
PROPOSED GRID CONNECTION FOR THE SUURPLAAT WIND ENERGY FACILITY NEAR SUTHERLAND, WESTERN CAPE & NORTHERN CAPE PROVINCES

CONSTRUCTION & OPERATION ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

Submitted as part of the Final Split EIA Report
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PROJECT DETAILS

| | | |
|--------------------------|---|--|
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DEFINITIONS AND TERMINOLOGY

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

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.

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.

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

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

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

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

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

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

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

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

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

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.

Natural properties of an ecosystem (*sensu* Convention on Wetlands): Defined in Handbook 1 as the "...physical, biological or chemical components, such as soil, water, plants, animals and nutrients, and the interactions between them". (Ramsar Convention Secretariat. 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition.

Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (see <http://www.ramsar.org/>).

Ramsar Convention on Wetlands: "The Convention on Wetlands (Ramsar, Iran, 1971) is an intergovernmental treaty whose mission is "the conservation and wise use of all wetlands through local, regional and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world". As of March 2004, 138 nations have joined the Convention as Contracting Parties, and more than 1300 wetlands around the world, covering almost 120 million hectares, have been designated for inclusion in the Ramsar List of Wetlands of International Importance." (Ramsar Convention Secretariat. 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition. Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (refer <http://www.ramsar.org/>). South Africa is a Contracting Party to the Convention.

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: Any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, 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 of the NEM WA; or any other substance, material or object that is not included in Schedule 3 of the NEM WA that may be defined as a waste by that is identified as waste by the Minister of Environmental Affairs (by notice in the Gazette). Any waste or portion of waste, referred to in the section above, 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 of Environmental Affairs has, in terms of Section 74 of the NEM WA, exempted any waste or a portion of waste generated by a particular process from the definition of waste; or
- (iv) where the Minister of Environmental Affairs 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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PURPOSE & OBJECTIVES OF THE EMPr

CHAPTER 1

An Environmental Management Programme (EMPr) is defined as “an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented or mitigated, and that the positive benefits of the projects are enhanced”¹. 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 help ensure continuous improvement of environmental performance, reducing negative impacts and enhancing positive effects during the construction and operation of the facility. An effective EMPr is concerned with both the immediate outcome as well as the long-term impacts of the project.

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

The EMPr has been developed as a set of environmental specifications (i.e. principles of environmental management for the grid connection for the Suurplaat Wind Energy Facility), 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 various monitoring and implementation tools for assisted use of the EMPr by the project implementer as well as compliance monitors). During its lifecycle, projects journey through four distinctive phases, as presented in Figure 1.1. The EMPr is accordingly separated into measures dealing with the various project phases.

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

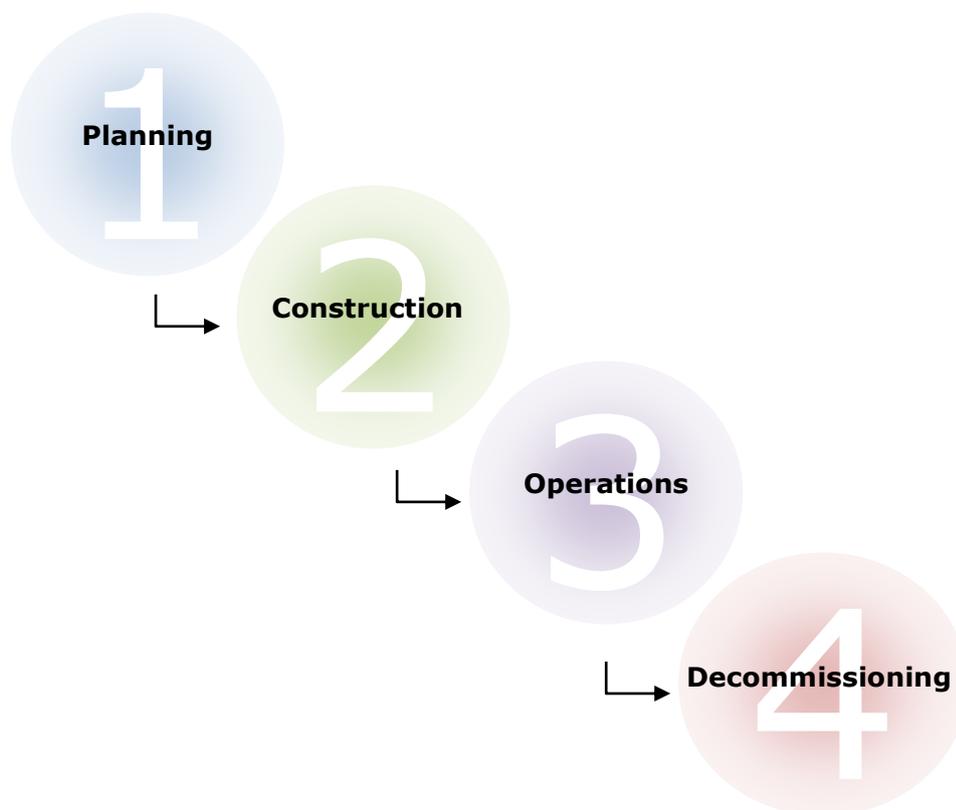


Figure 1: Four Phases of a Project

The EMPr has the following objectives:

- » To outline mitigation measures and environmental specifications which are required to be implemented for the planning, construction, rehabilitation and operation phases of the project in order to minimise the extent of environmental impacts, and to manage environmental impacts associated with the grid connection.
- » To ensure that the construction and operation phases do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits are enhanced.
- » To identify entities who will be responsible for the implementation of the measures and outline functions and responsibilities.
- » To propose mechanisms and frequency for monitoring compliance, and preventing long-term or permanent environmental degradation.
- » To facilitate appropriate and proactive responses to unforeseen events or changes in project implementation that was not considered in the EIA process.

The mitigation measures identified within the Environmental Impact Assessment process are systematically addressed in the EMPr, ensuring the minimisation of adverse environmental impacts to an acceptable level.

The proponent must ensure that the implementation of the project complies with the requirements of any and all environmental authorisations and permits, and obligations

emanating from other relevant environmental legislation. This obligation is partly met through the development and the implementation of the EMPr through its integration into the contract documentation. Since this EMPr is part of the EIA process undertaken for the proposed Suurplaat Wind Energy Facility grid connection, it is important that this document be read in conjunction with the Scoping Report (June 2010) and split EIA Report (October 2016), as well as the Environmental Authorisation. This will contextualise the EMPr and enable a thorough understanding of its role and purpose in the integrated environmental management process. This EMPr for construction and operation activities has been compiled in accordance with Section 34 of the EIA Regulations 2010 and will be further developed in terms of specific requirements listed in any authorisations issued for the proposed project.

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 Contractor's obligations in this regard include the following:

- » Ensuring that employees 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 staff are aware of the location and have access to the document. Employees will be familiar with the requirements of the EMPr and the environmental specifications as they apply to the construction of the facility.
- » Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended an Environmental Awareness Training course. The course must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- » Providing basic training in the identification of archaeological sites/objects, and protected flora and fauna that may be encountered on the site.
- » Ensuring awareness of any other environmental matters, which are deemed to be necessary by the ECO.

PROJECT DETAILS

CHAPTER 2

Moyeng Energy (Pty) Limited is proposing the establishment of the Suurplaat Wind Energy Facility on a site near Sutherland. The proposed development site is located within the Laingsburg Local Municipality (Western Cape) and Karoo Hoogland Local Municipality (Northern Cape), approximately 50 km south-east of Sutherland (Northern Cape Province) and approximately 41 km north of the N1 national road (near Laingsburg).

The primary components for the grid connection for the Suurplaat Wind Energy Facility include the following:

- » 3 x 132kV Substations with an HV Yard footprint of 80 m x 90 m each.
- » 4 x 132kV double circuit distribution power lines (i.e. a total of 8 power lines) linking the internal substations to a 132kV/400kV substation.
- » 400kV Loop In-Loop Out power line.
- » Eskom 400kV Main Transmission Substation. The substation will require an HV yard of approximately 20-30 ha. This area includes provision for a 200 m buffer strip around the perimeter.
- » Internal roads (approximately 6 m in width) along the power line routes.

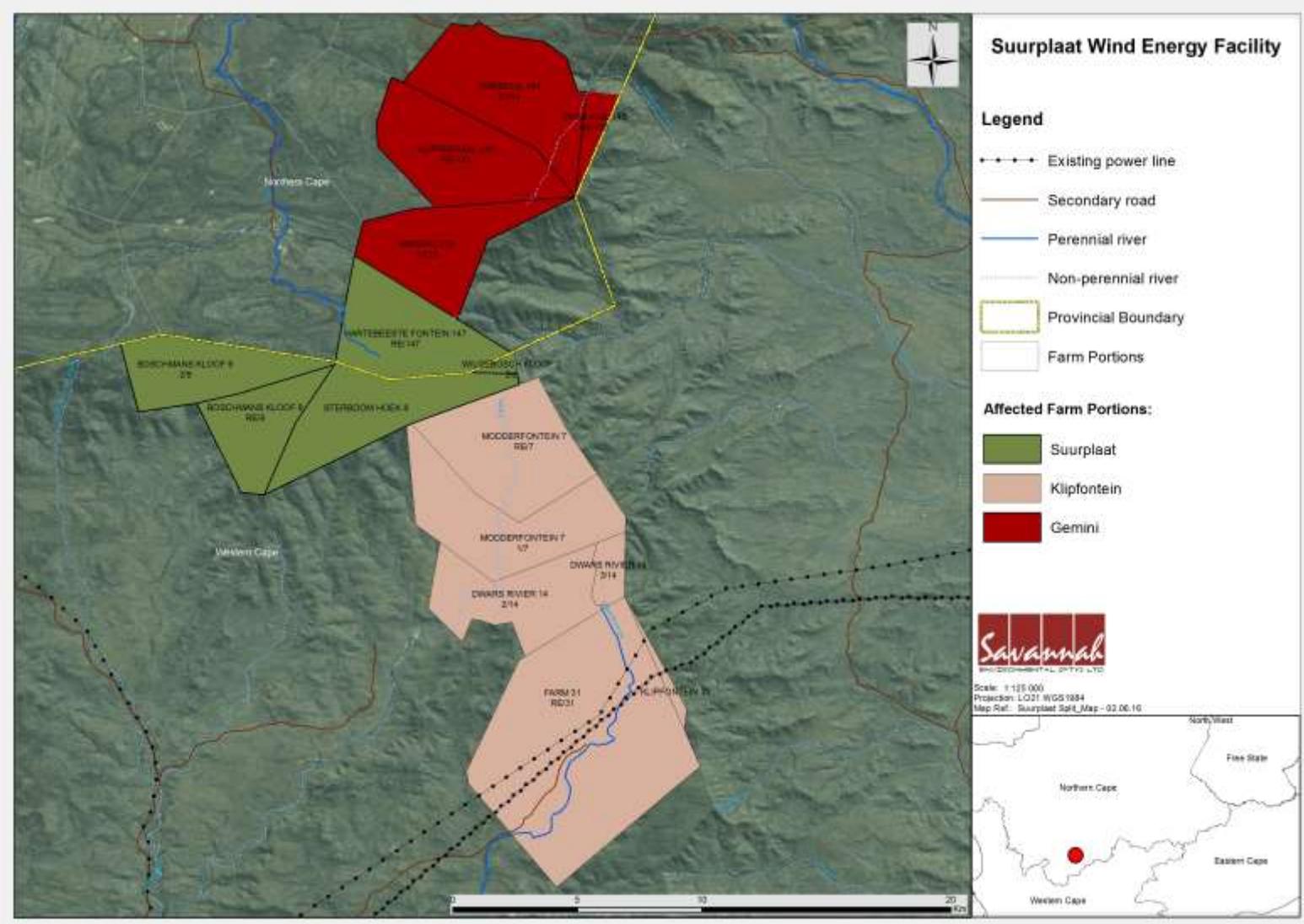


Figure 2.1: Locality map showing the farm portions which form part of the study area for the Suurplaat Wind Energy Facility

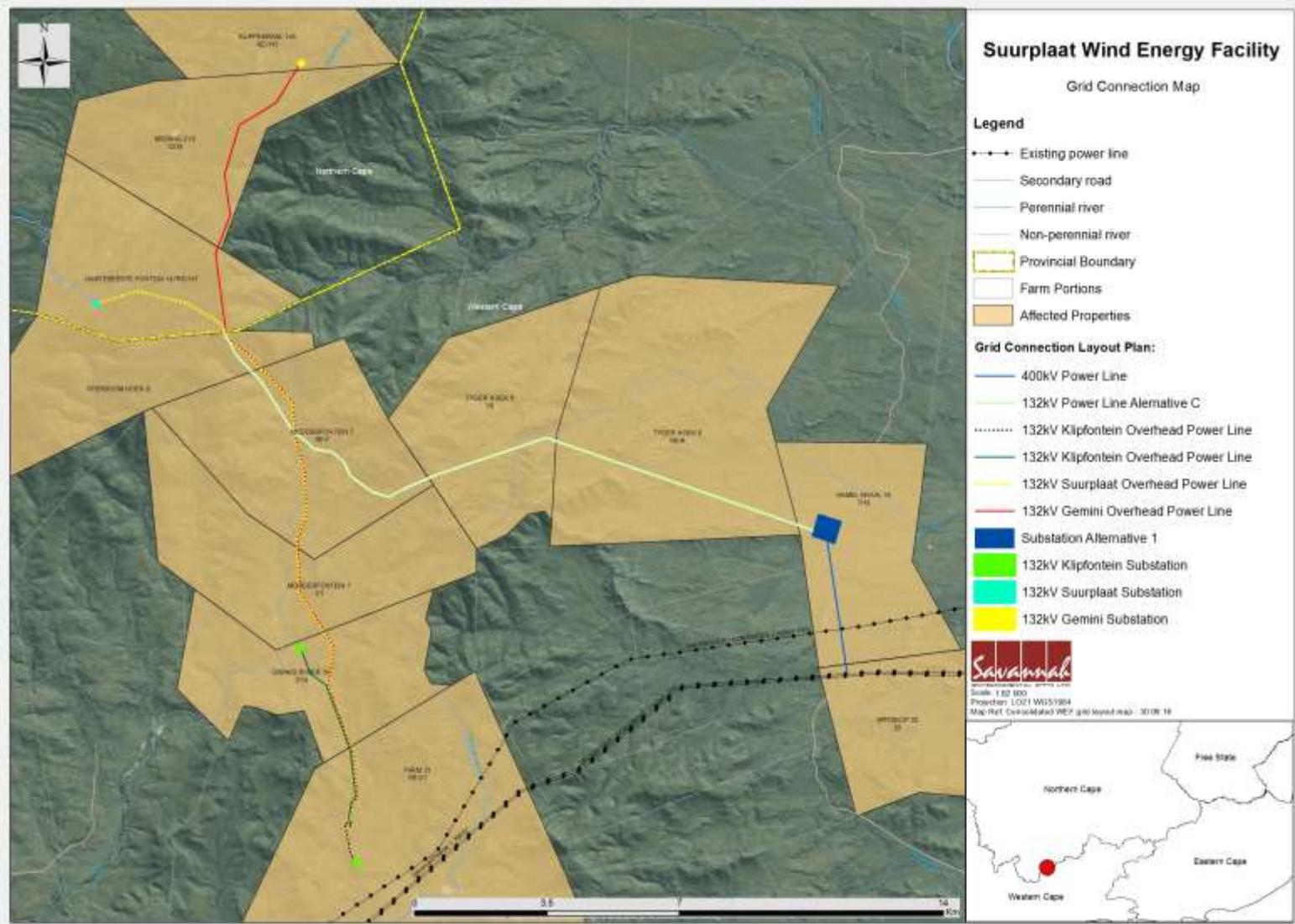


Figure 2.2: Locality map showing provisional layout for the grid connection infrastructure.

In terms of the findings of the EIA Report, various planning, construction and operation-related environmental impacts were identified, including:

- » Disturbance of ecological environment (flora fauna, and habitats (including wetlands and watercourses))
- » Impacts on avifauna (birds)
- » Disturbance to sense of place, visual aesthetics
- » Soil disturbance and erosion
- » Impacts on heritage and fossil resources
- » Socio-economic impacts

No absolute no go areas have been identified. Potentially sensitive areas in the project area identified through the EIA include:

- » Areas of medium - high ecological sensitivity
- » All dams, natural wetlands, rivers and drainage lines and associated buffer zones.
- » Areas of high avifaunal and bat sensitivity
- » Heritage sites
- » Potentially sensitive visual and noise receptors

In order to reduce/avoid impacts on sensitive areas, it is suggested that:

- » Sensitive heritage sites must be physically identified and cordoned to prevent any accidental incursion and damage during the construction and operational phases. It may be necessary for an archaeologist to identify physical exclusion zones in the field. Plans for the final positions of turbines, road infrastructure and any changes to sub-station positions should be inspected by the archaeologist prior to implementation. Account must be taken of the sites identified in Appendix 1 of the heritage report (Refer to Appendix K).
- » A field scoping survey of natural and artificial rock exposures within the study region as a whole should be undertaken by a qualified palaeontologist to identify specific areas or horizons of palaeontological sensitivity on the ground.
- » The most sensitive landscape features for planning purposes in the study area will be the presence of dams, wetlands and drainage lines. These features and an associated 30 m buffer should be excluded from any development footprint wherever possible. Wetland areas should be avoided from construction disturbance/infrastructure, wherever possible. Where unavoidable, ideally bridge a drainage line or wetland area, alternatively place box culverts the width of the affected area.
- » A walk-through survey of the final surveyed power line corridor must be undertaken during the site-specific EMP phase by an ornithologist from the WEIG-EWT to identify the exact power line spans requiring marking in order to minimise the risk of collision of birds with the earth wire. Ideally, a pre-construction inspection of the

substation site, and a walk-through of the selected power line alignment should be done by an experienced ornithologist to check key areas for nests of threatened species.

The preferred substation site and associated power line alternatives nominated through the EIA are as follows (refer to Figure 2.2):

- » Substation site 1 and associated 400kV power line route
- » 132kV power line route A or C associated with substation site 1

The EMPr has been developed on the basis of the findings of the EIA, and must be implemented to protect sensitive on-site and off-site features through controlling construction and operation activities that could have a detrimental effect on the environment, and avoiding or minimising potential impacts.

2.1 Activities and Components associated with the grid connection

The main activities/components associated with the planning, construction, operation and decommissioning of the proposed grid connection for the Suurplaat Wind Energy Facility are detailed in Table 2.1.

Table 2.1: Activities Associated with Planning, Construction, Operation and Decommissioning of the grid connection infrastructure

| Main Activity/Project Component | Components of Activity | Details |
|---|---|---|
| Planning | | |
| Conduct technical surveys | <ul style="list-style-type: none"> » Geotechnical survey by geotechnical engineer: » Survey of substation sites » Survey of power line servitudes to determine tower locations | <ul style="list-style-type: none"> » All surveys are to be undertaken prior to initiating construction. |
| Conduct environmental surveys (environmental specialists) | <ul style="list-style-type: none"> » Ecological surveys » Avifauna surveys » Heritage surveys | <ul style="list-style-type: none"> » All surveys are to be undertaken during the final design phase of the facility, prior to initiating construction. » Surveys should include all project components in identified sensitive areas |
| Construction | | |
| Construct substations and ancillary infrastructure. | <ul style="list-style-type: none"> » Substations » Other substation components » Security fencing around high-voltage (HV) Yard | <ul style="list-style-type: none"> » A temporary construction area is needed for containers, toilets and equipment. » The 132kV on site substations will be constructed with a high-voltage (HV) yard footprint of up to 80m x 90m. » The 400kV substation will be constructed with an HV yard footprint of up to 400m x 400m with an additional 200m buffer area. » The substations would be constructed in the following simplified sequence: <ul style="list-style-type: none"> * <u>Step 1:</u> Survey of the site * <u>Step 2:</u> Site clearing and levelling and construction of access road to substation site |

| Main Activity/Project Component | Components of Activity | Details |
|--|--|---|
| | | <ul style="list-style-type: none"> * <u>Step 3</u>: Construction of terrace and foundations * <u>Step 4</u>: Assembly, erection and installation of equipment (including transformers) * <u>Step 5</u>: Connection of conductors to equipment * <u>Step 6</u>: Rehabilitation of any disturbed areas and protection of erosion sensitive areas. |
| Connection of wind turbines to the on-site substations | <ul style="list-style-type: none"> » Wind Turbines » 33 kV underground electrical cabling connecting each turbine to the substations | <ul style="list-style-type: none"> » The installation of these cables will require the excavation of trenches, approximately 1m in depth within which these cables can then be laid. The underground cables would follow the internal access roads as far as reasonably possible. |
| Connect substations to power grid | <ul style="list-style-type: none"> » Three double-circuit 132 kV power lines connecting the substations to the 132kV/400kV substation. » One 400kV transmission line connecting the 132kV/400kV substation to the electricity grid via connection to one of the existing transmission lines in the area. | <ul style="list-style-type: none"> » The nominated preferred routes for the power lines will be assessed, surveyed and pegged prior to construction. » A servitude of approximately 32 m will be required for each 132kV power line. » A servitude of approximately 55 m will be required for the 400kV power line. |
| Undertake site remediation | <ul style="list-style-type: none"> » Remove all construction equipment from the site » Rehabilitation of temporarily disturbed areas where practical and reasonable | <ul style="list-style-type: none"> » On full commissioning of the facility (or a phase thereof), any access points to the site which are not required during the operation phase will be closed and prepared for rehabilitation. |

STRUCTURE OF THIS EMPR

CHAPTER 3

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

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

These chapters set out the procedures necessary for Moyeng Energy to 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 management programme has been structured in table format in order to show the links between the goals for each phase and their associated objectives, activities/risk sources, mitigation actions monitoring requirements and performance indicators. A specific environmental management programme table has been established for each environmental objective. The information provided within the EMPr table for each objective is illustrated below:

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

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

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

| | |
|------------------------------|--|
| Performance Indicator | Description of key indicator(s) that track progress/indicate the effectiveness of the management Programme. |
| 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 (i.e. in terms of the components and/or layout of the facility).
- » Modification to or addition to environmental objectives and targets.
- » Relevant legal or other requirements are changed or introduced.
- » Significant progress has been made on achieving an objective or target such that it should be re-examined to determine if it is still relevant, should be modified, etc.

3.1. Project Team

This draft EMPr was compiled by:

| | Name | Company |
|------------------------|--|--|
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| | John Almond - palaeontologist | Natura Viva cc |
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| | Morne de Jager - noise | MENCO (M2 Environmental Connections cc) |
| | Tony Barbour - social | Tony Barbour Consultants |

The Savannah Environmental team have extensive knowledge and experience in environmental impact assessment and environmental management, having been involved in EIA processes over the past ten (10) years. They have managed and drafted Environmental Management Programmes for other power generation projects throughout South Africa.

MANAGEMENT PROGRAMME: PLANNING & DESIGN

CHAPTER 4

4.1. Goal for Planning and Design

Overall Goal for Planning and Design: Undertake the planning and design phase of the grid connection for the wind energy facility in a way that:

- » Ensures that the design responds to the identified environmental constraints and opportunities.
- » Ensures that adequate regard has been taken of any landowner concerns and that these are appropriately addressed through design and planning (where appropriate).
- » Ensures that the best environmental options are selected for the project, including the power line alignment and substation site alternatives.
- » Enables the construction activities to be undertaken without significant disruption to other land uses in the area.

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

4.2. Objectives

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

From the specialist investigations undertaken for the proposed development site, no absolute 'no go' areas were identified.

In order to minimise impacts associated with the construction and operation of the grid connection for the wind energy facility and associated infrastructure, the following surveys are required to be undertaken during the final design phase of the facility:

- » Ecological survey. The most sensitive landscape features for planning purposes in the study area will be the presence of dams, wetlands and drainage lines. These features and an associated 30 m buffer should be excluded from any development footprint wherever possible.
- » Avifaunal survey. High sensitivity areas with regards to potential collision risk have been identified on the basis of the presence of rivers/streams and the ridges. As a preliminary indication of potential sensitivity in these areas, the rivers/streams were

buffered by 1km, and the ridges were buffered by 500m (refer to the specialist avifauna assessment included as Appendix H of the EIA Report).

- » Heritage survey. A walk-through survey of the power line during the final design phase in order to determine the need for realignment of the infrastructure (if possible) to avoid impacts, or the need to implement mitigation measures.

| | |
|-------------------------------------|---|
| Project component/s | <ul style="list-style-type: none"> » access roads » substations » power lines |
| Potential Impact | » Design fails to respond optimally to the environmental consideration |
| Activities/risk sources | <ul style="list-style-type: none"> » Positioning of turbines and access roads » Positioning of substations » Alignment of power line |
| Mitigation: Target/Objective | » To ensure that the design of the facility responds to the identified environmental constraints and opportunities |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|---|--|
| Undertake pre-construction surveys for the following: <ul style="list-style-type: none"> » Ecology » Avifauna » Heritage | Specialists | Design stage |
| Consider design level mitigation measures recommended by the specialists, especially with respect to visual aesthetics, noise, flora, aquatic ecology (i.e. wetlands and pans), avifauna, and heritage, as detailed within the EIA report and relevant appendices. These recommendations are to be supplemented by information collected during the pre-construction surveys. | Engineering Design Consultant / turbine supplier Moyeng Energy | Tender Design & Design Review Stage |
| Access roads to be carefully planned to minimise the impacted area and prevent unnecessary over compaction of soil. | Moyeng Energy | Design phase |
| A monitoring programme should be implemented to document the effect of the wind turbines on birds. This should take place before construction (to provide a benchmark), during construction and during operation. | Moyeng Energy in consultation with specialist | Pre-construction, Construction and Operation |
| A detailed geotechnical investigation is required for the design phase. | Moyeng Energy | Design phase |
| Compile a comprehensive stormwater management plan for hard surfaces (e.g. substation footprints) as part of the final design of the project. | Moyeng Energy | Design phase |
| Balance technical and financial considerations against environmental constraints and opportunities in finalising the design of key elements. | Moyeng Energy | Tender Design & Design Review Stage |

| | |
|------------------------------|--|
| Performance Indicator | <ul style="list-style-type: none"> » Design meets objectives and does not degrade the environment » Design and layouts etc respond to the mitigation measures and recommendations in the EIA report. |
| Monitoring | <ul style="list-style-type: none"> » Ensure that the design implemented meets the objectives and mitigation measures in the EIA report through review of the design by the Project Manager, SHE representative and Environmental Control Officer (ECO) prior to the commencement of construction. |

OBJECTIVE: To ensure selection of best environmental option for alignment/design of the power lines, 132kV/400kV substation and associated access roads

Up to three 132 kV power lines are proposed to connect the three substations at the wind energy facility to the electricity network/grid, a distance of approximately 17km. In addition, a 132kV/400kV substation and associated 400kV transmission line are required to be constructed in order to link the wind energy facility to the transmission grid. Alternative substation sites and routes/corridors for the 132 kV power line were identified and assessed in the EIA phase. From the conclusions of the specialist studies undertaken within the EIA, the preferred substation site and associated power line alternatives are as follows (refer to Figure 2.2):

- » Substation site 1 and associated 400kV power line route
- » 132kV power line routes A or C associated with substation site 1

| | |
|-------------------------------------|--|
| Project component/s | <ul style="list-style-type: none"> » Power lines » 132kV/400kV substation |
| Potential Impact | <ul style="list-style-type: none"> » Route that degrades environment unnecessarily, particularly with respect to visual aesthetics, loss of indigenous flora, erosion, and impacts on local communities/residents » Substation site that degrades environment unnecessarily, particularly with respect to visual aesthetics, loss of indigenous flora, erosion, and impacts on local communities/residents |
| Activities/risk sources | <ul style="list-style-type: none"> » Alignment of power line within corridor » Construction of substation |
| Mitigation: Target/Objective | <ul style="list-style-type: none"> » To ensure selection of best environmental option for alignment for the power line and site for the substation |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|-----------------------|----------------------------------|
| Select an alignment and substation site that curtail environmental impacts and enhances environmental benefits. | Moyeng Energy | Prior to submission of Final EIA |

| Mitigation: Action/control | Responsibility | Timeframe |
|--|-----------------------|------------------|
| Consider design level mitigation measures recommended by the specialists, especially with respect to visual aesthetics, noise, flora, ecology (i.e. wetlands and pans), avifauna, and heritage, as detailed within the EIA report and relevant appendices. | Moyeng Energy | Design phase |
| Plan new access roads according to contour lines to minimise cutting and filling operations. | Moyeng Energy | Design phase |
| Use bird-friendly power line tower and conductor designs. | Moyeng Energy | Design phase |
| The most sensitive landscape features for planning purposes in the study area will be the presence of dams, wetlands and drainage lines. These features and an associated 30 m buffer should be excluded from any development footprint wherever possible. | Moyeng Energy | Design phase |
| Route new lines as close as possible to existing lines. | Moyeng Energy | Design phase |
| In order to minimise impacts associated with the power lines and substation, the following surveys are required to be undertaken during the final design phase of the facility: <ul style="list-style-type: none"> » Ecological survey. A walk-through survey of the final power line routes is required once tower positions have been finalised in order to minimise any impacts as far as possible. » Avifaunal survey. A walk-through survey of the final power line routes is required once tower positions have been finalised in order to minimise any impacts as far as possible and to identify areas where bird diverters are required to be installed. » Heritage survey. A walk-through survey of the power line routes and substation site during the final design phase in order to determine the need for realignment of the infrastructure (if possible) to avoid impacts, or the need to implement mitigation measures. | Moyeng Energy | Design phase |

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| Performance Indicator | <ul style="list-style-type: none"> » Power line alignments meet environmental objectives. » Selected power line alignments and substation site minimises any negative environmental impacts and maximises any benefits. |
| Monitoring | <ul style="list-style-type: none"> » Ensure that the design implemented meets the objectives and mitigation measures in the EIA report through review of the design by the Project Manager, SHE representative and the ECO prior to the commencement of construction. |

MANAGEMENT PROGRAMME: CONSTRUCTION

CHAPTER 5

5.1. Overall Goal for Construction

Overall Goal for Construction: Undertake the construction phase of the grid connection for the wind energy facility in a way that:

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

5.2. Objectives

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

OBJECTIVE: Environmentally sensitive location of construction equipment camps on site

It is expected that all construction workers will not be housed onsite and stay in the nearby towns. No construction workers will be accommodated on site. In addition, construction equipment may need to be stored at an appropriate location on site, along the power line routes and at the substation site for the duration of the construction period.

| | |
|----------------------------|---|
| Project component/s | <ul style="list-style-type: none">» substation» power lines» access roads |
| Potential Impact | <ul style="list-style-type: none">» Damage to protected / endangered vegetation |

| | |
|-------------------------------------|--|
| | <ul style="list-style-type: none"> » Damage to and/or loss of topsoil » Compacting of ground » Impacts on the surrounding environment due to inadequate sanitation and waste removal facilities |
| Activities/risk sources | <ul style="list-style-type: none"> » Bush clearing and levelling of equipment storage area/s » Access to and from the equipment storage area/s |
| Mitigation: Target/Objective | <ul style="list-style-type: none"> » To minimise impacts on the social and biophysical environment. » To limit equipment storage to within the demarcated site |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|-----------------------|--|
| Before construction commences, representatives from the local authority and community-based organisations (e.g. residents associations), as well as neighbouring residents should be informed of the details of the construction company, size of the workforce and construction schedules | Moyeng Energy | Pre-construction |
| The exact siting of the construction equipment camp/s shall be negotiated with the relevant landowner, and must take cognisance of any sensitive areas identified by the EIA studies. | Contractor | Pre-construction |
| Minimise vegetation clearing and levelling for equipment storage areas. | Contractor | Erection: during site establishment Maintenance: for duration of Contract |
| Rehabilitate all disturbed areas at the construction equipment camp as soon as construction is complete within an area. | Contractor | Duration of Contract |
| Bird-flappers must be fitted to aerial power line cabling, where required (as identified by a suitably qualified ornithologist). | The Proponent | Operation/maintenance |
| Search and rescue for threatened plant species prior to site establishment. Particular threatened species to look for include: <ul style="list-style-type: none"> » <i>Jamesbrittenia incisa</i> (VU), in Roggeveld Karoo and Roggeveld Shale Renosterveld; » <i>Romulea subfistulosa</i> (NT), in Roggeveld Karoo and Roggeveld Shale Renosterveld; » <i>Cliffortia arborea</i> (VU), in mountainous areas, steep slopes, kloofs, cliffs and rocky areas; » <i>Brunsvigia josephinae</i> (VU), on stream bank of close to drainage line in escarpment zone; » <i>Romulea multifida</i> (VU), in sandy soil in the escarpment zone; » <i>Romulea syringodeoflora</i> (VU), in damp areas in the | Flora specialist | Prior to site establishment |

| Mitigation: Action/control | Responsibility | Timeframe |
|--|----------------|-----------|
| escarpment zone; » <i>Romulea komsbergensis</i> (NT), in damp areas in the escarpment zone. | | |

| | | |
|------------------------------|--|--|
| Performance Indicator | <ul style="list-style-type: none"> » No visible erosion scars once construction in an area is completed. » No claims regarding damage leading to litigation due to unauthorised removal of vegetation. » All damaged areas successfully rehabilitated one year after completion » No damage to wetland or riverine areas. » Appropriate waste management. | |
| Monitoring | <ul style="list-style-type: none"> » Regular audits of the construction camps and areas of construction on site. » An incident reporting system should be used to record non-conformances to the EMPr. | |

OBJECTIVE: Site establishment and securing the site

Site establishment is the first activity which is to be undertaken within the construction phase. The Contractor must take all reasonable measures to ensure the safety of the public in the surrounding area. 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 and / Project Manager.

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|-------------------------------------|---|
| Project component/s | <ul style="list-style-type: none"> » substations » power lines |
| Potential Impact | <ul style="list-style-type: none"> » Hazards to landowners and public » Security of materials » Substantially increased damage to adjacent sensitive vegetation, due largely to ignorance of where such areas are located. |
| Activities/risk sources | <ul style="list-style-type: none"> » Open excavations (foundations and cable trenches) » 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 |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|----------------|---|
| Secure site, working areas and excavations in an appropriate manner, as agreed with the SHE Representative. | Contractor | Erection: during site establishment Maintenance: for duration of |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|----------------|---|
| Where necessary to control access, fence and secure area. | Contractor | Contract Erection: during site establishment Maintenance: for duration of Contract |
| Fence and secure Contractor's equipment camp. | Contractor | Erection: during site establishment Maintenance: for duration of Contract |
| All development footprints for roads, buildings, underground cables, laydown areas and turbine footings should be fenced off with two strand wire and clearly indicated with flags and/or danger tape strips. There is to be no disturbance outside these demarcated areas. | Contractor | Erection: during site establishment Maintenance: for duration of Contract |
| Establish the necessary ablution facilities with chemical toilets. Provide adequate sanitary facilities and ablutions for construction workers (1 toilet per every 15 workers) at appropriate locations on site. | Contractor | Erection: during site establishment Maintenance: for duration of Contract |
| Ablution or sanitary facilities should not be located within 100 m from a 1:100 year flood line including water courses, wetlands or within a horizontal distance of less than 100 m, whichever is applicable | Contractor | During site establishment, construction and maintenance |
| Supply adequate waste collection bins at site where construction is being undertaken. | Contractor | Erection: during site establishment Maintenance: for duration of Contract within a particular area |
| Dispose of all solid waste collected at an appropriately registered waste disposal site. The disposal of waste shall be in accordance with all relevant legislation. Under no circumstances may waste be burnt on site. | Contractor | Erection: during site establishment Maintenance: for duration of Contract within a particular area |
| Where a registered waste site is not available close to the construction site, provide a method statement with | Contractor | Site establishment |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|----------------|--------------------|
| regard to waste management. | | |
| All unattended open excavations shall be adequately demarcated and/or fenced (fencing shall consist of a minimum of three strands of wire wrapped with danger tape). Adequate protective measures must be implemented to prevent unauthorised access to the working area and the internal access/haul routes. | Contractor | Site establishment |

| | |
|------------------------------|---|
| Performance Indicator | <ul style="list-style-type: none"> » Site is secure and there is no unauthorised entry » No members of the public/ landowners injured |
| Monitoring | <ul style="list-style-type: none"> » An incident reporting system will be used to record non-conformances to the EMPr. » ECO to monitor all construction areas on a continuous basis until all construction is completed; immediate report backs to site manager. |

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

Contractors typically make use of their own skilled and semi-skilled staff. Direct employment opportunities to members of local communities are therefore likely to be limited to low skilled opportunities.

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|-------------------------------------|--|
| Project component/s | Construction and establishment activities |
| Potential Impact | The opportunities and benefits associated with the creation of local employment and business should be maximised. |
| Activities/risk sources | The employment of outside contractors to undertake the work and who make use of their own labour will reduce the employment and business opportunities for locals. Employment of local labour will maximise local employment opportunities. |
| Mitigation: Target/Objective | The proponent, in discussions with the local municipalities, should aim to employ a minimum of 80% of the low-skilled workers from the local area. This should also be made a requirement for all contractors. The proponent should also develop a database of local BEE service providers |

| Mitigation: Action/control | Responsibility | Timeframe |
|--|-------------------------------|---|
| Ensure that, as far as possible, a minimum of 80% of the low-skilled workers are sourced from the local area as far as possible. | The proponent and contractors | Before construction phase commences. |
| Where required, implement appropriate training and skills development programmes prior to the initiation | The proponent | Prior to the initiation of the construction |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|----------------|--|
| of the construction phase to ensure that 80% target is met. | | phase. |
| Skills audit to be undertaken to determine training and skills development requirements | The proponent | Prior to the initiation of the construction phase. |
| Develop a database of local BEE service providers and ensure that they are informed of tenders and job opportunities; | The proponent | Before construction phase commences. |
| Identify potential opportunities for local businesses for involvement in the construction phase of the project. | The proponent | Tender Design and Review stage |

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| Performance Indicator | <ul style="list-style-type: none"> » Employment and business policy document that sets out local employment and targets completed before construction phase commences; » 80 % of semi and unskilled labour locally sourced as far as possible. » Database of potential local BEE services providers in place before construction phase commences. |
| Monitoring | <ul style="list-style-type: none"> » An independent ECO to be appointed by the proponent to monitor indicators listed above to ensure that they have been met for the construction phase. |

OBJECTIVE: To avoid and/ minimise the potential impacts on family structures and social networks associated with presence of construction workers from outside the area

The presence of construction workers poses a potential risk to family structures and social networks. While the presence of construction workers does not in itself constitute a social impact, the manner in which construction workers conduct themselves can impact on local communities. The most significant negative impact is associated with the disruption of existing family structures and social networks. This risk is linked to potentially risky behaviour of male construction workers, including:

- » An increase in alcohol and drug use
- » An increase in crime levels
- » The loss of girlfriends and or wives to construction workers
- » An increase in teenage and unwanted pregnancies
- » An increase in prostitution
- » An increase in sexually transmitted diseases (STDs)

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| Project component/s | Construction and establishment activities |
| Potential Impact | The presence of construction workers who live outside the area and who are housed in local towns can impact on family structures and social networks. |
| Activities/risk sources | The presence of construction workers can impact negatively on family structures and social networks, especially in small, rural communities. |
| Mitigation: Target/Objective | To avoid and or minimise the potential impact of construction workers on the local community. This can be achieved by maximising the number of locals employed during the construction phase and minimising the number of workers housed on the site. |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|-------------------------------|---------------------------------------|
| Tender documents for contractors include conditions set out in SIA, including transport of workers home over weekends, transportation of workers home on completion of construction phase, establishment of MF etc, | The proponent | Tender stage Pre-construction |
| Identify local contractors who are qualified to undertake the required work | The proponent | Tender stage Pre-construction |
| Ensure that, as far as possible, a minimum of 80% of the low-skilled workers are sourced from the local area. This should be included in the tender documents. Construction workers should be able to provide proof of having lived in the area for five years or longer. | The proponent and contractors | Pre-construction |
| Establish a Monitoring Forum (MF) consisting of representatives from the local community, local police, local farming community and the contractor prior to the commencement of the construction phase | The proponent | Prior to commencement of construction |
| Develop a Code of Conduct to cover the activities of the construction workers housed on the site. Ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct. Construction workers should attend a brief session before they commence activities. The aim of the briefing session is to inform them of the rules and regulations governing activities on the site as set out in the Code of Conduct within first week of being employed. | The proponent | Prior to commencement of construction |
| Ensure that construction workers who are found guilty of breaching the Code of Conduct are dismissed. All dismissals must be in accordance with South African labour legislation. | Contractors | Construction phase |
| On completion of the construction phase all construction workers must be transported back to their | Contractor | Conclusion of construction |

| Mitigation: Action/control | Responsibility | Timeframe |
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| place of origin within two days of their contract ending. The costs of transportation must be borne by the contractor. | | |

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| Performance Indicator | <ul style="list-style-type: none"> » Employment policy and tender documents that sets out local employment and targets completed before construction phase commences » 80 % of semi and unskilled labour locally sourced, as far as possible » Construction workers employed have proof that they have lived in the area for five years or longer » Tender documents for contractors include recommendations for construction camp » Monitoring Forum set up prior to implementation of construction phase » Code of Conduct drafted before commencement of construction phase » Briefing session with construction workers held at outset of construction phase; |
| Monitoring | <ul style="list-style-type: none"> » The proponent and/or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase. |

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

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| Project component/s | Construction and establishment activities |
| Potential Impact | Impact on safety of farmers and communities (increased crime etc) and potential loss of livestock due to stock theft by construction workers and also damage to farm infrastructure, such as gates and fences. |
| Activities/risk sources | The presence of construction workers on the site can pose a potential safety risk to local farmers and communities and may also result in stock thefts. The activities of construction workers may also result in damage to farm infrastructure. |
| Mitigation: Target/Objective | 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 | The proponent and contractor | Duration of construction |
| Compensate farmers / community members at full | Contractors | Duration of |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|----------------|--------------|
| market related replacement cost for any proven losses, such as livestock, damage to infrastructure etc. associated with the construction of the facility. | | construction |

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| Performance Indicator | <ul style="list-style-type: none"> » Community Monitoring Forum in place before construction phase commences. » Code of Conduct developed and approved prior to commencement of construction phase. » All construction workers made aware of Code of Conduct within first week of being employed. » Compensation claims settled within 1 month of claim being verified by Community Monitoring Forum. |
| Monitoring | <ul style="list-style-type: none"> » The proponent and/or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase. |

OBJECTIVE: Management of dust and emissions to air

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.

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| Project component/s | Construction and establishment activities |
| Potential Impact | <ul style="list-style-type: none"> » Dust and particulates from vehicle movement to and on-site, foundation excavation, road construction activities, road maintenance activities, temporary stockpiles, and vegetation clearing affecting the surrounding residents and visibility » Release of minor amounts of air pollutants (for example NO₂, CO and SO₂) from vehicles and construction equipment |
| Activities/risk sources | <ul style="list-style-type: none"> » Clearing of vegetation and topsoil » Excavation, grading, scraping » Transport of materials, equipment and components on internal access roads » Re-entrainment of deposited dust by vehicle movements » Wind erosion from topsoil and spoil stockpiles and unsealed roads and surfaces » Fuel burning vehicle engines |
| Mitigation: Target/Objective | <ul style="list-style-type: none"> » To ensure emissions from all vehicles 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 to a manner that will ensure that dust from road or vehicle sources is not visibly excessive. Ensure that damage to roads is repaired on completion of construction phase. | Contractor | Site establishment; Duration of construction |
| Appropriate dust suppressant must be applied on all exposed areas and stockpiles as required to minimise/control airborne dust. | 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 |
| Speed of construction vehicles must be restricted, as defined by the Health and Safety Representative. | Contractor | Duration of contract |
| 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 visible dust is blowing toward nearby residences. | Contractor | Duration of contract |
| Strictly control vibration pollution from compaction plant or excavation plant. | Contractor | Duration of contract |
| Disturbed areas must be re-vegetated as soon as practicable once construction is completed in an area. | Contractor | At completion of the construction phase |
| Vehicles and equipment must be maintained in a road-worthy condition at all times. | Contractor | Duration of contract |
| If monitoring results or complaints indicate inadequate performance against the criteria indicated, then the source of the problem must be identified, and existing procedures or equipment modified to ensure the problem is rectified. | Contractor | Duration of contract |

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| Performance Indicator | <ul style="list-style-type: none"> » No complaints from affected residents or community regarding dust or vehicle emissions » Dust suppression measures implemented on roads and the site for all areas where heavy vehicles that require such measures during the construction phase commences. » Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed. » Road worthy certificates in place for all heavy vehicles at outset of construction phase and up-dated on a monthly basis. |
| Monitoring | <p>Monitoring must be undertaken to ensure emissions are not exceeding the prescribed levels via the following methods:</p> <ul style="list-style-type: none"> » Visual daily inspections of dust generation by construction activities |

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| | <p>throughout the construction phase. If considered necessary by the Health and Safety Representative.</p> <ul style="list-style-type: none"> » Immediate reporting by personnel of any potential or actual issues with nuisance dust or emissions to the Project Manager or Health and Safety Representative. » A complaints register must be maintained, in which any complaints from residents/the community will be logged. Complaints will be investigated and, where appropriate, acted upon. » An incident reporting system must be used to record non-conformances to the EMPr. |
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OBJECTIVE: Minimisation of development footprint and protection of vegetation, fauna, habitats and soil

All infrastructure could potentially have a significant impact on natural vegetation. There are a number of Red List plant species that could occur in available habitats in the study area. None of these species were encountered during the field survey of the site, although the vegetation was extremely dry at the time of the survey. There are a number of threatened animal species that may occur in habitats within the study area.

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| Project component/s | <ul style="list-style-type: none"> » substations » power lines |
| Potential Impact | <ul style="list-style-type: none"> » Impacts on or loss of indigenous natural vegetation due to construction activities » Impacts on soil » Loss of topsoil |
| Activity/risk source | <ul style="list-style-type: none"> » Site preparation and earthworks » Construction-related traffic » Foundations or plant equipment installation » Mobile construction equipment » 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 highly sensitive areas the site » To minimise footprints of disturbance of vegetation/habitats on-site » To minimise loss of indigenous vegetation » No alien plants within project control area » No loss of species of conservation concern |

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

| Mitigation: Action/control | Responsibility | Timeframe |
|---|---|---|
| | Specialist | |
| The extent of clearing and disturbance to the native vegetation must be kept to a minimum so that impact on flora and fauna is restricted. | Contractor | Site establishment & duration of contract |
| Construction activities must be restricted to demarcated areas so that impact on flora and fauna is restricted. | Contractor | Site establishment & duration of contract |
| Unnecessary impacts on surrounding natural vegetation must be avoided, e.g. driving around in the veld, use access roads only | Contractor | Site establishment & duration of contract |
| Roads must be aligned away from steep slopes and drainage lines as much as possible. | Contractor | Design; Duration of construction |
| 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 | Construction team, management (environmental officer) | Construction & Operation |
| Establish an on-going monitoring programme to detect and quantify any alien species that may become established and identify the problem species (as per conservation of agricultural resources act) | Construction team, management (environmental officer) | Construction & Operation |
| Immediately control any alien plants that become established using registered control methods | Construction team, management (environmental officer) | Construction & Operation |
| Avoid the unnecessary removal of vegetation for the distribution power line servitudes and limit access to the servitudes (during both construction and operational phases) along existing access roads as far as possible. | Contractor | Duration of contract |
| A site rehabilitation programme must be developed and implemented. | Contractor in consultation with Specialist | Duration of contract |
| Soil stockpiles should not be translocated from areas with alien plants into the mine area and within the mine area alien plants on stockpiles must be controlled so as to avoid the development of a soil seed bank of alien plants within the stock-piled soil. | Construction team, management (environmental officer) | Construction & Operation |

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| Performance Indicator | <ul style="list-style-type: none"> » Zero disturbance outside of designated work areas » Minimised clearing of existing/natural vegetation » Loss of natural vegetation equivalent to the exact footprint of the proposed project » Number of plants and aerial cover of plants within project area and immediate surroundings |
| Monitoring | <ul style="list-style-type: none"> » Observation of vegetation clearing and soil management activities by SHE Officer throughout construction phase » Before construction, determine required number of hectares to accommodate footprint of proposed infrastructure. » After construction, determine amount of natural vegetation lost due to construction. » Supervision of all clearing and earthworks » Annual audit of project area and immediate surroundings by qualified botanist. If no species are detected, then this can be stated. If any alien invasive species are detected then the distribution of these should be mapped (GPS co-ordinates of plants or concentrations of plants), number of individuals (whole site or per unit area), age and/or size classes of plants and aerial cover of plants. The results should be interpreted in terms of the risk posed to sensitive habitats within and surrounding the project area. The environmental manager should be responsible for driving this process. Reporting frequency depends on legal compliance framework. » An incident reporting system will be used to record non-conformances to the EMPr. |

OBJECTIVE: To avoid and or minimise the potential risk of increased veld fires during the construction phase

The vegetation in the study area is known of high risk to fires. The increased presence of people on the site could increase the risk of veld fires, particularly in the dry season.

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|-------------------------------------|---|
| Project component/s | Construction and establishment activities |
| Potential Impact | Veld fires can pose a personal safety risk to local farmers and communities, and their homes, crops, livestock and farm infrastructure, such as gates and fences. |
| Activities/risk sources | The presence of construction workers and their activities on the site can increase the risk of veld fires. |
| Mitigation: Target/Objective | To avoid and or minimise the potential risk of veld fires on local communities and their livelihoods. |

| Mitigation: Action/control | Responsibility | Timeframe |
|--|----------------|--------------------------|
| Ensure that open fires on the site for cooking or heating are not allowed except in designated areas. | Contractor | Duration of construction |
| Provide adequate firefighting equipment onsite. | Contractor | Duration of construction |
| Provide fire-fighting training to selected construction staff. | Contractor | Duration of construction |
| Compensate farmers / community members at full market related replacement cost for any losses, such as livestock, damage to infrastructure etc. | Contractor | As required |
| Ensure landowner is part of the local Fire Protection Agency and that appropriate communication channels are established to be implemented in the event of a fire. | The proponent | Pre-construction |

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| Performance Indicator | <ul style="list-style-type: none"> » Designated areas for fires identified on site at the outset of the construction phase. » Fire fighting equipment and training provided before the construction phase commences. » Compensation claims settled within 1 month of claim being verified by Community Monitoring Forum. |
| Monitoring | <ul style="list-style-type: none"> » The proponent and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase. |

OBJECTIVE: Control runoff and soil erosion

The soil resource on the site needs to be conserved as far as possible to minimise the cumulative impact on the local environment. Erosion and soil loss will be associated with both wind and water. Impacts of wind-blown erosion will increase with increased disturbance to the vegetation cover. Intense rainfall periods will also result in significant soil loss. The provision of erosion/sediment control measures and water quality management is paramount.

A set of strictly adhered to mitigation measures are required to effectively limit the impact on the environment. The disturbance areas where human impact is likely are the focus of the mitigation measures laid out below.

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|----------------------------|---|
| Project component/s | <ul style="list-style-type: none"> » substations » power lines |
| Potential Impact | <ul style="list-style-type: none"> » Increased soil erosion, silt loads or sedimentation that may cause damage to sensitive habitats |

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| | <ul style="list-style-type: none"> » Erosion and soil loss associated with both wind and water » Negative impacts on wetlands » Disturbance to or loss of wetland/pan habitat » Sedimentation of watercourses/wetland areas » Increased runoff » A loss of indigenous vegetation cover. |
| Activities/risk sources | <ul style="list-style-type: none"> » Water and wind erosion of cleared and excavated areas » Stormwater run-off from sealed surfaces » Accidental spills of petrochemical products (e.g. transformer oils associated with the operation of the substations and wind turbines) or cement on-site, or during transport of these products to the site » Site preparation and earthworks » Foundations or plant equipment installation » Mobile construction equipment movement on site » Power line construction activities » River/stream/drainage line road crossings. » Roadside drainage ditches. » Project related infrastructure, such as buildings, turbines and fences. |
| Mitigation: Target/Objective | <ul style="list-style-type: none"> » To minimise degradation of rock and soil by construction activity » To conserve topsoil by stockpiling and re-using in disturbance areas » To minimise erosion of soil from site during construction » To minimise deposition of soil into drainage lines |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|-----------------------|--|
| Identify disturbance areas and restrict construction activity to these areas | Contractor | Pre-construction and Construction |
| Rehabilitate any disturbed areas immediately after construction in that area is complete in order to stabilise landscapes | Contractor | Post-construction |
| It may be necessary to use geotextiles and/or wind nets to limit wind erosion of exposed areas, where wind erosion could present difficulties and result in the loss of valuable topsoil. | Contractor | Site establishment & duration of contract |
| Any stockpiles must be protected against wind erosion (e.g. surrounded by shadecloth fences or damped down on a regular basis). | Contractor | Duration of contract |
| Use silt traps / bunds to trap sediment wherever possible and re-vegetate affected areas as soon as is practical. | Contractor | Erection: Before construction Maintenance: Duration of contract |
| Vehicular traffic must be controlled during construction, confining access and roadways, where possible, to proposed or existing road alignments. | Contractor | Duration of contract |
| Internal access roads should be kept to a minimum. Use existing roads wherever possible. | Contractor | During site establishment |

| Mitigation: Action/control | Responsibility | Timeframe |
|--|-------------------------|---|
| Movement of vehicles on-site is to be on approved and formalised access roads only, which shall be adequately maintained throughout construction. Where temporary tracks are required (e.g. for use by crawler crane) these are to be ripped and rehabilitated as soon use of the track is no longer required. | Contractor | Duration of contract |
| Control depth of excavations and stability of cut faces/sidewalls | Engineer/ Contractor | Before construction and maintenance over duration of contract |

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| Performance Indicator | <ul style="list-style-type: none"> » Limited level of soil erosion around site » Limited level of increased siltation in drainage lines » Limited level of soil degradation » Acceptable state of excavations » No activity in restricted areas |
| Monitoring | <ul style="list-style-type: none"> » On-going monitoring of area by environmental control officer during construction » Weekly inspections of the site » Fortnightly inspections of sediment control devices » Fortnightly inspections of surroundings, including drainage lines » Immediate reporting of ineffective sediment control systems » An incident reporting system will record non-conformances » Reporting frequency depends on legal compliance framework. |

OBJECTIVE: Protection of Fossil Resources

The study area is largely underlain by continental sediments of the Abrahamskraal and Teekloof Formations of the Lower Beaufort Group (Karoo Supergroup). These Mid to Late Permian sediments are renowned for their outstandingly rich fossil heritage of terrestrial vertebrates (most notably "mammal-like reptiles" or therapsids), as well as fish, amphibians, molluscs, trace fossils (e.g. trackways) and plants (e.g. petrified wood, leaves). The paleontological sensitivity of the Beaufort Group sediments within the study area is consequently very high. In contrast, Cenozoic surface sediments mantling the Beaufort bedrocks here (e.g. alluvium, fluvial gravels, colluvium) are generally of low paleontological sensitivity, although sparse fossil remains such as mammalian bones and teeth, or freshwater molluscs, may also occur.

Construction work undertaken over Beaufort Group bedrock, in order to install the wind turbines and associated infrastructure (e.g. underground cables, access road network,

substations, overhead power lines), is likely to expose, disturb, destroy or seal-in valuable fossil heritage. Although the direct impact will be local, these fossils are of importance to national as well as international research projects on the fossil biota of the ancient Karoo and the Permian mass extinction events.

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| Project component/s | Construction of access roads, transmission pylons, substations |
| Potential Impact | Disturbance, destruction or sealing-in of scientifically valuable fossil material embedded within bedrock or weathered out at ground surface |
| Activity/risk source | Extensive bedrock excavations and surface disturbance (e.g. road construction) |
| Mitigation: Target/Objective | Recording, sampling and curation of important fossil heritage within the development area, both before and during construction, to be achieved before completion of construction phase. |

| Mitigation: Action/control | Responsibility | Timeframe |
|--|--|--|
| Paleontological field survey of broader development area (i.e. all land parcels), leading to interim fossil heritage report | Professional palaeontologist | Pre-Construction |
| Short workshop to train EOs in recognition, recording and safeguarding of relevant fossil heritage | Professional palaeontologist | Following paleontological field survey, before development commences |
| Recording and judicious sampling of representative as well as any exceptional fossil material from the development footprint | Professional palaeontologist assisted by EOs | Before and during construction phase |
| Curation of fossil specimens at an approved repository (e.g. museum) & final technical report on paleontological heritage within study area. | Professional palaeontologist | Following mitigation |
| Should any graves be found, an archaeologist should be contacted to have a look at the grave. The grave site should be cordoned off and human finds to be reported to the nearest police station | Professional palaeontologist assisted by EOs | During construction |

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| Performance Indicator | <ul style="list-style-type: none"> » No impacts on valuable fossil heritage / graves. » Identification of palaeontological hotspots within broader development footprint. » Training of EOs » Cumulative acquisition of geographically and stratigraphically well-localised fossil records and samples from successive subsections of the development area. » Submission of interim and final technical reports to HWC , SAHRA |
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| Monitoring | <ul style="list-style-type: none"> » Monitoring of compliance by professional palaeontologist in collaboration with SHE Officer » Realistic frequency, scale and protocol of monitoring to be determined by professional palaeontologist in conjunction with Heritage Western Cape, SAHRA and developer » Assessment of interim and final reports by Heritage Western Cape & SAHRA |
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OBJECTIVE: Protection of sites of heritage value

The main cause of impacts to archaeological sites during construction activities is physical disturbance of the material itself and its context. The heritage and scientific potential of an archaeological site is highly dependent on its geological and spatial context. This means that even though, for example a deep excavation may expose archaeological artefacts, the artefacts are relatively meaningless once removed from the area in which they were found. Large-scale excavations for foundations will damage archaeological sites, as will road construction activities.

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| Project component/s | <ul style="list-style-type: none"> » substations » power line |
| Potential Impact | » Heritage objects or artefacts 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 » Power line construction activities |
| 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 (which will not be surveyed in detail by a heritage specialist). | Contractor in consultation with Specialist | Pre-construction |
| If a heritage object is found, work in that area must be stopped immediately, and appropriate specialists brought in to assess to site, notify the administering authority of the item/site, and undertake due/required processes. | The proponent /Contractor in consultation with Specialist | Duration of contract |
| Apply for sampling permits from Heritage Western Cape for work on any archaeological sites identified as | The proponent | Duration of contract |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|----------------|-----------|
| needing intervention – in other words any archaeological site that will be affected by the access road, crane track, laydown areas, turbine bases and cable trenches. | | |

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| Performance Indicator | <ul style="list-style-type: none"> » Zero disturbance outside of designated work areas » All heritage items located are dealt with as per the legislative guidelines » A record is kept of all instances of accidental disturbance of heritage material, as well as post construction review of impacts on landscape context. |
| Monitoring | <ul style="list-style-type: none"> » Observation of excavation activities by SHE Officer throughout construction phase » Supervision of all clearing and earthworks » A log of monitoring and observations be kept by the responsible archaeologist for submission to HWC for review by relevant committees. Compliance authority to check as per their discretion. |

OBJECTIVE: Minimisation of visual impacts associated with construction

During construction heavy vehicles, components, cranes, equipment and construction crews will frequent the area and may cause, at the very least, a visual nuisance to landowners and residents in the area as well as road users.

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|-------------------------------------|---|
| Project component/s | <ul style="list-style-type: none"> » Substations » Power Line |
| Potential Impact | <ul style="list-style-type: none"> » Temporary visual intrusion |
| Activity/risk source | <ul style="list-style-type: none"> » Transportation of substation and power line components to the site » Construction activities on-site, along power line corridor and at substation site » The potential scarring of the landscape due to the creation of new access roads/tracks or the unnecessary removal of vegetation. |
| Mitigation: Target/Objective | <ul style="list-style-type: none"> » Minimise contrast with surrounding environment and visibility of the construction activities to people in the area |

| Mitigation: Action/control | Responsibility | Timeframe |
|--|----------------|----------------------|
| Adopt responsible construction practices aimed at containing the construction activities to specifically demarcated areas thereby limiting the removal of natural vegetation to the minimum. | Contractor | Duration of contract |
| The activities and movement of construction workers | Contractor | Duration of |

| Mitigation: Action/control | Responsibility | Timeframe |
|--|-----------------------------|----------------------------------|
| and construction site vehicles will be restricted to the immediate construction site. | | contract |
| Limit access to the construction sites along existing access roads. | Contractor | Duration of contract |
| The general appearance of construction activities, construction equipment camps and lay-down areas will be maintained by means of the timely removal of rubble and disused construction materials. | Contractor | Duration of contract |
| Construction activities must be restricted to daylight hours (as far as possible) in order to negate or reduce the visual impacts associated with lighting. In the event that night-time construction activities are required to be undertaken, lighting will be placed in such a manner as to limit impacts on the surrounding areas. | Contractor | Duration of contract |
| Implement an environmentally responsive planning approach to roads and infrastructure to limit cut and fill requirements. | The proponent Contractor | Pre-construction Construction |
| Rehabilitate all disturbed areas, including cut and fill slopes to acceptable visual standards. | Contractor | Post-construction |

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| Performance Indicator | » No complaints regarding visual intrusion associated with construction activities |
| Monitoring | <ul style="list-style-type: none"> » Ensure that mitigation measures are implemented during construction to minimise visual impacts on surrounding communities » An incident reporting system will be used to record non-conformances to the EMPr. |

OBJECTIVE: 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 (including turbine components) and materials and construction crews to the site and the return of the vehicles after delivery of materials.

The following existing public roads will be used to access the relevant sites both during construction and operational phases:

- » Phases 1-2: The P2254 (R354 Sutherland to Merweville) and P2256 (P2554 to Waterval);

- » Phase 3: The P2247 (Laingsburg to Welgemoed via Koringplaas) and P2246 (R354 to Klipfontein boundary);
- » 132/400 kV substation: Koup station (off the N1) to Houdenbeck Road (off the P2254).

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| Project component/s | <ul style="list-style-type: none"> » Substations » Power Lines |
| Potential Impact | <ul style="list-style-type: none"> » Traffic congestion, particularly on narrow roads or on road passes where overtaking is not permitted » Risk of accidents » Deterioration of road pavement conditions (both surfaced and gravel road) due to abnormal loads |
| Activity/risk source | <ul style="list-style-type: none"> » Traffic congestion increase |
| Mitigation: Target/Objective | <ul style="list-style-type: none"> » To minimise impact of traffic associated with the construction of the facility on local traffic » To minimise potential for negative interaction between pedestrians or sensitive users and traffic associated with the facility 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/es to the proposed site must be created to ensure safe entry and exit. | Contractor | Pre-construction |
| No deviation from approved access routes within the site allowed. | 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 |
| Times for arrival and departure of heavy vehicles must be co-ordinated to minimise congestion. | Contractor | Duration of contract |
| Any traffic delays as a result of construction traffic must be co-ordinated with the appropriate authorities. | Contractor | Duration of contract |
| Signage to be established at appropriate points warning of turning traffic and the construction site. | Contractor | Duration of contract |
| Appropriate maintenance of all vehicles must be ensured. | Contractor | Duration of contract |
| All vehicles travelling on public roads to adhere to the specified speed limits and all drivers must be in possession of an appropriate valid driver's license | Contractor | Duration of contract |
| Keep hard road surfaces as narrow as possible. | Contractor | Duration of |

| Mitigation: Action/control | Responsibility | Timeframe |
|------------------------------|---|-----------|
| | | contract |
| Performance Indicator | <ul style="list-style-type: none"> » No traffic incidents involving the proponent's personnel or appointed contractors » Appropriate signage in place | |
| Monitoring | <ul style="list-style-type: none"> » Visual monitoring of dust produced by traffic movement » Visual monitoring of traffic control measures to ensure they are effective » A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon » An incident reporting system will be used to record non-conformances to the EMPr. | |

OBJECTIVE: Appropriate handling and storage of chemicals, hazardous substances and waste

The main wastes expected to be generated by the construction of the power lines and substations will include general solid waste, hazardous waste and liquid waste. A guideline for integrated management of construction waste is included as Appendix D of this EMPr.

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| Project component/s | Storage and handling of chemicals, hazardous substances and waste |
| 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 » Inefficient use of resources resulting in excessive waste generation » Pollution of the surrounding environment through inappropriate waste management practices » Litter or contamination of the site or water through poor waste management practices » Pollution of water and soil resources |
| Activity/risk source | <ul style="list-style-type: none"> » Wind turbine construction » Vehicles associated with site preparation and earthworks » Power line construction activities » Substation construction activities » Packaging and 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 ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons » To ensure that the storage and maintenance of machinery on-site |

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| | <p>does not cause pollution of the environment or harm to persons</p> <ul style="list-style-type: none"> » To minimise production of waste » To ensure appropriate waste handling, storage and disposal » To avoid environmental harm from waste disposal |
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| Mitigation: Action/control | Responsibility | Timeframe |
|--|-----------------------|----------------------|
| 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 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. | 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 removed from the site must be disposed of at a licensed hazardous waste disposal facility. | Contractor | Duration of contract |
| Routine servicing and maintenance of vehicles must 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, an appropriate drip tray must be used to contain any fuel or oils. | 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 in an appropriately sealed area. | Contractor | Duration of contract |
| Oily water from bunds at the substations must be removed from site by licensed contractors. | Contractor | Duration of contract |
| The storage of flammable and combustible liquids such as oils will be in designated areas which are appropriately banded, and stored in compliance with MSDS files. | 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 compiled with. | Contractor | Duration of contract |

| Mitigation: Action/control | Responsibility | Timeframe |
|--|-----------------------|----------------------------|
| Transport of all hazardous substances must be in accordance with the relevant legislation and regulations. | 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 |
| Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors. | 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 transporters to sites designated for their disposal. | Contractor | Duration of contract |
| Documentation (waste manifest) must be maintained detailing the quantity, nature and fate of any regulated waste. Waste disposal records must be available for review at any time. | Contractor | Duration of contract |
| Upon the completion of construction, the area must be cleared of potentially polluting materials. | Contractor | Completion of construction |
| No fires permitted on site. | Contractor | Duration of contract |
| No waste may be buried or burnt on site | Contractor | Duration of contract |

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| Performance Indicator | <ul style="list-style-type: none"> » No chemical spills outside of designated storage areas » No water or soil contamination by spills » No complaints received regarding waste on site or indiscriminate dumping » Internal site audits ensuring that waste segregation, recycling and reuse is occurring appropriately » Provision of all appropriate waste manifests for all waste streams |
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| | » No human induced fires |
| Monitoring | <ul style="list-style-type: none"> » Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase » 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 » Observation and supervision of waste management practices throughout construction phase » Waste collection to be monitored on a regular basis » Waste documentation completed » A complaints register to 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 to be used to record non-conformances to the EMPr. |

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

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

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| Project component/s | <ul style="list-style-type: none"> » Substations » Power Lines |
| Potential Impact | <ul style="list-style-type: none"> » Pollution/contamination of the environment » Disturbance to the environment |
| Activity/risk source | » Contractors are not aware of the requirements of the EMPr, leading to unnecessary impacts on the surrounding environment |
| Mitigation: Target/Objective | » To ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment |

| Mitigation: Action/control | Responsibility | Timeframe |
|--|-----------------------|--------------------------|
| The terms of this EMPr and the Environmental Authorisation (once issued) will be included in all tender documentation and Contractors contracts. | The proponent | Tender process |
| An ECO must be permanently on site throughout the road construction, cable laying, and turbine foundation excavation periods, and at other times | The proponent | Duration of construction |

| Mitigation: Action/control | Responsibility | Timeframe |
|--|-----------------------------------|----------------------|
| should visit the site at least once a week. | | |
| Contractors must use chemical toilets/ablution facilities situated at designated areas of the site; no abluting will be permitted outside the designated area. These facilities must be regularly serviced by appropriate contractors. | Contractor (and sub-contractor/s) | Duration of contract |
| Cooking/meals must take place in a designated area; no firewood or kindling may be gathered from the site or surrounds. | Contractor (and sub-contractor/s) | Duration of contract |
| All litter 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 one may disturb flora or fauna outside of the demarcated construction area/s. | Contractor (and sub-contractor/s) | Duration of contract |
| Contractors appointed by the proponent must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms. | Contractor (and sub-contractor/s) | Construction |
| Provide opportunities for workers to go home over weekends. The cost of transporting workers home over weekends and back to the site should be borne by the contractors. | Contractor (and sub-contractor/s) | Construction |
| On completion of the construction phase all construction workers must be transported back to their place of origin within two days of their contract ending. The costs of transportation must be borne by the contractor | Contractor (and sub-contractor/s) | Construction |
| An environmental awareness programme and training to be developed and implemented. | Contractor | Construction |

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| Performance Indicator | <ul style="list-style-type: none"> » Compliance with specified conditions of Environmental Authorisation, EIA report and EMPr. » No complaints regarding contractor behaviour or habits » Code of Conduct drafted before commencement of construction phase. » Briefing session with construction workers held at outset of construction phase |
| Monitoring | <ul style="list-style-type: none"> » Observation and supervision of Contractor practices throughout construction phase. » A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon |

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

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

The Proponent must ensure that the implementation of the grid connection infrastructure complies with the requirements of any and 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. The Proponent will retain various key roles and responsibilities during the construction. These are outlined below.

OBJECTIVE: To establish clear reporting, communication and responsibilities in relation to environmental incident

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Project Manager; Site Manager; Safety, Health and Environment Representative; Environmental Control Officer and Contractor for the construction phase of this project are as detailed below.

The **Project Manager** will:

- » Ensure of all specifications and legal constraints specifically with regards to the environment are highlighted to the Contractor(s) so that they are aware of these.
- » Ensure that The Proponent and its Contractor(s) are made aware of all stipulations within the EMPr.
- » Ensure that the EMPr is correctly implemented throughout the project by means of site inspections and meetings. This will be documented as part of the site meeting minutes.
- » Be fully conversant with the Environmental Impact Assessment for the project, the EMPr, the conditions of the Environmental Authorisation (once issued), and all relevant environmental legislation.

The **Site Manager** (The Proponent's On-site Representative) will:

- » Be fully knowledgeable with the contents of the Environmental Impact Assessment.
- » Be fully knowledgeable with the contents and conditions of the Environmental Authorisation (once issued).
- » Be fully knowledgeable with the contents of the Environmental Management Plan.

- » Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with these.
- » Have overall responsibility of the EMPr and its implementation.
- » Conduct audits to ensure compliance to the EMPr.
- » Ensure there is communication with the Project Manager, the Environmental Control Officer 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.

The **Safety, Health and Environment Representative** (SHE officer) will:

- » Develop and compile environmental policies and procedures.
- » Direct and liaise with the Environmental Control Officer (ECO) regarding monitoring and reporting on the environmental performance of the construction phase.
- » Conduct internal environmental audits and co-ordinate external environmental audits.
- » Liaise with statutory bodies on environmental performance and other issues as required.

The **Environmental Control Officer** (ECO) will be responsible for monitoring, reviewing and verifying compliance by the Contractor with the environmental specification. Accordingly, the ECO will:

- » Be fully knowledgeable with the contents with the Environmental Impact Assessment.
- » Be fully knowledgeable with the contents with the conditions of the Environmental Authorisation (once issued).
- » Be fully knowledgeable with the contents with the Environmental Management Programme.
- » Be fully knowledgeable with the contents with all relevant environmental legislation, and ensure compliance with them.
- » Ensure that the contents of this document are communicated to the Contractor site staff and that the Site Manager and Contractor are constantly made aware of the contents through discussion.
- » Ensure that the compliance of the EMPr is monitored through regular and comprehensive inspection of the site and surrounding areas.
- » Ensure that if the EMPr conditions or specifications are not followed then appropriate measures are undertaken to address this.
- » 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.
- » 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.

Contractors and Service Providers: All contractors (including sub-contractors and staff) and service providers are ultimately responsible for:

- » Ensuring adherence to the environmental management specifications.
- » Ensuring that Method Statements are submitted to the Site Manager (and ECO) for approval before any work is undertaken. Any lack of adherence to this will be considered as non-compliance to the specifications of the EMPr.
- » Ensuring that any instructions issued by the Site Manager on the advice of the ECO are adhered to.
- » Ensuring that a report is tabled at each site meeting, which will document all incidents that have occurred during the period before the site meeting.
- » Ensuring that a register is kept in the site office, which lists all transgressions issued by the ECO.
- » Ensuring that a register of all public complaints is maintained.
- » Ensuring that all employees, including those of sub-contractors receive training before the commencement of construction in order that they can constructively contribute towards the successful implementation of the EMPr (i.e. ensure their staff are appropriately trained as to the environmental obligations).

5.4. Detailing Method Statements

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

The environmental specifications are required to be underpinned by a series of Method Statements, within which the Contractors and Service Providers are required to outline how any identified environmental risks will practically be mitigated and managed for the duration of the contract, and how specifications within this 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, setting out the plant, materials, labour and method the Contractor proposes using to conduct an activity, in such detail that the Site Manager is able to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications". The Method Statement must cover applicable details with regard to:

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

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

5.5. Awareness and Competence: Construction Phase

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

To achieve effective environmental management, it is important that Contractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this 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 staff are aware of the location and have access to the document. Employees will be familiar with the requirements of the EMPr and the environmental specifications as they apply to the construction of the facility.
- » Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended an Environmental Awareness Training course. The course must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- » Basic training in the identification of archaeological sites/objects, paleontological sites, and protected flora and fauna that may be encountered on the site.
- » Awareness of any other environmental matters, which are deemed to be necessary by the ECO.
- » Ensuring that appropriate communication tools are used to outline the environmental "do's" and "don'ts" (as per the environmental awareness training course) to employees..
- » Records must be kept of those that have completed the relevant training.
- » Refresher sessions must be held to ensure the contractor staff are aware of their environmental obligations.

5.6. Monitoring Programme: Construction Phase

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

A monitoring programme must be in place not only to ensure conformance with 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 period and frequency of monitoring will be stipulated by the Environmental Authorisation (once issued). Where this is not clearly dictated, The Proponent will determine and stipulate the period and frequency of monitoring required in consultation with relevant stakeholders and authorities. The Developer and Project Manager to ensure that the monitoring is conducted and reported.

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

- » Monitor and audit compliance with the prescriptive and procedural terms of the environmental specifications
- » Ensure adequate and appropriate interventions to address non-compliance
- » Ensure adequate and appropriate interventions to address environmental degradation
- » Provide a mechanism for the lodging and resolution of public complaints
- » Ensure appropriate and adequate record keeping related to environmental compliance
- » Determine the effectiveness of the environmental specifications and recommend the requisite changes and updates based on audit outcomes, in order to enhance the efficacy of environmental management on site
- » Aid communication and feedback to authorities and stakeholders.

MANAGEMENT PROGRAMME: REHABILITATION OF DISTURBED AREAS

CHAPTER 6

6.1. Overall Goal for the Rehabilitation of Disturbed Areas

Overall Goal for the Rehabilitation of Disturbed Areas: Undertake the rehabilitation measures in a way that:

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

6.2. Objectives

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

OBJECTIVE: To ensure appropriate rehabilitation of disturbed areas following the execution of the works, such that residual environmental impacts are remediated or curtailed

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

The main areas requiring rehabilitation will be the laydown areas adjacent to the turbines, the crane tracks alongside the permanent 6 m wide roads, any cable routings where these fall outside the above-mentioned areas, and disturbed areas around the substation and maintenance building, and disturbed areas associated with the power line tower foundations, substation site and access roads.

| | |
|-------------------------------------|--|
| Project component/s | <ul style="list-style-type: none"> » Power line servitudes and associated service roads » Substation site and associated access road |
| Potential Impact | <ul style="list-style-type: none"> » Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention |
| Activity/risk source | <ul style="list-style-type: none"> » Temporary laydown areas » Temporary access roads/tracks » Other disturbed areas/footprints |
| Mitigation: Target/Objective | <ul style="list-style-type: none"> » To ensure and encourage site rehabilitation of disturbed areas » To ensure that the site is appropriately rehabilitated following the |

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| | execution of the works, such that residual environmental impacts (including erosion) are remediated or curtailed |
|--|--|

| Mitigation: Action/control | Responsibility | Timeframe |
|---|--|--|
| A rehabilitation specialist must be consulted for input into rehabilitation of disturbed areas as soon as practically possible after construction is complete | The Proponent | Planning stages |
| All temporary facilities, equipment and waste materials must be removed from site. | Contractor | Following execution of the works |
| All temporary fencing and danger tape must be removed once the construction phase has been completed. | Contractor | Following completion of construction activities in an area |
| 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 |
| Disturbed areas must be rehabilitated/re-vegetated with appropriate natural vegetation and/or local seed mix. Re-use of native/indigenous plant species removed from disturbance areas in the rehabilitation phase. | Contractor in consultation with rehabilitation specialist | Following completion of construction activities in an area |
| Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved. | The Proponent in consultation with rehabilitation specialist | Post-rehabilitation |
| On-going alien plant monitoring and removal must be undertaken on all areas of natural vegetation on an annual basis. | The Proponent in consultation with rehabilitation specialist | Post-rehabilitation |

| | |
|------------------------------|--|
| Performance Indicator | <ul style="list-style-type: none"> » All portions of site, including construction equipment camp and working areas, cleared of equipment and temporary facilities » Topsoil replaced on all areas and stabilised » Disturbed areas rehabilitated and acceptable plant cover achieved on rehabilitated sites » Completed site free of erosion and alien invasive plants |
| Monitoring | <ul style="list-style-type: none"> » On-going inspection of rehabilitated areas in order to determine effectiveness of rehabilitation measures implemented for the duration of rehabilitation and for two years post-construction, for every three months. » On-going alien plant monitoring and removal should be undertaken on an annual basis. |

**MANAGEMENT PROGRAMME:
OPERATION**

CHAPTER 7

7.1. Overall Goal for Operation

Overall Goal for Operation: To ensure that the operation of the grid connection infrastructure for the wind energy facility 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.
- » impacts, farming practices, traffic and road use, and effects on local residents.
- » Minimises impacts on birds and other fauna using the site.

7.2. Objectives

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

OBJECTIVE: Protection of vegetation

Indirect impacts on vegetation during operation could result from maintenance activities and the movement of people and vehicles on site.

| | |
|-------------------------------------|---|
| Project component/s | <ul style="list-style-type: none"> » Substations and access to substations » Power lines and service road for power line servitude |
| Potential Impact | <ul style="list-style-type: none"> » Disturbance to or loss of vegetation and/or habitat |
| Activity/risk source | <ul style="list-style-type: none"> » Movement of employee vehicles within and around site |
| Mitigation: Target/Objective | <ul style="list-style-type: none"> » To maintain minimised footprints of disturbance of vegetation/habitats on-site » To ensure and encourage plant regrowth in areas of post-construction rehabilitation |

| Mitigation: Action/control | Responsibility | Timeframe |
|--|-----------------------|------------------|
| Vehicle movements must be restricted to designated | The proponent | Operation |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|----------------|-----------|
| roadways | | |
| Existing roads must be maintained to ensure limited erosion and impact on areas adjacent to roadways. | The proponent | Operation |
| An on-going alien plants monitoring and eradication programme must be implemented, where necessary. | The proponent | Operation |
| An independent environmental manager must be appointed during operation whose duty it will be to minimise impacts on surrounding sensitive habitats | The proponent | Operation |

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|------------------------------|--|
| Performance Indicator | <ul style="list-style-type: none"> » No further disturbance to vegetation » Continued improvement of rehabilitation efforts |
| Monitoring | <ul style="list-style-type: none"> » Observation of vegetation on-site by Site Manager and environmental manager. » Regular inspections to monitor plant regrowth/performance of rehabilitation efforts and weed infestation compared to natural/undisturbed areas |

OBJECTIVE: Maintenance of rehabilitated areas

In order to ensure the long-term environmental integrity of the site following construction, maintenance the areas rehabilitated post-construction must be undertaken until these areas have successfully re-established. Fire breaks should be established, where appropriate, to limit both incoming and outgoing veld fires.

| | |
|-------------------------------------|--|
| Project component/s | <ul style="list-style-type: none"> » Power line servitude and associated service road » Substation site and associated access road |
| Potential Impact | <ul style="list-style-type: none"> » Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention |
| Activity/risk source | <ul style="list-style-type: none"> » Laydown areas » Access roads » Other disturbed areas |
| Mitigation: Target/Objective | <ul style="list-style-type: none"> » To ensure and encourage site rehabilitation of disturbed areas |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|----------------------------|--|
| A botanist familiar with the vegetation of the area should monitor the rehabilitation success and alien plant removal on an annual basis for two years, post construction , every three months. | The Proponent / Specialist | Annual monitoring until successful re- |

| Mitigation: Action/control | Responsibility | Timeframe |
|--|----------------|--|
| | | establishment of vegetation in an area |
| Fire breaks should be established, where appropriate. | The Proponent | Duration of contract |
| Appoint an independent environmental manager during operation whose duty it will be to minimise impacts on surrounding sensitive habitats. | The Proponent | Operation |

| | |
|------------------------------|---|
| Performance Indicator | » Successful rehabilitation of disturbed areas |
| Monitoring | » On-going alien plant monitoring and removal should be undertaken on an annual basis |

OBJECTIVE: Protection of avifauna and determine the impact of the power lines on priority bird species

Overhead power lines pose a collision and possibly an electrocution threat to certain bird species.

| | |
|-------------------------------------|--|
| Project component/s | » power lines » substations |
| Potential Impact | » Disturbance to or loss of birds as a result of collision with the turbine blades » Disturbance to or loss of birds as a result of collision with the overhead power lines » Electrocution as a result of power lines and substations |
| Activity/risk source | » Spinning turbine blades » Overhead power lines » substations |
| Mitigation: Target/Objective | » More accurately determine the impact of the project on priority bird species |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|----------------|-----------------------|
| Bird-flappers must be maintained. | The Proponent | Operation/maintenance |
| Substation site must be monitored for any evidence of electrocution. An ornithologist must be contacted for the implementation of appropriate mitigation should evidence of electrocution be found. | The Proponent | Operation/maintenance |

| | |
|------------------------------|---|
| Performance Indicator | <ul style="list-style-type: none"> » Continued improvement of avifaunal protection efforts » No additional disturbance to avifaunal populations along the length of the power line route » No fatalities due to electrocutions |
| Monitoring | <ul style="list-style-type: none"> » Observation of avifaunal populations and incidence of injuries/death from collisions from turbine blades or power line » Environmental manager to monitor turbine field for fatalities. |

OBJECTIVE: Protection of terrestrial fauna and habitats

Indirect impacts on terrestrial fauna during operation could include disturbance and further habitat destruction as a result of maintenance activities and the movement of people and vehicles on site, and direct fatalities from vehicle movements on-site.

| | |
|-------------------------------------|--|
| Project component/s | <ul style="list-style-type: none"> » substations and access to substation » power lines and service road for power line servitude |
| Potential Impact | <ul style="list-style-type: none"> » Disturbance to or loss of fauna and/or habitat » Direct mortalities |
| Activity/risk source | <ul style="list-style-type: none"> » Power lines |
| Mitigation: Target/Objective | <ul style="list-style-type: none"> » To keep number of vehicle movements to a minimum » To maintain minimised footprints of disturbance of vegetation/habitats on-site » To minimise impacts on bats » To ensure and encourage site rehabilitation |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|-----------------------|------------------|
| Vehicle movements restricted to designated roadways. | The proponent | Operation |
| Appoint an independent environmental manager during operation whose duty it will be to minimise impacts on surrounding sensitive habitats | The proponent | Operation |
| Adherence to reduced vehicle speeds (as prescribed by the environmental manager) by any vehicles moving on the site to reduce potential for direct mortalities. | The proponent | Operation |

| | |
|------------------------------|--|
| Performance Indicator | <ul style="list-style-type: none"> » No further disturbance to faunal populations on the site » Continued improvement of faunal protection efforts |
| Monitoring | <ul style="list-style-type: none"> » Observation and recording of bird and bat mortality |

OBJECTIVE: Appropriate handling and management of hazardous substances and waste

The main wastes expected to be generated by the operation activities includes general solid waste, hazardous waste and liquid waste.

| | |
|-------------------------------------|--|
| Project component/s | » Substations |
| Potential Impact | » 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 | » Generators and gearbox - turbines » Transformers and switchgear - substation » Water storage tank » Fuel and oil storage |
| Mitigation: Target/Objective | » To comply with waste management guidelines » To minimise production of waste » To ensure appropriate waste disposal » To avoid environmental harm from waste disposal |

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

| Mitigation: Action/control | Responsibility | Timeframe |
|--|----------------|-----------|
| licensed facility in consultation with the administering authority. » Waste must be stored and handled according to the relevant legislation and regulations. | | |
| General waste must be recycled where possible or disposed of at an appropriately licensed landfill. | The Proponent | Operation |
| Hazardous waste (including hydrocarbons) and general waste must be stored and disposed of separately. | The Proponent | Operation |
| Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors. | The Proponent | Operation |

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

MANAGEMENT PROGRAMME FOR GRID CONNECTION: CHAPTER 8 DECOMMISSIONING

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

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

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

8.1. Objectives

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

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

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

8.2. Approach to the decommissioning phase

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

8.2.1. Identification of structures for post-closure use

Access roads should be assessed in conjunction with the ultimate land users to determine if these could be used in future. Where not required, these access roads should be decommissioned and rehabilitated.

8.2.2. Removal of infrastructure

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

8.2.3. Soil rehabilitation

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

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

8.2.4. Establishment of vegetation

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

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

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

8.2.5. Maintenance

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

8.2.6. Monitoring

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

The following items should be monitored continuously:

- » Erosion status;
- » Surface drainage systems and surface water quality;
- » Vegetation species diversity; and
- » Faunal re-colonisation.