Appendix H

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

MAINSTREAM RENEWABLE POWER

Proposed Development of the Dwarsrug Wind Farm near Loeriesfontein, Northern Cape Province, South Africa

Draft Environmental Management Programme (EMPr)

DEA Ref No: 14/12/16/3/3/2/690/AM2
Issue Date: 27 September 2019
Version No.: 3
Project No.: 15659

Date:	27 September 2019
Document Title:	Proposed Development of the Dwarsrug Wind Farm near Loeriesfontein, Northern Cape Province – Draft Environmental Management Programme
Author:	**Kerry Schwartz** BA (Geography), University of Leeds Stephan Jacobs B.Sc. (Hons) Environmental Management & Analysis (UP) B.Sc. Environmental Sciences (UP)
Version Number:	3
Checked by:	**Andrea Gibb** B.Sc. (Hons) Environmental Management (UNISA) B.Sc. Landscape Architecture Cum Laude (UP)
Approved:	**Tarryn Curtis**
Signature:	
For:	SiVEST Environmental Division

Confidentiality Statement

MAINSTREAM RENEWABLE POWER SOUTH AFRICA

PROPOSED DEVELOPMENT OF THE DWARSRUG WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE, SOUTH AFRICA

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

Contents Page

List of Tables:

List of Figures

Glossary of Terms:

Construction Phase: The activities pertaining to the preparation for and the physical construction of the proposed development.

Contractor: Persons/organisations contracted by Mainstream to carry out parts of the work for the proposed development.

Decommissioning: Means to take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily recommissioned.

Engineer (E)/ Project Manager (PM): Person/ organisation appointed by Mainstream to oversee the work of all consultants, sub-developers, contractors, residents and visitors.

Environmental Control Officer (ECO): Person/organisation appointed by Mainstream who will provide direction to the Project Manager concerning the activities within the Construction Zone, and who will be responsible for conducting the environmental audit of the project during the construction phase of the project according to the provisions of the Environmental Management Programme.

Environmental Management Programme (EMPr): The EMPr is a detailed plan for the implementation of the mitigation measures to minimise negative environmental impacts during the life-cycle of a project. The EMP contributes to the preparation of the contract documentation by developing clauses to which the contractor must adhere for the protection of the environment. The EMPR specifies how the construction of the project is to be carried out and includes the actions required for the Post-Construction Phase to ensure that all the environmental impacts are managed for the duration of the project's life-cycle.

Operational Phase (Post Construction): The period following the Construction Phase, during which the proposed development will be operational.

Pre-Construction Phase: The period prior to commencement of the Construction Phase, during which various activities associated with the preparation for the Construction Phase will be undertaken.

Rehabilitation: Rehabilitation is defined as the return of a disturbed area to a state which approximates the state (where possible) which it was in before disruption. Rehabilitation for the purposes of this specification is aimed at post-reinstatement re-vegetation of a disturbed area and the insurance of a stable land surface. Re-vegetation should aim to accelerate the natural succession processes so that the plant community develops in the desired way, i.e. promote rapid vegetation establishment.

Site Manager: The person, representing the Contractor, responsible for all the Contractor's activities on the site including supervision of the construction staff and activities associated with the Construction Phase. The Site Manager will liaise with the Project Manager in order to ensure that the project is conducted in accordance with the Environmental Management Programme

Abbreviations:

DEA	Department of Environmental Affairs
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
ELO	Environmental Liaison Officer
EHS	Environment, Health and Safety
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EMA	Environmental Management System
EP	Equator Principles
EPCM	Engineering Procurement and Contracts Management
HOD	Head of Department
IFC	International Finance Corporation (World Bank Group)
I&APs	Interested and Affected Parties
MAP	Mean Annual Precipitation
MC	Main Contractor
MRP	Mainstream Renewable Power
MSDS	Material Safety Data Sheets
NEMA	National Environmental Management Act
OECD	Organisation for Economic Co-operation and Development
PM	Project Manager
SAHRA	South African Heritage Resources Agency
SSM	Small Stock Unit

MAINSTREAM RENEWABLE POWER SOUTH AFRICA

PROPOSED DEVELOPMENT OF THE DWARSRUG WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE, SOUTH AFRICA

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

1 INTRODUCTION

South Africa Mainstream Renewable Power (Pty) Ltd (hereafter referred to as Mainstream) has appointed SiVEST to undertake the EIA process and Environmental Management Programme (EMPr) for the proposed construction of a wind farm near Loeriesfontein in the Northern Cape Province of South Africa. The objective of the project is to develop a wind farm in order to generate electricity to feed into the national grid. The project is also in line with the government's commitment to provide renewable energy as an alternative energy source to those currently utilised.

Environmental Authorisation (EA) for this project was granted on 28 September 2015, by way of EA Reference No 14/12/16/3/3/2/690 and subsequently amended on 12 October 2015 (14/12/16/3/3/2/690/AM1). A second amendment application was submitted on 12 August 2019 (14/12/16/3/3/2/690/AM2) to allow for changes in the turbine specifications stipulated in the original EA for the Dwarsrug Wind Farm.

Accordingly, this Draft EMPr has been compiled in line with the recommendations of the original EIA for the Dwarsrug Wind Farm, as well as the additional mitigation measures and recommendations contained in the revised specialist reports / comment letters commissioned for the second EA amendment application submitted. Importantly, all additional mitigation measures carried across from the revised specialist reports / comment letters have been included herein and underlined in the various sections for ease of reference.

This EMPr will be updated to include the conditions of the EA and second amended EA (if approved) as well as measures dictated by the final layout plan and micro-siting. The updated EMPr will be re-submitted to the DEA for final approval prior to the commencement of construction on the project site. Additional details will be provided by the contractors and engineers once the detailed design has been completed.

1.1 Details of the EAP

As per the requirements of the NEMA (2010), the details and level of expertise of the persons who prepared the EMPr are provided in **Table 1** below.

Table 1: Consultant Team

Environmental Practitioner	Stephan Jacobs
Contact Details	stephanj@sivest.co.za
Qualifications	B.Sc. Environmental Sciences (undergraduate) and B.Sc. (Hons) Environmental Management and Analysis
Professional Affiliations	IAIA (International Association for Impact Assessment)
Expertise	Stephan joined SiVEST in May 2015 and holds the position of Environmental Consultant in the Johannesburg and Pretoria offices. Stephan specialises in the field of Environmental Management and has been extensively involved in Environmental Impact Assessment (EIA) and Basic Assessment (BA) processes for various types of projects / developments, particularly energy generation and electrical distribution projects. Stephan thus has vast experience with regards to the compilation of EIAs and BAs. Additionally, Stephan has extensive experience in undertaking public participation and stakeholder engagement processes. Stephan has also assisted extensively in the undertaking of fieldwork and the compilation of reports for specialist studies such as Surface Water and Visual Impact Assessments. Stephan also has experience in Environmental Compliance and Auditing and has acted as an Environmental Control Officer (ECO) for several infrastructure projects.

1.2 Site Locality and Description

1.2.1 Regional Locality

The study area is situated approximately 60km north of Loeriesfontein and is accessed via the Granaatboskolk Road (Figure 1). The site is located within the Namakwa District Municipality and Hantam Local Municipality of the Northern Cape Province.

The town of Loeriesfontein is within a basin surrounded by mountains, and it is accessed from the N7 highway (north out of Cape Town), turning off on the R27 at Vanrhynsdorp to Nieuwoudtville, then following the R357 to Loeriesfontein (a further 65km north).

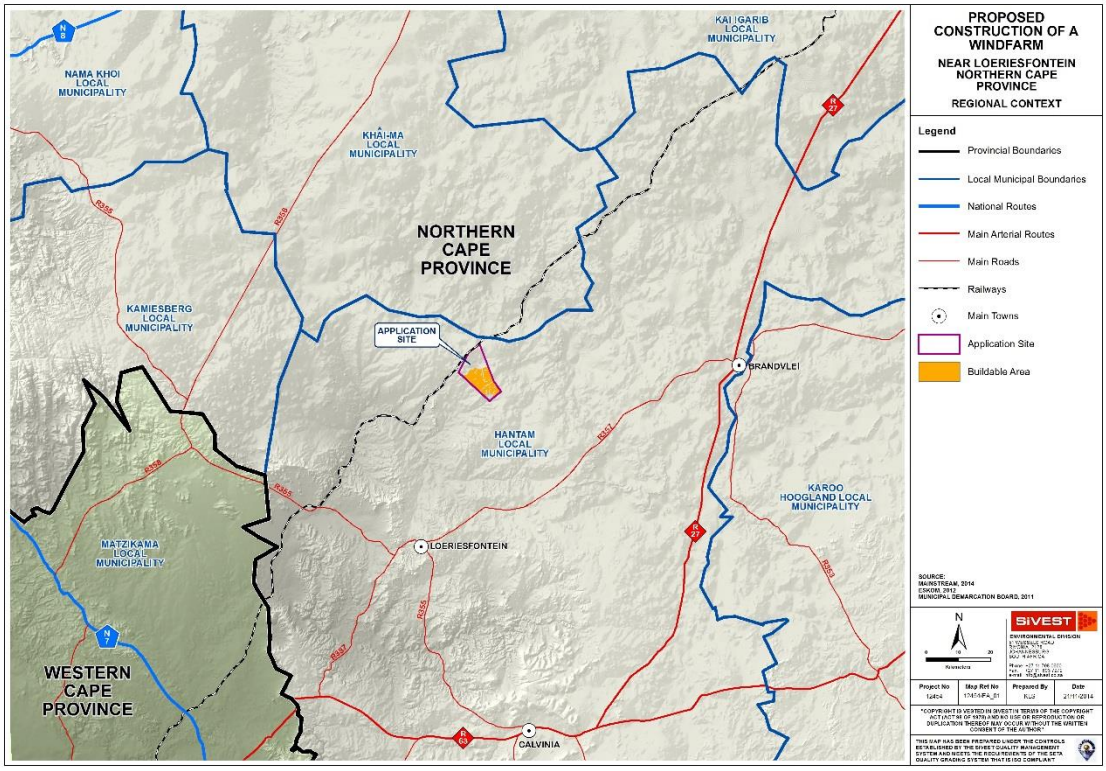


Figure 1: Regional locality map

1.2.2 Study Site Description

The sites that are proposed for the proposed Dwarsrug wind farm near Loeriesfontein are located on the following portions of land (Figure 2):

- **Wind Farm**
  - Remainder of Farm Brak Pan No. 212;
  - Stinkputs North No. 229.
- **Access Road**
  - Remainder of Farm Narosies No. 228;
  - Remainder of Farm Kleine Rooiberg No. 227;
  - Portion 5 of Farm Kleine Rooiberg No. 227;
  - Portion 4 of Farm Rooiberg No. 263.
- **Grid Line**
  - Portion 1 of the Farm Aan De Karree Doorn Pan No 213;
  - Remainder of the Farm Sous No. 226;
  - Portion 1 of the Farm Sous No. 226.

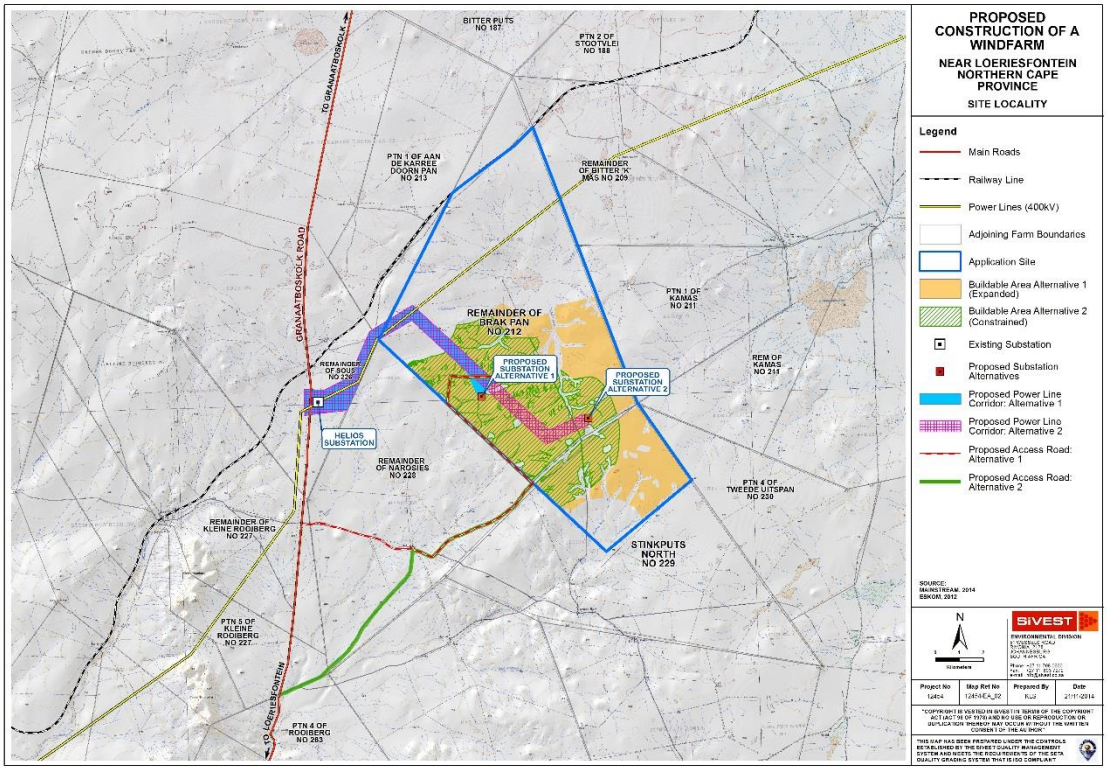


Figure 2: Site locality map

The study area is classified as natural / vacant and is used as general grazing land for sheep and wildlife. As such the human footprint in most of the area is considered to be relatively low. Stocking rate for the area is approximately at a low stocking rate of around 1 SSM (small stock unit) per 6 hectares. Vast grazing land is interspersed with seasonal pans and non-perennial streams. The non-perennial streams are located to the southwest of the site.

The western part of the study area contains an existing substation which will be the link between the proposed development and the national electricity grid.

The topography in the immediate vicinity of the site proposed for the wind farm is characterised by a flat to gently undulating landscape (typical of much of the Karoo). In the wider area, the Klein and Groot Rooiberg and Leeuberg koppies form an area of localised hilly topography to the south and south-west of the site. Immediately north of the site the presence of a number of large pans signals that the topography is very flat and thus very poorly drained. Within the proposed wind farm site, the topography characterised by relatively flat terrain that slopes down gradually toward a pan in the central parts of the site. Several low hills and ridges are scattered throughout the site.

The proposed development is found within the Bushmanland Basin Shrubland and the Bushmanland Vloere vegetation units, respectively. The Bushmanland Basin Shrubland vegetation unit is one of the most extensive vegetation types in South Africa. The vegetation is characterised by slightly irregular low shrubs around 30-40 cm in height, distributed uniformly across the landscape, except in areas of disturbance where patches of bare earth occur, as well as succulent shrubs or perennial grasses.

1.2.3 Climate

The study area has an arid Mediterranean type climate with winter rainfall regime i.e. most of the rainfall is confined to early autumn and winter. Mean Annual Precipitation (MAP) is approximately 179 mm per year and without some form of supplementary irrigation natural rainfall is insufficient to produce sustainable harvests (**Table 2** and **Figure 3**). This is reflected in the lack of dry land crop production within the study area. Average daily temperatures range from 30ºC in summer to 17 ºC in winter. Average night time temperatures drop to around 2.4 ºC during winter (**Table 3**).

Table 2: Mean monthly rainfall for Loeriesfontein (Source: South Africa's Rain Atlas)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
Rainfall (mm)	8.7	11.3	17	20.8	23.3	21.1	18.3	14.3	11.1	9	7	7	14.1

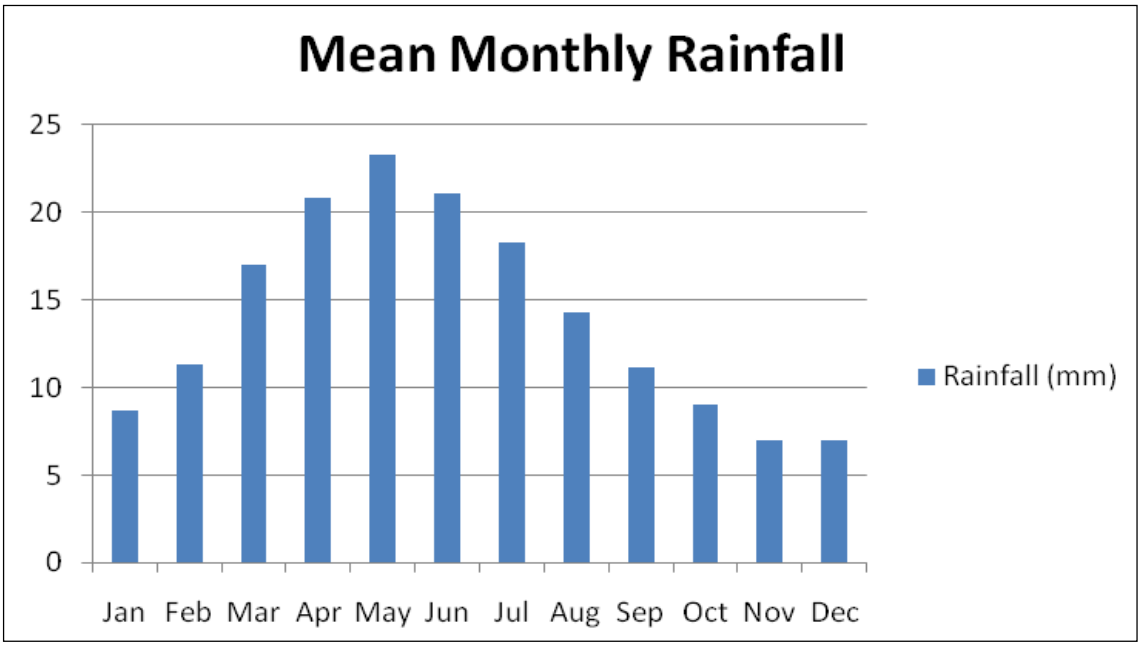


Figure 3: Mean Monthly Rainfall Graph for Loeriesfontein

Table 3: Mean monthly and annual temperature for Loeriesfontein (Source: http://www.saexplorer.co.za)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Avg
Midday Temp (°C)	21	32	29	25	21	17	17	19	22	25	28	30	24
Night Temp (°C)	31	14	13	9	6	4	2	3	5	8	10	12	8

1.3 Overview of the proposed project

The entire assessed site for the proposed wind farm is approximately 10701.04 ha (Remainder of the Farm Brak Pan No. 212 and part of the Farm Stinkputs North No. 229). Based on the sensitive areas identified by the specialists a smaller buildable area of 5210.045 ha was identified within the assessed site that is suitable for development. The actual footprint of the wind farm will be much smaller with generator infrastructure fitting within this 5210.045 ha buildable area. It is estimated that the proposed wind farm will encompass the installation of a number of wind turbine generators and associated components in order to generate electricity that is to be fed into the national distribution network at MTS via a 132kV power line.

The project (including associated infrastructure) is proposed on the following farm portions:

- Remainder of the Farm Brak Pan No. 212, Northern Cape
- Stink Puts North No. 229, Northern Cape
- Remainder of the Farm Narosies No. 228, Northern Cape
- Portion 1 of the Farm Aan De Karree Doorn Pan No 213, Northern Cape
- Remainder of the Farm Kleine Rooiberg 227, Northern Cape
- Portion 5 of the Farm Kleine Rooiberg 227, Northern Cape
- Portion 4 of the Farm Rooiberg 263, Northern Cape
- Portion 1 of the Farm Sous No. 226, Northern Cape
- Remainder of the Farm Sous No. 226, Northern Cape

At this stage, it is proposed that the development will consist of approximately 44 wind turbines and associated infrastructure with a total generation capacity of approximately 140MW. As mentioned above, the generated electricity will be fed into the national distribution network at Helios MTS via a 132kV power line with a length of between approximately 10km and 15km, depending on the route alternative selected.

The key components of the project are detailed below.

1.3.1 Turbines

The EA granted for the Dwarsrug Wind Farm on 28 September 2015 made provision for the construction of a total number of 70 wind turbines. Although no turbine specifications were included in the EA, the Environmental Impact Assessment (EIA) and associated specialist studies considered the impacts of turbines with hub heights of up to 150m and rotor diameters of up to 150m. An amendment is currently underway to allow for a total of 44 turbines each with a hub height of up to 200m and a rotor diameter of 200m (**Figure 4**).

The blade rotation direction will depend on wind measurement information received later in the process. The foundation of each wind turbine will have a footprint of approximately 20m x 20m, and will be approximately 5m deep. A hard standing area of approximately 2 800m^2 per turbine will be required for crane usage. As already mentioned, approximately 44 wind turbines will be constructed with a total generation capacity of approximately 140MW.

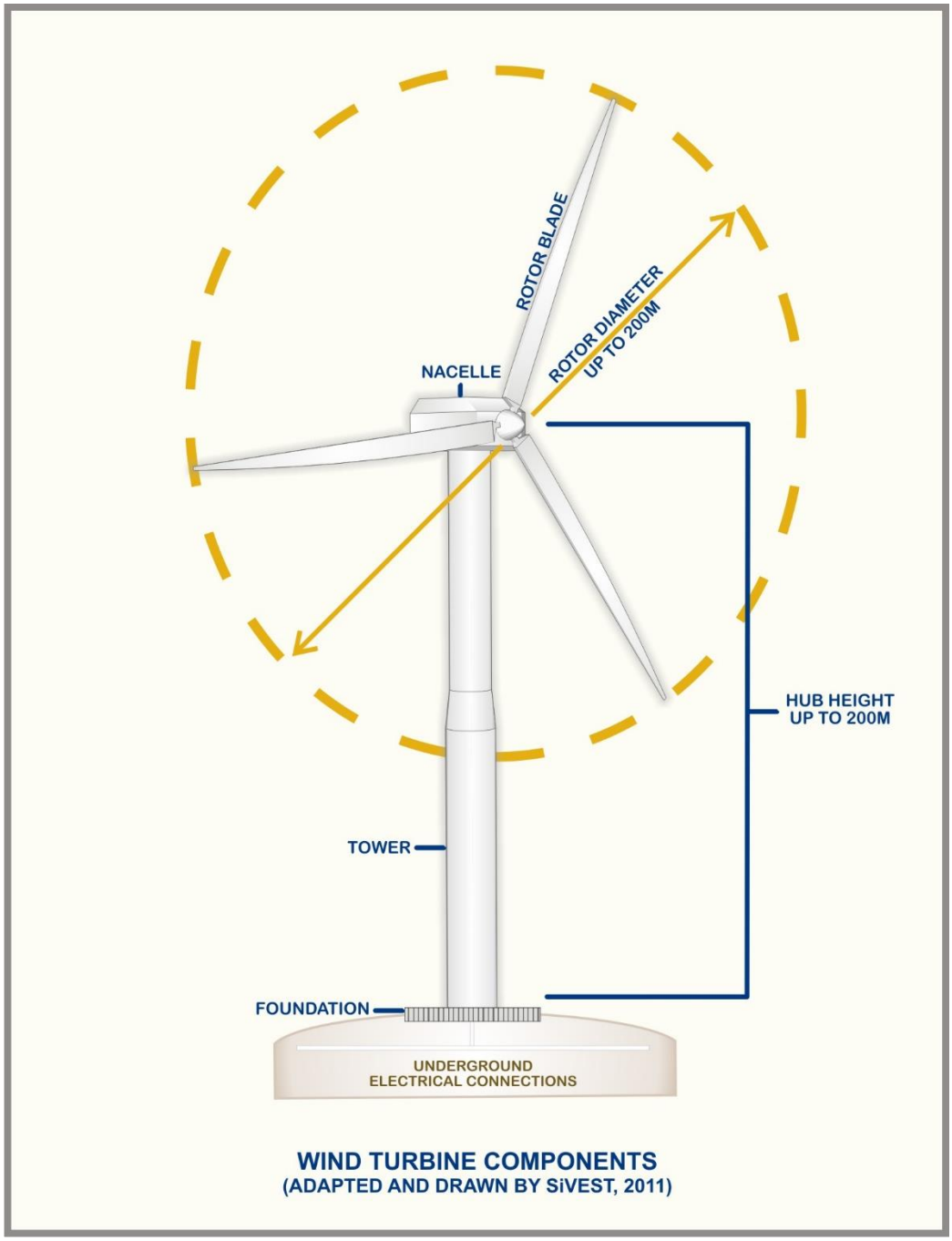


Figure 4: Typical Components of a Wind Turbine

1.3.2 Electrical Connections

The wind turbines will be connected to the substation using buried (up to a 1.5m depth) medium voltage cables (Figure 5) except where a technical assessment of the proposed design suggests that overhead lines are appropriate such as over rivers and gullies. Where overhead power lines are to be constructed, monopole tower structures will be used in combination with the steel lattice towers at bend points. The dimensions of the monopole structures will depend on grid safety requirements and the grid operator. The exact location of the towers, the selection of the tower type and the final design will comply with

the requirements of Eskom. No servitudes will be associated with the wind farm infrastructure although servitudes for Eskom infrastructure may be required on site. As mentioned, the proposed wind farm will connect with the national distribution network at Helios MTS via a 132kV power line with a length of up to 15km. Eskom has confirmed during a meeting with Mainstream that the proposed wind farm can connect onto the grid at Helios Main Transmission Substation (MTS).

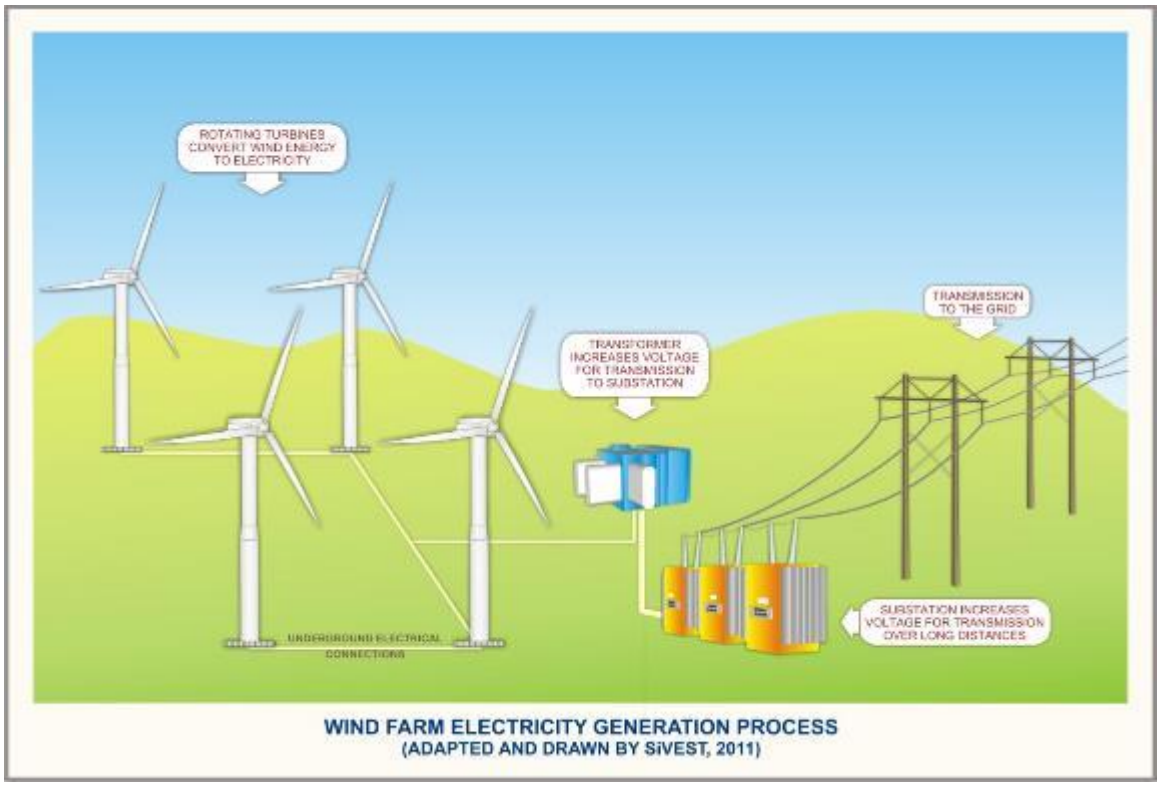


Figure 5: Conceptual wind farm electricity generation process showing electrical connections

1.3.3 Substation

A new substation (approx. 90 x 120m) and associated transformers will be developed which will supply the generated electricity to the Eskom grid. The transformers' operating voltage may range up to 275kV. The footprint of the substation yard will be approximately 10 800m². The connection from the substation to the Eskom grid line will be an overhead power line as mentioned above.

A new substation bay may be required at Helios MTS along with associated transformers, breakers, and associated gear. It is expected that this work will be completed within the existing substation yard at Helios MTS.

1.3.4 Roads

The internal access roads are proposed to be between 8 and 10m wide. An existing access road from the Granaatboskolk road will be upgraded to provide access to the site. In some sections the internal and site access roads may need to be as wide as 12 meters at certain corners, during the construction phase, to accommodate the turning circle of the extended trucks transporting the turbine tower sections

and turbine blades. Laybys may need to go up to 15m, but this will be limited. The cut and fill areas required along roads will be determined during the final detailed designs. This information will be described in the Final EMPr that will be submitted to the DEA for approval.

1.3.5 Temporary Construction Area

A maximum 10 000m^2 temporary lay down area will be constructed for the proposed development and will include an access road and a contractor's site offices of up to 5 000m^2.

1.3.6 Borrow Pits

Borrow pits will not be required. If additional material is required it will be sourced from commercial operations, from turbine base excavations or from an offsite licensed borrow pit.

1.3.7 Buildings

An administration and warehouse buildings with a footprint of 5 000 m^2 will be constructed.

No workers accommodation will be provided on site. Workers will reside at an existing construction camp located at Helios MTS or within the town of Loeriesfontein. A temporary construction camp will be erected for the security guards on site.

1.3.8 Other Associated Infrastructure

Other infrastructure includes the following:

- Fencing (approximately 3m for the laydown area, O&M buildings and substation);
- Linking station (if required); and
- Water treatment facility** (if required)

***Should the water treatment facility be required; the maximum storage capacity, quantity transferred, internal pipe diameter and peak throughput would all be below the thresholds provided in listing notice 1, 2 and 3 (GN R. 544, 545 and 546). As such, no additional listed activities would be triggered.*

1.3.9 Water Supply, Treatment and Effluent

At this stage, it is anticipated that water for construction and operational use will be supplied from a borehole located on the development site. Alternatively, water will be provided from one or more of the three (3) available boreholes on neighbouring farms (Portion 1 of the farm Sous No. 226 and Portion 1 of the Farm Ann De Karree Doorn Pan No 213), which have already been issued with a WUL (Water Use License). These boreholes will initially be utilised during the construction phase of the Loeriesfontein 2 and Khobab wind farms. The quantity of water in these boreholes is sufficient to accommodate the operations at the Loeriesfontein 2 and Khobab wind farms in combination with the construction of the Dwarsrug wind farm thereafter.

During the construction phase water will be carried in trucks from the borehole directly to the site for dust suppression and to the offsite batching plant. Approximately 40,000 cubic meters of water will be required for the entire 18-26 month long construction phase. The borehole water will either be treated to provide potable water or water will be trucked in from the Municipality for drinking and toilets. Potable water will be stored in Jojo tanks. Conservancy tanks will be utilised on site and waste stored in them will be removed by trucks and disposed of at a local treatment facility in Loeriesfontein which has recently been expanded.

1.3.10 Transportation of Components

As part of the construction phase planning, a transportation route plan has been prepared indicating the proposed route to be used in order to transport the WEF components safely to the proposed development site. As part of the route plan, verges and signs requiring widening or moving have been identified. A traffic and transportation management plan to minimise the impact of the additional traffic and ensure safety is also included with the EMPr. Refer to Appendix 8.

1.4 Site Layout

During the EIA process, specialist studies were undertaken to identify areas of environmental sensitivity and address the potential impacts relating to the proposed development. Alternative site layouts, access road proposals and grid line corridor alignments were refined based on the findings of the specialist studies to ensure that all environmentally sensitive areas are avoided.

The resultant Preferred Site Layout is shown in relation to the areas of environmentally sensitive areas in **Figure 6** below.

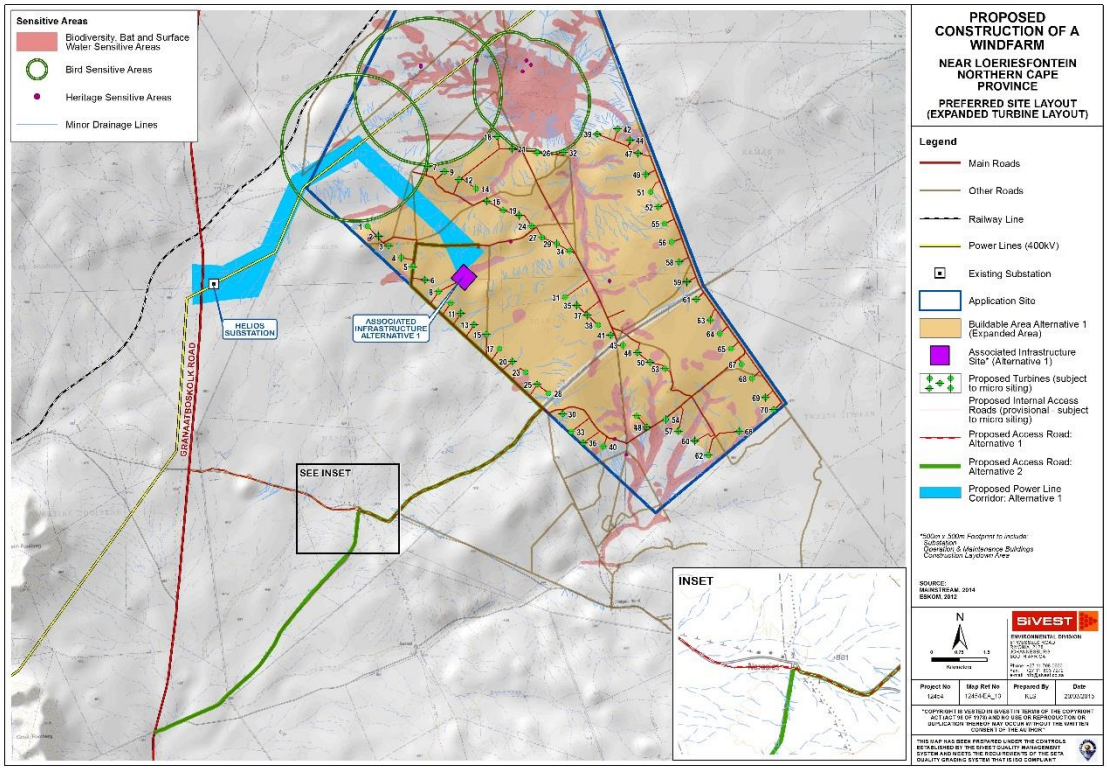


Figure 6: Preferred Site Layout in relation to Sensitive Areas

1.5 Revised Layout

As previously stated, an amendment application was submitted on 12 August 2019 (14/12/16/3/3/2/690/AM2) to allow for changes in the turbine specifications stipulated in the original EA for the Dwarsrug Wind Farm. Avifaunal and Bat Specialist studies commissioned in respect of the proposed amendments to the turbine specifications recommended revisions to the sensitive areas previously identified on the Dwarsrug Wind Farm site. These revised areas of sensitivity in relation to the previously preferred layout are shown in **Figure 7** below.

In light of these revisions as well as the mitigation measures recommended by the specialists, Mainstream has further refined the proposed layout for Dwarsrug Wind Farm. This new layout takes into account the following specialist concerns/comments:

- **Avifauna:**
  - a 5km "No-Go" zone around the Martial Eagle nests on the Aries-Helios 400kV transmission line;
  - a "High Sensitivity" zone between 5km and 6km from the Martial Eagle nests.
- **Bats:**
  - all areas of sensitivity, inclusive of a 200m buffer, must be upgraded to "High Sensitivity".
  - a maximum of 60 turbines are deployed.

In light of the fact that the previously assessed buildable area now encroaches into the revised sensitive areas, Mainstream has clipped the buildable area to ensure that the sensitive areas are avoided and reduced the number of turbines in the layout 44. **Figure 8** below shows the revised areas of sensitivity in relation to the refined layout.

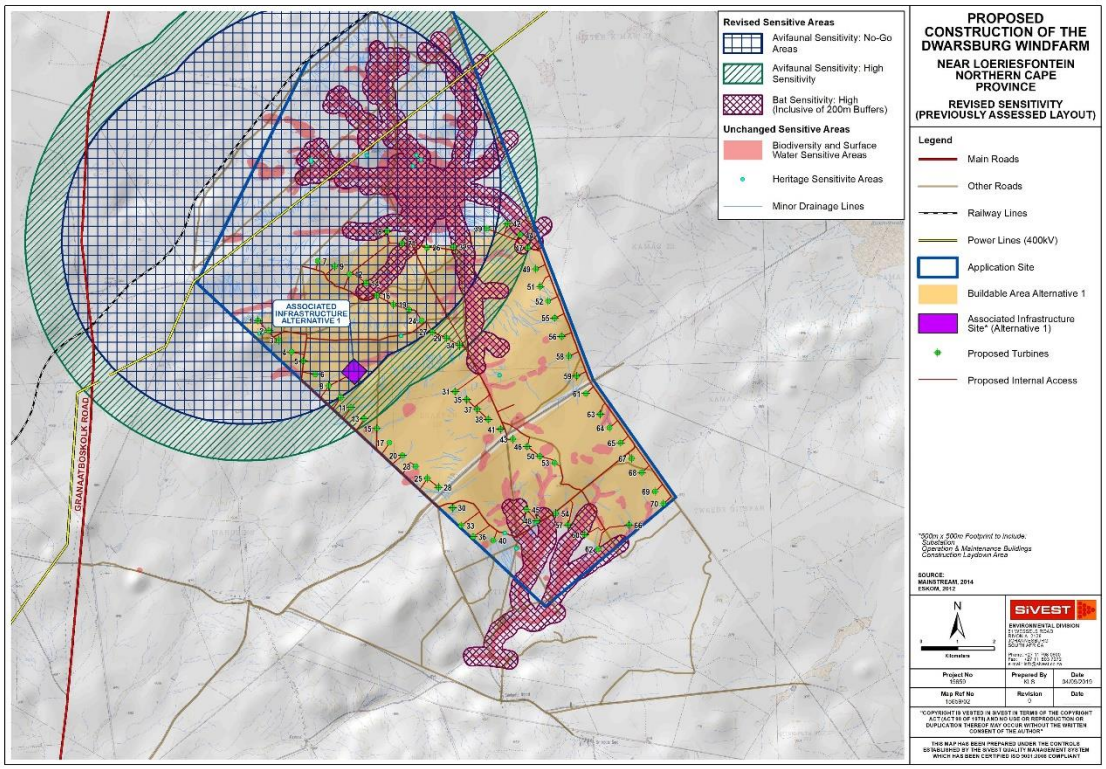


Figure 7: Revised areas of sensitivity in relation to the previously preferred layout.

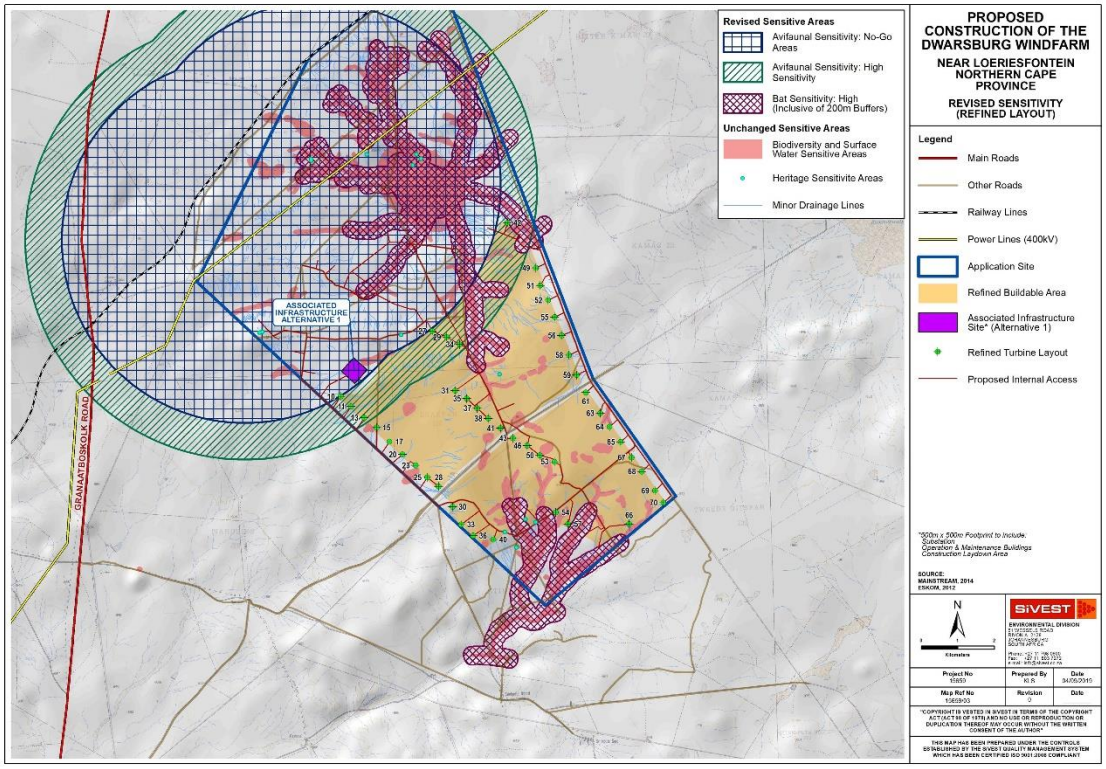


Figure 8: Revised areas of sensitivity in relation to the refined layout.

1.6 Specific Conditions Pertaining to Authorisations

Should the Department of Environmental Affairs (DEA) issue an Environmental Authorisation (EA), this EMPr will be updated to include all the pre-construction, construction, operation and decommissioning conditions stipulated in the EA.

A water use license will be applied for and may become applicable to the proposed project at a later stage.

Specific conditions pertaining to regulatory processes, or Licensee / Holder of the Authorisation requirements, have not been included within the EMPr. These conditions are to be undertaken by the Licensee / Holder of the Authorisation prior to the commencement of construction related activities.

1.7 Project Responsibilities

The roles and responsibilities of all the key role players involved in the EMPr are represented below.

1.7.1 The Project Company

The Project Company (South Africa Mainstream Renewable Power Developments (Pty) Ltd) will be responsible for the overall control of the project site in environmental terms during the pre-construction, construction, operation, decommissioning and rehabilitation phases of the proposed project. These responsibilities include the following:

- Appointing an independent ECO for the duration of the Contract and notify the DEA of their contact details;
- Being fully familiar with the EIA Report, EA conditions and the EMPr;
- Notifying the DEA of changes in the developments that result in significant environmental impacts;
- Notifying the DEA within 30 days of change of ownership;
- Notifying the DEA of any change of address of the owner/Project Company;
- The overall implementation of the EMPr;
- Ensuring compliance, by all parties, and the imposition of penalties for noncompliance
- Implementing corrective and preventive actions, where required;
- Preventing pollution and actions that will harm or may cause harm to the environment;
- Ensuring the activity does not commence within 30 days of the EA being issued;
- Notifying the DEA within 30 days that construction activity will commence;
- Notifying the DEA in writing within 24 hours if any condition in the EA cannot be or is not adhered to; and
- Notifying the DEA 14 days prior to commencement of the operational phase.

1.7.2 Construction Team

Several professionals will form part of the construction team. The most important from an environmental perspective are the Project Manager (PM), the Contractor Project Manager (CPM), the Main Contractor (MC), the Environmental Control Officer (ECO), the Environmental Officer (EO) and the Social Officer (SO).

The PM is responsible for the implementation of the EMPr on the site during the pre-construction and construction phases of the project.

The CPM is responsible for the establishment and management of contracts for the Main Contractor and the Sub-contractors.

The MC is responsible for abiding by the mitigation measures of the EMPr which are implemented by the Project Manager during the construction phase.

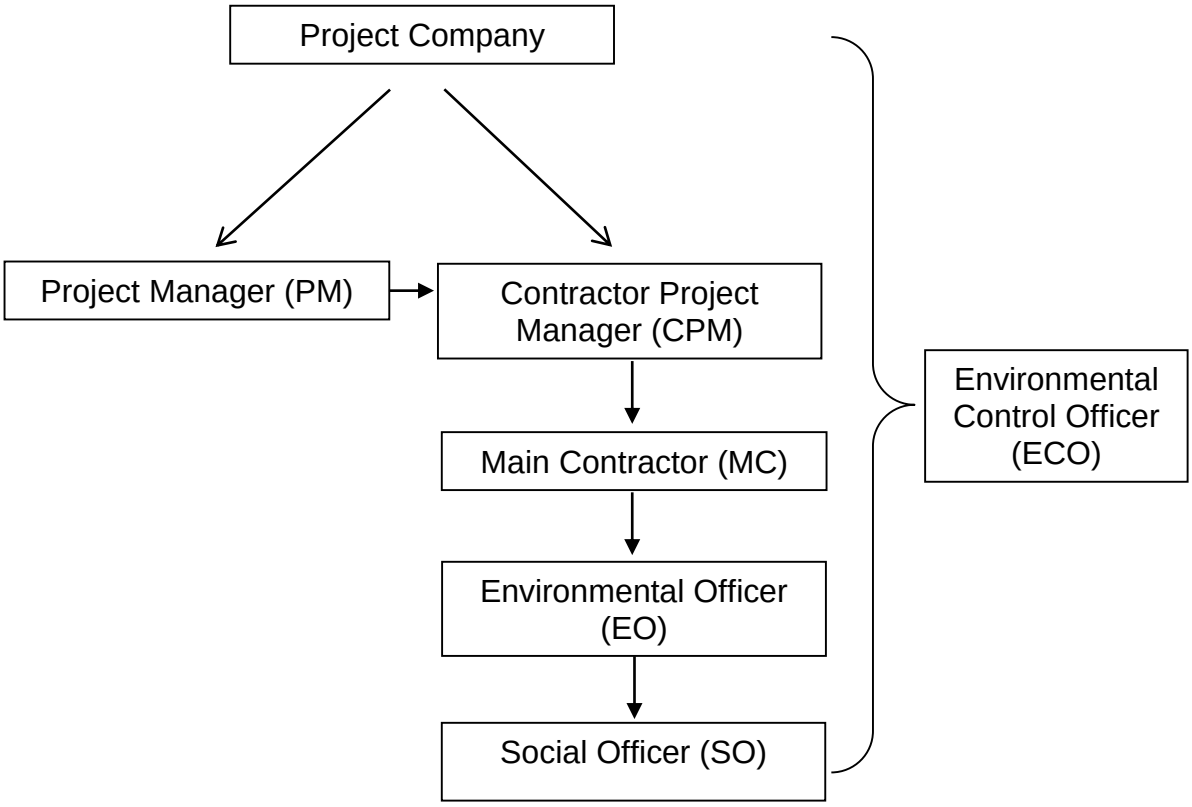
The MC is also responsible for the implementation of the EMPr during the operational and decommissioning phases of the project. However, it must be noted that the MC may change for each phase of the project. The EMPr will therefore be applicable to the relevant MC appointed for each phase of the project.

The ECO is responsible for monitoring the implementation of the EMPr during the design, pre-construction and construction phases of the project.

The EO is responsible for managing the daily onsite implementation of the EMPr.

The SO is responsible for managing the daily on-site implementation of the social aspects of the EMPr.

Basic Organogram:



1.7.3 Project Manager

The PM is responsible for overall construction management of the project as well as the implementation of the EMPr. The following tasks will fall within his / her responsibilities:

- Be aware of the findings and conclusions of the Environmental Impact Assessment and the conditions stated within the Environmental Authorisation;
- Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures;
- Monitor site activities on a daily basis for compliance;
- Confine the construction site to the demarcated area; and
- Rectify transgressions through the implementation of corrective action.

The Project Manager will assume ultimate responsibility. However, the abovementioned tasks can be delegated to the on-site manager for daily management.

1.7.4 Contractor Project Manager

The CPM will undertake overall project contracts management between of the Main Contractor and the appointed Sub-Contractors. The following tasks will fall within his / her responsibilities:

- Responsible for establishing contractual agreements with the Main Contractor and Sub-Contractors, and ensuring that sub-contractors adhere to the EMPr;
- One of the key contracts will be for the supply, transport, erection and commissioning of the Wind Turbine Generators. This will be covered under the Turbine Supply Agreement (TSA); and
- The TSA contractor will be bound by the EMPr and will need to report to the Project Company via the CPM.

1.7.5 Main Contractor

The MC is responsible for the implementation and compliance with recommendations and conditions set out in the EMPr. This requires that the MC be familiar with the EIA report, EA conditions and the EMPr. This encompasses the following activities:

- Ensuring compliance with the EMPr at all times during construction;
  - Ensuring that all subcontractors have a copy of and understand the contents of the EMPr, to ensure environmental best practice.
- Preventing pollution and avoid actions that will impact or harm the surrounding environment;
- Responsible for the construction activities to be carried out for the duration of the project (will subcontractors and contract workers);
- Implementing corrective and preventive actions, where required;
- Maintain an environmental register which keeps a record of all incidents which occur on the site during construction. These incidents include:
  - Public involvement / complaints;
  - Health and safety incidents;
  - Hazardous materials stored on site; and
  - Non-compliance incidents.
- Development of specific method statements prior to commencment of environmentally sensitive constructions activities as identified in the EMPr.

1.7.6 Environmental Control Officer

The ECO is responsible for the implementation of the EMPr during the construction phase and liaison between the Contractor and the Landowners. The ECO should have a minimum of two years of relevant experience as well as a relevant environmental degree or relevant tertiary qualification. The ECO is also to be an independent party. The ECO will liaise and report to the Contractor and authorities, thus the ECO should have effective communication and negotiating skills. The following tasks will fall within his / her responsibilities:

- Be aware of the findings and conclusions of the Environmental Impact Assessment and the conditions stated within the environmental authorisation.
- Work with the construction team to review relevant risk/ method statements from an environmental perspective;
- Be familiar with the recommendations and mitigation measures of this EMPr;
- Conduct monthly audits of the construction site according to the EMPr and EA. A monthly report will be produced detailing the findings of the audit highlighting any non-compliance issues. Positive compliance with the EMPr will also be noted;
- Educate the construction team about the management measures of the EMPr and EA.
- Regular liaison with the construction team and the project leader;
- Recommend corrective action for any environmental non-compliance incidents on the construction site;
- The affected parties shall always be kept informed about any changes to the construction programme should they be involved. If the ECO is not on site the Contractor should keep the affected parties informed. The contact numbers of the Contractor and the ECO shall be made available to the affected parties. This will ensure open channels of communication and prompt response to queries and claims; and
- Liaising with the heritage specialist in the case of unearthing of artefacts and/ or graves.

The ECO is responsible for providing an independent evaluation of compliance with the EMPr and not for enforcement of conditions of the EMPr. The Project Company is responsible for enforcement of the conditions of the EMPr.

The Contractor and the EO are accountable to the ECO for non-compliance with the EMPr. The ECO provides feedback to the Project Company and I&APs, as required. Issues of noncompliance raised by the ECO must be taken up by the Project Company's Representative and resolved with the Contractor as per the conditions of his/her contract.

The ECO will remain employed for the full duration of the contract until all snag items have been resolved, rehabilitation measures have been completed, and the site is handed over to the Operator, thereby indicating the start of the operational phase.

1.7.7 Environmental Officer

The EO must be appointed by the Contractor and is responsible for managing the daily onsite implementation of the EMPr, and for the compilation of weekly environmental monitoring reports. In addition, the EO must act as liaison and advisor on all environmental and related issues, seek advice from the ECO when necessary, and ensure that any complaints received from I&APs are duly processed and addressed and that conflicts are resolved in an acceptable manner and timely manner. The EO shall be full time dedicated member of the Contractor's team and must be approved by the Project Company.

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

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

The EO's responsibilities include:

- Monitoring, on a daily basis, environmental specifications on site and compliance with the conditions of the EA, environmental legislation and EMPr;
- Keeping a register of compliance / non-compliance with the environmental specifications;
- Identifying and assessing previously unforeseen, actual or potential impacts on the environment;
- Ensuring that a brief weekly environmental monitoring report is submitted to the ECO;
- Conducting site inspections during the defects liability period, and bringing any environmental concerns to the attention of the ECO and Contractor;
- Advising the Contractor on the rectification of any pollution, contamination or damage to the construction site, rights of way and adjacent land;
- Attending site meetings (scheduled and ad hoc);
- Presenting the environmental awareness training course to all staff, Contractors and Sub contractors, and monitoring the environmental awareness training for all new personnel on-site, as undertaken by the Contractor;
- Ensuring that a copy of the EA and the latest version of the EMPr are available on site at all times;
- Ensuring that the Contractor is made aware of all applicable changes to the EMPr that are approved by the DEA;
- Assisting the Contractor in drafting environmental method statements and/or the Environmental Policy where such knowledge/expertise is lacking;
- Undertaking daily environmental monitoring to ensure the Contractor's activities do not impact upon the receiving environment. Such monitoring shall include dust, noise and water monitoring; and
- Maintaining the following on site:
  - A weekly site diary.
  - A non-conformance register.
  - An I&AP communications register, and

- A register of audits.

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

1.7.8 Social Officer

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

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

The SO may be the same person as the EO, but will assume all the responsibilities of the duel roll.

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

- A person with communication and negotiating skills;
- Report writing skills; and
- Fluency in English, Afrikaans and any other local language as and where required.

The responsibilities and functions of the Construction SO will include:

- Implement and manage the daily social and communication aspects of the construction process according to the EMPr;
- Liaise and maintain good relations with I&APs;
- Monitor social aspects in terms of the specifications;
- Implement mitigation and corrective measures;
- Submit a monthly environmental report to the Contractor's Project Manager;
- Conduct site inspections during the defects notification period, and bring any social concerns to the attention of the Contractor;
- Attend site meetings (scheduled and ad hoc);
- Maintain a filing system meeting the project's quality management plan;
- Assist the Contractor in the drafting of social methods statements where such knowledge/expertise is lacking;
- Maintain the following on site:
  - A daily site diary;
  - A public complaints and communications register; and
  - A register of audits.
- Remain employed until the end of the end of construction.

1.7.9 Responsible Parties and Auditing Process

As described above, **Table 4** below provides a summary of the responsible parties and the auditing process to be carried out.

Table 4: Responsible Parties and Auditing Process

TITLE	PARTY	ROLE DURING CONSTRUCTION	ROLE DURING OPERATION
Project Company	South Africa Mainstream Renewable Power Developments (Pty) Ltd	Assume ultimate responsibility	Assume ultimate responsibility
Project Manager	To be appointed by proponent	Construction management	N/A
Contractor's Project Manager	Balance of Plant Contractor	Project management	N/A
Main Contractor/s	There will be multiple contracts placed and managed by the Contractor's Project Manager for the construction phase. These will cover civil earthworks and concrete, structural mechanical and electrical / instrumentation (CI). Then there could also be the construction camp management contract.	Main Contractor will undertake day to day construction activities covering aspects such as civil earthworks and concrete, structural mechanical and electrical / instrumentation (CI).	N/A
Environmental Officer	To be appointed by Main Contractors	Day to day environmental responsibility, point of contact for ECO	N/A
Environmental Control Officer	To be appointed by proponent	Monthly audits	Annual audits
Social Officer	To be appointed by Main Contractors	Day to day environmental responsibility, point of contact for landowners and I&AP's	Monthly Audits
Determining Authority	National Department of Environmental Affairs (DEA)	Conduct site visits when necessary.	Conduct site visits when necessary

The following are the environmental management responsibilities (**Table 5**) of the various parties during construction and operational phases. Unless otherwise stated, the EMPr will be adhered to as follows:

- The EO will be the responsible party for all daily compliance of this EMPr during the construction phase;
- The monitoring party will be the ECO;
- Method of record keeping will be monthly audits undertaken by the ECO;
- Audit Technique will be the review of records and documentation (including EMPr/EA) that will be kept on site by the EO and/ or site inspections; and
- The Project Company will bear ultimate responsibility.

Table 5: Environmental Management Responsibilities

ITEM	PROJECT COMPONENT AND ACTIVITY	RESPONSIBLE PARTY	MONITORING PARTY	AUDIT TECHNIQUE
1.1	PRE-CONSTRUCTION (SITE ESTABLISHMENT)			
1.1.1	Site preparation	PROJECT COMPANY, MC, EO, ECO	PROJECT COMPANY, ECO	SITE VISIT
1.1.2	Consultation	MC, SO	EO, ECO	SITE VISIT
1.1.3	Cumulative impacts	MC,	EO, ECO	SITE VISIT
1.1.4	Social and Environmental Management Systems	MC,	EO, ECO, SO	SITE VISIT
2.1	CONSTRUCTION ACTIVITIES			
2.1.1	Site Clearing	MC,	EO, ECO	SITE VISIT
2.1.2	Construction traffic and access	MC, EO	ECO	SITE VISIT
2.1.3	Construction Camp	MC, EO, ECO	ECO	SITE VISIT
2.1.4	Environmental Education and Training	PROJECT COMPANY, MC	PROJECT COMPANY	SITE VISIT
2.1.5	Soils and Geology	MC, EO	ECO	SITE VISIT
2.1.6	Erosion Control	EO	ECO	SITE VISIT
2.1.7	Water Use and Quality	EO	ECO	SITE VISIT
2.1.8	Surface and Groundwater	EO	ECO	RECORDS REVIEW
2.1.9	Waste Management	EO	ECO	SITE VISIT
2.1.10	Flora	EO	ECO	SITE VISIT
2.1.11	Fauna	EO	ECO	RECORDS REVIEW, SITE VISIT
2.1.12	Air Quality	EO	ECO	RECORDS REVIEW
2.1.13	Noise and Vibrations	EO	ECO	RECORDS REVIEW

2.1.14	Energy use	EO	ECO	RECORDS REVIEW
2.1.15	Climate Change	EO	ECO	RECORDS REVIEW
2.1.16	Agricultural Potential	EO	ECO	RECORDS REVIEW
2.1.17	Employment	PROJECT COMPANY, MC	ECO	RECORDS REVIEW
2.1.18	Occupational Health and Safety	MC, EO	SO	SITE VISIT
2.1.19	Health and Safety	MC, EO	SO	SITE VISIT
2.1.20	Security	MC, EO	ECO	SITE VISIT
2.1.21	Social Environment	PROJECT COMPANY, MC, SO	ECO	RECORDS REVIEW, SITE VISIT
2.1.22	Community Engagement	SO	ECO	SITE VISIT
2.1.23	Visual Impact	EO	ECO	SITE VISIT
2.1.24	Bat Impact	PROJECT COMPANY, MC, EO	ECO	SITE VISIT
2.1.25	Avifauna Impact	PROJECT COMPANY, MC, EO	ECO	SITE VISIT
3.1	OPERATION ACTIVITIES			
3.1.1	Construction Site Decommissioning	PROJECT COMPANY	ECO	RECORDS REVIEW
3.1.2	Operation and Maintenance	PROJECT COMPANY	ECO	RECORDS REVIEW
3.1.3	Surface and Groundwater	MC	ECO	RECORDS REVIEW
3.1.6	Pollution Control	PROJECT COMPANY, MC	ECO	RECORDS REVIEW
3.1.7	Biodiversity	EO	ECO	RECORDS REVIEW
3.1.8	Waste Management	EO	ECO	RECORDS REVIEW
3.1.9	Health and Safety	PROJECT COMPANY, EO	ECO	RECORDS REVIEW
3.1.10	Visual Impact	EO	ECO	RECORDS REVIEW
3.1.11	Bat Impact	EO	ECO	RECORDS REVIEW AND SITE VISIT
3.1.12	Avifauna Impact	EO	ECO	RECORDS REVIEW AND SITE VISIT

4.1	DECOMMISSIONING ACTIVITIES OF PROPOSED DEVELOPMENT			
4.1.1	Ongoing Stakeholder involvement	PROJECT COMPANY, SO	PROJECT COMPANY,	SITE VISIT
4.1.2	Community health and safety	PROJECT COMPANY, SO	PROJECT COMPANY,	RECORDS REVIEW
4.1.3	Waste management	PROJECT COMPANY, EO	PROJECT COMPANY,	RECORDS REVIEW AND SITE VISIT
4.1.4	Surface and groundwater	PROJECT COMPANY, EO	PROJECT COMPANY,	RECORDS REVIEW AND SITE VISIT
4.1.5	Biodiversity	PROJECT COMPANY, EO	PROJECT COMPANY,	RECORDS REVIEW AND SITE VISIT
4.1.6	Air quality	PROJECT COMPANY, EO	PROJECT COMPANY,	RECORDS REVIEW AND SITE VISIT

1.7.10 Environmental Audits

Table 6 below provides an outline of the generic process involved in the auditing process. It briefly describes the activities of the process initially beginning with defining the objectives and scope of the auditing process as well as the responsibilities of the various parties. The procedure for the auditing process is explained through to the production of audit findings and the compliance (or non-compliance) of the audit findings.

Table 6: Example of Procedure for Conducting Audits

Objective	To ensure that formal audits of the EMPr are scheduled and performed so as to verify compliance with the requirements of the EMPr.
Scope	This procedure describes the sequence of events required to perform a compliance audit and the verification of implemented corrective action.
Responsibilities	The ECO or a person authorised and appointed by him, is responsible for the maintenance of the Environmental Audit System The ECO is responsible for the scheduling and execution of the audit, as well as the verification of the implementation of corrective action. At

	his/her discretion, this authority may be delegated to responsible company personnel or to an independent Environmental Auditing Authority to perform the audit on his/her behalf. Auditors shall have no direct responsibility in the area/ system being audited. They will be trained in techniques for auditing environmental management systems. The head of department (HOD)/ supervisor for an area/system to be audited (or a responsible person nominated by him/ her) will assist the audit team in the execution of the audit. The HOD will also be responsible for timely corrective actions based on the findings of the audit.
Planning the audit	The ECO or his authorised delegate, shall plan the audit of a particular environmental area or system as follows: ▪ He shall inform, in writing, the contractor to be audited of the intention to conduct an audit at least two weeks prior to the audit. This notification should include the audit objective, scope and duration and any assistance required from the contractor. ▪ On completion of the audit, an audit findings report shall be prepared and submitted to the Project Company, project manager and construction team. ▪ Corrective actions shall be implemented, within four weeks after the audit, where possible.
Audit Check List	Auditing will be performed by collecting evidence for verification through interviews, relevant documentation and observation of activities and conditions. Instances of non-conformity to EMPr criteria should be recorded. An environmental audit checklist can be used as a guide to address all relevant issues.
Audit Compliance	See below.
Audit Findings and Reporting of non-compliances	The audit team shall review all evidence of their audit findings to decide on non-compliance. Audit findings of non-compliance must be

	documented and supported by evidence in the Audit Findings Report. The non-compliance findings will be communicated to the Project Manager and his representatives during an audit feedback meeting.

1.8 Layout of Environmental Management Programme (EMPr)

1.8.1 Introduction

This EMPr addresses both generic issues as well as specific issues. The generic and specific issues are each separated into different phases. Each phase has specific issues unique to that period of the development and operation of the wind farm as well as associated infrastructure. The impact is identified and given a brief description. The phases of the development are then identified as below:

- Pre-construction (Site Establishment)
- Construction (including associated rehabilitation of affected environment)
- Operation Phase
- Decommissioning

This EMPr seeks to manage and keep to a minimum the negative impacts of a development and at the same time, enhance the positive and beneficial impacts.

The EMPr specifies mitigation measures for the following environmental aspects:

1.8.2 Pre-construction (Site establishment)

- Site preparation
- Consultation
- Site clearing
- Social and Environmental Management Systems

1.8.3 Construction

- Construction Camp
- Construction Traffic and Access
- Environmental Education and Training
- Soils and Geology

- Erosion Control
- Water Use and Quality
- Surface and Groundwater
- Waste Management
- Flora
- Fauna
- Air Quality
- Noise and Vibrations
- Energy Use
- Employment
- Occupational Health and Safety
- Security
- Social Environment
- Cultural and Heritage Artefacts
- Community Engagement
- Visual Impact

1.8.4 Operation

- Construction Site Decommissioning
- Operation and Maintenance
- Surface and Groundwater
- Biodiversity
- Waste Management
- Health and Safety
- Visual Impact
- Avifauna
- Social

1.8.5 Decommissioning Phase

- Ongoing Stakeholder involvement
- Community health and safety
- Waste Management
- Surface and Groundwater
- Biodiversity
- Air Pollution

1.9 Objectives of an EMPr

The objectives of this EMPr are to:

- Identify a range of mitigation measures which could reduce and mitigate the potential impacts to minimal or insignificant levels
- To identify measures that could optimise beneficial impacts
- To create management structures that address the concerns and complaints of I&APs with regards to the development
- To establish a method of monitoring and auditing environmental management practices during all phases of development
- Ensure that the construction and operational phases of the project continues within the principles of Integrated Environmental Management and Environmental Management System (EMS) ISO 14001 Principles
- Detail specific actions deemed necessary to assist in mitigating the environmental impact of the project.
- Ensure that the safety recommendations are complied with.
- Propose mechanisms for monitoring compliance with the EMPr and reporting thereon.
- Specify time periods within which the measures contemplated in the EMPr are implemented, where appropriate.

The EMPr Seeks to highlight the following:

- Avoiding impacts by not performing certain actions
- Minimising impacts by limiting aspects of an action
- Rectifying impacts through rehabilitation, restoration, etc. of the affected environment
- Compensating for impacts by providing substitute resources or environments
- Minimising impacts by optimising processes, structural elements and other design features
- Provide ongoing monitoring and management of environmental impacts of a development and documenting of any digressions /good performances
- The EMPr is a legally binding document that all parties involved in the project must be made aware of.

1.9.1 Environmental monitoring

A monitoring programme will be implemented for the duration of the lifecycle of proposed development. This programme will include:

- Monthly audits according to the EMPr conditions will be conducted by the Environmental Control Officer. These audits can be conducted randomly and do not require prior arrangement with the project manager.
- Compilation of an audit report with a rating of the compliance with the EMPr. This report will be submitted to the relevant authorities.
- An annual audit will also be undertaken by an external specialist.

The ECO shall keep a photographic record of any damage to areas outside the demarcated site area. The date, time of damage, type of damage and reason for the damage shall be recorded in full to ensure the responsible party is held liable. All claims for compensation emanating from damage should be

directed to the ECO for appraisal. A register shall be kept of all complaints from the landowner or community (Annexure A). All complaints / claims shall be handled immediately to ensure timeous rectification / payment by the responsible party.

A copy of the EMPr must be kept on site during the life of the wind farm. The EMPR will be made binding on all contractors operating on the site and must be included within the Contractual Clauses. Those responsible for environmental damage must pay the repair costs both to the environment and human health and the preventative measures to reduce or prevent further pollution and/or environmental damage (the polluter pays principle).

1.10 Applicable Legislation, Development Strategies and Guidelines

The following legislation applies:

- Constitution of South Africa (Act No. 108 of 1996)
- National Environmental Management Act (Act No 107 of 1998) – NEMA
- Environment Conservation Act (Act No 73 of 1989)
- National Heritage Resources Act (Act No 25 of 1999)
- National Water Act (Act No 36 of 1998)
- Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009)
- National Environmental Management: Biodiversity (Act No. 10 of 2004)
- National Forests Act, 1998 (Act No. 84 of 1998)
- Conservation of Agricultural Resources Act No. 43 of 1983)
- Subdivision of Agricultural Land (Act No. 70 of 1970, as amended)
- National Road Traffic (Act No. 93 of 1996, as amended)
- Astronomy Geographic Advantage (Act No. 21 of 2007)
- Civil Aviation Act (Act No.13 of 2009)
- Occupational Health and Safety Act No. 85 of 1993
- National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)
- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
- Development Facilitation Act No. 67 of 1995
- Northern Cape Planning and Development Act, 1998 (Act No. 7 of 1998)
- National Protected Areas Act (Act No. 25 of 2003)

Several regulations will be applicable to the construction phase of the project. These guidelines are mentioned in the EMPr tables. Also of significance in this EMPr are:

- World Bank International Finance Corporation (IFC), EHS Guidelines and
- Equator Principles

1.10.1 The Equator Principles

The Equator Principles are a financial industry benchmark for determining, assessing and managing social & environmental risk in project financing. A number of banks, exchanges and organisations worldwide have adopted the Principles as requirements to be undertaken for project funding on application and approval. Furthermore, certain funding institutions have not formally adopted the Principles, but require clients to be compliant with them in order to qualify for loans.

Under Principle 3, the Equator Principles establish the International Finance Corporations (IFC) Performance Standards (April 30, 2006) and associated General and Sector Specific Environmental, Health and S Guidelines as the applicable social and environmental standards that a project should comply with if the project is located in a non-OECD country or OECD country that is not designated as high income.

The social and environmental assessment that is undertaken for a project establishes whether or not the project is in compliance with the IFC Performance Standards[1].

According to these principles, the performance standards relevant to the proposed development are summarised in **Table 7**.

[1] **NB** A project does not seek compliance with the Equator Principles per se but the standards that the EP refers to. A financial institution that has adopted the EP must ensure that any projects it is financing meet the standards referred to and that it adopts an appropriate risk management system to ensure this.

Table 7: IFC Performance Standards

Performance Standard	Intent and objective
Social & Environmental Assessment Management Systems **(1)**	▪ Adverse and beneficial impacts should be identified within the projects Area of Influence. Emphasis on integrated assessment of social and environmental impacts. ▪ Compliance with national legislation and IFC PS and EHS guidelines as appropriate. ▪ Emphasis on avoidance of impacts wherever practical and where this is not feasible, minimizes, mitigate and compensate. ▪ To ensure effective and ongoing stakeholder engagement ▪ To assess specifically the capacity and commitment of clients to manage risks and opportunities over the course of the transaction.
Labour working conditions **(2)**	▪ Looks at the working conditions by following these principles; ▪ To establish and maintain the worker-management relationship (including specifically a human resources policy). ▪ To promote fair treatment, non-discrimination and equal opportunity of employees (and some contractors) and meet national employment laws. ▪ To protect the workforce by addressing child labour and forced labour. ▪ To promote healthy and safe working conditions.
Pollution, Prevention and Abatement **(3)**	▪ To avoid and minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities. ▪ To promote the reduction of emissions that contributes to climate change.
Community Health, Safety and security **(4)**	▪ To avoid or minimise risks to and impacts on the health and safety of the local community during the project life cycle from both routine and non-routine circumstances. ▪ To ensure that the use of security personnel is carried out in a legitimate manner that avoids or minimizes risks to the community's safety and security.
Land Acquisition & Involuntary Settlement **(5)**	▪ To avoid or at least minimize involuntary resettlement wherever feasible by exploring alternative project designs.

	▪ To mitigate adverse social and economic impacts from land acquisition or restrictions on affected persons' use of land by; (i) providing compensation for loss of assets at replacement cost, and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected. ▪ To improve or at least restore the livelihoods and standards of living of displaced persons. ▪ To improve living conditions among displaced persons through provision of adequate housing with security of tenure at resettlement sites.
Biodiversity Conservation & Sustainable Natural Resources Management **(6)**	▪ To promote and conserve biodiversity. ▪ To avoid the introduction of alien invasive species. ▪ To promote sustainable management and use of natural resources (NRM).
Indigenous people **(7)**	▪ To foster full respect for the dignity, human rights, aspirations, cultures and natural resource-based livelihoods of Indigenous Peoples (IP). ▪ To avoid impacts or where avoidance is not feasible, minimize, mitigate and compensate in a culturally appropriate fashion and within the framework of successful good faith negotiation (a form of stakeholder engagement requiring approval of both parties). ▪ To establish and maintain effective relationships with IPs over the course of the project.
Cultural Heritage (**8)**	▪ To protect cultural heritage from adverse impacts of project activities and support its preservation. ▪ To promote the equitable sharing of benefits from the use of cultural heritage in business activities.

(Source; IFC Guidelines, 2006)

2 ENVIRONMENTAL DOCUMENTATION, REPORTING AND COMPLIANCE

2.1 Documentation

The Contractor must ensure the following documentation is kept on the project site for the full duration of the contract:

- Final Environmental Management Programme once approved by the DEA;
- EA issued by the DEA;
- Environmental Policy of the Contractor;
- Environmental method statements compiled by the Contractor;
- Weekly environmental monitoring records;
- Minutes and record of attendance of all environmental meetings;
- Environmental incident book;
- Communications register;
- Register of audits;
- Non-conformance reports; and
- Waste manifests.

2.1.1 Weekly Environmental Monitoring Report

The EO will be required to provide the Main Contractor with a brief weekly environmental monitoring report covering the onsite events which occurred during the past week. This will highlight key performance areas and provide feedback on corrective and preventive actions taken. The EO will have the weekly reports submitted by the Contractor's Manager prior to submission to The Project Company for monthly reporting.

2.1.2 Site Meetings

Weekly site meetings are undertaken which include environmental matters. This meeting shall be chaired by a Senior Site Representative with the Project Company, Contractor(s), the EO ('s), and SO ('s) in attendance. Where practical or necessary, the ECO will need to attend if possible.

2.1.3 Method Statements

It is a statutory requirement to ensure the wellbeing of employees and of the environment. Therefore, the Contractor shall submit a Method Statement to the Project Company and the ECO for approval prior to the commencement of construction works.

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

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

The Contractor will be accountable for all actions taken in non-compliance of the approved method statements. The Contractor shall keep all the method statements and subsequent revisions on file, copies of which must be distributed to all relevant personnel for implementation.
The Contractor will be required to submit, as a minimum, the relevant method statements as requested by the ECO which are to be compliant with the conditions of the EMPr for review prior to the start of that specific activity.

2.1.4 Communications Register

All complaints or communications that are received from I&APs or any other stakeholder must be recorded in a communications register. These complaints and communications will be brought to the attention of the Project Company, whereupon it will be investigated and a response to the Complainant, I&APs or stakeholder will be given within 10 days. The communications register shall include the following information:

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

The relevant authorities include:

- Department of Water Affairs (e.g. for any incidents involving the contamination of water resources).
- DEA (e.g. for any significant incident of pollution of the soil and air).
- Department of Agriculture, Forestry and Fisheries (e.g. uses of appropriate herbicides for eradication of alien invasive species, and permits for trees of special concern).
- Department of Health (e.g. for incidents such as contamination of water resources, accidental spill of hazardous substances).
- Department of Transport (e.g. for the diversion of traffic due to construction activities).
- Department of Labour (e.g. for labour disputes).

2.1.5 Photographic Record

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

- A pre-construction site record
- Monthly environmental audit reports;
- Weekly environmental monitoring reports;
- Corrective action;
- Progress of environmental works; and
- Incidences of non-conformance.

2.1.6 Waste Manifests

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

2.1.7 Good Housekeeping

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

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

2.1.8 Management and Control

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

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

2.1.9 Recording And Reporting

The Contractor shall maintain detailed records of parameters monitored. These detailed records shall demonstrate the effectiveness of the management actions implemented to mitigate potential impacts. The Contractor shall submit a monthly database/report of management works implemented to the Project Company, as part of the Contractors monthly report.

2.1.10 Monitoring

The Contractor shall submit an Environmental Monitoring Method Statement which details the scope, nature, process, schedule and templates for environmental monitoring. The monitoring results shall be used to determine the effectiveness of the management programme. All complaints, compliments or

other comments relating to environmental management parameters are to be recorded in the site issues register of the Contractor for inclusion in the project issues register held by the Project Company.

Monitoring results and the associated required management and mitigation actions for the coming monitoring period are to be presented in the monitoring section of the Contractors monthly report. The daily and weekly reports are to detail observations and information relating to requested management actions and their effectiveness.

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

- Re-growth of alien invasive vegetation;
- Validity of the pest control officer certificate;
- Fire break requirements associated to construction related activities;
- Stormwater systems;
- Topsoil and backfill volumes;
- Access road condition;
- Dust generated from stockpiles;
- Noise;
- Water quality;
- Erosion prevention; and
- Landscaping requirements for rehabilitation.

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

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

All complaints, compliments or other comments relating to construction related works are to be recorded by the Contractor in the communications register of the receiving party for inclusion in the project issues register. Site clearance monitoring results and the associated required management and mitigation actions for the coming monitoring period are to be presented in the monitoring section of the Contractors monthly report. The weekly report is to detail observations and information relating to requested management actions and their effectiveness.

2.2 Compliance with the EMPr

The Contractor/s is/are deemed not to have complied with the EMPr if:

- Within the boundaries of the site, site extensions and access roads there is evidence of contravention of clauses;
- If environmental damage ensues due to negligence;
- The contractor fails to comply with corrective or other instructions issued by the ECO or Authorities within a specified time; and
- The Contractor fails to respond adequately to complaints from the public.

The Project Company is deemed not to have complied with the EMPr if:

- Within the boundaries of the site there is evidence of contravention of clauses;
- If environmental damage ensues due to negligence; and
- They fail to respond adequately to complaints from the public.

2.2.1 Non-Conformance Report

A Non-Conformance Report (NCR) will be issued to the Contractor as a final step towards rectifying a failure in complying with a requirement of the EMPr. This will be issued to the Contractor in writing. Preceding the issuing of the NCR, the Contractor will be presented with an opportunity to rectify the outstanding issue in a timely manner.

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

Should the ECO assess an incident / issue and find it to be significant (e.g. non-repairable damage upon the environment), it will be reported to the DEA and immediately escalated to the level of an NCR. This will be done in consultation with the Project Company. The following information should be recorded in the NCR:

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

2.2.2 Environmental Emergency Response

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

- Accidental discharges to water (i.e. into a water resource) and land;
- Accidental spillage of hazardous substances (typically oil, petrol, and diesel);
- Accidental toxic emissions into the air;
- Specific environmental and ecosystem effects from accidental releases or incidents;
- The Environmental Emergency Response Plan is separate to the Health and Safety Plan as it is aimed at responding to environmental incidents and must ensure and include the following:
  - Construction employees shall be adequately trained in terms of incidents and emergency situations;
  - Details of the organisation (manpower) and responsibilities, accountability and liability of personnel;
  - A list of key personnel and contact numbers;
  - Details of emergency services (e.g. the fire department, spill cleanup services) shall be listed;
  - Internal and external communication plans, including prescribed reporting procedures;
  - Actions to be taken in the event of different types of emergencies;
  - Incident recording, progress reporting and remediation measures to be implemented; and
  - Information on hazardous materials, including the potential impact associated with each, and measures to be taken in the event of accidental release.

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

2.2.3 Penalties for non-compliance

Application of a penalty clause to the contractor will apply for incidents of non-compliance. The penalty imposed will be per incident and will be deducted from the contractor's monthly payment certificate. Unless stated otherwise in the project specification, the penalties imposed per incident or violation will be pre-determined and agreed upon between the Contractor and the ECO. These will vary in amount based upon the severity and/or regularity of the incidence occurring.

The ECO in consultation and with the approval of the Senior Site Supervisor shall issue spot fines if the Contractor infringes specifications of the EMPr and EA. The Contractor shall be advised in writing of the nature of the infringement and the amount of the spot fine. The Contractor shall be liable for the fine and it is his responsibility to recover the fine from the relevant employee. The Contractor (through the Environmental Officer) shall also take the necessary steps (e.g. training) to prevent a recurrence of the infringement. The Contractor is also advised that the imposition of spot fines does not replace any legal

proceedings from the authorities, landowners and/or members of the public that may institute against the Contractor. Spot fines for minor offences shall be agreed upon with the Project Company, depending upon the severity of the infringement. Any rectification costs incurred will be passed to the infringing party(ies). The decision on how much to impose will be made by the ECO and will be final. In addition to the spot fine, the Contractor shall be required to make good any damage caused as a result of the infringement at his own expense. A preliminary list of infringements for which spot fines will be imposed is as follows:

- Using areas outside the working areas without permission/accessing “no-go areas”;
- Clearing and/or levelling area outside of the working areas;
- Littering of the site and surrounds;
- Burying waste on site and surrounds;
- The undertaking of informal ablutions
- Making fires on site;
- Spillage onto the ground or water bodies of oil, diesel, or any other potential pollutants;
- Picking/damaging plant material, especially that from the residual areas of natural bush on the site;
- Exceeding the speed limit of 30km/h;
- Driving and/or parking on any rehabilitated areas;
- Damaging/killing wild or domestic animals/birds;
- Discharging effluent and/or stormwater onto the ground or into surface water; and
- Repeated contravention of the specification or failure to comply with instruction.

In this context the ECO shall retain records of all fines issued. Monies for the spot fines will be deducted from the Contractors monthly certificate. It is recommended that these monies be collected and donated to a suitable charity or cause.

The Senior Site Supervisor, on recommendation from the ECO, may also order the Contractor to suspend part or all the works if the Contractor repeatedly causes damage to the environment by not adhering to the EMPr (i.e. more than 3 cases of infringements). The suspension will be enforced until such time as the offending actions, procedure or equipment is corrected. No extension of time will be granted for such delays and all costs will be borne by the Contractor.

2.2.4 Training and awareness

The Main Contractor is to take responsibility for the management of their staff and subcontractors on the project site during the construction phase and supervise them closely at all times. The onus is on the Contractor to make sure that all their staff and subcontractors fully comprehend the contents of the EMPr. The Contractor shall organise environmental awareness training programmes, which should, be targeted at the two levels of employment: management and labour.

2.2.4.1 Training of construction workers

The construction workers must receive basic training in environmental awareness, including the storage and handling of hazardous substances, minimisation of disturbance to sensitive areas, management of waste, and prevention of water pollution. They must be informed of how to recognise historical / archaeological artefacts that may be uncovered. They must also be appraised of the EMPr's requirements. Environmental awareness training programmes need to be formulated for these levels and must comprise:

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

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

- Acceptable behaviour with regard to flora and fauna;
- Management and minimising of waste, including waste separation;
- Maintenance of equipment to prevent the accidental discharge or spill of fuel, oil, lubricants, cement, mortar and other chemicals;
- Responsible handling of chemicals and spills;
- Environmental emergency procedures and incident reporting; and
- General code of conduct towards I&APs.

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

2.2.4.2 Contractor performance

The Main Contractor must ensure that the conditions of the EMPr are adhered to. Should the Main Contractor require clarity on any aspect of the EMPr, the Main Contractor must contact the Environmental Control Officer for advice.

3 MITIGATION GUIDELINES

3.1 Introduction

Mitigation guidelines are addressed through four phases namely Pre-construction (Site Establishment) Phase; Construction Phase (and associated rehabilitation of affected environment); Operational Phase (Post-Construction) as well as Decommissioning Phase. Each phase has specific issues unique to that period of the development and operation of the wind farm and the associated infrastructure. The impact is identified and given a brief description. The four phases of the development are then identified as below:

3.2 Pre-construction (Site Establishment)

Requirements for the pre-construction phase

- Proper and continuous liaison between the ECO, the Contractor and Landowners to ensure all parties are appropriately informed at all times.
- The Contractor must adhere to all conditions of the contract including the Environmental Management Programme (EMPr).
- Adequate planning of the construction programme to allow for disruptions due to rain and very wet conditions.
- Where existing private roads are in a bad state of repair, such roads' condition shall be documented before they are used for construction purposes. This will allow for easy assessment of any damage to the roads which may result from the construction process. If necessary, some repairs should be done to prevent damage to equipment. All roads no matter what the condition need to be documented prior to construction.
- Proper documentation and record keeping of all complaints and actions taken.
- Appointment of an Environmental Control Officer to implement this EMPr.
- Regular site inspections by the ECO and good control over the construction process throughout the construction period.
- Independent Environmental Audits to be carried out during and upon completion of construction.
- A formal communications protocol should be set up during the construction phase. The aim of the protocol should be to ensure that effective communication on key issues that may arise during this phase be maintained between key parties such as the ECO, project manager and contractor. The protocol should also ensure that concerns / issues raised by I&APs are formally recorded and considered and where necessary acted upon. If necessary, a forum for communicating with key stakeholders on a regular basis may need to be set up. This could be done through an Environmental Monitoring Committee that would meet on a regular basis. The communications protocol should be maintained throughout the construction phase.

3.3 Pre-Construction Phase

3.3.1 Site preparation

Table 8: Site preparation

IMPACT	SITE PREPARATION This section deals with the preparation of the site and actions that need to be implemented before construction commences	RESPONSIBILITY
PHASE	**SITE ESTABLISHMENT**	**MC, ELO, ECO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**Specialist Investigations** 1. Pre-construction walk down must be undertaken by the flora specialist in order to locate species of conservation concern that can be translocated as well as comply with the Northern Cape Nature Conservation Act permit conditions. 2. A pre-construction walk down study should be undertaken by the surface water specialist once final tower positions have been established. 3. A walk down of the final approved layout by the Heritage specialist will be required before construction commences. 4. Any heritage features of significance identified during this walk down will require formal mitigation or where possible a slight change in design could accommodate such resources. 5. An avifaunal walk-through must be undertaken by the avifaunal specialist prior to the construction commencing, to confirm the location and status of all priority species nests within the area of influence of the wind farm. 6. Turbine layouts must adhere to the sensitivity areas and buffers, and the layout should be approved by a bat specialist upon finalisation of turbine specifications.	

	Appoint construction team and suitable manager 7. Appoint an Environmental Control Officer and Environmental Liaison Officer. The ELO is from the contractor's side while the ECO is from the client's side. **Site demarcation and compliance** 8. Before construction begins, all areas to be developed must be clearly demarcated with fencing or orange construction barrier where applicable. 9. All Construction Camps are to be fenced off in such a manner that unlawful entry is prevented and access is controlled. Signage shall be erected at all access points in compliance with all applicable occupational health and safety requirements. All access points to the Construction Camp should be controlled by a guard or otherwise monitored, to prevent unlawful access. 10. The contractor and ECO must ensure compliance with conditions described in the EA. 11. Records of compliance/ non-compliance with the conditions of the authorisation must be kept and be available on request. 12. Records of all environmental incidents must be maintained and a copy of these records be made available to provincial department on request throughout the project execution. 13. Any further extension of the proposed project should be reviewed in terms of the Subdivision of Agricultural Land Act 70 (Act 70 of 1970) 14. No subdivision for the purposes of demarcating the individual footprint area should be allowed. **Construction Camp** 15. Site establishment shall take place in an orderly manner and all required amenities shall be installed at camp sites before the main workforce move onto site. 16. All construction equipment must be stored within this construction camp.	

	17. All associated oil changes etc. (no servicing) must take place within this camp over a sealed surface such as a concrete slab. 18. An area for the storage of hazardous materials must be established that conforms to the relevant safety requirements and that provides for spillage prevention and containment 19. All Construction Camps shall be provided with portable fire extinguishing equipment, in accordance with all relevant legislation and must be readily accessible. 20. The Contractor must provide sufficient ablution facilities, in the form of portable / VIP toilets, at the Construction Camps, and shall conform to all relevant health and safety standards and codes. No pit latrines, French drain systems or soak away systems shall be allowed and toilets may not be situated within 100 meters of any surface water body or 1:100 year flood line. A sufficient number of toilets shall be provided to accommodate the number of personnel working in the area. 21. The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed. 22. No fires will be allowed and the Contractor must make alternative arrangements for heating. LP Gas may be used, provided that all required safety measures are in place. The Contractor shall take specific measures to prevent the spread of veld fires, caused by activities at the campsites. These measures may include appropriate instruction of employees about fire risks and the construction of firebreaks around the site perimeter. **Labour** 23. All unskilled labourers for pre-site construction should be drawn from the local market and where possible use should be made of local semiskilled and skilled personnel. **Training of site staff**	

	24. Environmental awareness training for construction staff, concerning the prevention of accidental spillage of hazardous chemicals and oil; pollution of water resources (both surface and groundwater), air pollution and litter control and identification of archaeological artefacts. 25. Project manager shall ensure that the training and capabilities of the Contractor's site staff are adequate to carry out the designated tasks. 26. Staff operating equipment (such as loaders, etc.) shall be adequately trained and sensitised to any potential hazards associated with their tasks. 27. No operator shall be permitted to operate critical items of mechanical equipment without having been trained by the Contractor and certified competent by the Project Manager. 28. Staff should be educated as to the need to refrain from indiscriminate waste disposal and/or pollution of local soil and water resources and receive the necessary safety training. 29. Staff must be trained in the hazards and required precautionary measures for dealing with these substances 30. Spillage packs must be available at construction areas.	
SPECIFIC MITIGATION MEASURES		
	31. <u>No turbines should be present within a 5km zone around the Martial Eagle Nests on the Aries – Helios 400kV transmission line (as shown on the revised sensitivity map).</u> **32.** <u>Turbines numbers should be restricted in the high sensitivity zone (between 5km and 6km from the Martial Eagle nests).</u> **33.** <u>The sensitivity areas identified by the Bat Specialist must be upgraded to high sensitivity with a minimum buffer zone of 200 m. High sensitivity entails the full exclusion of turbines from sensitivity areas as well as their buffer zones. Turbine blade tips must also be excluded from entering the buffer areas.</u> **34.** <u>Turbine layouts must adhere to the sensitivity areas and buffers, and the layout should be approved by a bat specialist upon finalisation of turbine specifications.</u>	

3.3.2 Consultation

Table 9: Consultation

IMPACT	CONSULTATION This section deals with the public consultation of the site and actions that need to be implemented before construction commences	RESPONSIBILITY
PHASE	**PRE-CONSTRUCTION**	**MC**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**Consultation** 1. Provide a mechanism through which information could be exchanged between the project proponent and stakeholders. 2. Identify relevant stakeholders and engage them at applicable stages of the EIA process. 3. Inform the public about the proposed construction process. 4. Surrounding communities must be kept informed, through the identified and agreed consultation channels, of the commencement of construction. 5. Solicit views and concerns from the public and allow them to suggest mitigations and enhancement measures 6. Determine stakeholder satisfaction levels.	

3.3.3 Site Clearing

Table 10: Site Clearing

IMPACT	SITE CLEARING This section deals with site clearing and actions that need to be implemented before construction commences	RESPONSIBILITY

PHASE	PRE-CONSTRUCTION	MC
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**Site clearing** 1. Site clearing must take place in a phased manner, as and when required. 2. Areas which are not to be constructed on within two months must not be cleared to reduce erosion risks. 3. The area to be cleared must be clearly demarcated and this footprint strictly maintained. 4. Spoil that is removed from the site must be removed to an approved spoil site or a licensed landfill site. 5. The necessary silt fences and erosion control measures must be implemented in areas where these risks are more prevalent.	

3.3.4 Social and Environmental Management Systems

Table 11: Social and Environmental Management Systems

IMPACT	**SOCIAL AND ENVIRONMENTAL MANAGEMENT SYSTEMS** **This section deals with the Social and Environmental Management Systems and actions that need to be implemented before construction commences**	**RESPONSIBILITY**
PHASE	**SITE ESTABLISHMENT**	**MC**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**Social** 1. Performance Standard One underscores the importance of managing social and environmental performance throughout the life of a project. 2. An effective social and environmental management system is a dynamic, continuous process initiated by management and involving communication between the client, its workers and the local communities directly affected by the project. 3. The client will establish and maintain a Social and Environmental Management System, appropriate to the nature and scale of the project and commensurate to the level of social and environmental risks and impacts. The management system will incorporate the following elements: o Social and Environmental Assessment o Management program o Organizational capacity o Training o Community Engagement o Monitoring and Reporting	
	SITE SPECIFIC MITIGATION MEASURES	

	4. Equal job opportunities should be given to all local residents. If possible, a local Mainstream Office should be established in Loeriesfontein prior to construction and all job applications should be done through this office.	

3.4 Construction Phase

3.4.1 Construction Camp

Table 12: Construction Camp

IMPACT	CONSTRUCTION CAMP This section deals with construction camp (equipment and batching camp) and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	**CONSTRUCTION**	**MC / ELO / ECO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**Site of construction camp** 1. The size of the construction camp must be minimized. 2. Adequate parking must be provided for site staff and visitors. The Contractor must attend to drainage of the camp site to avoid standing water and / or sheet erosion. 3. Suitable control measures over the Contractor's yard, plant and material storage to mitigate any visual impact of the construction activity must be implemented. 4. No construction should occur in an area of high or unique agricultural value, or in an area under cultivation. **Storage of materials (including hazardous materials)** 5. Choice of location for storage areas must take into account prevailing winds, distances to water bodies, general onsite topography and water erosion potential of the soil. Impervious surfaces must be provided where necessary. 6. Storage areas must be designated, demarcated and fenced if necessary.	

	7. Storage areas should be secure so as to minimize the risk of crime. They should also be safe from access by unauthorised persons i.e. children / animals etc. 8. Fire prevention facilities must be present at all storage facilities. 9. Proper storage facilities for the storage of oils, paints, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the temporary storage area(s). These pollution prevention measures for storage must include a bund wall high enough to contain at least 110% of any stored volume, and this must be sited away from drainage lines in a site with the approval of the Project Manager. The bund wall must be high enough to contain 110% of the total volume of the stored hazardous material with an additional allocation for potential stormwater events. 10. All fuel storage areas must be roofed to avoid creation of dirty stormwater 11. These storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of storm water from surrounding areas and that will not infiltrate into the ground in order to ensure that accidental spillage does not pollute local soil or water resources. 12. Material Safety Data Sheets (MSDSs) shall be readily available on site for all chemicals to be used on site. Where possible the available, MSDS's must additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or escapes. 13. Storage areas containing chemical substances / materials must be clearly sign posted. 14. Staff dealing with these materials / substances must be aware of their potential impacts and follow the appropriate safety measures.	

	15. An approved waste disposal contractor must be employed to remove and recycle waste oil, if practical. The contractor must ensure that its staff is made aware of the health risks associated with any hazardous substances used and has been provided with the appropriate protective clothing/equipment in case of spillages or accidents and have received the necessary training. 16. All excess cement and concrete mixes are to be contained on the construction site prior to disposal off site. 17. All major spills as specified in the contractor emergency response procedure of any materials, chemicals, fuels or other potentially hazardous or pollutant substances must be cleaned immediately and the cause of the spill investigated. Preventative measures must be identified and submitted to the MC and ECO for information. Emergency response procedures to be followed and implemented. **Drainage of construction camp** 18. Surface drainage measures must be established in the Construction Camps so as to prevent ▪ Ponding of water; ▪ Erosion as a result of accelerated runoff; and, ▪ Uncontrolled discharge of polluted runoff.	

3.4.2 Construction traffic and access

Table 13: Construction Traffic and Access

IMPACT	CONSTRUCTION TRAFFIC AND ACCESS This section deals with construction traffic and access and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	**CONSTRUCTION**	**MC / ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**Construction traffic** 1. Construction routes and required access roads must be clearly defined. 2. Recommendations of the stormwater management plan must be implemented. 3. Delivery of equipment must be undertaken with the minimum amount of trips to reduce the carbon footprint of these activities 4. Access of all construction and material delivery vehicles should be strictly controlled, especially during wet weather to avoid compaction and damage to the topsoil structure. 5. Damping down of the un-surfaced roads must be implemented to reduce dust and nuisance. 6. Vehicles and equipment shall be serviced regularly to avoid the contamination of soil from oil and hydraulic fluid leaks etc. 7. Servicing must be done in dedicated service areas on site or else off site if no such area exists. 8. Oil changes must take place on a concrete platform and over a drip tray to avoid pollution. 9. Soils compacted by construction shall be deep ripped to loosen compacted layers and re-graded to even running levels. **Access** 10. The main routes on the site must be clearly sign posted and printed delivery maps must be issued to all suppliers and Sub-contractors.	

	11. Planning of access routes to the site for construction purposes shall be done in conjunction with the Contractor and the Landowner. All agreements reached should be documented and no verbal agreements should be made. The Contractor shall clearly mark all access roads. Roads not to be used shall be marked with a “NO ENTRY for construction vehicles" sign. 12. Access to the site must be via secondary roads as requested by SANRAL. **Road maintenance** 13. Where necessary suitable measures shall be taken to rehabilitate damaged areas. 14. Contractors should ensure that access roads are maintained in good condition by attending to potholes, corrugations and stormwater damages as soon as these develop. 15. If necessary, staff must be employed to clean surfaced roads adjacent to construction sites where materials have spilt. 16. Recommendations of the surface water report must be taken into consideration. **General** 17. The contractor shall meet safety requirements under all circumstances. All equipment transported shall be clearly labelled as to their potential hazards according to specifications. All the required safety labelling on the containers and trucks used shall be in place. 18. The Contractor shall ensure that all the necessary precautions against damage to the environment and injury to persons are taken. 19. Care for the safety and security of community members crossing access roads should receive priority at all times.	

3.4.3 Environmental Education and Training

Table 14: Environmental Education and Training

IMPACT	**ENVIRONMENTAL EDUCATION AND TRAINING** **This section deals with the environmental training of construction employees who will work at the proposed power plants**	**RESPONSIBILITY**
PHASE	**CONSTRUCTION**	**MAINSTREAM**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**Environmental training** 1. The project manager must appoint an ECO prior to construction. 2. Ensure that all site personnel have a basic level of environmental awareness training. The Contractor must submit a proposal for this training to the ECO for approval. Topics covered should include: ▪ What is meant by "Environment" ▪ Why the environment needs to be protected and conserved ▪ How construction activities can impact on the environment ▪ What can be done to mitigate against such impacts ▪ Awareness of emergency and spills response provisions ▪ Social responsibility during construction e.g. being considerate to local residents 3. Training should be undertaken by a party such as the ECO who has sufficient expertise and knowledge of environmental issues. 4. It is the Contractor's responsibility to provide the site foreman with no less than 1 hour's environmental training and to ensure that the foreman has sufficient understanding to pass this information onto the construction staff. 5. Training should be provided to the staff members in the use of the appropriate fire-fighting equipment. Translators are to be used where necessary. 6. Use should be made of environmental awareness posters on site.	

	7. The need for a “clean site” policy also needs to be explained to the workers. 8. Staff operating equipment (such as loaders, etc.) shall be adequately trained and sensitized to any potential hazards associated with their tasks. **Monitoring of environmental training** 9. The Contractor must monitor the performance of construction workers to ensure that the points relayed during their introduction have been properly understood and are being followed. If necessary, the ECO and / or a translator should be called to the site to further explain aspects of environmental or social behaviour that are unclear. Toolbox talks are recommended.	

3.4.4 Soils and Geology

General guidelines for management of soils are provided in annexure B

Table 15: Soils and Geology

IMPACT	**SOILS AND GEOLOGY** **This section deals with soils and geology and actions that need to be implemented during construction**	**RESPONSIBILITY**
PHASE	**CONSTRUCTION**	**MC/ ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**Topsoil** 1. The contractor should, prior to the commencement of earthworks determine the average depth of topsoil (if any), and agree on this with the ECO. The full depth of topsoil should be stripped from areas affected by construction and related activities prior to the commencement of foundations. This should include the building footprints,	

	working areas and storage areas. Topsoil must be reused at the where possible to rehabilitate disturbed surface areas. 2. Care must be taken not to mix topsoil and subsoil during stripping. 3. Should any topsoil become polluted the contractor must remove the polluted soil to the full depth of pollution and replace it at his own expense with clean topsoil. 4. Removed polluted topsoil should be transported to a licensed landfill site. 5. The topsoil must be conserved on site in and round the pit area **Soil Stripping** 6. No soil stripping must take place on areas within the site that the contractor does not require for construction works or areas of retained vegetation. 7. Subsoil and overburden in all construction and lay down areas should be stockpiled separately to be returned for backfilling in the correct soil horizon order. 8. Construction vehicles must only be allowed to utilize existing tracks or pre-planned access routes. **Soil Stockpiles** 9. Stockpiles should not be situated such that they obstruct natural water pathways. 10. Stockpiles should not exceed 2m in height unless otherwise permitted by the Engineer. 11. If stockpiles are exposed to windy conditions or heavy rain, they should be covered either by vegetation or geofabric, depending on the duration of the project. Stockpiles may further be protected by the construction of berms or low brick walls around their bases. 12. Stockpiles should be kept clear of weeds and alien vegetation growth by regular weeding. 13. Where contamination of soil is expected, analysis must be done prior to disposal of soil to determine the appropriate disposal route. Proof from an approved waste disposal	

	site where contaminated soils are dumped if and when a spillage / leakage occurs should be attained and given to the project manager. **Fuel storage** 14. Topsoil and subsoil to be protected from contamination. This should be monitored on a monthly basis by a visual inspection of diesel/oil spillage and pollution prevention facilities. 15. Fuel and material storage must be away from stockpiles. 16. Concrete and chemicals must be mixed on an impervious surface and provisions should be made to contain spillages or overflows into the soil. 17. Any storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material. **Concrete mixing** 18. Should a concrete batching plant be required, it must be contained within a bunded area. 19. Concrete mixing must only take place within designated areas. 20. Ready mixed concrete must be utilised where possible. 21. No vehicles transporting concrete to the site may be washed on site. 22. If a batching plant is necessary, run-off should be managed effectively to avoid contamination of other areas of the site. Run-off from the batch plant must not be allowed to enter the storm water system. Earthworks 23. Soils compacted during construction should be deeply ripped to loosen compacted layers and re-graded to even running levels. Topsoil should be re-spread over	*Main contractor / ECO*

	landscaped areas. According to specifications by a landscape architect, the area should be re-vegetated upon completion of construction activities.	
	SITE SPECIFIC MITIGATION MEASURES	
	24. Dispose of any sub-surface spoils from excavations where they will not impact on agricultural land (for example use as road surfacing), or where they can be effectively covered with topsoil.	

3.4.5 Erosion Control

Table 16: Erosion Control

IMPACT	**EROSION CONTROL** **This section deals with erosion and actions that need to be implemented during construction**	**RESPONSIBILITY**
PHASE	**CONSTRUCTION**	**ECO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	1. Wind screening and stormwater control should be undertaken to prevent soil loss from the site. 2. The use of silt fences and sand bags must be implemented in areas that are susceptible to erosion. 3. Other erosion control measures that can be implemented are as follows: ▪ Brush packing with cleared vegetation ▪ Mulch or chip packing ▪ Planting of vegetation ▪ Hydroseeding / hand sowing 4. Sensitive areas need to be identified prior to construction so that the necessary precautions can be implemented.	

	5. All erosion control mechanisms need to be regularly maintained. 6. Seeding of topsoil and subsoil stockpiles to prevent wind and water erosion of soil surfaces. 7. Retention of vegetation where possible to avoid soil erosion 8. Vegetation clearance should be phased to ensure that the minimum area of soil is exposed to potential erosion at any one time. 9. Re-vegetation of disturbed surfaces should occur immediately after construction activities are completed. This should be done through seeding with indigenous grasses. 10. No impediment to the natural water flow other than approved erosion control works is permitted. 11. To prevent stormwater damage, the increase in stormwater run-off resulting from construction activities must be estimated and the drainage system assessed accordingly. 12. Stockpiles not used in three (3) months after stripping must be seeded to prevent dust and erosion.	
SITE SPECIFIC MITIGATION MEASURES		
	13. Dust suppression and erosion management should be an integrated component of the construction approach. 14. Disturbance near to drainage lines should be avoided and sensitive drainage areas near to the construction activities should demarcated as no-go areas. 15. Erosion problems should be rectified on a regular basis following rainfall events during construction. 16. Sediment traps may be necessary to prevent erosion and soil movement if there are topsoil or other waste heaps present during the wet season. 17. Wind erosion is likely to be more prevalent than water erosion and steps to limit wind erosion of soil stockpiles may be necessary, including the use of soil protectors. 18. Authorised vegetation clearing in the RoW of surface water resources where required must take place in a phased manner, only clearing areas that will be constructed on	

	immediately. Vegetation clearing must not take place in areas where construction will only take place in the distant future. Vegetation must not be completely removed and must be undertaken according to standard Eskom vegetation clearance standards and policies. Vegetation clearance must be limited to the RoW. 19. An appropriate storm water management plan formulated by a suitably qualified professional must accompany the proposed development to deal with increased run-off and potential sedimentation impacts for the construction phase of the proposed development. Adequate structures must be put in place (temporary or permanent where necessary) to handle run-off and sediment volumes. These typically can include the use of silt netting and hessian sand bags. All impacted areas must be adequately sloped to prevent onset of erosion.	

3.4.6 Water Use and Quality

Table 17: Water Use and Quality

IMPACT	**WATER USE AND QUALITY** **This section deals with water use and quality as well as actions that need to be implemented during construction**	**RESPONSIBILITY**
PHASE	**CONSTRUCTION**	**ECO**
MITIGATION / METHOD STATEMENT	**Water Use** 1. Develop a sustainable water supply management plan to minimize the impact to natural systems by managing water use, avoiding depletion of aquifers and minimizing impacts to water users. 2. Water must be reused, recycled or treated where possible. 3. Consultation with key stakeholders to understand any conflicting water use demands and the community's dependency on water resources and conservation requirements within the area.	Engineer

		ECO
	Water Quality 4. The quality and quantity of effluent streams discharged to the environment including stormwater should be managed and treated to meet applicable effluent discharge guidelines.	
	5. Efficient oil and grease traps or sumps should be installed and maintained at refuelling facilities, workshops, fuel storage depots, and containment areas and spill kits should be available with emergency response plans.	ECO
	Stormwater 6. The site must be managed in order to prevent pollution of drains, downstream watercourses or groundwater, due to suspended solids and silt or chemical pollutants.	Contractor
	7. Silt fences should be used to prevent any soil entering the stormwater drains. 8. Temporary cut off drains and berms may be required to capture stormwater and promote infiltration. 9. Promote a water saving mind set with construction workers in order to ensure less water wastage. 10. New stormwater construction must be developed strictly according to specifications from engineers in order to ensure efficiency. 11. Hazardous substances (fuel) must be stored at least 100m from any water bodies on site to avoid pollution. 12. The installation of the stormwater system must take place as soon as possible to attenuate stormwater from the construction phase as well as the operation phase. 13. Earth, stone and rubble is to be properly disposed of, or utilized on site so as not to obstruct natural water path ways over the site. I.e. these materials must not be placed in stormwater channels, drainage lines or rivers. 14. There should be a periodic checking of the site's drainage system to ensure that the water flow is unobstructed.	

	15. If a batching plant is necessary, run-off should be managed effectively to avoid contamination of other areas of the site. Untreated runoff from the batch plant must not be allowed to get into the storm water system or nearby streams, rivers or erosion channels or dongas. ***Sanitation*** 16. Adequate sanitary facilities and ablutions must be provided for construction workers (1 toilet per every 15 workers). 17. The facilities must be regularly serviced to reduce the risk of surface or groundwater pollution. ***Concrete mixing*** 18. Concrete contaminated water must not enter soil or any natural drainage system as this disturbs the natural acidity of the soil and affects plant growth. ***Public areas*** 19. Food preparation areas should be provided with adequate washing facilities and food refuse should be stored in sealed refuse bins which should be removed from site on a regular basis. 20. The contractor should take steps to ensure that littering by construction workers does not occur and persons should be employed on site to collect litter from the site and immediate surroundings, including litter accumulating at fence lines. 21. No washing or servicing of vehicles on site.	
	SITE SPECIFIC MITIGATION MEASURES	
	22. All vehicles must be serviced and in a good working order before being allowed on the construction site. Additionally, all vehicles and machinery must be checked for oil/fuel	

	leakages before being allowed on the construction site. No vehicles or machinery are to be allowed on the construction site if there are leaks detected. 23. Oil and fuel spill kits must be available in the event of a spill of leak being detected. If detected, spills or leakages must be cleaned immediately. 24. No fuelling or servicing is to take place unless it is in a designated area within the construction camp and facilities are available to undertake these tasks. The fuelling or servicing area must not be within 100m of a surface water resource. Lastly, the fuelling or servicing area must have adequate storm water run-off measures to ensure that no pollution substance enters any surface water resources and is contained in the designated fuelling or servicing area.	

3.4.7 Surface and Groundwater

Table 18: Surface and Groundwater

IMPACT	**SURFACE WATER AND GROUNDWATER** **This section deals with surface and groundwater and actions that need to be implemented during construction**	**RESPONSIBILITY**
PHASE	**CONSTRUCTION**	**ECO / Main Contractor**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**Sanitation** 1. Adequate sanitary facilities and ablutions must be provided for construction workers (1 toilet per every 15 workers). 2. The facilities must be regularly serviced to reduce the risk of surface or groundwater pollution. **Hazardous materials**	

	3. Use and or storage of materials, fuel and chemicals which could potentially leak into the ground must be controlled. 4. All storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material. 5. Any hazardous substances must be stored at least 20m from any of the water bodies on site. 6. The Contractor (monitored by the ECO or ELO) should be responsible for ensuring that potentially harmful materials are properly stored in a dry, secure, ventilated environment, with concrete or sealed flooring and a means of preventing unauthorised entry. 7. Contaminated wastewater must be managed by the Contractor to ensure existing water resources on the site are not contaminated. All wastewater from general activities in the camp shall be collected and removed from the site for appropriate disposal at a licensed commercial facility. **Concrete mixing** 8. Concrete contaminated water must not enter soil or any natural drainage system as this disturbs the natural acidity of the soil and affects plant growth **Public areas** 9. Food preparation areas should be provided with adequate washing facilities and food refuse should be stored in sealed refuse bins which should be removed from site on a regular basis. 10. The contractor should take steps to ensure that littering by construction workers does not occur and persons should be employed on site to collect litter from the site and immediate surroundings, including litter accumulating at fence lines. 11. No washing or servicing of vehicles on site.	

	Water resources 12. Site staff shall not be permitted to use any other open water body or natural water source adjacent to or within the designated site for the purposes of bathing, washing of clothing or for any construction or related activities. 13. Municipal water (or another source approved by the ECO) should instead be used for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting, etc. 14. Relevant departments and other emergency services should be contacted in order to deal with spillages and contamination of aquatic environments.	
SITE SPECIFIC MITIGATION MEASURES		
	15. Placement of the construction lay-down area must not be directly in or within 100m from any delineated surface water resource. 16. Wind farm road plan to avoid all surface water resources as far as possible. 17. Where access is required through surface water resources during the construction phase, a right of way (RoW) is to be established. This must be limited to no more than a 3m width and must route as direct as possible to limit compaction impacts as far as possible. No access beyond the RoW is allowed in surface water resources. Additionally, access should only be granted to normal and not heavy vehicles where possible to limit compaction impacts. 18. A surface water rehabilitation plan will be required to address site specific construction impacts as this information is not currently available. The surface water rehabilitation plan must be compiled in the final surface walk-down report once all wind farm components (including internal roads, cable routes and hardstand areas) have been finalised. 19. The following mitigation measure applies to turbines located within proximity to the surface water features and their buffers:	

	▪ The area of construction for each turbine location must only be cleared when construction of the turbine takes place. Areas should not be cleared for all turbines at the same time unnecessarily unless construction is taking place at each location. This is to limit the amount of time of exposure for each construction location to the bare minimum and reduce the vulnerability potential for wind/water erosion and potential sedimentation (should heavy and sudden rainfall take place) impacts. ▪ Provision needs to be made for construction phase storm water mitigation measures should sudden and heavy rainfall take place. Provision for silt nets or hessian sandbags to obstruct and limit increased storm water run-off to terrestrial and surface water resources downstream needs to be made by contractors and implemented in the event of this taking place. 20. Potential negative impacts can be avoided by locating any structures that need to be developed, away from any surface water resources. Where any structures need to be placed in or near surface water resources, the prevention of such inappropriate activities can be achieved by limiting access to the surface water resources to remain with identified and authorized construction areas, and restricting construction activities to the proposed development areas only. 21. Temporary fencing can be used to restrict activities to authorised areas. If utilised or deemed to be necessary, temporary fencing should allow for enough spacing for small mammals to pass through. 22. If construction activities take place within the proximity of a surface water resource, the respective surface water resource is to be demarcated and no access will be allowed in this restricted sensitive area. 23. Where the proposed power line will need to cross surface water resources and spanning will be required, a single access route or “Right of Way” (RoW) is to be established through the surface water resource should this absolutely be required and the relevant environmental authorisation and water use licenses have been	

	obtained. The width of the RoW must be limited to the width of the vehicles required to enter a surface water resource (no more than a 3m width). 24. Construction workers are only allowed in the RoW of the proposed power lines, and not into the surrounding surface water resource system. The RoW in through surface water resources are to be clearly demarcated and no access beyond these areas is to be allowed. 25. The number and type of permissible vehicles or machinery into or near to surface water resources must be limited to the bare minimum. Preferably light vehicles are to be utilised where possible. 26. All vehicles and machinery are to be checked for oil, fuel or any other fluid leaks before entering the RoW. All vehicles and machinery must be regularly serviced and maintained before being allowed to enter the construction RoW. No fuelling or re-fuelling of vehicles and machinery servicing or maintenance is to take place in the RoW. The construction site is to contain sufficient safety measures throughout the construction process. These include, but are not limited to, oil spill kits and fire extinguishers. 27. No hazardous materials are to be stored or brought into surface water resources. Should a designated storage area be required, the storage area must be placed at least 50m from surface water resources. 28. Temporary chemical sanitation facilities must be placed no closer than 50m from any delineated surface water resource. Temporary chemical sanitation facilities must be placed over a bunded or an impermeable surface area and adequately maintained to prevent leakage or spillage of sanitary chemicals. 29. Rehabilitation in the RoW areas through surface water resources will need to take place in the impacted areas following construction. The rehabilitation of the RoW areas in must be covered in the surface water rehabilitation plan to be compiled as part of the final walk-down study undertaken once final tower positions have	

	been established and once the affected surface water resources have been identified. 30. For the stringing process specifically, stringing of the power lines must be undertaken by hand where possible and the number of workers allowed to cross through surface water resources to be kept to a minimum in order to limit trampling impacts. Once this has been undertaken, access must be strictly prohibited in the surface water resource unless a RoW has been established allowing limited access during the construction phase only. The ECO must be present on site to observe the stringing process through the surface water resources to ensure that potential impacts are minimised and where required, adequate mitigation measures to address impacts are undertaken. 31. Before any construction of roads through surface water resources is undertaken, the relevant water use license and environmental authorisation must be obtained and conditions adhered to. 32. It is important that where possible construction activities planned inside surface water features should be scheduled to take place over the dry season when flows are low (December/January/February). 33. Adequate structures must be put into place (temporary or permanent where necessary in extreme cases) to deal with run-off and sediment volumes. The use of soft structures such as silt fencing and hessian sand bags can be used to prevent erosion in susceptible construction areas. However, where required, the installation of hard structures such as gabions may also be used where required through surface water resources. 34. Where direct impacts are required for the removal, re-laying and widening of roads in the highly sensitive areas, impacts should be limited to the absolute bare minimum (RoW) in identified drainage lines, watercourses and riparian habitats designated as “highly sensitive”. The RoW is to be established to the desired construction area in the wetlands and/or riparian habitat. The width of the RoW	

	must be limited to the width of the vehicles required to enter the surface water resource. 35. The number and type of permissible vehicles or machinery into the RoW must be limited to the bare minimum. Preferably light vehicles are to be utilised as far as possible. 36. All vehicles and machinery are to be checked for oil, fuel or any other fluid leaks before entering the RoW. All vehicles and machinery must be regularly serviced and maintained before being allowed to enter the construction RoW within the sensitive areas. No fuelling, re-fuelling, vehicle and machinery servicing or maintenance is to take place in the RoW. The construction site is to contain sufficient safety measures throughout the construction process. These include, but are not limited to, oil spill kits and fire extinguishers. Fuel, oil or hazardous substances storage areas must not be placed within 100m of any surface water resource. No hazardous materials are to be stored or brought into the surface water resources. 37. Construction workers are only allowed in the RoW and not into the surrounding surface water resource systems. The required construction areas in the surface water resources are to be clearly demarcated and no access beyond these areas is to be allowed. 38. Any foundation-cement mixing should take place over a bin lined (impermeable) surface or alternatively in the load bin of a vehicle to prevent the direct mixing of cement with the ground of the surface water resources. Importantly, no mixing of cement directly in a surface water resource is allowed. 39. Stockpiled soils from surface water resources will need to be protected from wind and water erosion. Stockpiled soils are not to exceed a 2m height and are to be bunded by suitable materials where stockpiles are within 50m of any surface water resource. Stacked bricks surrounding the stockpiled soils can be adopted. Alternatively, wooden planks pegged around the stockpiled soils can be used.	

	40. If flow from surface water resources is required to be altered or diverted, this should be temporary and only exist for the duration of the construction process. Furthermore, flow should not be stopped completely, but instead should be diverted, thus allowing flow to continue downstream. Use of flumes pipes for example can be used in this instance.	

3.4.8 Waste Management

Table 19: Waste Management

IMPACT	**WASTE MANAGEMENT** **This section deals with waste management and actions that need to be implemented during construction**	**RESPONSIBILITY**
PHASE	**CONSTRUCTION**	**ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	***Litter management*** 1. Refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction site. 2. The Contractor shall supply waste collection bins where such is not available and all solid waste collected shall be disposed of at registered/licensed landfill. 3. A housekeeping team should be appointed to regularly maintain the litter and rubble situation on the construction site. 4. If possible and feasible, all waste generated on site must be separated into glass, plastic, paper, metal and wood and recycled. An independent contractor can be appointed to conduct this recycling. 5. Littering by the employees of the Contractor shall not be allowed under any circumstances. The ECO shall monitor the neatness of the work sites as well as the Contractor campsite. 6. Skip waste containers should be maintained on site. These should be kept covered and arrangements made for them to be collected regularly. 7. All waste must be removed from the site and transported to a landfill site promptly to ensure that it does not attract vermin or produce odours. 8. Where a registered waste site is not available close to the construction site, the Contractor shall provide a method statement with regard to waste management.	

	9. A certificate of disposal shall be obtained by the Contractor and kept on file, if relevant. 10. Under no circumstances may solid waste be burnt on site. 11. All waste must be removed promptly to ensure that it does not attract vermin or produce odours. ***Hazardous waste*** 12. All waste hazardous materials, if present, must be carefully stored as advised by the ECO, and then disposed of off-site at a licensed landfill site, where practical. Incineration may be used where relevant. 13. Contaminants to be stored safely to avoid spillage. 14. Machinery must be properly maintained to keep oil leaks in check 15. All necessary precaution measures shall be taken to prevent soil or surface water pollution from hazardous materials used during construction and any spills shall immediately be cleaned up and all affected areas rehabilitated ***Sanitation*** 16. The Contractor shall install mobile chemical toilets on the site. 17. Staff shall be sensitised to the fact that they should use these facilities at all times. No indiscriminate sanitary activities on site shall be allowed. 18. Ablution facilities shall be within proximity from workplaces and not closer than 100m from any natural water bodies or boreholes. There should be enough toilets available to accommodate the workforce (minimum requirement 1: 15 workers). Male and females must be accommodated separately where possible. 19. Toilets shall be serviced regularly and the ECO shall inspect toilets regularly. 20. Toilets should be no closer than 100m or above the 1:100 year flood line from any natural or manmade water bodies or drainage lines or alternatively located in a place approved of by the Engineer.	

	21. Under no circumstances may open areas, neighbours fences or the surrounding bush be used as a toilet facility. 22. The construction of “Long Drop” toilets are forbidden. Rather, portable toilets are to be used. 23. Potable water must be provided for all construction staff. ***Remedial actions*** 24. Depending on the nature and extent of the spill, contaminated soil must be either excavated or treated on-site. 25. Excavation of contaminated soil must involve careful removal of soil using appropriate tools/machinery to storage containers until treated or disposed of at a licensed hazardous landfill site. 26. The ECO must determine the precise method of treatment for polluted soil. This could involve the application of soil absorbent materials as well as oil-digestive powders to the contaminated soil. 27. If a spill occurs on an impermeable surface such as cement or concrete, the surface spill must be contained using oil absorbent material. 28. If necessary, oil absorbent sheets or pads must be attached to leaky machinery or infrastructure. 29. Materials used for the remediation of petrochemical spills must be used according to product specifications and guidance for use. 30. Contaminated remediation materials must be carefully removed from the area of the spill so as to prevent further release of petrochemicals to the environment and stored in adequate containers until appropriate disposal.	

3.4.9 Flora

Table 20: Flora

IMPACT	FLORA This section deals with flora and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	**CONSTRUCTION**	**ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**Existing vegetation** 1. Vegetation removal must be limited to the wind farm construction site 2. Vegetation to be removed as it becomes necessary rather than removal of all vegetation throughout the site in one step 3. Materials should not be delivered to the site prematurely which could result in additional areas being cleared or affected. 4. No vegetation to be used for firewood. **Rehabilitation** 5. All damaged areas shall be rehabilitated upon completion of the contract 6. Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction. 7. All natural areas impacted during construction must be rehabilitated with locally indigenous species typical of the representative botanical unit. 8. Rehabilitation must take place in a phased approach as soon as possible. 9. Rehabilitation process must make use of species indigenous to the area. Seeds from surrounding seed banks can be used for re-seeding. 10. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas.	

	11. Planting of indigenous tree species in areas not to be cultivated or built on must be encouraged. **Demarcation of construction and laydown areas** 12. All plants not interfering with the operation of the wind farm construction shall be left undisturbed, clearly marked and indicated on the site plan. 13. The construction area must be well demarcated and no construction activities must be allowed outside of this demarcated footprint. 14. Vegetation removal must be phased in order to reduce impact of construction. 15. Construction site office and laydown areas must be clearly demarcated and no encroachment must occur beyond demarcated areas. 16. Strict and regular auditing of the wind farm construction process to ensure containment of the construction and laydown areas. 17. Soils must be kept free of petrochemical solutions that may be kept on site during construction. Spillage can result in a loss of soil functionality thus limiting the re-establishment of flora. **Utilisation of resources** 18. Gathering of firewood, fruit, multi plants, or any other natural material onsite or in areas adjacent to the site is prohibited unless with prior approval of the ECO. **Exotic vegetation** 19. Alien vegetation on the site will need to be controlled. 20. The contractor should be responsible for implementing a programme of weed control (particularly in areas where soil has been disturbed); and grassing of any remaining stockpiles to prevent weed invasion. 21. The spread of exotic species occurring throughout the site should be controlled.	

	Herbicides 22. Herbicide use shall only be allowed according to contract specifications. The application shall be according to set specifications and under supervision of a qualified technician. The possibility of leaching into the surrounding environment shall be properly investigated and only environmentally friendly herbicides shall be used. 23. The use of pesticides and herbicides on the site must be discouraged as these can impact on important pollinator species of indigenous vegetation.	
	SITE SPECIFIC MITIGATION MEASURES	
	24. Vegetation clearing should commence only after walk down has been conducted and necessary permits obtained. 25. Preconstruction environmental induction for all construction staff on site should be undertaken to ensure that basic environmental principles are adhered to. This includes awareness as to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas etc. 26. ECO to provide supervision and oversight of vegetation clearing activities within sensitive areas such as near drainage areas. 27. Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared. 28. All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the construction area. 29. Temporary lay-down areas should be located within previously transformed areas or areas that have been identified as being of low sensitivity. These areas should be rehabilitated after use.	

3.4.10 Fauna

Table 21: Fauna

IMPACT	FAUNA This section deals with fauna and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	**CONSTRUCTION**	**ECO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	1. Demarcation of sensitive areas must be verified on site by the ECO prior to construction activities starting. 2. Use of appropriate construction techniques 3. Rehabilitation to be undertaken as soon as possible after construction has been completed. 4. No trapping or snaring to fauna on the construction site is allowed. 5. No faunal species are to be harmed by maintenance staff during any routine maintenance at the development.	
	SITE SPECIFIC MITIGATION MEASURES	
	6. All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition. 7. Any fauna threatened by the construction activities should be removed to safety by the ECO or appropriately qualified environmental officer. 8. Plastic, barrier tape and other packaging material and litter should not be allowed to blow into the veld and should be disposed of in purpose-built, enclosed waste management areas. 9. All construction vehicles should adhere to a low speed limit (30km/h max) to avoid collisions with susceptible species such as snakes and tortoises.	

	10. All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. 11. If trenches need to be dug for pipelines or electrical cabling, these should not be left open for extended periods of time as fauna may fall in and become trapped in them. Trenches which are standing open should have places where there are soil ramps allowing fauna to escape the trench.	

3.4.11 Avifauna

Table 22: Avifauna Impact

IMPACT	**Avifauna** **This section deals with avifaunal issues and actions that need to be implemented during construction**	**RESPONSIBILITY**
PHASE	**CONSTRUCTION**	**ELO/ LA**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	1. Ensure that key areas of conservation importance and sensitivity are avoided. 2. Implement appropriate working practices to protect sensitive habitats. 3. Provide adequate briefing for site personnel and, in particularly sensitive locations, employing an on-site ecologist during construction. 4. Implement an agreed post-development monitoring programme. 5. Site turbines close together to minimise the development footprint (subject to technical constraints such as the need for greater separation between larger turbines). 6. Where possible, install transmission cables underground (subject to habitat sensitivities and in accordance with existing best practice guidelines for underground cable installation).	

	7. Mark overhead cables using deflectors where required and avoiding use over areas of high bird concentrations, especially for species vulnerable to collision. 8. Time construction to avoid sensitive periods. 9. Implement habitat enhancement for species using the site.	
	SITE SPECIFIC MITIGATION MEASURES	
	10. Restrict the construction activities to the construction footprint area. Do not allow any access to the remainder of the property during the construction period. A 1km exclusion zone should be implemented around Brak Pan where no construction activity or disturbance should take place. A 2km buffer zone has already been implemented around the Martial Eagle nests. 11. Maximum use must be made of existing roads. 12. Utilise lights with wavelengths that attract less insects (low thermal/infrared signature), such lights generally have a colour temperature of 5000k (Kelvin) or more. If not required for safety or security purposes, lights should be switched off when not in use.	

3.4.12 Air Quality

Table 23: Air Pollution

IMPACT	**AIR POLLUTION** **This section deals with air pollution and actions that need to be implemented during construction**	**RESPONSIBILITY**
PHASE	**CONSTRUCTION**	**ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	**Dust control** 1. Wheel washing and damping down of un-surfaced and un-vegetated areas must be undertaken if required. 2. Retention of vegetation where possible will reduce dust travel.	

	3. Clearing activities must only be done during agreed working times and permitting weather conditions to avoid drifting of sand and dust into neighbouring areas. 4. Damping down of all exposed soil surfaces with a water bowser or sprinklers when necessary to reduce dust. 5. The Contractor shall be responsible for dust control on site to ensure no nuisance is caused to the neighbouring communities. 6. A speed limit of 30km/h must not be exceeded on site. 7. Any complaints or claims emanating from the lack of dust control shall be attended to immediately by the Contractor. 8. Any dirt roads that are utilised by the workers must be regularly maintained to ensure that dust levels are controlled. **Odour control** 9. Regular servicing of vehicles in order to limit gaseous emissions. 10. Regular servicing of on-site toilets to avoid potential odours. 11. Allocated cooking areas must be provided. 12. The contractor must make alternative arrangements (other than fires) for cooking and/ or heating requirements. LP gas cookers may be used provided that all safety regulations are followed. **Rehabilitation** 13. The contractor should commence rehabilitation of exposed soil surfaces as soon as practical after completion of earthworks. **Fire prevention** 14. No open fires shall be allowed on site under any circumstance. All cooking shall be done in demarcated areas that are safe and cannot cause runaway fires.	

	15. The Contractor shall have operational fire-fighting equipment available on site at all times. The level of firefighting equipment must be assessed and evaluated through a typical risk assessment process.	

3.4.13 Noise and Vibrations

Table 24: Noise and Vibrations

IMPACT	**NOISE** **This section deals with noise and actions that need to be implemented during construction**	**RESPONSIBILITY**
PHASE	**CONSTRUCTION**	**ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	1. The construction phase must aim to adhere to the relevant noise regulations and limit noise to within standard working hours in order to reduce disturbance of surrounding farms. 2. Construction site yards, workshops, concrete batching plants, and other noisy fixed facilities should be located well away from noise sensitive areas. Once the proposed final layouts are made available by the contractor(s), the sites must be evaluated in detail and specific measures designed in to the system. 3. Truck traffic should be routed away from noise sensitive areas, where possible. 4. Noise levels must be kept within acceptable limits. 5. Noisy operations should be combined so that they occur where possible at the same time. 6. Construction activities are to be contained to reasonable hours during the day and early evening. Night-time activities near noise sensitive areas should not be allowed. 7. Construction workers to wear necessary ear protection gear. 8. Noisy activities to take place during allocated construction hours 9. Noise from labourers must be controlled. 10. Noise suppression measures must be applied to all construction equipment. Construction equipment must be kept in good working order and where appropriate fitted with silencers which are kept in good	

	working order. Should the vehicles or equipment not be in good working order, the contractor may be instructed to remove the offending vehicle or machinery from site 11. The contractor must take measures to discourage labourers from loitering in the area and causing noise disturbance. Where possible labour shall be transported to and from the site by the contractor or his Sub-Contractors by the contractors own transport. 12. Implementation of enclosure and cladding of processing plants 13. Applying regular and thorough maintenance schedules to equipment and processes. An increase in noise emission levels very often is a sign of the imminent mechanical failure of a machine. 14. Route construction traffic as far as practically possible from potentially sensitive receptors; 15. Ensure a good working relationship between the developer and all potentially sensitive receptors. Communication channels should be established to ensure prior notice to the sensitive receptor if work is to take place close to them. Information that should be provided to the potential sensitive receptor(s) include: ▪ Proposed working times; ▪ how long the activity is anticipated to take place; ▪ what is being done, or why the activity is taking place; ▪ contact details of a responsible person where any complaints can be lodged should there be an issue of concern. 16. When working near (within 500 meters – potential construction of access roads and trenches) to a potential sensitive receptor(s), limit the number of simultaneous activities to the minimum as far as possible; 17. When working near to potentially sensitive receptors, coordinate the working time with periods when the receptors are not at home where possible. An example would be to work within the 08:00 to 14:00 time-slot to minimize the significance of the impact because: ▪ Potential receptors are most likely at school or at work, minimizing the probability of an impact happening; ▪ Normal daily activities will generate other noises that would most likely mask construction noises, minimizing the probability of an impact happening.	

	18. Reduce the noise impact during the construction phase by: ▪ Using the smallest/quietest equipment for the particular purpose. For modelling purposes the noise emission characteristics of large earth-moving equipment (typically of mining operations) were used, that would most likely over-estimate the noise levels. The use of smaller equipment therefore would have a significantly lower noise impact; ▪ Ensuring that equipment is well-maintained and fitted with the correct and appropriate noise abatement measures.	

3.4.14 Energy use

Table 25: Energy use

IMPACT	**ENERGY USE** **This section deals with energy use and actions that need to be implemented during construction**	**RESPONSIBILITY**
PHASE	**CONSTRUCTION**	**ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	1. Energy saving lighting must be implemented across the board. 2. Water saving measures must be implemented across the plant to ensure little wastage. 3. Minimal lighting, while maintaining health and safety regulations, must be kept on during the night operations. 4. Equipment not in use must be switched off and unplugged to save on unnecessary energy costs.	

3.4.15 Employment

Table 26: Employment

IMPACT	**EMPLOYMENT** **This section deals with employment and actions that need to be implemented during construction**	**RESPONSIBILITY**
PHASE	**CONSTRUCTION**	**MC**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**Labour** 1. The use of labour intensive construction measures should be used where appropriate. 2. Training of labour to benefit individuals beyond completion of the project. **Recruitment Plan** 3. All unskilled labourers should be drawn from the local market and where possible use should be made of local semiskilled and skilled personnel. 4. Local suppliers to be used where possible. 5. The Project Manager must ensure that all staff working on the proposed project are in possession of a South African Identity Document or a relevant work permit. 6. Ensure adequate advertising in the project community areas, local papers for skilled labour. Adverts are to be placed in each area where the public meetings were conducted. 7. Local community leaders must be utilised to source labour. 8. The recruitment process must be equitable and transparent. A concerted effort will be made to guard against nepotism and/or any form of favouritism during the process	

	9. The recruitment of skilled labour will follow standard advertising process in national newspapers and interview based selection 10. A record of official complaints by employees is to be maintained and submitted to authorities i.e. Labour and Social Security.	
	SITE SPECIFIC MITIGATION	
	11. Procure construction materials, goods, and products from local suppliers if feasible 12. Employ local contractors where possible 13. Employ labour-intensive methods in construction, where feasible. 14. Employ local residents and communities, where possible. 15. Sub-contract to local construction companies, where possible. 16. Utilise local suppliers where possible, and arrange with the local Small and Medium Enterprises to provide transport, catering, and other services for the construction crew. 17. Recruit local labour as far as feasible to increase the benefits to the local households. 18. In order to improve the chances of skills being developed during the construction period it is recommended that contractors are encouraged to provide learnerships and share knowledge with the employees. 19. Developers should undertake consultation with farmers to ensure that the potential of job losses as a result of the proposed project is limited; alternatively, those labourers who stand a chance of losing their employment could be re-skilled and offered employment on the farm. 20. Developers should be open to local recruitment processes and be willing to offer some skills transfer during this phase of the project to ensure maximum local procurement of labour. This will decrease the likelihood of an influx of migrant labourers. Job seekers should also be discouraged from contacting the project for employment by informing the community with respect to the planned recruitment process.	

3.4.16 Occupational Health and Safety

Table 27: Occupational Health and Safety

IMPACT	**HEALTH AND SAFETY** **This section deals with health and safety and actions that need to be implemented during construction**	**RESPONSIBILITY**
PHASE	**CONSTRUCTION**	**MC/ ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	**Worker safety** 1. Implementation of safety measures, work procedures and first aid must be implemented on site. 2. Workers should be thoroughly trained in using potentially dangerous equipment 3. Contractors must ensure that all equipment is maintained in a safe operating condition. 4. A safety officer must be appointed. 5. A record of health and safety incidents must be kept on site. 6. Any health and safety incidents must be reported to the Project Manager immediately. 7. First aid facilities must be available on site at all times and a number of employees trained to carry out first aid procedures. 8. Workers have the right to refuse work in unsafe conditions. 9. The Contractor shall take all the necessary precautions against the spreading of disease such as measles, foot and mouth, etc. especially under livestock. 10. A record shall be kept of drugs administered or precautions taken and the time and dates when this was done. This can then be used as evidence in court should any claims be instituted against Mainstream or the Contractor.	

	11. The contractor must ensure that all construction workers are well educated about HIV/ AIDS and the risks surrounding this disease. The location of the local clinic where more information and counselling is offered must be indicated to workers. 12. Material stockpiles or stacks must be stable and well secured to avoid collapse and possible injury to site workers / local residents. **Worker facilities** 13. Eating areas should be regularly serviced and cleaned to ensure the highest possible standards of hygiene and cleanliness. 14. Fires are not to be allowed outside controlled areas. **Hazardous substances** 15. Working areas should be provided with adequate ventilation and dust/fume extraction systems to ensure that inhalation exposure levels for potentially corrosive, oxidizing, reactive or siliceous substances are maintained and managed at safe levels. **Machinery and Equipment** 16. Use of contrast colouring on equipment/ machinery including the provision of reflective markings to enhance visibility. 17. Use of moving equipment/machinery equipped with improved operator sight lines. 18. Issuing workers with high visibility clothing 19. Use of reflective markings on structures, traffic junctions, and other areas with a potential for accidents. 20. Installing safety barriers in high risk locations **Fitness for work**	

	21. Review shift management systems to minimize risk of fatigue. Establish alcohol and other drugs policy for the operation. **Travel and remote site health** 22. Develop programs to prevent both chronic and acute illnesses through appropriate sanitation and vector control systems. 23. Where food is prepared on site, food preparation storage and disposal should be reviewed regularly and monitored to minimise risk of illness. **Protective gear** 24. Personal Protective Equipment (PPE) must be made available to all construction staff and must be compulsory. Hard hats and safety shoes must be worn at all times and other PPE worn were necessary i.e. dust masks, ear plugs etc. 25. No person is to enter the site without the necessary PPE. **Site safety** 26. The construction camp must remain fenced for the entire construction period. 27. Potentially hazardous areas are to be demarcated and clearly marked 28. Adequate warning signs of hazardous working areas. 29. Emergency numbers for local police and fire department etc. must be placed in a prominent area. 30. Firefighting equipment must be placed in prominent positions across the site where it is easily accessible. This includes fire extinguishers, a fire blanket as well as a water tank. 31. Suitable conspicuous warning signs in English and all other applicable languages must be placed at all entrances to the site. 32. All speed limits must be adhered to.	

	Construction equipment safety 33. All equipment used for construction, including drills, TLB's must be in good working order with up to date maintenance records. **Hazardous Material Storage** 34. All storage tanks containing hazardous materials (fuel) must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material. These areas should be roofed to avoid contamination of stormwater. 35. Material Safety Data Sheets (MSDS) which contain the necessary information pertaining to a specific hazardous substance must be present for all hazardous materials stored on the site. **Procedure in the event of a petrochemical spill** 36. A spill kit needs to be kept on site to address any unforeseen spillages. 37. The individual responsible for or who discovers the petrochemical spill must report the incident to the Project Manager, Contractor or ECO. 38. The problem must be assessed and the necessary actions required will be undertaken. 39. The immediate response must be to contain the spill. 40. The source of the spill must be identified, controlled, treated or removed wherever possible. **Fire management** 41. Firefighting equipment should be present on site at all times. 42. All construction staff must be trained in fire hazard control and firefighting techniques.	

	43. All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances. 44. No open fires will be allowed on site. 45. Smoking may only be conducted in demarcated areas. **Safety of surrounding residents** 46. All I & AP's should be notified in advance of any known potential risks associated with the construction site and the activities on it. Examples of these are: o Blasting o Earthworks / earthmoving machinery on steep slopes above houses / infrastructure o Risk to residence along haulage roads / access routes **Emergency evacuation plan** 47. Upon completion of the construction phase, an emergency preparedness plan must be drawn up to ensure the safety of the staff and surrounding land users in the case of an emergency. 48. All permanent staff must undergo safety training. **Maintenance** 49. The wind farm and surrounding areas are to be regularly maintained. A maintenance schedule must be drawn up and records of all maintenance kept.	

3.4.17 Security

Table 28: Security

IMPACT	SECURITY This section deals with security and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	**CONSTRUCTION**	**MC /ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	1. A security company should be employed to guard the construction site and monitor access. This company should also be utilised for the operation phase. 2. Labour should be transported to and from the site to discourage loitering in adjacent areas and possible increase in crime or disturbance. 3. Unsocial activities such as consumption or illegal selling of alcohol, drug utilisation or selling and prostitution on site shall be prohibited. Any persons found to be engaged in such activities should receive disciplinary or criminal action taken against them. 4. Only pre-approved staff must be permitted to stay within the staff accommodation which will be provided. 5. The site shall be fenced, where necessary to prevent any loss or injury to persons during the construction phase. 6. No alcohol/ drugs are to be present or taken on site. 7. No firearms allowed on site or in vehicles transporting staff to / from site (unless used by security personnel). 8. No harvesting of firewood from the site or from the business property adjacent to it without prior consent from the ECO.	

	9. Construction staff are to make use of the facilities provided for them, as opposed to ad-hoc alternatives (e.g. fires for cooking, the use of surrounding bush as a toilet facility are forbidden). 10. Trespassing on private / commercial properties adjoining the site is forbidden. 11. Driving under the influence of alcohol is prohibited. 12. All employees must undergo the necessary safety training and wear the necessary protective clothing. 13. The site must be secured in order to reduce the opportunity for criminal activity in the locality of the construction site.	

3.4.18 Social Environment

Table 29: Social Environment

IMPACT	**SOCIAL ENVIRONMENT** **This section deals with social environment and actions that need to be implemented during construction**	**RESPONSIBILITY**
PHASE	**CONSTRUCTION**	**MC /ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	1. All contact with the affected parties shall be courteous at all times. The rights of the affected parties shall be respected at all times. 2. A complaints register should be kept on site. Details of complaints should be incorporated into the audits as part of the monitoring process. This should be in carbon copy format, with numbered pages. Any missing pages must be accounted for by the Contractor.	

	3. Damage to infrastructure shall not be tolerated and any damage shall be rectified immediately by the Contractor. A record of all damage and remedial actions shall be kept on site. 4. Care must be taken not to damage irrigation equipment, lines, channels and crops.	
	SITE SPECIFIC MITIGATION	
Social pathologies	5. Set up a recruitment office in the nearby towns (i.e. Loeriesfontein) and adhere to strict labour recruitment practices that would reduce the desire of potential job seekers to loiter around the properties in hope to find temporary employment 6. Set up a gate or access control to site to limit or completely eliminate the possibility of livestock theft and burglaries at the residential properties. 7. Employ locals as far as feasible through the creation of the local skills database and recruitment of suitable candidates. 8. Implementing health awareness campaigns to curb the potential of spreading disease, use of drugs or alcohol abuse for example. 9. Engage with local authorities and inform them of the development as well discuss with them the ability of the municipality to meet the demands for social and basic services created by the migrant construction workers. 10. Where feasible, assist the municipality in ensuring that the quality of the local social and economic infrastructure does not deteriorate making use of the social responsibility allocations.	
Living and working conditions	11. Natural areas that are not affected by the footprint should be retain as such and avoided to be disturbed during construction. 12. Movement of workers and vehicles on the roads should be limited to working hours and workdays.	

3.4.19 Heritage

Table 30: Heritage

IMPACT	**CULTURAL AND HERITAGE ARTEFACTS** **This section deals with the impact that the new development has on potential archaeological artefacts of the site**	**RESPONSIBILITY**
PHASE	**CONSTRUCTION**	**MC /ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	1. Any finds must be reported to the nearest National Monuments office to comply with the National Heritage Resources Act (Act No 25 of 1999) and to DEA. 2. Local museums as well as the South African Heritage Resource Agency (SAHRA) should be informed if any artefacts are uncovered in the affected area. 3. The contractor must ensure that his workforce is aware of the necessity of reporting any possible historical or archaeological finds to the ECO so that appropriate action can be taken. 4. Any discovered artefacts shall not be removed under any circumstances. Any destruction of a site can only be allowed once a permit is obtained and the site has been mapped and noted. Permits shall be obtained from the South African Heritage Resources Association (SAHRA) should the proposed site affect any world heritage sites or if any heritage sites are to be destroyed or altered. 5. Should any archaeological sites / graves be uncovered during construction, their existence shall be reported to MRP immediately.	
	SITE SPECIFIC MITIGATION MEASURES	
	6. The EAP as well as the ECO for this project must be made aware of the fact that the Ecca Group sediments contains significant fossil remains, albeit mostly trace fossil assemblages. Several types of fossils have been recorded from this Group in the Karoo Basin of South Africa, with special mention of the very important	

	Whitehill Formation. The Whitehill Formation outcrops are however very restricted in this study area. 7. In areas that are allocated a Very High and High Palaeontological sensitivity and specifically where deep excavation into bedrock is envisaged (following the geotechnical investigation), or where fossils are recorded during the geotechnical investigations, a qualified palaeontologist must be appointed to assess and record fossils at specific footprints of infrastructure developments (Phase 1 PIA). 8. If significant fossil finds (e.g. vertebrate teeth, bones, burrows, petrified wood) are recorded during excavations for infrastructure such as road developments, the palaeontologist must apply for a collection permit to collect the fossils according the SAHRA specifications. 9. Demarcate heritage sites as no-go areas 10. Demarcate and fence during construction if construction activities are to happen within 100 meters from a site. 11. Monitor find spot areas if construction is going to take place through them. 12. A management plan for the heritage resources needs then to be compiled and approved for implementation during construction and operations.	

3.4.20 Community Engagement

Table 31: Community Engagement

IMPACT	**COMMUNITY ENGAGEMENT** **This section deals with surrounding community and actions that need to be implemented during construction**	**RESPONSIBILITY**
PHASE	**CONSTRUCTION**	**ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	1. A communication guideline to be drafted and agreed upon with authority representatives and affected communities. 2. Open and transparent community engagement to be followed as culturally appropriate. 3. Records (written) are to be kept of all community engagements (e.g. complaints, resolutions, etc.).	

*3.4.21 **Visual Impact***

Table 32: Visual Impact

IMPACT	**VISUAL** **This section deals with visual issues and actions that need to be implemented during construction**	**RESPONSIBILITY**
PHASE	**CONSTRUCTION**	**ELO/ LA**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	1. Construction activities must not occur at night and lighting should only be erected where absolutely necessary 2. Construction traffic must stick to designated routes or access roads;	

	3. Construction areas are to be kept clean and tidy 4. Measures must be taken to suppress dust arising from construction activities 5. Labour being transported to the site must take cognisance of litter and waste concerns 6. Equipment being transported to the site must be covered with tarps should they be fines etc. 7. Topsoil stockpiles must be well managed and seeded when possible if not utilised within three months 8. It is recommended that equipment be stored discreetly so as not to increase visual impacts 9. Construction must be conducted in the shortest possible time in order to reduce visual impacts.	
	SITE SPECIFIC MITIGATION MEASURES	
	10. Carefully plan to reduce the construction period. 11. Locate construction camp and storage areas in zones of low visibility i.e. behind tall trees or in lower lying areas. 12. Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. 13. Maintain a neat construction site by removing rubble and waste materials regularly. 14. Make use of existing gravel access roads where possible. 15. Ensure that dust suppression techniques are implemented on all access roads. 16. All reinstated cable trenches should be re-vegetated with the same vegetation that existing prior to the cable being laid.	

3.5 Operation Phase

3.5.1 Construction Site Decommissioning

Table 33: Construction Site Decommissioning

IMPACT	CONSTRUCTION SITE DECOMMISSIONING	RESPONSIBILITY
PHASE	**OPERATION**	**Main contractor / Developer / ECO / ELO**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	**Removal of equipment** 1. All structures comprising the construction camp are to be removed from site. 2. The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc., and these shall be cleaned up. 3. All hardened surfaces within the construction camp area should be ripped, all imported materials removed, and the area shall be top soiled and regressed using the guidelines set out in the re-vegetation that forms part of this document. **Temporary services** 4. The Contractor must arrange the cancellation of all temporary services. 5. Temporary roads must be closed and access across these, blocked. 6. All areas where temporary services were installed are to be rehabilitated to the satisfaction of the ECO. **Associated infrastructure** 7. Surfaces are to be checked for waste products from activities such as concreting or asphalting and cleared in a manner approved by the Engineer. 8. All surfaces hardened due to construction activities are to be ripped and imported material thereon removed.	

	9. All rubble is to be removed from the site to an approved disposal site as approved by the Engineer. Burying of rubble on site is prohibited. 10. The site is to be cleared of all litter. 11. The Contractor is to check that all watercourses are free from building rubble, spoil materials and waste materials. 12. Fences, barriers and demarcations associated with the construction phase are to be removed from the site unless stipulated otherwise by the Engineer. 13. All residual stockpiles must be removed to spoil or spread on site as directed by the Engineer. 14. All leftover building materials must be returned to the depot or removed from the site. 15. The Contractor must repair any damage that the construction works has caused to neighbouring properties, specifically, but not limited to, damage caused by poor storm water management. **Rehabilitation plan** 16. Rehabilitate and re-vegetate cleared areas with indigenous plant species.	

3.5.2 Operation and Maintenance

Table 34: Operation and Maintenance

IMPACT	OPERATION AND MAINTENANCE	RESPONSIBILITY
PHASE	**OPERATION**	**Developer**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	**Maintenance** 1. All applicable standards, legislation, policies and procedures must be adhered to during operation.	

	2. Regular ground inspection of the power plants must take place to monitor their status. **Public awareness** 3. The emergency preparedness plan must be ready for implementation at all times should an emergency situation arise.	
	SITE SPECIFIC MITIGATION MEASURES	
	Erosion during operation 4. All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk. 5. Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance. 6. All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. **7.** All cleared areas which remain following construction should be revegetated with indigenous perennial grasses or shrubs from the local area or treated with scarification or similar surface treatment to encourage natural regeneration of the vegetation.	

3.5.3 Surface and Groundwater

Table 35: Surface and Groundwater

IMPACT	SURFACE AND GROUNDWATER	RESPONSIBILITY
PHASE	**OPERATION**	**Developer**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	**Surface water** 1. Correct drainage of the site should ensure that contaminants do not impact upon surface water. 2. The stormwater system on the proposed site needs to be regularly maintained to ensure effective working. **Monitoring and Reporting** 3. Specific activities that should be monitored include: ▪ Erosion potential (specifically in and around roads and storm-water discharge points). ▪ Stormwater management and design ▪ Identified problem areas	
	SITE SPECIFIC MITIGATION MEASURES	
	4. Any hardstand area, building or substation inside or within 100m proximity to a surface water resource must have energy dissipating structures on the perimeter of the structures to prevent increased run-off entering adjacent areas or surface water resources. This can be in the form of hard concrete structures or soft structures such as grass blocks for example. 5. Alternatively, a suitable operational storm water management design or plan must account for and implement the use of appropriate alternative structures or devices	

	that will prevent increased run-off entering adjacent areas or surface water resources. 6. Where possible, existing roads are to be used so that damage is limited. Where new service roads are required, these should preferably route around surface water resources where possible. Should service roads be required through surface water resources and the necessary environmental authorisations and water use licences are obtained, these roads must be limited as far as possible in extent (i.e. go directly through) and will need to be maintained. 7. If dirt roads are required as the means of access, these will have to be regularly monitored and checked for erosion. Monitoring should be conducted on a weekly to monthly basis. Moreover, after short or long periods of sudden and/or heavy rainfall or after long periods of sustained rainfall, the roads will need to be checked for erosion and the necessary rehabilitation measures will need to be employed. 8. Where erosion begins to take place, this must be dealt with immediately to prevent severe erosion damage to the wetland. Should large scale erosion occur, a rehabilitation plan will be required. Input, reporting and recommendations from a suitably qualified wetland specialist must be obtained and implemented to address erosion impacts in surface water resources. 9. Water needed for the maintenance of the site should not be sourced from existing water rights allocated to the site of nearby farm portions which area being utilised primarily for existing agricultural production.	

3.5.4 Biodiversity

Table 36: Biodiversity

IMPACT	BIODIVERSITY (FAUNA AND FLORA)	RESPONSIBILITY
PHASE	**OPERATION**	**Developer**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	**Vegetation** 1. Indigenous vegetation must be maintained and all exotics removed as they appear and disposed of appropriately. 2. Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction. 3. Vegetative re-establishment shall, as far as possible, make use of indigenous or locally occurring plant varieties within a 20-metre radius of the site. 4. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas during and following rehabilitation. **Other fauna** 5. No faunal species must be harmed by maintenance staff during any routine maintenance at the development.	
	SITE SPECIFIC MITIGATION MEASURES	
	6. Wherever excavation is necessary, topsoil should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species. 7. Due to the disturbance at the site as well as the increased runoff generated by the hard infrastructure, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented.	

	8. Regular (annual basis) monitoring for alien plants within the development footprint as well as adjacent areas which receive runoff from the facility as there are also likely to be prone to invasion problems. 9. Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible and restricted to woody species which resprout. 10. No unauthorised persons should be allowed onto the site. 11. Any potentially dangerous fauna such snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location. 12. The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. 13. If any part of the site must be lit at night for security purposes, this should be done with downward-directed low-UV type lights (such as most LEDs), which do not attract insects. 14. All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. 15. All vehicles accessing the site should adhere to a low speed limit (30km/h max) to avoid collisions with susceptible species such as snakes and tortoises. 16. If any part of the facility is to be fenced, then no electrified strands should be placed within 30cm of the ground as some species such as tortoises are susceptible to electrocution from electric fences as they do not move away when electrocuted but rather adopt defensive behaviour and are killed by repeated shocks. Alternatively, the electrified strands should be placed on the inside of the fence and not the outside.	

3.5.5 Waste Management

Table 37: Waste Management

IMPACT	WASTE MANAGEMENT	RESPONSIBILITY
PHASE	**OPERATION**	**Developer**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	***Recycling and litter management*** 1. The site should be kept clear of litter at all times. 2. Solid waste separation and recycling should take place for the duration of the operational phase for the development at the administration block. 3. All waste must be removed promptly to ensure that it does not attract vermin or produce odours. 4. In house treatment procedures must be followed strictly. 5. Solid waste should be collected on a regular basis. 6. Package treatment plant must be regularly serviced.	

3.5.6 Health and Safety

Table 38: Health and Safety

IMPACT	HEALTH AND SAFETY	RESPONSIBILITY
PHASE	**OPERATION**	**Developer**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	**Emergency evacuation plan** 1. Upon completion of the construction phase, an emergency evacuation plan must be drawn up to ensure the safety of the staff and surrounding land users in the case of an emergency. **Maintenance** 2. The wind farm is to be regularly maintained. A maintenance schedule must be drawn up and records of all maintenance kept. **Fire safety** 3. Firefighting equipment in the form of fire hydrants or fire extinguishers must be available on the site. These must be regularly maintained by an appropriate company. **Storage and handling of hazardous waste** 4. Transformer oil containers must be regularly maintained to ensure that leaks do not occur. 5. A spill kit needs to be kept on site to address any unforeseen spillages. 6. Transport of all hazardous substances must be in accordance with the relevant legislation.	

IMPACT	HEALTH AND SAFETY	RESPONSIBILITY
	7. The bund wall surrounding the transformer oil containers must be regularly maintained to ensure that any spills are completely contained.	

3.5.7 Visual Impact

Table 39: Visual Impact

IMPACT	VISUAL IMPACT	RESPONSIBILITY
PHASE	**OPERATION**	**Developer**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	***Maintenance and lighting*** 1. Lighting must be kept to a minimum and restricted to low level, downward facing lights to reduce light spill; 2. Lighting must be inward and downward pointing to reduce glare in surrounding areas; 3. The wind farm area and surrounds must be kept clean, tidy and well maintained to reduce negative visual impacts; 4. Rehabilitation of surrounding areas must take place with indigenous species; 5. Surrounding roads must be well maintained; and 6. Regular maintenance of exteriors and associated infrastructure must be undertaken.	
	SITE SPECIFIC MITIGATION MEASURES	
	7. Should the other proposed wind farms already be constructed on adjacent farms, turbines of similar type and size should be utilised where possible to prevent visual clutter. Repeating elements of the same height, scale and form can result in unity and lessen the visual impact that would typically be experienced in a	

IMPACT	VISUAL IMPACT	RESPONSIBILITY
	chaotic landscape made up of diverse colours, textures and patterns (Vissering, 2011). 8. Light fittings for operations and security at night should reflect the light toward the ground and prevent light spill. 9. Turbines should be painted plain white, as this is a less industrial colour (Vissering, 2011). Bright colours or obvious logos should not be permitted. 10. Turbines should be repaired promptly, as they are considered more visually appealing when the blades are rotating (or at work) (Vissering, 2011). 11. If required, turbines should be replaced with the same model, or one of equal height and scale to avoid creating visual clutter (Vissering, 2011). 12. The operations and maintenance buildings should not be illuminated at night. 13. The operation and maintenance building should be painted with natural tones that fit with the surrounding environment. Non-reflective surfaces should be utilised where possible.	

3.5.8 Avifauna

Table 40: Avifauna

IMPACT	AVIFAUNA	RESPONSIBILITY
PHASE	**OPERATION**	**Developer**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	1. Once the turbines have been construction monitoring should be implemented to compare actual collision rates with predicted collision rates. If actual collision rates indicate high mortality levels, the following mitigation measures will have to be considered:	

	▪ Negotiating appropriate off-set compensation for turbine related collision mortality; ▪ As a last resort, halting operation of specific turbines during peak flight periods, or reducing rotor speed, to reduce the risk of collision mortality. 2. Maintenance staff should not be allowed to access other parts of the property unless it is necessary for wind farm related work. 3. If actual displacement levels of priority species prove to be high, appropriate off-sets should be considered. 4. The proposed power line should be routed as far as possible from high risk areas. In addition, the entire line should be marked with Bird Flight Diverters, to reduce the risk of collisions. 5. The proposed pole design must be assessed to ensure that the power line design poses no potential electrocution risk of large raptors.	
	SITE SPECIFIC MITIGATION MEASURES	
	6. Should the Martial Eagle nest become active before construction commences, monitoring of the breeding pair of Martial Eagles should be implemented during the construction phase, to ascertain if the 2km buffer zone is effective to prevent disturbance of the birds. 7. Should the Martial Eagle nest become occupied before construction commences, it is recommended that the flight activity of the juvenile Martial Eagle is monitored by monthly direct observations prior to construction commencing, from October – March i.e. after fledging up until it leaves its natal territory, to assess its flight patterns during this period when it will be most vulnerable to potential collision. This should give an indication of the extent of the potential curtailment (if any) that would be required to minimize the risk of collisions i.e. which turbines and for what period. This monitoring should be conducted pro-actively, i.e. before the first turbines are constructed in order to have baseline information available on flight behaviour before the	

	turbines become operational. This will help in the pro-active identification of high risk areas which could form the focus of subsequent monitoring. 8. Formal monitoring should be resumed once the turbines have been constructed, as per the most recent edition of the best practice guidelines (Jenkins *et al.* 2011). The exact scope and nature of the post-construction monitoring will be informed on an ongoing basis by the result of the monitoring through a process of adaptive management. The purpose of this would be (a) to establish if and to what extent displacement of priority species has occurred through the altering of flight patterns post-construction, and (b) to search for carcasses at turbines. 9. As an absolute minimum, post-construction monitoring should be undertaken for the first two (preferably three) years of operation, and then repeated again in year 5, and again every five years thereafter. The exact scope and nature of the post-construction monitoring will be informed on an ongoing basis by the result of the monitoring. 10. The environmental management plan should provide for the on-going inputs of a suitable experienced ornithological consultant to oversee the post-construction monitoring and assist with the on-going management of bird impacts that may emerge as the post-construction monitoring programme progresses. 11. Depending on the results of the carcass searches, a range of mitigation measures will have to be considered if mortality levels turn out to be significant, including selective curtailment of problem turbines during high risk periods. 12. If turbines are to be lit at night, lighting should be kept to a minimum and should preferably not be white light. Flashing strobe-like lights should be used where possible (provided this complies with Civil Aviation Authority regulations).	

	13. Lighting of the wind farm (for example security lights) should be kept to a minimum. Lights should be directed downwards (provided this complies with Civil Aviation Authority regulations). 14. The proposed sub-transmission should be marked with Bird Flight Diverters (BFDs) for its entire length on the earth wire of the line, 5 metres apart, alternating black and white. See Specialist Avifauna report for the type of BFD which is recommended. 15. Utilise lights with wavelengths that attract less insects (low thermal/infrared signature), such lights generally have a colour temperature of 5000k (Kelvin) or more. If not required for safety or security purposes, lights should be switched off when not in use. Lights can make use of passive motion sensors to only be operational when a person/vehicle is in the direct vicinity. 16. No turbines should be present within a 5km zone around the Martial Eagle Nests on the Aries – Helios 400kV transmission line (as shown on the revised sensitivity map). 17. Turbines numbers should be restricted to an absolute minimum in the high sensitivity zone (between 5km and 6km from the Martial Eagle nests). 18. Adhere to the Bat sensitivity maps. Turbines situated in moderate sensitivity or their buffers may possibly need to be mitigated during operation, depending on operational results. 19. All turbines are prevented from freewheeling at all times. 20. A post construction bat monitoring programme must be put in place before operation and operational bat monitoring should start when turbines start to operate.	

3.5.9 Social

Table 41: Social

IMPACT	SOCIAL	RESPONSIBILITY
PHASE	**OPERATION**	**Developer**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
	SITE SPECIFIC MITIGATION MEASURES	
MITIGATION	1. In order to increase the benefit to the local economy, thereby improving the intensity of the impact felt by the Hantam LM, operators should procure goods and services locally where possible. 2. The Dwarsrug Wind Farm should be encouraged to procure materials, goods, services and products required for the operation of their businesses from local suppliers to increase the impact on local and regional economies, without jeopardising its own efficiency and competitiveness. 3. Local labour should be considered for employment as far as feasible, and if necessary appropriate skills development programmes should be implemented 4. Local small business should also be approached to investigate the possibility of supplying inputs for maintenance and operations where viable, this should increase local indirect employment creation. 5. In order to improve the chances of skills being developed during the operational period it is recommended that vocational skills transfer/training programmes be developed and knowledge sharing among employees encouraged. 6. It is recommended that the project owner develops a two-year SED and ED programmes throughout the project's lifespan. The plan should be developed in consultation with local authorities and existing strategy documents to	

	identify community projects that would result in the greatest social benefits. With regards to ED initiatives, focus should be on developing plans to support and create sustainable, self-sufficient enterprises. It is important that these plans be reviewed annually and where possible updated. 7. Where possible and feasible, developers should aid local development to increase the likelihood of economic development leading to an increased demand for property and subsequently higher property prices.	

3.6 Decommissioning phase

The mitigation measures presented below are of relevance to the decommissioning of the wind farm. Furthermore, mitigation measures implemented during construction with regards to the construction camp and equipment, and social impacts, will remain the same for the decommissioning phase when a construction camp will need to be established again.

3.6.1 On-going Stakeholder involvement

This is the process that is recommended when the proposed wind farms are decommissioned.

Table 42: On-going Stakeholder involvement

IMPACT	ONGOING STAKEHOLDER INVOLVEMENT	RESPONSIBILITY
PHASE	**DECOMMISSIONING**	**MAINSTREAM**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	1. Community to be notified, as culturally appropriate, timeously of the planned decommissioning, e.g.: ▪ Proposed decommissioning start date; and ▪ Process to be followed. 2. Recommend that a meeting with community leader(s) be held before decommissioning commence to inform them: ▪ What activities will take place during the decommissioning phase. ▪ How these activities will impact upon the communities and/or their properties. ▪ Regarding the timeframes of scheduled activities 3. Regular interaction between Mainstream and community leader(s) during the decommissioning phase 4. A reporting office/ channel to be established should community members experience problems with contractors/ sub-contractors during the decommissioning phase. 5. A register to be kept of problems reported by community members and the steps taken to address / resolve it.	

3.6.2 Community health and safety

Table 43: Community health and safety

IMPACT	COMMUNITY HEALTH AND SAFETY	RESPONSIBILITY
PHASE	**DECOMMISSIONING**	**MAINSTREAM**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	1. Demarcated routes to be established for construction vehicles to ensure the safety of communities, especially in terms of road safety and communities to be informed of these demarcated routes. 2. Where dust is generated by trucks passing on gravel roads, dust mitigation to be enforced. 3. Any infrastructure that would not be decommissioned must be appropriately locked and/or fenced off to ensure that it does not pose any danger to the community.	

3.6.3 Waste Management

Table 44: Waste Management

IMPACT	WASTE MANAGEMENT	RESPONSIBILITY
PHASE	**DECOMMISSIONING**	**MAINSTREAM**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	1. All decommissioned equipment must be removed from site and disposed of at a registered land fill. Records of disposal must be kept. 2. Wind turbines must be returned to the manufacturer or relevant recycling agent to be recycled.	

3.6.4 Surface and Groundwater

Table 45: Surface and Groundwater

IMPACT	SURFACE AND GROUNDWATER	RESPONSIBILITY
PHASE	**DECOMMISSIONING**	**MAINSTREAM**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	1. Removal of any historically contaminated soil as hazardous waste must be undertaken. 2. Removal of hydrocarbons and other hazardous substances by a suitable contractor to reduce contamination risks must be undertaken. 3. Removal of all substances which can result in groundwater (or surface water) contamination must be undertaken. 4. Re-vegetation of exposed soil surfaces to ensure no erosion in these areas is to be undertaken.	

3.6.5 Biodiversity

Table 46: Biodiversity

IMPACT	BIODIVERSITY	RESPONSIBILITY
PHASE	**DECOMMISSIONING**	**MAINSTREAM**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	1. Rehabilitation of exposed surfaces with indigenous species. 2. Adherence to surface and groundwater mitigation measures to prevent secondary impacts on biodiversity. 3. Prevention of expansion of current footprints.	

	SITE SPECIFIC MITIGATION MEASURES	
	Biodiversity 4. All above-ground infrastructure associated with the facility should be removed from the site and recycled where possible. 5. Roads, crane pads, turbine foundation areas and other infrastructure areas that will no longer be used should be rehabilitated. 6. There should be monitoring for erosion and alien plants within the disturbance footprint for at least 5 years following decommissioning. 7. If any part of the facility is to be fenced, then no electrified strands should be placed within 30cm of the ground as some species such as tortoises are susceptible to electrocution from electric fences as they do not move away when electrocuted but rather adopt defensive behaviour and are killed by repeated shocks. Alternatively, the electrified strands should be placed on the inside of the fence and not the outside. **Avifauna** 8. Restrict the decommissioning activities to the facility footprint area. Do not allow any access to the remainder of the property during the decommissioning period. A 1km exclusion zone should be implemented around Brak Pan where no activity should take place. A 2km buffer zone has already been implemented around the Martial Eagle nests.	

3.6.6 Air Quality

Table 47: Air Pollution

IMPACT	AIR POLLUTION	RESPONSIBILITY
PHASE	**DECOMMISSIONING**	**MAINSTREAM**
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	1. Regular maintenance of equipment to ensure reduced exhaust emissions	

4 MANAGEMENT PLANS REQUESTED BY DEA

4.1 Alien Invasive Management Plan

Table 48: Alien Invasive Management Plan

ALIEN INVASIVE MANAGEMENT PROGRAMME	
MITIGATION MEASURES	1. Stockpiles should be kept clear of weeds and alien vegetation growth by regular weeding. 2. Alien vegetation and the spread of exotic species on the site will need to be controlled. 3. The contractor should be responsible for implementing a programme of weed control (particularly in areas where soil has been disturbed); and grassing of any remaining stockpiles to prevent weed invasion. 4. Herbicide use shall only be allowed according to contract specifications. The application shall be according to set specifications and under supervision of a qualified technician. The possibility of leaching into the surrounding environment shall be properly investigated and only environmentally friendly herbicides shall be used. 5. The use of pesticides and herbicides on the site must be discouraged as these can impact on important pollinator species of indigenous vegetation. 6. Six monthly checks of the area should take place for the emergence of invader species. 7. Mitigation measures mentioned for the construction phase above must be implemented for any maintenance of the development that may be undertaken during the operation phase. 8. Correct rehabilitation with locally indigenous species. 9. Monitoring programme to ensure that rehabilitation efforts are successful to ensure that risks such as erosion, spread of exotic species and the edge effect are avoided. 10. Constant maintenance of the area to ensure re-colonisation of floral species. 11. Regular removal of alien species which may jeopardise the proliferation of indigenous species.

4.2 Plant Rescue Protection Plan

Table 49: Plant Rescue Protection Plan

PLANT RESCUE PROTECTION PLAN	
MITIGATION MEASURES	1. Preconstruction walk down of the development site must be undertaken in order to locate species of conservation concern that can be translocated as well as comply with the Northern Cape Nature Conservation Act permit conditions. 2. Vegetation clearing should only commence after the walk down has been conducted and necessary permits obtained. 3. Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared. 4. Vegetation removal must be limited to the wind farm construction site 5. Vegetation to be removed as it becomes necessary rather than removal of all vegetation throughout the site in one step 6. Materials should not be delivered to the site prematurely which could result in additional areas being cleared or affected. 7. No vegetation to be used for firewood. 8. Gathering of firewood, fruit, muti plants, or any other natural material onsite or in areas adjacent to the site is prohibited unless with prior approval of the ECO. 9. Only vegetation within the study area must be removed. 10. Vegetation removal must be phased in order to reduce impact of construction. 11. Construction site office and laydown areas must be clearly demarcated and no encroachment must occur beyond demarcated areas. 12. All natural areas impacted during construction must be rehabilitated with locally indigenous plant species. 13. A buffer zone should be established in areas where construction will not take place to ensure that construction activities do not extend into these areas. 14. Construction areas must be well demarcated and these areas strictly adhered to. 15. The use of pesticides and herbicides in the study area must be discouraged as these impacts on important pollinator species of indigenous vegetation.

	16. Soils must be kept free of petrochemical solutions that may be kept on site during construction. Spillage can result in a loss of soil functionality thus limiting the re-establishment of flora. 17. The grid access power line must span rocky areas in order to avoid transformation in these areas. 18. Soil stockpiles must not become contaminated with oil, diesel, petrol, garbage or any other material, which may inhibit the later growth of vegetation in the soil.

4.3 Re-Vegetation and Habitat Rehabilitation Plan

Table 50: Re-Vegetation and Habitat Rehabilitation Plan

RE-VEGETATION AND HABITAT REHABILITATION PLAN	
MITIGATION MEASURES	1. Re-vegetation should aim to accelerate the natural succession processes so that the plant community develops in the desired way, i.e. promote rapid vegetation establishment 2. Re-vegetation of disturbed surfaces should occur immediately after construction activities are completed. This should be done through seeding with indigenous grasses. 3. All damaged areas shall be rehabilitated upon completion of the contract 4. Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction. 5. All natural areas impacted during construction must be rehabilitated with locally indigenous species typical of the representative botanical unit. 6. Rehabilitation must take place in a phased approach as soon as possible. 7. Rehabilitation process must make use of species indigenous to the area. Seeds from surrounding seed banks can be used for re-seeding. 8. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas. 9. Planting of indigenous tree species in areas not to be cultivated or built on must be encouraged. 10. Habitat destruction should be limited to what is absolutely necessary for the construction of the infrastructure, including the construction of new roads. In this respect, the recommendations from the Ecological Specialist Study

	should be applied strictly. Personnel should be adequately briefed on the need to restrict habitat destruction and must be restricted to the actual construction area. 11. Monitoring programme to ensure that rehabilitation efforts are successful to ensure that risks such as erosion, spread of exotic species and the edge effect are avoided.

4.4 Open Space Management Plan

Table 51: Open Space Management Plan

OPEN SPACE MANAGEMENT PLAN	
MITIGATION MEASURES	1. A buffer zone should be established in areas where construction will not take place to ensure that construction activities do not extend into these areas. 2. Vehicle movement should be restricted to authorised access roads. 3. Before construction begins, all areas to be developed must be clearly demarcated with fencing or orange construction barrier where applicable. 4. All Construction Camps are to be fenced off in such a manner that unlawful entry is prevented and access is controlled. Signage shall be erected at all access points in compliance with all applicable occupational health and safety requirements. All access points to the Construction Camp should be controlled by a guard or otherwise monitored, to prevent unlawful access. 5. The contractor and ECO must ensure compliance with conditions described in the EA. 6. Records of compliance/ non-compliance with the conditions of the authorisation must be kept and be available on request. 7. Records of all environmental incidents must be maintained and a copy of these records be made available to provincial department on request throughout the project execution. 8. Site establishment shall take place in an orderly manner and all required amenities shall be installed at camp sites before the main workforce move onto site. 9. All construction equipment must be stored within this construction camp.

	10. An area for the storage of hazardous materials must be established that conforms to the relevant safety requirements and that provides for spillage prevention and containment 11. The Contractor must provide sufficient ablution facilities, in the form of portable / VIP toilets, at the Construction Camps, and shall conform to all relevant health and safety standards and codes. No pit latrines, French drain systems or soak away systems shall be allowed and toilets may not be situated within 100 meters of any surface water body or 1:100 year flood line. A sufficient number of toilets shall be provided to accommodate the number of personnel working in the area. 12. The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed. 13. No fires will be allowed and the Contractor must make alternative arrangements for heating. LP Gas may be used, provided that all required safety measures are in place. The Contractor shall take specific measures to prevent the spread of veld fires, caused by activities at the campsites. These measures may include appropriate instruction of employees about fire risks and the construction of firebreaks around the site perimeter. 14. Environmental awareness training for construction staff, concerning the prevention of accidental spillage of hazardous chemicals and oil; pollution of water resources (both surface and groundwater), air pollution and litter control and identification of archaeological artefacts. 15. Project manager shall ensure that the training and capabilities of the Contractor's site staff are adequate to carry out the designated tasks. 16. Staff should be educated as to the need to refrain from indiscriminate waste disposal and/or pollution of local soil and water resources and receive the necessary safety training. 17. Staff must be trained in the hazards and required precautionary measures for dealing with these substances

4.5 Erosion Management Plan

Table 52: Erosion Management Plan

EROSION MANAGMENT PLAN	
MITIGATION MEASURES	1. To prevent erosion, material stockpiled for long periods (2 weeks) should be retained in a bermed area. 2. Areas which are not to be constructed on within two months must not be cleared to reduce erosion risks. 3. The area to be cleared must be clearly demarcated and this footprint strictly maintained. 4. The necessary silt fences and erosion control measures must be implemented in areas where these risks are more prevalent. 5. Wind screening and stormwater control should be undertaken to prevent soil loss from the site. 6. The use of silt fences and sand bags must be implemented in areas that are susceptible to erosion. 7. Other erosion control measures that can be implemented are as follows: a. Brush packing with cleared vegetation b. Mulch or chip packing c. Planting of vegetation d. Hydroseeding / hand sowing 8. Sensitive areas need to be identified prior to construction so that the necessary precautions can be implemented. 9. All erosion control mechanisms need to be regularly maintained. 10. Seeding of topsoil and subsoil stockpiles to prevent wind and water erosion of soil surfaces. 11. Retention of vegetation where possible to avoid soil erosion 12. Vegetation clearance should be phased to ensure that the minimum area of soil is exposed to potential erosion at any one time. 13. Re-vegetation of disturbed surfaces should occur immediately after construction activities are completed. This should be done through seeding with indigenous grasses. 14. No impediment to the natural water flow other than approved erosion control works is permitted. 15. To prevent stormwater damage, the increase in stormwater run-off resulting from construction activities must be estimated and the drainage system assessed accordingly. 16. Stockpiles not used in three (3) months after stripping must be seeded to prevent dust and erosion.

4.6 Storm Water Management Plan

A Storm Water Management Plan cannot be compiled until the detailed designs are complete, which will only take place if the Wind Farm is authorised by the DEA and issued with a license by the DoE. It is stipulated in the in this EMPr that a Storm Water Management Plan must be compiled before any construction commences and implemented during the construction phase.

4.7 Monitoring System.

Table 53: Monitoring System

MONITORING SYSTEM	
MITIGATION MEASURES	1. An area for the storage of hazardous materials must be established that conforms to the relevant safety requirements and that provides for spillage prevention and containment. 2. Environmental awareness training for construction staff, concerning the prevention of accidental spillage of hazardous chemicals and oil; pollution of water resources (both surface and groundwater), air pollution and litter control. 3. Spillage packs must be available at construction areas. 4. Proper storage facilities for the storage of oils, paints, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the temporary storage area(s). These pollution prevention measures for storage should include a bund wall high enough to contain at least 110% of any stored volume, and this should be sited away from drainage lines in a site with the approval of the Project Manager. The bund wall must be high enough to contain 110% of the total volume of the stored hazardous material with an additional allocation for potential storm water events. 5. These storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of storm water from surrounding areas in order to ensure that accidental spillage does not pollute local soil or water resources. 6. An approved waste disposal contractor must be employed to remove and recycle waste oil, if practical. The contractor must ensure that its staff is made aware of the health risks associated with any hazardous

	substances used and has been provided with the appropriate protective clothing/equipment in case of spillages or accidents and have received the necessary training. 7. Where contamination of soil is expected, analysis must be done prior to disposal of soil to determine the appropriate disposal route. Proof from an approved waste disposal site where contaminated soils are dumped if and when a spillage / leakage occur should be attained and given to the project manager. 8. Topsoil and subsoil to be protected from contamination. This should be monitored on a monthly basis by a visual inspection of diesel/oil spillage and pollution prevention facilities. 9. Concrete and chemicals must be mixed on an impervious surface and provisions should be made to contain spillages or overflows into the soil. 10. Relevant departments and other emergency services should be contacted in order to deal with spillages and contamination of aquatic environments. 11. Soils must be kept free of petrochemical solutions that may be kept on site during construction. Spillage can result in a loss of soil functionality thus limiting the re-establishment of flora.

4.8 Traffic Management Plan

Table 54: Traffic Management Plan

TRAFFIC MANAGEMENT PLAN	
MITIGATION MEASURES	1. A designated transport coordination manager should be appointed to oversee and manage the traffic safety officers. Additionally, the designated transport coordination manager should inform and keep up-to-date the interested and affected parties of all the activities taking place that may have a direct impact on them. 2. A traffic safety officer shall be nominated to make all the necessary arrangements to maintain the required traffic measures for the duration of the project. The safety officer shall liaise daily with the transportation coordination manager to keep them apprised of the state of all the traffic arrangements. 3. All construction traffic shall comply with the legal load requirements as outlined in the National Road Traffic Act and National Road Traffic Regulations.

	4. Construction traffic entering the site along busy public roads should be limited to times when peak hour traffic can be avoided. The peak traffic occurs during 7h00 to 8h30, and 16h00 to 17h30. Construction traffic can also be restricted further to avoid travelling on public holidays, long weekends, or at night. 5. During periods of high construction traffic entering and exiting the site, it is recommended that flagmen help direct the traffic. This will enable the safe movement of construction and public traffic at the entrance and reduce the number of potential conflicts. 6. Signage will be required along Granaatboskolk Road (AP2972) before the proposed access point for the construction area to warn the public of the activities. 7. Granaatboskolk Road may need to be strengthened and widened at bends to accommodate the abnormal vehicles/loads. If there are any existing bridges/culverts along the road, these will need to be monitored for signs of damage. 8. Any damage caused by the construction vehicles to the existing road infrastructure shall be repaired in kind, prior to the completion of the project. 9. A dust suppression system for the gravel roads shall be in place to prevent excessive dust from the traffic polluting the air.

4.9 Transportation Management Plan

Table 55: Transportation Management Plan

TRAFFIC MANAGEMENT PLAN	
MITIGATION MEASURES	1. For each convoy of abnormal vehicles/loads a designated safety officer shall be nominated. 2. All vehicles used during the transport of materials and in the construction activities are required to be roadworthy per the National Road Traffic Act (NRTA) and display all pertinent certificates as required. 3. For any vehicles that operate under an exemption permit, a roadworthy certificate may not be required; however, the exemption permit will require that the vehicle is fit for operation on public roadways. 4. All vehicles travelling to and from the site shall adhere to all laws imposed by the law enforcement agencies, and shall comply with any requests made by the law enforcement officials. 5. All construction vehicles that are entering the site shall also be available via radio or telephone communication to the transport coordination manager. So that in the event of an emergency, all vehicles can be accounted for. 6. During the delivery of the wind turbine components, the person in charge shall be in communication with transport coordination manager, so that he/she may keep track and document the progress of the vehicles to facilitate any issues that may arise during the transportation phase. 7. All vehicles shall comply with the posted speed limits on public roads as well as the speed limits within the development. 8. All abnormal vehicles and loads to be transported are required to have a valid permit before any trip is begun. 9. The route should be assessed to determine if any structures or vegetation need to be temporarily or permanently relocated so as to avoid damage to the load as well as public and private property during the trips. 10. The route should be evaluated for any overhead conflicts such as overhead bridges and/or overhead lines. 11. An escort is required to accompany the abnormal vehicle to warn the normal travelling public and to promote the safe flow of traffic if the normal flow of traffic is disrupted by the abnormal vehicle. 12. Construction vehicles delivering raw materials to the site shall be covered to prevent any debris along the roads.

4.10 Fire Management Plan

Table 56: Fire Management Plan

FIRE MANAGEMENT PLAN	
MITIGATION MEASURES	1. All Construction Camps shall be provided with portable fire extinguishing equipment, in accordance with all relevant legislation and must be readily accessible. 2. No fires will be allowed and the Contractor must make alternative arrangements for heating. LP Gas may be used, provided that all required safety measures are in place. The Contractor shall take specific measures to prevent the spread of veld fires, caused by activities at the campsites. These measures may include appropriate instruction of employees about fire risks and the construction of firebreaks around the site perimeter. 3. Fire prevention facilities must be present at all storage facilities. 4. No open fires shall be allowed on site under any circumstance. All cooking shall be done in demarcated areas that are safe and cannot cause runaway fires. 5. The Contractor shall have operational fire-fighting equipment available on site at all times. The level of firefighting equipment must be assessed and evaluated through a typical risk assessment process. 6. Fires are not to be allowed outside controlled areas. 7. Emergency numbers for local police and fire department etc. must be placed in a prominent area. 8. Firefighting equipment must be placed in prominent positions across the site where it is easily accessible. This includes fire extinguishers, a fire blanket as well as a water tank. 9. All construction staff must be trained in fire hazard control and firefighting techniques. Translators are to be used where necessary. 10. All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances. 11. Smoking may only be conducted in demarcated areas. 12. Firefighting equipment must be regularly maintained by an appropriate company.

5 CONCLUSION

The environmental and social impacts of the project were identified through the four project phases (pre-construction, construction, operation and decommissioning). Both positive and negative project impacts have been identified. The following section briefly describes some of the major impacts and proposed mitigation measures within each of the project phases.

5.1 Pre-Construction Phase

The first site activities before mobilization of equipment will be a survey, required for final design of wind farm foundations. There will be negative impacts on land associated with the construction of camps (temporary loss) and storage of construction materials, and foundations for the buildings (permanent loss) and wind turbines. Expectations of improvement in livelihood among locals should be addressed through public participation. Construction contracts will include environmental monitoring and management procedures and requirements. These must be in place prior to the commencement of any construction activities. Avifauna and Bat Monitoring programmes have been initiated to document the current baseline of avifauna and bat activity on the site and the area surrounding the site. Once the final site has been selected for the wind farm and the layouts plans have been finalised a detailed geotechnical investigation should be undertaken.

5.2 Construction Phase

This phase of the activity will have both positive and negative impacts. The positive impacts are employment opportunities offered to the construction workers and any other labourer who will be hired to provide their services during the construction phase. The negative impacts would include wastes generated, accidents, health and safety, air, dust and noise pollution, vegetation clearance, soil erosion, socio-environmental issues, loss of vegetation, and compaction of soil. Most of the negative impacts are minor and temporary and the significance of the impacts can be greatly reduced by the implementation of mitigation measures, which are outlined in this EMPr. The contractor shall ensure that all staff have adequate protective clothing and are adequately trained. Avifauna and Bat Monitoring should be initiated to document the impact of the construction phase on Avifauna and bat activity on the site and the area surrounding the site.

5.3 Operational Phase

The proposed project will have minimal negative effects which mainly relates to loss of aesthetic value and habitat. The habitat that will be lost is not regarded as pristine and therefore, is not viewed as significant. Most of the negative impacts are minor and the significance of the impacts can be greatly reduced by the implementation of mitigation measures, which are outlined in this EMPr.

5.4 Decommissioning Phase

As with any project, the facilities used in this project will have a lifetime after which they may no longer be cost effective to continue with operation. At that time, the project would be decommissioned, and the existing equipment removed.

Potential environmental impacts caused during decommissioning are those, which will be mitigated as provided by the Environmental Management Programme. These include: noise and emissions to the surrounding environment, removal of hazardous waste and substances, fire, oil spills, wastes and public safety.

The disposal of materials from the decommissioned plant is not viewed as high risk. Much of the material would be recyclable (steel structures and turbine engines etc.) or inert (concrete foundations, etc.). These materials would however, need to be disposed of at a formal waste disposal or recycling centre.

Based on the above information, it is unlikely that the Project will have significant adverse social and environmental impacts. Most adverse impacts will be of a temporary nature during the construction phase and can be managed to acceptable levels with implementation of the recommended mitigation measures for the Project such that the overall benefits from the Project will greatly outweigh the few adverse impacts.

All the negative impacts could be easily mitigated and will either be moderate or less in rating. Generally, the proposed wind farm will result in appreciable benefits to the people in the project area of influence and bring opportunities for development to the country.

Appendix A

Environmental Incidents

LOG Environmental Incident Log

ENVIRONMENTAL INCIDENT LOG				
Date	**Env. Condition**	**Comments** *(Include any possible explanations for current condition and possible responsible parties. Include photographs, records etc. if available)*	**Corrective Action Taken** (*Give details and attach documentation as far as possible)*	**Signature**

Complaints Record Sheet

Complaints Record Sheet

COMPLAINTS RECORD SHEET	**File Ref:**	**DATE:**
	Page …. of ….	**……**
COMPLAINT RAISED BY:		
CAPACITY OF COMPLAINANT:		
COMPLAINT RECORDED BY:		
COMPLAINT:		
PROPOSED REMEDIAL ACTION:		
ECO: _____ Date: _____		
NOTES BY ECO:		
ECO: _____ Date: _____ Site Manager: _____ Date: _____		

Annexure B

Management of Soils: Guidelines

Topsoil

- Source of topsoil
    - Topsoil shall be stripped from all areas that are to be utilised during the construction period and where permanent structures and access is required. These areas will include temporary and permanent access roads, construction camps, and lay down areas. Topsoil shall be stripped after clearing of woody vegetation and before excavation or construction commences.
    - The topsoil is regarded as the top 300mm of the soil profile irrespective of the fertility appearance, structure, agricultural potential, fertility and composition of the soil.

- Topsoil stripping
    - Soil shall be stripped to a minimum depth of 150mm and maximum depth of 300mm or to the depth of bedrock where soil is shallower than 300mm. Herbaceous vegetation, overlying grass and other fine organic matter shall not be removed from the stripped soil.
    - No topsoil which has been stripped shall be buried or in any other way be rendered unsuitable for further use by mixing with spoil or by compaction using machinery.
    - Topsoil shall preferably be stripped when it is in a dry condition in order to prevent compaction.

- Topsoil stockpiling
    - The Consulting Engineer or Environmental Control Officer shall stockpile stripped topsoil in areas, which have been approved. Soil stockpiles may take the form of windows.
    - To prevent erosion, material stockpiled for long periods (2 weeks) should be retained in a bermed area.
    - Topsoil, mulch and subsoil stockpiles must be placed in higher-lying areas of the silt and must not be positioned within stormwater channels or areas of ponding.
    - Topsoil stripped from different soil zones shall be stockpiled separately and clearly identified as such. Under no circumstances shall topsoil obtained from different soil zones be mixed.
    - Soil stockpiles shall not be higher than 2m or stored for a period longer than one year. The slopes of soil stockpiles shall not be steeper than 1 vertical to 2.5 horizontal.

- No vehicles shall be allowed access onto the stockpiles after they have been placed. Topsoil stockpiles shall be clearly demarcated in order to prevent vehicle access and for later identification when required.
- Soil stockpiles must not become contaminated with oil, diesel, petrol, garbage or any other material, which may inhibit the later growth of vegetation in the soil.
- After topsoil removal has been completed, the Contractor shall apply soil conservation measures to the stockpiles where and as directed by the Consulting Engineer or Environmental Control Officer. This may include the use of erosion control fabric or grass seeding.

- Topsoil replacement
  - Topsoil shall be replaced to a minimum depth of 75mm over all areas where it has been stripped and over disused borrow pits, after construction in those areas has ceased. Topsoil placement shall follow as soon as construction in an area has ceased.
  - All areas onto which topsoil is to be spread shall be graded to the approximate original landform with maximum slopes of 1:25 and shall be ripped prior to topsoil placement. The entire area shall be ripped parallel to the contours to a minimum depth of 300mm.
  - Topsoil shall be placed in the same soil zone from which it had been stripped. However, if there is insufficient topsoil available from a particular soil zone to produce the minimum specified depth, topsoil may be brought from other soil zones at the approval of the Consulting Engineer or Environmental Control Officer.
  - Where topsoil that has been stripped by the Contractor is insufficient to provide the minimum specified depth, the Contractor shall obtain suitable substitute material from other sources at no cost to the employer. The suitability of the substitute material shall be determined by means of soil analyses, which are acceptable to the Consulting Engineer or Environmental Control Officer.
  - No vehicles shall be allowed access onto or through topsoil after it has been reinstated.
  - After topsoil reinstatement is complete, cleared and stockpiled vegetative matter shall be spread randomly by hand over the top soiled area. The vegetative material must be replaced on the areas from where it has been removed.

Annexure C

ESKOM REQUIREMENTS FOR WORK IN OR NEAR ESKOM SERVITUDES.

1) Eskom's rights and services must be acknowledged and respected at all times.

2) Eskom shall at all times retain unobstructed access to and egress from its servitudes.

3) Eskom's consent does not relieve the developer from obtaining the necessary statutory, land owner or municipal approvals.

4) Any cost incurred by Eskom as a result of non-compliance to any relevant environmental legislation will be charged to the developer.

5) If Eskom has to incur any expenditure in order to comply with statutory clearances or other regulations as a result of the developer's activities or because of the presence of his equipment or installation within the servitude restriction area, the developer shall pay such costs to Eskom on demand.

6) The use of explosives of any type within 500 metres of Eskom's services shall only occur with Eskom's previous written permission. If such permission is granted the developer must give at least fourteen working days' prior notice of the commencement of blasting. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued in terms of the blasting process. It is advisable to make application separately in this regard.

7) Changes in ground level may not infringe statutory ground to conductor clearances or statutory visibility clearances. After any changes in ground level, the surface shall be rehabilitated and stabilised so as to prevent erosion. The measures taken shall be to Eskom's satisfaction.

8) Eskom shall not be liable for the death of or injury to any person or for the loss of or damage to any property whether as a result of the encroachment or of the use of the servitude area by the developer, his/her agent, contractors, employees, successors in title, and assignees. The developer indemnifies Eskom against loss, claims or damages including claims pertaining to consequential damages by third parties and whether as a result of damage to or interruption of or interference with Eskom's services or apparatus or otherwise. Eskom will not be held responsible for damage to the developer's equipment.

9) No mechanical equipment, including mechanical excavators or high lifting machinery, shall be used in the vicinity of Eskom's apparatus and/or services, without prior written permission having been granted by Eskom. If such permission is granted the developer

must give at least seven working days' notice prior to the commencement of work. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued by the relevant Eskom Manager

Note: Where and electrical outage is required, at least fourteen work days are required to arrange it.

10) Eskom's rights and duties in the servitude shall be accepted as having prior right at all times and shall not be obstructed or interfered with.

11) Under no circumstances shall rubble, earth or other material be dumped within the servitude restriction area. The developer shall maintain the area concerned to Eskom's satisfaction. The developer shall be liable to Eskom for the cost of any remedial action which has to be carried out by Eskom.

12) The clearances between Eskom's live electrical equipment and the proposed construction work shall be observed as stipulated by Regulation 15 of the Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993).

13) Equipment shall be regarded electrically live and therefore dangerous at all times.

14) In spite of the restrictions stipulated by Regulation 15 of the Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993), as an additional safety precaution, Eskom will not approve the erection of houses, or structures occupied or frequented by human beings, under the power lines or within the servitude restriction area.

15) Eskom may stipulate any additional requirements to highlight any possible exposure to Customers or Public to coming into contact or be exposed to any dangers of Eskom plant.

16) It is required of the developer to familiarise himself with all safety hazards related to Electrical plant.

17) Any third party servitudes encroaching on Eskom servitudes shall be registered against Eskom's title deed at the developer's own cost. If such a servitude is brought into being, its existence should be endorsed on the Eskom servitude deed concerned, while the third party's servitude deed must also include the rights of the affected Eskom servitude.

John Geeringh (Pr Sci Nat)

Senior Environmental Advisor
Eskom GC: Land Development

SiVEST Environmental Division
51 Wessels Road, Rivonia. 2128. South Africa
PO Box 2921, Rivonia. 2128. South Africa

Tel + 27 11 798 0600
Fax +27 11 803 7272
Email info@sivest.co.za
www.sivest.co.za

Contact Person: Stephan Jacobs
Cell No.: +27 72 737 2114
Email: stephanj@sivest.co.za