
AGGENEIS ORANJEMOND 400KV LINE AND SUBSTATIONS UPGRADE PROJECT NORTHERN CAPE PROVINCE

CONSTRUCTION & OPERATION ENVIRONMENTAL MANAGEMENT PROGRAMME (EMP)

Submitted as part of the Draft EIA Report

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PROJECT DETAILS

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Environmental Management Programme: Proposed
Aggeneis-Oranjemond 400 kV Line and Substation
Upgrade Project, Northern Cape Province

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DEFINITIONS AND TERMINOLOGY

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.

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.

Do nothing alternative: The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

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.

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: An operational plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its ongoing maintenance after implementation.

Heritage Resources: That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act of 2000).

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.

Insufficiently known species: Taxa that are suspected but not definitely known to belong to any of the above categories, because of the lack of information (Note, most of South African literature has used the term "Uncertain (U) for this category).

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).

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.

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OVERVIEW OF THE PROJECT

CHAPTER 1

Eskom Holdings Ltd is responsible for the provision of reliable and affordable power to its consumers in South Africa. Electricity cannot be effectively stored and therefore must be used as it is generated. It is, therefore, required that electricity must be efficiently transmitted from the point of generation to the end user.

If Eskom Transmission is to meet its mandate and commitment to supply the ever-increasing needs of end-users, it has to plan, establish and expand its infrastructure of generation capacity and Transmission power lines on an on-going basis, in support of the generation processes. Eskom is currently responding to the growing electricity demand and predicted future demand within South Africa through the establishment of new generation and Transmission capacity in South Africa.

In response to the growing electricity demand within the Northern Cape and to address current supply problems in the area, Eskom Holdings Limited is proposing the establishment of a new 400kV Transmission line which will connect the Aggeneis and Oranjemond substations over an approximate distance of 240km. The proposed project includes the expansion of the existing Aggeneis and Oranjemond substations in order to accommodate the new Transmission line. It is proposed that the Transmission line will be constructed as a 400kV line but will be operated at 220kV for the first 5-10 years. The proposed project forms part of the **Northern Cape Strengthening Project**. This proposed project includes the following:

- » The construction of a new **400 kV Transmission power line** which will connect the Aggeneis and Oranjemond substations. The Transmission power line is expected to be approximately 240 km in length, depending on the final alignment.
- » The **expansion** of both the Aggeneis and Oranjemond Substations to accommodate the new power line.
- » **Associated works** to integrate the proposed new Transmission power line into Eskom's electricity Transmission grid (including the construction of service/access roads etc.).

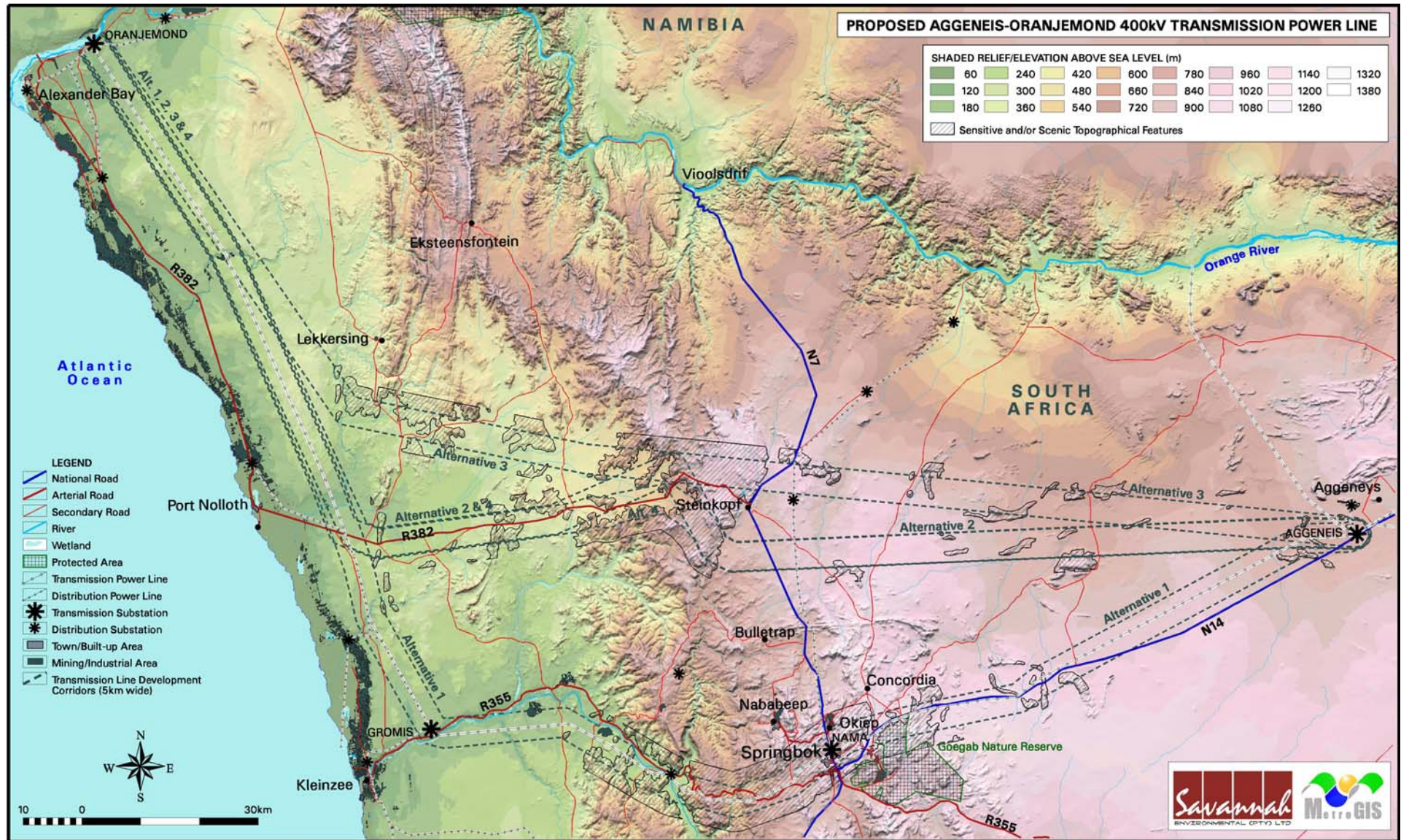


Figure 1.1: Nominated alternative corridors for the Aggeneis-Oranjemond 400kV Line and Substations Upgrade Project

1.1. Project Construction Phase

1.1.1. Construction Camps

It is expected that all construction workers will be accommodated within construction camps outside of any sensitive areas and within the existing accommodation within the study area as far as possible. The construction of the power line will require the establishment of construction camps at appropriate locations along the route. The exact siting of construction camps is required to be negotiated with the relevant landowner/s, and must take cognisance of any no-go and sensitive areas identified by the EIA studies. The location of these construction camps must be approved by the project Environmental Control Officer (ECO).

1.1.2. Construction Process for Transmission Lines

Transmission lines are constructed in the following simplified sequence:

- Step 1:** Determination of technically feasible alternative corridors
- Step 2:** EIA input into route selection
- Step 3:** Negotiation of final route with affected landowners
- Step 4:** Survey of the route (by air)
- Step 5:** Determination of the conductor type
- Step 6:** Selection of best-suited conductor, towers, insulators, foundations
- Step 7:** Final design of line and placement of towers (including final walk-through survey by environmental specialists and compilation of site-specific Environmental Management Programme (EMP)).
- Step 8:** Issuing of tenders, and award of contract to construction companies
- Step 9:** Vegetation clearance and construction of access roads (where required)
- Step 10:** Tower pegging
- Step 11:** Construction of foundations
- Step 12:** Assembly and erection of towers
- Step 13:** Stringing of conductors
- Step 14:** Rehabilitation of disturbed areas and protection of erosion sensitive areas
- Step 15:** Testing and commissioning

Construction of the proposed Aggeneis-Oranjemond 400kV line will take approximately 24 months to complete. Construction crews for the power line and substations upgrade will constitute mainly skilled and semi-skilled workers. It is most likely that construction workers will be accommodated within construction camps which will move along the Transmission line as construction progresses. In the event of construction personnel being sourced from the local communities, the opportunity to travel to-and-from work will present itself. Construction Camps can be located within the construction area but

only in consultation and agreement with the landowner. It is generally preferred that the construction camps be in close proximity to the construction site.

Construction of the Transmission power line is required to be undertaken in accordance with the specifications of this EMP.

1.1.3. Potential Environmental Impacts Associated with the Construction Phase

Potential impacts identified through the EIA process to be associated with the construction of the Transmission power line and substations upgrade include:

- » Impacts on flora and fauna as a result of disturbance and/or loss of sensitive species and habitats.
- » Impacts on avifauna as a result of the disturbance and/or destruction of habitats.
- » Visual impacts associated with the construction phase.
- » Impacts on heritage sites as a result of disturbance or destruction of these sites due to construction activities.
- » Impacts on the social environment as a result of influx of construction workers and job seekers, disruption in daily movement patterns and nuisance impacts (such as noise and dust impacts).

1.2. Project Operation Phase

The expected lifespan of the proposed Transmission power line and substation is expected to be between 35 and 40 years, depending on the maintenance undertaken on the power line and substation structures.

During the life-span of the Transmission power line and substation, on-going maintenance is performed. Power line inspections are undertaken on an average of 1–2 times per year, depending on the area. During this maintenance period, the line is accessed via the access routes established during the construction phase. During maintenance activities on the substation, components may require replacement in order to significantly extend the lifespan of the substation. Maintenance of the power line and substation is required to be undertaken in accordance with the specifications of this Environmental Management Programme (EMP).

The creation of additional employment opportunities during the operational phase of the power lines and substation will be limited, and will be restricted to skilled maintenance personnel employed by Eskom.

1.2.1. Servitude Maintenance Responsibilities

The management of Transmission power line servitudes is dependent on the details and conditions of the agreement between the landowner and Eskom Transmission, and are therefore site-specific. These may, therefore, vary from one location to another. However, it is a common occurrence that there is a dual responsibility for the maintenance of the servitude:

- » Eskom Transmission will be responsible for the tower structures, maintenance of access roads, watercourse crossings, and gates and fences relating to servitude access.
- » The landowner will retain responsibility for the maintenance of the land and land use within the servitude (e.g. cropping activities, veld management, etc.).

Exceptions to the above may arise where, for example dual use is made of the access roads and gates or specific land use limitations are set by Eskom Transmission within the servitude which directly affect the landowner (e.g. the planting of tall trees or erection of permanent structures). Maintenance responsibilities are, ultimately, clearly set out in the servitude agreement which is established between the landowner and Eskom Transmission. Once agreed upon, these maintenance agreement conditions must be deemed to form part of this EMP and must be adhered to at all times.

1.2.2. Potential Environmental Impacts Associated with the Operation and Maintenance Phases

Potential impacts identified through the EIA process to be associated with the operation and maintenance phase of the Transmission power line and substation include:

- » Impacts on flora and fauna as a result of disturbance of sensitive species and habitats during maintenance activities.
- » Impacts on avifauna as a result of collisions with the earth wire of the Transmission line and the disturbance of habitats during maintenance activities.
- » Visual impacts associated with the power line and substations on the surrounding areas.
- » Impacts on heritage sites located within the power line servitude and in surrounding areas.
- » Impacts on the social environment as a result of influx of maintenance workers, nuisance impacts (such as noise and dust impacts during maintenance activities), impacts on sense of place (as a result of the visual impact associated with the Transmission power line and the substations), and impacts on tourism potential.

Although some impacts of potential high significance are associated with the Transmission line and substation upgrades, there are no environmental fatal flaws that

should prevent the proposed line from being constructed within the nominated preferred corridor (i.e. corridor 3 or 2), provided that the recommended no-go areas are adhered to and the recommended mitigation measures are implemented.

PURPOSE & OBJECTIVES OF THE EMP

CHAPTER 2

An Environmental Management Programme (EMP) is defined as “an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented or mitigated, and that the positive benefits of the projects are enhanced”¹. As the construction and maintenance of Transmission power lines and substations can have a major impact on the environment, it is imperative that these activities are managed and mitigated so that unnecessary or preventable environmental impacts do not result.

The objective of this EMP 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 EMP is to help ensure compliance with recommendations and conditions specified through an EIA process, as well as to ensure continuous improvement of environmental performance, reducing negative impacts and enhancing positive effects during the construction and operation of the project. An effective EMP is concerned with both the immediate outcome as well as the long-term impacts of the project.

An Environmental Management Programme (EMP) provides a link between the impacts predicted and mitigation measures recommended within the EIA report, and the construction and operational activities of a project.

The draft EMP has the following objectives:

- » To outline mitigation measures, and environmental specifications which are required to be implemented for the planning, construction, rehabilitation and operation/maintenance phases of the project in order to minimise the extent of environmental impacts, and to manage environmental impacts associated with the Aggeneis-Oranjemond 400 kV Line and Substation Upgrade Project.
- » To identify measures that could optimise beneficial impacts.
- » To ensure that the construction and operational phases do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits are enhanced.

¹ Provincial Government Western Cape, Department of Environmental Affairs and Development Planning: *Guideline for Environmental Management Plans*. 2005

- » To ensure that all environmental management conditions and requirements as stipulated in the Environmental Authorisation (once issued) are implemented throughout the project life-cycle.
- » To ensure that all relevant legislation (including national, provincial and local) is complied with during the construction and operation phases
- » To identify entities who will be responsible for the implementation of the measures and outline functions and responsibilities.
- » To propose mechanisms for monitoring compliance, and preventing long-term or permanent environmental degradation.
- » To facilitate appropriate and proactive responses to unforeseen events or changes in project implementation that were not considered in the EIA process.

The draft EMP has been developed as a set of environmental specifications (i.e. principles of environmental management for the Aggeneis-Oranjemond 400 kV Line and Substation Upgrade Project), which are appropriately contextualised to provide clear guidance in terms of the implementation of these specifications within the project area.

It should be noted that since this EMP is part of the EIA process undertaken for the proposed Aggeneis-Oranjemond 400 kV Line and Substation Upgrade Project, it is important that this guideline document be read in conjunction with the Draft EIA Report (September 2011) and Environmental Authorisation (once issued). This will contextualise the EMP and enable a thorough understanding of its role and purpose in the integrated environmental process. This draft EMP for construction and operation activities has been compiled in accordance with Section 33 of the EIA Regulations of June 2010, and will be further developed in terms of specific requirements listed in any authorisations issued for the proposed project. This EMP will be further supported by the Eskom Transmission Draft Environmental Management Programme (which has been compiled in fulfilment of ISO 14001 requirements, forms part of the construction and maintenance contracts, and is supplementary to Eskom's TRMSCAAC1 REV 3 – refer to Appendix A), as well as method statements to be detailed by the contractors.

This EMP should be considered a dynamic document, requiring regular review and updating as new information becomes available in order for it to remain relevant to the requirements of the site and the environment.

STRUCTURE OF THIS EMP

CHAPTER 3

The first two chapters provide background to the EMP (including objectives and purpose) and the proposed project. The chapters which follow consider the:

- » Planning and design activities
- » Construction activities
- » Operation activities
- » Decommissioning activities

These chapters set out the procedures necessary for Eskom to achieve environmental compliance. For each of the phases of the Aggeneis-Oranjemond 400 kV Line and Substations Upgrade Project, an over-arching environmental **goal** is stated. In order to meet this goal, a number of **objectives** are listed. **Performance indicators** for auditing purposes and **monitoring** requirements are also detailed for each objective. The management programme has been structured in table format in order to show the links between the goals for each phase and their associated objectives, activities/risk sources, mitigation actions monitoring requirements and performance indicators. A specific environmental management programme table has been established for each environmental objective. The information provided within the EMP table for each objective is illustrated below:

OBJECTIVE: Description of the objective, which is necessary in order to meet the overall goals; these take into account the findings of the environmental impact assessment specialist studies

Project component/s	List of project components affecting the objective, e.g.: » power line » substations upgrade » access roads
Potential Impact	Brief description of potential environmental impact if objective is not met
Activity/risk source	Description of activities which could impact on achieving the objective
Mitigation: Target/Objective	Description of the target; include quantitative measures and/or dates of completion

Mitigation: Action/control	Responsibility	Timeframe
List specific action(s) required to meet the mitigation target/objective described above.	Who is responsible for the measures	Time periods for implementation of measures

Performance Indicator	Description of key indicator(s) that track progress/indicate the effectiveness of the management plan.
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 EMP tables are required to be reviewed and possibly modified whenever changes, such as the following, occur:

- » Planned activities change (i.e. in terms of the alignment of the power line within the approved corridor).
- » Modification to or addition to environmental objectives and targets.
- » Additional or unforeseen environmental impacts are identified.
- » Relevant legal or other requirements are changed or introduced.
- » Significant progress has been made on 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 draft EMP was compiled by:

	Name	Company
EMP Compilers:	Gerhard Cronje	Savannah Environmental
	Jo-Anne Thomas	Savannah Environmental
Specialists:	David Hoare – Ecology specialist	David Hoare Consulting cc
	Luke Strugnell and Jon Smallie – Avifauna specialists	Endangered Wildlife Trust
	Lourens du Plessis – Visual specialist	MetroGIS
	Lita Webley – Heritage specialist	ACO Associates
	Ingrid Snyman – Social specialist	Batho Earth

The Savannah Environmental Team has extensive knowledge and experience in environmental impact assessment and environmental management, having been

involved in Environmental Impact Assessment processes over the past ten (10) years. They have managed and drafted Environmental Management Programmes for other Transmission projects for Eskom Holdings Limited throughout South Africa.

MANAGEMENT PLAN FOR THE AGGENEIS-ORANJEMOND 400 KV LINE AND SUBSTATIONS UPGRADE PROJECT:

PLANNING & DESIGN

CHAPTER 4

4.1. Goal for Planning and Design

Overall Goal for Planning and Design: Undertake the planning and design phase of the Aggeneis-Oranjemond 400 kV Line and Substations Upgrade Project in a way that:

- » Ensures that the design of the project components responds to the identified environmental constraints and opportunities.
- » Ensures that adequate regard has been taken of landowner concerns and that these are appropriately addressed through planning and design (where appropriate and possible).
- » Ensures that the best environmental options are selected for all components of the project.
- » Enables the required construction activities to be undertaken without significant disruption to other land uses in the area.

4.2. Objectives for Planning and Design

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

***OBJECTIVE:** To ensure that the design of the project responds to the identified environmental constraints and opportunities*

In terms of the conclusions of the specialist investigations undertaken for the proposed Aggeneis-Oranjemond 400 kV Line and Substations Upgrade Project, the nominated preferred alternatives are:

- » **Upgrade** of the existing Aggeneis and Oranjemond substations. Expansion of the **Oranjemond Substation** must take place towards the east or west within the existing substation site, but not to the north, where a small koppie shields the site from the Orange River.
- » Construction of a **new 400kV Transmission power line** between the Aggeneis Substation and the Oranjemond Substation, as follows:

- * Construction of the new Aggeneis-Oranjemond 400 kV Transmission line within **Corridor 3**.
- » **Associated works** to integrate the proposed new Transmission power line into Eskom's electricity Transmission grid.

The following conditions of this recommendation must, however, be met:

- » All mitigation measures detailed within the draft EIA report and the specialist reports must be implemented.
- » This draft Environmental Management Programme (EMP) should form part of the contract with the Contractors appointed to construct and maintain the proposed Aggeneis-Oranjemond 400 kV Line and Substations Upgrade Project, and will be used to ensure compliance with environmental specifications and management measures. The implementation of this EMP for all life cycle phases of the proposed project is considered to be key in achieving the appropriate environmental management standards as detailed for this project.
- » Applications for all other relevant and required permits required to be obtained by Eskom must be submitted to the relevant regulating authorities. This includes permits for the transporting of all components (abnormal loads) to site and disturbance of protected vegetation.
- » The alignment of the power line within the preferred corridor must be negotiated and designed to avoid the sensitive areas identified (as defined in the EIA report). It must be noted that avoiding these areas does not preclude the marking of the proposed power lines in other areas. It is likely that extensive marking will be required within the preferred corridor owing to the open nature of the vegetation and its ability to support the large terrestrial bird species recorded in the area. These areas will be required to be identified during the site specific walk down during the final EMP phase of the project.

In addition, once the final Transmission power line route has been negotiated, surveyed and pegged, a walk-through survey must be undertaken by suitably qualified specialists as follows:

- » An ornithologist must identify the exact power line spans requiring marking in order to minimise the risk of collision of birds with the earth wire. Recommendations must be made regarding the installation of bird guards on all self-supporting towers according to the existing Eskom guidelines. This will prevent birds from perching in high risk areas on the towers directly above live conductors.
- » An ecological specialist must conduct a final walkthrough before construction in order to identify and relocate any possible plant species of conservation importance as well as the location and number of protected tree species. If any populations of species of concern are encountered, then the individual tower structure must be shifted to avoid impacting on the specific habitat of concern.

- » A heritage specialist must conduct a final walkthrough before construction in order to identify any important heritage resources which must be avoided. The transmission line should be rerouted or realigned in order to avoid heritage sites and heritage resources can be conserved unaffected underneath power lines.

Project component/s	Project components affecting the objective: <ul style="list-style-type: none"> » Power line towers » Existing Substation sites » access roads
Potential Impact	<ul style="list-style-type: none"> » Design fails to respond optimally to the environmental considerations » Power line route design that degrades the environment unnecessarily, particularly with respect to visual aesthetics, loss of indigenous flora, erosion, impacts on heritage resources, and impacts on local communities/residents
Activities/risk sources	<ul style="list-style-type: none"> » Alignment of power line and positioning of towers and access roads within the approved power line corridor
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure that the design of the project components respond to the identified environmental constraints and opportunities » To ensure selection of best environmental option for alignment for the power lines

Mitigation: Action/control	Responsibility	Timeframe
Undertake negotiations with affected landowners within the approved power line corridor and agree on landowner-specific conditions for construction and maintenance	Negotiator	Planning Phase
Eskom must consult with the Northern Cape Heritage Authority regarding the crossing of the Richtersveld World Heritage Site.	Eskom	Planning Phase
Should Corridor 4 be selected as the overall preferred option, then this will require extensive mitigation on the escarpment area to the west of Steinkopf, to ensure that there are no direct impacts on the Anenous Pass, "Meulpad", old railway line or any other pre-colonial or colonial heritage resources which are concentrated in this area. This will require a walk down of the proposed location of the transmission lines and micro-siting of the towers to ensure that impacts are minimised.	Eskom	Planning Phase
As far as possible, formally protected areas should be avoided by the final routing of the power line.	Eskom	Planning and Design
Undertake a detailed geotechnical survey of the proposed Transmission line tower positions in order to fully understand the soils in terms of founding conditions and erosion potential.	Eskom	Design Phase

Mitigation: Action/control	Responsibility	Timeframe
Undertake specialist walk-through surveys of each tower footprint in terms of ecology, heritage and avifaunal aspects.	Specialist consultants	Planning & Design Phase
Consider planning and design level mitigation measures recommended by the specialists following the walk-through survey.	Engineering Design Consultant	Design Phase
Ensure that any riparian areas are spanned/ towers are not placed within close proximity to rivers, streams. Ensure placement of footprints outside 1:100 year floodlines. Crossing of riparian systems by access roads should take place existing/ approved crossing points as far as possible, taking due care to prevent additional/ new impacts	Eskom	Planning phase
Ensure that bird-friendly power line towers and conductor designs are used.	Eskom Distribution design team	Design Phase
Balance technical and financial considerations against environmental constraints and opportunities in finalising the design of key elements (such as the tower design and required servitude width).	Eskom	Tender Design & Design Phase
Tower design should be carefully considered as it could limit negative construction related impacts.	Engineering Design Consultant	Planning & Design Phase
Conditions stipulated by property owners during negotiation in terms of the construction activities should be implemented and monitored.	Eskom	Duration of contract
When finalising tower locations and access roads - avoid positions along lower slopes of mountains and hills, near rocky koppies, over pans and on the banks of rivers (such as Holgat River). These are all sensitive.	Contract archaeologist to undertake a walkdown of selected pylon positions particularly those identified as sensitive	Planning and design
Avoid old roads, bridges, railway lines, buildings, stone kraals, stockposts, old mining features, Anglo Boer War features etc.	Contract archaeologist to undertake a walkdown of sensitive pylon positions, servitude roads and construction camps	Planning and design
Avoid building pylons and road in close proximity to stockposts in communal areas	Eskom negotiator to discuss proposed route with communities.	Planning and design
Update Construction EMP with findings and	Eskom/ specialist	Planning

Mitigation: Action/control	Responsibility	Timeframe
recommendations from the specialist walk-through survey and submit to DEA for approval.	consultants	

Performance Indicator	<ul style="list-style-type: none"> » Design meets objectives and does not degrade the environment. » Design responds to the mitigation measures and recommendations in the EIA report and recommendations of the specialist walk-through surveys. » Final surveyed route alignment minimises any negative environmental impacts and maximises any benefits.
Monitoring	<ul style="list-style-type: none"> » Ensure that the design implemented meets the objectives and mitigation measures in the EIA report through review of the design by the Project Manager and Environmental Control Officer (ECO) prior to the commencement of construction.

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

For a 400kV Transmission power line, a servitude of approximately 55 m is required. This servitude is established along the entire length of the power line, for which the affected landowner is required to be appropriately compensated. Within this servitude, Eskom Transmission has certain rights and controls that support the safe and effective operation of the power line. The negotiation process for this servitude is undertaken by Eskom Transmission directly with the appropriate landowner and culminates in the signing of a servitude agreement. Here Eskom Transmission enters into a legal agreement with the landowner. The agreements will detail such aspects as the exact location and extent of the servitude, and access arrangements and maintenance responsibilities, as well as any specific landowner requirements for construction and maintenance of the power line, as well as regarding rehabilitation measures.

Project component/s	Project components affecting the objective: <ul style="list-style-type: none"> » Power line » access roads
Potential Impact	<ul style="list-style-type: none"> » Landowners impacted by proposed alignment of the power line, positioning of towers and access road/s
Activities/risk sources	<ul style="list-style-type: none"> » Positioning of towers and access roads » Alignment of power line and placement of towers within the approved corridor » Positioning of access roads
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure adequate regard has been taken of concerns of affected and surrounding landowners and that these are appropriately

	addressed » Minimise potential impacts on local land use and business potential
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Mitigation: Action/control	Responsibility	Timeframe
Initiate negotiations with all affected landowners timeously.	Eskom Lands and Rights	Ideally initiated together with submission of final EIA. Finalised prior to construction.
Address reasonable expectations/requests of landowners, where possible.		
Avoid the resettlement and/or displacement of households as far as possible. If resettlement is unavoidable, compensate at market related rates for property value loss as indicated by an independent valuations expert.	Eskom Lands and Rights	Planning phase
Eskom should discuss the construction schedule and activities with the affected farmers and property owners of the affected stock posts to enable them to plan their farming activities and animal movement accordingly	Eskom and Contractor	Pre-Construction Construction
Careful consideration should be given to the final route alignment and tower placements to limit the negative impact on properties as far as possible	Engineering Design Consultant	Planning phase
Careful consideration should be given to the tower designs in relation to landowner requirements in this regard.	Engineering Design Consultant	Planning phase
Where possible, towers should be placed on the boundary of properties	Engineering Design Consultant	Planning phase
Route Transmission line as far away from existing structures as possible	Engineering Design Consultant	Planning phase
Careful consideration should be given to the final route alignment and tower placements to limit the negative impact on existing and planned developments and activities on the affected properties.	Engineering Design Consultant	Planning phase
Secured areas around facilities on the farms and property should be avoided by construction workers.	Engineering Design Consultant	Planning phase
A specific contact person within the project team should be identified to allow community members and property owners to easily direct their queries and concerns and obtain general information regarding the construction process.	Eskom	Planning phase & continuing throughout project implementation
Residents should be informed of the construction activities and schedules prior to the construction workforce entering any property.	Eskom	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
Eskom should liaise with landowners and developers in the area, including members of farmers associations during the negotiation phase of the project to ensure a route alignment which would ensure the protection of the land value and resources and which would also be to the socio-economic benefit of the communities.	Eskom	Planning phase

Performance Indicator	<ul style="list-style-type: none"> » Appropriate and fair negotiation should be undertaken with all affected landowners. » Landowners should be afforded reasonable and appropriate rights/access.
Monitoring	<ul style="list-style-type: none"> » Not applicable.

MANAGEMENT PLAN FOR THE AGGENEIS-ORANJEMOND 400 KV LINE AND SUBSTATIONS UPGRADE PROJECT:

CONSTRUCTION

CHAPTER 5

5.1. Overall Goal for Construction

Overall Goal for Construction: Undertake the construction phase of the Aggeneis-Oranjemond 400 kV Line and Substations Upgrade Project in a way that:

- » Ensures that construction activities are properly managed in respect of environmental aspects and impacts.
- » Enables the construction activities to be undertaken without significant disruption to other land uses in the area, in particular with regard to effects on local residents, farming practices, traffic and road use, and noise impacts.
- » Minimises the impact on the vegetation, fauna, avifauna and habitats within the area, and where possible adds to the botanical record of this area.
- » Minimises the impact on the archaeological and historical value of the area, and where possible adds to the archaeological record of this area.

This section should be read in conjunction with Eskom Transmission's Draft Environmental Management Programme (EMP) for construction, which is included within Appendix A. Generic environmental specifications and guidelines included within this draft EMP are not repeated here.

5.2. Project Responsibilities and Reporting Structure during the Construction Phase

Several professionals will form part of the construction team. The most important from an environmental perspective are the **Project Manager/Site Manager**, the **Environmental Control Officer** (ECO), the **contractor** and the **developer**.

The Project Manager/Site Manager represents and acts on behalf of Eskom Transmission regarding the administration of contracts, and is responsible for the implementation of the EMP on the site during the pre-construction and construction phases of the project. The ECO is responsible for monitoring the implementation of the EMP during the design, pre-construction and construction phases of the project. The contractor is responsible for abiding by the mitigation measures of the EMP which are implemented by the Project Manager during the construction phase.

Figure 5.1 details the reporting structure for the construction phase of the Transmission power lines and substation.

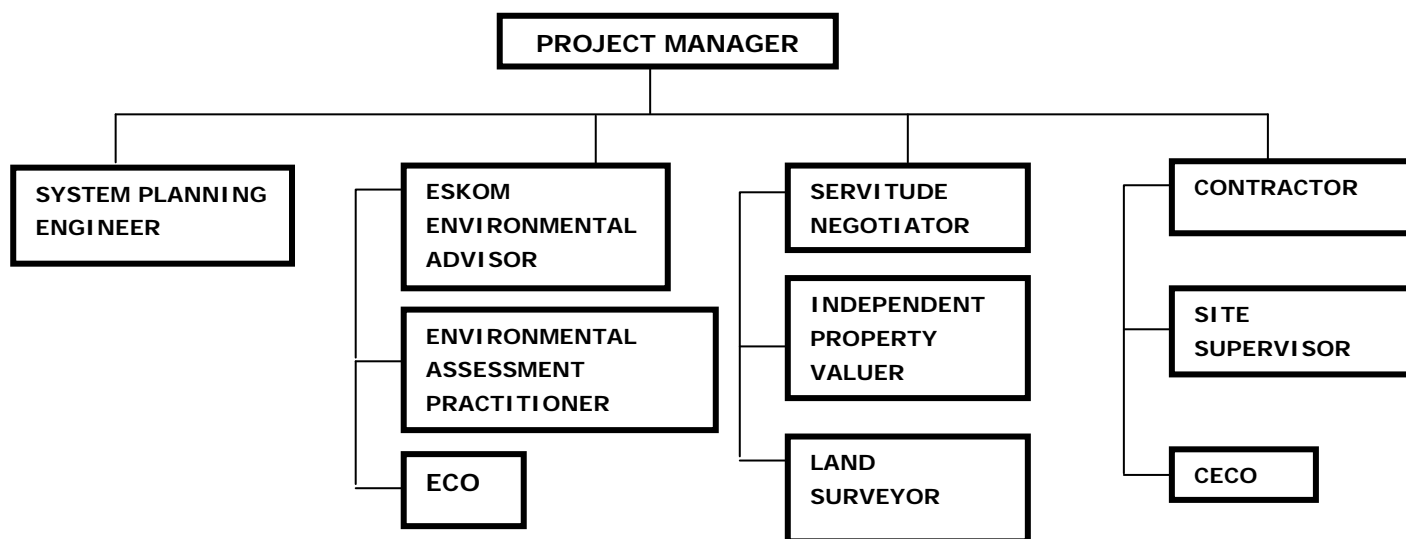


Figure 5.1: Reporting structure for the construction phase of a Transmission power line (as per the Eskom Transmission Draft EMP – refer to Appendix A)

The developer (i.e. Eskom Transmission) is responsible for the implementation of the EMP during the operational and decommissioning phases of the project. Decommissioning will entail the appointment of a new professional team and responsibilities will be similar to those during the design, pre-construction and construction phases.

Specific responsibilities of each of these parties are detailed in the sections which follow.

5.2.1. Project Manager/Site Manager

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

- » Be aware of the findings and conclusions of the Environmental Impact Assessment and the conditions stated within the Environmental Authorisation (once issued).
- » Be familiar with the recommendations and mitigation measures of this EMP, and implement these measures.
- » Monitor site activities on a daily basis for compliance.
- » Conduct internal audits of the construction site against the EMP.
- » Confine the construction site to the demarcated area.
- » Rectify transgressions through the implementation of corrective action.

5.2.2. Environmental Control Officer

The Environmental Control Officer is responsible for the implementation of the EMP during the construction phase, as well as for liaison between Eskom, the Contractor and the Landowners. The following tasks will fall within his/her responsibilities:

- » Be aware of the findings and conclusions of the Environmental Impact Assessment and the conditions stated within the Environmental Authorisation (once issued).
- » Be familiar with the recommendations and mitigation measures of this EMP.
- » Convey the contents of this document, the conditions of the Record of Decision (Environmental Authorisation) from DEA as well as the Landowner Special Conditions to the Contractor site staff and discuss the contents in detail with Eskom Project Manager and Contractor at a pre-construction meeting.
- » Educate the construction team about the management measures stipulated within the EMP and Environmental Authorisation. This formal induction training is a requirement of ISO 14001 and shall be done with all main and sub-contractors. Records of the training date, people who attended and discussion points shall be kept by the ECO.
- » Undertake regular liaison with the construction team and the project leader.
- » Conduct weekly / monthly audits of the construction site according to the EMP and Environmental Authorisation.
- » Maintain records of non-compliance with the conditions of the Environmental Authorisation and the EMP.
- » Recommend corrective action for any non-compliance incidents on the construction site.
- » Report progress made on a monthly basis to the Project Manager/Site Manager and Land & Rights EIA Manager. These reports shall be available at all times, on site or in project file and on request by auditors, DEA and other I&APs.
- » Independently report to DEA in terms of compliance with the specifications of the EMP and conditions of the Environmental Authorisation (once issued).
- » All negotiations for any reason shall be between the ECO, the affected parties and the Contractor. No verbal agreements shall be made. All agreements shall be recorded in writing and all parties shall co-sign the documentation.
- » The affected parties shall always be kept informed about any changes to the construction programme should they be involved. If the ECO is not on site the Contractor should keep the affected parties informed. The contact numbers of the Contractor and the ECO shall be made available to the affected parties. This will ensure open channels of communication and prompt response to queries and claims.

5.2.3. Contractor

The contractor is responsible for the implementation and compliance with recommendations and conditions of the EMP.

- » Ensure compliance with the EMP at all times during construction.
- » Provide all necessary supervision during the execution of the project. He/ She should be available on site all the time.
- » Comply with special conditions as stipulated by landowners during the negotiation process.
- » Inform and educate all employees about the environmental risks associated with the various activities to be undertaken, and highlight those activities which should be avoided during the construction process in order to minimise significant impacts to the environment.
- » Maintain an environmental register which keeps a record of all incidents which occur on the site during construction. These incidents include:
 - * Public involvement / complaints
 - * Health and safety incidents
 - * Hazardous materials stored on site
 - * Non-compliance incidents
- » Where construction activities are undertaken is close to any inhabited area, the necessary precautions shall be taken by the Contractor to safeguard the lives and property of the inhabitants.
- » The Contractor shall under no circumstances interfere with the property of landowners, Grid staff or nearby communities.
- » Should the Contractor require clarity on any aspect of the EMP the Contractor must contact the Environmental Consultant/Officer for advice.

5.3. Environmental Monitoring

A monitoring programme shall be implemented for the duration of the construction phase of the project. This programme must include:

- » Two weekly audits during the first month where-after monthly audits should be conducted by the ECO, which are according to the EMP and Environmental Authorisation's conditions. These audits can be conducted randomly and do not require prior arrangement with the Project Manager.
- » Compilation of an audit report with a rating of the compliance with the EMP. This report must be submitted to the relevant authorities (i.e. DEA).

The ECO shall keep a photographic record of any damage to areas outside the demarcated site area. The date, time of damage, type of damage and reason for the damage shall be recorded in full to ensure the responsible party is held liable. All claims for compensation emanating from damage shall be directed to the ECO for appraisal. The Contractor shall be held liable for all unnecessary damage to the environment. A register shall be kept of all complaints from the landowner, Grid or community. All complaints/claims must be handled immediately to ensure timeous rectification/ payment by the responsible party.

5.4. Objectives for Construction

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

OBJECTIVE: Environmentally sensitive location of construction equipment camps along the power line servitude and at the substation site

Due to the remoteness of the project area, it is expected that all construction workers will be required to be accommodated within construction camps outside of any sensitive areas and within the existing accommodation within the study area as far as possible.

Project component/s	Project components affecting the objective: <ul style="list-style-type: none"> » power lines » access roads » construction camps
Potential Impact	<ul style="list-style-type: none"> » Damage to protected / endangered vegetation » Damage to and/or loss of topsoil » Compacting of ground » Impacts on the surrounding environment due to inadequate sanitation and waste removal facilities at construction crew camp
Activities/risk sources	<ul style="list-style-type: none"> » Bush clearing and levelling of equipment storage area/s » Access to and from the equipment storage area/s » Construction crew camp
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise impacts on the social and biophysical environment. » To limit equipment storage to within the demarcated site

Mitigation: Action/control	Responsibility	Timeframe
Before construction commences, representatives from the local authority and community-based organisations (e.g. residents associations), as well as neighbouring residents should be informed of the details of the construction company, size of the workforce and construction schedules.	Eskom	Pre-construction
The exact siting of construction equipment camp/s shall be negotiated with the relevant landowner, and must take cognisance of any no-go and sensitive areas identified by the EIA studies. The location of this construction equipment camp (or camps) shall be approved by the project Environmental Control Officer (ECO).	Contractor	Pre-construction
Undertake search and rescue of Red Data and protected	Specialist &	Pre-construction

Mitigation: Action/control	Responsibility	Timeframe
plant species prior to the establishment of the equipment storage area. A permit shall be obtained from the provincial conservation authority prior to this being undertaken.	Contractor	
Minimise bush clearing and levelling for equipment storage areas.	Contractor	Erection: during site establishment Maintenance: for duration of Contract
Minimise the possibility of erosion due to removal of vegetation through the implementation of appropriate erosion control measures.	Contractor	Erection: during site establishment Maintenance: for duration of Contract
Establish the necessary ablution facilities with chemical toilets should such facilities not be available at the construction crew camp at commencement of construction.	Contractor	Erection: during site establishment Maintenance: for duration of Contract
Supply a wastewater management system that will comply with legal requirements and be acceptable to Eskom.	Contractor	Pre-construction
Provide adequate sanitary facilities and ablutions for construction workers (1 toilet per every 15 workers) at appropriate locations along the servitude.	Contractor	Erection: during site establishment Maintenance: for duration of Contract within a particular area
Ablution or sanitary facilities should not be located within 100 metres from a 1:100 year flood line including water courses, wetlands or within a horizontal distance of less than 100 metres, whichever is applicable.	Contractor	During site establishment, construction and maintenance
Supply appropriate and adequate waste collection bins at construction equipment camps and at site where construction is being undertaken.	Contractor	Erection: during site establishment Maintenance: for duration of Contract within a particular area
Dispose of all solid waste collected at an appropriately	Contractor	Erection: during

Mitigation: Action/control	Responsibility	Timeframe
registered waste disposal site. The disposal of waste shall be in accordance with all relevant legislation. Under no circumstances may waste be burnt or buried on site.		site establishment Maintenance: for duration of Contract within a particular area
Where a registered waste site is not available close to the construction site, provide a method statement with regard to appropriate waste management practices.	Contractor	Site establishment
Rehabilitate all disturbed areas along the servitude and at the construction camps as soon as construction is complete within an area.	Contractor	Duration of Contract
Rehabilitate all disturbed areas at the substation sites not occupied by permanent infrastructure as soon as construction is complete.	Contractor	Duration of Contract
Dedicate a specific area for fires for cooking purposes (if required) and ensure that all electrical wiring of other cooking equipment complies with the relevant standards.	Contractors	Construction
Embark on an HIV/Aids and Health and Safety Campaign through presentations, posters and even workshops in the local languages.	Contractors	Construction
Limit noise generating activities to normal working hours, e.g. 6am to 6pm.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » Written agreement between landowner and Contractor regarding occupation of the construction site. » No visible erosion scars once construction in an area is completed. » No claims regarding damage leading to litigation due to unauthorised removal of vegetation. » All damaged areas successfully rehabilitated one year after completion » No damage to wet areas. » Appropriate waste management.
Monitoring	<ul style="list-style-type: none"> » Regular audits of the construction camps and areas of construction along the servitude. » An incident reporting system (which is in line with Eskom's requirements in this regard) should be used to record non-conformances to the EMP.

OBJECTIVE: Securing of the site

The Contractor must take all reasonable measures to ensure the safety of the public in the surrounding area during the construction phase. 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 all appropriate languages for the area, all to the approval of the Site Manager.

Care should be taken that the construction activities do not pose any safety risks to the animals (especially the livestock and game) or to children.

Concerns relating to possible theft of animals and animal losses due to gates being left open must also be addressed. All unattended open excavations shall be adequately demarcated and/or fenced (fencing shall consist of a minimum of three strands of wire wrapped with danger tape). Adequate protective measures must be implemented to prevent unauthorised access to the working area and the access routes.

Project component/s	Project components affecting the objective: » power lines » access roads » contractors camps
Potential Impact	» Hazards to landowners and public » Security of materials and equipment
Activities/risk sources	» Open excavations (foundations) » Movement of construction vehicles in the area and within the servitude
Mitigation: Target/Objective	» To secure the site against unauthorised entry » To protect members of the public/landowners/residents

Mitigation: Action/control	Responsibility	Timeframe
Secure site, working areas and excavations in an appropriate manner, as agreed with the SHE Representative and ECO.	Contractor	Erection: during site establishment Maintenance: for duration of Contract
Where necessary to control access, fence and secure the area.	Contractor	Erection: during site establishment Maintenance: for duration of Contract

Mitigation: Action/control	Responsibility	Timeframe
Fence and secure Contractor's equipment camp.	Contractor	Erection: during site establishment Maintenance: for duration of Contract
The construction sites should be fenced off to avoid any unauthorised individuals entering the site	Contractor	During of construction

Performance Indicator	<ul style="list-style-type: none"> » Site is secure and there is no unauthorised entry. » No members of the public/ landowners injured.
Monitoring	<ul style="list-style-type: none"> » Regular visual inspection of fence for signs of deterioration/forced access. » An incident reporting system (which is in line with Eskom's requirements in this regard) should be used to record non-conformances to the EMP.

OBJECTIVE: Maximise local employment and business opportunities associated with the construction phase

The majority of the economic active population only have experience in the primary sector (mainly farming and mining). Due to the specialised work to be undertaken during the construction phase, few locals would be able to comply with the necessary requirements to fill the semi-skilled and skilled positions. These positions are furthermore usually filled by the employees of the subcontractor. It is therefore not expected that the proposed project would have significant positive impacts with regards to employment opportunities in the area.

Limited opportunities for manual labour would exist where the local contractor could make use of locals to assist with some activities associated with the construction of the transmission line and the upgrading of the substations (e.g. the installation of gates, fencing, access roads, etc.).

Project component/s	Construction and establishment activities associated with the establishment of the power line and substations upgrade and associated infrastructure.
Potential Impact	The opportunities and benefits associated with the creation of local employment and business should be maximised.
Activities/risk sources	<ul style="list-style-type: none"> » Contractors who make use of their own labour thereby reducing the employment and business opportunities for locals as well as the inflow

	<p>of various specialists from outside the study area and even abroad.</p> <ul style="list-style-type: none">» Sourcing of individuals outside the municipal area.
Mitigation: Target/Objective	<p>Eskom should aim to employ a maximum number of the low-skilled to semi-skilled workers from the local area where possible. This should also be stipulated in the tender documentation and contractors should adhere to this guideline. Inputs from the three affected Local Municipalities in this regard would be critical.</p>

Mitigation: Action/control	Responsibility	Timeframe
Employment of local community members (e.g. source labour from within the municipal area focused on the communities in closest proximity to the construction areas should be undertaken where possible.	Eskom, RLM, NKLM, & KMLM Contractor	Pre-Construction
A broad-based approach should be followed to identify and involve relevant organisations which could assist the main contractor and Eskom in identifying local people whose skills may correspond with the job specifications.	Eskom, NKLM, RLM & KMLM & Contractor	Pre-Construction
An equitable process should be promoted whereby locals and previously disadvantaged individuals and women from the area are taken into account.	NKLM, RLM & KMLM and Eskom	Pre-Construction
Create conditions that are conducive for the involvement of entrepreneurs, small businesses, and SMMEs during the construction process.	NKLM, RLM & KMLM, Eskom and Contractor	Pre-Construction
Tender documentation should contain guidelines for the involvement of labour, entrepreneurs, businesses and SMMEs from the local sector.	Eskom and Contractor	Pre-Construction
A local labour desk should be set-up (if not already established) in the beneficiary communities to co-ordinate the process of involving local labour.	NKLM, RLM & KMLM and Contractor	Pre-Construction
Communication efforts concerning job creation opportunities should refrain from creating unrealistic expectations.	Eskom	Pre-Construction and Construction

Performance Indicator	<ul style="list-style-type: none"> » Job opportunities, especially of low to semi-skilled positions, are primarily awarded to members of local communities. » Locals and previously disadvantaged individuals and women are taken into account during the hiring process. » SMMEs are awarded with contracts during the construction phase. » Labour, entrepreneurs, businesses, and SMMEs from the local sector are awarded with jobs, based on requirements in the Tender Documentation. » The involvement of local labour is promoted. » Reports are not made from members of the local communities regarding unrealistic employment opportunities or that only outsiders were employed.
Monitoring	<ul style="list-style-type: none"> » Eskom and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.

OBJECTIVE: Minimise the impact of the inflow of an outside workforce and job seekers into the study area

Project component/s	Inflow of an outside workforce and jobseekers during construction phase
Potential Impact	<ul style="list-style-type: none"> » Security and safety issues and intrusion impacts for the local communities due to an influx of people. » Conflict between local jobseekers and newcomers. » Possible degradation of the environment.
Activity/risk source	<ul style="list-style-type: none"> » Lack in sanitation facilities and a general mismanagement of the areas where job seekers gather. » An oversupply of job seekers (outsiders) thereby increasing the local unemployment base and competing with local job seekers for employment. » Outsiders remaining in the area after the construction phase would put additional pressure on local government for housing and services.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » The contractor should liaise with the NKLM, KMLM and RLM and use existing databases of local workers, if available. The labour desk should be set up at a locality posing the minimum disturbances for neighbouring communities. » A transparent approach and open consultation with adjacent property owners, prior and throughout the construction period will further provide a platform where grievances or requests can be addressed before issues become contentious.

Mitigation: Action/control	Responsibility	Timeframe
Construction workers falling within the semi-skilled to unskilled category should be sourced from the local population where possible	Contractor	Pre-Construction
Local labourers should remain at their existing residences as far as possible.	Contractor	Construction
Maintain normal working hours (e.g. 6 am to 6 pm on weekdays).	Contractor	Construction
Before construction commences, representatives from the local municipalities, community leaders, community-based organisations and the surrounding property owners (of the larger area) should be informed of the details of the contractors, size of the workforce and construction schedules.	Eskom and contractor	Pre-Construction
Security on-site should be active prior to the construction period.	Eskom	Pre-Construction

Mitigation: Action/control	Responsibility	Timeframe
Construction workers to wear identity tags and are not allowed to trespass on private properties or work outside of designated areas.	Environmental Control Officer & Contractor	Construction
Care should be taken to avoid conflict between the local communities and the "outside" workforce.	Eskom	Construction
Sufficient water and sanitation facilities should be provided for the workers on site during the construction period.	Contractor	Construction
The construction site and accommodation facility should be properly managed to avoid any environmental pollution (due to inadequate water and waste infrastructure and services) and littering.	Environmental Control Officer & Contractor	Construction
The construction camp should be properly fenced	Contractor	Construction
The applicant, local leaders and the NKLM, RLM and KMLM should jointly develop a strategy to minimise the influx of jobseekers to the area.	Eskom, local leaders NKLM, RLM and KMLM	Pre-Construction Construction
Information distributed as part of an HIV/Aids awareness campaigns should be focused on and communicated to the local workforce.	Eskom & Contractors	Construction
Develop a transparent communication and recruitment process to minimise the influx of jobseekers to the area.	Eskom, local leaders and the NKLM, RLM & KMLM	Pre-construction
The recruitment process and the use of contractors should be clearly communicated to the local communities.	Eskom	Pre-construction
The communication strategy should ensure that unrealistic employment expectations are not created.	Eskom	Pre-construction & Construction

Performance Indicator	<ul style="list-style-type: none"> » Reports to the Municipality or community organisations are not made of outsiders that are being employed. » The SAPS and community organisations do not report any criminal activities that could be associated with the construction phase and construction workers. » The involvement of local labour is promoted. » Reports to the relevant Municipalities or community organisations are not made of noise, visual or other intrusion impacts. » Sufficient ablution facilities available and no pollution takes place at the areas where the jobseekers gather or where the construction workers are housed. » No conflict between outsiders, jobseekers and local community members occur.
Monitoring	<ul style="list-style-type: none"> » Eskom and/or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase. » An incident reporting system (which is in line with Eskom's

requirements in this regard) should be used to record non-conformances to the EMP.

OBJECTIVE: To minimise the potential impact on the daily living and movement patterns and farming activities

Sheep and goat farming and to a lesser extent cattle farming, as well as mining activities mainly characterise the study area. Due to the vastness of the study area and size of the farms it is not expected that the construction of the proposed transmission line would have more than a very limited temporary intrusion impact on the daily living and movement patterns of the affected landowners and the owners of the affected stock posts.

The possibility of stock losses due to theft and/or poaching, increase in noise and the actual construction activities placing stress on the animals, however, would remain of concern.

During the construction phase, crossings of national and provincial roads (e.g. the N7 and N14, R355, R382, and numerous gravel roads) would have to be made. These roads would have to be temporary closed when stringing across the roads take place. Large scale traffic interruptions and congestions are unlikely due to the fairly low traffic volumes on these roads. This impact would thus be of a temporary nature and the severity of the impact would depend on the location of the proposed transmission line, on the time of construction and the management of the construction activities. With adherence to the necessary mitigation measures included in the EMPR, it is expected that this impact can be mitigated to have limited negative impacts.

The number of vehicles transporting the workforce, material and equipment is anticipated to be low and would be distributed over the entire study area. No traffic congestions or other delays are thus expected due to the presence of these vehicles on the roads. The daily living and movement patterns of locals on a daily basis and those travelling on the roads would thus not be expected to be influenced by the movement of these construction vehicles.

The main negative impact associated with the movement of these vehicles is the temporary access roads that would have to be created to enable the vehicles to access the actual construction areas. Heavy vehicles transporting the pylons, however, could result in even more intense impacts. The overall impact as a result of the movement of the construction vehicles is of a short duration with some negative impacts that could have long lasting consequences. Mitigation measures are thus required.

The proposed transmission line should also avoid any conservation areas and/or nature reserves, but should this not be possible, mitigation as proposed should be implemented.

It would thus be possible to avoid homestead and tourist establishments as the rural character of the area lends itself to various detailed alignment options within the transmission line corridors. Even though it would be achievable to limit the negative impacts, it should be noted that the transmission line within the unspoilt areas would still have a grave impact on the rural, quiet sense of place of the area which could result in some negative impacts on the land value. Care should also be taken with the placement of the proposed power line to avoid areas dedicated for future mining infrastructure or for future tourism activities to avoid sterilisation of that land for those activities.

Project component/s	<ul style="list-style-type: none"> » Construction activities could impact on the farming activities undertaken on the farms under investigation, as well as impact on the activities and daily living and movement patterns of those farms. » Construction activities could impact on conservation areas and/or nature reserves.
Potential Impact	<ul style="list-style-type: none"> » Theft and/or poaching of livestock, game and plant species » Possible increase in dust and noise
Activity/risk source	<ul style="list-style-type: none"> » Possible stock losses » Possible degradation of local roads
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Limit any negative impacts on the farming activities and on the property owners' daily living and movement patterns

Mitigation: Action/control	Responsibility	Timeframe
Eskom should discuss the construction schedule and activities with the affected farmers and property owners of the affected stock posts to enable them to plan their farming activities and animal movement accordingly.	Eskom and Contractor	Pre-Construction Construction
Conditions and/or specific requests relating to construction activity raised by property owners during the negotiation process should be included in the amended EMP.	Eskom and Contractor	Pre-Construction Construction
The contractors should communicate the construction schedule and vehicle movements to the affected property owners and government departments.	Contractor and property owners	Construction
Should local road users be affected by the movement of the construction vehicles or by the construction activities taking place across roads, sufficient warning signs should be erected.	Contractor	Construction
All construction vehicles should be in a good condition.	Contractor	Construction
Dust creation should be kept to the minimum by	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
adhering to the speed limits on the gravel roads and implementation of appropriate dust suppression measures.		
The construction of additional access roads should be limited. Make use of existing access as far as possible.	Eskom and Contractor	Pre-construction Construction
Eskom should undergo an intensive consultation process with the affected property owners within the selected corridor to determine the best possible routes for the construction of the access routes.	Eskom and Contractor	Pre-construction Construction
Contractors should make sure that no materials are left on the properties after construction and maintenance activities have been completed.	Contractor	Construction
Tower positions should be carefully considered to have the least possible impact on the residences and other dwellings within the affected towns.	Eskom and Contractor	Pre-construction Construction
Eskom should liaise with the relevant representatives of the NKLM to ensure that the land proposed for future erven in Steinkopf are not sterilised by the transmission line alignment, should Corridor 2, 3 or 4 be implemented.	Eskom	Pre-construction Construction
<p>The proposed transmission line should not be placed within any conservation areas and/or nature reserves. Should this not be possible and the alignment would traverse such areas, the following mitigation measures should be put in place:</p> <ul style="list-style-type: none"> » No bulldozers should be used within these areas during the construction phase. » Eskom should ensure that contractors are supervised and monitored by the Environmental Control Officer when undertaking construction activities. » Existing access roads should be used and no additional access routes should preferably be created. If new access routes would have to be constructed the mitigation measures proposed by the various specialist studies should be strictly implemented. » Satisfactory rehabilitation should be undertaken as soon as the construction activities in that area have been completed. • Construction schedules, construction activities, and entries to the conservation areas and/or nature reserves should be discussed with and confirmed by the management of these areas. 	Eskom, Environmental Control Officer & Contractor	Construction

<p>Performance Indicator</p>	<ul style="list-style-type: none"> » No loss of resource use » No loss of livestock and/or game » No noise and dust pollution » No intrusions onto surrounding properties or on nature reserves and conservation areas » Limited or no reports from property owners regarding problems with construction activities and workforce » No degradation of local roads
<p>Monitoring</p>	<ul style="list-style-type: none"> » Eskom and appointed ECO must monitor indicators listed above to ensure that they have been implemented. » An incident reporting system (which is in line with Eskom's requirements in this regard) should be used to record non-conformances to the EMP.

OBJECTIVE: To minimise the potential impact on health, safety and security

Experience has shown that landowners perceive the construction of any development to impact on their safety and security due to uncontrolled access on their properties and increase in livestock theft and/or damage to farm infrastructure or theft of rare plant species (succulents) during the construction phase of the project. Other relevant risks associated with the construction of power lines refer to the increased risks of veld fires due to construction worker practises (e.g. cooking), the increased risk of vehicular and pedestrian accidents (even limited in the scarcely populated area with low traffic volumes).

The actual safety of construction workers is also of concern as is the case with any other similar construction activities. Safety issues include possible unauthorised entry to the construction sites, electrocution, risks of falling from working heights and so forth as well as the risks associated with the storage of chemicals or other hazardous substances on site.

It is doubtful that the local municipalities' fire fighting services are all adequate and that they would successfully be able to deal with emergency situations.

Poor management of the construction process and construction camp could contribute to water and other pollution problems (improper sanitation facilities, waste water and littering) and flies, rodents and pests, resulting in health issues for the workforce and the surrounding communities.

People movement (workers and job seekers) and possible promiscuous activities at the construction camps, especially if located in close proximity to existing settlements and towns, could increase the risk of spreading HIV/Aids and other sexually transmitted diseases even though a limited influx of people are expected.

Project component/s	» Inflow of workers during construction phase could result in increased safety and security risks, as well as increased health risks
Potential Impact	» Outside workers are involved in criminal activities » Possible environmental pollution » Possible increase in sexually transmitted diseases in the long-term
Activities/risk sources	» Safety of individuals, animals and plant species are at risk » Theft of livestock » Theft of construction material » On-site accidents » Spread of sexually transmitted diseases » Littering and environmental pollution
Mitigation:	» Employment of local labour should be maximised and strict security

Target/Objective measures should be implemented at the construction sites.

Mitigation: Action/control	Responsibility	Timeframe
A Fire/Emergency Management Plan should be developed and implemented. It is important that this management plan and associated communication channels are developed at the onset of the construction phase. It would be important to regularly review the functionality and efficiency of such a plan in conjunction with the local emergency teams and affected landowners.	Contractor, Eskom and RLM, KHLM and NKLM	Pre-Construction and Construction
The construction camps should be fenced off and measures should be implemented to restrict unauthorised access.	Contractor	Construction
The maintenance of fire breaks is of critical importance.	Contractor	Construction
Fire fighting equipment should be available on site and construction workers should be appropriately trained for fire-fighting.	Contractor	Construction
Signs must be erected at strategic locations throughout the area, warning residents and visitors about the hazards around the construction sites and the presence of heavy vehicles.	Contractor	Construction
Employing local community members could minimise the potential for criminal activity or perceived perception of an increase in criminal activity due to the presence of an outside workforce, as well as limit the health risks.	Contractor	Pre-Construction and Construction
Screening of workers that apply for work in terms of background could be useful to lessen perceived negative perceptions about the outside workforce.	Contractor	Pre-Construction and Construction
Workers should adhere to good conduct at all times to ensure that this proposed project does not contribute to any possible increase in the existing low crime levels found in the study area.	Contractor	Pre-Construction and Construction
A Health and Safety Officer should be appointed for the duration of the construction period. The contact details of this person should be made available to the affected property owners to enable them to lodge complaints when problems with regards to community health arise.	Contractor	Construction
Provide adequate drinking water and appropriate sanitation facilities to the workers at the construction sites.	Contractor	Construction
Although the conduct of individuals cannot be easily controlled, the contractor and/or Eskom could assist to limit the risk of the spread of HIV/Aids by providing	Contractor	Pre-Construction and Construction

Mitigation: Action/control	Responsibility	Timeframe
additional awareness campaigns prior to the construction phase.		

Performance Indicator	<ul style="list-style-type: none"> » No criminal activities, incidences of theft are reported which can be attributed to the construction workforce » No fires occur as a result of the construction activities » No 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. » An incident reporting system (which is in line with Eskom's requirements in this regard) should be used to record non-conformances to the EMP.

OBJECTIVE: Control alien invasive plants

The presence of a diffuse disturbance over a wide area could lead to the spread of alien species that are present in the area. Watercourses are especially vulnerable to such impacts.

Project component/s	<ul style="list-style-type: none"> » Any infrastructure or activity that will result in disturbance to natural areas
Potential Impact	<ul style="list-style-type: none"> » Invasion of natural vegetation surrounding the site by declared weeds or invasive alien species
Activity/risk source	<ul style="list-style-type: none"> » Construction of power line infrastructure » Construction of access roads » Expansion of substations » Construction camps
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Target: no alien plants within project control area » Time period: construction, operation

Mitigation: Action/control	Responsibility	Timeframe
<ul style="list-style-type: none"> » Avoid creating conditions in which alien plants may become established, including: <ul style="list-style-type: none"> a. Keep disturbance of indigenous vegetation to a minimum b. Rehabilitate disturbed areas as quickly as possible after construction is completed in an area c. Do not import soil from areas with 	Construction team, management (environmental officer)	Construction

» alien plants		
» 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)	Construction team, management (environmental officer)	Construction
» Immediately control any alien plants that become established using registered control methods	Construction team, management (environmental officer)	Construction

Performance Indicator	For each alien species: number of plants and aerial cover of plants within project area and immediate surroundings
Monitoring	<ul style="list-style-type: none"> » On-going monitoring of area by environmental control officer during 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 unit area), age and/or size classes of plants and aerial cover of plants. 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

OBJECTIVE: Control loss of/disruption to indigenous vegetation

Construction of infrastructure may lead to direct loss of vegetation. This will lead to localised or more extensive reduction in the overall extent of grassland vegetation. Where this vegetation has already been stressed due to degradation and transformation at a regional level, the loss may lead to increased vulnerability (susceptibility to future damage) of the habitat and a change in the conservation status (current conservation situation). Consequences of the impact occurring may include:

- » negative change in conservation status of habitat (Driver et al. 2005);
- » increased vulnerability of remaining portions to future disturbance;
- » general loss of habitat for sensitive species;
- » loss in variation within sensitive habitats due to loss of portions of it;
- » general reduction in biodiversity;
- » increased fragmentation (depending on location of impact);
- » disturbance to processes maintaining biodiversity and ecosystem goods and services; and

- » loss of ecosystem goods and services.

There are 26 different vegetation types across which the proposed alternative alignments traverse. All except one of these is classified as Least Threatened. However, the site falls within the Gariiep Centre of Endemism and the study area is situated in the heart of the part of this Centre that is considered a high priority for conservation in order to preserve species and ecosystems typical of this Centre. The area is also within the succulent Karoo Region, which is indicated as one of the world's 25 global biodiversity hotspots.

Project component/s	Any infrastructure or activity that will result in disturbance to natural areas
Potential Impact	Loss of indigenous natural vegetation due to construction activities
Activity/risk source	Construction of power line infrastructure Construction of new access roads
Mitigation: Target/Objective	Target: minimal loss of natural vegetation Time period: construction

Mitigation: Action/control	Responsibility	Timeframe
<ul style="list-style-type: none"> » The construction impacts must be contained to the footprint of the infrastructure and/or the servitude of the power line. » Limit unnecessary impacts on surrounding natural vegetation during maintenance activities, e.g. driving around in the veld, use access roads only » Before construction, demarcate servitude and ensure that construction impacts are contained within this area. » Use existing access roads as far as possible » Locate construction camps outside of sensitive areas 	Construction team, management (environmental officer)	Construction

Performance Indicator	Minimum loss of natural vegetation outside of the exact footprint of the proposed project
Monitoring	» On-going monitoring of area by environmental control officer during construction

OBJECTIVE: Avoid impacts on threatened plants and/or animals

There are various threatened animal species that occur in the study area, many of which are restricted to specific localities (cannot move from the path of construction). This includes De Winton's Golden Mole (CR), which could potentially be severely affected if infrastructure is placed directly over habitat in which it occurs. It also includes various species that are relatively slow-moving and/or likely to be restricted to specific localities, including the Namaqua Stream Frog (VU), the Armadillo Girdled Lizard (VU), the Namaqua Plated Lizard (NT) and the Speckled Padloper (NT). The remaining two species of concern (Hartmann's Mountain Zebra and the Angolan Wing-gland Bat) can move from the path of construction and are, therefore, less likely to be directly affected by construction. The assessment below is for those species that are most likely to be directly affected and the assumption is made that they will be directly affected.

There are a large number of Red List or Orange List plant species that have a geographic distribution that includes the study area and populations of these may occur in concentrations in different parts of the study area. Corridors 2 and 4 go through the grids with the highest concentration of threatened species, although all 4 corridors could affect threatened species and all 4 corridors have an equal probability of affecting additional species of lower conservation concern.

Project component/s	» Any infrastructure or activity that will result in disturbance to populations of plant and/or animal species of concern
Potential Impact	» Loss of individuals/populations or habitats of high importance for populations of threatened plant and/or animal species.
Activity/risk source	» Construction of power line infrastructure » Construction of new access roads
Mitigation: Target/Objective	» No loss of individuals or important habitat of species of concern

Mitigation: Action/control	Responsibility	Timeframe
Undertake a walkthrough survey of the selected route, once tower positions are known. If any populations of species of concern are encountered, then the individual tower structure must be shifted to avoid striking the specific habitat of concern.	Construction team, management (environmental officer)	Construction
Use existing access roads as far as possible	Eskom Construction team, management (environmental	Planning Construction

	officer)	
As far as possible, limit construction activities to within the power line servitude	Construction team, management (environmental officer)	Construction
Locate construction camps outside of sensitive areas	Eskom Construction team, management (environmental officer)	Planning Construction

Performance Indicator	No loss of individuals or important habitat of species of concern
Monitoring	None required

OBJECTIVE: Limit impacts on protected trees

There are four protected tree species that have a geographic distribution that includes the study area, i.e. *Acacia erioloba*, *Acacia haematoxylon*, *Boscia albitrunca* and *Euclea pseudebenus*. Any of these species could occur in any part of the study area, depending on local conditions. It is, however, most likely that they would occur in drainage areas or at the base of mobile dunes.

Project component/s	» Power line towers » Access roads » Construction camps
Potential Impact	» Loss of single individuals or groups of protected trees
Activity/risk source	» Construction of power line infrastructure » Construction of new access roads
Mitigation: Target/Objective	» Limit loss of individuals of protected trees » Time period: construction

Mitigation: Action/control	Responsibility	Timeframe
Where possible, position infrastructure so that individuals of protected trees are not affected. »	Environmental management team, management (environmental officer)	Construction
Use existing access roads as far as possible.	Environmental management team, management (environmental officer)	Construction

Mitigation: Action/control	Responsibility	Timeframe
Undertake a walkthrough survey of the selected route, once locations of tower positions and access routes are known, in order to determine the exact number of individuals of each species that will be affected.	Environmental management team, management (environmental officer)	Construction
If it is not possible to avoid destroying or damaging trees, a permit is required from Dept. of Forestry for removal of trees or damage to trees. The permit requires the identity, number, size and condition of each tree that will be affected.	Environmental management team, management (environmental officer)	Construction
If large numbers of trees will be affected then additional biodiversity offsets or planting programmes may be required.	Environmental management team, management (environmental officer)	Construction

Performance Indicator	» No loss of trees OR obtain removal permit for affected trees » Use of existing access roads
Monitoring	» None required

OBJECTIVE: Limit damage to watercourses

Construction may lead to some direct or indirect loss of or damage to seasonal marsh wetlands or drainage lines or impacts that affect the catchment of these wetlands. This will lead to localised loss of wetland habitat and may lead to downstream impacts that affect a greater extent of wetlands or impact on wetland function. Where these habitats are already stressed due to degradation and transformation, the loss may lead to increased vulnerability (susceptibility to future damage) of the habitat. Physical alteration to wetlands can have an impact on the functioning of those wetlands. Consequences may include:

- » increased loss of soil;
- » loss of or disturbance to indigenous wetland vegetation;
- » loss of sensitive wetland habitats;
- » loss or disturbance to individuals of rare, endangered, endemic and/or protected species that occur in wetlands;
- » fragmentation of sensitive habitats;
- » impairment of wetland function;
- » change in channel morphology in downstream wetlands, potentially leading to further loss of wetland vegetation; and
- » reduction in water quality in wetlands downstream of road.

The study area contains a number of non-perennial streams and drainage lines. In most cases, it is likely that these can be traversed without situating infrastructure anywhere within them.

Project component/s	Any infrastructure or activity that will result in disturbance to watercourses
Potential Impact	Damage to watercourses by any means that will result in hydrological changes (includes erosion, siltation, dust, direct removal of soil of vegetation, dumping of material within wetlands). The focus should be on the functioning of the watercourse as a natural system
Activity/risk source	<ul style="list-style-type: none"> » Construction of power line infrastructure » Construction of access roads » Operation and maintenance
Mitigation: Target/Objective	No unnecessary damage to watercourses within project area Time period: construction, operation

Mitigation: Action/control	Responsibility	Timeframe
Keep power line tower structures and access roads a minimum of 50 m outside any watercourse or drainage line	Planning team, construction team, management, environmental control officer	Planning, Construction, Operation
Where watercourse crossings cannot be avoided, obtain a permit from DWA.	Eskom, ECO	Planning, Construction, Operation
Ensure construction camps are not located within the 1:50 year floodline of any watercourse.	Planning team, construction team, management, environmental control officer	Planning, Construction, Operation

Performance Indicator	No impacts on water quality, water quantity, wetland vegetation, natural status of watercourses outside of footprint of infrastructure
Monitoring	Habitat loss in watercourses should be monitored before and after construction

OBJECTIVE: To ensure that human remains which are uncovered during construction are properly dealt with

During the construction phase of the project, buried human remains may be uncovered. If they are not adequately dealt with, they may be accidentally destroyed. Human remains are protected by several sets of legislation which means that certain protocols must be followed in the event of a find.

Project component/s	<ul style="list-style-type: none"> » Power line towers » Construction camps » access roads
Potential Impact	<ul style="list-style-type: none"> » Accidental destruction of human remains
Activity/risk source	<ul style="list-style-type: none"> » Construction activities
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Reduce impact on buried human remains

Mitigation: Action/control	Responsibility	Timeframe
If human remains are accidentally uncovered: <ul style="list-style-type: none"> » Leave remains in place, do not remove anything; » Cordon off the area; » Notify the archaeologist at SAHRA » Contact an archaeologist who will indicate whether to inform the SA Police Services; » If exhumation is required, a permit will have to be obtained from the SAHRA Burials Unit 	Environmental officer or senior person on site	Immediately

Performance Indicator	Reduce impact of construction on buried human remains
Monitoring	None

OBJECTIVE: Management of visual impacts associated with the construction of the proposed Aggeneis-Oranjemond 400kV Power Line

The construction phase of the Aggeneis-Oranjemond 400 kV Line and Substation Upgrade Project is approximated at two years. This is obviously dependent on a number of external factors that may not always be controlled by either Eskom or the preferred contractors. During this time heavy vehicles will frequent the roads along the transmission line corridor and to the substation sites and may cause, at the very least, a visual nuisance to other road users and resident of the area.

Visual impacts associated with the construction phase, albeit temporary, should be managed according to the following principles:

- » Reduce the construction period through careful planning and productive implementation of resources.
- » Plan the placement of lay-down areas and any potential temporary construction camps along the corridor in order to minimise vegetation clearing.

- » Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.
- » Ensure that rubble, litter and disused construction materials are managed and removed regularly.
- » Ensure that all infrastructure and the site and general surrounds are maintained in a neat and appealing way
- » Reduce and control construction dust through the use of approved dust suppression techniques.
- » Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.
- » Rehabilitate all disturbed areas, construction areas, road servitudes and cut and fill slopes to acceptable visual standards.

Project component/s	Construction activities related to the power line and associated infrastructure
Potential Impact	Visual impact of general construction activities, and the potential scarring of the landscape due to vegetation clearing.
Activity/risk source	The viewing of the above mentioned by observers on or near the site.
Mitigation: Target/Objective	Minimal visual intrusion by construction activities and intact vegetation cover outside of immediate works areas.

Mitigation: Action/control	Responsibility	Timeframe
Reduce the construction period through careful planning and productive implementation of resources.	Eskom / contractor	Construction
Plan the placement of lay-down areas and temporary construction equipment camps in order to minimise vegetation clearing.	Contractor	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 managed and removed regularly.	Contractor	Construction
Ensure that all infrastructure and the sites and general surrounds are maintained in a neat and appealing way	Contractor	Construction
Reduce and control construction dust through the use of approved dust suppression techniques.	Contractor	Construction
As far as possible, Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.	Contractor	Construction
Use existing roads as far as possible	Contractor	Construction
Rehabilitate all disturbed areas, construction areas, road servitudes and cut and fill slopes to acceptable	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
visual standards.		

Performance Indicator	Vegetation cover on and in the vicinity of the site is intact with no evidence of degradation or erosion.	
Monitoring	<ul style="list-style-type: none"> » Monitoring of vegetation clearing during construction. » Monitoring of rehabilitated areas post construction. 	

OBJECTIVE: Erosion and sediment control

The construction of the Transmission power line requires foundations to be constructed in order to increase the stability of the tower structures. The depth of the foundations will be determined by the underlying geology of an area.

The greatest impact on the geology and soil associated with the construction of any structures is the potential for soil erosion. This impact depends on the soil erosion potential of the overlying soils. The potential soil erosion rate of the area is considered to be high due to the nature of the soils in the area, and numerous eroded areas present within the study area.

Project component/s	Project components affecting the objective: <ul style="list-style-type: none"> » Power line towers » Substation » access roads » contractors camp
Potential Impact	<ul style="list-style-type: none"> » Erosion and soil loss associated with both wind and water » Sediment entering surrounding hydrological system
Activities/risk sources	<ul style="list-style-type: none"> » Water and wind erosion of cleared and excavated areas » Stormwater run-off from sealed surfaces at the substation site
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise erosion on site and along gravel access roads during construction » To provide permanent erosion and sediment control measures, where required » To minimise the risk of sedimentation of water resources during the construction phase

Mitigation: Action/control	Responsibility	Timeframe
An update of the existing Stormwater Management Plan for the substation sites to be upgraded must be compiled, detailing the location and design of stormwater and sediment control devices shall be	Contractor	Pre-construction

Mitigation: Action/control	Responsibility	Timeframe
prepared and approved prior to the commencement of construction activities.		
All areas susceptible to erosion shall be protected with suitable erosion control measures from the onset of the project.	Contractor	Duration of contract
All stockpiles shall be positioned at least 50m away from drainage lines and rivers.	Contractor	During site establishment and any activity related to earthworks
The time from commencement of construction to rehabilitation shall be kept to a minimum in order to limit the period of surface exposure and thereby limit the potential for erosion.	Contractor	Duration of contract
Disturbance of vegetation and topsoil shall be kept to a practical minimum.	Contractor	Duration of contract
Movement of vehicles on-site must be on approved and formalised access roads only, which shall be adequately maintained throughout construction.	Contractor	Duration of contract
Culverts of adequate size must be provided across drainage lines for any access roads established within the power line servitude.	Contractor	Erection: during site establishment Maintenance: for duration of contract
The use of silt fences and sand bags must be implemented in areas that are susceptible to erosion.	Contractor	Duration of contract
Access roads and/or tracks used during construction which are not required for maintenance purposes or for use by the landowner shall be closed and appropriately rehabilitated.	Contractor	Completion of construction

Performance Indicator	<ul style="list-style-type: none"> » No evidence of erosion is present in construction areas or along gravel access roads. » Surface and groundwater meet required water quality guideline levels. » No evidence of excessive sedimentation of water resources.
Monitoring	<ul style="list-style-type: none"> » Regular visual inspections of the construction areas and along gravel access roads for signs of erosion. » Fortnightly visual inspection of sediment and water quality control devices throughout construction phase and during or following major rain events. » Immediate reporting by personnel of damaged or ineffective sediment control measures or potential water contamination to Site Manager. » An incident reporting system should be used to record non-conformances to the EMP.

OBJECTIVE: Appropriate Handling and Storage of Equipment and Materials

Construction equipment and materials will be required to be stored on site. The appropriate handling of storage of these materials and equipment is important in order to minimise impacts on the surrounding environment.

Project component/s	Project components affecting the objective: <ul style="list-style-type: none"> » power line » substations upgrade » access roads » contractors camp
Potential Impact	<ul style="list-style-type: none"> » Hazards to the natural environment, landowners, community members and the general public » Security of materials and equipment
Activities/risk sources	<ul style="list-style-type: none"> » Storage and handling of potentially hazardous materials » Storage and maintenance of construction equipment
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure environmental best practice in terms of the storage and handling of construction materials and equipment » 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

Mitigation: Action/control	Responsibility	Timeframe
All construction equipment shall be appropriately stored within the formal construction equipment camp.	Contractor	Duration of contract
Routine servicing and maintenance of vehicles must not take place on-site (except for emergency situations or large cranes which cannot be moved off-site). If repairs of vehicles must take place outside of designated areas, an appropriate drip tray must be used to contain any fuel or oils.	Contractor	Duration of contract
All stored fuels must be maintained within a bund and on a sealed surface.	Contractor	Duration of contract
Only designated areas must be used for storage of construction materials, soil stockpiles, machinery and other equipment	Contractor	Duration of contract
Specific areas shall be designated for cement batching plants (if required). The cement batching plant must be contained within a bunded area. Sufficient drainage	Contractor	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
for these plants must be in place to ensure that soils do not become contaminated.		
Cement, concrete and chemicals must be mixed on plastic linings and provisions should be made to contain spillages or overflows into the soil.	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
Any hazardous substances must be stored well away from any water body.	Contractor	Duration of contract
Noise created by the loading and off loading of construction material should be limited as far as possible.	Contractor	Duration of contract
Workshop areas shall be monitored for oil and fuel spills and such spills shall be cleaned and remediated to the satisfaction of the ECO. The Contractor shall be in possession of an emergency spill kit that must be complete and available at all times on site.	Contractor/ECO	Duration of contract
Hazardous waste handling and spill response training shall be included for staff and contractors as part of site induction.	Contractor/ECO	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
Spill response procedures must include removal/disposal of potentially contaminated water and soil.	Contractor	Duration of contract
Any contaminated/polluted soil removed from the site must be disposed of at a licensed hazardous waste disposal facility.	Contractor	Duration of contract
Any oily water from bunds at the substation shall be removed from site by licensed contractors.	Contractor	Duration of contract
Spilled cement or concrete must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site.	Contractor	Duration of contract
Any storage and disposal permits/approvals which may be required shall be obtained, and the conditions attached to such permits and approvals shall be compiled with.	Contractor	Duration of contract
Transport of all hazardous substances shall be in accordance with the relevant legislation and	Contractor	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
regulations.		
Once construction has been completed on site and all excess material has been removed, the storage area must be appropriately rehabilitated. If the area has been badly damaged, re-seeding shall be done and fencing in of the area shall be considered if livestock will subsequently have access to such an area.	Contractor	Completion of construction

Performance Indicator	<ul style="list-style-type: none"> » Construction equipment and materials are appropriately stored. » No impacts on the surrounding environment occur as a result of the inappropriate handling and storage of equipment and materials.
Monitoring	<ul style="list-style-type: none"> » Regular inspection of the construction equipment camp to ensure that appropriate handling and storage practices are in place. » Regular monitoring of the area surrounding the construction equipment camp/s to identify any impacts on the environment from this area/s. » A complaints register shall be maintained, in which any complaints from the community will be logged. Complaints shall be investigated and, if appropriate, acted upon. » An incident reporting system (which is in line with Eskom's requirements in this regard) should be used to record non-conformances to the EMP

OBJECTIVE: Appropriate Access and Traffic Management

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 and equipment to site.

Project component/s	List of project components affecting the objective: <ul style="list-style-type: none"> » power lines » access roads » existing substations to be updated
Potential Impact	<ul style="list-style-type: none"> » Impacts on traffic movement along major routes (e.g. N14) where components are to be transported » Risk of accidents » Generation of dust and noise from increased vehicles moving on gravel roads to and along the power line servitude and substation site
Activity/risk source	<ul style="list-style-type: none"> » Use of existing and new gravel roads to access the power line servitude and substation sites » Increased traffic movement (especially heavy/abnormal load vehicles) » Traffic congestion from abnormal weight or sized loads » Transportation of ready-mix cement from batching plant to the power line servitude and substation sites » Mobile construction equipment movement on-site
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise impacts on existing gravel access roads, where these are to be used for construction purposes » To minimise the creation of new access roads along the power line servitude » To minimise impact of traffic associated with the construction of the power line and substation on local traffic » To minimise potential for negative interaction between pedestrians or sensitive users and traffic associated with the construction phase » To ensure all vehicles are roadworthy and all materials/equipment are carried appropriately and within any imposed permit/licence conditions

Mitigation: Action/control	Responsibility	Timeframe
Transportation of equipment and project components to site shall be in accordance with all relevant legislation as well as Eskom specifications. Permits for abnormal loads shall be applied for from the relevant authority, where required.	Contractor (or appointed transportation contractor)	Pre-construction
Strategic positioning of entry and exit points shall be undertaken to ensure as little effect as possible on the traffic.	Contractor (or appointed transportation contractor)	Pre-construction

Mitigation: Action/control	Responsibility	Timeframe
Planning of access routes to the site for construction purposes shall be done in conjunction between the Contractor, Eskom and the landowner. All agreements reached should be documented and no verbal agreements should be made. The Contractor shall appropriately mark all access roads. Roads not to be used shall be marked with a "NO ENTRY" sign.	Contractor (or appointed transportation contractor)	Pre-construction
Signage shall 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
Existing access roads shall be used as far as possible. Access roads to and from the construction site should be kept to a minimum.	Contractor	Duration of contract
Where new access roads are constructed, this must be done according to design and contract specifications. Drainage channels shall be suitably designed to ensure erosion does not occur, especially at the outflow points. The creation of additional access roads especially on private properties should be limited.	Contractor	Duration of contract
Access roads and entrances to the actual construction sites should be carefully planned to limit any intrusion impacts, noise and dust pollution, as well as to limit any risks of accidents	Contractor	Duration of contract
Where necessary suitable measures shall be taken to rehabilitate damaged areas next to newly constructed roads.	Contractor	Duration of contract
Movement of vehicles on-site must be on approved and formalised access roads only, which shall be adequately maintained throughout construction.	Contractor	Duration of contract
The main routes to the site must be clearly signposted and printed delivery maps must be issued to all suppliers and Sub-Contractors.	Contractor	Duration of contract
No deviation from approved transportation routes shall be allowed, unless roads are closed for whatever reason outside the control of the contractor.	Contractor	Duration of contract
Appropriate dust suppression techniques shall be used to minimise dust emissions on gravel roads (water spraying).	Contractor	Duration of contract
Vehicle movements on local roads shall be limited to standard construction operating hours wherever possible to limit noise impacts and dust nuisance.	Contractor	Duration of contract
Times for arrival and departure of heavy vehicles shall be co-ordinated as far as possible in order to minimise congestion.	Contractor	Duration of contract
All hazardous substances shall be transported in	Contractor	Duration of

Mitigation: Action/control	Responsibility	Timeframe
accordance with the relevant legislation and regulations.		contract
Appropriate maintenance of all vehicles shall be ensured.	Contractor	Duration of contract
All vehicles travelling on public roads shall adhere to the specified speed limits and all drivers shall be in possession of an appropriate valid driver's license.	Contractor	Duration of contract
Landowners shall be informed timeously of the construction programme, duration, access requirements, and all interference with their daily activities	Contractor	Duration of contract
Access roads must be maintained for the duration of the construction phase in order to ensure that they are passable and that the potential for erosion is minimised.	Contractor	Duration of contract
Appropriate access gates shall be installed where required and fitted with locks. These shall be kept closed at all times,	Contractor	Installation: site establishment Maintenance: Duration of contract
Access roads and/or tracks used during construction which are not required for maintenance purposes or for use by the landowner shall be closed and appropriately rehabilitated.	Contractor	Completion of construction
The contractors should consult with the relevant officials and key stakeholders regarding the traffic schedule, routes, diversions, road closures and so forth.	Contractor	Duration of contract

Performance Indicator	<ul style="list-style-type: none"> » Gravel access roads maintained in passable condition with no erosion occurring » Upon completion of construction, all private roads are left in at least the original condition » No traffic incidents involving Eskom personnel or appointed contractors » No complaints resulting from traffic congestion, delays or driver negligence associated with construction of the power lines and/or substation
Monitoring	<ul style="list-style-type: none"> » Pre-construction photographic record of existing access roads to be used for construction purposes. » Visual monitoring of the condition of access roads to ensure appropriate maintenance thereof. » Visual monitoring of traffic control measures to ensure they are effective. » Visual monitoring of dust produced by traffic movement. » A complaints register shall be maintained, in which any complaints

	<p>from the community will be logged. Complaints will be investigated and, if appropriate, acted upon.</p> <ul style="list-style-type: none"> » An incident reporting system shall be used to record non-conformances to the EMP.
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OBJECTIVE: Appropriate handling and management of waste

The construction of the power line and upgrade of the substations will involve the generation of various wastes. 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.

The main wastes expected to be generated by the construction of the Aggeneis-Oranjemond 400 kV Line and Substations Upgrade Project will include:

- » general solid waste
- » liquid waste (including grey water and sewage)

Project component/s	<p>List of project components affecting the objective:</p> <ul style="list-style-type: none"> » power lines » access roads » construction camps
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"> » 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 guidelines » To minimise production of waste » To ensure appropriate waste storage and disposal » To avoid environmental harm from waste disposal

Mitigation: Action/control	Responsibility	Timeframe
Construction contractors shall provide specific detailed waste management plans to deal with all waste streams.	Contractor	Pre-construction
Supply a wastewater management system that will comply with legal requirements and be acceptable to Eskom.	Contractor	Pre-construction
Supply waste collection bins at construction equipment	Contractor	Erection: during

Mitigation: Action/control	Responsibility	Timeframe
and construction crew camps.		site establishment Maintenance: for duration of Contract within a particular area
Specific areas shall be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste, 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
Hazardous and non-hazardous waste shall be separated at source. Separate waste collection bins must be provided for this purpose. These bins must be clearly marked and appropriately covered.	Contractor	Erection: during site establishment Maintenance: for duration of Contract within a particular area
All solid waste collected shall be disposed of at a registered waste disposal site. A certificate of disposal shall be obtained and kept on file. The disposal of waste shall be in accordance with all relevant legislation. Under no circumstances may solid waste be burnt on site.	Contractor	Erection: during site establishment Maintenance: for duration of Contract within a particular area
Where possible, construction and general wastes on-site shall be reused or recycled. Bins and skips shall be available on-site for collection, separation and storage of waste streams (such as wood, metals, general refuse etc). A recycling plan shall be developed in accordance with the requirements of the National Waste Management Strategy and submitted for Eskom approval.	Contractor	Duration of contract
Disposal of waste will be in accordance with relevant legislative requirements, including the use of licensed contractors.	Contractor	Duration of contract
Where a registered waste site is not available close to the construction site, a method statement shall be provided with regard to waste management.	Contractor	Site establishment
Documentation (waste manifest) shall be maintained detailing the quantity, nature and fate of any regulated waste.	Contractor	Duration of contract
Regularly serviced chemical toilets facilities shall be	Contractor	Duration of

Mitigation: Action/control	Responsibility	Timeframe
used to ensure appropriate control of sewage.		contract
An incident/complaints register shall be established and maintained on-site.	Contractor	Duration of contract
No waste may be buried or burnt on site under any circumstances.	Contractor	Duration of contract

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"> » Observation and supervision of waste management practices throughout construction phase » Waste documentation completed and maintained on site » A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon » An incident reporting system will be used to record non-conformances to the EMP

OBJECTIVE: Ensure disciplined conduct of on-site contractors and workers

In order to minimise impacts on the surrounding environment, Contractors must be required to adopt a certain Code of Conduct and commit to restricting construction activities to areas within the development footprint. Contractors and their sub-contractors must be familiar with the conditions of the Environmental Authorisation (once issued), the EIA Report and this EMP, as well as the requirements of all relevant environmental legislation.

Project component/s	List of project components affecting the objective: <ul style="list-style-type: none"> » power lines » substations upgrade » access roads
Potential Impact	<ul style="list-style-type: none"> » Pollution/contamination of the environment » Disturbance to the environment
Activity/risk source	<ul style="list-style-type: none"> » Contractors are not aware of the requirements of the EMP, leading to unnecessary impacts on the surrounding environment » Worker conflict
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment

Mitigation: Action/control	Responsibility	Timeframe
The terms of this EMP and the Environmental Authorisation (once issued) will be included in all tender documentation and Contractors contracts.	Eskom	Tender process
Conditions stipulated by property owners in terms of the construction activities should be implemented and monitored by selected community representatives (e.g. councillors, farmers, members of Conservancies and ward committee members) and Eskom	Contractor (and sub-contractor/s)	Duration of contract
No personnel other than night watchmen and shift security will be permitted to remain on the site overnight.	Contractor (and sub-contractor/s)	Duration of contract
Contractors will use chemical toilets/ablution facilities situated at designated areas of the site; no abluting will be permitted outside the designated area. These facilities will be regularly serviced by appropriate contractors.	Contractor (and sub-contractor/s)	Duration of contract
Cooking/meals will take place in a designated area; no firewood or kindling may be gathered from the site or surrounds.	Contractor (and sub-contractor/s)	Duration of contract
All litter will be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area; particular attention needs to be paid to food waste.	Contractor (and sub-contractor/s)	Duration of contract
No one other than the ECO or personnel authorised by the ECO, will disturb flora or fauna outside of the demarcated construction area/s.	Contractor (and sub-contractor/s)	Duration of contract
Contractors, Eskom personnel and temporary employees should behave fittingly at all times (e.g. no littering, not cause damage to properties, no unauthorised entry of properties, etc)	Contractor (and sub-contractor/s)	Duration of contract
Workers should receive fines if they do not adhere to the conditions, rules and regulations.	Contractor (and sub-contractor/s)	Duration of contract
Members of the construction team should be easily identifiable	Contractor (and sub-contractor/s)	Duration of contract
Workers should be made aware of property owners' concerns regarding construction work on their properties so that they are familiar with the sensitive issues.	Contractor (and sub-contractor/s)	Duration of contract
Privacy of residents and property owners should be respected and the construction team should obtain permission to enter properties	Contractor (and sub-contractor/s)	Duration of contract
Animals disturbed during construction activities should not be harmed but should be allowed to move off to an undisturbed area of the site.	Contractor (and sub-contractor/s)	Duration of contract
Hunting of wild animals including setting up of snares is not be allowed	Contractor (and sub-contractor)	Duration of contract

Performance Indicator	<ul style="list-style-type: none">» Compliance with specified conditions of Environmental Authorisation, EIA report and EMP» No complaints regarding contractor behaviour or habits
Monitoring	<ul style="list-style-type: none">» Observation and supervision of Contractor practices throughout construction phase.» A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon» An incident reporting system will be used to record non-conformances to the EMP

5.5. Detailing Method Statements

OBJECTIVE: To ensure all construction activities/practices/procedures are undertaken with the appropriate level of environmental awareness to minimise environmental risk, in line with the specifications of the EMP

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. 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 Project Manager/Site Manager, setting out the plant, materials, labour and method the Contractor proposes using to conduct an activity, in such detail that the Project Manager/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:

- » 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 Project Manager/Site Manager.

The Contractor may not commence the activity covered by the Method Statement until it has been approved, 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.

5.5. Awareness and Competence

OBJECTIVE: To ensure all construction personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm

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 staff are aware of the location and have access to the document.
- » Employees will be familiar with the requirements of the EMP and the environmental specifications as they apply to the construction of the facility.
- » Employees must undergo training for the operation and maintenance activities associated with a wind energy facility and have a basic knowledge of the potential environmental impacts that could occur and how they can be minimised and mitigated.
- » 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 environmental matters, which are deemed to be 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 in an appropriate format for the receiving audience.
- » Refresher sessions must be held to ensure the contractor staff are aware of their environmental obligations as practically possible.

5.5. Monitoring Programme

OBJECTIVE: To monitor the performance of the control strategies employed against environmental objectives and standards

An environmental monitoring programme should be developed and implemented 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 environmental monitoring will most likely be stipulated by the Environmental Authorisation. Where this is not clearly dictated, Eskom will determine and stipulate the period and frequency of monitoring required in consultation with relevant stakeholders and authorities. The Project Manager will ensure that the monitoring is conducted and reported.

The aim of the monitoring and auditing process would be to routinely 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
- » Determine the effectiveness of the environmental specifications and recommend the requisite changes and updates based on audit outcomes, in order to enhance the efficacy of environmental management on site
- » Aid communication and feedback to authorities and stakeholders.

The Environmental Control Officer (ECO) will ensure compliance with the EMP during construction, and will conduct monitoring activities on a regular basis. An independent

ECO must be appointed, and have the appropriate experience and qualifications to undertake the necessary tasks. The ECO will report any non-compliance or where corrective action is necessary to the Site Manager, DEA and/or any other monitoring body stipulated by the regulating authorities.

MANAGEMENT PLAN FOR THE AGGENEIS-ORANJEMOND 400 KV LINE AND SUBSTATIONS UPGRADE PROJECT:
REHABILITATION OF DISTURBED AREAS **CHAPTER 6**

6.1. Overall Goal for the Rehabilitation of Disturbed Areas

Overall Goal for the Rehabilitation of Disturbed Areas: 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. In order to meet this goal, the following objective, actions and monitoring requirements are relevant:

***OBJECTIVE:** To ensure rehabilitation of disturbed areas following the execution of the works, 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 maintenance operations. The main areas requiring rehabilitation will be the construction camps, laydown areas adjacent to the servitudes, the centre line of the power line servitudes cleared for stringing purposes, access roads not required for maintenance purposes, and disturbed areas around the substation.

Project component/s	List of project components affecting the objective: » Power line servitudes (including temporary access roads and laydown areas) » Contractors camps
Potential Impact	» Environmental integrity of power line servitude undermined resulting in reduced visual aesthetics, erosion, and the requirement for on-going management intervention
Activity/risk source	» Temporary laydown areas alongside power line servitude » Temporary access roads/tracks » Contractors camps » Other disturbed areas/footprints
Mitigation: Target/Objective	» To ensure and encourage site rehabilitation of disturbed areas » To 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
A site rehabilitation programme shall be formulated following the specialist walk-through survey, and must	Contractor in consultation with	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
be implemented as soon as possible after construction is completed in an area.	Specialist	
Implement an alien plant monitoring and control programme within the power line servitude.	ECO, contractor	Construction, operational phases
Ensure immediate surface restoration and re-sloping in order to prevent erosion, taking cognisance of local contours and landscaping.	ECO, contractor	Construction phase
Use only local indigenous species in the rehabilitation/re-vegetation process.	ECO, contractor	Rehabilitation phase
All temporary facilities, equipment and waste materials shall be removed from site.	Contractor	Following execution of the works
Compacted areas that are no longer needed post-construction (e.g. laydown areas, contractors camps) shall be ripped and scarified.	Contractor in consultation with rehabilitation specialist	Following completion of construction activities in an area
Necessary drainage works and anti-erosion measures shall be installed, where required, to minimise loss of topsoil and control erosion.	Contractor	Following completion of construction activities in an area
Stockpiled topsoil shall be replaced in disturbed areas where rehabilitation is to be undertaken as a layer of an appropriate thickness (to be dictated by local conditions).	Contractor in consultation with rehabilitation specialist	Following completion of construction activities in an area
Disturbed areas shall be rehabilitated/re-vegetated with appropriate natural vegetation and/or local seed mix in the appropriate season.	Contractor in consultation with rehabilitation specialist	Following completion of construction activities in an area

Performance Indicator	<ul style="list-style-type: none"> » Monitoring of all construction areas, including construction equipment camps and working areas, cleared of equipment and temporary facilities » Topsoil replaced on all areas and stabilised » Disturbed areas rehabilitated and acceptable plant cover achieved on rehabilitated sites » Closed site free of erosion and 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 PLAN FOR THE AGGENEIS-ORANJEMOND 400 KV LINE AND SUBSTATIONS UPGRADE PROJECT:

OPERATION AND MAINTENANCE

CHAPTER 7

7.1. Overall Goal for Operation

Overall Goal for Operation: To ensure that the operation and maintenance of the Aggeneis-Oranjemond 400 kV Line and Substations Upgrade Project 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 Aggeneis-Oranjemond 400 kV Line and Substations Upgrade Project in a way that:

- » Ensures that operation activities are properly managed in respect of environmental aspects and impacts.
- » Enables operation and maintenance 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 birds and other fauna in the area.

7.2. Roles and Responsibilities for Operation and Maintenance

7.2.1. 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

7.3. Objectives for Operation and Maintenance

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

OBJECTIVE: To reduce the impact of construction and operation of the proposed power lines on birds in the area

Bird interactions with the power lines can be anticipated during the operation phase of the power lines. These are, however, well researched in the South African context (through the EWT and Eskom partnership). The main impacts expected are as a result of collisions with the earth-wire and disturbance of bird species in the area.

As a result of long-term monitoring, Eskom are in a position to make use of 'bird-friendly' towers and conductor configurations for their power lines. Exact spans requiring marking and towers requiring bird guards shall be determined by a suitably qualified specialist during an avifaunal walk-through survey to be conducted as part of the site-specific EMP phase.

Electrocutions of certain bird species within the substation sites during its operation, could potentially have a negative impact on a variety of bird species, particularly those species that regularly utilise the electrical infrastructure within the substation yard on which to breed and nest (e.g. crows, herons, sparrows, owls and geese). However, the more sensitive eagle species recorded in the area do not utilise substation yards extensively and therefore the significance of the impact is considered to be negligible.

A number of mechanisms exist through which birds are able to cause electrical faults. These include:

- » Bird streamer induced faulting, whereby the fault is caused by the bird releasing a "streamer" of faeces which can constitute an air gap intrusion between the conductor and the earthed structure.
- » Bird pollution, whereby a flashover occurs when an insulator string gets coated with pollutant, which compromises the insulation properties of the string.
- » Bird nests, which may cause faults through nest material protruding and constituting an air gap intrusion

Project component/s	List of project components affecting the objective: » power line » substations
Potential Impact	» Habitat destruction during construction and maintenance, » Disturbance of birds during construction and maintenance, » Collision of birds with substation components and earth wires once lines are operational.
Activity/risk source	» Overhead power line » Substation HV yards

Mitigation: Target/Objective	<ul style="list-style-type: none"> » More accurately determine the impact of the operating substation and power lines on priority bird species » To minimise the number of bird collisions with the power line » To minimise the amount of natural habitat destroyed during construction of this power line » To minimise the number of electrical faults caused by birds
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Mitigation: Action/control	Responsibility	Timeframe
Control all activities so as to impact on natural vegetation as little as possible and create as little as possible noise and disturbance on site.	Construction team, enforced by ECO	Duration of construction
Suitable anti-collision marking devices should be fitted on earth wires of high risk sections of line identified during avifaunal walk down.	Eskom / specialist	Should be fitted at construction as soon as line is strung. Relevant sections to be identified by EWT once line profiles are available
Bird Guards should be fitted on all self-supporting type towers, as per Eskom Transmission guidelines (refer to Appendix B).	Eskom / specialist / construction teams.	Should be fitted at construction. Relevant towers should be identified by EWT once line profiles are available
Construction teams should take care in all sensitive areas (i.e. wetlands, streams and grassland) not to impact any more on natural habitat than is absolutely necessary. Vehicle and machinery access to these areas should be strictly controlled.	Eskom/ Construction Teams	Duration of contract

Performance Indicator	<ul style="list-style-type: none"> » Limited bird collisions on the power line once built – this will be monitored by standard Eskom line patrols, and random public detection of carcasses. » No undue destruction or alteration of natural habitat. » Limited bird related faulting on line once built – this will be monitored by Eskom's line performance management systems.
Monitoring	<ul style="list-style-type: none"> » Eskom's standard line patrols will detect any bird collisions that occur. Landowners are also likely to detect and report any collisions that occur » This will be checked regularly during construction by the ECO » Eskom's standard line performance monitoring will detect whether any bird related faulting occurs on this power line once operational.

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

Maintenance of the line and inspection of the servitude would be undertaken for the life of the line. It is not anticipated that this would have severe negative intrusions on the landowners, mainly due to the size of the affected properties (lines could be situated far away from homesteads and other dwellings) and the fact that stock farming activities such as grazing could continue underneath the proposed line and within the servitude. Misconduct of workers could however result in long-term secondary negative impacts with possible negative financial implications for farmers and damage to the environment

Project component/s	List of project components affecting the objective: » power lines » substations
Potential Impact	» Stakeholder concerns not addressed with regard to maintenance
Activity/risk source	» Maintenance of substation » Maintenance of Transmission 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 on-going 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	» Landowners should be afforded reasonable and appropriate rights/access.
Monitoring	» Not applicable.

OBJECTIVE: Minimise the potential impact on farming activities and on the affected property owners

Maintenance of the line and inspection of the servitude would be undertaken for the life of the line. It is not anticipated that this would have severe negative intrusions on the landowners, mainly due to the size of the affected properties (lines could be situated far away from homesteads and other dwellings) and the fact that stock farming activities such as grazing could continue underneath the proposed line and within the servitude.

Misconduct of workers could however result in long-term secondary negative impacts with possible negative financial implications for farmers and damage to the environment. The proposed Aggeneis-Oranjemond transmission line is however not expected to negatively impact on the property values of the farms in the area in the long term due to the limited impact expected on the resource use and size of the properties.

Project component/s	» Possible negative impacts on activities undertaken on affected properties and on the daily living and movement patterns of property owners during the operational phase
Potential Impact	<ul style="list-style-type: none"> » Possible intrusion impact on property owners » Possible impact on farming activities » Possible devaluation of land » Possible impact on future developments and on existing and future tourism establishments
Activity/risk source	<ul style="list-style-type: none"> » Stock losses » Littering » Environmental damage to land
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Effective maintenance » Mitigation of intrusion impacts on property owners » Mitigation of impact on farming activities » Limit noise impacts » Proper communication to property owners with regards to maintenance activities to be undertaken

Mitigation: Action/control	Responsibility	Timeframe
Property owners should be notified of the maintenance activities to be undertaken on their properties.	Eskom	Operation
Speeding on the local roads should be avoided for safety reasons and to limit dust creation.	Eskom and employees	Operation
The local access roads should be regularly maintained to keep the local road conditions in a good quality state.	Eskom	Operation

Performance Indicator	<ul style="list-style-type: none"> » No environmental pollution occurs (waste, water and sanitation related) » Limited noise increase » No intrusion on private properties and on the farming activities undertaken on these properties » No stock losses » No impact on tourism establishments
Monitoring	<ul style="list-style-type: none"> » Eskom should be able to demonstrate that the transmission line and substations are well managed without environmental pollution and that the above requirements have been met

OBJECTIVE: *Appropriate handling and management of hazardous substances and waste at the substation sites*

The operation and maintenance of the substations 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	List of project components affecting the objective: <ul style="list-style-type: none"> » power line » substations
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	Eskom	Operation

Mitigation: Action/control	Responsibility	Timeframe
appropriately sealed and banded.		
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 banded 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
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: <ul style="list-style-type: none"> » 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

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 exact quantities of all waste streams exiting the site must be compiled by the waste management contractor and monitored by the SHE Representative. All appropriate waste disposal certificates accompany the monthly reports.

MANAGEMENT PLAN FOR THE AGGENEIS-ORANJEMOND 400 KV LINE AND SUBSTATIONS UPGRADE PROJECT:

DECOMMISSIONING

CHAPTER 8

At this point of the project planning process, the necessity for and timing of the decommissioning of the Aggeneis-Oranjemond 400 kV Line and Substations Upgrade Project is not known. Therefore, only general principles for decommissioning are detailed below. These principles will be required to be re-visited and refined in the event of the decommissioning of the power lines and substation.

In order to minimise the extent of rehabilitation activities required during the decommissioning phase, Eskom shall ensure that constant effort is applied to rehabilitation activities throughout the construction, operation and maintenance phases of the project.

In decommissioning the power line and/or the substation, Eskom shall ensure that:

- » All sites not already vegetated are vegetated as soon as possible after operation ceases with species appropriate to the area.
- » All structures, foundations and sealed areas are demolished, removed and waste material disposed of at an appropriately licensed waste disposal site.
- » All access/service roads not required to be retained by landowners are closed and fully rehabilitated.
- » All disturbed areas are compacted, sloped and contoured to ensure drainage and runoff and to minimise the risk of erosion.
- » All rehabilitated areas are monitored for erosion.
- » Components of the power line are removed from the site and disposed of appropriately. Equipment that is to be reused must be stored on Eskom property and equipment to be disposed of must be done so according to the manufacturer's recommendations.

**FINALISATION OF THE
ENVIRONMENTAL MANAGEMENT PROGRAMME**

CHAPTER 9

The EMP is a dynamic document, which must be updated when required. It is considered critical that this draft EMP be updated to include site specific information and specifications following the final walk-through survey by specialists following the negotiation process and surveying of the power lines. This will ensure that the construction and operation activities are planned and implemented taking sensitive environmental features into account.