
BON ESPIRANGE SUBSTATION AND 132KV OVERHEAD POWER LINE FOR THE AUTHORISED ROGGEVELD WIND FARM PROJECT

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

Submitted as part of the Basic Assessment Report

March 2016

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PROJECT DETAILS

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DEFINITIONS AND TERMINOLOGY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Hazardous waste: Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment (Van der Linde and Feris, 2010;pg 185).

Indigenous: All biological organisms that occurred naturally within the study area prior to 1800.

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

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

Pollution: A change in the environment caused by substances (radio-active or other waves, noise, odours, dust or heat emitted from any activity, including the storage or treatment or waste or substances.

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.

Waste: (a) any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to the National Environmental Management: Waste Act, 2008 (Act 59 of 2008) (as amended) (NEM:WA),; or
(b) any other substance, material or object that is not included in schedule 3 that may be defined as a waste by the Minister by notice in the Gazette, but any waste or portion of waste, referred to in paragraphs (a) and (b), ceases to be a waste—
(i) once an application for its re-use, recycling or recovery has been approved or, after such approval, once it is, or has been re-used, recycled or recovered; (ii) where approval is not required, once a waste is, or has been re used, recycled or recovered; iii) where the Minister has, in terms of section 74, exempted any waste or a portion of waste generated by a particular process from the definition of waste; or iv) where the Minister has, in the prescribed manner, excluded any waste stream or a portion of a waste stream from the definition of waste.

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PROJECT DETAILS

CHAPTER 1

Roggeveld Wind Power (Pty) Ltd received environmental authorisation for Phase 1 of the Roggeveld Wind Farm on 12 August 2014. In order to connect the Roggeveld Wind Farm to the high voltage electricity network (grid), an on-site substation (known as the Bon Espirange Substation Eskom Yard) and a new overhead power line is required to be constructed. The Bon Espirange Substation Eskom Yard applied for in this Basic Assessment process will be located directly adjacent to the authorised Bon Espirange Substation IPP Yard (overlapping with the area assessed through the Roggeveld Wind farm EIA). The entire extent of the Bon Espirange Substation, including both the Independent Power Producer (IPP) Yard and the proposed Eskom Yard, is located within the authorised Roggeveld Wind Farm Facility site. The 132kV overhead power line (6-7 km in length) will connect the Bon Espirange Substation to the Eskom Komsberg Substation. The authorised connection for the Roggeveld Wind Farm is no longer viable due to a proposed expansion of the Komsberg Substation. Therefore, the point of connection to the Komsberg Substation has been reconsidered, and the only viable connection solution for the Roggeveld Wind Farm is to connect to the Komsberg Substation on the eastern side of the substation. Limited upgrades might also be required to the Komsberg Substation including but not limited to additional feeder bay, limited access roads and cabling. Any upgrades to the Komsberg Substation would be determined by Eskom at a later stage, but would be within the Komsberg Substation high voltage yard boundary.

Following completion of construction and commissioning, this infrastructure (Eskom Yard and 132kV line along with any required upgrades to the Komsberg Substation) will be transferred to Eskom for ownership and operation.

The proposed project site is located approximately 20 km north of Matjiesfontein. The project site falls within both the Western Cape and Northern Cape Provinces within the Central Karoo District Municipality and the Namakwa District Municipality respectively.

The proposed development for which application is made includes the following (refer to Figure 1.1):

- » An on-site substation (Eskom Yard within the Bon Espirange Substation) (within the authorised Roggeveld Wind Farm footprint).
- » 132kV overhead power line (approximately 6 7 km in length with a final servitude of approximately 36m) between the Bon Espirange Substation and the Eskom Komsberg Substation.
- » Limited upgrades to the existing Komsberg Substation may be required by Eskom. These upgrades could potentially include an additional feeder

bay(s), high-voltage switchgear(s), cabling, limited access roads all within the existing footprint of the Komsberg Substation.

The following property will be affected by the Bon Espirange Substation:

- » The Remainder of the Farm Bon Espirange 73, Laingsburg Local Municipality, Western Cape (RE/73 Bon Espirange)

The development footprint of the proposed substation will be approximately 130m wide x 50m long. The specialists assessed a 25m buffer around the proposed location to allow for micro-siting. The site for development is located directly adjacent to Bon Espirange Substation IPP Yard (the authorised IPP substation for the Roggeveld Wind Farm hereafter referred to as the Bon Espirange IPP Yard) and within the same proximity of the area assessed for the Bon Espirange Substation IPP Yard. This new Eskom Yard will be located approximately 6 km north west of the Komsberg Substation within the authorised Roggeveld Wind Farm footprint.

The following properties will be affected by the power line:

- » The Remainder of the Farm Bon Espirange 73, Laingsburg Local Municipality, Western Cape (RE/73 Bon Espirange)
- » Portion 1 of the Farm Bon Espirange 73, Laingsburg Local Municipality, Western Cape (1/73 Bon Espirange)
- » The Farm Aprilskraal 105, Laingsburg Local Municipality, Western Cape (105 Aprilskraal)
- » Portion 2 of the Farm Standvastigheid 210, Karoo Hoogland Local Municipality, Northern Cape (2/210 Standvastigheid)
- » The Remainder of the Farm Standvastigheid 210, Karoo Hoogland Local Municipality, Northern Cape (RE/210 Standvastigheid)

A 300m wide corridor has been investigated for the siting of the proposed route of the power line. Two alternative routes are provided for the power line, and are described as follows:

- » Alternative 1: begins at the Bon Espirange Substation and follows an alignment east of the Bon Espirange Substation. After approximately 1.5km the corridor bends in a south easterly direction and then traverses the R354. As the corridor reaches a length of approximately 3 km it bends again in an easterly direction, continues for a further 2km and is aligned parallel to the existing 400kV Komsberg-Muldersvlei 1 overhead power line. At 5km the corridor bends in a south easterly direction where it traverses a secondary road off the R354 and at approximately 6km the corridor passes into the Komsberg Substation property (2/210

Standvastigheid) on the northern side. The 132kV line connection to the substation itself would be from the eastern side.

- » Alternative 2: begins at the Bon Espirange Substation and follows an alignment east of the Bon Espirange Substation and directly overlaps with Alternative 1. After approximately 1.5km the corridor bends in a south easterly direction, traverses the R354 and, unlike Alternative 1, continues to follow this alignment and then crosses under the existing 400kV Komsberg-Muldersvlei 1 power line. At 4.5 km the corridor traverses the Aprils Kraal property boundary and bends in a slight north easterly direction for approximately 6km and passes into the Komsberg Substation property (2/210 Standvastigheid) on the northern side at approximately 6km. The 132kV line connection to the substation itself would be from the eastern side.

As required by Eskom's technical specifications for the construction of a power line, the power line will comprise a combination of monopole in-line towers, guyed towers, as well as self-supporting towers depending on the technical aspects. The tower structures within the Komsberg Substation footprint would be double circuit while the remainder of the power line would be single circuit.

SG 21 Digit Codes for the properties are listed below:

- » RE/73 Bon Espirange C-0-4-3-0-0-0-0-0-0-0-0-0-0-7-3-0-0-0-0-1
- » RE/73 Bon Espirange C-0-4-3-0-0-0-0-0-0-0-0-0-0-7-3-0-0-0-0-0
- » 2/210 Standvastigheid C-0-7-2-0-0-0-0-0-0-0-0-0-0-2-1-0-0-0-0-0-2
- » RE/210 Standvastigheid C-0-7-2-0-0-0-0-0-0-0-0-0-0-2-1-0-0-0-0-0-0
- » 105 Aprilskraal C-0-4-3-0-0-0-0-0-0-0-0-0-0-1-0-5-0-0-0-0-0

This Environmental Management Programme (EMPr) has been prepared as part of the Basic Assessment process for the proposed substation and power line for the project.

1.1. Potential impacts

Through the assessment of impacts associated with the proposed grid connection infrastructure, both potentially positive and negative impacts have been identified.

The primary project components, for which mitigation and management measures are specified, include the following:

- » A 132kV overhead power line (approximately 6.7 km in length)
- » An on-site substation (Bon Espirange) (within the authorised Roggeveld Wind Farm footprint)

The most significant environmental impacts associated with the proposed project include:

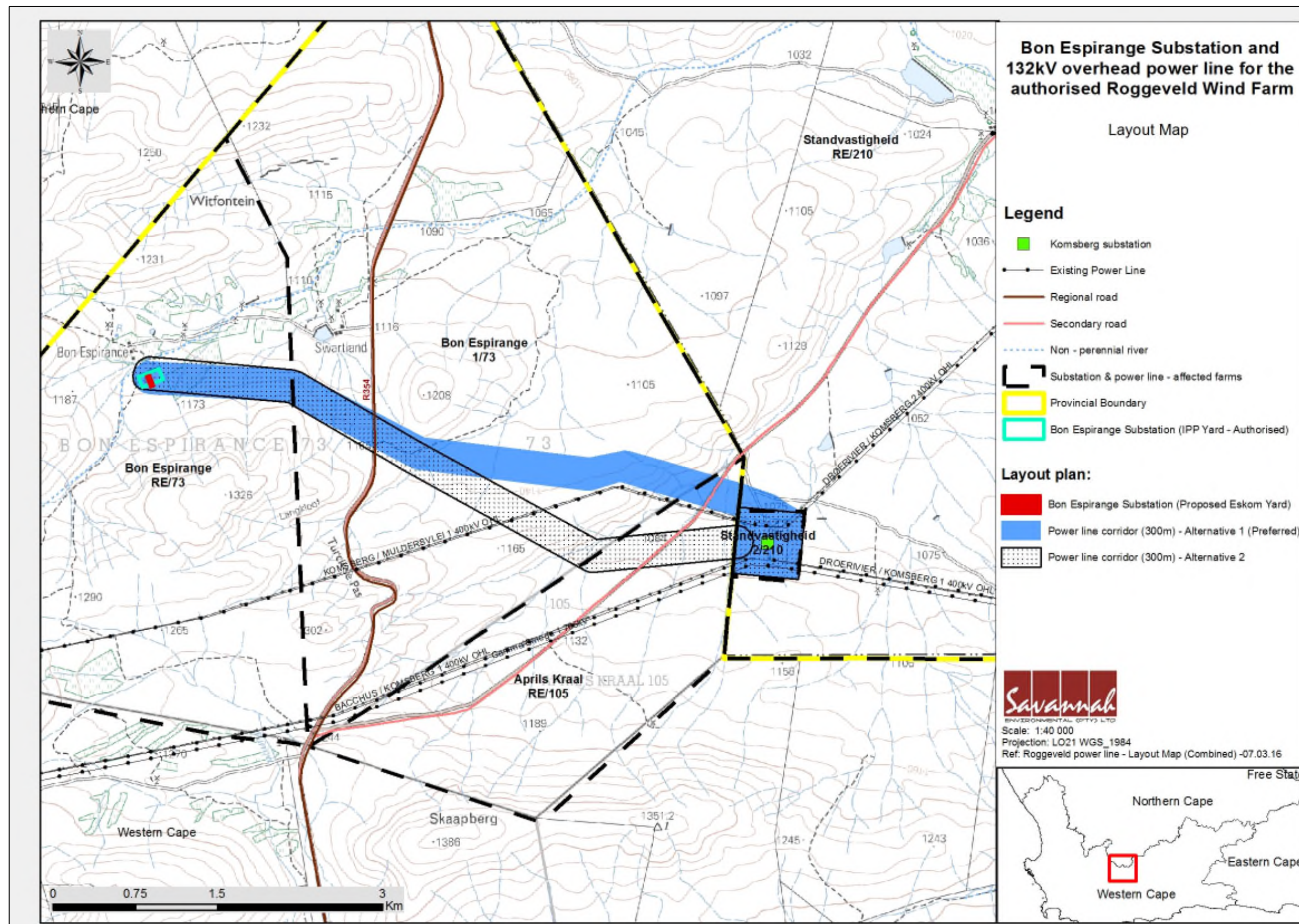
Ecology: The impacts on vegetation and fauna within the proposed footprint is likely to be relatively low given the small footprint of the power line and substation. Given the small footprint of the development, the construction and operation of the Bon Espirange Substation and the 132kV distribution line corridor would not generate any impact of unacceptable negative significance. The proposed Bon Espirange Substation and power line Alternatives 1 and 2 are considered acceptable from an ecological perspective. The preferred power line Alternative 1 impacts less ecologically sensitive areas and is therefore recommended as the preferred alternative for development.

Avifauna: The predominant vegetation seldom grows above human knee height. Most of the food for birds is on this vegetation or the ground below. Consequently, the great majority of birds that use the area have no need to fly high off the ground and their risk of collision with power lines is considered to be inconsequential. As such, the risks posed to avifauna by the proposed development are considered to be limited, are considered low and can be successfully mitigated to acceptable levels. The proposed Bon Espirange Substation and power line Alternatives 1 and 2 are considered acceptable from an avifaunal perspective. The preferred power line Alternative 1 poses less of a collision risk to foraging birds and is therefore recommended as the preferred alternative for development.

Palaeontology and Heritage: The proposed substation and both power line corridors are of low significance. It is most likely that sites of high significance will not be directly impacted by the construction and operation of the substation and the power line. Impacts of cultural significance due to the proposed substation and power line are low. The proposed Bon Espirange Substation and power line Alternatives 1 and 2 are considered acceptable from a palaeontological and heritage perspective. The preferred power line Alternative 1 is aligned along an existing servitude and is therefore recommended as the preferred alternative for development.

Visual Impacts: The proposed substation and power line infrastructure as assessed in this Basic Assessment Report are considered of medium significance but are not likely to contribute significantly to the potential visual impacts associated with the authorised, much taller, towers of the wind turbines of the authorised Roggeveld Wind Farm, Komsberg Substation (plus all expansions to this substation) and the existing power lines in the study area.

Figure 1.1: Layout Map indicating the two proposed power line alternatives and the location of the proposed Bon Espirange substation



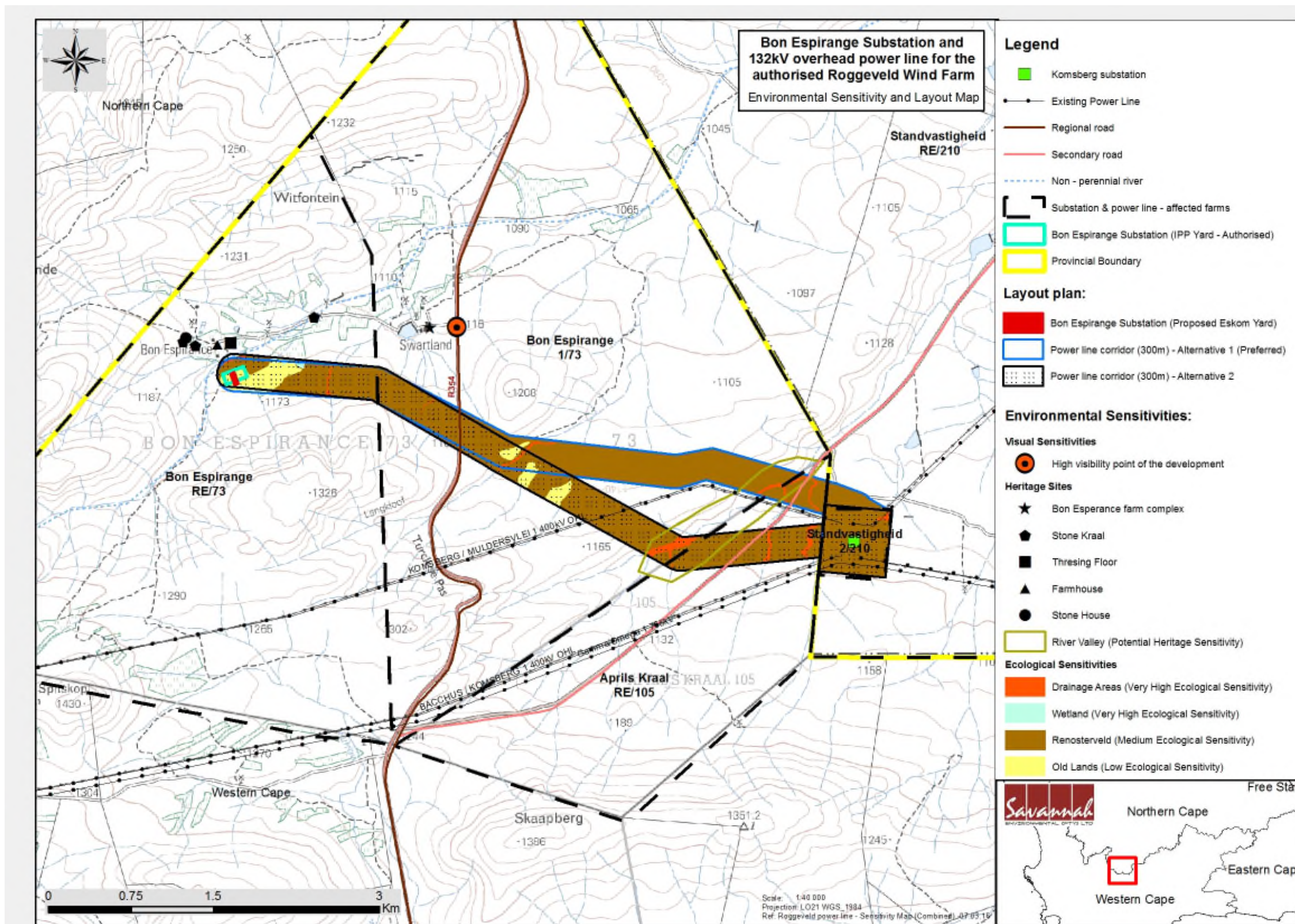


Figure 1.2: Sensitivity map indicating areas of high, moderate and low sensitivity

From a visual perspective, both the proposed substation and power line Alternatives 1 and 2 are considered acceptable, but Alternative 1 is preferred as it avoids the prominent ridgeline to the south.

Cumulative Impacts: Cumulative impacts from the proposed substation, 132kV power line and limited upgrades to Komsberg Substation will result from impacts arising from multiple renewable energy facilities and power lines being constructed in the area. Considering the nature and extent of the planned grid connection infrastructure, the contribution of this infrastructure to the cumulative impacts in the area are considered to be **low and acceptable**. The area is within the Komsberg REDZ, where nodal development is supported.

The sensitivity map (Figure 1.2) is the result of a composite overlay based on the findings of the BA studies undertaken for the substation and the power line corridor alternatives. It is concluded that the proposed substation and power line corridor alternatives are acceptable from an environmental perspective.

1.2. Activities and Components associated with the Development

1.2.1. Construction Phase

Construction of the Bon Espirange substation

The Bon Espirange Substation (IPP Yard) has been authorised as part of the EA for the Roggeveld Wind Farm. The proposed Bon Espirange Substation (Eskom substation) will now be required to evacuate the power into the National Eskom grid at the Komsberg MTS. Substations are constructed in the following simplified sequence:

- Step 1: Surveying of the development area and negotiation with affected landowners;
- Step 2: Final design and micro-siting of the infrastructure and laydown areas based on geotechnical, topographical conditions and potential environmental sensitivities;
- Step 3: Vegetation clearance and construction of access road/tracks;
- Step 4: Site grading and levelling;
- Step 5: Construction of foundations;
- Step 6: Import of substation components;
- Step 7: Construction of substation;
- Step 8: Rehabilitation of disturbed area and protection of erosion sensitive areas;
and
- Step 9: Testing and commissioning

The construction of Ancillary infrastructure will follow a similar sequence as that of the substation described above.

Construction of a Power Line:

The 132kV overhead power line considered within this Basic Assessment Report will be approximately 6-7 km in length, and would be constructed within a servitude of up to 32m in width. This servitude would be within the 300m wide corridor assessed through this BAR. Power lines are constructed in the following simplified sequence:

- Step 1: Survey the area;
- Step 2: Final design and siting of the infrastructure;
- Step 3: Vegetation clearance and construction of access roads (where required);
- Step 4: Construction of foundations;
- Step 5: Assembly and erection of infrastructure on site;
- Step 6: Stringing of conductors;
- Step 7: Rehabilitation of disturbed areas and protection of erosion sensitive areas;
- Step 8: Continued maintenance.

Construction of the proposed power line will take approximately 10 to 14 months to complete.

The self-supporting monopole structure (in-line tower) is typically used along the straight sections of the power line, while the guyed suspension and bend/strain structures are used where there is a bend in the power line alignment. The tower structures within the Komsberg Substation footprint would be double circuit while the rest of the distribution line are proposed to be single circuit. Construction of access roads to the tower positions and construction of tower foundations will be the most significant construction phase activity resulting in environmental impact requiring mitigation. The footprint of each tower will be approximately 10mx10m (100m²) depending on the final structure to be used.

The servitude width for a 132kV power line is up to 36m. The minimum vertical clearance to buildings, poles and structures not forming part of the power line must be in line with Eskom requirements. On receipt of an approval of the final corridor by the environmental Authorities and after negotiations with landowners and final environmental and technical surveys, the final definition of the centre line for the power line and co-ordinates of each bend in the line will be determined. Optimal tower sizes and positions will be identified and verified using a ground survey (in terms of the Environmental Management Programme (EMPr) requirements.

1.2.2. Operation and Maintenance Phase

The proposed Project will require routine maintenance work throughout the operation period. During operation, the Project will be accessed via a gravel road and existing roads would be used, as well as access roads for the authorised Roggeveld WEF. A servitude of 36m will be registered (a right of way) along the length of the power line. During this operation phase vegetation within the servitude and at the Bon Espirange substation will require management only if it impacts on the operational objectives of the infrastructure. The maintenance of the grid connection infrastructure will be the responsibility of the Holder of the Environmental Authorisation. Following completion of construction and commissioning, this infrastructure (Eskom Yard and 132kV line) will be transferred to Eskom for ownership and operation.

1.2.3. Decommissioning Phase

The power line and substation are expected to have a lifespan of more than 25 years (with maintenance) and the infrastructure would only be decommissioned once it has reached the end of its economic life or is no longer required. If economically feasible/desirable the decommissioning activities would comprise the disassembly of the individual components and removal from site. This phase would include the following decommissioning activities:

a) Site Preparation

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

b) Disassemble Components

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

c) Rehabilitation

Disturbed areas (where infrastructure has been removed) will be rehabilitated, if required, depending on the future land-use of the site.

PURPOSE AND OBJECTIVES OF THE EMPr

CHAPTER 2

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

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

This EMPr has been compiled in accordance with Appendix 4, Section 1 of the EIA Regulations of December 2014 (refer to Table 3.1) and will be further developed in terms of specific requirements listed in any authorisations or permit issued for the proposed project. The EMPr has been developed as a set of environmental specifications which are appropriately contextualised to provide clear guidance in terms of the on-site implementation of these specifications (i.e. on-site contextualisation is provided through the inclusion of expected impacts of activities and various monitoring and implementation tools for the management measures).

This EMPr has the following objectives:

- » Outline impact management objectives and environmental specifications which are required to be implemented for the planning, construction and rehabilitation, operation, and decommissioning phases of the project in order to manage and minimise the extent of potential environmental impacts associated with the substation, power line and associated infrastructure.
- » Ensure that all the phases of the project do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential positive environmental benefits are enhanced.

- » Identify entities responsible for the implementation of the measures and outline functions and responsibilities.
- » Propose mechanisms and frequency for monitoring compliance, and preventing long-term or permanent environmental degradation.
- » Facilitate appropriate and proactive responses to unforeseen events or changes in project implementation that was not considered in the BA process.

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

The Holderholder of the Environmental Authorisation must ensure that the implementation of the project complies with the requirements of all its Environmental Authorisations, permits, and obligations emanating from relevant environmental legislation.

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

STRUCTURE OF THIS EMPr

CHAPTER 3

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

- » Key legislation applicable to the development;
- » Pre-construction, planning and design activities;
- » Construction activities;
- » Rehabilitation activities;
- » Operation activities; and
- » Decommissioning activities.

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

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

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

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

Performance Indicator	Description of key indicator(s) that track progress/indicate the effectiveness of the EMP.
Monitoring	Mechanisms for monitoring compliance; the key monitoring actions required to check whether the objectives are being achieved, taking into consideration responsibility, frequency, methods, and reporting.

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

- » Planned activities change;
- » Modification to or addition to environmental objectives and targets;
- » Relevant legal or other requirements are changed or introduced; or
- » Significant progress has been made 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. Content of the EMPr: Legislated and DEA Requirements

Table 3.1: Content of this EMPr in terms of NEMA and Appendix 4 of the EIA Regulations of December 2014

Requirement	EMP Reference
EMP REQUIREMENTS IN TERMS OF APPENDIX 4 OF EIA REGULATIONS	
(a) details of— (i) the EAP who prepared the EMPr; and (ii) the expertise of the EAP to prepare an EMPr	Section 3.3
(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 1.2
(c) a description of the impact management objectives, including management statements, identifying the impacts that need to be avoided, managed and/or mitigated as identified through the environmental impact assessment process for all phases of the development including— (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iii) where relevant operation activities; and (iv) rehabilitation of the environment after construction and where applicable post closure;	Chapter 5 – Preconstruction and planning Chapter 6 – Construction activities Chapter 7 – Rehabilitation Chapter 8 – Operation activities
(d) a description of impact management outcomes, identifying the standard of impact management required for the aspects contemplated in paragraph (c);	Chapters 6-8

Requirement	EMP Reference
<p>(e) a description of impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (c) and (d) will be achieved, and may include actions to –</p> <ul style="list-style-type: none"> (i) modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) remedy the cause of pollution or degradation and migration of pollutants; (iii) comply with any prescribed environmental management standards or practices; (iv) comply with any applicable provisions of the Act regarding closure, where applicable; (v) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable 	<p>Actions listed in terms of each Objective detailed in Chapters 6-8</p>
<p>(f) the method of monitoring the implementation of the impact management actions contemplated in paragraph (e);</p>	<p>Monitoring requirements listed under each Objective detailed in Chapters 6-8</p>
<p>(g) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (e);</p>	<p>Monitoring requirements and timeframes listed under each Objective detailed in Chapters 6-8</p>
<p>(h) an indication of the persons who will be responsible for the implementation of the impact management actions;</p>	<p>Responsibility listed for each management action under each Objective detailed in Chapters 6-8</p>
<p>(i) the time periods within which the impact management actions contemplated in paragraph (e) must be implemented;</p>	<p>Timeframes listed for each management action under each Objective detailed in Chapters 6-8</p>
<p>(j) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (e);</p>	<p>Monitoring requirements listed under each Objective detailed in Chapters 6-8</p>
<p>(k) a program for reporting on compliance, taking into account the requirements as prescribed by these Regulations; and</p>	<p>Section 6.5</p>
<p>(l) an environmental awareness plan describing the manner in which—</p> <ul style="list-style-type: none"> (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment. 	<p>Section 6.4</p>

3.2. Project Team

This draft EMPr was compiled by and had input from:

	Name	Company
EMPr Compilers:	Michelle Moodley Karen Jodas	Savannah Environmental
Ecological impact assessment	Simon Todd	Simon Todd Consulting
Heritage impact assessment	Lita Webley	ACO Associates
Avifaunal impact assessment	Dr A.J. Williams	African Insights
Visual impact assessment	Quinton Lawson and Bernard Oberholzer	MLB Architects

The Savannah Environmental team has extensive knowledge and experience in EIAs and environmental management, having been involved in BA processes & EIAs over the past sixteen years. The team has managed and drafted EMPrs for other power generation projects throughout South Africa, including numerous wind and solar energy facilities.

3.3. Details of the EAP

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

- » *Michelle Moodley* - the principle author of this report is a Professional Natural Scientist, holds an Honours degree in Environmental Science and has 4 years of experience in environmental consulting. She has undertaken EIAs for various proposed solar energy facilities and various other infrastructure projects in South Africa.
- » *Karen Jodas* is a registered Professional Natural Scientist and holds a Master of Science degree and is the registered EAP on the proposed project. She has more than 18 years of experience consulting in the environmental field. Her key focus is on strategic environmental assessment and advice; management and co-ordination of environmental projects, which includes integration of environmental studies and environmental processes into larger engineering-based projects and ensuring compliance to legislation and guidelines; compliance reporting; the identification of environmental management solutions and mitigation/risk minimising measures; and strategy and guideline development. She is currently responsible for the project management of EIAs for several renewable energy projects across the country

Curricula vitae for the Savannah Environmental project team **and specialist consultants** are included in Appendix E.

APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES CHAPTER 4

The following legislation and guidelines have informed the scope and content of this EMPr Report:

- » National Environmental Management Act (Act No 107 of 1998).
- » EIA Regulations, published under Chapter 5 of the NEMA (GNR R983, GNR 984 in Government Gazette 38282 of 4 December 2014).
- » Guidelines published in terms of the NEMA EIA Regulations, in particular:

Several other Acts, standards, or guidelines have also informed the project process and the scope of issues addressed and assessed in the BAR. A review of legislative requirements applicable to the proposed project is provided in Table 4.1.

Table 4.1: Relevant legislative and permitting requirements applicable to the proposed grid connection infrastructure

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
National Legislation			
National Environmental Management Act (Act No. 107 of 1998)	<p>The EIA Regulations have been promulgated in terms of Chapter 5 of the Act. Listed activities which may not commence without an environmental authorisation are identified within these Regulations.</p> <p>In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation.</p> <p>In terms of GNR 983 and 985 of June 2010 a Basic Assessment Process is required to be undertaken for the proposed project.</p>	<ul style="list-style-type: none"> » National Department of Environmental Affairs (DEA) » Northern Cape Department of Environment and Nature Conservation (NC DENC) – commenting authority » Western Cape: Department of Environmental Affairs and Development Planning (DEADP) – commenting authority 	<p>The listed activities triggered by the proposed Project has been identified and assessed in the EIA process being undertaken (i.e. Basic Assessment).</p> <p>This Basic Assessment Report will be submitted to the competent and commenting authority in support of the application for authorisation.</p>
National Environmental Management Act (Act No. 107 of 1998)	In terms of the Duty of Care provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with a project is avoided, stopped or minimised.	DEA	<p>While no permitting or licensing requirements arise directly, the holistic consideration of the potential impacts of the proposed Project has found application in the EIA process.</p> <p>The implementation of mitigation measures are included as part of the Draft EMP and will continue to apply throughout the life cycle of the Project.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
<p>National Environmental Management: Biodiversity Act (Act No. 10 of 2004)</p>	<p>In terms of S57, the Minister of Environmental Affairs has published a list of critically endangered, endangered, vulnerable, and protected species in GNR 151 in Government Gazette 29657 of 23 February 2007 and the regulations associated therewith in GNR 152 in GG29657 of 23 February 2007, which came into effect on 1 June 2007.</p> <p>In terms of GNR 152 of 23 February 2007: Regulations relating to listed threatened and protected species, the relevant specialists must be employed during the EIA Phase of the project to incorporate the legal provisions as well as the regulations associated with listed threatened and protected species (GNR 152) into specialist reports in order to identify permitting requirements at an early stage of the EIA Phase.</p> <p>» The Act provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics</p>	<p>» DEA » NC DENC » DEADP</p>	<p>A Specialist Ecological Assessment was undertaken as part of the Basic Assessment process (refer to Appendix D of the BAR). As such the potential occurrence of critically endangered, endangered, vulnerable, and protected species, as well as critically endangered (CR), endangered (EN), vulnerable (VU) or protected ecosystems and species and the potential for them to be affected has been considered. Provincially protected plant species were identified to be affected by the proposed project and a permit will be required for the relocation of these plant species.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
<p>National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)</p>	<p>and national maps of listed ecosystems (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (GG 34809, GN 1002), 9 December 2011).</p> <p>The Minister may by notice in the <i>Gazette</i> publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment.</p> <p>The Minister may amend the list by –</p> <ul style="list-style-type: none"> » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. <p>In terms of the Regulations published in terms of this Act (GN 921), A Basic Assessment or Environmental Impact Assessment is required to be undertaken for identified listed activities (Category A and B) while Category C Activities (such as storage of waste) must be undertaken in accordance with the necessary norms and standards.</p> <p>Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that:</p>	<ul style="list-style-type: none"> » DEA » NC DENC » DEADP 	<p>As no waste disposal site is to be associated with the proposed Project, no permit is required in this regard.</p> <p>Waste handling, storage and disposal during construction and operation is required to be undertaken in accordance with the requirements of the Act, as detailed in the EMPr</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<ul style="list-style-type: none"> » The containers in which any waste is stored, are intact and not corroded or in any other way rendered unfit for the safe storage of waste. » Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away. » Nuisances such as odour, visual impacts and breeding of vectors do not arise; and » Pollution of the environment and harm to health are prevented. 		
<p>National Environmental Management: Air Quality Act (Act No. 39 of 2004)</p>	<p>S18, S19, and S20 of the Act allow certain areas to be declared and managed as "priority areas."</p> <p>Declaration of controlled emitters (Part 3 of Act) and controlled fuels (Part 4 of Act) with relevant emission standards.</p> <ul style="list-style-type: none"> » GN R 827 – National Dust Control Regulations prescribes general measures for the control of dust in all areas 	<ul style="list-style-type: none"> » DEA » Karoo Hoogland Local Municipality » Laingsburg Local Municipality 	<p>Dust Control Regulations describe the measures for control and monitoring of dust, including penalties. These regulations might be applicable during the construction phase of the project. Dust management have also been accounted for in the EMPr</p>
<p>National Water Act (Act No. 36 of 1998)</p>	<p>Water uses under S21 of the Act must be licensed unless such water use falls into one of the categories listed in S22 of the Act or falls under the general authorisation.</p> <p>In terms of S19, the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to prevent and remedy the effects of pollution to water resources from occurring, continuing, or recurring.</p>	<ul style="list-style-type: none"> » National Department of Water and Sanitation » Northern Cape Department of Water and Sanitation » Western Cape Department of Water and Sanitation 	<p>A water use license (WUL) or General Authorisation will be required in terms of Section 21 of the Act.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
Environment Conservation Act (Act No. 73 of 1989)	<ul style="list-style-type: none"> » National Noise Control Regulations (GN R154 dated 10 January 1992) 	<ul style="list-style-type: none"> » DEA » NC DENC » DEA&DP 	Noise impacts are expected to be associated with the construction phase of the Project and are not likely to present a significant intrusion to the local community. There is no requirement for a noise permit in terms of the legislation.
Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)	<ul style="list-style-type: none"> » A mining permit or mining right may be required where a mineral in question is to be mined (e.g. materials from a borrow pit) in accordance with the provisions of the Act. » Requirements for Environmental Management Programmes and Environmental Management Plans are set out in S39 of the Act. » S18, S19, and S20 of the Act allow certain areas to be declared and managed as "priority areas." » Declaration of controlled emitters (Part 3 of Act) and controlled fuels (Part 4 of Act) with relevant emission standards. » GN R 827 – National Dust Control Regulations prescribes general measures for the control of dust in all areas 	<ul style="list-style-type: none"> » Department of Mineral Resources 	As no borrow pits are expected to be required for project, no mining permit or right is required to be obtained.
National Heritage Resources Act (Act No. 25 of 1999)	<ul style="list-style-type: none"> » S38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including <ul style="list-style-type: none"> » The construction of a road, power line, pipeline, canal or other similar linear development or barrier exceeding 300 m in length; » Any development or other activity which will change the character of a site exceeding 5 000 m² in extent » The relevant Heritage Authority must be notified of developments such as linear developments (i.e. roads and 	<ul style="list-style-type: none"> » South African Heritage Resources Agency » Northern Cape Heritage Resources Authority » Heritage Western Cape 	A permit may be required should any identified cultural/ heritage sites on site be required to be disturbed or destroyed as a result of the proposed development. No cultural or heritage sites were identified during the site study by the Heritage specialists but it is possible that some may be unearthed during construction.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>power lines), bridges exceeding 50 m, or any development or other activity which will change the character of a site exceeding 5 000 m²; or the re-zoning of a site exceeding 10 000 m² in extent. This notification must be provided in the early stages of initiating that development, and details regarding the location, nature and extent of the proposed development must be provided.</p> <p>» Standalone HIAs are not required where an EIA is carried out as long as the EIA contains an adequate HIA component that fulfils the provisions of S38. In such cases only those components not addressed by the EIA should be covered by the heritage component.</p>		
National Forests Act (Act No. 84 of 1998)	<p>» In terms of S5 (1) no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a license granted by the Minister to an (applicant and subject to such period and conditions as may be stipulated”.</p> <p>» The list of protected tree species was published in GN 877 of 22 November 2013.</p>	<p>» Department of Agriculture, Forestry and Fisheries</p> <p>» NC DENC</p> <p>» DEADP</p>	No protected trees were identified within the study area and therefore no permits would be required in this regard.
National Veld and Forest Fire Act (Act 101 of 1998)	<p>» In terms of S12 the landowner would be obliged to burn firebreaks to ensure that should a veldfire occur on the property, that it does not spread to adjoining land.</p> <p>» In terms of S12 the firebreak would need to be wide and long enough to have a reasonable chance of</p>	Department of Agriculture, Forestry and Fisheries	While no permitting or licensing requirements arise from this legislation, and this Act will find application during the construction and Operation phase of the project.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	preventing the fire from spreading, not causing erosion, and is reasonably free of inflammable material. » In terms of S17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires.		
Conservation of Agricultural Resources Act (CARA) (Act No 43 of 1983)	» Prohibition of the spreading of weeds (S5). » Classification of categories of weeds & invader plants (Regulation 15 of GN R1048) & restrictions in terms of where these species may occur. » Requirement & methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R1048).	Department of Agriculture, Forestry and Fisheries	An Ecology study was undertaken (refer to Appendix D1 of the BAR) and CARA was taken into account. The relevant mitigations measures were identified and are included in the EMPr
Hazardous Substances Act (Act No. 15 of 1973)	This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising, or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products. » Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of	» Department of Health	It is necessary to identify and list all the Group I, II, III, and IV hazardous substances that may be on the site and in what Operation context they are used, stored or handled. If applicable, a license could be required to be obtained from the Department of Health.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>injury etc., can be declared to be Group I or Group II hazardous substance;</p> <ul style="list-style-type: none"> » Group IV: any electronic product; » Group V: any radioactive material. <p>The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.</p>		
<p>National Road Traffic Act (Act No 93 of 1996)</p>	<p>The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed.</p> <p>Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges and culverts.</p> <ul style="list-style-type: none"> » The general conditions, limitations and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the 	<ul style="list-style-type: none"> » Provincial Department of Transport (provincial roads) » South African National Roads Agency Limited (national roads) 	<p>An abnormal load/vehicle permit may be required to transport the various components to site for construction. These include route clearances and permits could be required for vehicles carrying abnormally heavy or abnormally dimensioned loads.</p> <p>Depending on the trailer configuration and height when loaded, some of the components may not meet specified dimensional limitations (height and width) and would need to apply for the relevant permit/ clearance.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	requirements of the National Road Traffic Act and the relevant Regulations.		
Provincial Legislation			
Northern Cape Nature Conservation Act (Act No. 9 of 2009)	<p>» Provides inter alia for the sustainable utilisation of wild animals, aquatic biota and plants as well as permitting and trade regulations regarding wild fauna and flora within the province. In terms of this act the following section may be relevant with regards to any security fencing the development may require.</p> <p>Manipulation of boundary fences</p> <p>19. No Person may –</p> <p>(a) erect, alter remove or partly remove or cause to be erected, altered removed or partly removed, any fence, whether on a common boundary or on such person’s own property, in such a manner that any wild animal which as a result thereof gains access or may gain access to the property or a camp on the property, cannot escape or is likely not to be able to escape therefrom;</p> <p>The Act also lists protected fauna and flora under 3 schedules ranging from Specially protected (Schedule 1), protected (schedule 2) to common (schedule 3). The majority of mammals, reptiles and amphibians are listed under Schedule 2,</p>	» NC DENC	<p>A permit is required for any activities which involve species listed under schedule 1 or 2. The NC DENC permit offices provide an integrated permit which can be used for all provincial and Threatened or Protected Species (TOPS)-related permit requirements.</p> <p>Provincially protected plant species were found within the study area. Therefore, a permit could be required for removal of such species. A permit could be required from NC DENC to relocate protected plants and to clear natural vegetation.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	except for listed species which are under Schedule 1.		
Northern Cape Nature Conservation Act, Act No. 9 of 2009	<p>This Act provides for the sustainable utilisation of wild animals, aquatic biota and plants; provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; and provides for the issuing of permits and other authorisations. Amongst other regulations, the following may apply to the current project:</p> <ul style="list-style-type: none"> » Boundary fences may not be altered in such a way as to prevent wild animals from freely moving onto or off of a property; » Aquatic habitats may not be destroyed or damaged; » The owner of land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species. » The Act provides lists of protected species for the Province. 	» DEADP	A permit is required for any activities which involve species listed under schedule 1 or 2. Provincially protected plant species were found within the study area. Therefore, a permit could be required for removal of such species. A permit could be required from DEADP to relocate protected plants and to clear natural vegetation.

MANAGEMENT PROGRAMME: PRECONSTRUCTION

CHAPTER 5

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

- » Ensures that the design responds to the identified environmental constraints and opportunities.
- » Ensures that pre-construction activities are undertaken in accordance with all relevant legislative requirements.
- » Ensures that the best environmental options are selected for the linear components.
- » Enables the construction activities to be undertaken without significant disruption to other land uses and activities in the area.

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

5.1 Objectives

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

Ecological Sensitivity

From an ecological perspective Power line Alternative 1 will impact less sensitive sites and therefore is preferred. There are a number of minor drainage lines and a small pan along the corridor route for both Alternative 1 and 2 and the towers should be positioned to minimise impact on the riparian areas. There are also some wetland areas towards the Bon Espirange Substation that should be mapped in the field during a preconstruction walk-through and avoided where necessary. A pre-construction walk through of the power line route and substation footprint should be undertaken to ensure that any individuals of protected species directly beneath the line or within the footprint can be avoided. (Please refer to the Ecological Report in Appendix D of the BAR for more information).

Heritage sensitivity

From a heritage perspective it is preferable to keep power line infrastructure along an established servitude wherever possible. Possible pastoralist sites tend to concentrate along the river valleys. The underlying rocks of the Middle Permian Beaufort group are renowned for their rich fossil heritage of terrestrial vertebrates. Farmsteads in the area of the Roggeveld WEF have a moderate to low heritage significance. There is no direct threat to the farmhouse or outbuildings on the Bon-

Espirange farm. Cemeteries and graves are usually located near farmsteads. The power line will cross the R354 which is a scenic route. Power line Alternative 1 is preferred. Direct impacts to stone walling, stone kraals, etc. which may occur on the top of the hill near the proposed Bon Espirange substation must be avoided. While it is unlikely that these features will occur on elevated areas at a considerable distance from the farmhouse, nevertheless, the ECO should be alerted to this possibility. (Please refer to the Heritage Report in Appendix D of the BAR for more information).

Avifauna

Alternative Power line 1 which will reduce the likelihood of bird collision mortality relative to alternative 2 should be selected. Hill-slope habitats should be avoided as there's are areas where raptors regularly forage. Diverters must be placed at 5 m intervals on the single span of line between the two support structures where, approaching the Komsberg substation, the power line is closest to the farm dam. (Please refer to the Avifaunal Report in Appendix D of the BAR for more information).

Visual

During consideration of the final design and layout of the substation and power line any signage required and related to the proposed facilities must be discrete and confined to the entrance gates. Corporate or advertising signage should be avoided. The location of the power line route should avoid prominent ridgelines where possible because of their skyline effect. The number of access / maintenance roads should be minimised, and existing roads used as far as possible. (Please refer to the Visual Report in Appendix D of the BAR for more information).

A sensitivity map has been prepared from the findings of the BA studies undertaken (refer to Figure 1.2).

Project Component/s	<ul style="list-style-type: none"> » Substation and power line » Access roads where required
Potential Impact	<ul style="list-style-type: none"> » Soil erosion » Impacts on flora and fauna » Loss of Species of Conservation Concern » Impacts on sensitive habitats including pans and drainage lines » Impacts on heritage sites of cultural significance » Visual intrusion
Activities/Risk Sources	<ul style="list-style-type: none"> » Construction not being confined as far as possible to area of impact
Mitigation: Target/Objective	<ul style="list-style-type: none"> » The design responds to the identified environmental constraints and opportunities

Mitigation: Action/Control	Responsibility	Timeframe
Preconstruction walk-through (ecology) of the route and substation site in order to locate species of conservation concern that should be avoided or translocated. Construction to commence only after walk through has been conducted and necessary permits obtained from CapeNature and DENC. There are no protected trees at the site and a permit from DAFF would not be required.	Roggeveld Wind Power (Pty) Ltd	Pre-construction
Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness as to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimising wildlife interactions, remaining within demarcated construction areas	Roggeveld Wind Power (Pty) Ltd	Pre-construction
ECO to provide supervision and oversight of vegetation clearing activities near sensitive areas.	Roggeveld Wind Power (Pty) Ltd	Pre-construction
Avoidance of hill-slopes where some resident raptors regularly forage.	Roggeveld Wind Power (Pty) Ltd	Project planning
Placing diverters on the single span of line where, approaching the Komsberg substation, it is closest to the farm dam.	Roggeveld Wind Power (Pty) Ltd	Project planning
Signage related to the proposed facilities to be discrete and confined to the entrance gates. No corporate or advertising signage.	Roggeveld Wind Power (Pty) Ltd	Project planning
Lighting at the substation to be fitted with reflectors to avoid light spillage.	Roggeveld Wind Power (Pty) Ltd	Project planning
The location of the power line route to avoid the prominent ridgeline to the southeast where possible because of their skyline effect.	Roggeveld Wind Power (Pty) Ltd	Project planning
Plan and conduct pre-construction activities in an environmentally acceptable manner	Roggeveld Wind Power (Pty) Ltd	Pre-construction
Obtain any additional environmental permits required (biodiversity permits, SAHRA permits etc.) based on final positioning of infrastructure.	Roggeveld Wind Power (Pty) Ltd	Project planning
There are a number of minor drainage lines and a small pan along the route and the towers should be positioned to minimise impact on the riparian areas. There are also some wetland areas towards the Bon Espirange Substation that should be mapped in the field during a preconstruction walk-through and avoided where necessary	Roggeveld Wind Power (Pty) Ltd	Project planning

Mitigation: Action/Control	Responsibility	Timeframe
A rehabilitation plan should be drawn up that specifies the rehabilitation process	Roggeveld Wind Power (Pty) Ltd	Pre-construction
Bird-friendly (Eskom approved or similar) power line tower and conductor designs must be used.	Contractor	Design phase
Plan to install best available (at the time of construction) Eskom approved or similar, anti-bird collision line marking devices on the earth wire of the power line. Diverters must be placed at 5 m intervals on the single span of line between the two support structures where, approaching the Komsberg substation, the power line is closest to the farm dam. This should preferably be a dynamic device, i.e. one that moves, as it is believed that these are more effective in reducing collisions. It is recommended that a durable device be used.	Contractor	Design phase
Any new access roads are required to be carefully planned and constructed to minimise the impacted area and prevent unnecessary excavation, placement, and compaction of soil. Construction vehicles also need to consider the load carrying capacity of road surfaces and adhere to all other prescriptive regulations regarding the use of public roads by construction vehicles.	Engineer/ Contractor	Planning/Design Phase
The terms of this EMP and the Environmental Authorisation must be included in all tender documentation and Contractors contracts.	Roggeveld Wind Power (Pty) Ltd and Contractor	Tender process
Ensure that vegetation is not unnecessarily removed during the construction period	Contractor	Planning
Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources	Contractor	Planning
Stone walling, stone kraals, etc. which may occur on the top of the hill near the proposed Bon Espirange substation must be avoided.	Roggeveld Wind Power (Pty) Ltd	Project planning

Performance Indicator	<ul style="list-style-type: none"> » The design meets the objectives and does not degrade the environment to unsatisfactory levels » Design and layouts respond to the mitigation measures and recommendations in the BAR
Monitoring	<ul style="list-style-type: none"> » The Contractor must familiarise himself/herself with the design prior to the commencement of construction

OBJECTIVE 2: To ensure effective communication mechanisms

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

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

Mitigation: Action/control	Responsibility	Timeframe
Implement a grievance mechanism procedure for the public in line with the mechanism implemented for the WIND FARM facility (Appendix A)	Roggeveld Wind Power (Pty) Ltd/ Contractor	Pre-construction (construction procedure) Pre-operation (operation procedure)
Develop and implement a grievance mechanism for the construction, operational and decommissioning phases of the project for all employees, contractors, subcontractors and site personnel. This procedure should be in line with the South African Labour Law and aligned with WIND FARM facility mechanism	Contractor	Pre-construction (construction procedure) Pre-operation (operation procedure)

Performance Indicator	<ul style="list-style-type: none"> » Effective communication procedures in place
Monitoring	<ul style="list-style-type: none"> » An incident reporting system should be used to record non-conformances to the EMPr

MANAGEMENT PROGRAMME: CONSTRUCTION

CHAPTER 6

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

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

6.1 Institutional Arrangements: Roles and Responsibilities for the Construction Phase

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

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

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

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

- » Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures.
- » Commission internal audits of the construction site against the EMPr
- » Confine the construction site to the demarcated areas
- » Ensure that transgressions are rectified through the implementation of corrective action contained in this EMPr.

Site Manager (Roggeveld Wind Power (Pty) Ltd's on-site Representative) will:

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

An independent **ECO** must be appointed by Roggeveld Wind Power (Pty) Ltd prior to the commencement of any authorised construction activities. The ECO will be responsible for monitoring, reviewing and verifying compliance by the Contractor with the environmental specifications of the EMPr and the conditions of the Environmental Authorisation. Accordingly, the ECO will:

- » Be fully knowledgeable with the contents of the BA.
- » Be fully knowledgeable with the contents with the conditions of the Environmental Authorisation.
- » Be fully knowledgeable with the contents with the EMPr.
- » Be fully knowledgeable of all the licences and permits issued to the site.
- » Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with them.

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

Contractor is responsible for the overall execution of the activities envisioned in the construction phase including the implementation and compliance with recommendations and conditions of the EMPr as well as the EA. The Contractor must therefore:

- » Ensure implementation and compliance with the EMPr at all times during construction activities and maintain, *inter alia*, an environmental register which keeps a record of all environmental incidents which occurs on the site during construction of the substation and power line).
- » Ensure that the compliance of the EMPr, EA and the legislation is monitored through regular and comprehensive inspection of the site and surrounding areas.

- » Ensure that if the EMPr, EA and/or the legislation conditions, regulations or specifications are not followed then appropriate measures are undertaken to address any non-compliances (for example an ECO may cease construction or an activity to prevent a non-compliance from continuing, if reasonable).

These incidents may include:

- » Public involvement / complaints;
- » Health and safety incidents;
- » Incidents involving Hazardous materials stored on site; and/or
- » Non-compliance incidents.

The Contractor is also responsible for the implementation of corrective actions recommended by the EO/ Environmental Representative; for non-conformances recorded by the ECO, and Project Coordinator within a reasonable period.

Environmental Officer (EO)/ Environmental Representative: The Contractor's EO/ Environmental Representative (employed by the Contractor), is responsible to:

- » Ensure that the compliance of the EMPr, EA, and the legislation is monitored through regular and comprehensive inspection of the site and surrounding areas.
- » Ensure that if the EMPr, EA and/or the legislation conditions, regulations or specifications are not followed then appropriate measures are undertaken to address any non-compliances.
- » Implementation of all other environmental licenses required.
- » Ensure that the compilation of progress reports for submission to the Project Manager, with input from the Site Manager, takes place on a regular basis, including a final post-construction audit.
- » Ensure that there is communication with the Site Manager regarding the monitoring of the site.
- » Ensure that any non-compliance or remedial measures that need to be applied are reported.
- » Managing the day-to-day on-site implementation of this EMPr.
- » Managing daily checklists, and weekly reports.
- » Liaise and advise on all environmental and related issues and ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor.

The Contractor's EO/ Environmental Representative should:

- » Be well versed in environmental matters.
- » Understand the relevant environmental legislation and processes.

- » Understand the hierarchy of Environmental Compliance Reporting, and the implications of Non-Compliance.
- » Know the background of the project and understand the implementation programme.
- » Keep accurate and detailed records of all EMPr-related activities on site.

6.2 Objectives

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

OBJECTIVE 2: Minimise impacts related to inappropriate site establishment

The Contractor must take all reasonable measures to ensure the safety of the public in the surrounding area.

Project Component/s	<ul style="list-style-type: none"> » Substation and power line » Access roads where required
Potential Impact	<ul style="list-style-type: none"> » Hazards to landowners and public » Damage to indigenous natural vegetation, due largely to ignorance of where such areas are located » Loss of species of conservation concern
Activities/Risk Sources	<ul style="list-style-type: none"> » Excavations » Movement of construction vehicles in the area and on-site
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To secure the site against unauthorised entry » To protect members of the public/landowners/residents » No loss of or damage to sensitive vegetation in areas outside the immediate development footprint

Mitigation: Action/Control	Responsibility	Timeframe
Secure site, working areas and excavations in an appropriate manner, as agreed with the Site Manager	Contractor	Site establishment, and duration of construction
Where necessary control access, fence, and secure area	Contractor	Site establishment, and duration of construction
Fence and secure contractor's equipment camp/ laydown area	Contractor	Site establishment

Mitigation: Action/Control	Responsibility	Timeframe
Where the public could be exposed to danger by any of the works or site activities, the contractor must, as appropriate, provide suitable flagmen, barriers and/or warning signs in English, Afrikaans and any other relevant local languages, all to the approval of the Site Manager	Contractor	Site establishment and duration of construction
All unattended open excavations shall be adequately demarcated and/or fenced. Adequate protective measures must be implemented to prevent unauthorised access to the working area and the internal access/haul routes	Contractor	Site establishment and duration of construction
Establish appropriately bunded areas for storage of hazardous materials (i.e. fuel/chemicals to be required during construction)	Contractor	Site establishment
All development footprints should be appropriately fenced off and clearly demarcated. Excavations should also be physically demarcated with, for example, orange snow netting.	Contractor	Site establishment, and duration of construction
Establish the necessary ablution facilities with chemical toilets and provide adequate sanitation facilities and ablutions for construction workers (1 toilet per every 15 workers) at appropriate walking distance. Provide sanitary bins for female workers	Contractor	Site establishment, and duration of construction
Ablution or sanitation facilities should not be located within 100 m from a 1:100 year flood line including drainage lines or within 32m of a watercourse, whichever is greatest.	Contractor	Site establishment, and duration of construction
Supply adequate (closable, tamper proof) waste collection bins at site where construction is being undertaken	Contractor	Site establishment, and duration of construction
Separate bins should be provided for general and hazardous waste	Contractor	Site establishment, and duration of construction
As far as possible, provision should be made for separation of waste for recycling	Contractor	Site establishment, and duration of construction

Performance Indicator	<ul style="list-style-type: none"> » Site is secure and there is no unauthorised entry » No members of the public/ landowners injured » Appropriate and adequate waste management and sanitation facilities provided at construction site
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Monitoring	<ul style="list-style-type: none"> » An incident reporting system must be used to record non-conformances to the EMPr » ECO to monitor all construction areas on a continuous basis until all construction is completed. Non-conformances will be immediately reported to the site manager
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OBJECTIVE 3: Appropriate management of the construction site and construction workers

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

Mitigation: Action/Control	Responsibility	Timeframe
The siting of the construction equipment camp(s)/ laydown area(s) must take cognisance of any sensitive areas reflected on the sensitivity map	Contractor	Pre-construction
As far as possible, minimise vegetation clearing and levelling for equipment storage area(s)/ laydown area(s)	Contractor	Site establishment, and during construction
Rehabilitate all disturbed areas as soon as construction is complete within an area. No exotic plants may be used in rehabilitation. Only indigenous plants of the area may be used	Contractor	Construction
Ensure waste containers are maintained and emptied on a regular basis	Contractor	Duration of construction
Chemical toilets and hazardous substances must not be located within 50m of drainage lines or pans.	Contractor	Duration of construction
Ensure ablution facilities are appropriately maintained. Ablutions must be cleaned regularly and associated waste disposed of at a registered/permitted waste	Contractor	Duration of construction

Mitigation: Action/Control	Responsibility	Timeframe
disposal site. The ablutions facilities must be removed from site when construction is completed.		
Cooking and eating of meals must take place in a designated area	Contractor and sub-contractor/s	Duration of contract
No firewood or kindling may be gathered from the site or surrounds	Contractor and sub-contractor/s	Duration of contract
No open fires are permitted on site and construction personnel must be made aware of the consequences of starting a fire on site to avoid damage to neighbouring farms	Contractor and sub-contractor/s	Duration of contract
All litter must be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area. Particular attention needs to be paid to food waste	Contractor and sub-contractor/s	Duration of contract
No plants may be collected from site for medicinal or any other purpose	Contractor	Duration of contract
No one may disturb flora or fauna in/outside of the demarcated construction area/s	Contractor and sub-contractor/s	Duration of contract
Firefighting equipment and training must be provided before the construction phase commences	Contractor and sub-contractor/s	Duration of contract
A Code of conduct for construction workers should be implemented	Contractor and sub-contractor/s	Construction
Contractors must ensure that all workers before commencing work are informed of the conditions contained in the EMP, specifically consequences of stock theft and trespassing on adjacent farms	Contractor and sub-contractor/s	Construction
Construction workers, except for security personnel – if required, are not allowed to reside on site outside of working hours or without proper supervision	Contractor and sub-contractor/s	Duration of contract
On completion of the construction phase, all construction workers must leave the site	Contractor and sub-contractor/s	Construction

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

OBJECTIVE 4: Maximise local employment associated with the construction phase

Although limited, employment opportunities could be created during the construction phase, specifically for semi-skilled and unskilled workers. Use should be made of local labour as far as possible.

Project Component/s	<ul style="list-style-type: none"> » Substation and power line » Access roads where required
Potential Impact	<ul style="list-style-type: none"> » The opportunities and benefits associated with the creation of local employment and business
Activities/Risk Sources	<ul style="list-style-type: none"> » Contractors who make use of their own labour for unskilled tasks, thereby reducing the employment and business opportunities for locals » Sourcing of individuals with skills similar to the local labour pool outside the municipal area
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Employment of a maximum number of low-skilled to semi-skilled workers for the project from the local area where possible

Mitigation: Action/Control	Responsibility	Timeframe
Construction workers should be recruited, as far as possible, from the local areas	Contractor	Duration of construction
Tender documentation should contain guidelines for the involvement of labour, entrepreneurs, businesses, and Small, Medium and Micro Enterprises (SMMEs) from the local sector	Roggeveld Wind Power (Pty) Ltd/ Contractor and subcontractors	Planning/ Pre-construction

Performance Indicator	<ul style="list-style-type: none"> » The involvement of local labour and previously disadvantaged individuals is promoted » Labour, entrepreneurs, businesses, and SMMEs from the local sector are awarded jobs/ contracts, where practically possible, based on requirements in the tender documentation
Monitoring	<ul style="list-style-type: none"> » Roggeveld Wind Power (Pty) Ltd and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase

OBJECTIVE 5: Minimise impacts related to traffic management and transportation of equipment and materials to site

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

Project Component/s	<ul style="list-style-type: none"> » Substation and power line » Access roads where required
Potential Impact	<ul style="list-style-type: none"> » Impact of construction vehicles on road surfaces, and possible increased risk in accidents involving people and animals » Traffic congestion, particularly on narrow roads or on road passes where overtaking is not permitted » Deterioration of road pavement conditions (both surfaced and gravel road) due to increased traffic
Activities/Risk Sources	<ul style="list-style-type: none"> » Construction vehicle movement » Speeding on local roads » Degradation of local road conditions » Site preparation and earthworks » Foundations or plant equipment installation » Transportation of ready-mix cement from off-site batching plant to the site, if required » Mobile construction equipment movement on-site » Substation and power line construction activities
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Minimise impact of traffic on local traffic volume, existing infrastructure, property owners, animals, and road users » To ensure all vehicles are roadworthy and all materials/equipment are transported appropriately and within any imposed permit/licence conditions

Mitigation: Action/Control	Responsibility	Timeframe
Strict vehicle safety standards should be implemented and monitored	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
All relevant permits for abnormal loads must be applied for from the relevant authority	Contractor (or appointed transportation contractor)	Pre-construction
A designated access to the proposed site and power line servitude must be created to ensure safe entry and exit	Contractor	Pre-construction
No deviation from approved transportation or construction routes must be allowed, unless roads are closed for whatever reason outside the control of the Contractor	Contractor	Duration of contract
Appropriate road management strategies must be implemented on external and internal roads with all employees and contractors required to abide by standard road and safety procedures	Contractor (or appointed transportation contractor)	Pre-construction
Any traffic delays resulting from the presence of construction traffic must be co-ordinated with the appropriate authorities	Contractor	Duration of contract
The movement of all vehicles within the site must be on designated roadways or tracks created for the purpose of construction, or where possible, on existing tracks	Contractor	Duration of contract
Signage must be established at appropriate points warning of turning traffic and the construction site (all signage to be in accordance with prescribed standards)	Contractor	Duration of contract
Signs must be placed along construction roads to identify speed limits, travel restrictions, and other standard traffic control information. Signage must be appropriately maintained for the duration of the construction period	Contractor	Duration of contract
An speed limit of 40km/h should be implemented for vehicles travelling on site in order to minimise dust generation and ensure safety of personnel and the environment and lessen environmental degradation	Contractor	Duration of contract
All construction vehicles and or machineries travelling on public roads must adhere to the specified speed limits and all drivers must be in possession of an appropriate valid driver's license	Contractor	Duration of contract

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

OBJECTIVE 6: To avoid and or minimise the potential impact of the activities during the construction on the safety of local communities and the potential loss of livestock, game, other fauna and damage to farm infrastructure

An inflow of workers could, as a worst case scenario and irrespective of the size of the workforce, pose some security risks. Criminals could also use the opportunity, due to "outsiders" being in the area, to undertake their criminal activities.

Project Component/s	<ul style="list-style-type: none"> » Substation and power line » Access roads where required
Potential Impact	<ul style="list-style-type: none"> » Impact on safety of farmers and communities (increased crime etc.) and potential loss of livestock due to stock theft by construction workers, illegal hunting or trapping of fauna and game, and also damage to farm infrastructure, such as gates and fences
Activities/Risk Sources	<ul style="list-style-type: none"> » The presence of construction workers on the site can pose a potential safety risk to local farmers and communities and may result in stock thefts or illegal hunting/ trapping of fauna and game. The activities of construction workers may also result in damage to farm infrastructure
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To avoid and or minimise the potential impact on local communities and their livelihoods

Mitigation: Action/Control	Responsibility	Timeframe
The housing of construction workers on the site should be limited to security personnel, if required in addition to the security that will be on site for the Roggeveld Wind Power Project	Contractor	Construction
Ensure that all farm gates are locked (when not in use) and secure (when in use) at all times	Contractor	Construction
Inform the landowner of activity on their land as per agreed landowner construction requirements or at least two (2) days in advance of planned activities	Project Company/Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
Procedures and measures to prevent, and in worst cases, attend to fires should be developed in consultation with the surrounding property owners	Contractor	Pre-construction and when required
Contact details of emergency and police services should be prominently displayed on site	Contractor	Construction
Appropriate fire-fighting equipment must be present on site and members of the workforce should be appropriately trained in using this equipment in the fighting of veld fires	Contractor	Construction
Employees, visitors and/or subcontractors should be made well aware of the consequences of any damage to private property and/or loss of livestock, game and/or other fauna	Project Company/ Contractor	Duration of contract
Should there be any damage to private property and/or loss of livestock, game and/or other fauna that can be linked to the Contractor, or any subcontractor, the landowner shall be compensated accordingly upon sufficient proof thereof.	Project Company/ Contractor	Duration of contract
Reasonable site access control should be implemented and existing access roads to be used as far as possible.	Contractor	Duration of contract
All construction vehicles should adhere to a low speed limit (40km/h) to avoid collisions with susceptible species such as snakes and tortoises.	Contractor	Duration of contract

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

OBJECTIVE 7: Management of dust and other air emissions

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

Project Component/s	<ul style="list-style-type: none"> » Substation and power line » Access roads where required 	
Potential Impact	<ul style="list-style-type: none"> » Dust and particulates from vehicle movement to and on-site, foundation excavation, road construction activities, road maintenance activities, temporary stockpiles, and vegetation clearing affecting the surrounding residents and visibility » Release of minor amounts of air pollutants (for example NO₂, CO₂ and SO₂) from vehicles and construction equipment 	
Activities/Risk Sources	<ul style="list-style-type: none"> » Clearing of vegetation and topsoil » Excavation, grading, scraping, levelling, digging, drilling » Transport of materials, equipment, and components on internal access roads/ tracks » Re-entrainment of deposited dust by vehicle movements » Wind erosion from topsoil and spoil stockpiles and unsealed roads and surfaces » Fuel burning from construction vehicles with combustion engines 	
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure emissions from all construction vehicles with combustion engines are minimised, where possible, for the duration of the construction phase » To minimise nuisance to the community from dust emissions and to comply with workplace health and safety requirements for the duration of the construction phase 	
Mitigation: Action/Control	Responsibility	Timeframe
Roads must be maintained in a manner that will ensure that nuisance from dust emissions from road or vehicle sources are not visibly excessive	Contractor	Construction
Ensure that any damage to roads attributed to construction activities is repaired before completion of the construction phase, or shortly after	Contractor	Construction
Appropriate dust suppressant must be applied on all exposed areas, stockpiles and gravel roads as required to minimise/control airborne dust. These could include the use of water or other appropriate dust suppressants, as determined by the local site conditions and in consultation with the ECO. Potable water should not be used for dust control.	Contractor	Duration of contract
Haul vehicles moving outside the construction site carrying material that can be wind-blown must be covered with tarpaulins	Contractor	Duration of contract
A speed limit of 40km/h should be implemented for vehicles travelling on site in order to minimise dust generation and ensure safety of personnel and the environment	Contractor	Duration of contract

Drivers must be made aware of the potential safety issues and enforcement of strict speed limits when they are employed	Contractor	Pre-construction
Dust-generating activities or earthworks may need to be rescheduled or the frequency of application of dust control/suppressant increased during periods of high winds if excessive visible dust is blowing toward nearby residences outside the site	Contractor	Duration of contract
Disturbed areas must be re-vegetated as soon as practicable in line with the progression of construction activities	Contractor	Completion of construction
Vehicles and equipment must be maintained in a road-worthy condition at all times	Contractor	Duration of contract

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

OBJECTIVE 8: Minimisation of development footprint and disturbance to topsoil

In order to minimise impacts on flora, fauna and ecological processes, the development footprint should be limited as far as possible.

Project Component/s	<ul style="list-style-type: none"> » Substation and power line » Access roads where required
Potential Impact	<ul style="list-style-type: none"> » Impacts on natural vegetation » Impacts on soil » Loss of topsoil
Activity/Risk Source	<ul style="list-style-type: none"> » Site preparation and earthworks » Excavation of foundations » Construction of site access roads » Site preparation (e.g. compaction)

	<ul style="list-style-type: none"> » Substation and power line construction activities » Stockpiling of topsoil, subsoil and spoil material
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To retain natural vegetation, where possible » To minimise footprints of disturbance of vegetation/habitats » Remove and store all topsoil on areas that are to be excavated; and use this topsoil in subsequent rehabilitation of disturbed areas » Minimise spoil material

Mitigation: Action/Control	Responsibility	Timeframe
Areas to be cleared must be clearly marked on-site to eliminate the potential for unnecessary clearing	Contractor	Pre-construction
The extent of clearing and disturbance to the native vegetation must be kept to a minimum so that impact on flora and fauna and their habitats are restricted	Contractor	Site establishment & duration of contract
No activities must take place out of the demarcated construction site	Contractor	Site establishment & duration of contract
Any fill material required must be sourced from a commercial off-site suitable/permitted source, quarry or borrow pit. Where possible, material from foundation excavations must be used as fill on-site	Contractor	Duration of contract
Existing access roads to be used as far as possible.	Contractor	Duration of contract

Performance Indicator	<ul style="list-style-type: none"> » Minimal disturbance outside of designated work areas » Minimise clearing of existing vegetation » Topsoil appropriately stored
Monitoring	<ul style="list-style-type: none"> » Observation of vegetation clearing and soil management activities by ECO throughout construction phase » Supervision of all clearing and earthworks » An incident reporting system must be used to record non-conformances to the EMPr

OBJECTIVE 9: Minimise the impacts on and loss of indigenous vegetation and faunal habitat and fauna

The substation and power line will be largely confined to areas of moderate ecological sensitivity. Placement of non-essential infrastructure in areas of high

ecological sensitivity should be avoided as far as possible. A permit will be required for the removal of any Species of Conservation Concern.

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

Mitigation: Action/control	Responsibility	Timeframe
Limit areas of disturbance to the development footprint	Contractor	Duration of construction
Areas to be cleared must be clearly marked in the field to eliminate unnecessary clearing. In this regard, staff/employees must be educated to keep construction activities within the demarcated areas	Contractor	Pre-construction
The extent of clearing and disturbance to the native vegetation must be kept to a minimum so that the impact on flora and avifaunal habitat is restricted	Contractor	Site establishment & duration of contract
Placing of diverters at 5 m intervals on the single span of line between the two support structures where, approaching the Komsberg substation, the power line is closest to the farm dam	Contractor	Site establishment & duration of contract
A site rehabilitation programme must be prepared and implemented	Contractor in consultation with Specialists	Duration of contract
Protected plants identified within the development footprint must not be disturbed or removed prior to a relevant permit being granted	Contractor	Pre-construction
Employees must be prohibited from harvesting wild plants for any purpose	Contractor	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
Restrict construction activities to post-dawn and pre-dusk	Contractor	Construction
All construction vehicles should adhere to a low speed limit (40km/h) to avoid collisions with susceptible species such as snakes and tortoises.	Contractor	Construction
EO must inspect the immediate vegetation for evidence of snares.	Contractor/EO	Construction
The collection, hunting or harvesting of any plants or animals at the site or in the surrounding area by decommissioning personnel should be strictly forbidden. No open excavations, holes or pits should be left open for extended periods at the site as fauna can fall in and become trapped. Active pits and trenches should have soil ramps present to allow fauna to escape and all holes and trenches should be filled and levelled following removal of infrastructure. All disturbed areas should be rehabilitated with a cover of indigenous species grown from seed or cuttings sourced locally.	Contractor	Construction
Contractor	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » No disturbance outside of designated work areas » Minimised clearing of existing/natural vegetation » Limited impacts on areas of identified and demarcated sensitive habitats/vegetation » No trapping or killing of fauna illegally
Monitoring	<ul style="list-style-type: none"> » Observation of vegetation clearing activities by ECO or the Contractor's Environmental Officer throughout construction phase » Supervision of all clearing and earthworks by ECO or the Contractor's EO » An incident reporting system must be used to record non-conformances to the EMPr

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

On-going alien plant monitoring and removal should be undertaken on all areas of natural vegetation on an annual basis. Some alien invasive plant species occur in

the study area and there is a definite potential for alien plants to spread or become established following disturbance on site.

Project Component/s	» Substation and power line » Access roads where required
Potential Impact	» Invasion of natural vegetation surrounding the site by declared weeds or invasive alien species
Activities/Risk Sources	» Construction, environmental management
Mitigation: Target/Objective	» No alien plants within project control area during the construction and operation phases

Mitigation: Action/Control	Responsibility	Timeframe
Avoid creating conditions in which alien plants may become established: » Keep disturbance of indigenous vegetation to a minimum » Rehabilitate disturbed areas as quickly as possible. » Do not import soil from areas with alien plants	Contractor	Construction
Establish an on-going monitoring programme to detect and quantify any alien species that may become established and identify the problem species (as per Conservation of Agricultural Resources Act and Biodiversity Act)	Contractor	Construction
Immediately control any alien plants that become established using registered control methods	Contractor	Construction

Performance Indicator	» Disturbed areas rehabilitated in line with the rehabilitation plan » Closed site free of erosion and alien invasive plants
Monitoring	» On-going monitoring of area by EO during construction » If any alien invasive species are detected, then the distribution of these should be mapped and investigated » The results should be interpreted in terms of the risk posed to sensitive habitats within and surrounding the project area » Reporting frequency depends on legal compliance framework

OBJECTIVE 11: Minimise soil degradation and erosion

The soil on site may be impacted in terms of:

- » Soil degradation including erosion (by wind and water) and subsequent deposition elsewhere.

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

Project Component/s	<ul style="list-style-type: none"> » Substation and power line » Access roads where required
Potential Impact	<ul style="list-style-type: none"> » Soil and rock degradation » Soil erosion » Increased deposition of soil into drainage systems » Increased run-off over the site
Activities/Risk Sources	<ul style="list-style-type: none"> » Removal of vegetation, excavation, stockpiling, compaction and pollution of soil » Rainfall - water erosion of disturbed areas » Wind erosion of disturbed areas » Concentrated discharge of water from construction activity
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Minimise extent of disturbance areas » Minimise activity within disturbance areas » Minimise soil degradation (mixing, wetting, compaction, etc.) » Minimise soil erosion » Minimise deposition of soil into drainage lines » Minimise instability of embankments/excavations

Mitigation: Action/Control	Responsibility	Timeframe
Identify disturbance areas and restrict construction activity to these areas	Contractor	Before and during construction
Rehabilitate disturbance areas as soon as practicable when construction in an area is complete	Contractor	During and after construction
Any new access roads are required to be carefully planned and constructed to minimise the impacted area and prevent unnecessary excavation, placement, and compaction of soil	Engineer Contractor	Design and construction
Minimise removal of vegetation which adds stability to soil	Contractor	Construction
Excavated topsoil must be stockpiled in designated areas separate from base material at a maximum height of 1.5m and covered (during windy conditions) or vegetated until replaced during rehabilitation. The stockpiles should be actively managed to ensure that they do not erode and alien species are removed.	Contractor	Site establishment & duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
Topsoil must not be stripped or stockpiled when it is raining or when the soil is wet as compaction will occur	Contractor	Site establishment Maintenance: for duration of contract
Implement appropriate erosion control measures (i.e. run-off attenuation on slopes (sand bags, logs), silt fences, storm water catch-pits, shade nets, or temporary mulching over denuded area as required)	Contractor and ECO	Erection: Before construction Maintenance: Duration of contract
Control depth of excavations and stability of cut faces/sidewalls using appropriate methods	Contractor	Duration of contract
Implement an appropriate storm water management plan	Contractor	Duration of construction

Performance Indicator	<ul style="list-style-type: none"> » No activity outside demarcated disturbance areas » Minimal level of soil erosion around site » No activity in restricted areas
Monitoring	<ul style="list-style-type: none"> » On-going inspections of the site by the ECO » Monthly inspections of erosion control devices » Immediate reporting of ineffective erosion and sediment control systems » An incident reporting system must be in place to record non-conformances

OBJECTIVE 12: Protection of heritage resources

Although it is unlikely that remains will be found in situ, there is always a possibility that human remains and/or other archaeological and historical material may be uncovered during the development.

Project Component/s	<ul style="list-style-type: none"> » Access roads/ tracks where required » Substation location » Power line route
Potential Impact	» Heritage objects/ artefacts/ unidentified sites/ burial and grave sites found on site are inappropriately managed or destroyed
Activity/Risk Source	<ul style="list-style-type: none"> » Site preparation and earthworks » Foundations or plant equipment installation » Mobile construction equipment movement on site » Construction activities associated with the facility substation complex, metering station, power line and access roads/ tracks
Mitigation: Target/Objective	» To ensure that any heritage objects found on site are treated appropriately and in accordance with the relevant legislation

Mitigation: Action/control	Responsibility	Timeframe
Areas required to be cleared during construction must be clearly marked in the field to avoid unnecessary disturbance of adjacent areas	Contractor & EO in consultation with Specialist	Pre-construction
Project employees and any contract staff will maintain, at all times, a high level of awareness of the possibility of discovering heritage sites. Familiarise all staff and contractors with procedures for dealing with heritage objects/sites	Contractor	Duration of contract
Construction managers/foremen should familiarise himself/herself before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites. The contractor's EO may be trained to identify/ follow the relevant procedure and report to the site manager if heritage sites are found.	Contractor	Duration of contract
If stone artefacts, a heritage object is found i.e. grave/ burial site, or archaeological site, human remain, work in the immediate area affecting the find will be stopped immediately, and appropriate specialists brought in to assess to site, notify the Heritage Western Cape (Tel: 021 483 9685).or SAHRA (Tel: (021) 462 4502) so that a systematic and professional investigation can be undertaken. Sufficient time should be allowed to remove/collect such material Areas of possible sensitivity include river valleys, lower slopes of mountainous terrain, any farmsteads	Roggeveld Wind Power (Pty) Ltd, and Contractor in consultation with Specialist	Duration of contract
If fossil material is encountered, the palaeontologist must be given sufficient time to recover a scientifically representative sample;	Roggeveld Wind Power (Pty) Ltd, and Contractor in consultation with Specialist	Duration of contract
Avoid direct impacts to stone walling, stone kraals, etc. which may occur on the top of the hill near the proposed Bon Espirange substation. While it is unlikely that these features will occur on elevated areas at a considerable distance from the farmhouse, nevertheless, the ECO should be alerted to this possibility;	Roggeveld Wind Power (Pty) Ltd, and Contractor in consultation with Specialist	Duration of contract

Performance Indicator	» Completion of SAHRA report on management plan or relocation of graves if applicable
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	<ul style="list-style-type: none"> » No disturbance outside of designated work areas » All heritage items located are dealt with as per the legislative guidelines » Project employees and any contract staff aware of potential for uncovering heritage materials during construction
Monitoring	<ul style="list-style-type: none"> » Observation of clearing and excavation activities by EO throughout construction phase » Appropriate permits obtained from SAHRA prior to the disturbance or destruction of heritage sites, if applicable » An incident reporting system must be used to record non-conformances to the EMPr

OBJECTIVE 13: Minimisation of visual impacts associated with construction

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

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

Mitigation: Action/Control	Responsibility	Timeframe
Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible	Contractor	Construction
Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads/ tracks	Contractor	Construction

Mitigation: Action/Control		Responsibility	Timeframe
Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities		Contractor	Construction
Reduce and control construction dust using approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent)		Contractor	Construction
In areas close to sensitive receptors, restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts		Contractor	Construction
Rehabilitate all disturbed areas immediately after the completion of construction works, or as soon as feasibly possible		Contractor	Construction
Performance Indicator	<ul style="list-style-type: none"> » Vegetation cover on and near the site is intact with no evidence of degradation or erosion » Construction site is kept in a neat and tidy state 		
Monitoring	<ul style="list-style-type: none"> » Monitoring of vegetation clearing during the construction phase » Monitoring of rehabilitation activities to ensure appropriate rehabilitation of the site » An incident reporting system will be used to record non-conformances to the EMPr » Public complaints register must be developed and maintained on site 		

OBJECTIVE 14: Noise control

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

Project component/s	<ul style="list-style-type: none"> » Substation and power line » Access roads where required
Potential Impact	<ul style="list-style-type: none"> » Nuisance noise from construction affecting the surrounding communities
Activity/risk source	<ul style="list-style-type: none"> » Site preparation and earthworks » Construction-related transport » Foundations or plant equipment installation
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise noise to any surrounding residences from the construction activities » To comply with Noise Control Regulations and SANS Guidelines

	» To ensure noise levels are acceptable at residences in close proximity to construction activities
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Mitigation: Action/control	Responsibility	Timeframe
In areas close to sensitive receptors, on-site construction activities should be limited to daylight hours as far as possible.	Contractor	Duration of contract
Construction noise shall be managed according to the Noise Control Regulations and SANS 10103	Contractor	Duration of contract
All construction equipment, including vehicles, must be properly and appropriately maintained in order to minimise noise generation, e.g. silencers must be in good working order	Contractor	Duration of contract

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

OBJECTIVE 15: Appropriate handling and management of waste

The main wastes expected will include spoil from excavation activities, general construction waste, hazardous waste (i.e. fuel), and liquid waste (including grey water and sewage). In order to manage the wastes effectively, guidelines for the assessment, classification, and management of wastes, along with industry principles for minimising construction wastes must be implemented.

Project Component/s	<ul style="list-style-type: none"> » Substation and power line » Access roads where required
Potential Impact	<ul style="list-style-type: none"> » Inefficient use of resources resulting in excessive waste generation » Litter or contamination of the site or water through poor waste management practices
Activity/Risk Source	<ul style="list-style-type: none"> » Packaging » Other construction wastes » Hydrocarbon use and storage » Spoil material from excavation, earthworks, and site preparation
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To comply with waste management legislation » To minimise production of waste

	<ul style="list-style-type: none"> » To ensure appropriate waste storage and disposal » To avoid environmental harm from waste disposal » A waste manifest should be developed for the ablutions showing proof of disposal of sewage at appropriate wastewater treatment works
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Mitigation: Action/control	Responsibility	Timeframe
The storage of flammable and combustible liquids such as oils must be in designated areas which are appropriately bunded, and stored in compliance with Material Safety Data Sheets (MSDS) files.	Contractor	Duration of contract
Any spills will receive the necessary clean-up action. Bioremediation kits are to be kept on-site and used to remediate any spills that may occur. Appropriate arrangements to be made for appropriate collection and disposal of all cleaning materials, absorbents and contaminated soils (in accordance with a waste management plan)	Contractor	Duration of contract
Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals will be complied with	Contractor	Duration of contract
Routine servicing and maintenance of vehicles is not to take place on-site (except for emergency situations or large cranes which cannot be moved off-site). If repairs of vehicles must take place on site, an appropriate drip tray must be used to contain any fuel or oils	Contractor	Duration of contract
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations	Contractor	Duration of contract
Waste disposal records must be available for review at any time	Contractor	Duration of contract
Construction contractors must provide specific detailed waste management plans to deal with all waste streams	Contractor	Duration of contract
Specific areas must be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste (wood and metal scrap) and contaminated waste. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage and vermin control	Contractor	Duration of contract
Where possible, construction and general wastes on-site must be reused or recycled. Bins and skips must be available on-site for collection, separation and storage of waste streams (such as wood, metals, general refuse etc.)	Contractor	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors and licensed waste disposal sites	Contractor	Duration of contract
Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area	Contractor	Duration of contract
Waste and surplus dangerous goods must be kept to a minimum and must be transported by approved waste contractors to sites designated for their disposal	Contractor	Duration of contract
Documentation (waste manifest) must be maintained detailing the quantity, nature and fate of any hazardous waste	Contractor	Duration of contract
An incident/complaints register must be established and maintained on-site	Contractor	Duration of contract
Hazardous and non-hazardous waste must be separated at source. Separate waste collection bins must be provided for this purpose. These bins must be clearly marked and appropriately covered	Contractors	Erection: during site establishment Maintenance: for duration of Contract within a particular area
All solid waste collected, that cannot be recycled, must be disposed of at a registered waste disposal site. A certificate of disposal must be obtained and kept on file. The disposal of waste must be in accordance with all relevant legislation. Under no circumstances may solid waste be burnt or buried on site	Contractors	Erection: during site establishment Maintenance: for duration of Contract within a particular area
Supply waste collection bins at construction equipment and construction crew camps	Contractors	Erection: during site establishment Maintenance: for duration of Contract within a particular area
Construction equipment must be refuelled within designated refuelling locations, or where remote refuelling is required, appropriate drip trays must be utilised	Contractor	Duration of contract
All stored fuels to be maintained within a bund and on a sealed surface	Contractor	Duration of contract
Fuel storage areas must be inspected regularly to ensure bund stability, integrity and function	Contractor	Duration of contract
Construction machinery must be stored within a bunded area and on a sealed surface	Contractor	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
Oily water from bunds at the substation must be removed from site by licensed contractors	Contractor	Duration of contract
Spilled cement and concrete must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site	Contractor	Duration of contract
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
In the event of a major spill or leak of contaminants, the relevant administering authority must be immediately notified as per the notification of emergencies/incidents. Spill kits to be kept on-site	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
Upon the completion of construction, the area will be cleared of potentially polluting materials	Contractor	Completion of construction

Performance Indicator	<ul style="list-style-type: none"> » No complaints received regarding waste on site or indiscriminate dumping » Availability of all appropriate waste manifests for all waste streams
Monitoring	<ul style="list-style-type: none"> » Observation of waste management practices throughout construction phase by EO and contractor » Supervision of waste management practices throughout construction phase by EO and contractor » A complaints register must 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 must be used to record non-conformances to the EMP

OBJECTIVE 16: Appropriate handling and storage of chemicals and hazardous substances

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

Project Component/s	<ul style="list-style-type: none"> » Substation and power line » Access roads where required
Potential Impact	<ul style="list-style-type: none"> » Release of contaminated water from contact with spilled chemicals » Generation of contaminated wastes from used chemical containers
Activity/Risk Source	<ul style="list-style-type: none"> » Vehicles associated with site preparation and earthworks » Construction activities of area and linear infrastructure » Hydrocarbon use and storage
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons or animals » To ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons or animals

Mitigation: Action/Control	Responsibility	Timeframe
Appropriate spill kits must be made available on-site for the clean-up of spills and leaks of contaminants	Contractor	Duration of contract
Corrective action must be undertaken immediately if a potential/actual leak or spill of a polluting substance is identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures	Contractor	Duration of contract
In the event of a major spill or leak of contaminants, the relevant administering authority must be immediately notified as per the notification of emergencies/incidents	Contractor	Duration of contract
Spilled cement must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site	Contractor	Duration of contract
Any contaminated/polluted soil can be stored onsite to a maximum of 90 days before removed from the site and must be disposed of at a licensed hazardous waste disposal facility (note: if storage is for less than 90 days, the Norms and Standards for temporary waste storage in terms of the National Waste act must be adhered to)	Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
Routine servicing and maintenance of vehicles must not to take place on-site but on designated bunded areas at the camp (except for emergencies). If repairs of vehicles must take place, an appropriate drip tray must be used to contain any fuel or oils leaks	Contractor	Duration of contract
All stored fuels must be maintained within a bunded area and on a sealed surface	Contractor	Duration of contract
Fuel storage areas must be inspected regularly to ensure bund stability, integrity and function	Contractor	Duration of contract
Small construction machineries (i.e. stumpers, generators etc.) must be stored in an appropriately sealed area	Contractor	Duration of contract
The storage of flammable and combustible liquids such as oils will be in designated areas which are appropriately bunded, and stored in compliance with Material Safety Data Sheets (MSDS) files	Contractor	Duration of contract
Drip trays must be placed under stationery machineries in sensitive areas	Contractor	Duration of contract
Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals must be compiled with	Contractor	Duration of contract
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations	Contractor	Duration of contract
All small chemical substances used onsite must be accompanied by a portable drip tray to store them	Contractor	Duration of contract
Construction vehicles must be washed within designated area, agreed with the EO and the site manager	Contractor	Duration of contract
The sediment control and water quality structures used on-site must be monitored and maintained in an operational state at all times	Contractor	Duration of contract
Upon the completion of construction, the area must be cleared of potentially polluting materials	Contractor	Completion of construction

Performance Indicator	<ul style="list-style-type: none"> » No chemical spills outside of designated storage areas » No unattended water or soil contamination by spills » No complaints received regarding waste on site or indiscriminate dumping
Monitoring	<ul style="list-style-type: none"> » Supervision of waste management practices throughout construction phase by EO and contractor » A complaints register must be maintained, in which any complaints from the community will be logged

- » An incident reporting system must be used to record non-conformances to the EMPr

6.3 Detailing Method Statements

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

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

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

Specific method statements required may include, *inter alia*:

- » Site establishment.
- » Preparation of the site.
- » Soil management/stockpiling and erosion control.
- » Excavations and backfilling procedure.
- » Stipulate norms and standards for water supply and usage (i.e.: comply strictly to licence and legislation requirements and restrictions).
- » Storm water management procedures.

- » Wash bay for the construction vehicles and or machineries.
- » Ablution facilities (placement, maintenance, management and servicing).
- » Solid Waste Management.
- » Liquid waste management.
- » Dust and noise pollution.
- » Hazardous substance storage (ensure compliance with all national, regional and local legislation with regard to the storage of oils, fuels, lubricants, solvents, wood treatments, bitumen, cement, pesticides and any other harmful and hazardous substances and materials. South African National Standards apply).
- » Fire prevention and management measures on site.
- » Fauna and flora protection process on and off site (i.e. removal to reintroduction or replanting, if necessary).
- » Incident and accident reporting protocol.
- » General administration
- » Designate access road/ tracks and the protocol while roads are in use.
- » Requirements on gate control protocols.

The Contractor may not commence with the activity covered by the Method Statement until it has been provided to, reviewed and accepted by the Site Manager and/or ECO, except in the case of emergencies and then only with the consent of the Site Manager. Review and accepted (or approval where required) of the Method Statement will not absolve the Contractor from their obligations or responsibilities in terms of their contract.

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

6.4 Awareness and Competence: Construction Phase

To achieve effective environmental management, it is important that Contractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. 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 EMPr is readily available on-site, and that all site employees are aware of the location and have access to the document.
- » Employees shall be familiar with the requirements of the EMPr and the environmental specifications as they apply to the construction of the substation and power line.
- » Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended an Environmental Awareness Training course (see 6.4.1 below).
 - The course should be sufficient to provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- » Awareness of any other relevant environmental matters, which are deemed necessary by the ECO.
- » 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.
- » Training must be appropriate for the receiving audience.
- » Ensuring that employee information posters, outlining the environmental "do's" and "don'ts" are erected at prominent locations throughout the site.
- » Records must be kept of those that have completed the relevant training.
- » Refresher sessions must be held annually to ensure the contractor staffs are aware of their environmental obligations as practically possible, detailed below.

6.4.1 Environmental Awareness Training

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

6.4.2 Induction Training

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

This induction training should include discussing the proponent's environmental policy and values, the function of the EMPr and Contract Specifications and the importance and reasons for compliance to these. The induction training must

highlight overall do's and don'ts on site and clarify the contractual and legal repercussions of non-compliance (penalty fees will be outline in the service level agreement between the proponent and the contractor). The non-conformance reporting system must be explained during the induction as well. Opportunity for questions and clarifications must form part of this training. A record of attendance of this training must be maintained by the EO on site. Proof of induction training should be kept on record.

6.4.3 Toolbox Talks

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

6.5 Monitoring Schedule: Construction Phase

A monitoring schedule should be in place internally not only to ensure conformance with the conditions of the EMPr, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are, or could result in significant environmental impacts for which corrective action is required. The independent ECO will be responsible for monitoring for the most part although it will include others on a needs basis (also refer to section 6.5.2 below). The Project Manager will ensure that the internal monitoring is conducted and reported.

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

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

6.5.1. Non-Conformance Reports

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

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

6.5.2. Monitoring Reports

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

6.5.3. Final Audit Report

A final Environmental Audit Report must be compiled by an independent auditor and be submitted to DEA upon completion of the construction and rehabilitation activities. This report must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the Environmental Authorisation conditions and the requirements of the EMPr.

MANAGEMENT PROGRAMME: REHABILITATION

CHAPTER 7

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

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

7.1. Objectives

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

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

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

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

Mitigation: Action/Control	Responsibility	Timeframe
All temporary facilities, equipment, and waste materials (including spoil material) must be removed from site	Contractor	Following execution of the works

Mitigation: Action/Control	Responsibility	Timeframe
All temporary fencing and danger tape must be removed once the construction phase has been completed	Contractor	Following completion of construction activities in an area
The area that previously housed the construction equipment camp is to be checked for spills of substances such as oil, paint, etc. and these should be cleaned up	Contractor	Following completion of construction activities in an area
All hardened surfaces within the construction equipment camp area, not forming part of permanent laydown areas, should be ripped, all imported materials removed, and the area shall be top soiled and re-vegetated	Contractor	Following completion of construction activities in an area
Temporary roads must be closed and access across these blocked, if these roads can no longer be of value to local farmers	Contractor	Following completion of construction activities in an area
Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion	Contractor	Following completion of construction activities in an area
Rehabilitation must be in line with the requirements of the landowner for the land use (except in those areas of remaining natural vegetation which are disturbed) and	Contractor in consultation with rehabilitation specialist	Following completion of construction activities in an area
Areas damaged by construction activities to be rehabilitated / revegetated. Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved	Contractor in consultation with rehabilitation specialist	Post-rehabilitation
Erosion control measures should be used in sensitive areas	Contractor in consultation with rehabilitation specialist (if required)	Post-rehabilitation
Alien plant management must be undertaken as per the alien management and monitoring plan to be developed pre-construction	Contractor	Post-rehabilitation

Mitigation: Action/Control	Responsibility	Timeframe
Topsoil replaced on all areas and stabilised where practicable	Contractor	Rehabilitation
Cleared and disturbed areas should be revegetated with a cover of indigenous grass or shrubs, to a minimum cover of at least 25% projected canopy cover.	Contractor	Rehabilitation
Rehabilitation of cleared areas with indigenous species after construction to reduce alien invasion potential.	Contractor	Rehabilitation

Performance Indicator	<ul style="list-style-type: none"> » All areas of site, including construction equipment camp and working areas, cleared of equipment and temporary facilities » Topsoil replaced on all areas and stabilised where practicable or required after construction and temporarily utilised areas » Disturbed areas rehabilitated and acceptable plant cover achieved on rehabilitated sites » Appropriate vegetation utilised in rehabilitation activities » Complete development area free of 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 as per the alien monitoring and management plan to be developed pre-construction » An incident reporting system must be used to record non-conformances to the EMP

MANAGEMENT PROGRAMME: OPERATION

CHAPTER 8

Overall Goal: To ensure that the operation of the proposed infrastructure 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 facility in a way that:

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

The grid operator (currently envisaged to be Eskom) will be responsible for the operation and maintenance of the grid infrastructure. An Environmental Manager must ensure the implementation of the operational EMPr.

8.1. Objectives

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

OBJECTIVE 1: Protection of Indigenous natural vegetation and fauna, and maintenance of rehabilitated areas

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

Project component/s	» Service roads utilised during regular maintenance » Areas disturbed during the construction phase and subsequently rehabilitated
Potential Impact	» Disturbance to or loss of vegetation and/or habitat
Activity/Risk Source	» Movement of employee vehicles within and around site

Mitigation: Target/Objective	<ul style="list-style-type: none"> » Maintain minimised footprints of disturbance of vegetation/habitats on-site » Ensure and encourage plant regrowth in non-operational areas of post-construction rehabilitation
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Mitigation: Action/Control	Responsibility	Timeframe
Vehicle movements must be restricted to designated roadways	Grid operator (Eskom)	Operation
No disturbance of vegetation outside of the project site must occur	Grid operator (Eskom)	Operation
Existing roads must be maintained to ensure limited erosion and impact on areas adjacent to roadways	Grid operator (Eskom)	Operation
A Regular monitoring and management for alien plants disturbed areas for at least the first 2 years of operation. Bi-annual surveys are likely to be sufficient for this purpose.	Grid operator (Eskom)	Operation
If there are any infestations, alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible and should only be used for woody species which re-sprout following manual control.	Grid operator (Eskom)	Operation

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

OBJECTIVE 2: Protection of avifauna

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

Project Component/s	<ul style="list-style-type: none"> » Power line » Substation
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Potential Impact	» Collision and electrocution events with the overhead power line » Electrocution at substation
Activities/Risk Sources	» Operation of the power line and substation complex without appropriate mitigation measures
Mitigation: Target/Objective	» Maintain a low number of collision and electrocution events

Mitigation: Action/Control	Responsibility	Timeframe
Maintain bird diverters on new line in identified sensitive areas	Grid operator (Eskom)	Operation
Maintain insulation of live components at support structures and substation	Grid operator (Eskom)	Operation

Performance Indicator	» Minimal collision or electrocution events
Monitoring	» Observation of electrocution or collision events with the power line and electrocution at substation » Monitor power line servitude and substation area for mortalities

OBJECTIVE 3: Minimise soil degradation and erosion

The soil on site may be impacted in terms of:

- » Soil degradation including erosion (by wind and water) and subsequent deposition elsewhere is of a concern across the entire site if not managed sufficiently.
- » Uncontrolled run-off relating to operational activities could also lead to accelerated erosion and possible sedimentation of drainage systems.
- » Degradation of the natural soil profile due to pollution.

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

	<ul style="list-style-type: none"> » Minimise soil erosion and deposition of soil into drainage lines » Ensure continued stability of embankments/excavations
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Mitigation: Action/Control	Responsibility	Timeframe
Rehabilitate disturbance areas should the previous attempt be unsuccessful	Grid operator (Eskom)	Operation
Maintain erosion control measures implemented during the construction and rehabilitation phases (i.e. run-off attenuation on slopes (sand bags, logs), silt fences, storm water catch-pits, and shade nets)	Grid operator (Eskom)	Operation

Performance Indicator	<ul style="list-style-type: none"> » Minimal soil erosion around site
Monitoring	<ul style="list-style-type: none"> » Immediate reporting of ineffective sediment control systems » An incident reporting system must record non-conformances according to the EMPr

MANAGEMENT PROGRAMME: DECOMMISSIONING

CHAPTER 9

It is most likely that decommissioning activities of the infrastructure would comprise the disassembly and removal of the substation and power line from the site.

Should the activity ever cease or become redundant, the Holder of the EA shall undertake the required actions as prescribed by legislation at the time and comply with all relevant legal requirements administered at any relevant and competent authority at that time.

The relevant mitigation measures contained under the construction EMP (Chapter 6) should be applied during decommissioning, if still applicable at the time, and therefore is not repeated in this section.

The following ecological mitigation measures must be complied with during the decommissioning phase:

- » Site access to be controlled and no unauthorised persons should be allowed onto the site.
- » The collection, hunting or harvesting of any plants or animals at the site or in the surrounding area by decommissioning personnel should be strictly forbidden.
- » Any accidental chemical, fuel, and oil spills that occur at the site during decommissioning should be cleaned up in the appropriate manner as related to the nature of the spill.
- » No open excavations, holes or pits should be left open for extended periods at the site as fauna can fall in and become trapped. Active pits and trenches should have soil ramps present to allow fauna to escape and all holes and trenches should be filled and levelled following removal of infrastructure.
- » All disturbed areas should be rehabilitated with a cover of indigenous species grown from seed or cuttings sourced locally.
- » Due to the disturbance at the site during decommissioning, alien plant species are likely to invade the site and a long-term control plan will need to be implemented for two to three years after decommissioning.
- » Regular monitoring (bi-annual) for alien plants within the development footprint for two to three years after decommissioning.
- » Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible. The frequency of alien clearing events should be determined by the identity of the species present and the density of invasion.
- » Cleared and disturbed areas should be revegetated with a cover of indigenous grass or shrubs, to a minimum cover of at least 25% projected canopy cover.

This section of the EMPr will need to be revisited and amended at the time in accordance with the applicable legislation. The EMPr for Rehabilitation (Chapter 7) is also relevant to the decommissioning of the proposed infrastructure and must be adhered to.

FINALISATION OF THE EMPr

CHAPTER 10

The EMPr is a dynamic document, which must be updated to include any additional specifications as and when required. This will ensure that the construction and operation activities are planned and implemented considering sensitive environmental features.

**APPENDIX A:
GRIEVANCE MECHANISM FOR PUBLIC COMPLAINTS
AND ISSUES**

GRIEVANCE PROCESS

The Holder of the Environmental Authorisation (EA) should develop a grievance procedure to ensure fair and prompt resolution of problems that may arise from the project. The grievance procedure should be underpinned by the following principles and commitments:

- Implement a transparent grievance procedure, and disseminate key information to directly impacted stakeholders.
- Seek to resolve all grievances timeously.
- Maintain full written records of each grievance case and the associated process of resolution and outcome for transparent, external reporting.

The responsibility for resolution of grievances will lie with the Holder of the EA and its contractors. The ECO should ensure that the grievance procedure is made accessible to the local community and other relevant stakeholder.

**APPENDIX B:
EROSION MANAGEMENT PLAN**

EROSION MANAGEMENT PLAN

1.1 Purpose

The purpose of the Bon Espirange Substation and 132kV powerline erosion management plan is to implement avoidance and mitigation measures to reduce the erosion potential and likely impact of erosion associated with the construction and operational phases of the proposed infrastructure.

1.2 Scope & Limitations

This plan is intended at introducing measures aimed reducing the negative impacts of erosion on biodiversity as well as reducing the vulnerability of the site to erosion problems during the construction and operational phases of the development. The focus is on managing runoff and reducing the construction phase impact on ecologically sensitive areas. The plan does not cover engineering-side issues which are of relevance to soil management and erosion. Therefore, issues such as the presence of heaving clays, compressible soils, perched water tables, dispersive soils and corrosive groundwater at the site are beyond the general scope of this study and are not directly dealt with. These issues would need to be addressed and their relevance assessed during detailed geotechnical investigation of the site.

1.3 Relevant Aspects of the Site

The local area is characterised by flat plains interspersed with hills and ridges formed by shales, sandstones and mudstone of the Beaufort Series of rocks. Dry drainage courses are characteristic of the arid landscape. The major risk factor in terms of erosion potential at the site is the access roads and power lines. On account of the topography of the site, some of the powerline may need to cross drainage lines. In such areas, the risk of erosion problems and secondary ecological impact is very high and mitigation measures should pay specific attention of these susceptible areas.

1.4 Background

Types of Erosion

Erosion comes in several forms, some of which are not immediately apparent. The major types of erosion are briefly described below:

Raindrop impact

This is the erosion that occurs due to the "bomb blast" effect of raindrop impact. Soil particles can be blasted more than a metre into the air.

Sheet erosion

This is the removal of a shallow and uniform layer of soil from the surface. It is caused initially by raindrop splash and then by runoff. Sheet erosion is often difficult to see as no perceptible channels are formed. Accumulated sediment at the bottom of the slope is often the only indicator.

Rill erosion

This is the removal of soil from the surface whereby small channels or rills up to 300mm are formed. It is caused by runoff concentrating into depressions, wheel tracks etc.

Gully erosion

This is the removal of soil from the surface and sub-surface caused by concentrated runoff eroding channels greater than 300mm deep. Gully erosion often begins as rill erosion which is not addressed.

Promoting Factors

Rainfall

High-intensity, short-duration storm events have much greater erosion potential than low intensity, longer duration storm events with the same runoff volume. Intense storms produce larger raindrops, and are more likely to break up the soil and dislodge particles. The erosion potential of rainfall is dependent on its geographical location. Rainfall within the winter-rainfall region is generally less erosive than rainfall within the summer rainfall region of South Africa.

Soil erodibility

Soil erodibility is determined by the soils ability to resist detachment and transport due to rainfall, runoff and infiltration capacity. Well-structured soils with a high clay content are generally least erodible. Some clays are dispersible meaning that they break down when wet and become highly erodible. Silts and fine sands are highly erodible.

Length and steepness of slope

Steeper slopes cause runoff flow velocities to increase, resulting in increased erosion. As the slope length increases the opportunity for runoff to concentrate and achieve an erosive velocity increases.

Soil surface cover

Soil surface covers such as vegetation and mulches protect the soil surface from raindrop impact, reduce flow velocity, disperse flow, and promote infiltration and the deposition of sediment. This is a basic principle underlying many erosion control approaches which aim to modify the surface characteristics in order to reduce the flow velocity and reduce the potential for erosion.

1.5 Erosion and Sediment Control Principles

The goals of erosion and sediment control during and after construction at the site should be to:

- Protect the land surface from erosion;
- Intercept and safely direct run-on water from undisturbed upslope areas through the site without allowing it to cause erosion within the site or become contaminated with sediment; and
- Progressively revegetate or stabilise disturbed areas.

These goals can be achieved by applying the following principles:

1. Integrate project design with site constraints;
2. Plan and integrate erosion and sediment control with construction activities;
3. Minimise the extent and duration of disturbance;
4. Control stormwater flows onto, through, and from the site in stable drainage structures;
5. Use erosion controls to prevent on-site damage;
6. Use sediment controls to prevent off-site damage;
7. Control erosion and sediment at the source;
8. Stabilise disturbed areas promptly; and
9. Inspect and maintain control measures.

On-Site Erosion Management

Exposed and unprotected soils are the main cause of erosion in most situations. Therefore, the erosion management plan and the revegetation and rehabilitation plan are closely linked to one another and should not operate independently, but should rather be seen as complementary activities within the broader environmental management of the site and should therefore be managed together.

General factors to consider regarding erosion risk at the site includes the following:

- Soil loss will be greater during wet periods than dry periods. Intense rainfall events outside of the wet season, such as occasional summer thunder storms can also however cause significant soil loss. Therefore, precautions to prevent erosion should be present throughout the year;
- Soil loss is related to the length of time that soils are exposed prior to rehabilitation or stabilization. Therefore, the gap between construction activities and rehabilitation should be minimized. Allied to this the fact that topsoil does not store well and should preferably be used within a month or at most within 3 months to aid in the revegetation and rehabilitation of disturbed areas;
- Phased construction and progressive rehabilitation are important elements of the erosion control strategy; and
- The extent of disturbance will influence the risk and consequences of erosion. Therefore, large areas should not be cleared at a time, especially in areas such as slopes where the risk of erosion is higher.
- Roads should be constructed and routed in manner which minimises their erosion potential. Roads should therefore follow the contour as far as possible and roads parallel to the slope direction should be avoided as much as possible.
- All roads, if required, should have water diversion structures present with energy dissipation features present to slow and disperse the water into the receiving area.
- Regular monitoring of the site (minimum of twice annually) for erosion problems is recommended, particularly after large summer thunderstorms have been experienced.
- Any erosion problems observed should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.
- All bare areas should be revegetated with locally occurring species, to bind the soil and limit erosion potential.
- Roads and other disturbed areas should be regularly monitored for erosion problems and problem areas should receive follow-up monitoring to assess the success of the remediation.
- Silt traps should be used where there is a danger of topsoil or material stockpiles eroding and entering streams and other sensitive areas.
- Topsoil should be removed and stored separately and should be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas.

- Phased development and vegetation clearing so that cleared areas are not left unvegetated and vulnerable to erosion for extended periods of time.
- Construction of gabions and other stabilisation features on steep slopes to prevent erosion.
- Reduced activity at the site after large rainfall events when the soils are wet. No driving off of hardened roads should occur immediately following large rainfall events until soils have dried out and the risk of bogging down has decreased.

Specific Recommendations to Reduce Erosion Potential and Degradation of Drainage Systems

Concentration of flows into downstream areas

Road crossings over drainage lines, streams and wetlands can impact downstream wetland ecosystems. Crossings that result in narrowing of the downstream system can result in concentration of flows and channelisation downstream. This may result in a loss of wetland function, and result in the drying out and shrinkage of the wetland area. Erosion and increased vulnerability to invasion of drier banks by alien vegetation may occur.

- Culverts should be adequately spaced such that they do not result in shrinkage of downstream wetlands. Where roads cross minor drainage channels, a single culvert may be adequate, aligned with the downstream drainage line. Where more substantial wetland systems are intercepted by a road, sufficient culverts should be provided such that downstream shrinkage of wetland width does not occur. Moreover, culverts should be aligned, as far impossible, with existing, natural channels;
- All crossings of drainage systems should ensure that both surface and shallow subsurface flows can be accommodated where appropriate and that unnatural channelisation does not occur downstream; and
- Significant wetlands should be avoided. There is sufficient space at the site and flexibility in the design constraints of the access roads, such that it should not be necessary to traverse wetlands.

Runoff Concentration

The increase in hardened surfaces associated with roads, will lead to an increase in the volumes and velocities of flows generated from the hardened surfaces during rainfall events.

- Runoff from road surfaces is usually channeled off the road surface towards the downslope side of the road. On steep slopes, the volumes and velocity of runoff generated may result in erosion of the surrounding areas. Therefore, specific measures to curb the speed of runoff water is usually required in such areas, such as rock beds or even gabions. In addition, these areas should be monitored for at least a year after construction to ensure that erosion is not being initiated in the receiving areas. Once erosion on steep slopes has been initiated, it can be very difficult to arrest.

Diversion of flows

Diversion of flows from natural drainage channels may occur when roads interrupt natural drainage lines, and water is forced to run in channels along the manipulated road edge to formalized crossing points. Even slight diversion from the natural drainage line can result in excessive downstream erosion, as the new channel cuts across the slope to reach the valley bottom.

- Adequate culverts should be provided along the length of all roads to prevent diversion of flow from natural drainage lines;
- Culverts should be carefully located, such that outlet areas do in fact align with drainage lines;
- The downstream velocity of runoff should be managed, such that it does not result in downstream erosion – on steep slopes, where roads have been constructed on cut areas, allowance should be made for culverts to daylight sufficiently far down the slope that their velocities are managed and erosion does not occur;
- Where necessary, anti-erosion structures should be installed downstream of road drains – these may comprise appropriate planting, simple riprap or more formal gabion or other structures; and
- roads and their drainage system should be subject to regular monitoring and inspection, particularly during the wet season, so that areas where head cut erosion is observed can be addressed at an early stage.

Existing Erosion

In some parts of the site, erosion problems are already present. In these areas particular precautions should be exercised to avoid exacerbating the existing problems. In the long-term these areas should be rehabilitated as part of the overall erosion management plan for the site. In cases where severe erosion is already present the following broad-scale measures are recommended:

- the advice of a wetland ecologist, working in association with an engineer should be sought regarding rehabilitation / remediation activities – these may include the construction of gabions to halt head cut erosion and further loss of wetlands, as well as planting of disturbed areas;
- the design of the existing drainage system should be addressed, and incorrect culvert or outlet alignment, as and downstream flow velocity, addressed through changes in design;
- the eroded area should be carefully monitored for up to three years after remediation, and until a new stable state is achieved in wetland structure and function;
- eroded areas should be protected from grazing and trampling by livestock during their re-establishment phases.

1.6 Monitoring Requirements

Construction Phase

The following monitoring actions should be implemented during the construction phase of the development.

Monitoring Action	Indicator	Time frame
Identify all river and drainage line crossings affected by the development	Map of sites of potential concern	Preconstruction
Identify all sections of access roads along steep slopes (>10%)	Map of vulnerable slopes	Preconstruction
Identify and delineate all wetlands near access roads and other infrastructure	On-site demarcation of sensitive no-go areas by suitably qualified ecologist	Preconstruction
Monitor cleared areas for erosion problems	Record of monitoring site, problems encountered and remedial actions implemented	Monthly during the rainy season and following significant rainfall events otherwise
Monitor vegetation	Activity log of monitoring	Monthly during the

Monitoring Action	Indicator	Time frame
clearing activities near sensitive areas such as wetlands drainage lines	actions and any mitigation measures implemented	rainy season and following significant rainfall events otherwise
Monitor revegetated and stabilised areas	Record of monitoring site, problems encountered and remedial actions implemented	Monthly during the rainy season and following significant rainfall events otherwise

Operational Phase

The following monitoring actions should be implemented during the operational phase of the development.

Monitoring Action	Indicator	Time frame
Monitor for the development of new erosion problems across the site, with a focus on areas where water has been diverted or collected from upslope onto downslope areas	Map of erosion problem areas	Quarterly
Document erosion control measures implemented	Records of control measures and their success rate.	Quarterly
Document the extent of erosion at the site and the remedial actions implemented	Decline in erosion and vulnerable bare areas over time	Biannually

**APPENDIX C:
PLANT RESCUE AND PROTECTION PLAN**

PLANT SEARCH AND RESCUE PLAN

1. Purpose

The purpose of the plant rescue and protection plan is to implement avoidance and mitigation measures to reduce the impact of the development of the Bon Espirange Substation and 132kV distribution line on listed and protected plant species and their habitats.

2. Background & Identification of Species of Conservation Concern

The recently promulgated ToPS (Threatened and Protected Species) regulations provide for the regulation of activities which may directly or indirectly impact threatened and protected species. Such species are identified under NEMBA as well as by the National Red Data List of Plants. At a provincial level, the Western Cape Nature Conservation Laws Amendment Act (2000), also provides lists of species which are protected within the province. Species listed under the National Red Data List of Plants as well as those protected under the provincial legislation must be specified on permit applications required for site clearing.

3. Mitigation and Avoidance Options

The development should strive to avoid impact to listed plant species through micro-sitting of the powerline and substation. Where listed plant species fall within the development footprint and avoidance is not possible, then it may be possible to translocate the affected individuals outside of the development footprint. However, not all species are suitable for translocation as only certain types of plants are able to survive the disturbance. Suitable candidates for translocation include most geophytes and succulents. Although there are exceptions, the majority of woody species do not survive translocation well.

4. Preconstruction

- Identification of all listed species which may occur within the site; and
- As the scope for changing layouts is limited once the final layout has been submitted, a preliminary walk-through of the final layout should be conducted to assess the presence of listed plant species within the development footprint and the layout adjusted as necessary to avoid significant populations of species of conservation concern. Such a walk-through should be conducted at the favorable time of year when the probability of recognizing species of conservation concern is high.

Before construction commences at the site, the following actions should be taken:

- Walk-through of the final development footprint by a suitably qualified botanist/ecologist to locate and identify all listed and protected species which fall within the development footprint;

- Walk-through report which identifies areas where minor deviations to roads and other infrastructure can be made to avoid sensitive areas and important populations of listed species. As well as contains a full list of localities where listed species occur within the development footprint and the number of affected individuals in each instance; and
- Search and rescue operation of all listed species within the development footprint that cannot be avoided. Affected individuals should be translocated to a similar habitat outside of the development footprint and marked for monitoring purposes.

5. Construction

- ECO to monitor vegetation clearing at the site. Any deviations from the plans that may be required should first be checked for listed species by the ECO and any listed species present which are able to survive translocation should be translocated to a safe site;
- Any listed species observed within the development footprint that were missed during the preconstruction plant sweeps should be translocated to a safe site;
- Many listed species are also sought after for traditional medicine or by collectors and so the ECO should ensure that all staff attend environmental induction training in which the legal and conservation aspects of harvesting plants from the wild are discussed; and
- The ECO should monitor construction activities in sensitive habitats such as near rivers and wetlands carefully to ensure that impacts to these areas are minimized.

6. Operation

- Access to the site should be strictly controlled and all personnel entering or leaving the site should be required to sign and out with the security officers; and
- The collecting of plants or their parts should be strictly forbidden and signs stating so should be placed at the entrance gates to the site.

7. Identification of Listed Species

In this section, the listed species known to occur in the area based on previous studies is provided from the SANBI SIBIS database.

According to the SANBI SIBIS database, nearly 1000 indigenous species have been recorded from the four quarter degree squares around the site. This includes 26 threatened species and an additional 44 species of lower conservation concern. This is however a considerably larger area than the study area and includes a wide variety of habitats, many of which are not found within the study area, but this is an exceptionally high number for a semi-arid environment. This serves to illustrate the high species richness of the area and high potential impact of the development on plant species of conservation concern.

Species of conservation concern that were observed in the vicinity of the site include *Brunsvigia josephinae* (VU), *Duvalia parviflora* (VU) and *Eriosephalus grandiflorus* (Rare) and *Drimia altissima* (Declining). However, none of these species were observed directly within the proposed development footprint and it is likely that the abundance of listed species within the footprint of the development is low as the listed species tend to be associated with drainage lines or higher-lying ground which would not be impacted by the current development.

List of plant species of conservation concern which are known to occur in the vicinity of the Bon Espirange Substation, 132kV distribution line corridor alternatives corridor. The list is derived from the SIBIS:SABIF website. Those in red are confirmed present at the site, but not necessarily within the development footprint.

Family	Species	IUCN Status
AMARYLLIDACEAE	<i>Brunsvigia josephinae</i>	VU
APOCYNACEAE	<i>Duvalia parviflora</i>	VU
ASPHODELACEAE	<i>Astroloba herrei</i>	VU
	<i>Gasteria disticha</i>	CR
	<i>Haworthia serrata</i>	CR
ASTERACEAE	<i>Antithrixia flavicoma</i>	VU
	<i>Euryops namaquensis</i>	VU
COLCHICACEAE	<i>Wurmbea capensis</i>	VU
CRASSULACEAE	<i>Adromischus mammillaris</i>	EN
FABACEAE	<i>Amphithalea spinosa</i>	VU
	<i>Amphithalea villosa</i>	EN
	<i>Aspalathus candicans</i>	EN
	<i>Lotononis comptonii</i>	EN
	<i>Lotononis densa subsp. congesta</i>	VU
	<i>Lotononis gracilifolia</i>	EN
	<i>Lotononis venosa</i>	VU
<i>Xiphotheca fruticosa</i>	VU	
HYACINTHACEAE	<i>Drimia arenicola</i>	VU
	<i>Lachenalia martinae</i>	VU
IRIDACEAE	<i>Geissorhiza karooica</i>	VU
	<i>Moraea aspera</i>	VU
	<i>Romulea eburnea</i>	VU
	<i>Romulea hallii</i>	VU
	<i>Romulea multifida</i>	VU
	<i>Romulea syringodeoflora</i>	VU
MESEMBRYANTHEMACEAE	<i>Antimima hamatilis</i>	VU
	<i>Didymaotus lapidiformis</i>	VU
	<i>Lampranthus amoenus</i>	EN
	<i>Tanquana archeri</i>	VU
	<i>Tanquana hilmarii</i>	CR

Family	Species	IUCN Status
ORCHIDACEAE	<i>Pterygodium inversum</i>	EN
POLYGALACEAE	<i>Muraltia karroica</i>	VU
PROTEACEAE	<i>Protea convexa</i>	CR
RESTIONACEAE	<i>Hypodiscus sulcatus</i>	EN
RUTACEAE	<i>Acmadenia argillophila</i>	VU

**APPENDIX D:
ALIEN PLANT MANAGEMENT PLAN**

ALIEN INVASIVE PLANT MANAGEMENT PLAN

1. Overall Objective

Manage alien and invasive plant species during the construction and operation of the BonEspirnage Substation and 132kV distribution line to Komsberg Substation, through the implementation of an alien invasive species management and control programme.

2. Problem Outline

Alien plants replace indigenous vegetation leading to severe loss of biodiversity and change in landscape function. Potential consequences include loss of biodiversity, loss of grazing resources, increased fire risk, increased erosion, loss of wetland function, impacts on drainage lines, increased water use etc.

In addition, the Conservation of Agricultural Resources Act (Act 43 of 1983), as amended in 2001, requires that landusers clear Declared Weeds from their properties and prevent the spread of Declared Invader Plants on their properties. A list of declared weeds and invader plants is attached.

3. Current Status of Alien Plants at the Site

Disturbance associated with the construction phase of the project will render the disturbed areas vulnerable to alien plant invasion. Some alien invasion is inevitable and regular alien clearing activities would likely be required to limit the extent of this invasion. Once the natural vegetation has returned to the disturbed areas, the site will be less vulnerable to alien plant invasion. Although the disturbance is generated during construction, this is of short duration and alien plants must be managed during operation as well as following decommissioning. Alien plants are likely to invade along the power line route as a result of the disturbance created during construction. (The construction period is too short to have significant alien invasion within the construction phase and the resulting invasion risk will need to be managed during the operational phase). Alien plants are likely to invade the site as a result of disturbance created during decommissioning

Species of concern include:

- Bromus spp.
- Salsola kali
- Malva parviflora
- Prosopis glandulosa
- Atriplex inflate

4. Vulnerable Habitats

The susceptibility of the site to alien invasion is not homogenous and specific environments and habitats can be singled out as being more vulnerable to invasion. This includes:

- Riparian areas and wetlands
- Disturbed areas which receive runoff
- Construction camps experiencing prolonged use
- Lay down areas experiencing prolonged use

These areas are likely to require specific attention and repeated alien clearing may be required to keep these areas clear of invasive species.

5. Specific Management Objectives:

- The alien plant management plan should be inclusive and cover all the properties involved.
- Ensure alien plants do not become dominant in parts or the whole landscape.
- Initiate and implement a monitoring and eradication programme for alien and invasive species.
- Control alien and invasive species dispersal & encroachment.
- Promote the planting of indigenous species.

6. General Clearing & Guiding Principles

- Alien control programs are long-term management projects and should include a clearing plan which includes follow up actions for rehabilitation of the cleared area. Alien problems at the site should be identified during preconstruction surveys of the development footprint. This may occur simultaneously to other required searches and surveys. The clearing plan should then form part of the preconstruction reporting requirements for the site.
- The plan should include a map showing the alien density and indicating dominant alien species in each area.
- The lighter infested areas should be cleared first (with young/ immature, less dense trees) to prevent the build-up of seed banks. In the case of alien species confined to rivers, it is ideal to start in the headwaters and then move downstream, thereby removing the source of re-infestation.
- Dense mature stands ideally should be left for last, as they probably won't increase in density or pose a greater threat than they are at the moment.
- Collective management and planning with neighbours may be required as seeds of aliens are easily dispersed across boundaries by wind or water courses.
- All clearing actions should be monitored and documented to keep track of which areas are due for follow-up clearing.

7. Clearing Methods

- Different species require different clearing methods such as manual, chemical or biological methods or a combination of both.
- The best-practice clearing method for each species identified should be used.

8. Identification of Alien Species

Table 3 of CARA (the Conservation of Agricultural Resources Act) lists all declared weeds and invader plants. Alien plants are divided into 3 categories based on their risk as an invader.

- Category 1 - These plants must be removed and controlled by all land users. They may no longer be planted or propagated and all trade in these species is prohibited.
- Category 2 - These plants pose a threat to the environment but nevertheless have commercial value. These species are only allowed to occur in demarcated areas and a landuser must obtain a water use licence as these plants consume large quantities of water.

- Category 3 – These plants have the potential of becoming invasive but are considered to have ornamental value. Existing plants do not have to be removed but no new plantings may occur and the plants may not be sold.

The following guide is a useful starting point for the identification of alien species:
Bromilow, C. 2010. Problem Plants and Alien Weeds of South Africa. Briza, Pretoria.

9. Use of Herbicides for Alien Control

Although it is usually preferable to use manual clearing methods where possible, such methods may create additional disturbance which stimulates alien invasion and may also be ineffective for many woody species which resprout. Where herbicides are to be used, the impact of the operation on the natural environment should be minimised by observing the following:

- The use of herbicides should be restricted for the control of alien species that cannot easily be controlled manually and should be applied according to the relevant instructions and by appropriately trained personnel.
- Area contamination must be minimised by careful, accurate application with a minimum amount of herbicide to achieve good control.
- All care must be taken to prevent contamination of any water bodies. This includes due care in storage, application, cleaning equipment and disposal of containers, product and spray mixtures.
- Equipment should be washed where there is no danger of contaminating water sources and washings carefully disposed of in a suitable site.
- To avoid damage to indigenous or other desirable vegetation, products should be selected that will have the least effect on non-target vegetation.
- Coarse droplet nozzles should be fitted to avoid drift onto neighbouring vegetation.
- The appropriate health and safety procedures should also be followed regarding the storage, handling and disposal of herbicides.

For all herbicide applications, the following guidelines should be followed:

Working for Water: Policy on the Use of Herbicides for the Control of Alien Vegetation.

ALIEN PLANT MANAGEMENT PLAN

Construction Phase Activities

The following management actions are aimed at reducing soil disturbance during the construction phase of the development, as well as reducing the likelihood that alien species will be brought onto site or otherwise encouraged.

Action	Frequency
10. The ECO is to provide permission prior to any vegetation being cleared for development.	Daily
11. Clearing of vegetation must be undertaken as the work front progresses – mass clearing is not allowed unless the entire cleared area is to be rehabilitated immediately.	Weekly
12. Should revegetation not be possible immediately, the cleared areas must be protected with packed brush, or appropriately battered with fascine work. Alternatively, jute (Soil Saver) may be pegged over the soil to stabilise it.	Weekly

Action	Frequency
13. Cleared areas that have become invaded can be sprayed with appropriate herbicides provided that these are such that break down on contact with the soil. Residual herbicides should not be used.	Weekly
14. Although organic matter is frequently used to encourage regrowth of vegetation on cleared areas, no foreign material for this purpose should be brought onto site. Brush from cleared areas should be used as much as possible. Arid soils are usually very low in organic matter and the use of manure or other soil amendments is likely to encourage invasion.	Weekly
15. Clearing of vegetation is not allowed within 32m of any wetland, 80m of any wooded area, within 1:100 year floodlines, in conservation servitude areas or on slopes steeper than 1:3, unless permission is granted by the ECO for specifically allowed construction activities in these areas.	Weekly
16. Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas. (Particular attention must be paid to imported material such as building sand or dirty earth-moving equipment.) Stockpiles should be checked regularly and any weeds emerging from material stockpiles should be removed.	Weekly
17. Alien vegetation regrowth must be controlled throughout the entire site during the construction period.	Monthly
18. The alien plant removal and control method guidelines should adhere to best-practice for the species involved.	Monthly
19. Clearing activities must be contained within the affected zones and may not spill over into demarcated No Go areas.	Daily
20. Pesticides may not be used. Herbicides may be used to control listed alien weeds and invaders only.	Monthly
21. Wetlands (existing), forest edges, riverine fringe vegetation and potentially unstable areas must remain demarcated with appropriate fencing or hazard tape. These areas are no-go areas (this must be explained to all workers) that must be excluded from all development activities – workers entering these zones for any reason other than rehabilitation work must be disciplined.	Daily

Monitoring – Construction Phase

The following monitoring actions should be implemented during the construction phase of the development.

Monitoring Action	Indicator	Timeframe
Document alien species present at the site	List of alien species	Preconstruction
Document alien plant distribution	Alien plant distribution map	3 Monthly
Document & record alien control measures implemented	Record of clearing activities	3 Monthly
Review & evaluation of control success rate	Decline in documented alien abundance over time	Biannually

Operational Phase Activities

The following management actions are aimed at reducing the abundance of alien species within the site and maintaining non-invaded areas clear of aliens.

Action	Frequency
Surveys for alien species should be conducted regularly. Every 3 months for the first two years after construction and biannually thereafter. All aliens identified should be cleared.	Every 3 months for 2 years and biannually thereafter
Revegetation with indigenous, locally occurring species should take place in areas where natural vegetation is slow to recover or where repeated invasion has taken place.	Biannually, but revegetation should take place at the start of the rainy season.
Areas of natural vegetation that need to be maintained or managed to reduce plant height or biomass, should be controlled using methods that leave the soil protected, such as using a weed-eater to mow above the soil level.	When necessary
No alien species should be cultivated on-site. If vegetation is required for esthetic purposes, then non-invasive, water-wise locally-occurring species should be used.	When necessary

Monitoring – Operational Phase

The following monitoring and evaluation actions should take place during the operational phase of the development.

Monitoring Action	Indicator	Timeframe
Document alien species distribution and abundance over time at the site	Alien plant distribution map	Biannually
Document alien plant control measures implemented & success rate achieved	Records of control measures and their success rate. A decline in alien distribution and cover over time at the site	Quarterly
Document rehabilitation measures implemented and success achieved in problem areas	Decline in vulnerable bare areas over time	Biannually

Decommissioning Phase Activities

The following management actions are aimed at preventing the invasion, by alien plant species, of the re-vegetated areas created during the decommissioning phase. Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to operation.

Action	Frequency
All damaged areas shall be rehabilitated upon completion of the contract.	Once off

Action	Frequency
All natural areas must be rehabilitated with species indigenous to the area. Re-seed with locally-sourced seed of indigenous grass species that were recorded on site pre-construction.	Once off, with annual follow up re-vegetation where required.
Maintain alien plant monitoring and removal programme for 5 years after rehabilitation.	Biannually

Monitoring – Decommissioning Phase

The following monitoring and evaluation actions should take place during the decommissioning phase of the development.

Monitoring Action	Indictor	Timeframe
Monitor newly disturbed areas where infrastructure has been removed to detect and quantify any aliens that may become established for 5 years after decommissioning and rehabilitation.	Alien plant surveys and distribution map	Biannually until such time as the natural vegetation has recovered sufficiently to resist invasion.
Monitor re-vegetated areas to detect and quantify any aliens that may become established for 5 years after decommissioning and rehabilitation.	Alien plant surveys and distribution map	Biannually for 5 years
Document alien plant control measures implemented & success rate achieved	Records of control measures and their success rate. A decline in alien distribution and cover over time at the site	Annually for 5 years

**APPENDIX E:
CURRICULA VITAE FOR PROJECT TEAM**