigation: Action/Control	Responsibility	Timeframe
Lists specific action(s) required to meet the mitigation target/objective described above.	Who is responsible for the measures?	Periods for implementation.

Performance Indicator	Description of key indicator(s) that track progress/indicate the effectiveness of the EMPr.
Monitoring	Mechanisms for monitoring compliance; the key monitoring actions required to check whether the objectives are being

achieved, taking into consideration responsibility, frequency, methods, and reporting.

The objectives and EMPr tables are required to be reviewed and possibly modified whenever changes, such as the following, occur:

- » Planned activities change;
- » Modification to or addition to environmental objectives and targets;
- » Relevant legal or other requirements are changed or introduced; or
- » Significant progress has been made in achieving an objective or target such that it should be re-examined to determine if it is still relevant, should be modified, etc.

3.1. Project Team

This EMPr was compiled by and had input from:

Inputs	Name	Company
EMPr Compilers:	Ashleigh Blackwell Jo-Anne Thomas	Savannah Environmental
Ecological impact assessment	Simon Todd	Simon Todd Consulting
Avifaunal impact assessment and Hydrological impact assessment	Gerhard Botha	Eco-Care Consultancy
Heritage impact assessment	Jon Marshall	Afzelia Consulting
Visual impact assessment	Jenna Lavin	Cedar Towers Heritage Consulting

The Savannah Environmental team has extensive knowledge and experience in EIAs and environmental management, having been involved in BA processes & EIAs over the past 10 years. The team has managed and drafted EMPrs for other large infrastructure and power distribution projects throughout South Africa.

3.2. Details of the EAP

Environmental Assessment Practitioners (EAPs) and Public Participation consultants from Savannah Environmental who are responsible for this project are:

- » *Ashleigh Blackwell* -Responsible for the compilation of this EMPr. She holds a B.Sc Honours in Conservation Ecology. She has 1 year and 3 months experience in an environmental consulting role. Her core competencies lie in Environmental Impact Assessments, Public Participation, environmental management plans and programmes for various projects. She is currently enrolled for 2017 to complete a part-time LLB Law Degree through the University of South Africa.
- » *Jo-Anne Thomas* - Is the principle EAP for the project. Registered with the South African Council for Natural Science Professions (SACNSP) as an Environmental Scientist, holds a Masters of Sciences degree in Botany and has over 19 years' experience in the environmental management field. Responsible for the

management of environmental compliance monitoring on various projects over the past 10 years. Currently responsible for the management of various EIA processes across the country

- » *Gabriele Wood* - Holds an Honours Degree in Anthropology, with 6 years consulting experience in public participation and social research. Her experience includes the design and implementation of public participation programmes and stakeholder management strategies for numerous integrated development planning and infrastructure projects. Her work focuses on managing the public participation component of Environmental Impact Assessments and Basic Assessments undertaken by Savannah Environmental.

Curricula vitae for the Savannah Environmental project team **and specialist consultants** are included in **Appendix H of the Basic Assessment Report**.

MANAGEMENT PROGRAMME: PRE- CONSTRUCTION

CHAPTER 4

Overall Goal: Undertake the pre-construction (planning and design) activities in a way that:

- » Ensures that the design responds to the identified environmental constraints and opportunities.
- » Ensures that pre-construction activities are undertaken in accordance with all relevant legislative requirements
- » Ensures that adequate regard has been taken of any landowner and community concerns and that these are appropriately addressed through design and planning (where appropriate).
- » Ensures that the best environmental options are selected for the linear components, including the access roads and power line alignments.
- » Enables the construction activities to be undertaken without significant disruption to other land uses and activities in the area.

In order to meet this goal, the following objectives have been identified, together with necessary actions and monitoring requirements.

4.1. Objectives

OBJECTIVE 1: Ensure the design responds to identified environmental constraints and opportunities

The major impact associated with the construction of the power line and the substation is likely to result from vegetation clearing. This includes habitat loss and disturbance for endemic fauna and flora. Vegetation clearing is necessary and is required beneath the power line in order to comply with fire risk and safety requirements. As the amount of vegetation clearing is likely to be less where the line is constructed adjacent to the existing line, this option is likely to generate an overall lower impact than the alternative alignments where there is currently no power line. In terms of the vegetation clearing, this has several potential impacts; protected species, some of which are relatively common along the power line routes such as *Acacia Erioloba* will be impacted, while the vegetation clearing itself will impact the habitat for fauna.

A sensitivity map has been prepared from the findings of the Basic Assessment studies undertaken (refer to **Figure 1.2 above**). The study area is considered to have a low to low - moderate sensitivity based on the extent of the area to be used for the power line. Some areas of high sensitivity have been identified due to the occurrence of sensitive vegetation.

As per the recommendations in the BAR, The preferred substation (yellow substation) and the Preferred Powerline alignment (Green powerline) are to be implemented

Project Component/s	<ul style="list-style-type: none"> » Power line » Substation and Ancillaries » Access roads, where required
Potential Impact	<ul style="list-style-type: none"> » Soil erosion » Impacts on flora and fauna » Loss of protected plant species » Impacts on sensitive habitats
Activities/Risk Sources	<ul style="list-style-type: none"> » Positioning of power line towers, substation site and new access roads » Construction not being confined as far as possible to area of impact
Mitigation: Target/Objective	<ul style="list-style-type: none"> » The design responds to the identified environmental constraints and opportunities

Mitigation: Action/Control	Responsibility	Timeframe
Plan and conduct pre-construction activities in an environmentally acceptable manner	Eskom	Pre-construction
Implement preferred alternatives as recommended in the Basic Assessment	Eskom	Design
Avoid the alternative substation option as this option will impact on the riparian habitat fringing the upper reaches (within the town boundary) of the Olifantsloop River	Eskom	Design
Align the 132kV overhead power line as far from homesteads and the N14 as possible.	Eskom	Planning
Plan to use motion sensor triggered lighting at the substation.	Eskom	Planning
Obtain any additional environmental permits required (such as a water use license, biodiversity permits, etc.).	Eskom	Project planning
A rehabilitation plan that specifies the rehabilitation process should be compiled	Eskom	Pre-construction
Undertake negotiations with affected landowners and agree on landowner-specific conditions for construction and maintenance	Eskom	Project planning
Undertake specialist walk-overs of the final power line route – ecology, heritage and avifauna	Specialists	Pre-construction
Undertake a detailed geotechnical survey of the proposed tower positions and substation site in order to fully understand the soils in terms of founding conditions and erosion potential.	Eskom	Design
Plan to use existing roads as far as possible. Any new access roads must be carefully planned to minimise the impacted area and prevent unnecessary excavation, placement, and compaction of soil. These roads must follow the same alignment as the power line itself and must be micro-sited within the assessed 300m corridor to avoid any sensitive areas .	Eskom	Planning/ Design Phase
Bird-friendly power line tower and conductor designs must be used. The tower designs used should be those which are poorly suited to serve as nesting substrates by most bird	Eskom	Design phase

Mitigation: Action/Control	Responsibility	Timeframe
species and with perching areas situated in areas either off-set or well away from the conductors.		
All relevant perching surfaces should be fitted with bird guards and perch guards as deterrents to avoid perching on live electrical structures at the substation. The installation of artificial bird space perches and nesting platforms, at a safe distance from energised components.	Eskom	Design phase
Plan to install anti-collision devices such as bird flappers onto the power line where this crosses avifaunal sensitive areas (refer to Figure 1.2).	Eskom	Design phase
Compile an appropriate storm water management plan.	Contractor	Pre-construction
Ensure that, as far as possible, riparian areas are spanned/ pole structures are not placed within proximity to rivers, streams. Ensure placement of footprints outside 1:100 year floodlines.	Eskom	Design phase
Ensure that Heritage resources (if any) are preserved in situ as far as possible through micro adjustments of the tower positions.	Eskom in consultation with Specialist	Pre-construction
Placement of towers should avoid potential sites of high sensitivity such as pans, rocky ridges, and building structures.	Eskom in consultation with Specialist	Pre-construction
The terms of this EMPr and the Environmental Authorisation (once issued) must be included in all tender documentation and Contractors contracts	Eskom	Tender process

Performance Indicator	<ul style="list-style-type: none"> » The design meets the objectives and does not degrade the environment. » Design and layouts respond to the mitigation measures and recommendations in the BA Report.
Monitoring	<ul style="list-style-type: none"> » Review of the design by the Eskom and the project manager prior to the commencement of construction. » Review of the alignment of the servitude by the Environmental Control Officer (ECO) prior to the commencement of construction.

OBJECTIVE 2: To ensure effective communication mechanisms

On-going communication with affected and surrounding landowners is important to maintain during the construction and operational phases of the power lines. Any issues and concerns raised should be addressed as far as possible in as short a timeframe as possible.

Project component/s	<ul style="list-style-type: none"> » Power line » Substation and Ancillaries » Access roads, where required
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Potential Impact	» Impacts on affected and surrounding landowners and land uses
Activity/risk source	<ul style="list-style-type: none"> » Activities associated with power line construction and operation » Activities associated with the construction and operation of the substation » Activities associated with the decommissioning of the existing substation
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Effective communication with affected and surrounding landowners » Addressing of any issues and concerns raised as far as possible in as short a timeframe as possible

Mitigation: Action/control	Responsibility	Timeframe
The Eskom approved grievance mechanism procedure for the public must be followed and implemented during both the construction and operational phases of the project.	Eskom	Pre-construction (construction procedure) Pre-operation (operation procedure)
Develop and implement a grievance mechanism for the construction, operational and closure phases of the project for all employees, contractors, subcontractors and site personnel. This procedure should be in line with the South African Labour Law.	Eskom	Pre-construction (construction procedure) Pre-operation (operation procedure)
Liaison with landowners is to be undertaken prior to the commencement of construction in order to provide sufficient time for them to plan agricultural activities.	Eskom	Pre-construction

Performance Indicator	» Effective communication procedures in place.
Monitoring	» An incident reporting system should be used to record non-conformances to the EMP.

MANAGEMENT PROGRAMME: CONSTRUCTION

CHAPTER 5

Overall Goal: Undertake the construction phase in a way that:

- » Ensures that construction activities are appropriately managed in respect of environmental aspects and impacts.
- » Enables construction activities to be undertaken without significant disruption to other land uses and activities in the area, in particular concerning noise impacts, farming practices, traffic and road use, and effects on local residents.
- » Minimises the impact on the indigenous natural vegetation, and habitats of ecological value.
- » Minimises impacts on fauna (including birds) in the study area.
- » Minimises the impact on heritage sites should they be uncovered.
- » Establishes an environmental baseline during construction activities on the site, where possible.

5.1. Institutional Arrangements: Roles and Responsibilities for the Construction Phase

As the proponent, Eskom must ensure that the project complies with the requirements of all environmental authorisations and permits, and obligations emanating from other relevant environmental legislation. This obligation is partly met through the development of the EMPr, and the implementation of the EMPr through its integration into the contract documentation. Eskom will retain various key roles and responsibilities during the construction phase.

OBJECTIVE 1: Establish clear reporting, communication, and responsibilities in relation to overall implementation of the EMP

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Project Manager; Site Manager; the Environmental Officer (EO), Environmental Control Officer (ECO) and Contractor for the construction phase of this project are as detailed below. Roles and responsibilities should be confirmed and updated throughout the construction phase in order to ensure effective environmental management and communication between parties.

Project Manager/Coordinator is responsible for overall management of project and EMPr implementation. The following tasks will fall within his/her responsibilities:

- » Ensure all specifications and legal constraints specifically with regards to the environment are highlighted to the Contractor(s) so that they are aware of these.
- » Ensure that Eskom and its Contractor(s) are made aware of all stipulations within the EMPr.
- » Commission internal audits of the construction phase against the EMPr.
- » Ensure that the EMPr is correctly implemented throughout the project by means of site inspections and meetings. This will be documented as part of the site meeting minutes.
- » Confine the construction site to the demarcated areas.
- » Be fully conversant with the BA for the project, the EMPr, the conditions of the Environmental Authorisation (once issued), and all relevant environmental legislation.
- » Ensure that transgressions are rectified through the implementation of corrective action contained in this EMPr.

Site Manager (Eskom's on-site Representative) will:

- » Be fully knowledgeable with the contents of the BA and risk management.
- » Be fully knowledgeable with the contents and conditions of the Environmental Authorisation (once issued).
- » Monitor site activities on a daily basis for compliance
- » Be fully knowledgeable with the contents of the EMPr.
- » Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with these.
- » Have overall responsibility of the EMPr and its implementation.
- » Conduct audits to ensure compliance to the EMPr.
- » Ensure there is communication with the Project Manager, the ECO, and relevant discipline engineers on matters concerning the environment.
- » Ensure that no actions are taken which will harm or may indirectly cause harm to the environment, and take steps to prevent pollution on the site.
- » Confine activities to the demarcated construction site.

An independent **Environmental Control Officer (ECO)** must be appointed by Eskom prior to the commencement of any authorised activities and will be responsible for monitoring, reviewing and verifying compliance by the Contractor with the environmental specifications of the EMPr and the conditions of the Environmental Authorisation. Accordingly, the ECO will:

- » Be fully knowledgeable with the contents with the BA.
- » Be fully knowledgeable with the contents with the conditions of the Environmental Authorisation (EA) (once issued).
- » Be fully knowledgeable with the contents with the EMPr.
- » Be fully knowledgeable of all the licences and permits issued to the site.

- » Be fully knowledgeable with the contents with all relevant environmental legislation, and ensure compliance with them.
- » Ensure that the contents of this document are communicated to the Contractor site staff and that the Site Manager and Contractor are constantly made aware of the contents through discussion.
- » Ensure that the compliance of the EMPr, EA and the legislation is monitored through regular and comprehensive inspection of the site and surrounding areas.
- » Ensure that if the EMPr, EA and/or the legislation conditions, regulations or specifications are not followed then appropriate measures are undertaken to address any non-compliances (for example an ECO may cease construction or an activity to prevent a non-compliance from continuing).
- » Monitoring and verification must be implemented to ensure that environmental impacts are kept to a minimum, as far as possible.
- » Ensure that the Site Manager has input into the review and acceptance of construction methods and method statements.
- » Ensure that activities on site comply with all relevant environmental legislation.
- » Ensure that a removal is ordered of any person(s) and/or equipment responsible for any contravention of the specifications of the EMPr.
- » Keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.
- » Ensure that the compilation of progress reports for submission to the Project Manager, with input from the Site Manager, takes place on a regular basis, including a final post-construction audit.
- » Ensure that there is communication with the Site Manager regarding the monitoring of the site.
- » Ensure that any non-compliance or remedial measures that need to be applied are reported.
- » Keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.
- » Submit independent reports to the DEA and other regulating authorities regarding compliance with the requirements of the EMPr, EA and other environmental permits. This can be done upon request from the Competent Authority.

Contractors and Service Providers are responsible for the overall execution of the activities envisioned in the construction phase including the implementation and compliance with recommendations and conditions of the EMPr as well as the EA (once issued). It is important that contractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMP. The contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The contractor's obligations in this regard include the following:

- » Ensure implementation and compliance with the EMPr at all times during construction activities and maintain, inter alia, an environmental register which

keeps a record of all environmental incidents which occurs on the site during the construction of the Project.

- » Ensure that the compliance of the EMPr, EA and the legislation is monitored through regular and comprehensive inspection of the site and surrounding areas.
- » Ensure that if the EMPr, EA and/or the legislation conditions, regulations or specifications are not followed then appropriate measures are undertaken to address any non-compliances (for example an ECO may cease construction or an activity to prevent a non-compliance from continuing, if reasonable).
- » Implementation of corrective actions recommended by the EO/ Environmental Representative, for non-conformances recorded by the ECO, and Project Coordinator within a reasonable period.

The **Contractor's EO/ Environmental Representative** should:

- » Be well versed in environmental matters.
- » Understand the relevant environmental legislation and processes.
- » Understand the hierarchy of Environmental Compliance Reporting, and the implications of Non-Compliance.
- » Know the background of the project and understand the implementation programme.
- » Be able to resolve conflicts and make recommendations on site in terms of the requirements of this Specification.
- » Keep accurate and detailed records of all EMPr-related activities on site.

5.2. Objectives

In order to meet the overall goal for construction, the following objectives, actions, and monitoring requirements have been identified.

OBJECTIVE 2: Minimise impacts related to site establishment

Project Component/s	<ul style="list-style-type: none"> » Power line » Substation and ancillaries » Access roads and internal tracks
Potential Impact	<ul style="list-style-type: none"> » Hazards to landowners and public. » Damage to indigenous natural vegetation. » Loss of threatened plant species.
Activities/Risk Sources	<ul style="list-style-type: none"> » Excavations. » Movement of construction vehicles in the area and on-site.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To secure the site against unauthorised entry. » To protect members of the public/landowners/residents. » No loss of or damage to sensitive vegetation in areas outside the immediate development footprint.

Mitigation: Action/Control	Responsibility	Timeframe
Secure site, working areas and excavations in an appropriate manner, as agreed with the Site Manager and EO.	Contractor	Site establishment, and duration of construction
Where necessary control access, fence, and secure area.	Contractor	Site establishment, and duration of construction
The siting of the construction equipment camp/s must take cognisance of any sensitive areas identified by the EIA studies and reflected on the sensitivity map (Figure 1.2).	Contractor	Site establishment
Plan the placement of lay-down areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible.	Contractor	Site establishment, and duration of construction
Fence and secure contractor's equipment camp.	Contractor	Site establishment
As far as possible, minimise vegetation clearing and levelling for equipment storage areas.	Contractor	Site establishment, and during construction
Where the public could be exposed to danger by any of the works or site activities, the contractor must, as appropriate, provide suitable flagmen, barriers and/or warning signs in English, Afrikaans and any other relevant local languages.	Contractor	Site establishment and duration of construction
All unattended open excavations must be adequately demarcated and/or fenced. Adequate protective measures must be implemented to prevent unauthorised access to the working area and the access routes.	Contractor	Site establishment and duration of construction
Establish appropriately bunded areas for storage of hazardous materials (i.e. fuel/chemicals to be required during construction).	Contractor	Site establishment
All development footprint for the substation should be appropriately fenced off and clearly demarcated.	Contractor	Site establishment, and duration of construction
Provide adequate sanitation facilities and ablutions for construction workers (1 toilet per every 15 workers) within appropriate walking distance of the work area/s. Separate toilets should be provided for men and women. Provide sanitary bins for female workers.	Contractor	Site establishment, and duration of construction
Ablution or sanitation facilities should not be located within 100 m from a 1:100 year flood line including drainage lines.	Contractor	Site establishment, and duration of construction

Mitigation: Action/Control	Responsibility	Timeframe
Supply adequate (closable, tamper proof) waste collection bins at site where construction is being undertaken.	Contractor	Site establishment, and duration of construction
Separate bins should be provided for recyclable, general and hazardous waste.	Contractor	Site establishment, and duration of construction
As far as possible, provision should be made for separation of waste for recycling.	Contractor	Site establishment, and duration of construction

Performance Indicator	<ul style="list-style-type: none"> » Site is secure and there is no unauthorised entry. » The construction equipment camps have avoided sensitive areas. » Appropriate and adequate waste management and sanitation facilities provided at construction site.
Monitoring	<ul style="list-style-type: none"> » An incident reporting system must be used to record non-conformances to the EMP. » ECO to monitor all construction areas on a continuous basis until all construction is completed. Non-conformances must be immediately reported to the site manager.

OBJECTIVE 3: Appropriate management of the construction site and construction workers

Project Component/s	<ul style="list-style-type: none"> » Power line » Substation and ancillaries » Access roads and internal tracks
Potential Impact	<ul style="list-style-type: none"> » Damage to indigenous natural vegetation and sensitive areas. » Damage to and/or loss of topsoil (i.e. pollution, compaction etc.). » Impacts on the surrounding environment due to inadequate sanitation and waste removal facilities. » Pollution/contamination of the environment.
Activities/Risk Sources	<ul style="list-style-type: none"> » Vegetation clearing and levelling of equipment storage area/s. » Access to and from the equipment storage area/s. » Ablution facilities. » Contractors not aware of the requirements of the EMP, leading to unnecessary impacts on the surrounding environment.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Limit equipment storage within demarcated designated areas. » Ensure adequate sanitation facilities and waste management practices. » Ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment.

Mitigation: Action/Control	Responsibility	Timeframe
<p>Ensure that all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm. This can be achieved through the provision of appropriate environmental awareness training to all personnel. Records of all training undertaken must be kept. Topics must include, but are not limited to:</p> <ul style="list-style-type: none"> » What is meant by "Environment" » Why the environment needs to be protected and conserved » How construction activities can impact on the environment » Awareness of emergency and spills response provisions » Social responsibility during construction activities, e.g. being considerate to local residents 	Contractor	Duration of construction
<p>Contractors must use chemical toilets/ablution facilities provided on site. No ablution activities will be permitted outside the designated areas.</p>	Contractor and sub-contractor/s	Duration of contract
<p>Ensure ablution facilities are appropriately maintained. Ablutions must be cleaned regularly and associated waste disposed of at a permitted wastewater treatment facility. Ablutions must be removed from site when construction is completed.</p>	Contractor	Duration of construction
<p>Cooking and eating of meals must take place in a designated area.</p>	Contractor and sub-contractor/s	Duration of contract
<p>No firewood or kindling may be gathered from the site or surrounds.</p>	Contractor and sub-contractor/s	Duration of contract
<p>No open fires are permitted on site and construction personnel must be made aware of the consequences of starting a fire on site to avoid damage to neighbouring farms.</p>	Contractor and sub-contractor/s	Duration of contract
<p>All litter must be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area. Particular attention needs to be paid to food waste.</p>	Contractor and sub-contractor/s	Duration of contract
<p>Ensure waste containers are maintained and emptied on a regular basis.</p>	Contractor	Duration of construction
<p>Ensure waste is removed from site on a regular basis and disposed of at an appropriately licensed waste disposal facility.</p>	Contractor	Duration of construction
<p>No plants may be collected from site for medicinal or any other purpose</p>	Contractor	Duration of contract
<p>No one may disturb flora or fauna outside of the demarcated construction area/s.</p>	Contractor and sub-contractor/s	Duration of contract
<p>Firefighting equipment and training must be provided before the construction phase commences and must be maintained in working order throughout construction.</p>	Contractor and sub-contractor/s	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
A Code of Conduct for construction workers should be compiled and implemented.	Contractor and sub-contractor/s	Construction
Contractors must ensure that all workers are informed of the conditions contained in the EMP before commencing work, specifically consequences of stock theft and trespassing on adjacent farms.	Contractor and sub-contractor/s	Construction
On completion of the construction phase, all construction workers must leave the site.	Contractor and sub-contractor/s	Construction
Rehabilitate all disturbed areas as soon as construction is complete within an area. No exotic plants may be used in rehabilitation. Only indigenous plants of the area may be used.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » Ablution and waste removal facilities are in a good working order and do not pollute the environment due to mismanagement. » Excess vegetation clearing and levelling is not undertaken. » No complaints regarding contractor behaviour or habits. » Appropriate training of all staff is undertaken prior to them commencing work on the construction site. » Code of Conduct drafted before commencement of construction phase. » All areas are rehabilitated promptly after construction in an area is complete.
Monitoring	<ul style="list-style-type: none"> » Regular audits of the construction camps and areas of construction on site by the ECO. » Proof of disposal of sewage at an appropriate licensed wastewater treatment works. » Proof of disposal of waste at an appropriate licensed waste disposal facility. » Observation and supervision of Contractor practices throughout construction phase by the ECO. » Complaints must be investigated and, if appropriate, acted upon. » An incident reporting system must be used to record non-conformances to the EMP.

OBJECTIVE 4: Ensure regulation of construction and maintenance vehicles to-site, on-site and off-site

The construction phase of the project will be the most significant in terms of generating traffic impacts; resulting from the transport of equipment and materials and construction crews to the site and the return of the vehicles after delivery of materials.

Project Component/s	<ul style="list-style-type: none"> » Power line » Substation and ancillaries
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	» Access roads
Potential Impact	<ul style="list-style-type: none"> » Impact of construction vehicles on road surfaces, and possible increased risk in accidents involving people and animals. » Deterioration of road pavement conditions (both surfaced and gravel road) due to increased traffic.
Activities/Risk Sources	<ul style="list-style-type: none"> » Construction vehicle movement. » Speeding on local roads. » Degradation of local road conditions. » Site preparation and earthworks. » Foundations or plant equipment installation. » Transportation of ready-mix cement from off-site batching plant to the site if required. » Mobile construction equipment movement on-site. » Construction activities related to the project
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Minimise impact of traffic on local traffic volume, existing infrastructure, property owners, animals, and road users. » To ensure all vehicles are roadworthy and all materials/ equipment are transported appropriately and within any imposed permit/licence conditions.

Mitigation: Action/Control	Responsibility	Timeframe
Construction vehicles and those transporting materials and goods should in good working order and not overloaded. Proof in this regard should be provided by the transport contractor on request.	Transport Contractor	Construction
All relevant permits for abnormal loads must be applied for from the relevant authority.	Contractor (or appointed transportation contractor)	Pre-construction
A designated access to the proposed site must be created to ensure safe entry and exit.	Contractor	Pre-construction
No unnecessary deviation from approved transportation or construction routes must be allowed, unless roads are closed for whatever reason outside the control of the contractor.	Contractor	Duration of contract
Appropriate dust suppression techniques must be implemented to minimise dust from gravel roads. These could include the use of water or other appropriate dust suppressants, as determined by the local site conditions.	Contractor	Construction
Appropriate road management strategies must be implemented, and all employees and contractors required must be required to abide by standard road and safety procedures.	Contractor (or appointed transportation contractor)	Pre-construction
Any traffic delays resulting from the presence of construction traffic must be co-ordinated with the appropriate authorities.	Contractor	Duration of contract
The movement of all vehicles within the power line servitude and substation site must be on designated roadways.	Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
Signage must be established at appropriate points warning of turning traffic and the construction site (all signage to be in accordance with prescribed standards).	Contractor	Duration of contract
Signs must be placed along construction roads to identify speed limits, travel restrictions, and other standard traffic control information. Signage must be appropriately maintained for the duration of the construction period.	Contractor	Duration of contract
A speed limit of 30km/h should be implemented for vehicles travelling on site in order to minimise dust generation and ensure safety of personnel and the environment and lessen environmental degradation	Contractor	Duration of contract
All construction vehicles and or machineries travelling on public roads must adhere to the specified speed limits and all drivers must be in possession of an appropriate valid driver's license.	Contractor	Duration of contract
Ensure that there is adequate signage along all roads to be used throughout the project and that there are effective control measures to make Local residents and road users are aware of vehicle movements and schedules	Contractor	Duration of contract
Ensure that any damage to roads attributed to construction activities is repaired before completion of the construction phase.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » Vehicles keeping to the speed limits » Vehicles are in good working order and safety standards are implemented » Local residents and road users are aware of vehicle movements and schedules » No construction traffic related accidents are experienced » Local road conditions and road surfaces are not unnecessarily degraded by development » Complaints of residents are not received (e.g. concerning the speeding of heavy vehicles) » Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed
Monitoring	<ul style="list-style-type: none"> » Proponent, Contractor or appointed ECO (whichever is more applicable) must monitor performance indicators to ensure that they have been effectively implemented.

OBJECTIVE 5: To avoid and or minimise the potential impact of the activities during the construction on the safety of local communities and the potential loss of stock and damage to farm infrastructure

Project Component/s	<ul style="list-style-type: none"> » Power line » Substation and ancillaries » Access roads
Potential Impact	<ul style="list-style-type: none"> » Impact on safety of farmers and communities and potential loss of livestock and damage to farm infrastructure, such as gates and fences. » Impact on agricultural practices
Activities/Risk Sources	<ul style="list-style-type: none"> » The presence of construction workers on the site and people in the area seeking employment can pose a potential safety risk to local farmers and communities and may result in stock thefts. The activities of construction workers may also result in damage to farm infrastructure.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To avoid and or minimise the potential impact on local communities and their livelihoods.

Mitigation: Action/Control	Responsibility	Timeframe
The housing of construction workers on the site should be limited to security personnel.	Contractor	Construction
Ensure that all farm gates are locked and secure at all times.	Contractor	Construction and Operation
Inform all landowners of activity on their land at least 2 days in advance of planned activities.	Contractor	All phases of the project
The construction site should be fenced and access to the area controlled.	Contractor	All phases of project
Procedures and measures to prevent, and in worst cases, attend to fires should be developed in consultation with the surrounding property owners	Eskom Contractor	Pre-construction and when required
Employees, visitors and/or subcontractors should be made well aware of the consequences of any damage to private property and/or loss of livestock, game and/or other fauna	Contractor	Duration of contract
Should there be any damage to private property and/or loss of livestock, game and/or other fauna that can be linked to the Contractor, or any subcontractor, the landowner shall be compensated accordingly upon sufficient proof thereof.	Project Company/Contractor	Duration of contract
Contact details of emergency services should be prominently displayed on site.	Contractor	Construction
Appropriate fire-fighting equipment must be present on site and members of the workforce should be appropriately trained in using this equipment in the fighting of veld fires	Contractor	Construction
Establish and communicate employment procedures to community and municipal representatives.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » No criminal activities and theft of livestock, illegal hunting or trapping of game and/or other fauna attributable to the construction workers are reported. » No complaints received from landowners or the general public. » No fires or on-site accidents occur.
Monitoring	<ul style="list-style-type: none"> » Eskom and appointed ECO must monitor indicators listed above to ensure that they have been implemented.

OBJECTIVE 6: Management of dust and air emissions

During the construction phase, limited gaseous or particulate emissions are anticipated from exhaust emissions from construction vehicles and equipment on-site, as well as vehicle entrained dust from the movement of vehicles on the main and internal access roads.

Project Component/s	<ul style="list-style-type: none"> » Power line » Substation and ancillaries » Access roads
Potential Impact	<ul style="list-style-type: none"> » Dust and particulates from vehicle movement to and on-site, foundation excavation, road construction activities, road maintenance activities, temporary stockpiles, and vegetation clearing affecting the surrounding residents and visibility. » Release of minor amounts of air pollutants (for example NO₂, CO and SO₂) from vehicles and construction equipment
Activities/Risk Sources	<ul style="list-style-type: none"> » Clearing of vegetation and topsoil. » Excavation, grading, scraping, levelling, digging, drilling. » Transport of materials, equipment, and components on internal access roads. » Re-entrainment of deposited dust by vehicle movements. » Wind erosion from topsoil and spoil stockpiles and unsealed roads and surfaces. » Fuel burning vehicle and construction engines.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure emissions from all vehicles and construction engines are minimised, where possible, for the duration of the construction phase » To minimise nuisance to the community from dust emissions and to comply with workplace health and safety requirements for the duration of the construction phase

Mitigation: Action/Control	Responsibility	Timeframe
Access roads must be maintained in a manner that will ensure that nuisance from dust emissions from road or vehicle sources are not visibly excessive.	Contractor	Construction
Appropriate dust suppressant must be applied on all exposed areas and stockpiles as required to minimise/control airborne dust. These could include the use of water or other appropriate dust suppressants, as	Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
determined by the local site conditions. This is particularly relevant to construction activities in close proximity to residences (such as the decommissioning of the existing substation in the town of Olifantshoek).		
Haul vehicles moving outside the construction site carrying material that can be wind-blown must be covered with tarpaulins	Contractor	Duration of contract
A speed limit of 30km/h should be implemented for vehicles travelling on site in order to minimise dust generation and ensure safety of personnel and the environment	Contractor	Duration of contract
Drivers must be made aware of the potential safety issues and enforcement of strict speed limits when they are employed	Contractor	Pre-construction
Dust-generating activities or earthworks may need to be rescheduled or the frequency of application of dust control/suppressant increased during periods of high winds if excessive visible dust is blowing toward nearby residences outside the site.	Contractor	Duration of contract
Disturbed areas must be re-vegetated as soon as practicable in line with the progression of construction activities.	Contractor	Completion of construction
Vehicles and equipment must be maintained in a road-worthy condition at all times.	Contractor	Duration of contract

Performance Indicator	<ul style="list-style-type: none"> » No complaints from affected residents or community regarding dust or vehicle emissions. » Dust suppression measures implemented for all areas that require such measures during the construction phase. » Road-worthy certificates in place for all heavy vehicles at outset of construction phase and monitored on a monthly basis.
Monitoring	<ul style="list-style-type: none"> » Immediate reporting by personnel of any potential or actual issues with nuisance dust or emissions to the Site Manager. » An incident reporting system must be used to record non-conformances to the EMPr. » Public complaints register must be developed and maintained on site.

OBJECTIVE 7: Minimisation of soil degradation and erosion, as well as disturbance to topsoil

It is expected that there will be a sufficient amount of topsoil and/or subsoil moved and stockpiled during the construction phase to facilitate rehabilitation. If required, areas or land for extracting topsoil or subsoil will be identified. The land capability

characteristics of such areas should be similar to the affected soils (same texture, colour, permeability, etc.).

The soil on site may be impacted in terms of:

- » Soil degradation including erosion (by wind and water) and subsequent deposition elsewhere (i.e. into the drainage lines)
- » Uncontrolled run-off relating to construction activity (excessive wetting, uncontrolled discharge, etc.) will also lead to accelerated erosion and possible sedimentation of the drainage lines.
- » Degradation of the natural soil profile due to excavation, stockpiling, compaction, pollution and other construction activities will affect soil forming processes and associated ecosystems. Degradation of parent rock is considered low as there are no deep excavations envisaged.

Project Component/s	<ul style="list-style-type: none"> » Power line » Substation and Ancillaries » Access roads
Potential Impact	<ul style="list-style-type: none"> » Impacts on soil » Loss of topsoil » Soil and rock degradation. » Soil erosion. » Increased deposition of soil into drainage systems. » Increased run-off over the site.
Activity/Risk Source	<ul style="list-style-type: none"> » Site preparation and earthworks » Excavation of foundations » Construction of access road » Site preparation (e.g. compaction) » Power line and substation construction activities » Stockpiling of topsoil, subsoil and spoil material » Rainfall - water erosion of disturbed areas. » Wind erosion of disturbed areas. » Concentrated discharge of water from construction activity.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To retain natural vegetation, where possible » Minimise extent of disturbance areas. » Minimise activity within disturbance areas. » Minimise soil degradation (mixing, wetting, compaction, etc). » Minimise soil erosion. » Minimise deposition of soil into drainage lines. » Minimise instability of embankments/excavations » To ensure appropriate removal, storage and reuse of topsoil in areas » Minimise spoil material

Mitigation: Action/Control	Responsibility	Timeframe
Areas to be cleared must be clearly marked on-site to eliminate the potential for unnecessary clearing.	Contractor in consultation with Specialist	Pre-construction

Mitigation: Action/Control	Responsibility	Timeframe
Stockpiled topsoil should be covered to prevent erosion if deemed necessary by the EO	Contractor	Site establishment & duration of contract
Erosion control measures should be implemented in areas where soil has been disturbed due to construction activities	Contractor	Site establishment & duration of contract
No activities must take place outside of demarcated construction site	Contractor	Site establishment & duration of contract
All bare areas, as a result of the development, should be revegetated as soon as possible with locally occurring species, to bind the soil and limit erosion potential.	Contractor	Site establishment & duration of contract
Silt traps should be used where there is a danger of topsoil or material stockpiles eroding and entering streams and other sensitive areas.	Contractor	Site establishment & duration of contract
Topsoil should be removed and stored separately and should be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas.	Contractor	Site establishment & duration of contract
Any fill material required must be sourced from a commercial off-site suitable/permitted source, quarry or borrow pit. Where possible, material from foundation excavations must be used as fill on-site.	Contractor	Duration of contract
Excavated topsoil must be stockpiled in designated areas separate from base material at a maximum height of 2m and covered (during windy conditions) until replaced during rehabilitation.	Contractor	Site establishment & duration of contract
Topsoil must not be stripped or stockpiled when it is raining or when the soil is wet as compaction will occur.	Contractor	Site establishment Maintenance: for duration of contract
Identify disturbance areas and restrict construction activity to these areas.	Contractor	Before and during construction
Rehabilitate disturbance areas as soon as practicable when construction in an area is complete.	Contractor	During and after construction
Any erosion problems observed should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.	Contractor/ECO	Duration of the contract
All bare areas, as a result of the development, should be revegetated with locally occurring species, to bind the soil and limit erosion potential.	Contractor/ECO	Duration of the contract

Mitigation: Action/Control	Responsibility	Timeframe
Silt traps should be used where there is a danger of topsoil or material stockpiles eroding and entering streams and other sensitive areas.	Contractor/ECO	Duration of the contract
Topsoil should be removed and stored separately and should be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas.	Contractor/ECO	Duration of the contract
Erosion control measures should be implemented in areas where soil has been disturbed due to construction activities.	Contractor	During and after construction
Due to the disturbance at the site as well as the increased runoff generated at the site, alien plant species are likely to be a long-term problem at the site. A long-term control plan will need to be implemented and regular monitoring for alien plants within the development footprint should be undertaken (Appendix C)	Contractor	During and after construction
Any new access roads required to be carefully planned and constructed to minimise the impacted area and prevent unnecessary excavation, placement, and compaction of soil.	Engineer Contractor	Design and construction
Where new access roads cross natural drainage lines, culverts must be designed to allow free flow and regular maintenance must be carried out. A Water Use License must be obtained from the Department of Water & Sanitation.	Contractor	Design, before and during construction
Minimise removal of vegetation which adds stability to soil.	Contractor	Construction
Excavated topsoil must be stockpiled in designated areas separate from base material at a maximum height of 2m and covered (during windy conditions) or vegetated until replaced during rehabilitation	Contractor	Site establishment & duration of contract
Topsoil must not be stripped or stockpiled when it is raining or when the soil is wet as compaction will occur.	Contractor/ EO	Site establishment Maintenance: for duration of contract
Soil conservation: Stockpile topsoil for re-use in rehabilitation phase, protect stockpile from erosion	Contractor	Before and during construction
Erosion control measures (i.e. run-off attenuation on slopes (sand bags, logs), silt fences, storm water catch-pits, shade nets, or temporary mulching over denuded area as required).	Contractor	Erection: Before construction Maintenance: Duration of contract
Control depth of excavations and stability of cut faces/sidewalls.	Contractor	Duration of contract
Compile and implement an appropriate stormwater management plan.	Contractor	Duration of construction

Performance Indicator	<ul style="list-style-type: none"> » Minimal disturbance outside of designated work areas. » Minimise clearing of existing vegetation. » Topsoil appropriately stored. » No activity outside demarcated disturbance areas. » Minimal level of activity within disturbance areas. » Minimal level of soil erosion around site. » Minimal level of increased siltation in drainage lines attributable to the project activities. » Acceptable state of excavations. » No activity in restricted areas.
Monitoring	<ul style="list-style-type: none"> » An incident reporting system will be used to record non-conformances to the EMPr. » Monthly inspections of erosion control devices » Immediate reporting of ineffective erosion and sediment control systems » An incident reporting system must be in place to record non-conformances

OBJECTIVE 8: Minimise the impacts of disturbance and loss of indigenous vegetation and faunal habitat

Areas of high local ecological sensitivity have been identified. Placement of infrastructure in these areas should be avoided as far as possible. Permits will be required to be obtained where Red Data or protected flora will be disturbed or relocated. The majority of the power line follows an existing line, and occurs in an area that is already transformed by existing infrastructure. The majority of the 31km power line route and substation area can be regarded as low sensitivity with two areas of high sensitivities near the existing pans. A permit will be required for the removal or relocation of any protected plant species where they are to be affected.

Project component/s	<ul style="list-style-type: none"> » Power line » Substation and ancillaries » Access roads
Potential Impact	<ul style="list-style-type: none"> » Clearing of natural vegetation » Construction activities » Traffic to and from site
Activity/risk source	<ul style="list-style-type: none"> » Site preparation and earthworks » Construction-related traffic » Excavations of foundations » Mobile construction equipment » Construction activities related to the project » Dumping or damage by construction equipment outside of demarcated construction areas.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To retain natural vegetation as far as possible, especially in the high and moderate sensitive areas on the site » To minimise footprints of disturbance of vegetation/habitats on-site » To protect fauna

Mitigation: Action/control	Responsibility	Timeframe
Areas to be cleared must be clearly marked in the field to eliminate unnecessary clearing.	Contractor in consultation with Specialist	Pre-construction
Staff/ employees must be educated to keep construction activities within the demarcated areas.	Contractor	Construction
The extent of clearing and disturbance to the native vegetation must be kept to a minimum so that impact on flora and fauna and their habitats is restricted.	Contractor	Site establishment & duration of contract
Vegetation clearing to commence only after walk through has been conducted and necessary permits obtained.	Contractor in consultation with Specialist	Pre-construction
Areas containing protected plant species must be noted and every effort made to reduce the impacts of construction on these areas. Protected plant species in any area to be cleared should be identified and rescued. Permits will be required from NC DENC to remove or translocate protected plant species, if they are to be affected.	Contractor in consultation with Specialist	Pre-construction and construction
The extent of clearing and disturbance to the native vegetation must be kept to a minimum so that the impact on flora is restricted. . Vegetation should not be cleared using herbicides or with a bulldozer. Vegetation can be cleared manually with bush cutters to 0.5m height where necessary. Preferably <i>Acacia erioloba</i> trees under the line should be trimmed and not cut down.	Contractor	Site establishment & duration of contract
A site rehabilitation programme must be developed implemented as soon as possible once construction is completed.	Contractor in consultation with Specialist	Duration of contract
The collection, hunting or harvesting of any plants or animals at the site or surrounding area must be strictly forbidden	Contractor	Duration of contract
Enforce speed limits of 30km/h within the construction site and vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed	Contractor	Construction
EO must inspect the immediate area surrounding the construction area for evidence of snares.	Contractor /EO	Construction
Any fauna directly threatened by the construction activities should be removed to a safe location, in line with the required permit, to a similar environment by a other suitably qualified person.	Contractor/suitably qualified fauna handler	Pre-construction and construction
Temporary lay-down areas should be located within the development footprint or within areas that have been identified as being of low sensitivity. These areas should be rehabilitated after use.	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
At the indication of soil erosion, methods to control this should be implemented in line with a soil erosion management plan (Appendix B)	Contractor	Duration of the contract
All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill	Contractor	Duration of the contract
The introduction of alien plant species should be monitored and controlled in line with a vegetation management plan (Appendix C)	Contractor	Duration of the contract
Construction staff should undergo an environmental induction at the start of the project to ensure that they are aware of the appropriate response to the presence of fauna at the site and do not kill or harm fauna such as snakes or other reptiles which are of-ten feared.	Contractor	Pre-construction and construction

Performance Indicator	<ul style="list-style-type: none"> » No disturbance outside of designated work areas » Minimised clearing of existing/natural vegetation » Limited impacts on areas of identified and demarcated sensitive habitats/vegetation » Limited displacement and killings of fauna » No trapping or killing fauna illegally
Monitoring	<ul style="list-style-type: none"> » Supervision of all clearing and earthworks by EO » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 9: Limit the damage to wetlands and watercourses

There are no natural perennial water sources within the affected area and all the drainage systems are ephemeral and not likely to hold water for more than a few days at a time. There are two ephemeral rivers which are anticipated to be impacted on by the proposed development, that is the Olifantsloop and the Ga-Magara rivers. Ephemeral rivers in arid ecosystems have high ecological value, and the riverbed, and particularly the deeper channels within the riverbed of the Ga-mogara River are considered highly sensitive habitat. Disturbance within the immediate environment of the Ga-mogara River should be kept to a minimum. In addition, there is a small artificial earth dam constructed within the course of the Olifantsloop which could represent a site for amphibians and provide a water source for fauna. The small pan that lies close to the route of the preferred power line can be considered an area of very high sensitivity. Care should therefore be taken not to disturb this habitat during the construction of the power line. Refer to the sensitivity map Figure 1.2. to see where these sensitivities are located, moreover, further sensitivity maps can be located in the BAR.

Areas near to wetlands and watercourses are usually particularly vulnerable to alien plant invasion and disturbance in these areas should be kept to a minimum to reduce this risk.

Project component/s	» Power line » Substation and ancillaries » Access roads
Potential Impact	» Damage to watercourse (such as erosion, siltation) that will impact on ecosystem functioning.
Activity/risk source	» Construction, environmental management
Mitigation: Target/Objective	No damage to the drainage line, wetlands and watercourses within the project area.

Mitigation: Action/control	Responsibility	Timeframe
Where new watercourse crossings are required, the engineering team must provide an effective means to minimise the potential upstream and downstream effects of sedimentation and erosion (erosion protection) as well minimise the loss of riparian vegetation (small footprint).	Contractor	Duration of the contract
The morphology and hydrology of the riverbeds should not be altered by unnecessary excavations, dumping of soil or other waste.	Contractor	Site establishment & duration of contract
No vehicles to refuel within watercourses or riparian vegetation.	Contractor	Duration of the contract
Strict use and management of all hazardous materials used on site must be implemented.	Contractor	Duration of the contract
Strict management of potential sources of pollutants (e.g. litter hydrocarbons from vehicles and machinery, cement during construction etc.) must be implemented.	Contractor	Duration of the contract
Containment of all contaminated water by means of careful run-off management on the development site must be ensured.	Contractor	Duration of the contract
Strict control over the behavior of construction workers must be implemented.	Contractor	Duration of the contract
As far as possible use the existing service roads through the riparian zones as well as non-perennial watercourses.	Contractor	Duration of the contract
Any erosion problems observed should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.	Contractor	Duration of the contract
All bare areas, as a result of the development, should be revegetated with locally occurring species, to bind the soil and limit erosion potential.	Contractor	Duration of the contract

Mitigation: Action/control	Responsibility	Timeframe
Silt traps should be used where there is a danger of topsoil or material stockpiles eroding and entering streams and other sensitive areas.	Contractor	Duration of the contract
Topsoil should be removed and stored separately and should be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas.	Contractor	Duration of the contract
Where practical, phased development and vegetation clearing should be applied so that cleared areas are not left un-vegetated and vulnerable to erosion for extended periods of time.	Contractor	Duration of the contract
Construction of gabions and other stabilisation features must be undertaken on steep slopes to prevent erosion, if deemed necessary.	Contractor	Duration of the contract
Reduce activity at the site after large rainfall events when the soils are wet. No driving off of hardened roads should occur.	Contractor	Duration of the contract
The development footprint should be kept to a minimum and natural vegetation should be encouraged to return to disturbed areas.	Contractor	Duration of the contract
Avoid placing pylons within the boundaries of the watercourses.	Contractor	Duration of the contract
Avoid any activities within the depression wetlands.	Contractor	Duration of the contract
Avoid clearing the fringing shrubby vegetation associated with the depression wetlands.	Contractor	Duration of the contract

Performance Indicator	<ul style="list-style-type: none"> » No disturbance outside of designated work areas » Minimised clearing of existing/natural vegetation » Limited impacts on areas of identified and demarcated sensitive habitats/vegetation » Status quo of the watercourses remains the same or improves
Monitoring	<ul style="list-style-type: none"> » The watercourses and wetlands should be monitored for the presence and development of erosion features downstream of any construction on site.

OBJECTIVE 10: Minimise the establishment and spread of alien invasive plants

The proposed project site (substation and power line route) contains some alien plant species. Alien plants are also likely to establish when the site is disturbed during construction.

Mitigation measures have been recommended to avoid the risk of increased alien invasion during construction, operation and maintenance phases of project. All alien

plants present at the site should be controlled using the best practice methods for the species present.

Project Component/s	<ul style="list-style-type: none"> » Power line » Substation and ancillaries » Access roads
Potential Impact	<ul style="list-style-type: none"> » Invasion of natural vegetation surrounding the site by declared weeds or invasive alien species.
Activities/Risk Sources	<ul style="list-style-type: none"> » Construction, environmental management.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » There is a target of no alien plants within project control area during the construction and operation phases.

Mitigation: Action/Control	Responsibility	Timeframe
Avoid creating conditions in which alien plants may become established: <ul style="list-style-type: none"> » Keep disturbance of indigenous vegetation to a minimum. » Rehabilitate disturbed areas as quickly as possible. » Do not import soil from areas with alien plants. 	Contractor	Construction
Due to the disturbance at the site as well as the increased runoff generated at the site, alien plant species are likely to be a long-term problem at the site. A long-term control plan will need to be implemented and regular monitoring for alien plants within the development footprint should be undertaken. Establish an on-going monitoring programme to detect and quantify any alien species that may become established and identify the problem species (as per Conservation of Agricultural Resources Act and Biodiversity Act).	Contractor	Construction
On-going alien plant monitoring and removal should be undertaken in all areas of the development site on an annual basis.	Contractor	Construction
Immediately control any alien plants that become established using registered control methods.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » For each alien species: number of plants and aerial cover of plants within project area and immediate surroundings. » Disturbed areas rehabilitated, if area does not establish naturally, and at least 40% plant cover achieved on rehabilitated sites over a period of 2 to 5 years » Site free of erosion and alien invasive plants
Monitoring	<ul style="list-style-type: none"> » On-going monitoring of area by EO during construction. » An Annual audit of project area and immediate surroundings should be conducted by a qualified botanist post construction. » If any alien invasive species are detected then the distribution of these should be mapped (GPS co-ordinates of plants or concentrations of plants), number of individuals (whole site or per

	<p>unit area), age and/or size classes of plants and aerial cover of plants.</p> <ul style="list-style-type: none"> » The results should be interpreted in terms of the risk posed to sensitive habitats within and surrounding the project area. » The environmental manager should be responsible for driving this process. » Reporting frequency depends on legal compliance framework.
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OBJECTIVE 11: Protection of heritage resources

The main cause of impacts to archaeological sites is physical disturbance of the material itself and its context. It was concluded in a **Heritage** Screener undertaken by Cedar Tower Heritage Consultants, that due to the disturbed nature of the proposed development area as well as the extensive HIA coverage for the area from previous assessments, it is unlikely that the proposed 123kV powerline and substation will impact on the significant heritage resources. As such it is recommended that **NO FURTHER HERITAGE STUDIES ARE REQUIRED**. The preferred options for the proposed project are considered acceptable from a heritage perspective for all project components. Should any heritage resources be discovered during the construction phase of the Olifantshoek Substation and Power Line, work must cease and the SAHRA APM unit should be contacted immediately.

Project Component/s	<ul style="list-style-type: none"> » Power line » Substation and ancillaries » Access roads
Potential Impact	<ul style="list-style-type: none"> » Heritage objects/ artefacts/ Unidentified Sites/ Burial and Grave Sites (found on site are inappropriately managed or destroyed)
Activity/Risk Source	<ul style="list-style-type: none"> » Site preparation and earthworks » Foundations or plant equipment installation » Mobile construction equipment movement on site » Construction activities associated with the power line and access roads
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure that any heritage objects found on site are treated appropriately and in accordance with the relevant legislation.

Mitigation: Action/control	Responsibility	Timeframe
Areas required to be cleared during construction must be clearly marked in the field to avoid unnecessary disturbance of adjacent areas.	Contractor consultation Specialist	in with Pre- construction
Familiarise all staff and contractors with procedures for dealing with heritage objects/sites. Project employees and any contract staff must maintain, at all times, a high level of awareness of the possibility of discovering heritage sites.	Contractor	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
Construction managers/foremen should familiarise himself/herself before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow if they find sites. The contractor's EO may be trained to identify/ follow the relevant procedure and report to the site manager if heritage sites are found.	Contractor	Duration of contract
If concentrations of historical and pre-colonial archaeological heritage material and/or human remains (including graves and burials) are uncovered during construction, all work in the immediate area affecting the find must cease immediately and be reported to the South African Heritage Resources Agency (SAHRA) and/or the MacGregor Museum, Kimberly (+27 (0) 53 839 2706 Or 021 462 4502), so that systematic and professional investigation/excavation can be undertaken. Phase 2 mitigation in the form of test-pitting/sampling or systematic excavations and collections of the pre-colonial shell middens and associated artefacts may then be conducted to establish the contextual status of the sites and possibly remove the archaeological deposit before development activities continue.	Eskom, and Contractor in consultation with Specialist	Duration of contract

Performance Indicator	<ul style="list-style-type: none"> » No disturbance outside of designated work areas. » All heritage items located are dealt with as per the legislative guidelines.
Monitoring	<ul style="list-style-type: none"> » Due care taken during earthworks and disturbance of land by all staff and any heritage objects found reported. » Appropriate permits obtained from SAHRA prior to the disturbance or destruction of heritage sites. » An incident reporting system will be used to record non-conformances to the EMP.

OBJECTIVE 12: Minimisation of visual impacts associated with construction

During the construction phase heavy vehicles, components, equipment and construction crews will frequent the area and may cause, at the very least, a cumulative visual nuisance to landowners and residents in the area as well as road users. The placement of lay-down areas and temporary construction camps should be carefully considered in order to not negatively influence the future perception of the project. Secondary visual impacts associated with the construction phase, such as the sight of construction vehicles, dust and construction litter must be managed to reduce visual impacts.

Project Component/s	<ul style="list-style-type: none"> » Power line » Laydown areas » Substation and ancillaries » Access roads
Potential Impact	<ul style="list-style-type: none"> » Visual impact of general construction activities » Potential scarring of the landscape due to vegetation clearing.
Activity/Risk Source	<ul style="list-style-type: none"> » The viewing of the above mentioned by observers on or near the site.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Minimal visual intrusion by construction activities and construction accommodation and intact vegetation cover outside of immediate works areas.

Mitigation: Action/Control	Responsibility	Timeframe
Ensure that vegetation is not unnecessarily removed during the construction period.	Contractor	Planning and construction
Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.	Contractor	Planning
Implement screening for the substation	Contractor	Construction
Rehabilitate decommissioned substation site and construction disturbance as soon as possible after construction in an area is completed.	Contractor	Construction
Both Alignments - Align power line as far from identified sensitive visual receptors (home steads, N14, urban residential areas) as possible within the identified corridor.	Eskom or contractor	Planning and construction
Ensure that lighting is focused on the development with no light spillage outside the site.	Contractor	Construction
Reduce the construction period through careful logistical planning and productive implementation of resources.	Eskom or contractor	Planning and duration of construction
Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.	Contractor	Construction
Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.	Contractor	Construction
Reduce and control construction dust using approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).	Contractor	Construction
Restrict construction activities in close proximity to sensitive receptors to daylight hours whenever possible in order to reduce lighting impacts.	Contractor	Construction
Rehabilitate all disturbed areas immediately after the completion of construction works.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » Vegetation clearance is minimised. » Construction site is kept in a neat and tidy state.
Monitoring	<ul style="list-style-type: none"> » An incident reporting system will be used to record non-conformances to the EMPr. » Public complaints register must be developed and maintained on site.

OBJECTIVE 13: Protection of avifauna

Both the power line corridor alternatives traverse the same habitat types and subsequently will likely have the same impacts on the avifaunal character of the area (low impact) during construction and operation. The preferred substation will exclude any impacts within the *Acacia karroo* thicket as well as shorten the potential power line that may interfere with the movement of the water fowl and waders between the sewage works and the gravel dam.

Project Component/s	<ul style="list-style-type: none"> » Power line » Substation
Potential Impact	<ul style="list-style-type: none"> » Collision and electrocution events with the overhead power line during operation. » Electrocution events with live hardware in the Substation yard during operation
Activities/Risk Sources	<ul style="list-style-type: none"> » Operation of the power line without appropriate mitigation measures. » Operation of the substation without appropriate mitigation measures. » Construction activities in close proximity to sensitive bird species or nesting sites
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Ensure that construction activities do not result in unnecessary disturbances to existing avifaunal species » Minimised disturbance on ground nesting species » Maintenance, as far as possible, of the ecological connectivity of the landscape for migrating species

Mitigation: Action/Control	Responsibility	Timeframe
Ensure bird-friendly tower designs are implemented to minimise the risk of electrocutions	Contractor	Construction
To reduce collision and electrocution of birds on the power line, insulating electrical components and bird flight diverters must be installed.	Contractor	Construction
The temporal and spatial footprint of the development should be kept to a minimum.	Contractor	Construction
The boundaries of the development footprint areas are to be clearly demarcated and it must be ensured that all activities remain within the demarcated footprint area.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Provide adequate briefing for site personnel on the possible important (Red Data) species occurring and/or nesting in the area and the procedures to be followed to minimise impacts.	Contractor	Construction
Strict control must be maintained over all activities during construction.	Contractor	Construction
During construction, if any of the Red Data species identified in the BA report are observed to be roosting and/or breeding in the vicinity, the ECO must be notified and where deemed necessary an appropriate buffer should be placed around the nests and/or roosting areas. If uncertain on the size of such buffer the ECO may contact an avifaunal specialist for advice.	Contractor Specialist	Construction
The construction equipment camps must be located as close to the site as possible.	Contractor	Construction
Contractors and working staff should remain within the development footprint and movement outside these areas especially into avian micro-habitats must be restricted.	Contractor	Construction
Driving must take place on existing roads and a speed limit of 30km/h must be implemented on all roads running through the study area during the construction phase. New road construction must be kept to a minimum	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » Power line and substation design implemented in line with required mitigation measures. » Bird diverters implemented in appropriate areas
Monitoring	<ul style="list-style-type: none"> » Monitoring of power line and substation construction activities by the EO to ensure implemented structures are in line with the required design to minimise impacts on birds

OBJECTIVE 14: Appropriate handling and management of waste

The main wastes expected will include spoil from excavation activities, general construction waste, hazardous waste (e.g. oils), and liquid waste (including grey water and sewage).

In order to manage the wastes effectively, guidelines for the assessment, classification, and management of wastes, along with industry principles for minimising construction wastes must be implemented.

Project Component/s	<ul style="list-style-type: none"> » Power line » Substation and ancillaries » Access roads
Potential Impact	<ul style="list-style-type: none"> » Inefficient use of resources resulting in excessive waste generation.

	» Litter or contamination of the site or water through poor waste management practices.
Activity/Risk Source	<ul style="list-style-type: none"> » Packaging. » Other construction wastes. » Hydrocarbon use and storage. » Spoil material from excavation, earthworks, and site preparation.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To comply with waste management legislation. » To minimise production of waste. » To ensure appropriate waste storage and disposal. » To avoid environmental harm from waste disposal. » A waste manifests should be developed for the ablutions showing proof of disposal of sewage at appropriate water treatment works.

Mitigation: Action/control	Responsibility	Timeframe
The storage of flammable and combustible liquids such as oils must be in designated areas which are appropriately bunded, and stored in compliance with Material Safety Data Sheets (MSDS) files.	Contractor	Duration of contract
Any spills must receive the necessary clean-up action. Bioremediation kits are to be kept on-site and used to remediate any spills that may occur. Appropriate arrangements to be made for appropriate collection and disposal of all cleaning materials, absorbents and contaminated soils (in accordance with a waste management plan).	Contractor	Duration of contract
Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals will be complied with.	Contractor	Duration of contract
Routine servicing and maintenance of vehicles is not to take place on-site (except for emergency situations or e.g. large cranes which cannot be moved off-site). If repairs of vehicles must take place on site, an appropriate drip tray must be used to contain any fuel or oils.	Contractor	Duration of contract
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations	Contractor	Duration of contract
Waste disposal records must be available for review at any time.	Contractor	Duration of contract
Construction contractors must provide specific detailed waste management plans to deal with all waste streams.	Contractor	Duration of contract
Specific areas must be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste (wood and metal scrap) and contaminated waste. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage and vermin control.	Contractor	Duration of contract
Where possible, construction and general wastes on-site must be reused or recycled. Bins and skips must be	Contractor	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
available on-site for collection, separation and storage of waste streams (such as wood, metals, general refuse etc.).		
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors and licensed waste disposal sites.	Contractor	Duration of contract
Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area.	Contractor	Duration of contract
Waste and surplus dangerous goods must be kept to a minimum and must be transported by approved waste contractors to sites designated for their disposal.	Contractor	Duration of contract
Documentation (waste manifest) must be maintained detailing the quantity, nature and fate of any hazardous waste.	Contractor	Duration of contract
Storage of waste must be undertaken in terms of the relevant Norms and Standards.	Contractor	Duration of contract
Hazardous and non-hazardous waste must be separated at source. Separate waste collection bins must be provided for this purpose. These bins must be clearly marked and appropriately covered.	Contractors	Erection: during site establishment Maintenance: for duration of Contract within a particular area
All waste collected must be disposed of at an appropriately licensed waste disposal site. A certificate of appropriate disposal must be obtained and kept on file. The disposal of waste must be in accordance with all relevant legislation. Under no circumstances may waste be burnt or buried on site.	Contractors	Erection: during site establishment Maintenance: for duration of Contract within a particular area
Sewage waste from chemical toilets and septic tanks (if required) must be removed on a regular basis and disposed of at a registered wastewater treatment facility. A certificate of appropriate disposal must be obtained and kept on file.		
Supply waste collection bins at construction equipment and construction crew camps.	Contractors	Erection: during site establishment Maintenance: for duration of Contract within a particular area
Construction equipment must be refuelled within designated refuelling locations, or where remote refuelling is required, appropriate drip trays must be utilised.	Contractor	Duration of contract
All stored fuels to be maintained within a bund and on a sealed surface.	Contractor	Duration of contract
Oily water from bunds at the substation must be removed from site by licensed contractors	Contractor	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
Spilled cement and concrete must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site	Contractor	Duration of contract
Any contaminated/polluted soil must be removed from the site and must be disposed of at a licensed hazardous waste disposal facility.	Contractor	Duration of contract
Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures	Contractor	Duration of contract
Upon the completion of construction, the area must be cleared of potentially polluting materials.	Contractor	Completion of construction

Performance Indicator	<ul style="list-style-type: none"> » No complaints received regarding waste on site or indiscriminate dumping. » Internal site audits ensuring that waste segregation, recycling and reuse is occurring appropriately. » Provision of all appropriate waste manifests for all waste streams.
Monitoring	<ul style="list-style-type: none"> » Waste collection must be monitored on a regular basis. » Waste documentation completed. » A complaints register must be maintained, in which any complaints from the community are logged. Complaints must be investigated and, if appropriate, acted upon. » An incident reporting system must be used to record non-conformances to the EMPr.

OBJECTIVE 15: Appropriate handling and storage of chemicals, hazardous substances and equipment

The construction phase will involve the storage and handling of a variety of chemicals including adhesives, abrasives, oils and lubricants, paints and solvents.

Project Component/s	<ul style="list-style-type: none"> » Power line » Substation and ancillaries » Access roads
Potential Impact	<ul style="list-style-type: none"> » Release of contaminated water from contact with spilled chemicals. » Generation of contaminated wastes from used chemical containers.
Activity/Risk Source	<ul style="list-style-type: none"> » Vehicles associated with site preparation and earthworks. » Construction activities of area and linear infrastructure. » Hydrocarbon use and storage.

Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons. » To ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons.
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Mitigation: Action/Control	Responsibility	Timeframe
Appropriate spill kits must be made available on-site for the clean-up of spills and leaks of contaminants	Contractor	Duration of contract
Corrective action must be undertaken immediately if a potential/actual leak or spill of a polluting substance is identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures	Contractor	Duration of contract
In the event of a major incident (including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed), the responsible person must, as soon as reasonably practicable after knowledge of the incident: <ul style="list-style-type: none"> (a) take all reasonable measures to contain and minimise the effects of the incident, including its effects on the environment and any risks posed by the incident to the health, safety and property of persons; (b) undertake clean-up procedures; (c) remedy the effects of the incident; (d) assess the immediate and long-term effects of the incident on the environment and public health. 	Contractor	Duration of contract
Routine servicing and maintenance of vehicles must not take place on-site but on designated bunded areas at the camp (except for emergencies). If repairs of vehicles must take place, an appropriate drip tray must be used to contain any fuel or oils leaks	Contractor	Duration of contract
Any storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material.	Contractor	Duration of contract
Bunded areas must be inspected regularly to ensure bund stability, integrity and function	Contractor	Duration of contract
Construction machineries (i.e. stumpers, generators etc.) must be stored in an appropriately sealed area	Contractor	Duration of contract
The storage of flammable and combustible liquids such as oils will be in designated areas which are appropriately bunded, and stored in compliance with Material Safety Data Sheets (MSDS) files	Contractor	Duration of contract
Drip trays must be placed under stationery machineries in sensitive areas	Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals must be complied with	Contractor	Duration of contract
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations	Contractor	Duration of contract
All small chemical substances used onsite must be accompanied by a portable drip tray to store them	Contractor	Duration of contract
Upon the completion of construction, the area must be cleared of potentially polluting materials	Contractor	Completion of construction

Performance Indicator	<ul style="list-style-type: none"> » No chemical spills outside of designated storage areas. » No unattended water or soil contamination by spills.
Monitoring	<ul style="list-style-type: none"> » A complaints register must be maintained, in which any complaints from the community will be logged. » An incident reporting system must be used to record non-conformances to the EMPr.

OBJECTIVE 16: Noise control

Traffic movement to and from the site, particularly of heavy-duty vehicles during construction, could potentially result in a noise impact.

Project component/s	<ul style="list-style-type: none"> » Power line » Substation and ancillaries » Access roads
Potential Impact	<ul style="list-style-type: none"> » Nuisance noise from construction affecting the surrounding community
Activity/risk source	<ul style="list-style-type: none"> » Site preparation and earthworks » Construction-related transport » Foundations or plant equipment installation » Power line and substation construction activities
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise noise to any surrounding residences from the construction activities » To comply with Noise Control Regulations and SANS Guidelines » To ensure noise levels are acceptable at residences in close proximity to construction activities

Mitigation: Action/control	Responsibility	Timeframe
On-site construction activities in close proximity to homesteads should be limited to daylight hours as far as possible. Affected and surrounding landowners should be	Contractor	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
notified if there is a need to deviate from standard working hours.		
Construction noise must be managed according to the Noise Control Regulations and SANS 10103.	Contractor	Duration of contract
All construction equipment, including vehicles, must be properly and appropriately maintained in order to minimise noise generation.	Contractor	Duration of contract

Performance Indicator	» No complaints received concerning noise
Monitoring	<ul style="list-style-type: none"> » A complaints register must be maintained, in which any complaints from the community will be logged. Complaints must be investigated and, if appropriate, acted upon. » An incident reporting system must be used to record non-conformances to the EMP.

5.3. Detailing Method Statements

The environmental specifications are required to be underpinned by a series of Method Statements, within which the Contractors and Service Providers are required to outline how any identified environmental risks will practically be mitigated and managed for the duration of the contract, and how specifications within this EMP will be met. That is, the Contractor will be required to describe how specified requirements will be achieved through the submission of written Method Statements to the Site Manager and ECO.

A Method Statement is defined as "a written submission by the Contractor in response to the environmental specification or a request by the Site Manager, setting out the plant, materials, labour and method the Contractor proposes using to conduct an activity, in such detail that the Site Manager is able to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications". The Method Statement must cover applicable details with regard to:

- » Responsible person/s;
- » Construction procedures;
- » Materials and equipment to be used;
- » Getting the equipment to and from site;
- » How the equipment/material will be moved while on-site;
- » How and where material will be stored;
- » The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
- » Timing and location of activities;
- » Compliance/non-compliance with the Specifications; and
- » Any other information deemed necessary by the Site Manager.

Specific method statements required may include:

- » Site establishment
- » Preparation of the site
- » Soil management/stockpiling and erosion control.
- » Excavations and backfilling procedure.
- » Stipulate norms and standards for water supply and usage (i.e.: comply strictly to licence and legislation requirements and restrictions)
- » Storm water management procedures
- » Wash bay for the construction vehicles and or machineries
- » Ablution facilities (placement, maintenance, management and servicing)
- » Solid Waste Management:
- » Liquid waste management:
- » Dust and noise pollution
- » Hazardous substance storage (Ensure compliance with all national, regional and local legislation with regard to the storage of oils, fuels, lubricants, solvents, wood treatments, bitumen, cement, pesticides and any other harmful and hazardous substances and materials. South African National Standards apply).
- » Fire prevention and management measures on site.
- » Fauna and flora protection process on and off site (i.e. removal to reintroduction or replanting, if necessary).
- » Incident and accident reporting protocol.
- » General administration
- » Designate access road and the protocol on while roads are in use.
- » Requirements on gate control protocols.

The Contractor may not commence the activity covered by the Method Statement until it has been approved by the Site Manager, except in the case of emergency activities and then only with the consent of the Site Manager. Approval of the Method Statement will not absolve the Contractor from their obligations or responsibilities in terms of their contract.

Failure to submit a method statement may result in suspension of the activity concerned until such time as a method statement has been submitted and approved. The ECO should monitor the construction activities to ensure that these are undertaken in accordance with the approved Method Statement.

5.4. Awareness and Competence: Construction Phase

To achieve effective environmental management, it is important that Contractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMP. The Contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts.

The Contractors obligations in this regard include the following:

- » Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment.
- » Ensuring that a copy of the EMP is readily available on-site, and that all site employees are aware of the location and have access to the document.
- » Employees shall be familiar with the requirements of the EMPr and the environmental specifications as they apply to the construction of the power line.
- » Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended an Environmental Awareness Training course.
- » The course should be sufficient to provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- » Awareness of any other relevant environmental matters, which are deemed necessary by the ECO.
- » Ensuring that employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) are erected at prominent locations throughout the site.
- » Ensure that construction workers have received basic training in environmental management, including the storage and handling of hazardous substances, minimisation of disturbance to sensitive areas, management of waste, and prevention of water pollution.
- » Records must be kept of those that have completed the relevant training.
- » Training should be done either in a written or verbal format but must be appropriate for the receiving audience.
- » Refresher sessions must be held annually to ensure the contractor staffs are aware of their environmental obligations as practically possible, detailed below.

5.4.1 Environmental Awareness Training

Environmental Awareness Training must take the form of an on-site talk and demonstration by the ECO and Contractor's EO before the commencement of site establishment and construction on site. The education/awareness programme should be aimed at all levels of management and construction workers within the contractor team. A record of attendance of this training must be maintained by the ECO on site. Proof of awareness training should be kept on record.

5.4.2 Induction Training

Environmental induction training must be presented to all persons who are to work on the site – be it for short or long durations; Contractor's or Engineer's staff; administrative or site staff; sub-contractors or visitors to site.

This induction training should include discussing the developer's environmental policy and values, the function of the EMPr and Contract Specifications and the importance and reasons for compliance to these. The induction training must highlight overall do's and don'ts on site and clarify the repercussions of not complying with these. The non-conformance reporting system must be explained during the induction as well.

Opportunity for questions and clarifications must form part of this training. A record of attendance of this training must be maintained by the Environmental Officer on site. Proof of induction training should be kept on record.

5.4.3 Toolbox Talks

Toolbox talks should be held on a scheduled and regular basis (at least twice a month) where foremen, environmental and safety representatives of different components of the Works and sub-consultants hold talks relating to environmental practices and safety awareness on site. These talks should also include discussions on possible common incidents occurring on site and ones recommended by the onsite ECO and the prevention of reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

5.5. Monitoring Programme: Construction Phase

A monitoring programme must be in place not only to ensure conformance with the EMP, but also to monitor any environmental issues and impacts which have not been accounted for in the EMP that are, or could result in significant environmental impacts for which corrective action is required. The period and frequency of monitoring will be stipulated by the Environmental Authorisation (once issued). The Project Manager will ensure that the monitoring is conducted and reported.

The aim of the monitoring and auditing process would be to monitor the implementation of the specified environmental specifications, in order to:

- » Monitor and audit compliance with the prescriptive and procedural terms of the environmental specifications.
- » Ensure adequate and appropriate interventions to address non-compliance.
- » Ensure adequate and appropriate interventions to address environmental degradation.
- » Provide a mechanism for the lodging and resolution of public complaints.
- » Ensure appropriate and adequate record keeping related to environmental compliance.

5.5.1. Non-Conformance Reports

All supervisory staff including Foremen, Engineers, and the ECO must be provided the means to be able to submit non-conformance reports to the Site Manager. Non-conformance reports will describe, in detail, the cause, nature and effects of any environmental non-conformance by the Contractor. Records of penalties imposed may be required by the relevant authority within 48 (forty eight) hours.

The non-conformance report will be updated on completion of the corrective measures indicated on the finding sheet. The report must indicate that the remediation measures have been implemented timeously and that the non-conformance can be closed-out to the satisfaction of the Site Manager and ECO.

5.5.2. Incident Reports

According to Section 30 of National Environmental Management Act (NEMA), an "Incident" is defined as unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed.

In terms of the requirements of NEMA, the responsible person must, within 14 days of the incident, report to the Director General, provincial head of department and municipality such information as is available to enable an initial evaluation of the incident, including:

- (a) the nature of the incident;
- (b) the substances involved and an estimation of the quantity released and their possible acute effect on persons and the environment and data needed to assess these effects;
- (c) initial measures taken to minimise impacts;
- (d) causes of the incident, whether direct or indirect, including equipment, technology, system, or management failure; and
- (e) measures taken and to be taken to avoid a recurrence of such incident.

5.5.3. Monitoring Reports

A monitoring report will be compiled by the ECO on a monthly basis and must be submitted to DEA for their records. This report should include details of the activities undertaken in the reporting period, any non-conformances or incidents recorded if any, corrective action required, and details of those non-conformances or incidents which have been closed out.

5.5.4. Final Audit Reports

Final environmental audit reports must be compiled by an independent auditor and be submitted to DEA upon completion of the construction and rehabilitation activities (within 30 days of completion of the construction phase (i.e.: within 30 days of site handover)) and within 30 days of completion of rehabilitation activities). These reports must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the environmental authorisation conditions and the requirements of the EMP.

MANAGEMENT PROGRAMME: REHABILITATION

CHAPTER 6

Overall Goal: Undertake the rehabilitation measures in a way that:

- » Ensures rehabilitation of disturbed areas following the execution of the works, such that residual environmental impacts are remediated or curtailed.

6.1. Objectives

In order to meet this goal, the following objective, actions and monitoring requirements are relevant:

OBJECTIVE 1: Ensure appropriate rehabilitation of disturbed areas such that residual environmental impacts are remediated or curtailed

Areas requiring rehabilitation will include all areas disturbed during the construction phase and that are not required for regular operation and maintenance operations. Rehabilitation should be undertaken in an area as soon as possible after the completion of construction activities within that area.

Project Component/s	<ul style="list-style-type: none"> » Power line » Substation and ancillaries » Access roads
Potential Impact	<ul style="list-style-type: none"> » Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion and increased runoff, and the requirement for on-going management intervention.
Activity/Risk Source	<ul style="list-style-type: none"> » Temporary construction areas » Temporary access roads/tracks » Power line servitudes » Other disturbed areas/footprints
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Ensure and encourage site rehabilitation of disturbed areas. » Ensure that the site is appropriately rehabilitated following the execution of the works, such that residual environmental impacts (including erosion) are remediated or curtailed.

Mitigation: Action/Control	Responsibility	Timeframe
All temporary facilities, equipment, and waste materials must be removed from site.	Contractor	Following execution of the works
All temporary fencing and danger tape must be removed once the construction phase has been completed.	Contractor	Following completion of construction activities in an area

Mitigation: Action/Control	Responsibility	Timeframe
The area that previously housed the construction equipment camp is to be checked for spills of substances such as oil, paint, etc. and these should be cleaned up.	Contractor	Following completion of construction activities in an area
All hardened surfaces within the construction equipment camp area should be ripped, all imported materials removed, and the area shall be top soiled and re-vegetated.	Contractor	Following completion of construction activities in an area
Temporary roads must be closed and access across these blocked.	Contractor	Following completion of construction activities in an area
Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion.	Contractor	Following completion of construction activities in an area
Where disturbed areas are not to be used during the construction of the proposed power line, these areas must be rehabilitated/re-vegetated with appropriate natural vegetation and/or local seed mix. Re-use of native/ indigenous plant species removed from disturbance areas in the rehabilitation phase to be determined by a botanist, as applicable.	Contractor in consultation with rehabilitation specialist	Following completion of construction activities in an area
Re-vegetated Areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.	Eskom in consultation with rehabilitation specialist	Post-rehabilitation
Erosion control measures should be used in sensitive areas such as areas with steep slopes.	Eskom in consultation with rehabilitation specialist (if required)	Post-rehabilitation
On-going plant monitoring and removal must be undertaken on all areas of natural Vegetation on an annual basis	Eskom	Post-rehabilitation

Performance Indicator	<ul style="list-style-type: none"> » All portions of site, including construction equipment camp and working areas, cleared of equipment and temporary facilities. » Topsoil replaced on all areas and stabilised where practicable or required after construction and temporally utilised areas. » Disturbed areas rehabilitated and acceptable plant cover achieved on rehabilitated sites. » Complete site free of erosion alien invasive plants.
Monitoring	<ul style="list-style-type: none"> » On-going inspection of rehabilitated areas in order to determine effectiveness of rehabilitation measures implemented.

- » On-going alien plant monitoring and removal should be undertaken on an annual basis.

MANAGEMENT PROGRAMME: OPERATION

CHAPTER 7

Overall Goal: To ensure that the operation of the power line and substation does not have unforeseen impacts on the environment and to ensure that all impacts are monitored and the necessary corrective action taken in all cases. In order to address this goal, it is necessary to operate the infrastructure in a way that:

- » Ensures that operation activities are properly managed in respect of environmental aspects and impacts.
- » Enables the operation activities to be undertaken without significant disruption to other land uses in the area, in particular with regard to farming practices, traffic and road use, and effects on local residents.
- » Minimises impacts on fauna and avifauna using the site.

7.1. Roles and Responsibilities for Operation and Maintenance

7.1.1. Eskom Environmental Advisor

Responsibilities include:

- » To implement and integrate environmental management systems by ensuring compliance to ISO 14000 and monitoring performance
- » Report environmental incidents
- » Provides environmental training
- » Ensures compliance to legislations and other legally binding documents

7.2. Objectives

In order to meet this goal, the following objectives have been identified, together With necessary actions and monitoring requirements.

OBJECTIVE 1: Minimisation of disturbance and Protection of Indigenous natural vegetation, fauna and maintenance of rehabilitation

Indirect impacts on vegetation and fauna during operation could result from maintenance activities and the movement of people and vehicles /n site and in the surrounding area. In order to ensure the long-term environmental integrity of the site following construction, maintenance of the areas rehabilitated post-construction must be undertaken until these areas have successfully re-established.

Project component/s	<ul style="list-style-type: none">» Service roads utilised during regular maintenance.» Areas disturbed during the construction phase and subsequently rehabilitated.
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	<ul style="list-style-type: none"> » Substation site » Power line servitude
Potential Impact	<ul style="list-style-type: none"> » Disturbance to or loss of vegetation and/or habitat. » The displacement and disturbance of fauna
Activity/Risk Source	<ul style="list-style-type: none"> » Movement of employee vehicles within and around site. » Vegetation clearance or trimming within the servitude.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Maintain minimised footprints of disturbance of vegetation/habitats on-site. » Ensure and encourage plant regrowth in non-operational areas of post-construction rehabilitation.

Mitigation: Action/Control	Responsibility	Timeframe
Vehicle movements must be restricted to designated roadways.	Eskom	Operation
Vegetation within the servitude can be cleared manually with bush cutters to 0.5m height where necessary. Preferably <i>Acacia erioloba</i> trees under the line should be trimmed and not cut down.	Eskom	Operation
Alien invasive vegetation must be removed from the servitude within one year of power line construction, and follow-ups conducted once every year thereafter.	Eskom	Operation
Due to the disturbance at the site as well as the increased runoff generated at the site, alien plant species are likely to be a long-term problem at the site. A long-term control plan will need to be implemented and regular monitoring for alien plants within the development footprint should be undertaken.	Eskom	Operation
No disturbance of vegetation outside of the project site must occur.	Eskom	Operation
Erosion control measures should be implemented in areas where soil has been disturbed due to construction activities.	Eskom	Operation
Due to the disturbance at the site as well as the increased runoff generated at the site, alien plant species are likely to be a long-term problem at the site. A long-term control plan will need to be implemented and regular monitoring for alien plants within the development footprint should be undertaken.	Eskom	Operation
Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible and should only be used for woody species which resprout following continual manual control.	Eskom	Operation
Existing roads must be maintained to ensure limited erosion and impact on areas adjacent to roadways.	Eskom	Operation

Performance Indicator	<ul style="list-style-type: none"> » No further disturbance to vegetation or terrestrial faunal habitats. » Continued improvement of rehabilitation efforts. » No disturbance of vegetation outside of project site.
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Monitoring	» Regular inspection to monitor plant regrowth/performance of rehabilitation efforts and weed infestation compared to natural/undisturbed areas
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OBJECTIVE 2: Protection of avifauna

During the operation, the threat of collision with the power line is the biggest potential threat to avifauna, particularly sensitive, collision prone species that may occur in the study area. The threat of electrocution while perching on the power line and associated infrastructure serves as a threat to certain sensitive species, depending on the power line structures implemented. Electrocutions occurring within the substation yard have been cited in some literature.

Project Component/s	» Power line » Substation
Potential Impact	» Collision and electrocution events with the overhead power line. » Electrocution events with live hardware in the Substation yard
Activities/Risk Sources	» Operation of the power line without appropriate mitigation measures. » Operation of the substation without appropriate mitigation measures.
Mitigation: Target/Objective	» Maintain a low number of collision, and electrocution events with both the power line and the substation

Mitigation: Action/Control	Responsibility	Timeframe
Maintain marked sections of line in high sensitivity areas with anti-collision marking devices (diurnal and nocturnal diverters) to increase the visibility of the power line and reduce likelihood of collisions. Marking devices should be spaced 10 m apart, and must be installed as soon as the conductors are strung	Eskom	Operation
After mitigation, direct mortality through collision or area avoidance by the species identified may still occur. Further research and mitigation for any problematic sections of line will be needed.	Eskom	Operation
Perching surfaces fitted with bird guards and perch guards as deterrents must be maintained.	Eskom	Operation
Maintenance staff should remain within the development footprint and movement outside these areas especially into avian micro-habitats must be restricted.	Eskom	Operation
Driving must take place on existing roads and a speed limit of 30km/h must be implemented on all roads running through the study area during the construction phase.	Eskom	Operation

Mitigation: Action/Control	Responsibility	Timeframe
Maintain insulation of live components at support structures.	Eskom	Operation

Performance Indicator	» Minimal collision or electrocution events.
Monitoring	» Line inspections should be ongoing for the operational life of the line. » Monitor power line servitude and substation for mortalities.

OBJECTIVE 3: Minimise soil degradation and erosion

The soil on site may be impacted in terms of:

- » Soil degradation including erosion (by wind and water) and subsequent deposition elsewhere is of a concern across the entire site which is underlain by fine grained soil which can be mobilised when disturbed, even on relatively low slope gradients (accelerated erosion).
- » Degradation of the natural soil profile due to pollution.

Project Component/s	» Power line » Substation » Access roads
Potential Impact	» Soil degradation. » Soil erosion. » Increased deposition of soil into drainage systems. » Increased run-off over the site.
Activities/Risk Sources	» Poor rehabilitation of cleared areas. » Rainfall - water erosion of disturbed areas. » Wind erosion of disturbed areas. » Concentrated discharge of water from construction activity.
Mitigation: Target/Objective	» Ensure rehabilitation of disturbed areas is maintained. » Minimise soil degradation (i.e. wetting). » Minimise soil erosion and deposition of soil into drainage lines. » Ensure continued stability of embankments/excavations.

Mitigation: Action/Control	Responsibility	Timeframe
Rehabilitate disturbance areas should the previous attempt be unsuccessful.	Eskom	Operation
Maintain erosion control measures implemented during the construction phase (i.e. run-off attenuation on slopes (sand bags, logs), silt fences, storm water catch-pits, and shade nets).	Eskom	Operation

Performance Indicator	» Minimal level of soil erosion around site. » Minimal level of siltation in drainage lines as a result of the project.
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Monitoring » Inspections of site on a bi-annual basis.

OBJECTIVE 4: Minimise disturbance and degradation of watercourses

Project Component/s	» Power line » Substation and ancillaries » Access roads
Potential Impact	» Damage to the watercourse (such as erosion, siltation, dumping of waste within the wetland) that will impact on ecosystem functioning.
Activities/Risk Sources	» Operation and maintenance activities
Mitigation: Target/Objective	» No damage to the drainage lines, wetlands and watercourses within the project area. » Minimise soil erosion and deposition of soil into drainage lines. » Ensure continued stability of embankments/excavations.

Mitigation: Action/Control	Responsibility	Timeframe
Rehabilitate disturbance areas should the previous attempt be unsuccessful.	Eskom	Operation
During the operational phase, monitor all water courses in the area to see if erosion issues arise and if any erosion control is required.	Eskom	Operation
Avoid any activities within the depression wetlands.	Eskom	Operation
Roads and other disturbed areas should be regularly monitored for erosion problems and problem areas should receive follow-up monitoring to assess the success of the remediation.	Eskom	Operation
Any erosion problems observed should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.	Eskom	Operation
Maintain erosion control measures implemented during the construction phase (i.e. run-off attenuation on slopes (sand bags, logs), silt fences, storm water catch-pits, and shade nets).	Eskom	Operation

Performance Indicator	» Minimal level of soil erosion around site. » Minimal level of increased siltation in drainage lines as a result of the project.
Monitoring	» Inspections of site on a bi-annual basis.

OBJECTIVE 5: Appropriate handling and management of hazardous substances and waste at the substation site

The operation and maintenance of the substation and power line will involve the generation of limited waste products. The main wastes expected to be generated by the operation and maintenance activities include:

- » general solid waste
- » hazardous waste
- » liquid waste

Project component/s	<ul style="list-style-type: none"> » Power line » Substation
Potential Impact	<ul style="list-style-type: none"> » Inefficient use of resources resulting in excessive waste generation » Litter or contamination of the site or water through poor waste management practices
Activity/risk source	<ul style="list-style-type: none"> » Office and workshop facilities at the substation » Transformers and switchgear - substation » Fuel and oil storage
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To comply with waste management guidelines » To minimise production of waste » To ensure appropriate waste disposal » To avoid environmental harm from waste disposal

Mitigation: Action/control	Responsibility	Timeframe
Hazardous substances must be stored in sealed containers within a clearly demarcated designated area.	Eskom	Operation
Storage areas for hazardous substances must be appropriately sealed and bunded.	Eskom	Operation
All structures and/or components replaced during maintenance activities shall be appropriately disposed of at an appropriately licensed waste disposal site or sold to a recycling merchant for recycling.	Eskom	Operation
Care shall be taken to ensure that spillage of oils and other hazardous substances are limited during maintenance. Handling of these materials should take place within an appropriately sealed and bunded area. Should any accidental spillage take place, it shall be cleaned up according to specified standards regarding bioremediation.	Eskom	Operation and maintenance
Waste handling, collection and disposal operations shall be managed and controlled by a waste management contractor.	Eskom/waste management contractor	Operation

Mitigation: Action/control	Responsibility	Timeframe
Wastewater: Water from bunds and oily water from oil/water separator shall be removed by a licensed contractor.	Eskom/waste contractor	Operation
Used oils and chemicals: » Appropriate disposal shall be arranged with a licensed facility in consultation with the administering authority. » Waste shall be stored and handled according to the relevant legislation and regulations.	Eskom/waste management contractor	Operation
General waste shall be recycled where possible or disposed of at an appropriately licensed landfill.	Eskom/waste management contractor	Operation
Hazardous waste (including hydrocarbons) shall be stored and disposed of separately.	Eskom/waste management contractor	Operation
Disposal of waste shall be in accordance with relevant legislative requirements, including the use of licensed contractors.	Eskom	Operation
<p>In the event of a major incident (including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed), the responsible person must, as soon as reasonably practicable after knowledge of the incident:</p> <p>(a) take all reasonable measures to contain and minimise the effects of the incident, including its effects on the environment and any risks posed by the incident to the health, safety and property of persons;</p> <p>(b) undertake clean-up procedures;</p> <p>(c) remedy the effects of the incident;</p> <p>(d) assess the immediate and long-term effects of the incident on the environment and public health.</p> <p>In terms of the requirements of NEMA, the responsible person must, within 14 days of the incident, report to the Director General, provincial head of department and municipality such information as is available to enable an initial evaluation of the incident, including:</p> <p>(a) the nature of the incident;</p> <p>(b) the substances involved and an estimation of the quantity released and their possible acute effect on persons and the environment and data needed to assess these effects;</p> <p>(c) initial measures taken to minimise impacts;</p> <p>(d) causes of the incident, whether direct or indirect, including equipment, technology, system, or management failure; and</p>	Eskom	Operation

Mitigation: Action/control	Responsibility	Timeframe
(e) measures taken and to be taken to avoid a recurrence of such incident.		

Performance Indicator	<ul style="list-style-type: none"> » No complaints received regarding waste on site or indiscriminate dumping » Internal site audits identifying that waste segregation recycling and reuse is occurring appropriately » Provision of all appropriate waste manifests » No contamination of soil or water
Monitoring	<ul style="list-style-type: none"> » Waste collection must be monitored on a regular basis » Waste documentation must be completed and available for inspection on request » An incidents/complaints register must be maintained, in which any complaints from the community must be logged. Complaints must be investigated and, if appropriate, acted upon » Regular reports on the quantities of all waste streams exiting the site must be compiled by the waste management contractor and monitored by the EO. All appropriate waste disposal certificates accompany the monthly reports.

OBJECTIVE 6: To ensure adequate regard is taken of landowner / stakeholder concerns and that these are appropriately addressed

Project component/s	<ul style="list-style-type: none"> » Power line » Substation
Potential Impact	» Stakeholder concerns not addressed with regard to maintenance
Activity/risk source	<ul style="list-style-type: none"> » Maintenance of substation » Maintenance of power line
Mitigation: Target/Objective	» To ensure adequate regard is taken of landowner / stakeholder concerns and that these are appropriately addressed

Mitigation: Action/control	Responsibility	Timeframe
Eskom maintenance personnel should be in possession of the required identification documents when undertaking maintenance work	Contractor	Duration of contract
Sound servitude management measures should be implemented. The implementation of the servitude management measures should be monitored on an ongoing basis	Contractor	Duration of contract
Eskom personnel should not access private properties without prior notification of the property owners	Contractor	Duration of contract

Performance Indicator	<ul style="list-style-type: none">» No additional disturbance to avifaunal populations along the length of the power line routes» Continued improvement of avifaunal protection efforts
Monitoring	<ul style="list-style-type: none">» Observation of avifaunal populations and incidence of injuries/death from collisions with the power line» Regular inspections to monitor casualties from collisions - delegate a suitable on-site monitor to assess avian mortality associated with the power lines.

MANAGEMENT PROGRAMME: DECOMMISSIONING

CHAPTER 8

It is most likely that decommissioning activities of the infrastructure would comprise the disassembly and removal of the power line and substation from the site. This would be applicable to the decommissioning of the Olifantshoek Substation planned as part of this project.

The EMPr for Construction (Chapter 6) and Rehabilitation (chapter 7) is also relevant to the decommissioning of sections of the proposed distribution line and must be adhered to.

The relevant mitigation measures contained under the construction section should be applied during decommissioning and therefore is not repeated in this section. It must be noted that decommissioning activities will need to be undertaken in accordance with the legislation applicable at that time, which may require this section of the EMP to be revisited and amended.

8.1. Objectives

The overall objective of the decommissioning phase is to leave the project area in a condition that minimises adverse impacts on the socio-economic and biophysical environment, with a legacy that contributes to sustainable development.

The objectives of the decommissioning phase of the proposed project are to:

- » Follow a process of decommissioning that is progressive and integrated into the short- and long-term project plans that will assess the closure impacts proactively at regular intervals throughout project life.
- » Implement progressive rehabilitation measures, beginning during the construction phase.
- » Leave a safe and stable environment for both humans and animals and make their condition sustainable.
- » Return rehabilitated land-use to a standard that can be useful to the post-project land user.
- » Where applicable, prevent any further soil and surface water contamination by maintaining suitable storm water management systems.
- » Maintain and monitor all rehabilitated areas following re-vegetation, and if monitoring shows that the objectives have been met, apply for closure.

8.2. Approach to the decommissioning phase

It is recommended that planning of the decommissioning of the project and rehabilitation of the site take place well in advance (at least two years) of the planned decommissioning activities. Important factors that need to be taken into consideration are detailed below.

8.2.1. Identification of structures for post-closure use

Access roads should be assessed in conjunction with the ultimate land users to determine if these could be used in future. Where not required, these access roads should be decommissioned and rehabilitated. Ensure that the use of the decommissioned substation site is consistent with residential use and Eskom Rehabilitation

8.2.2. Removal of infrastructure

All infrastructure must be dismantled and removed. Inert material must be removed from site and disposed of at a registered landfill site. All foundations must be removed to a depth of 1m. Hard surfaced must be ripped to a depth of 1 m and vegetated.

8.2.3. Soil amelioration

The steps that should be taken during the amelioration of soils are as follows:

- » The deposited soils must be ripped to ensure reduced compaction;
- » An acceptable seed bed should be produced by surface tillage;
- » Restore soil fertility;
- » Incorporate the immobile fertilisers in to the plant rooting zone before ripping; and
- » Apply maintenance dressing of fertilisers on an annual basis until the soil fertility cycle has been restored.

8.2.4. Establishment of vegetation

The objective is to restore the project site to a self-sustaining cycle, i.e. to realise the re-establishment of the natural nutrient cycle with ecological succession initiated.

The objectives for the re-vegetation of reshaped and top-soiled land are to:

- » Prevent erosion;
- » Restore the land to the agreed land capability;
- » Re-establish eco-system processes to ensure that a sustainable land use can be established without requiring fertilizer additions; and
- » Restore the biodiversity of the area as far as possible.

8.2.5. Maintenance

Established vegetation requires regular maintenance. If the growth medium consists of low-fertility soils, then regular maintenance will be required until the natural fertility cycle has been restored.

8.2.6. Monitoring

The purpose of monitoring is to ensure that the objectives of rehabilitation are met and that the rehabilitation process is followed. The physical aspects of rehabilitation should be carefully monitored during the progress of establishment of desired final ecosystems.

The following items should be monitored continuously:

- » Erosion status;
- » Surface drainage systems and surface water quality;
- » Vegetation species diversity; and
- » Faunal re-colonisation
- » Regular alien clearing should be conducted every year for 2 years using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible