Environmental Management Programme

Proposed Hugo Wind Energy Facility and associated Infrastructure, Western Cape Province

PREPARED FOR
FE Hugo & Khoe (Pty) Ltd

DATE
23 August 2024

REFERENCE
0695823

DOCUMENT DETAILS

DOCUMENT TITLE	Environmental Management Programme
DOCUMENT SUBTITLE	Proposed Hugo Wind Energy Facility and associated Infrastructure, Western Cape Province
PROJECT NUMBER	0695823
Date	23 August 2024
Version	01
Author	Kgotatso Maarman, Anathi Manyakanyaka
Client name	FE Hugo & Khoe (Pty) Ltd

DOCUMENT HISTORY

				ERM APPROVAL TO ISSUE		
VERSION	REVISION	AUTHOR	REVIEWED BY	NAME	DATE	COMMENTS
01	Draft for Client	Anathi Manyakanyaka and Kgotatso Maarman	Stephanie Gopaul	Stephanie Gopaul	16.08.2024	Draft for client consideration

SIGNATURE PAGE

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0695823

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ACRONYMS AND ABBREVIATIONS

Acronyms	Description
ABC	Activity Based Costing
BARESG	Bird and Renewable Energy Specialist Group
BBBEE	Broad-Based Black Economic Empowerment
BESS	Battery Energy Storage System
BVM	Brede Valley Municipality
CARA	Conservation of Agricultural Resources Act
CBAs	Critical Biodiversity Areas
CEC	Community Engagement Committee
CHSSP	Community Health, Safety, and Security Plan
CoC	Code of Conduct
CRM	Conservation Risk Management
CSI	Community Social Investment
CSR	Corporate Social Responsibility
DAERL	Department of Agriculture, Environmental Affairs, Rural Development, and Land Reform
DBA	A-weighted Decibels
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
DFFE	Department of Forestry, Fisheries, and the Environment
DMRE	Department of Mineral Resources and Energy
DRP	Decommissioning and Restoration Plan
DWAF	Department of Water Affairs and Forestry
EA	Environmental Authorization
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EoL	End-of-Life
ERM	Environmental Resource Management
ESAP	Environmental and Social Action Plan
ESM	Environmental and Social Manager
ESO	Environmental Site Officer

Acronyms	Description
GN	Government Notice
H&S	Health and Safety
Ha	Hectares
HV	High Voltage
I&APs	Interested and Affected Parties
IAPs	Invasive Alien Plants
IFC	International Finance Corporation
IPWIS	Integrated Pollutant and Waste Information System
Li-Ion	Lithium Ion
LV	Low Voltage
MC	Monitoring Committee
MPRDA	Mineral and Petroleum Resources Development Act
MSDS	Material Safety Data Sheets
MW	Megawatts
MWe	Megawatts electrical
NEMWA	National Environmental Management: Waste Act
NEMA	National Environmental Management Act
NFA	National Forests Act
NSR	Noise Sensitive Receptor
NWMS	National Waste Management Strategy
O&M	Operation and Maintenance
OHS	Occupational Health and Safety
OHSA	Occupational Health and Safety Act
PD	Project Director
PIA	Paleontological Impact Assessment
PV	Photovoltaic
S&EIA	Scoping and Environmental Impact Assessment
SABAA	South African Bat Assessment Association
SABS	South African Bureau of Standards
SANS	South African National Standards
SCADA	Supervisory Control and Data Acquisition
SCC	Species of Conservation Concern
SDOD	Shut Down on Demand
SEA	Strategic Environmental Assessment

Acronyms	Description
SED	Socio-Economic Development
SEP	Stakeholder Engagement Plan
SWMP	Storm Water Management Plan
TMP	Traffic Management Plan
ToR	Terms of Reference
ULM	Urban Land Management
WEF	Wind Energy Facility
WTG	Wind Turbine Generator

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 the Developer to carry out parts of the work for the proposed project

Engineer / Project Director (PD): Person/organisation appointed by the Developer to oversee the work of all consultants, sub-developers, contractors, residents and visitors.

Environment: The environment is defined as the surroundings within which humans exist and that are made up of – the land, water and atmosphere of the earth; micro-organisms, plant and animal life; any part or combination of (i) and (ii) and the interrelationships among and between them; and the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental and Social Manager (ESM) also known as the Environmental Control Officer (ECO): Person/organisation appointed by the Developer who will provide direction to the Principal Agent concerning the activities within the Construction site. The ECO will also be responsible to liaise with the independent auditor who will conduct an environmental audit during the construction phase of the project according to the provisions of the Environmental Management Programme.

Independent Auditor: The person or entity who will conduct an environmental audit during the construction phase of the project according to the provisions of the Environmental Management Programme and Environmental Authorisation.

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 EMPr 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.

Therefore the EMPr will be a working document, which will be reviewed when necessary, or if required by the authorities. A revision will be done once the detailed design of the proposed development has been completed.

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: detailed final designs, micro siting, etc. 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 before disruption. Rehabilitation for the purposes of this specification is aimed at post-reinstatement revegetation of a disturbed area and the insurance of a stable land surface. Revegetation 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.

Project Area: This refers to the authorised area for the proposed development to take place. Farm portions numbers are outline in the EMPr.

Local Community: People residing or present in the region and near the construction activities, including the owners and/or managers of land affected by construction, workers on the land, and people in nearby towns and villages.

Public: Any individual or group concerned with or affected by the Project and its consequences, including the local community, local, regional, and national authorities, investors, workforce, customers, consumers, environmental interest groups, and the general public.

Construction Area / Site: The land on which the Project is to be located. It includes the site, construction campsite, access roads and tracks, as well as any other area affected or disturbed by construction activities. The EMPr (particularly the specifications for rehabilitation) is relevant for all areas disturbed during construction.

Access Roads and Tracks: All newly established roads and tracks, and areas cleared or driven over to provide access to/from the construction areas, and for the transportation of the construction workforce, equipment and materials.

Environmental Impact: The effect of an activity on the environment, whether desirable or undesirable. Undesirable or negative environmental impacts will result in damage and/or pollution of, or detriment to the environment, or in danger to the public, whether immediate or delayed.

Environmental Incident: An unexpected or sudden occurrence related to the Project, including major emissions, spills, fires, explosions, floods or erosion leading to serious or potentially serious negative environmental impacts.

Fugitive Dust: Can be defined as natural and/or human-associated dust becoming airborne due to the forces of wind or human activity.

Fauna and Flora / Plants and Animals: Any individual or group of micro-organisms, plants or animals.

General Waste and Construction Rubble It includes waste paper, board, cardboard, benign organic and domestic waste and uncontaminated construction debris such as used bricks, wood, waste concrete, unused subsoil and rubble from excavations or demolished structures.

Heritage Sites and Artefacts: Heritage sites and artefacts can be defined as any object or site of cultural, historical, archaeological or palaeontological significance found in or on the land. Historical objects are objects older than 50 years with architectural, historical, scientific, cultural, social, spiritual, linguistic, technological or aesthetic value. For example: buildings or parts thereof, graves or burial sites, milestones, numismatic objects (i.e. coins and beads), and military objects.

Archaeological objects include material remains resulting from human activity which are older than 100 years and which are in a state of disuse, such as tools, artefacts, human and hominoid remains and artificial features and structures.

Palaeontological objects include any fossilised remains of animals or plants.

Hazardous Substances: Substances which are potentially dangerous and may affect human and/or environmental health. This would be because of the substances' inherent chemical and physical composition, which could be toxic, poisonous, flammable, explosive, carcinogenic or radioactive. Hazardous waste includes, but is not limited to: human excrement, the by-products and wastes associated will the use of hazardous substances (i.e. used fuel, oil, lubricants and solvents), as well as items such as spent batteries, old oil filters, light bulbs, tyres, circuit boards, etc. which requires special collection and handling. When left abandoned, even substances such as scrap metal, wire, tins, broken glass and plastic could be harmful to people, wild and domestic animals. For example: plastic could be ingested by animals; people and animals could be injured by broken glass or metal objects; and animals could get trapped in drums, tins and bottles or get entangled in plastic or metal wiring. Even if buried, such objects may become exposed over time due to wind erosion, scavengers or future human activities. Because of the sensitive nature of the area, these substances are all regarded as 'hazardous waste' for the purposes of this EMPr.

Hydrological Features: Hydrological features include, but are not limited to:

- wetlands;
- open water;
- vegetated drainage channels;
- subterranean water;
- marine environments;
- estuarine environments.

Life Support Systems: Life support systems include, but are not limited to: an ecological system in which its outputs are vital for sustaining specialised habitats; an ecological system in which its outputs are vital for sustaining human life (e.g. water purification).

Mitigation: Environmental management measures designed to avoid, limit or remedy undesirable environmental impacts.

Monitoring: Structured observation, measurement and evaluation of environmental data over a period of time to assess the efficiency of environmental mitigation and rehabilitation measures.

Rehabilitation: Measures implemented to restore a damaged Environment.

Sensitive Sites: Environmentally sensitive sites include, but are not limited to:

- Areas with high conservation value due to the presence of important plant specimens, pristine habitats, high biodiversity, important water resources or heritage features and artefacts;
- Areas particularly prone to erosion once disturbed (i.e. steep slopes);
- Vulnerable areas with low potential for rehabilitation / slow rate of recovery (i.e. rock outcrops, steep slopes); and
- Areas in close proximity of sensitive receptors, such as farm homesteads, viewpoints or tourist stopovers.

Specialised habitats: Specialised habitats include, but are not limited to, areas which are:

- Priority breeding habitats;
- Refuge areas;
- Vital for species survival (important for, part, or all of its life cycle);
- Essential for species performance;
- Cryptic habitats, etc.

EXECUTIVE SUMMARY

The FE Hugo & Khoe (Pty) Ltd ('the Project Applicant') is applying for environmental authorisation to construct and operate the up to 336 MW Hugo Wind Energy Facility (WEF). Additional ancillary infrastructure to the WEF would include underground and above-ground cabling between project components, onsite substation/s, Battery Energy Storage Systems (BESS), foundations to support turbine towers, internal/ access roads linking the wind turbines and other infrastructure on the site, and permanent workshop area and office for control, maintenance and storage. As far as possible, existing roads will be utilised and upgraded (where needed) ('the proposed development'). Environmental Resource Management Southern Africa (Pty) Ltd ('ERM') has been appointed by FE Hugo & Khoe (Pty) Ltd to act as the independent environmental impact assessment practitioner (EAP) to undertake the Scoping and Environmental Impact Assessment (S&EIA) process for Environmental Authorisation under Chapter 5 of the National Environmental Management Act, 1998 (Act 107 of 1998 - NEMA) as amended, for the Proposed Development.

FE Hugo and Khoe also proposed to develop and operate the Khoe WEF which is situated approximately 13 km south east of the Hugo WEF. The Khoe WEF will form part of a separate application process. However, it will run parallel to the Hugo WEF application process. As such, this report is strictly pertaining to the development and operation of the proposed Hugo WEF.

It is important to note that the grid connection will not form part of this S&EIA process. It will, however, be assessed in a separate application process at a later stage.

Site location and proposed development description

The proposed Hugo WEF project site is proposed to accommodate infrastructure (as detailed below), which will enable the wind farm to supply a contracted capacity of up to 336 MW. The development footprint of the site will be up to 100 ha, dependent on the sensitivities in the area. The proposed development will comprise of the following infrastructure:

Hugo WEF components:

- Up to 42 wind turbines with a maximum tip height of up to 250 m and a rotor diameter of up to 200 m.
- Each turbine will have a capacity of up to 8 MW.
- A transformer at the base of each turbine.
- Concrete turbine foundations - approximately up to 1,000 m^2 per turbine.
- Each turbine will have a hardstand of approximately up to 7,500m^2 per turbine.
- Temporary laydown areas (with a footprint of up to 9 ha), which will accommodate the boom erection, storage and assembly area.
- BESS (with a footprint of up to approximately 5 ha).
- Cabling between the turbines, to be laid underground where practical.
- One on-site substation of up to 2.5 ha in extent to facilitate the connection between the WEF and the electricity grid.

- Access roads to the site and between project components inclusive of stormwater infrastructure. A 13.5 m road corridor may be temporarily impacted upon during construction and rehabilitated to 6 m wide after construction.
- A temporary site camp establishment and concrete batching plants (with a combined footprint of up to 1 ha).
- Operation and Maintenance (O&M) buildings (with a combined footprint of up to 1 ha) including a gate house, security building, control centre, offices, warehouses, a workshop and visitor's centre.

The project is expected to have a 20-25-year life span, but with possible refurbishment this could be extended if deemed feasible at the time.

1. INTRODUCTION

FE Hugo and Khoe (Pty) Ltd is applying for an Environmental Authorisation to construct and operate the Hugo Wind Energy Facility (WEF) with a capacity of up to 336 MW. Additional ancillary infrastructure to the WEF would include underground and above-ground cabling between project components, onsite substation/s, Battery Energy Storage Systems (BESS), foundations to support turbine towers, internal/ access roads linking the wind turbines and other infrastructure on the site, and permanent workshop area and office for control, maintenance and storage. As far as possible, existing roads will be utilised and upgraded (where needed). The proposed development is located near the De Doorns town in the Western Cape Province. Hereafter, the proposed Hugo WEF as well as its associate infrastructure will be referred to as the "proposed development".

The proposed development is located approximately 7.5 km southeast of the De Doorns town within the Breede Valley Local Municipality and the Cape Winelands District Municipality of the Western Cape Province

Environmental Resource Management Southern Africa (Pty) Ltd (ERM) has been appointed to act as the independent Environmental Assessment Practitioner (EAP) to compile and submit the Environmental Management Programme (EMPr) to the Department of Forestry, Fisheries and the Environment (DFFE) as part of the Environmental Impact Assessment (EIA) process for the proposed development.

This EMPr is prepared as part of the requirements of the EIA Regulations promulgated under the National Environmental Management Act, 1998 (NEMA, Act 107 of 1998), as amended. The EMPr outlines measures to be implemented in order to minimise adverse environmental degradation associated with the various phases of the development. It serves as a guide for the contractor and the construction workforce on their roles and responsibilities concerning environmental management on site, and it provides a framework for environmental monitoring throughout the life cycle of the development, i.e., from Design phase until after Decommissioning phase.

This document must be seen as dynamic and be updated when and if required, throughout the lifecycle of the project.

1.1 Details of the Developer and the Environmental Assessment Practitioner

Details of the Developer (Applicant)	
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Environmental Assessment Practitioner	
EAP	Stephanie Gopaul
Organisation	Environnemental Resource Management (Pty) Ltd

Details of the Developer (Applicant)	
Qualifications	Masters in Environmental Management, University of the Free State, South Africa, 2012 BSc. Environmental and Engineering Geology, University of KwaZulu Natal, South Africa, 2005
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1.2 Purpose and Aim of this Document

An EMPr for the proposed development is required in terms of the Appendix 4 (Table 1.1) of the National Environmental Management Act, 1998 (Act 107 of 1998), EIA Regulations of 2014 (GNR 326), as amended.

According to the Western Cape's Department of Environmental Affairs and Development Planning (DEA&DP) Guideline for Environmental Management Plans (Lochner 2005), the over-arching objectives of an EMPr is *(1) to ensure compliance with regulatory authority stipulations and guidelines, (2) to ensure sufficient allocation of resources on the project budget, (3) to verify environmental performance through information on impacts as they occur, (4) to respond to changes in project implementation not considered in the EIA, (5) to respond to unforeseen events and (6) to provide feedback for continual improvement in environmental performance.*

The aim of this EMPr is to achieve the above objectives by:

- Defining the environmental management objectives to be realised during the life of the project, in order to enhance benefits and minimise adverse environmental impacts;
- Describing detailed actions needed to achieve these objectives, and mechanisms that address changes in the project implementation, emergencies and unexpected events;
- Clarifying institutional structures, roles, communication and reporting processes;
- Describing the link between the EMPr and associated legislated requirements; and
- Describing requirements for record keeping, reporting, review and auditing.

The purpose of the EMPr is to:

- Encourage good management practices through planning and commitment to environmental issues;
- Define how the management of the environment is reported and performance evaluated;
- Provide rational and practical environmental guidelines to:
- Minimise disturbance of the natural environment;
- Prevent pollution of land, air and water;
- Protect indigenous flora and fauna;
- Prevent soil erosion and facilitate re-vegetation;

- Comply with all applicable laws, regulations, standards and guidelines for the protection of the environment;
- Adopt the best practicable means available to prevent or minimise adverse environmental impacts;
- Identify and mitigate against any potential impact on ecology;
- Describe all monitoring procedures required to identify impacts on the environment; and
- Train employees and contractors with regard to environmental obligations.

This EMPr will be updated to include inputs from interested and affected parties (I&APs) during the public review and comment period. Moreover, it should be considered critical that the EMPr be updated to include site-specific information and specifications as required throughout the life-cycle of the facility - this will ensure that project activities are planned and implemented taking into account a changing environment and sensitive environmental features.

TABLE 1.1 CONTENT OF THE EMPR IN TERMS OF THE NEMA AND APPENDIX 4 OF THE EIA REGULATIONS, 2014 (AS AMENDED)

Appendix 4 Requirements NEMA, 1998 (Act No. 107 of 1998)		**EMPr Reference**
(1) An EMPr must comply with section 24N of the Act and include-details of		
(a)	*the EAP who prepared the EMPr; and* *the expertise of the EAP to prepare an EMPr, including a curriculum vitae;*	*Section 1.1*
(b)	*A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;*	*Section 3*
(c)	*a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitives of the preferred site, indicating any areas that should be avoided, including buffers;*	*Figure 2*
(d)	*a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment processed for all phased of the development including-* *-planning and design;* *-pre-construction activities;* *-construction activities;* *rehabilitation of the environment after construction and where applicable post closure; and* *where relevant, operation activities;*	*Section 4 - 27*
(f)	*a description of proposed impact management actions, identifying the manner in which the impact management outcomes and contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to-* *avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;*	*Section 4 - 27*
	comply with any prescribed environmental management standards or practices;	
	comply with any applicable provisions of the Act regarding closure, whre applicable; and	

Appendix 4 Requirements NEMA, 1998 (Act No. 107 of 1998)		EMPr Reference
	comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;	
(g)	*the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);*	*Section 4 - 27*
(h)	*the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);*	*Section 4 - 27*
(i)	*an indication of the persons who will be responsible for the implementation of the impact management actions;*	*Section 4 - 27*
(j)	*the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;*	*Section 4 - 27*
(k)	*the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);*	*Section 4 - 27*
(l)	*a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;*	*Section 4 - 27*
(m)	*an environmental awareness plan describing the manner in which- the applicant intends to inform his or her employees of any environmental risk which may result from their work; and risks must be dealt with in order to avoid pollution or the degradation of the environment; and*	*Section 4 - 27*
(n)	*any specific information that be required by the competent authority.*	*Section 4 - 27*

2. THE PROPOSED HUGO WEF PROJECT DISCRIPTION

2.1 Hugo WEF Components

2.1.1 Wind turbine generators and hardstand areas

The proposed Hugo WEF will comprise up to 42 turbines (each turbine with an approximate capacity of 8 MW) with a maximum combined output capacity of up to 336 MW with an anticipated lifespan of 20-25 years.

The turbines will be three-bladed horizontal-axis design with a Wind Turbine Generator (WTG) hub height from ground level is anticipated to be up to 150 m, with a blade length and rotor diameter of up to 100 m and 200 m respectively. The height of the complete structure is approximately up to 250 m. The exact turbine model has not yet been selected and will be identified based on the wind resource distribution, technical, commercial and site-specific considerations.

The proposed turbine development footprint and associated facility infrastructure will cover an area of up to 100 ha depending on the final design. The aerial extent of the total AOI is 7,900 ha.

Each turbine will require a transformer that will be located within the turbine tower. Each turbine will have a circular foundation which will be placed alongside the hardstand, resulting in that area being permanently disturbed by the turbine foundation. The dimensions of the turbines provided in this report are preliminary and will be finalized at a later stage of the Project.

The precise location of the turbines within the WEF site has been finalised and confirmed during the EIA process, following the assessment of technical and environmental constraints.

2.1.2 Electrical cabling and on-site substation

It is proposed that an on-site substation with a capacity up to 132 kV with an up to 33 kV overhead / underground powerline will be installed. It is unknown at this stage how long the connection to the grid will be, or what route the cabling will be installed. Due to the complexity related to the routing of the transmission line, it will not form a part of this application. The intention is for the internal project cabling to follow the road network to the on-site facility substation.

The on-site substation is expected to have a footprint of 2.5 ha. It will be used to facilitate the connection to the national grid. The turbines will be connected to the on-site substation using an underground cabling network with a capacity of up to 33kV.

2.1.3 Battery Energy Storage System

The BESS is expected to have a total footprint of approximately 5 ha. The function of the BESS will be to store peak kinetic energy produced by the Hugo WEF for use in the following ways:

- To power the operation of the proposed development when the national grid is strained by high (or peak) demand, often resulting in load-shedding.
- To provide excess generation to the national grid which will assist with stabilizing electricity supply during peaks and troughs of demand.

- To reduce the impact caused by the variability and limited predictability of wind generation.

The preferred battery technology being considered would be Solid-State, Lithium Ion (Li-Ion) batteries, which consists of multiple battery cells that are assembled to form module. Each cell contains a positive electrode, a negative electrode and an electrolyte. A module may consist of thousands of cells working in conjunction. Modules are normally packaged inside containers (like shipping containers) and these containers are delivered pre-assembled to the project site.

The containers will have approximate dimension ranges of: height 5 m, width 3 m, length 20 m. The containers are raised slightly off the ground and are bunded to prevent possible environmental damage resulting from any equipment malfunction. The proposed development is considering the option of stacking these containers vertically to a maximum of two container layers or a height of up to 10 m.

The BESS storage capacity has not been finalized at this point. The BESS will be placed on a concrete footprint of up to 5 ha. The BESS will be near the on-site substation, will be fenced off and will be linked to the substation via internal cables and will not have any additional office / operation / maintenance infrastructure as those of the substation.

The following figures are examples of BESS in other facilities for ease of reference. This proposed development will have similar project components and will be designed in a similar manner.

2.1.4 laydown areas and site offices

Individual turbine temporary laydown areas including crane boom laydown areas, blade laydown areas and other potential temporary areas will be up to a maximum of 6 ha. The temporary warehouse and site camp establishment, as well as the concrete batching plants will have a footprint of up to 2 ha. As such, the footprint of the construction laydown area will be up to 8 ha in aerial extent.

2.1.5 internal site Access roads

Permanent roads will be up to 4.5 m wide, with a servitude of up to 13.5 m, which includes additional space required for cut and fill, side drains and other stormwater control measures. Furthermore, the servitude will be used as turning areas and vertical and horizontal turning radii to ensure safe delivery of the WTG components. Internal roads will provide access to each turbine, the on-site substation hub (which includes substation infrastructure, BESS and Balance of Plant area). All roads may have underground cables running next to them. The 13.5 m wide road servitude will be temporarily impacted during construction and rehabilitated to 4.5 m wide after construction.

2.2 Service Provision

2.2.1 Health and Safety

The IFC guidelines for Health and Safety are based on the Occupational Health and Safety Act (OHSA) of America and are subsequently aligned with South African legislation (OHS Act no 85 of 1993). It is understood that the project infrastructure and equipment will be designed to good industry standards to minimise risks personnel working at the proposed development site.

FE Hugo & Khoe (Pty) Ltd will institute a Health and Safety (H&S) Plan prior to construction, for all persons working at the proposed development site. The policy will need to evaluate the risks and impacts to the health and safety of the affected community during the design, construction and operation of the proposed development, and establish preventive measures to address them in a manner commensurate with the identified risks and impacts within this assessment. Such measures need to adhere to the precautionary principle for the prevention or avoidance of risks and impacts over minimization and reduction.

2.2.2 Water Requirements

Water will be sourced from either the Local Municipality, supplied from a contractor and trucked in, from existing boreholes located within the application site or from a new licensed borehole (if feasible) if none of these options are available. Note, however, that should municipal water supply not be confirmed, the Applicant will investigate other water sources considering any necessary and relevant legal requirements.

High water use is only anticipated during the first twelve months of the construction phase mainly for purposes of the turbine foundations, roads and dust suppression. Thereafter the water usage will decrease drastically. The anticipated water usage for the proposed development for the duration of the construction phase includes the following:

- Drinking;
- Ablution facilities;
- Access Road construction;
- Dust suppression;
- Fire-fighting reserve;
- Cleaning of facilities; and
- Construction of foundations for the WEF infrastructure, i.e., turbines and substation, etc.

The water use requirement during the operational phase will be primarily for human consumption and sanitation purposes.

2.2.3 Stormwater Management

Stormwater drainage systems will be constructed and kept separate from the sewerage effluent system on site to ensure that stormwater run-off from site is appropriately managed. Water from these systems is not likely to contain any chemicals or hazardous substances and will be released into the surrounding environment based on the natural drainage contours.

Wastewater and sludge will be managed by local authorities and service providers. All wastewater will be handled in accordance with the Guidelines for the Utilisation and Disposal of Wastewater Sludge Volumes 1 to 6 (Herselmann & Snyman, 2006).

A project specific stormwater management plan was produced and has been included in the EMPr (Section 18 of this report) for implementation.

2.2.4 Waste Management

During the construction phase, it is estimated that the Hugo WEF would generate solid waste which includes (but is not limited to) packaging material, building rubble, discarded bricks, wood, concrete, plant debris and domestic waste. Solid waste will be collected and temporarily

stockpiled within designated areas on site during construction, and thereafter removed and disposed of at a nearby registered waste disposal facility on a regular basis as per agreement with the local municipality. Where possible, recycling and re-use of materials will be encouraged.

During the operational phase, the WEF will typically produce minor quantities of general non-hazardous waste mainly resulting from the O&M and office areas. General waste will be collected and temporarily stockpiled in skips in a designated area on site and thereafter removed and disposed of at a nearby registered waste disposal facility (or registered landfill) on a regular basis as per agreement with the local municipality. Where possible, recycling and re-use of materials will be encouraged.

The development of the wind energy facility will include the construction and operation of facilities and infrastructure for the storage and handling of dangerous goods (combustible and flammable liquids, such as oils, lubricants, solvents associated with the facility, and facility substation) where such storage will occur inside containers with a combined capacity exceeding 80 cubic meters but not exceeding 500 cubic meters.

Any hazardous waste such as chemicals or contaminated soil as a result of spillages, which may be generated during the construction and operational phases, will be temporarily stockpiled within a designated area on site and thereafter removed off site by a suitable service provider for safe disposal at a registered hazardous waste disposal facility.

It must be noted that waste handling is not yet confirmed and is to be confirmed at a later stage through municipal or private channels. Similarly, the volumes of waste to be generated during construction and operation phases cannot be confirmed at this stage. This being said, the Project will adopt the 4R principle for solid waste management, which includes (in order or priority) to:

- Refuse single use plastics as much as possible;
- Reduce the use of non-recyclable products;
- Reuse solid wastes where possible to convert it into other useful products; and
- Recycle all wastes where possible.

2.2.5 Sewage

The WEF will require sewage services during the construction and operational phases. Low volumes of sewage or liquid effluent are estimated during both phases. Liquid effluent will be limited to the ablution facilities during the construction and operational phases. Portable sanitation facilities (i.e. Chemical toilets) will be used during the construction phase, which will be regularly serviced and emptied by a registered contractor on a regular basis.

The Applicant may consider a conservancy tank system which will be employed on site during the operational phase for which a registered company will be contracted to store and transport sewage from site to an appropriate municipal wastewater treatment facility.

2.2.6 Electricity for Construction Phase

Electricity on site will be from on-site diesel generators as well as sourced from the national grid distribution networks.

2.3 Summary of Project Information

WEF Technical Details

WEF Technical Details Components	Description/Dimensions - Hugo
Maximum Generation Capacity	Up to 336MW
Turbine Capacity	Up to 8 MW
Type of technology	Onshore Wind
Number of Turbines	Up to 46
WTG Hub Height from ground level	Up to 150 m
Blade Length	Up to 100 m
Rotor Diameter	Up to 200 m
Structure height (Tip Height)	Up to 250 m
Structure orientation	Wind regime dependent
Area occupied by both permanent and construction laydown areas	Concrete turbine foundations - approximately up to 1,000 m^2 per turbine Each turbine will have a hardstand area of approximately up to 7,500 m^2 per turbine Temporary laydown areas (with a combined footprint of up to 9 ha) which will accommodate the boom erection, storage and assembly area; A temporary site camp establishment and concrete batching plants (with a combined footprint of up to 1 ha)
O&M building with parking area	Up to 1 ha
Site Access	Via the R318
Area occupied by inverter transformer stations/substations	Up to 2.5 ha
Capacity of on-site substation	132/33kv
Battery Energy Storage System footprint	Up to 5 ha
BESS type	Lithium-ion technology
Width of internal roads	Access roads to the site and between project components with a width of approximately 4.5 m and a servitude of 13.5 m.
Proximity to grid connection	This has not been determined at this stage of the Project.
Internal Cabling	Cabling between the turbines, to be laid underground where practical.
Height of fencing	Up to 3 m

Proposed Hugo WEF Site Boundary and Associated Infrastructure		
Aspect	Latitude	Longitude
WEF Boundary		
Reference Point 1	33° 25' 5.41'' S	19° 52' 34.15'' E
Reference Point 2	33° 25' 45.85'' S	19° 54' 1.13'' E
Reference Point 3	33° 28' 49.57'' S	19° 52' 34.48'' E
Reference Point 4	33° 29' 44.63'' S	19° 52' 48.24'' E
Reference Point 5	33° 29' 47.80'' S	19° 51' 37.40'' E
Reference Point 6	33° 30' 14.92'' S	19° 51' 38.75'' E
Reference Point 7	33° 31' 5.43'' S	19° 49' 7.10'' E
Reference Point 8	33° 31' 2.35'' S	19° 47' 4.33'' E
Reference Point 9	33° 32' 16.45'' S	19° 47' 54.47'' E
Reference Point 10	33° 32' 0.538'' S	19° 46' 30.43'' E
Reference Point 11	33° 32' 13.39'' S	19° 45' 20.59'' E
Reference Point 12	33° 31' 49.58'' S	19° 44' 52.11'' E
Reference Point 13	33° 30' 20.36'' S	19° 45' 7.29'' E
Reference Point 14	33° 30' 14.75'' S	19° 45' 50.19'' E
Reference Point 15	33° 28' 51.93'' S	19° 46' 12.05'' E
Reference Point 16	33° 28' 43.29'' S	19° 49' 20.97'' E
Reference Point 17	33° 28' 43.29'' S	19° 49' 20.97'' E
Preferred Laydown Area		
Northwest Corner	33° 27' 47.21'' S	19° 49' 39.97'' E
Northeast Corner	33° 27' 48.87'' S	19° 49' 56.74'' E
Southeast Corner	33° 27' 57.85'' S	19° 49' 56.35'' E
Southeast Point 1	33° 27' 57.57'' S	19° 49' 52.71'' E
Southeast Point 2	33° 27' 56.41'' S	19° 49' 52.72'' E
Southeast Point 3	33° 27' 55.75'' S	19° 49' 46.56'' E
Southeast Point 4	33° 27' 52.92'' S	19° 49' 46.93'' E
Southwest Corner	33° 27' 52.11'' S	19° 49' 39.35'' E
Preferred BESS		
Northwest Corner	33° 27' 52.11'' S	19° 49' 39.35'' E
Northeast Corner	33° 27' 52.92'' S	19° 49' 46.93'' E
Southwest Corner	33° 28' 0.29'' S	19° 49' 38.1'' E
Southeast Corner	33° 28' 0.71'' S	19° 49' 45.97'' E
Preferred Substation		
Northwest Corner	33° 27' 55.75'' S	19° 49' 46.56'' E

Proposed Hugo WEF Site Boundary and Associated Infrastructure		
Northeast Corner	33° 27' 56.41'' S	19° 49' 52.72'' E
Southeast Corner	33° 28' 1.15'' S	19° 49' 52.36'' E
Southwest Corner	33° 28' 0.71'' S	19° 49' 45.97'' E
Preferred OMM		
Northwest Corner	33° 27' 57.85'' S	19° 49' 56.35'' E
Northeast Corner	33° 27' 48.87'' S	19° 49' 56.74'' E
Southeast Corner	33° 28' 1.39'' S	19° 49' 55.94'' E
Southwest Corner	33° 28' 1.15'' S	19° 49' 52.36'' E
Alternate Laydown Area		
Northwest Corner	33° 28' 47.06'' S	19° 49' 5.89'' E
Northeast Corner	33° 28' 48.27'' S	19° 49' 10.78'' E
Southeast Corner	33° 29' 4.83'' S	19° 49' 7.17'' E
Southwest corner	33° 29' 3.22'' S	19° 48' 58.35'' E
Southeast Point 1	33° 28' 59.72'' S	19° 48' 58.94'' E
Southeast Point 2	33° 28' 59.94'' S	19° 49' 0.21'' E
Southeast Point 3	33° 28' 53.91'' S	19° 49' 1.52'' E
Southwest Point 4	33° 28' 54.53'' S	19° 49' 4.24'' E
Alternative BESS		
Northwest Corner	33° 28' 44.87'' S	19° 48' 58.03'' E
Northeast Corner	33° 28' 47.06'' S	19° 49' 5.89'' E
Southeast Corner	33° 28' 54.53'' S	19° 49' 4.24'' E
Southwest Corner	33° 28' 52.74'' S	19° 48' 56.59'' E
Alternative Substation		
Northwest Corner	33° 28' 52.74'' S	19° 48' 56.5'' E
Northeast Corner	33° 28' 53.91'' S	19° 49' 1.52'' E
Southeast Corner	33° 28' 59.94'' S	19° 49' 0.21'' E
Southwest Corner	33° 28' 58.99'' S	19° 48' 55.47'' E
Alternative OMM		
Northwest Corner	33° 28' 58.99'' S	19° 48' 55.47'' E
Northeast Corner	33° 28' 59.72'' S	19° 48' 58.94'' E
Southeast Corner	33° 29' 3.22'' S	19° 48' 58.35'' E
Southwest Corner	33° 29' 2.59'' S	19° 48' 54.81'' E

3. LEGAL FRAMEWORK

Any EA obtained from the DFFE or any other competent authority only applies to those specific listed activities for which the application was made. The applicable Listed Activities are presented in Table 3.1 below. This section of the EMPr will need to be updated to include the recommendations and requirements that are outlined in the EA, should this project be authorised by the DFFE.

TABLE 3.1 NEMA LISTED ACTIVITIES IN RELATION TO THE PROPOSED DEVELOPMENT

Listing Notices 1, 2 and 3 07 April 2017 (as amended)	**Listed Activity**	**Description of project activity that triggers listed activity**
Listing Notice 1 – GNR 327		
Listing Notice 1 GN R 327 Activity 11(i)	*The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts;*	FE Hugo and Khoe propose to develop an on-site substation at the WEF location with a capacity of 132 kV to facilitate the connection to the national grid. The turbines will be connected to the on-site substation via cabling with a capacity of 33 kV or more, the development footprint for the facility substation is located outside of an urban area.
Listing Notice 1 GN R 327 Activity 12(ii)(a)(c)	*The development of– (ii) infrastructure or structures with a physical footprint of 100 square metres or more; Where such development occurs- (a) within a watercourse; or (c) within 32 metres of a watercourse*	The WEF will require the establishment of infrastructure (including internal access roads) with a physical footprint exceeding 100m^2 within or within 32m of drainage features, ephemeral washes or streams present within the project site.
Listing Notice 1 GN R 327 Activity 14	*The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic meters or more but not exceeding 500 cubic meters.*	The development of the WEF will include the construction and operation of facilities and infrastructure for the storage and handling of dangerous goods (combustible and flammable liquids, such as oils, lubricants, solvents associated with the facility, and facility substation) where such storage will occur inside containers with a combined capacity exceeding 80 m^3 but not exceeding 500 m^3. The volumes are not known at the time but will have a maximum combined capacity of 490 m^3.
Listing Notice 1 GN R 327 Activity 19(i)	*The infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal or moving of soil, sand shells, shell grit, pebbles or rock of more than 10 cubic meters from a watercourse.*	Drainage features, ephemeral washes or streams are present within the project sites. During the construction phase, more than 10 m^3 of rock will be removed from drainage features for the construction of the WEF and associated infrastructure.
Listing Notice 1 GN R 327 Activity 24(ii)	*The development of a road— (ii) with a reserve wider than 13,5 meters, or where no*	The width of the internal access roads between the project components will be approximately 8 m but may be up to 10 m

Listing Notices 1, 2 and 3 07 April 2017 (as amended)	Listed Activity	Description of project activity that triggers listed activity
	reserve exists where the road is wider than 8metres;	wide where required for the movement of the crane between turbine positions
Listing Notice 1 GN R 327 Activity 28(ii)	*Residential, mixed, retail, commercial, industrial, or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development* *(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.*	The total area to be developed for the WEF (including the facilities substation) are greater than 1 ha and occurs outside an urban area and is currently used for agricultural purposes, mainly grazing. The WEF is located outside an urban area. The proposed development is approximately 100 ha.
Listing Notice 1 GN R 327 Activity 56(i)(ii)	*The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre –* *(i) where the existing reserve is wider than 13,5 meters; or* *(ii) where no reserve exists, where the existing road is wider than 8 metres.*	Existing farm roads within the project site will be widened to up to 8 m and/or lengthened by more than 1 km to accommodate the movement of heavy vehicles and cable trenching activities.
Listing Notice 2 – GNR 325		
Listing Notice 2 GN R 325 Activity 1	*The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more.*	The Hugo WEF is anticipated to have an electricity capacity of up to 336 MW.
Listing Notice 2 GN R 325 Activity 15	*The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for-* *(i) the undertaking of a linear activity*	The total for the Hugo WEF is ~7,900 ha, with a development footprint of up to 100 ha. The project is proposed on a property where the predominant land use is grazing and comprises of indigenous. vegetation. It is therefore anticipated that over 20 ha of indigenous vegetation will be cleared as a result of the development.
Listing Notice 3 – GNR 324		
Listing Notice 3 GN R 324 Activity 4(i)(ii)(aa)	*The development of a road wider than 4 metres with a reserve less than 13,5 metres* *(i) in the Western Cape,* *(ii) outside urban areas (aa) within areas containing indigenous vegetation*	Existing roads on the affected properties will be used where feasible and practical. The width of the main access roads at the access points will be up to 8 m. The WEF will have internal access roads of up to 4.5 m wide, with a servitude of up to 13.5 m, which will include additional space required for cut and fill, side drains and other stormwater control measures, turning areas and vertical and horizontal turning radii to ensure safe delivery of the WTG components. Internal roads will provide access to each turbine, the on-site substation hub (which includes substation

Listing Notices 1, 2 and 3 07 April 2017 (as amended)	**Listed Activity**	**Description of project activity that triggers listed activity**
		infrastructure, BESS and Balance of Plant area). The project site is located within the Western Cape Province, outside of an urban area on land containing indigenous vegetation.
Listing Notice 3 GN R 324 Activity 18(i)(ii)(aa)	*The widening of a road by more than four (4) meters, or the lengthening of a road by more than one (1) kilometre within (i) the Western Cape, and in (ii) Areas on the watercourse side of the development setback line or within 100 metres from the edge of a watercourse where no such setback line has been determined; (aa) Areas containing indigenous vegetation.*	Existing farm roads within the project site will be widened to up to 10 m. The project site is located in the Western Cape, outside of an urban area, on land containing indigenous vegetation and within 100 m of the edge of a watercourse.

4. ENVIRONMENTAL MANAGEMENT PROGRAMME

This section forms the core of the EMPr and outlines the specific mitigation measures for those key impacts identified for the development of the Hugo WEF.

4.1 Environmental Awareness and Compliance

The philosophy that has been used for the compilation of this management programme is derived from the principles of the NEMA, 1998 (Act No. 107 of 1998) which states that development must be socially, economically and environmentally sustainable. Sustainable development requires that:

- The disturbance of ecosystems and loss of biodiversity are avoided (minimised or remedied).
- Pollution and degradation of the environment are avoided or minimised and remedied.
- Waste is avoided or minimised and re-used or re-cycled where possible and otherwise disposed of in a responsible manner.
- A risk averse and cautious approach is applied.
- Negative impacts on the environment and on people's environmental rights be anticipated, and, prevented and where they cannot altogether be prevented, are minimised and remedied.

The Act makes provision that anyone who causes pollution or degradation of the environment is responsible for preventing impacts occurring, continuing or recurring and for the costs of repair of the environment.

4.1.1 Legally Binding Documents

Should favourable decision be received for the proposed development, a copy of the EA, the audit and compliance monitoring reports, and the approved EMPr, must be made available for inspection and copying during all phases of the development -

- At the site of the authorised activity;
- To anyone on request; and
- Where the holder of the EA has a website, on such publicly accessible website.

4.2 Roles And Responsibilities For Good Environmental Management

The developer, together with the appointed contractor, will be responsible for environmental management on site during all phases of (construction, operation and decommissioning) the development. Specific roles and responsibilities are highlighted below.

4.2.1 Environmental Manager - Developer Representative

- Review and approve final EMPr prior to authorisation by the DFFE.
- Review and approve any EMPr updates or amendments post approval of the EMPr.
- Ensure environmental requirements are integrated into the project plans, method statements and tender processes.
- Support the site environmental control officer (ECO) during the construction phase, to ensure implementation of the EMPr.

- Follow up and close out all environmental incidents and non-conformances.
- Appoint a suitably qualified independent ECO during the construction phase.

4.2.2 Environmental Control Officer - Principal Contractor Representative

An independent ECO will work along-side the Environmental Site Officer (ESO) to conduct the required inspections of the construction activities and EMPr implementation throughout the construction phase. After each monthly inspection, the ECO will produce a monitoring report that will be submitted to Developer / Applicant, the DFFE, and any other person(s) if required. Relevant sections of the minutes of customary (monthly) site meetings will be attached to the monitoring report.

The ECO will be responsible for overseeing the implementation of the EMPr during the construction and operations phases, and for monitoring, reviewing and verifying compliance of the ESO and contractor with the EMPr, record-keeping and updating of the EMPr as and when necessary.

The ECO will:

- Be fully knowledgeable of the contents of the EMPr.
- Be fully knowledgeable of the contents of all relevant environmental legislation and ensure compliance with them.
- Communicate the contents of the EMPr to the contractor, all site staff, and the contractor and /or site manager are made aware of the contents of the EMPr, through presentations and discussions.
- Monitor compliance to the EMPr by regular and comprehensive inspection of the site and surrounding areas.
- Report on any incidents of non-compliance and ensure mitigation measure are implemented as soon as practical.

During construction, the ECO will be responsible for the following:

- Meeting on site with the Construction Manager and ESO prior to the commencement of construction activities to confirm the construction procedure and designated activity zones.
- Ensuring that daily / weekly (depending on the extent of construction activities, at any given time) monitoring of site activities take place by the ESO to ensure adherence to the specifications contained in the EMPr. The ESO should use a monitoring checklist that is to be prepared by an independent environmental assessment practitioner (EAP) at the start of the construction phase.
- Preparation of the monitoring report based on the site visits and feedback by the ESO.
- Conducting an environmental inspection on completion of the construction period and signing off the construction process with the Construction Manager and ESO.
- Ensuring that the ESO maintains an Incidents Register and Complaints Register on site.

During operation, the Environmental Control Officer will be responsible for:

- Overseeing the ESO during the implementation of the EMPr for the operation phase.

- Ensure that the necessary environmental monitoring takes place as specified in the EMPr.
- Update the EMPr and ensure that records are kept of all monitoring activities and results.
- Ensuring that the ESO maintains an Incidents Register and Complaints Register on site.

During decommissioning, the Environmental Control Officer will be responsible for:

- Overseeing the ESO during the implementation of the EMPr for the decommissioning phase.
- Conducting an environmental inspection on completion of decommissioning and "signing off" the site rehabilitation process.

4.2.3 Environmental Site Officer – Nominated Contractor Representative

The ECO must appoint a nominated representative of the contractor as the Environmental Site Officer (ESO). The independent ESO is required to be on site at all times and will conduct the required inspections of the construction activities and ensure implementation of the EMPr throughout the construction phase. After each inspection, the ESO is required to submit a completed monitoring checklist to the ECO.

The ESO will be responsible for ensuring the implementation of the EMPr during the construction and operations phases by the contractor and providing feedback to the ECO regarding the compliance of the contractor with the EMPr and any updates required to the EMPr as and when necessary.

The ESO will:

- Be fully knowledgeable with the contents of the EMPr.
- Be fully knowledgeable with the contents of all relevant environmental legislation and ensure compliance with them.
- Ensure that the contents of the EMPr are implemented by the contractor, all site staff.
- Ensure that compliance to the EMPr is monitored by regular and comprehensive inspection of the site and surrounding areas.
- Report on any incidents of non-compliance to the ECO and ensure mitigation measures are implemented as soon as practical.

Contractor

An independent contractor who will be responsible for the implementation of the EMPr in accordance with the requirements of the EA.

The Contractor will:

- Be fully knowledgeable of the contents of the EMPr.
- Communicate and develop understanding of the contents of the EMPr by all staff on site and other relevant staff.
- Report on any incidents of non-compliance to the ESO and ensure mitigation measures are implemented as soon as practical.

4.2.4 Environmental Auditor

The Developer must appoint an Independent Environmental Auditor. The independent Auditor is required to undertake routine site visits (at least every three months) to conduct the required inspections of the compliance with the EA and EMPr during the construction and post construction phase of the activities. After each inspection, the auditor is required to submit an environmental audit report to the DFFE.

The Auditor will:

- Be fully knowledgeable of the contents of the EMPr.
- Be fully knowledgeable of the contents of all relevant environmental legislation and monitoring compliance with them.
- Submit reports to the DFFE.

4.2.5 Frequency for Auditing of Compliance and Submission of Reports

The Auditor will arrange for inspections of the activities and EMPr implementation throughout the construction and post construction phase. After each inspection, the auditor will produce an environmental audit report that will be submitted to the client, DFFE, Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAERL), and any other stakeholder as required. The monitoring reports, recommended to be produced by the ECO must be appended to the audit reports for submission.

The frequency of auditing and submission of the environmental audit reports must be at least every three months, or what is deemed necessary in consultation with the ECO during times of heavy earth works and vegetation clearing and ensuring compliance with all aspects of the EA and EMPr.

4.3 Training and Induction of Employees

The ECO has a responsibility to ensure that all personnel involved in the project are aware of and are familiar with the environmental requirements for the project. The EMPr shall be part of the terms of reference (ToR) for all contractors, sub-contractors and suppliers. All Contractors have to give some assurance that they understand the EMPr and that they will undertake to comply with the conditions therein. All senior and supervisory staff members shall familiarise themselves with the full contents of the EMPr. They shall know and understand the specifications of the EMPr and be able to assist other staff members in matters relating to the EMPr.

The ECO and / or ESO must ensure that all staff working on site have an environmental induction. The presentation can include the following topics;

- 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 militate against such impacts?
- Awareness of emergency and spills response provisions.
- Social responsibility during construction e.g. being considerate to local residents.

A detailed environmental management and training program must be developed. The purpose of this is to ensure that all staff and workers understand what is required of them. The main components of the program can incorporate the following:

- Concept of sustainability and the reasons for good environmental management and practice.
- Potential environmental impacts.
- Mitigation measures.
- Establishing a chain of responsibility and decision making.
- Specific training requirements of certain staff, and the potential hazardous associated with the job.
- Methodologies to be used for field sampling.
- Training in the use of field equipment.
- Training in identification of non-compliance situations and procedures to be followed in such instances.
- Reporting requirements.
- Healthy and Safety.
- Fire management.
- HIV/AIDS.

4.4 Complaints Register and Environmental Incidents Book

Any complaints received from the community must be brought to the attention of the ECO / ESO, who will respond accordingly.

The following information will be recorded:

- Time, date and nature of the complaint;
- Response and investigation undertaken; and
- Actions taken and by whom.

All complaints received will be investigated and a response (even if pending further investigation) will be given to the complainant within 7 days.

All environmental incidents occurring on the site will be recorded. The following information will be provided:

- Time, date, location and nature of the incident; and
- Actions taken and by who.

4.5 Construction Environmental Monitoring

In order to facilitate communication between the Environmental Manager, the ECO (and the ESO), it is vital that a suitable chain of command is structured that will ensure that the ECO's recommendations have the full backing of the project team before being conveyed to the Contractor. In this way, penalties as a result of non-compliances with the EMPr may be justified as failure to comply with instruction from the highest authority.

4.6 Dealing with Non-Compliance with the EMPr

There may be difficulties encountered with carrying out the mitigation measures within the EMPr, this may result in non-compliance with the EMPr. It may be possible that the contractor and or the developer put in place procedures to motivate staff members to comply with the EMPr and to deal with non-compliance. The developer must make this known to the contractor at the earliest stage possible, even during the tender phase. When dealing with non-compliance, the following process is recommended to take place:

- A notice of transgression should be issued to the transgressor;
- It must be documented in a designated register; and
- It must be reported in a monthly report and made available to I&APs and DFFE upon request.

National government, provincial government, local authorities or committees appointed in terms of the conditions of this authorisation or any other public authority shall not be held responsible for any damages or losses suffered by the holder of the authorisation or his/her successor in title in any instance where construction or operation subsequent to construction be temporarily or permanently stopped for reasons of non-compliance by the holder of the authorisation with the conditions of authorisation as set out in this document or any other subsequent document emanating from these conditions of authorisation.

4.7 EMPr Amendments and Instructions

No EMPr amendments shall be allowed without the approval of the DFFE. Amendments may be possible, following discussions with the relevant ECO, who may propose EMPr amendments on behalf of the developer or issue EMPr instructions, corrective actions, remediation or rehabilitation. These correction actions must be completed within the specified timeframes.

5. OBJECTIVES AND GENERAL MITIGATION MEASURES- DESIGN PHASE / PRE–CONSTRUCTION PHASE

The objectives of the pre-construction phase are:

- To promote environmental awareness.
- To define roles and responsibilities for environmental management.
- To ensure suitable environmental training and induction to all contractors, sub-contractors and labourers.
- To ensure that all legal obligations and contractual conditions have been met prior to commencing of construction.
- To ensure that the facility design responds to the identified environmental constraints and opportunities.
- To implement effective communication methods and practices.

5.1 Mitigation Measures for Legal Compliance

- Appoint an independent ECO.
- Appoint an internal ESO to oversee day to day environmental activities.
- 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.
- The contractor must ensure conditions described in the EA are adhered to.
- Confirm with ESO / ECO, suitable sites for the construction camps (equipment and batching etc.) and storage areas for materials. All construction equipment must be stored within this construction camp and all associated oil changes etc. (no servicing) must take place within this camp.
- Unskilled labourers should be drawn from the local market where possible.
- Environmental awareness training for site personnel, 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.
- The Contractor, together with the ESO shall ensure that the training and capabilities of the Contractor’s site staff are adequate to carry out the designated tasks. Training developed by the Contractor and ESO must be approved by the ECO.
- Site personnel operating light, and heavy duty equipment (such as excavators, loaders, etc.) shall be adequately trained and sensitised to any potential hazards associated with their tasks.
- 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.
- Before construction begins, all areas to be developed must be clearly demarcated with fencing, by a qualified surveyor.
- No construction camps are allowed on site. No workers are allowed to stay overnight in the construction area.

- The developer is to compile and implement a grievance mechanism procedure for the public.
- The contractor to develop a Construction Site Traffic Management Plan – this will be in the form of a site layout, showing the flow of traffic during the construction phase taking into consideration existing land users.
- Once the final layout plan has been approved the appointed responsible engineers must produce an updated storm water management plan (SWMP) for the site, during the construction and operational phases of the project. An effective SWMP will include bunds and ditches, where it is required - that is at all points of disturbance where water accumulation might occur. The system must effectively collect and safely disseminate any run-off water from all hardened surfaces and it must prevent any potential down slope erosion.
- A health and safety plan must be drawn up to ensure worker safety.
- Develop a Project Layout and Access Plan to show the intended use of the area. The plan shall clearly indicate and/or describe the location and details of the final:
    - Servitudes.
    - Areas and routes to be cleared – including the size / width of the cleared areas.
    - The construction campsite and rest areas to be used during construction.
    - Waste disposal sites to be used during construction.
    - Sources of construction materials.
    - Power supply during construction.
    - Existing roads and tracks to be used as transportation routes, and routes to gain access to construction areas.
    - New tracks deemed necessary to provide access to construction activities.
    - Any informal residential structures found within the property.
    - Affected land use, 1:50 year floodlines.
    - Sensitive areas.

5.2 Site Establishment

The object of site establishment is to ensure that an appropriate site is selected for the construction camp/site office and that the site office is managed in an environmentally responsible manner with minimal impact on the environment.

The optimised site layout (including the location of construction camps and laydown areas) must be finalised through a micro-siting process, which will include a detailed site assessment of the final site layout by various specialists as stipulated in the EA and this draft EMPr.

5.2.1 Mitigation Measures

Before establishing the construction office areas, carefully plan the layout and develop a Construction Site Office Plan[1]. The Construction Site Office Plan shall provide a description of

[1] To form part of the Project Layout and Access Plan.

the site and shall show, on a reasonably scaled map, the intended use of the site. Indicate and/or describe the location, size / quantity / capacity and design of:

- Access routes.
- Ablution facilities (including details on the handling of sewage and wastewater).
- On-site waste management facilities (waste containers, etc.).
- Design of bunds and other structures for containment of hazardous substances.
- Fencing.
- Water storage and supply.
- Power supply (for cooking, space heating, lighting, etc.).
- Fire extinguishers, first aid kit and any other relevant safety equipment.
- Other structures and buildings (offices, storerooms, workshops, etc.).
- Other storage areas and stockpiles (i.e. topsoil, construction materials, equipment, etc.).
- Location of areas to be rehabilitated upon completion of the construction period, providing measures to be used for rehabilitation.

The following requirements must be complied with:

- An area within the site must be demarcated for a construction site office, which will include storage area. This area must be fenced off.
- Site establishment shall take place in an orderly manner and all required amenities shall be installed at the lay down area before the main workforce move onto site.
- The construction camp shall have the necessary ablution facilities with chemical toilets at commencement of construction.
- During the pre-construction phase, the temporary construction camps and laydown areas must be located outside of the water courses (including the 45 m buffer).
- The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed other than in supplied facilities.
- The Contractor shall supply waste collection bins and all solid waste collected shall be disposed of at a registered landfill.
- Potable water for use by on site workers must be made available on a daily basis at the site office and the working areas on site.
- A certificate of disposal shall be obtained by the Contractor and kept on file. 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.
- The disposal of waste shall be in accordance with all relevant legislation. Under no circumstances may solid waste be burnt or buried on site.
- Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes topics such as no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas etc.
- Apply for all relevant permits for abnormal loads and route clearances with the relevant authorities prior to construction.

- Appoint a qualified specialist to conduct a detailed site-specific Transport Risk Assessment during the detailed design phase and prior to construction.
- Determine the pre-construction condition of the road immediately prior to construction by carrying out a condition assessment or from recent pavement management system condition assessments if available from the Provincial Authorities.
- Public notices regarding any planned abnormal load transports must be placed at the construction site to inform affected parties.
- Abnormal loads must conform with legal maximum dimensions, and vehicles carrying abnormal loads must display sufficient signage.
- Any roads damaged during the transportation of components, or from other construction vehicles must be rehabilitated and returned to pre-construction conditions.

5.3 Siting, Establishing and Management Materials

- 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.
- Mitigation measures as provided in this draft EMPr must be adhered to during site establishment.
- Storage areas must be designated, demarcated and fenced.
- Storage areas must be secure so as to minimize the risk of crime. They must also be safe from access by children / animals etc.
- Fire prevention facilities must be present at all storage facilities.
- 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 on site with the approval of the Engineer.
- Any water that collects in the bund must not be allowed to stand and must be removed immediately and the hydrocarbon digestion agent within must be replenished.
- All legal compliance requirements with respect to fuel storage and dispensing must be met.
- All fuel storage tanks (temporary or permanent) and associated facilities must be designed and installed in accordance with the relevant oil industry standards, SANS codes and other relevant requirements.
- Areas for storage of fuels and other flammable materials must comply with standard fire safety regulations2.
- Flammable fuel and gas must be separated from all welding workshops, assembly plants and loading bays where ignition of gas by an accidental spark may cause an explosion or fire.
- The tank must be erected at a safe distance from buildings, boundaries, welding sites and workshops and any other combustible or flammable materials.

[2] https://www.nfast.co.za/gallery/fire%20extinguisher%20regulations.pdf

- Symbolic safety signs depicting "No Smoking", "No Naked Flames" and "Danger" are to be prominently displayed in and around the fuel storage area.
- The capacity of the tank must be clearly displayed and the product contained within the tank clearly identified.
- There must be adequate fire-fighting equipment at the fuel storage and dispensing area or areas.
- The storage tank must be removed on completion of the construction phase of the project.
- All such tanks to be designed and constructed in accordance with the national standard for storage tanks, i.e., ISO 16961:2015 and a recognised international standard code if required.
- The rated capacity of tanks must provide sufficient capacity to permit expansion of the product contained therein by the rise in temperature during storage.
- Only empty and externally clean tanks may be stored on the bare ground. All empty and externally dirty tanks must be sealed and stored in an area where the ground has been protected.
- Any electrical or petrol-driven pump must be equipped and positioned so as not to cause any danger of ignition of the product.
- If fuel is dispensed from 200 litre drums, the proper dispensing equipment must be used.
- The drum must not be tipped in order to dispense fuel. The dispensing mechanism of the fuel storage tank must be stored in a waterproof container when not in use.
- All waste fuel and chemical impregnated rags must be stored in leak-proof containers and disposed of at an approved hazardous waste site.
- The amounts of fuel and chemicals stored on site must be minimised.
- Storage sites must be provided with bunds to contain any spilled liquids and materials.
- 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.
- Clear signage must be placed at all storage areas containing hazardous substances / materials.
- Material Safety Data Sheets (MSDSs) shall be readily available on site for all chemicals and hazardous substances to be used on site. Where possible, the available MSDSs must additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or escapes.
- Storage areas containing hazardous substances / materials must be clearly signed.
- Staff dealing with these materials / substances must be aware of their potential impacts and follow the appropriate safety measures.
- Any hazardous waste handling on site must be undertaken by experienced staff. No mixing of hazardous and general waste should be permitted.
- A suitable Waste Disposal Contractor must be employed to remove waste oil. These wastes must only be disposed of at licensed landfill sites designed to handle hazardous wastes.
- 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.

- All excess cement and concrete mixes are to be contained on the construction site prior to disposal off site.
- Any spillage, which may occur, shall be investigated and immediate action must be taken.

5.3.1 Site Clearance

- Vegetation clearance must preferably be phased as required to work in certain areas, rather than clearing of the entire site initially. If this is not practical and the entire site is cleared at the start of the contract, it is to be stabilized immediately to control dust. Wherever possible, vegetation shall be trimmed rather than cleared.
- Cleared vegetative material is not to be dumped anywhere other than an approved waste disposal site or an area as agreed to with the ECO.
- Wherever possible and where the material is suitable, the material must be chipped for later use as mulch in landscaped areas or for stabilization purposes or it must be dumped at a green waste recycling depot for compost production.
- Invasive alien plant species, which are removed from the site, are not to be chipped for mulch if they are in a seed bearing state. Such material is to be disposed of at a suitable waste disposal site. Wherever possible, suitable larger stumps must be made available to the local community as firewood.
- Plant material removed from the site is not to be burnt for disposal on site unless a burning permit has been obtained from the local authority.
- Sensitive ecosystems in the vicinity of the areas of construction must be demarcated (e.g. using danger tape or droppers) prior to any construction activities, so that these can be avoided.
- Removal of vegetation must be kept to a minimum, and cleared areas must be re-vegetated after clean-up. A detailed planting plan must be developed, in consultation with a landscaper and ecologist.
- Minimise the development footprint as far as possible and rehabilitate disturbed areas that are no longer required by the operational phase of the development
- Demarcate all areas to be cleared with construction tape or similar material. However, caution must be exercised to avoid using material that might entangle fauna.
- An alien control and monitoring program must be adhered to, to ensure that the site is cleared of alien plants (as listed under the Conservation of Agricultural Resources Act 43 of 1983 - as amended/updated) and kept free from alien plants for the duration of the construction phase.
- A low cover of vegetation must be left wherever possible within the construction footprint to bind the soil, prevent erosion and promote post-disturbance recovery of an indigenous ground cover.

5.3.2 Topsoil

Topsoil / top material shall be removed from all areas cleared of vegetation and retained for future landscaping use, where feasible. Top material must exclude litter, building rubble, alien plant material or any other waste.

All topsoil, and specifically any topsoil from areas which are likely to contain bulbs, must be stripped and stockpiled for re-use in rehabilitation. This will constitute at least a 300 mm layer.

Topsoil shall be stored in areas demarcated by the ECO and Engineer and in piles not higher than 2 m, and may not be removed from site, or used for any purpose other than in the rehabilitation of the site post-construction. The stockpiles shall not be compacted or disturbed, and shall be domed at the top to promote runoff. The period between the stockpiling of topsoil and its utilization shall be as short as possible, and ideally the topsoil must be transferred to its intended site of use immediately following site clearance and stockpiling. This would also avoid double handling.

Stockpiles that are to be stored for less than three months must be covered with shade-cloth or Geotech fabrics or similarly suitable material to prevent erosion. If stockpiles are to be stored for more than 3 months a protective vegetation layer must be established to cover topsoil stockpiles in order to protect them against erosion and desiccation. If possible, the stockpile must be kept moist in order to maintain the vitality of the vegetation. Vegetation may not consist of weeds, but must comprise of grass or ground covers.

5.4 Final Site Assessment by Specialists

Prior to the submission of the final layout plan to the DFFE for approval, the following specialists must visit the site to assist with micro-siting the final development layout:

- Aquatic specialist;
- Terrestrial Biodiversity specialist;
- Avifaunal specialist;
- Bat specialist; and
- Archaeological specialist.

Following the selection of turbine to be used for the project, the Developer must update the layout plan / site development plan, this together with the final management plans included in this EMPr must be submitted to the DFFE for approval.

Should any telephone communication lines require moving this will have to be facilitated and approved by Telkom separately and outside of the EIA process.

5.5 Potential Additional Permit Requirements

Activities planned during site preparation, construction and operation may require additional permits (ie. other than the EA). Additional permit requirements which may be required are described below.

5.5.1 Borrow Pits

A borrow pit refers to an open pit where material (soil, sand or gravel rock) is removed for use at another location. FE Hugo and Khoe (Pty) Ltd or their contractors may want to use borrow

pits for certain earthworks operations, such as the construction of roads, embankments, bunds, berms, and other structures. Licensed borrow pits will be used to source material.

The establishment of borrow pits is regarded as a mining activity and is legislated in terms of the Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002) (MPRDA). A mining permit must be obtained from the Department of Mineral Resources and Energy (DMRE) prior to the establishment of borrow pits on the site.

5.5.2 Water Use License

The construction of the WEF and roads may result in water crossings. The developer must ensure that any necessary Water Use Licenses (or general authorizations) are applied for and approved, prior to the start of construction, if required.

There are licensing procedures that need to be followed for particular "water uses" under the National Water Act, 1998 (Act No. 36 of 1998). Water uses that may be of relevance to the development and associated road construction include the following:

- Taking of water from a water resource, including a water course, surface water, estuary or aquifer (i.e. borehole);
- Altering the bed, banks, course or characteristics of a water course; and/or
- Impeding or diverting of a flow in a water course.

5.5.3 Heritage, Archaeology and Palaeontology

Should any heritage resources, including evidence of graves and human burials, archaeological material and paleontological material be discovered during the execution of the activities above, all works must be stopped immediately and heritage authorities must be notified without delay.

5.5.4 Vegetation Search and Rescue

Under the National Forests Act, 1998 (Act No. 84 of 1998) (NFA), a license must be applied for from the DFFE for the removal or disturbance of any protected trees on the site, in terms of the List of Protected Tree Species promulgated under the NFA.

5.6 Method Statements

Prior to construction the developer must ensure that the contractor supply the following method statements:

- Vegetation clearing.
- Cement mixing.
- Hazardous waste management.
- Emergency preparedness and response.
- Hazardous spills clean up.
- Topsoil stockpiling management.
- Laydown area management.
- Hazardous materials management.

6. CONSTRUCTION PHASE MITIGATION MEASURES

The following sections form the core of the EMPr during the construction phase of the development. The major sources of potential impacts include, the turbine footprint construction, the construction of infrastructure, the construction of roads and bridges, and vehicle operation, and spillages.

The objectives of the construction phase are:

- To promote environmental awareness.
- To define roles and responsibilities for environmental management.
- To ensure that the contractor complies with all mitigation measures during the construction period.

6.1 Potential Construction Phase Impacts

The following impacts are likely to occur during the construction of the development. Specific mitigation measures for each impact are presented below.

- The accidental, negligent, or deliberate spillage or inappropriate disposal of hazardous substances could result in air, soil and water pollution and may affect the health and well-being of people, plants and animals.
- Excessive noise could be made by the construction activity which would affect neighbouring communities.
- Potential damage to the soil structure, soil compaction and loss of soil fertility.
- Loss of the vegetation cover and increased erosion risks.
- Dust related problems.
- Safety hazards to the public, workers and animals in the area.
- Disturbance to local hydrology from construction activities.
- Pollution of surface water bodies.
- Dust can be a nuisance to the construction workforce and to the public and can negatively affect the growth and recovery rate of plants. Potential sources of fugitive dust include, but are not limited to:
    - Demolition of concrete foundations and existing buildings;
    - Grading / movement of soil;
    - Transportation and unloading of construction materials;
    - Vehicular movement over unsurfaced roads and tracks; and,
    - Wind erosion of stockpiles.
- Construction activities will result in the exposure of the soil to erosive factors, i.e., wind and water, and the compaction of the soil in other areas;
- Illegal poaching and collection of animals and plant material.
- Loss of established indigenous and exotic habitat
- Unnecessary trampling of vegetation and harm to animals.
- Degradation of the scenic quality due to the major earthworks and any unsightly structures.

- Damage or loss of important cultural, historical or pre-historical sites and artefacts.
- Damage to existing roads and tracks, power lines, pipelines, etc.
- Dangerous conditions near road.
- Trespassing and illegal access onto land.

The following is not allowed on site:

- No poaching of any animals or harvesting of any flora;
- No construction camp, for workforce accommodation is allowed on site; contractors are to ensure suitable housing for staff outside of the proposed development footprint.
- No cooking or fires allowed on site; and
- No alcohol or drugs are allowed on site.

Table 6.1 below presents a summary of the potential impacts as assessed by specialists for the construction phase of the WEF.

Recommended persons as provided in Table 6.1 below should take responsibility for the implementation and monitoring to ensure that all operational mitigation measures outlined in this document, and all revisions thereof, are complied with.

TABLE 6.1 DESIGN AND CONSTRUCTION PHASE IMPACT MANAGEMENT & MONITORING

Construction Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Freshwater & Wetlands (Aquatics)								
Spread of Alien Vegetation	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Moderate
	With Mitigation	Site	Short term	Partly reversible	Negative	Low	Possible	Low
Loss of habitat/vegetation	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Partly Reversible	Negative	Low	Possible	Low
Loss of Critical Biodiversity Areas (CBAs)	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Partly Reversible	Negative	Low	Possible	Low
Loss of riparian habitat	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Partly Reversible	Negative	Low	Possible	Low
Changes to the hydrological regime and increase potential for erosion	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Partly Reversible	Negative	Low	Possible	Low
Changes to surface water quality	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Partly Reversible	Negative	Low	Possible	Low
Terrestrial Biodiversity								
Potential vegetation clearing	Without Mitigation	Local	Medium term	Recoverable	Negative	Moderate	Highly Probable	Medium

	With Mitigation	Site	Short term	Recoverable	Negative	Low	Probable	Low
Potential chemical contamination	Without Mitigation	Local	Medium term	Recoverable	Negative	Moderate	Highly Probable	High
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Probable	Medium
Reduced connectivity and restricted movement of fauna	Without Mitigation	Local	Medium term	Recoverable	Negative	Moderate	Highly Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Probable	Low
Potential altered flow regime	Without Mitigation	Local	Medium term	Recoverable	Negative	Moderate	Highly Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Probable	Low
Potential disturbance and/or displacement	Without Mitigation	Regional	Medium term	Recoverable	Negative	Moderate	Highly Probable	High
	With Mitigation	Local	Short term	Recoverable	Negative	Low	Probable	Moderate
Potential mortality of faunal and flora species	Without Mitigation	Local	Long term	Irreversible	Negative	High	Highly Probable	Very High
	With Mitigation	Site	Medium term	Recoverable	Negative	Moderate	Probable	High
Faunal								
Direct habitat loss	Without Mitigation	Site	Medium term	Recoverable	Negative	Moderate	Highly Probable	Moderate
	With Mitigation	Local	Medium term	Recoverable	Positive	Moderate	Highly Probable	Moderate
Indirect habitat loss	Without Mitigation	Local	Medium term	Recoverable	Negative	Moderate	Probable	Moderate
	With Mitigation	Local	Medium term	Recoverable	Positive	Moderate	Highly Probable	Moderate
Displacement or disturbance	Without Mitigation	Site	Short term	Recoverable	Negative	Moderate	Highly Probable	High

	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Moderate
Direct Mortality	Without Mitigation	Site	Short term	Recoverable	Negative	Moderate	Highly Probable	High
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	High
Indirect Mortality	Without Mitigation	Site	Short term	Recoverable	Negative	Moderate	Highly Probable	High
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	High
Impacts of all phases of the proposed development on ecological processes of the area	Without Mitigation	Local	Medium term	Recoverable	Negative	Moderate	Highly Probable	High
	With Mitigation	Local	Medium term	Recoverable	Positive	Moderate	Probable	High
Avifauna								
Destruction of habitat and	Without Mitigation	Site	Short term	High	Negative	High-Moderate	Highly likely	High
	With Mitigation	Site	Short term	High	Negative	Moderate	Probable	High -Medium
Disturbance of birds	Without Mitigation	Site	Short term	High	Negative	High-Moderate	Highly likely	High
	With Mitigation	Site	Short term	High	Negative	Moderate	Probable	High -Medium
Bats								
Clearing and excavation of natural habitat	Without Mitigation	Local	Short Term	Recoverable	Negative	Moderate	Definite	Moderate
	With Mitigation	Local	Short Term	Recoverable	Negative	Low	Probable	Low
	Without Mitigation	Local	Long Term	Recoverable	Negative	Moderate	Highly probable	Moderate

Creating attractive bat habitat within the development terrain	With Mitigation	Site	Short Term	Reversable	Negative	Moderate	Low probability	Very Low
Construction noise	Without Mitigation	Local	Short term	Reversible	Negative	Moderate	Definite	Low
	With Mitigation	Site	Short Term	Reversable	Negative	Moderate	Definite	Very Low
Archaeology, Paleoontology and Heritage								
Disturbance or destruction of archaeological sites and/or materials	Without Mitigation	Local	Permanent	Irreversible	Negative	Low	Low Probability	Low
	With Mitigation	Local	Permanent	Irreversible	Negative	Low	Low Probability	Very Low
Disturbance or destruction of fossil material	Without Mitigation	Local	Permanent	Irreversible	Negative	Low	Low Probability	Low
	With Mitigation	Local	Permanent	Irreversible	Negative	Low	Low Probability	Very Low
Disruption of the cultural landscape due to the presence of construction equipment and activity	Without Mitigation	Local	Long-term	Irreversible	Negative	High	Definite	High
	With Mitigation	Local	Long-term	Recoverable	Negative	Moderate	Definite	Moderate
Visual								
Visual impact of construction activities on residents of homesteads and visitors to tourist accommodation within 5 km to the proposed WEF	Without Mitigation	Very short distance	Short term	Reversible	Negative	High	Highly Probable	Very High
	With Mitigation	Very short distance	Short term	Reversible	Negative	High	Probable	High
Visual impact of construction activities	Without Mitigation	Very short distance	Short term	Reversible	Negative	Moderate	Highly Probable	Very High

on observers travelling along roads within 5 km of the proposed WEF	With Mitigation	Very short distance	Short term	Reversible	Negative	Moderate	Probable	High
Noise								
Construction of Access Roads	Without Mitigation	Local	Temporary	High	Negative	Moderate	Likely	High
	With Mitigation	Local	Temporary	High	Negative	Low	Possible	Moderate
Traffic Noises	Without Mitigation	Local	Short-term	High	Negative	Low	Possible	Low
	With Mitigation	Local	Short-term	High	Negative	Low	Possible	Low
Daytime WTG construction	Without Mitigation	Local	Short-term	High	Negative	Low	Improbable	Low
	With Mitigation	Local	Short-term	High	Negative	Low	Improbable	Low
Night-time WTG construction	Without Mitigation	Regional	Short-term	Very High	Negative	Moderate	Likely	Very High
	With Mitigation	Regional	Short-term	High	Negative	Low	Possible	High
Social								
Creation of employment and business opportunities	Without Mitigation	Local-Regional	Short-term	n/a	Positive	Moderate	Probable	Moderate
	With Mitigation	Local-Regional	Short-term	n/a	Positive	Moderate	Highly Probable	Moderate
Impact of construction workers on local communities	Without Mitigation	Local	Short-term	Irreversible – in case of HIVE and AIDS	Negative	Moderate	Probable	Moderate
	With Mitigation	Local	Short-term	Irreversible – in case of HIVE and AIDS	Negative	Low	Probable	Low

Influx of job seekers	Without Mitigation	Local	Short-term	Irreversible – in case of HIVE and AIDS	Negative	Low	Probable	Low
	With Mitigation	Local	Short-term	Irreversible – in case of HIVE and AIDS	Negative	Low	Probable	Low
Safety risk, stock theft and damage to farm infrastructure associated with presence of construction workers	Without Mitigation	Local	Short-term	Reversible – with compensation	Negative	Moderate	Probable	Medium
	With Mitigation	Local	Short-term	Reversible – with compensation	Negative	Low	Probable	Low
Increased risk of grass fires	Without Mitigation	Local	Short-term	Reversible	Negative	Moderate	Probable	Moderate
	With Mitigation	Local	Short-term	n/a	Negative	Low	Probable	Low
Nuisance impacts associated with construction related activities	Without Mitigation	Local	Short-term	Reversible	Negative	Moderate	Probable	Medium
	With Mitigation	Local	Short-term	n/a	Negative	Low	Probable	Minor
Loss of farmland	Without Mitigation	Local	Long term	Reversible	Negative	Moderate	Probable	Medium
	With Mitigation	Local	Short term	Reversible	Negative	Low	Highly Probable	Minor
Traffic								
Increased Traffic	Without Mitigation	Regional - Local	Short term	Reversible	Negative	Low	Probable	Low
	With Mitigation	Regional - Local	Short term	Reversible	Negative	Very Low	Probable	Low
	Without Mitigation	Regional - Local	Short term	Reversible	Negative	Low	Probable	Low

Additional heavy vehicles/E80's on the external road network-	With Mitigation	Regional - Local	Short term	Reversible	Negative	Low	Probable	Low

TABLE 6.2 DESIGN AND CONSTRUCTION PHASE IMPACT MANAGEMENT

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
Soil Degradation due to Construction of the Development		
• A system to manage storm water and prevent erosion, will be an inherent part of the road engineering on site. • Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring there. • Any excavations done during the construction phase, in areas that will be re-vegetated at the end of the construction phase, must separate the upper 30 cm of topsoil from the rest of the excavation spoils and store it in a separate stockpile. When the excavation is back-filled, the topsoil must be back-filled last, so that it is at the surface. Topsoil should only be stripped in areas that are excavated. Across the majority of the site, including construction lay down areas, it will be much more effective for rehabilitation, to retain the topsoil in place. If levelling requires significant cutting, topsoil should be temporarily stockpiled and then re-spread after cutting, so that there is a covering of topsoil over the entire surface.	Site Engineer ECO / ESO	Design Phase Throughout Construction Phase
Impacts on Freshwater and Wetlands due to Construction of the Development		
• A stormwater management plan and Aquatic Rehabilitation and Monitoring plan must be developed, coupled to micro-siting of the final layout prior to construction. • Where large cut and fill areas are required, these must be stabilised and rehabilitated during the construction process, to minimise erosion and sedimentation. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc). • Suitable stormwater management systems must be installed along roads and other areas and monitored during the first few months of use. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc). • The aquatic systems have been mapped to a finer scale and have taken cognizance of any potential CBAs. As High / No-Go have been avoided by the major infrastructure such as turbines and buildings, the aquatic zones associated within the CBA / ESAs have also been avoided. Roads will need to traverse these areas, thus it is important to try and select existing areas with impacts / crossings where possible.	Site Engineer Specialist	Design Phase Throughout Construction Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
Impacts associated with the construction of Access Roads		
• Use existing roads or upgrade existing tracks rather than constructing entirely new roads wherever possible and has been included in the proposed layout. • Use the smallest possible working corridor. Outside the working corridor, all watercourses are to be considered no go areas. Where intrusion is required, the working corridor must be kept to a minimum and demarcated clearly before any construction commences. • Removal of vegetation must only be when essential for the continuation of the project. Do not allow any disturbance to the adjoining natural vegetation cover or soils. • Where required, all pipe culverts must be removed and replaced with suitable sized box culverts, where road levels are raised. Crossings that are installed below the natural ground level are to be constructed with an appropriate drop inlet structure on the upstream side to ensure that head cut erosion does not develop because of the gradient change from the natural ground level to the invert level of the culvert. • The channel profile, regardless of the current state of the river / water course, will be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist, with a preference for low level drifts where possible. • Water diversions must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in any diversion or for any other activity within a watercourse must be in a good condition, so that they do not burst and empty sediment into the watercourse. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from • construction activities. • Any fauna (frogs, snakes, etc.) that are found within the construction area must be moved to the closest point of similar habitat type outside of the areas to be impacted. • All disturbed areas beyond the construction site that are intentionally or accidentally disturbed during the construction phase must be rehabilitated.	Site Engineer ECO / ESO Specialist	Design Phase Throughout Construction Phase
Spread of alien invasion species due to Construction of the Development		
• Alien vegetation management must be initiated at the beginning of the construction period and must extend into any remaining areas into the operation phase on the facility. • The revegetation of any temporary sites as well as any previously degraded areas must begin from the onset of the project, with the involvement of a botanist to assist with the revegetation specifications.	Site Engineer ECO / ESO	Design Phase Following clearing of vegetation Throughout

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
• Regeneration of alien vegetation must be monitored once all areas have been cleared, forming part of a long-term alien vegetation management plan.		Construction Phase
Changes to the hydrological regime and increase potential for erosion due to Construction of the Development		
• No stormwater discharged may be directed to delineated aquatic zones or the associated buffers. • A detailed stormwater management plan must be compiled prior to construction once the final site layout has been completed. The SWMP should include the structures and actions that must be installed to prevent the increase of surface water flows directly into any natural systems. • Effective stormwater management must include measures to slow, spread and deplete the energy of concentrated flows thorough effective stabilisation (gabions and Reno mattresses) and the re-vegetation of any disturbed areas	Site Engineer ECO / ESO	Throughout Construction Phase
Changes to the surface water quality characteristics due to Construction of the Development		
• All liquid chemicals including fuels and oil, including for the BESS, must be stored in with secondary containment (bunds or containers or berms) that can contain a leak or spill. Such facilities must be inspected routinely and must have the suitable PPE and spill kits needed to contain likely worst-case scenario leak or spill in that facility, safely. • Washing and cleaning of equipment must be done in designated wash bays, where rinse water is contained in evaporation/sedimentation ponds (to capture oils, grease cement and sediment). • Mechanical plant and bowsers must not be refueled or serviced within 100m of a river channel or wetland. • All construction camps, lay down areas, wash bays, batching plants or areas and any stores should be beyond any demarcated water courses and their respective buffers. • Littering and contamination associated with construction activity must be avoided through effective construction camp management. • No stockpiling should take place within or near a water course. • All stockpiles must be protected and located in flat areas where run-off will be minimised and sediment recoverable. • ECO monitors the site on a daily basis to ensure plant is in working order (minimise leaks), spills are prevented and if they do occur, are quickly rectified.	Site Engineer ECO / ESO	Throughout Construction Phase
Potential vegetation clearing impacts associated with the construction of the WEF		

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
• The development footprint must avoid No-Go/ High Sensitivity areas as much as possible. • Limit the area of impact as much as possible. • A pre-construction walkthrough during the optimal flowering period (spring) of the finalized development layout must be conducted to ensure that No-Go and High Sensitivity areas are avoided where possible. • Ensure that lay-down and other temporary infrastructure are within Low Sensitivity areas. • Rehabilitate disturbed areas that are not required by the operational phase of the development. • All construction staff on site must attend an environmental induction to ensure that basic environmental principles are adhered to. This includes topics such as avoiding fire hazards, no littering, appropriate handling of pollution and chemical spills, minimizing wildlife interactions, remaining within demarcated construction areas, avoidance of No-Go areas and sensitive habitats etc. • Demarcate sensitive areas near the development footprint as no-go areas with construction tape or similar and clearly marked as No-Go areas. • An environmental management programme (EMPr) must be implemented and must provide a detailed description of how construction activities must be conducted to reduce unnecessary clearing and/or destruction of habitat.	Site Engineer ECO / ESO	Throughout Construction Phase
Potential chemical contamination impacts associated with construction of the WEF		
• The development footprint must avoid High Sensitivity areas as much as possible • Ensure proper storage and handling of chemicals (fuel, lubricants, cleaning agents) used on-site. Store all chemicals in designated areas equipped with spill containment measures to prevent leaks and spills • A chemical spill response plan must be developed before construction activities are undertaken. This spill response plan must be implemented by an ECO on site. • Provide appropriate training to construction staff on the safe handling of chemical and hazardous materials. • Implement measures to prevent runoff to nearby waterbodies by installing sediment traps and/or containment pods. This should be addressed in the Stormwater Assessment.	Site Engineer ECO / ESO	Throughout Construction Phase
Reduced connectivity and restricted movement of fauna impacts associated with the construction of the WEF		

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
• Minimization of length and width of road network. • Fencing and road designs to allow for passage of animals (e.g., short, wide culverts in roads and wildlife friendly fencing). • . • Implement habitat enhancement and restoration measures to offset the loss of connectivity caused by construction and decommissioning activities. This can be achieved by planting native vegetation, installing nesting boxes, or creating artificial shelters to provide alternative habitats for displaced fauna species and enhance connectivity within the landscape.	Site Engineer ECO / ESO	Throughout Construction
Overgrazing impacts associated with the construction phase of the proposed development.		
• Temporary laydown areas, construction yards and site office buildings to be placed in low sensitivity areas. • Developer should work closely with the farmer to identify areas that should be left for livestock grazing. These areas should be of an adequate size and should accommodate all livestock. • Developer to work with livestock farmers to reduce number of stock prior to construction to avoid the displacement of sheep during construction. The loss of income from livestock farming should be compensated by the developer. • Modified areas to be rehabilitated as far as possible through a restoration and rehabilitation plan. • Disturbed areas from construction activities should be rehabilitated and treated in conjunction with an Alien Invasive Management Plan to reduce encroachment of invasive species	Site Engineer ECO / ESO	Throughout Construction Phase
Potential disturbance and/or displacement impacts on local wildlife associated with the construction phase of the proposed development		
• Temporary laydown areas, construction yards and site office buildings to be placed in low sensitivity or modified areas. • Pre-construction baseline animal monitoring programme must be implemented, with focus on areas identified for the construction footprint during the design phase (e.g., road network). • Avoidance of highly sensitive habitats for construction areas. • Clearly demarcated construction areas and no unauthorized personnel to be permitted beyond demarcated areas. • Adequate noise reduction measures (where possible) on heavy machinery. • Minimize construction activity that occurs between dusk and dawn when animals are most active. • Minimization of lighting used to illuminate construction areas and site buildings.	Site Engineer ECO / ESO	Throughout Construction Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
Potential mortality of faunal and flora species due to direct and indirect impacts associated with the construction phase of the proposed development		
• No movement of construction vehicles and personnel between dusk and dawn. • Implementation and enforcement of speed limits. • Roadkill monitoring and recording programme. • Induction toolbox talks to personnel to increase awareness about animal SCCs present and roadkill risks. • No unauthorized movement of personnel. • No unauthorized access to the construction site. • No trenches to be left uncovered overnight. • Trenches, excavations and cattle grids to have slopes to allow for animals to escape should they fall in. • No hunting permitted. • No dogs or cats permitted (other than those of the landowner). • Waste management programme to prevent trash buildup attracting species such as crows. • Roadkill to be immediately reported, removed and suitably disposed of to prevent scavenging (e.g., buried).	Site Engineer ECO / ESO	Throughout Construction Phase
Direct and indirect habitat loss from construction activities		
• The production of an appropriate rehabilitation and restoration plan with the aims of improving and monitoring habitat availability and connectivity, in consultation with specialists and relevant stakeholders (e.g., CapeNature, Endangered Wildlife Trust) prior to construction; • Strategic rehabilitation and restoration of currently modified areas within areas of high sensitivity to be initiated concurrently with the construction phase; • Minimization of development footprint and utilization of existing roads and existing modified areas for temporary laydown areas and site buildings; • Rehabilitate disturbed areas that are not required by the operational phase of the development; • All construction vehicles should adhere to clearly defined and demarcated roads, no off-road driving should be allowed; • An environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes topics such as avoiding fire hazards, littering, appropriate	Site Engineer ECO / ESO	Throughout Construction Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
handling of pollution and chemical spills, minimizing wildlife interactions, remaining within demarcated construction areas; • 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; • No open fires to be permitted outside of designated areas. • The production of an appropriate rehabilitation and restoration plan with the aims of improving and monitoring habitat availability and connectivity, in consultation with specialists and relevant stakeholders (e.g., CapeNature, Endangered Wildlife Trust) prior to construction; • Strategic rehabilitation and restoration of currently modified areas within areas of high sensitivity to be initiated concurrently with the construction phase; • Fencing and road designs to allow for passage of animals (e.g., appropriately sized culverts in roads and wildlife friendly fencing); • Appropriate water runoff control measures to be constructed on all hard surfaces; • Appropriate erosion control measures to be constructed on all servitudes and access roads in the project area; • Rehabilitate existing servitude and access roads in the project area with sufficient erosion control measures to prevent the loss of soil and the degradation of vegetation.		
Disturbance or displacement of animal SCCs from the vicinity of construction activities		
• Restrict construction activity to daylight hours; • Minimize activity that occurs between dusk and dawn; • Pre-construction baseline animal monitoring programme, with focus on areas identified for the construction footprint during the design phase (e.g., road network); • Avoidance of highly sensitive habitats for laydown areas and temporary site offices • Clearly demarcated construction areas and no unauthorized personnel to be permitted beyond demarcated areas; • Adequate noise reduction measures (where possible) on heavy machinery; • Construction areas and site buildings should be lit with as little light as practically possible, with lights directed downwards where appropriate to reduce the disturbance and foraging activities of nocturnal species; • No dogs or cats other than those of the landowners permitted on site as these animals cause unnecessary disturbance such as chasing fauna.	Site Engineer ECO / ESO	Throughout Construction Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
Mortality of animal SCCs from direct and indirect impacts of construction activities		
• Waste management programme to prevent trash buildup attracting species such as crows; • Roadkill to be immediately reported to the environmental control officer, removed and suitably disposed of to prevent scavenging (e.g., buried); • Construction activity to be minimized during the night to reduce noise pollution during periods when Riverine Rabbit are most active.	Site Engineer ECO / ESO	Throughout Construction Phase
Impacts on broad-scale ecological processes from construction phase activities		
• In-situ habitat restoration designed to improve connectivity between natural/near-natural patches and facilitate animal SCC movement across the site (to be done by a specialist in consultation with appropriate stakeholders); • Restoration and rehabilitation of currently modified agricultural land; • Partner with the Drylands Conservation Programme of the Endangered Wildlife Trust to enhance the ecosystem processes across the site, e.g. through the Biodiversity Stewardship Programme and/ or the provision of research support; • Initiation of formal, long-term research programmes across the site, offering access to the property for the purposes of research on riverine rabbit if/when approached by appropriately recognised academic institutions.	Site Engineer ECO / ESO Specialist	Throughout Construction Phase
Avifauna impact of construction activities on sensitive receptors		
• Construction activity should be restricted to the immediate footprint of the infrastructure as far as possible and should avoid all sensitive areas (e.g., CRM-designated high-risk areas, wetlands). • Measures to control noise and dust should be applied according to current best practice in the industry. • Roads and tracks to avoid all identified sensitive areas wherever possible. • An avifaunal walk-down should be conducted to confirm final layout and identify any sensitivities that may arise between the conclusion of the EIA process and the construction phase.	Site Engineer ECO / ESO Specialist	Throughout Construction Phase
Impacts of clearing and excavation of natural habitat on bats		

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
• Apart from access roads and the management building, construction activities are to be kept out of all high bat-sensitive areas as far as possible. • Rock formations occurring along the ridge lines should be avoided during construction, as these could serve as roosting space for bats. • Destruction of limited trees should be avoided during construction. • Care should be taken if any dense bushes are destroyed, to make sure that there are not bat roosts in the vegetation. If bat roosts are found, a bat specialist should be contacted immediately. • Aardvark holes or any large derelict holes or excavations should not be destroyed before careful examination for bats. • The Environmental Control Officer (ECO) or a responsible appointed person or site manager should contact a bat specialist before construction commences so that they know what to look out for during construction.	Site Engineer ECO / ESO Specialist	Throughout Construction Phase
Creating attractive bat habitat within the development terrain		
• Completely seal off roofs of new buildings e.g., substations and site buildings. Note a small bat species could enter a hole the size of 1 cm^2. • Roofs need to be regularly inspected during the lifetime of the wind farm and any new holes need to be sealed. • Excavation areas, quarries or any other artificial depressions should be filled and rehabilitated to avoid creating new areas of open water sources which could attract bats during rainy spells. • Inspect all existing buildings and infrastructure for possible roosting opportunities regularly, at least on a seasonal basis. If any holes are found, the ECO or operational bat specialist should be contacted to establish whether there are any bats in the roofs. If there is a roost in the roof, a bat specialist should be consulted.	Site Engineer ECO / ESO Specialist	Throughout Construction Phase
Construction noise impacts on bats		
• Noise levels should be prevented as far as possible. • Avoid night-time construction activities as much as possible.	ECO	Throughout Construction Phase
Disruption of the cultural and paleontological landscape due to construction activities		

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring

• A pre-construction archaeological walkdown survey of the final WEF layout is recommended.
• Any archaeological sites or material encountered during construction activities must be reported to the ECO by contractors, and HWC must be notified of HWC of any such discovery by the ECO so that the find can be assessed and arrangements made to mitigate it, if necessary.
• Keep the construction duration as short as possible and as much of the activity as possible out of the public view.
• In particular the infrastructure area(s) should be screened if possible, and noise and light pollution kept to a minimum
• The EAP and ECO must be informed of the very high palaeontological significance of the WEF area;
• The Fossil Chance Find Protocol contained in Volume II, which is designed to record all unexpected fossils associated with the geological formations on site must:
  ◦ be implemented during the construction WEF, and
  ◦ be included as part of the EMPr for this project.
• If fossils are exposed during construction they should be rescued and a palaeontologist called to assess and collect a representative sample, unless HWC recommends an alternative approach; and
• Recommendations contained in the PIA must be approved by HWC for inclusion in the EMPr for the project.
	Site Engineer
	ECO / ESO
	Specialist
		Before and during construction

Visual impact of construction activities		
• Retain and maintain natural vegetation in all areas outside of the development footprint, but within the project site • Ensure that vegetation is not unnecessarily removed during the construction period. • Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) where possible. • Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. • Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at licensed waste facilities. • Reduce and control construction dust using approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent). • Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts. • Rehabilitate all disturbed areas immediately after the completion of construction works.	Site Engineer ECO / ESO	Before Construction begins

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
NOISE IMPACT DURING THE CONSTRUCTION PHASE		
• Ensure that vegetation is not unnecessarily removed during the construction period. • Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) where possible. • Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. • Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at licensed waste facilities. • Reduce and control construction dust using approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent). • Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts. • Rehabilitate all disturbed areas immediately after the completion of construction works. It is recommended that the project applicant: • re-evaluate the noise impact should the layout be revised (as part of amendment process post EA) where: ◦ any WTG, located within 2,500 m from a confirmed NSR, are moved closer to the NSR; ◦ any new WTG are introduced within 2,500m from an NSR; ◦ the number of WTG within 2,500m from an NSR are increased; • re-evaluate the noise impact if the applicant makes use of a WTG with a maximum PWL exceeding 108.4 dBA re 1 pW; • ensure that equipment is well maintained and fitted with the correct and appropriate noise abatement measures. Engine bay covers over heavy equipment could be pre-fitted with sound absorbing material. Heavy equipment that fully encloses the engine bay should be considered, ensuring that the seam gap between the hood and vehicle body is minimised; • include a component covering environmental noise in the Health and Safety Induction to sensitize all employees and contractors about the potential impact from noise, especially those employees and contractors that have to travel past receptors at night, or might be required to do work close (within 1,200m) to NSRs at night. This should include issues such as minimising the use of vehicle horns; • investigates any reasonable and valid noise complaint if registered by a receptor staying within 2,000 m from the location where construction activities are taking place, or where an operational WTG are located. A complaint register, keeping a full record of the complaint, must be kept by the applicant; and	Site Engineer ECO / ESO Contractor	Before and During the Construction phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
• develop and implement an environmental noise monitoring programme at selected Noise Sensitive Receptor (NSR) living within the 42 dBA noise contour; • Where practicable, mobile equipment should be fitted with broadband (white-noise generators/alarms 3 4), rather than tonal reverse alarms.		
Creation of employment and business opportunities		
Employment • Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase. • Where reasonable and practical, the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However, due to the low skills levels in the area, most skilled posts are likely to be filled by people from outside the area. • Where feasible, efforts should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria. • Before the construction phase commences the proponent should meet with representatives from the Breede Valley Municipality (BVM) to establish the existence of a skills database for the area. If such a database exists, it should be made available to the contractors appointed for the construction phase. • The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that the proponent intends following for the construction phase of the project. • Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase. • The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. Business • The proponent should liaise with the local municipality with regards the establishment of a database of local companies, specifically BBBEE companies, which could qualify as potential service providers (e.g., construction companies, catering companies, waste collection companies, security	Contractor Developer	Before and During the Construction phase

[3]White Noise Reverse Alarms: http://www.brigade-electronics.com/products.

[4] https://www.constructionnews.co.uk/home/white-noise-sounds-the-reversing-alarm/885410.article - White noise sounds the reversing alarm

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
companies etc.) prior to the commencement of the tender process for construction service providers. These companies should be notified of the tender process and invited to bid for project-related work. • Note that while preference to local employees and companies is recommended, it is recognised that a competitive tender process may not guarantee the employment of local labour for the construction phase.		
Potential impacts on family structures and social networks associated with the presence of construction workers		
• The proponent, in consultation with the local municipality should investigate the option of establishing a Monitoring Committee (MC) to monitor and identify potential problems that may arise during the construction phase. • Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase. • Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase. • The SEP and CHSSP should include a Grievance Mechanism that enables stakeholders to report and resolve incidents. • Where possible, the proponent should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories. • The proponent and contractor should develop a Code of Conduct (CoC) for construction workers. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be subject to appropriate disciplinary action and/or dismissed. All dismissals must comply with the South African labour legislation. The CoC should be signed by the proponent and the contractors before the contractors move onto site. The CoC should form part of the CHSSP. • The proponent and the contractor should implement an HIV/AIDS and Tuberculosis (TB) awareness programme for all construction workers at the outset of the construction phase. The programmes should form part of the CHSSP. • The contractor should provide transport for workers to and from the site daily. This will enable the contactor to effectively manage and monitor the movement of construction workers on and off the site. • The contractor must ensure that all construction workers from outside the area are transported back to their place of residence within 2 days for their contract coming to an end.	Applicant Contractors	Before and During the Construction phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
• No construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.		
Potential impacts on family structures, social networks and community services associated with the influx of job seekers		
It is impossible to stop people from coming to the area in search of employment. However, as indicated above, the proponent should ensure that the employment criteria favour residents from the area. In addition: • Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase. • Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase. • The proponent should implement a "locals first" policy, specifically with regard to unskilled and low skilled opportunities. • The proponent should implement a policy that no employment will be available at the gate. • The contractor must ensure that all construction workers from outside the area are transported back to their place of residence within 2 days for their contract coming to an end.	Site Engineer ECO / ESO Contractor	Before and During the Construction phase
Potential risk to safety of farmers and farm workers, livestock and damage to farm infrastructure associated with the presence of construction workers on site.		
• The proponent should enter into an agreement with the local farmers in the area whereby damages to farm property etc. during the construction phase will be compensated for. The agreement should be signed before the construction phase commences. • The developer(s) and local farming community should co-ordinate (and if necessary, upgrade) security arrangements, such as establishment of security cameras at strategic locations. • All farm gates must be closed after passing through. • Contractors appointed by the proponent should provide daily transport for low and semi-skilled workers to and from the site. • The proponent should consider the option of establishing a MC that includes local farmers and develop a Code of Conduct for construction workers. The MC should be established prior to commencement of the construction phase. The Code of Conduct should be signed by the proponent and the contractors before construction activities commence.	Site Engineer ECO / ESO Contractor	Before and During the Construction phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
• The proponent should hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be contained in the Code of Conduct to be signed between the proponent, the contractors, and neighbouring landowners. The agreement should also cover loses and costs associated with fires caused by construction workers or construction related activities (see below). • The EMPr must outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested. • Contractors appointed by the proponent must ensure that all workers are informed at the outset of the construction phase of the conditions contained in the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms. • Contractors appointed by the proponent must ensure that construction workers who are found guilty of stealing livestock and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation. • It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.		
Potential noise, dust and safety impacts associated with construction related activities.		
• The movement of construction vehicles on the site should be confined to agreed access road/s. • Establishment of a Grievance Mechanism that provides local farmers and other road users with an effective and efficient mechanism to address issues related to construction related impacts, including damage to local gravel farm roads. • The movement of heavy vehicles associated with the construction phase should be timed to avoid times and days of the week, such as weekends, when the volume of traffic travelling along the access roads may be higher. • Dust suppression measures should be implemented, such as wetting on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. • All vehicles must be road worthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.	Site Engineer ECO / ESO Contractor	Before and During the Construction phase
Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of grass fires		

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
• The proponent should enter into an agreement with the local farmers in the area whereby damages to farm property etc., during the construction phase will be compensated for. The agreement should be signed before the construction phase commences. • Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas. • Smoking on site should be confined to designated areas. • Contractor should ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high-risk dry, windy winter months. • Contractor should provide adequate fire-fighting equipment on-site, including a fire fighting vehicle. • Contractor should provide fire-fighting training to selected construction staff. • No construction staff, with the exception of security staff, to be accommodated on site overnight. • As per the conditions of the Code of Conduct, in the advent of a fire being caused by construction workers and or construction activities, the appointed contractors should compensate farmers for damage caused to their farms. The contractor should also compensate the fire-fighting costs borne by farmers and local authorities.	Site Engineer ECO / ESO Contractor	Before and During the Construction phase
The activities associated with the construction phase, will damage farmlands and result in a loss of farmlands for grazing.		
• An ECO should be appointed to monitor the implementation of the EMPr during the construction phase. • Existing internal roads should be used where possible. In the event that new roads are required, these roads should be rehabilitated upon completion of the construction phase. • The footprint associated with the construction- related activities (access roads, construction camps, workshop etc.) should be minimized to the approved layout. • All areas disturbed by construction related activities, such as access roads on the site and construction camps etc., should be rehabilitated at the end of the construction phase. • The implementation of a rehabilitation programme should be included in the terms of reference for the contractor/s appointed. The specifications for the rehabilitation programme should be included in the EMPr in Section 13 • The implementation of the Rehabilitation Programme should be monitored by the ECO.	Site Engineer ECO / ESO Contractor	Before and During the Construction phase
Increased traffic on the route and access points to site		

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
• Implementation of Traffic Management Plan(Section 15)	Site Engineer ECO / ESO Contractor	Before and During the Construction phase

6.2 Post construction

The following are the overarching post construction measures:

- Once construction has been completed on site and all excess material has been removed, the storage area shall be rehabilitated. If the area was badly damaged, re-seeding shall be done and fencing in of the area shall be considered if livestock/faunal species specific to the area may subsequently have access to such an area.
- Such areas shall be rehabilitated to their natural state. Any spilled concrete shall be removed and soil compacted during construction shall be ripped, levelled and re-vegetated.
- If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.
- Only designated areas must be used for storage of construction materials, soil stockpiles, machinery and other equipment.
- Specific areas must be designated for cement/concrete mixing/ batching plants. Sufficient drainage for these plants must be in place to ensure that soils do not become contaminated.
- The construction camp must be kept clear of litter at all times.
- Spillages within the construction camp need to be cleaned up immediately and disposed of in the hazardous skip bin for correct disposal.
- All remaining material including building rubble and waste are to be removed from the site.
- All disturbed areas must be managed to ensure efficient drainage.
- The area designated for the deposition of spoil material is to be levelled and shaped to ensure the efficient drainage of the site. Under no circumstances is general or hazardous waste to be disposed of at this site.

6.2.1 Infrastructure

The following are post construction infrastructure mitigation measures:

- Disassemble all temporary infrastructure units and remove components from the working areas and contractors' camp. This will include storage structures and containers, water storage container, power supply, workers accommodation, sewage systems.
- Drain all potable chemical toilets, being careful not to spill the contents. Transfer the waste to an appropriate disposal site.
- Drain all waste water and sewage associated with temporary ablution facilities and transfer the waste to an appropriate disposal site to be identified by the contractor.
- Disassemble all fencing around the camp and either sell, suction or donate to the local community or transfer the waste components to a disposal site or the contractor's base.
- Do not leave any components, waste or infrastructure units within the working area and camp unless specifically required for the operation and maintenance phases and as agreed with the ECO.

6.2.2 Contaminated Substrate and Pollution Control Structures

- Excavate all areas of contaminated substrate, transfer the contaminated substrate to an appropriate disposal site and treat the affected areas.
- Remove all plastic linings used for pollution control and transfer to an appropriate disposal site.
- Break up all concrete structures that have been created and remove concrete waste to an appropriate disposal site.

6.2.3 Waste

- Remove all remaining construction materials from the camp and working areas and either sell, auction, donate to the local community or transfer the waste components to a disposal site or a designated area in the contractor’s base.
- Remove all construction debris, litter and domestic waste from the camp and working areas and transfer to an appropriate disposal site.
- Remove all waste receptacles from the camp and working areas and either sell, auction, donate to the local community or transfer the waste components to a disposal site or the contractor’s base.

7. OPERATION PHASE MITIGATION MEASURES

Once the commissioning and construction of the WEF is complete, the project becomes operational. During the operation and maintenance of the WEF (including the normal operation of the turbine itself) a certain amount of disturbance is likely. An operational WEF will normally have various day to day activities occurring on site, such as (but not limited to) security control, routine maintenance, road clearing/cleaning, grass/bush cutting and clearing.

The objectives of the operation phase are:

- To promote environmental awareness.
- To define roles and responsibilities for environmental management.
- To ensure that the mitigation measures proposed for the operational phase of the WEF are implemented and conducted appropriately.
- To ensure that the recommended monitoring programmes are implemented accordingly.

The main impacts associated with the operation phase of the WEF relate to birds and bats. A bird and bat specialist must be appointed to undertake the operational phase monitoring as per the EA and according to the applicable bird and bat guidelines at the time of commercial operations.

If the destruction of natural vegetation is unavoidable, a habitat rehabilitation programme should be established before operation and following decommissioning. The programme must address the rehabilitation of the existing habitats as well as the rehabilitation of areas disturbed during construction and investigate the potential of rehabilitating previously transformed or degraded areas. This rehabilitation programme must be approved by the relevant government departments and the relevant permits must be obtained for the handling/transport/propagation of protected species.

7.1 Potential Operation Phase Impacts

Table 7.1 below provides a summary of the potential impacts of the operation of the WEF, as assessed by specialists.

Recommended persons as provided in Table 7.2 below should take responsibility for the implementation and monitoring to ensure that all operational mitigation measures outlined in this document, and all revisions thereof, are complied with.

TABLE 7.1 SUMMARY OF OPERATION PHASE POTENTIAL IMPACTS AND SIGNIFICANCE RATING

Operation Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Freshwater & Wetlands (Aquatics)								
Spread of Alien Vegetation	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Moderate
	With Mitigation	*Site*	*Short term*	*Partly reversible*	*Negative*	*Low*	*Possible*	*Low*
Terrestrial Biodiversity								
Potential habitat fragmentation impacts	Without Mitigation	Local	Long term	Recoverable	Negative	Moderate	Highly Probable	High
	With Mitigation	*Site*	*Medium term*	*Recoverable*	*Negative*	*Low*	*Probable*	*Medium*
Potential encroachment of alien invasive species resulting in loss of flora	Without Mitigation	Local	Long term	Irreversible	Negative	High	Definite	High
	With Mitigation	*Site*	*Medium term*	*Recoverable*	*Negative*	*Moderate*	*Highly Probable*	*Medium*
Potential light, noise and visual impacts	Without Mitigation	Local	Long term	*Recoverable*	Negative	Moderate	Highly Probable	High
	With Mitigation	*Site*	*Medium term*	*Recoverable*	*Negative*	*Low*	*Probable*	*Medium*
Potential fire	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Highly Probable	High
	With Mitigation	*Site*	*Medium term*	*Recoverable*	*Negative*	*Low*	*Probable*	*Medium*
Potential faunal mortality and loss of SCC	Without Mitigation	Local	Long term	Irreversible	Negative	High	Definite	High
	With Mitigation	*Site*	*Medium term*	*Recoverable*	*Negative*	*Moderate*	*Highly Probable*	*Medium*
Soil erosion	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Highly Probable	High
	With Mitigation	*Site*	*Medium term*	*Recoverable*	*Negative*	*Low*	*Probable*	*Medium*
Faunal								

Operation Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Direct habitat loss	Without Mitigation	Local	Long term	Recoverable	Negative	Moderate	Highly Probable	High
	With Mitigation	*Local*	*Long term*	*Recoverable*	*Negative*	*Low*	*Low Probability*	*High*
Indirect habitat loss	Without Mitigation	Local	Long term	Recoverable	Negative	Moderate	Highly Probable	High
	With Mitigation	*Local*	*Long term*	*Recoverable*	*Negative*	*Low*	*Low Probability*	*High*
Disturbance/displacement	Without Mitigation	Local	Long term	Reversible	Negative	Moderate	Highly Probable	High
	With Mitigation	*Local*	*Long term*	*Reversible*	*Negative*	*Low*	*Low Probability*	*High*
Direct Mortality	Without Mitigation	Local	Long term	Reversible	Negative	Moderate	Highly Probable	High
	With Mitigation	*Local*	*Long term*	*Reversible*	*Negative*	*Low*	*Low Probability*	*High*
Indirect Mortality	Without Mitigation	Site	Long term	Irreversible	Negative	Moderate	Highly Probable	High
	With Mitigation	*Site*	*Long term*	*Recoverable*	*Negative*	*Low*	*Probable*	*Low*
Avifauna								
Bird collision with turbine blades, habitat alteration and displacement	Without Mitigation	Site	Short term	High	Negative	Moderate - High	Highly Likely	High
	With Mitigation	*Site*	*Short term*	*High*	*Negative*	Moderate-Low	*Probable*	*High-Moderate*
Bird collision with overhead power lines	Without Mitigation	Site	Long term	High	Negative	High	Highly Likely	High
	With Mitigation	*Site*	*Long term*	*High*	*Negative*	*High-Moderate*	*Probable*	*High-Moderate*

Operation Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Bats								
Direct collision or barotrauma	Without Mitigation	Regional	Indefinite	Irreversible	Negative	High Negative	Definite	High
	With Mitigation	Regional	Long term	Recoverable	Negative	High Negative	Definite	Moderate
Fatality of migrating bats	Without Mitigation	National	Long term	Recoverable	Negative	Moderate Negative	Probable	Moderate
	With Mitigation	National	Long term	Recoverable	Negative	Low Negative	Low probability	Low
Loss of bats of conservation value	Without Mitigation	Regional	Long term	Recoverable	Negative	Moderate Negative	Probable	Moderate
	With Mitigation	Regional	Long term	Reversable	Negative	Low Negative	Low probability	Low
Fatality curiosity	Without Mitigation	Local	Long term	Recoverable	Negative	Moderate Negative	Probable	Moderate
	With Mitigation	Local	Long term	Reversable	Negative	Low Negative	Probable	Low
Smaller genetic pool	Without Mitigation	Regional	Long term	Irreversible	Negative	Moderate Negative	Highly probable	Moderate
	With Mitigation	Regional	Long term	Recoverable	Negative	Moderate Negative	Probable	Low
Visual								
Visual impact on residents of homesteads and visitors to tourist accommodation within 5 km to the proposed WEF	Without Mitigation	Very short distance	Long term	Reversible	Negative	Very High	Definite	Very High
	With Mitigation	*Very short distance*	*Long term*	*Reversible*	*Negative*	*Very High*	*Definite*	*Very High*
Visual impact on observers travelling	Without Mitigation	Very short distance	Long term	Reversible	Negative	Very High	Definite	Very High

Operation Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
along the roads within 5 km to the proposed WEF	*With Mitigation*	Very short distance	*Long term*	*Reversible*	*Negative*	*Very High*	*Definite*	*Very High*
Visual impact on residents of homesteads and visitors to tourist accommodation within 5-10 km to the proposed WEF	Without Mitigation	Short distance	Long term	Reversible	Negative	Very High	Definite	High
	With Mitigation	Short distance	*Long term*	*Reversible*	*Negative*	*Very High*	*Definite*	*High*
Visual impact on observers travelling along roads within 5-10 km to the proposed WEF	Without Mitigation	Short distance	*Long term*	*Reversible*	*Negative*	*Very High*	*Definite*	*High*
	With Mitigation	Short distance	Long term	*Reversible*	*Negative*	*Very High*	*Definite*	*High*
Visual impact on visitors to formally protected areas within 5-10 km to the proposed WEF	Without Mitigation	Short distance	*Long term*	*Reversible*	*Negative*	*Very High*	*Definite*	*High*
	With Mitigation	*Short distance*	*Long term*	*Reversible*	*Negative*	*Very High*	*Definite*	*High*
Visual impact on residents of homesteads and visitors to tourist accommodation within 10-20 km to the proposed WEF	Without Mitigation	Medium distance	*Long term*	*Reversible*	*Negative*	Moderate	Highly Probable	Moderate
	With Mitigation	*Medium distance*	*Long term*	*Reversible*	*Negative*	*Moderate*	*Highly Probable*	*Moderate*
Visual impact on observers travelling along roads within 10-20 km to the proposed WEF	Without Mitigation	Medium distance	*Long term*	*Reversible*	*Negative*	Moderate	Probable	Moderate
	With Mitigation	*Medium distance*	*Long term*	*Reversible*	*Negative*	*Moderate*	*Probable*	*Moderate*
Visual impact on visitors to formally	Without Mitigation	Medium distance	*Long term*	*Reversible*	*Negative*	Moderate	Highly Probable	Moderate

Operation Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
protected areas and private nature reserves within 10-20 km to the proposed WEF	*With Mitigation*	*Medium distance*	*Long term*	*Reversible*	*Negative*	*Moderate*	*Highly Probable*	*Moderate*
Visual impact of shadow flicker on sensitive visual receptors in close proximity to the proposed WEF	Without Mitigation	Very short distance	Long term	Reversible	Negative	Moderate	Probable	Moderate
	With Mitigation	Very short distance	*Long term*	*Reversible*	*Negative*	*Moderate*	*Probable*	*Moderate*
Visual impact of lighting at night on residents and visitors to homesteads and tourist accommodation within 10 km from the proposed WEF	Without Mitigation	Short to medium distance	Long term	Reversible	Negative	Very High	Definite	High
	With Mitigation	*Very short distance*	*Long term*	*Reversible*	*Negative*	*High*	*Highly Probable*	*Moderate*
Visual impact of lighting at night on observers travelling along roads within 10 km from the proposed WEF	Without Mitigation	Short to medium distance	Long term	Reversible	Negative	High	Definite	High
	With Mitigation	*Very short distance*	*Long term*	*Reversible*	*Negative*	*Moderate*	*Highly Probable*	*Moderate*
Visual impact of the ancillary infrastructure on observers in close proximity to the structures	Without Mitigation	Very short distance	Long term	Reversible	Negative	High	Highly Probable	High
	With Mitigation	*Very short distance*	*Long term*	*Reversible*	*Negative*	*Moderate*	*Probable*	*Moderate*
Visual impact of the ancillary infrastructure on observers in close proximity to the structures	Without Mitigation	Very short distance	Long term	Reversible	Negative	High	Definite	High
	With Mitigation	*Very short distance*	*Long term*	*Reversible*	*Negative*	*Moderate*	*Highly Probable*	*Moderate*
	Without Mitigation	Long distance	Long term	Reversible	Negative	Very High	Definite	Very High

Operation Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
The potential impact on the sense of place of the region	*With Mitigation*	*Long distance*	*Long term*	*Reversible*	*Negative*	*Very High*	*Definite*	*Very High*
Noise								
Daytime operation of WTG	Without Mitigation	Local	Long-term	High	Negative	Low	Improbable	Low
	With Mitigation	*Local*	*Long-term*	*High*	*Negative*	*Low*	*Improbable*	*Low*
Night-time operation of WTG	Without Mitigation	Regional	Long-term	High	Negative	Low	Possible	Low
	With Mitigation	*Regional*	*Long-term*	*High*	*Negative*	*Low*	*Possible*	*Low*
Social								
Improve energy security and support renewable sector	Without Mitigation	Local, Regional and National	Long term	Reversible	Positive	High	Highly Probable	High
	With Mitigation	*Local, Regional and National*	*Long term*	*n/a*	*Positive*	*High*	*Definite*	*High*
Creation of employment and business opportunities	Without Mitigation	Local and Regional	Long term	n/a	Positive	Low	Highly Probable	Minor
	With Mitigation	*Local and Regional*	*Long term*	*n/a*	*Positive*	*Moderate*	*Highly Probable*	*Low*
Generate income for affected landowners	Without Mitigation	Local	Long term	Reversible	Positive	Low	Probable	Low
	With Mitigation	*Local*	*Long term*	*Reversible*	*Positive*	*High*	*Definite*	*Moderate*
Benefits associated with the socio-economic development contributions	Without Mitigation	Local and Regional	Long term	Reversible	Positive	Moderate	Probable	Low

Operation Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
	With Mitigation	*Local and Regional*	*Long term*	*Reversible*	*Positive*	*High*	*Definite*	*Moderate*
Visual impact and impact on sense of place	Without Mitigation	Long distance	Long term	Reversible	Negative	Very High	Definite	Very High
	With Mitigation	*Long distance*	*Long term*	*Reversible*	*Negative*	*High*	*Definite*	*Very High*
Potential impact on property values	Without Mitigation	Local	Long term	Reversible	Negative	Moderate	Probable	Moderate
	With Mitigation	Local	*Long term*	*Reversible*	*Negative*	*Low*	*Probable*	*Low*
Visual impact associated with the proposed facility and associated infrastructure and the potential impact on the area's rural sense of place	Without Mitigation	Local	Long term	Reversible	Negative	Medium-High	Highly Probable	Moderate-High
	With Mitigation	Local	*Long term*	*Reversible*	*Negative*	*Medium-High*	*Highly Probable*	Moderate-High
Potential impact on tourism	Without Mitigation	Local	Long term	Reversible	Negative	Moderate	Probable	Moderate
	With Mitigation	Local	*Long term*	*Reversible*	*Negative*	*Low*	*Probable*	*Low*

TABLE 7.2 OPERATION PHASE IMPACT MANAGEMENT

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
Potential habitat fragmentation impacts associated with the operational phase of the proposed development.		
• The EMPr should include biodiversity monitoring and an adaptive management plan for the operational phase to ensure there are no adverse impacts observed to the fauna community. • Biodiversity monitoring must be implemented for various specialisms to assess the ongoing impacts of the operational wind farm compared to pre-construction baseline data. Specialists would need to be contracted by the Functional Entity and monitoring must come into effect in direct alignment with various specialist Guidelines and Best Practice. • Implement habitat enhancement and restoration measures to offset the loss of connectivity caused by operational activities. This can be achieved by planting native vegetation, installing nesting boxes, or creating artificial shelters to provide alternative habitats for displaced fauna species and enhance connectivity within the landscape. This should be considered in the EMPr. • All recommendations in the Terrestrial Animal Specialist Assessment must be adhered to.	Site Engineer ECO Specialist	Following clearing of vegetation Throughout Operation Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
Potential encroachment of alien invasive species resulting in loss of flora SCC associated with the operational phase of the proposed development		
• Disturbed areas such as road verges, lay-down areas and areas utilised by temporary construction facilities must be regularly monitored to detect the establishment of alien species and those species should be eradicated before they spread. • Regular clearing of alien vegetation should be conducted, as needed, using the best-practice methods for the species concerned, the use of herbicides should be avoided as far as possible. • The use of herbicides (if absolutely required) for the control and eradication of alien grasses should be done in accordance with the alien eradication programme in the EMPr to reduce unintended ecological impacts.	Site Engineer ECO / ESO Developer Specialist	Throughout operation phase according to the Bat Management Plan (Section 23).

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
Potential light, noise and visual pollution impacts associated with the operational phase of the proposed development.		
• Use low-intensity and downward-facing lighting fixtures to reduce the attraction of insects and mitigate the risk of bat collisions. • Employ noise mitigation measures, such as acoustic insulation, to reduce the transmission of noise from wind turbines and associated infrastructure. • Develop and implement operational protocols to minimize noise and vibration disturbances during critical periods for faunal species, such as breeding, nesting, and foraging. • Schedule maintenance activities and construction work during off-peak hours to minimize disruption to wildlife behavior and habitat use.	Site Engineer ECO / ESO	Throughout Operation Phase
Potential fire impacts associated with the operational phase of the proposed development.		
• No open fires should be permitted outside of designated areas. • Smoking areas must be defined, and no smoking should be permitted outside of designated areas. • An emergency response plan for uncontrolled fires must be in place prior to operation and implemented for the duration of the WEF's lifespan. • All staff members must have a Fire and Safety induction to increase awareness.	Developer Specialist	Before Operational Phase
Potential faunal mortality and loss of SCC impacts associated with the operational phase of the proposed development		
• Adhere to the open space management plan which makes provision for the favourable management of An environmental induction for all construction staff on site to identify SCC. • Demarcate sensitive areas, where SCC have been confirmed present near the development footprint as No-Go areas. • Site access should be controlled, and no unauthorised persons should be allowed onto the site to limit illegal harvesting. • The collection or harvesting of any plants at the site should be strictly forbidden. • Bird and bat carcass searchers must be deployed at the WEF and all findings to be reported to an appropriate bird and bat specialist. Refer to recommendations in the Avifaunal Specialist Impact Assessment and Bat Specialist Impact Assessment(Volume II of EIA report).	Maintenance Staff Site Engineer ECO / ESO Specialist	Throughout Operation Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
• The WEF must report all fatalities of SCC to a competent or Interested and Affected Party on a quarterly basis. • All vehicles must adhere traffic rules on the site with a maximum speed of 30km to be implemented. Alternatively, consult and enforce all recommendations in the Traffic Impact Assessment. • Limit driving at night on the site, between dusk and dawn, when fauna are most active. • No hunting permitted. • No dogs or cats permitted (other than those of the landowner). • Waste management programme to prevent trash buildup attracting species such as crows. • Roadkill to be immediately reported, removed and suitably disposed of to prevent scavenging (e.g., buried).		
Potential soil erosion impacts associated with the operational phase of the proposed development.		
• Utilize existing servitudes and access roads wherever possible, any new roads or the upgrading of roads should be minimized as far as possible and not be larger than required. • All construction vehicles should adhere to clearly defined and demarcated roads, no off-road driving should be allowed. • Ensure that sufficient erosion control measures are constructed on all servitudes and access roads in the project area, including where such crosses waterbodies. • Rehabilitate existing servitude and access roads in the project area with sufficient erosion control measures to prevent the loss of soil and the degradation of vegetation. • Construction activities in or near drainage lines, washes or temporary inundated depressions must only take place during the dry season. • Erosion management at the site should take place according to the Erosion Management Plan and Rehabilitation Plan included in the EMPr(Section 19). • All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate energy in the water stream which may pose an erosion risk. • Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance during the operation of the project.	Site Engineer ECO / ESO	Throughout Operation Phase
Artificially altered fire regimes may reduce habitat suitability/availability by changing vegetative communities and habitat structure		

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
• Waste management programme to prevent trash buildup attracting species such as crows; • Roadkill to be immediately reported to the environmental control officer, removed and suitably disposed of to prevent scavenging (e.g., buried); • Construction activity to be minimized during the night to reduce noise pollution during periods when Riverine Rabbit are most active.	Maintenance Staff Site Engineer ECO / ESO	Throughout Operation Phase
Novel infrastructure (e.g., perimeter fencing) may exclude species from portions of suitable habitat by restricting animals' movement across the landscape.		
• Wildlife friendly road and fence crossings to be frequently serviced as a restriction of fauna across the site (e.g., road culverts to be cleared of debris); • Livestock grazing pressure must be reduced in natural, near-natural and recovered areas; • Flow and erosion control measures to be continually monitored for efficacy and remedied if pooling, sedimentation or erosion is observed; • Previously disturbed areas such as road verges, lay-down areas and areas utilized by temporary construction facilities must be regularly monitored to detect the establishment of alien species and those species should be eradicated before they spread; • Regular alien clearing should be conducted, as needed, using the best-practice methods for the species concerned, the use of herbicides should be avoided as far as possible	Site Engineer ECO / ESO	Throughout Operation Phase
Operational activities may disturb and/ or displace certain animal SCCs from the vicinity of infrastructure.		
• Minimized lighting; • Minimize activity that occurs between dusk and dawn; • Adequate noise reduction measures (where possible) on machinery; • Wind Turbine Generators should not spin below a certain cut-in speed, i.e., no free-spinning of WTG blades permitted; • Speed limits should be strictly enforced to reduce unnecessary noise; • No dogs or cats other than those of the landowners should be allowed on site as these animals cause unnecessary disturbance such as chasing fauna; • Long-term animal monitoring programme;	Site Engineer ECO / ESO	Throughout Operation Phase
Increased frequency of vehicle movement associated with operational activity increases the possibility of vehicles colliding with animals, resulting in roadkill fatalities. Animals may become entangled or entrapped in fencing or cattle grids		

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
• Strictly enforced speed limits; • Strictly controlled site access; • Minimized movement of personnel vehicles at night; • Wildlife friendly road crossings (including culverts that allow animal movement below the road surface); • Signage, education and awareness induction training about relevant animal SCCs to personnel; and • Wildlife-friendly fencing and cattle grids.	Site Engineer ECO / ESO	Throughout Operation Phase
Operational activities can attract species such as crows, which depredate on various animals such as tortoises and juvenile rabbits.		
• Compile a Traffic Mnaagment Plan; • Overhead Transmission Lines to be of a type and design that reduces nesting opportunities (e.g., solid pylon design); • Nest and perch deterrents on transmission line pylons; • Waste management programme to be implemented; • Roadkill to be reported and immediately removed for adequate disposal that prevents scavenging (e.g., buried); • Operational studies on sound and animal populations (e.g., Riverine Rabbit) across the site; and • No spinning wind turbine generators at wind speeds below a certain cut-in speed (i.e. no free-spinning blades).	• Site Engineer • ECO / ESO	• Throughout Operation Phase
Bird Collision, habitat alteration and displacement		
• Re-position all turbines that fall within the high-risk zones delineated by the CRM to lower risk areas (as also identified by the CRM). • The high-risk No-Go zones delineated by the CRM should be adhered to (as depicted in this report). • A post-construction programme must be conducted by an avifaunal specialist (following the Birds and Renewable Energy Specialist Group guidelines) to: • (i) assess turbine-related fatalities; and • (ii) confirm that all mitigations have been appropriately adhered to and, in particular, that road and hard stand verges do not provide additional substrate for raptor prey species. • A bird fatality threshold and adaptive management policy must be designed by an ornithologist for the site, prior to construction. This policy should form an annexure of	• Site Engineer • ECO / ESO • Specialist	• Throughout Operation Phase •

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
the operational EMP for the facility. Most importantly, this policy should identify the number of bird fatalities of Priority species which will trigger a management response, appropriate responses, and timelines for such responses. In general, it is recommended that should one Red Data species or two or more LC species be killed per turbine per year then those turbines will require further mitigation. • Should the identified Priority bird species fatality thresholds be exceeded in Year 1 and 2, either (i) an automated turbine Shutdown on Demand (SDOD) programme must be immediately initiated; or • Appropriate alternative mitigation (e.g. striped blade, human-SDOD) must be implemented on site. The latter programme must consist of a suitably qualified, trained, and resourced team of observers present on site for all daylight hours 365 days of the year. This team must be stationed at vantage points (VPs) with full visible coverage of all turbine locations (typically 1 VP covering four turbines). The observers must detect incoming Priority bird species, track their flights, judge when they enter a turbine proximity threshold, and alert the control room to shut down the relevant turbine until the risk has passed. A full detailed method statement or protocol must be designed by an ornithologist.		
Direct collision or barotrauma		
• All turbines and turbine components, including the rotor-swept zone, should be kept out of all high-sensitivity zones. • Mitigation as proposed in Section 7, should be applied after testing and as soon as turbines start to turn. • No turbines should be placed within 200 m of open water sources. • The lowest sweep of the turbine blade should not be less than 30 m. • A bat specialist should be appointed before the turbines start to turn, and operational bat monitoring should start when all the turbines start to turn, for a minimum of two years, or as described by the latest South African bat guidelines. • Mitigation should be discussed between the bat specialist and developer during the construction and operational phase. Mitigation measures should be applied, using Table 9, Section 7, as a starting point for discussions. • Except for compulsory lighting required in terms of civil aviation, artificial lighting should be minimised, especially bright lights. Lights should rather be turned downwards where possible. Turbine tower lights should be switched off when not in operation, if possible.	Wind farm operator ECO / ESO Specialist	Throughout Operation Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
• Two years of compulsory bat monitoring as per the latest SABAA bat monitoring guidelines is recommended, but this might be extended, depending on the bat specialist.		
Fatality of migrating bats and fatal curiosity		
• Care should be taken during post-construction monitoring to verify the activity of *M. natalensis*, especially within the rotor swept area of the turbine blades. Carcasses should be identified to establish the fatality of this species. • All turbines and turbine components, including the rotor swept zone, should be kept out of all high sensitivity zones. • No turbines should be placed within 200 m of any open water sources. • The lowest sweep of the turbine blade should not be less than 30 m. • Mitigation as proposed in Section 7 should be applied as soon as the test period of turbines is completed, and the turbines start turning. • A bat specialist should be appointed before the turbines start to turn and operational bat monitoring should start when all the turbines start to turn, for a minimum of two years, or as described by the latest South African bat guidelines. • Mitigation should be discussed between the bat specialist and developer during the construction and operational phase. Mitigation measures should be applied, using Table 9, Section 7, as a starting point for discussions. • Except for compulsory lighting required in terms of civil aviation, artificial lighting should be minimised, especially bright lights. Lights should rather be turned downwards where possible. Turbine tower lights should be switched off when not in operation, if possible. • Two years of compulsory bat monitoring as per the latest SABAA bat monitoring guidelines is recommended, but this might be extended, depending on the recommendations from the bat specialist.	Applicant Contractors	Throughout Operation Phase
Loss of bats of conservation value		
• Care should be taken during post-construction monitoring to verify the activity of M. natalensis, especially within the rotor swept area of the turbine blades. Carcasses should be identified to establish the fatality of this species. • All turbines and turbine components, including the rotor swept zone, should be kept out of all high sensitivity zones. • No turbines should be placed within 200 m of any open water sources.	Applicant	Throughout Operation Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
• The lowest sweep of the turbine blade should not be less than 30 m. • Mitigation as proposed in Section 7 should be applied as soon as the test period of turbines is completed, and the turbines start turning. • A bat specialist should be appointed before the turbines start to turn and operational bat monitoring should start when all the turbines start to turn, for a minimum of two years, or as described by the latest South African bat guidelines. • Mitigation should be discussed between the bat specialist and developer during the construction and operational phase. Mitigation measures should be applied, using Table 9, Section 7, as a starting point for discussions. • Except for compulsory lighting required in terms of civil aviation, artificial lighting should be minimised, especially bright lights. Lights should rather be turned downwards where possible. Turbine tower lights should be switched off when not in operation, if possible. • Two years of compulsory bat monitoring as per the latest SABAA bat monitoring guidelines is recommended, but this might be extended, depending on the bat specialist.		
Disruption of the cultural landscape due to the presence of construction equipment and activity		
• Keep the construction duration as short as possible and as much of the activity as possible out of the public view. • In particular the infrastructure area(s) should be screened if possible, and noise and light pollution kept to a minimum.		
Visual impact from the operational activities		
• Maintain the general appearance of the facility as a whole.		
Noise from daytime and nighttime operation activities		
• Significance of potential impact is low, albeit worst case scenario with WTG emitting maximum noise levels were considered. Mitigation is therefore not required. • The potential significance for night-time operational activities is low and additional mitigation are not required or recommended for night-time operational activities. Operational WTG will be clearly audible at NSR H-6 (permanent residential use, located 750 m from closest WTG).		

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
Development of infrastructure to improve energy security and support the renewable sector.		
• Implement a skills development and training programme aimed at maximizing the number of employment opportunities for local community members. • Maximise opportunities for local content, procurement and community shareholding.		
Creation of employment and business opportunities and generation of additional income to landowners associated with the operational phase		
• Where reasonable and practical, the proponent should implement a 'locals first' policy, especially for semi and low-skilled job categories. • Where feasible, efforts should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria. • Where feasible, training and skills development programmes for locals should be initiated as part of the operational phase. The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. • Business • The proponent should liaise with the BVM with regards the establishment of a database of local companies, specifically BBBEE companies, which qualify as potential service providers for the operational phase. • Note that while preference to local employees and companies is recommended, it is recognised that a competitive tender process may not guarantee the employment of local labour for the operational phase. • Implement agreements with affected landowners.		
Benefits associated with support for local community's form SED contributions.		
• The proponents should liaise with the BVM to identify projects that can be supported by SED contributions. • Clear criteria for identifying and funding community projects and initiatives in the area should be identified. The criteria should be aimed at maximising the benefits for the community as a whole and not individuals within the community. • Strict financial management controls, including annual audits, should be instituted to manage the SED contributions	•	•

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8. BESS RISK ASSESSMENT AND MANAGEMENT PLAN

8.1 High-Level BESS Risk Assessment

The risks associated with Solid-State, Lithium Ion (Li-Ion) batteries, are typically well researched and documented. The main concerns relating to a BESS are fire hazards (from toxic and flammable gasses) and the potential for a condition known as '*thermal runaway*'. Thermal runaway occurs in situations where an increase in temperature changes the conditions in a way that causes a further increase in temperature, often leading to a destructive result. As far as general environmental risks, the main concerns are surrounding the disposal of the batteries at end of their life.

This section will attempt to address the risks associated with the on-site use of a BESS for the Hugo WEF, and the resultant Risk Assessment is presented in Table 8.1 below. To do this, the EAP looked at several potential situations which could result in a possible detrimental environmental hazard. These are:

1. The actual risks associated with the delivery, connection, operation, maintenance, disconnection and disposal of the batteries.
2. The likelihood of these actual risks occurring.
3. The significance of the impacts should these risks take place.
4. Appropriate and practical mitigation measures and/or management actions to reduce likelihood of the risk occurring and/or the impact.

A comprehensive operations and maintenance programme is necessary to ensure that all management and mitigation measured are included in the EMPr and adopted and implemented as well as to ensure that all monitoring and protective devices are in good working order.

Regular inspections should be undertaken to ensure the battery systems are not overheating or showing signs of malfunction. Annual thermographic scanning can help ensure the BESS is operating within normal parameters.

Where a BESS does not meet its performance requirements, and where repairs do not solve a problem which exists, and where change in the BESS does not lead to a profitable alternative business solution, the BESS is said to have reached its End-of-Life (EoL). Following an EoL shutdown procedure a BESS would be de-installed, disassembled, removed from the site and transported. Further, its components would be reused and/or recycled.

For decommissioning the energy storage system, the appropriate technical guidelines from the manufacturer should be consulted. Before the actual decommissioning, the BESS system needs to be checked for hazardous substances and a risk assessment should be performed considering safety and/or environmental risks which might occur during the decommissioning activities (e.g., fire hazards, electric shocks and poisonous effects on the environment). Depending on the safety and/or environmental risks identified and on the type of BESS equipment, local authorities should be consulted or informed about the decommissioning activities.

For recycling, it is advised to consult a specialized organization in waste treatment to the extent that all materials, also non-hazardous are disposed of correctly and preferably recycled. Several materials which commonly are found in modern batteries or redox flow batteries are

environmentally hazardous and regulated and thus should be disposed of according to regional government requirements, such as directive 2006/66/EC of the European parliament and of the council, also known as the Batteries Directive.

This high-level risk assessment must be replaced with a detailed technology specific risk assessment once the final equipment suppliers have been identified during the detailed design and procurement stage. The technology specific risk assessment should be undertaken or provided by the battery supplier once identified.

TABLE 8.1 HIGH-LEVEL BESS RISK ASSESSMENT

Possible Risk	Likelihood of occurrence	Potential Impact	Management / Mitigation
General leakage: Leakage of Coolant Leakage of Electrolyte	Low	On site fires. Electrical failure. Potential spillage of electrolytes or refrigerant Soil contamination Groundwater contamination	Latest BESS technologies to be used as far as possible. BESS installation is to adhere to the appropriate international standards and South African National Standard (SANS) requirements. Training of all staff and employees on how to handle spillages, fires and electrocutions. Records kept for well managed operations and maintenance. Bunding of containers and batteries to be placed on an impermeable barrier/layer (e.g., concrete surface with acid lining). In case of a spillage of hazardous chemicals where contamination of soil occurs, depending on the degree of contamination, excavation and removal to a hazardous waste disposal site might be necessary. If the spillage is widespread, a specialist will need to be immediately appointed to deal with the issue, the DFFE and Western Cape Province Pollution and Chemicals Management Directorate must be notified, and the notification process stipulated in the National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GN 331, 2 May 2014) must be followed. Implementation of spill handling and management in line with the EMPr. Demarcate all no-go and sensitive areas. Avoid the placement of batteries near watercourses and sensitive features. Material Safety Data Sheets (MSDS) Records to be kept, as well as incidents reporting register. Source batteries from reputable suppliers, and batteries to arrive on site pre-assembled in suitable containers. Battery inspection prior to installation.
Mishandling: Batteries incorrectly connected Batteries left disconnected Short circuits Forced discharged Venting of Electrolyte Punctured/Crushed or damaged modules and battery casing	Low	On site fires. Electrical failure Electrocution Potential spillage of electrolytes or refrigerant Vented gasses Staff and personal injury Contaminated Runoff Soil and microbe contamination Groundwater seepage Downstream effects on the current terrestrial ecosystem.	
Thermal Runaway:	Low	On site fires Electrical failure	Regular maintenance of equipment. Latest BESS technologies to be used as far as possible.

Possible Risk	Likelihood of occurrence	Potential Impact	Management / Mitigation
Thermal and/or Mechanical failure in one or more battery cells Overheating Short circuiting		Potential spillage of electrolytes or refrigerant Downstream effects on the current terrestrial ecosystem.	Appropriate battery design and venting control. Source from reputable manufacturers. Safe and appropriate storage in line with the above and the EMPr. Safe handling which must include battery inspection prior to installation. Should electrolyte solutions be stored on site, these must be stored away from incompatible materials such as all peroxides, such as hydrogen peroxide; chemicals that react with acid to generate a gaseous product, such as carbonate and bicarbonates, sulfites and bisulfites; strong reducing agents, such as alkaline metals (Li, Na, K) and alkaline earth metals (Be Mg Ca, Sr, Ba); reactive metals such as aluminum and zinc, all hydrides (such as LiAlH4, $NaBH_4$), and some carbides (such as CaC_2). Development and implementation of Thermal Management Plan prior to installation/construction.
Limited Employee Training and Experience: Device Monitoring Failure (SCADA) Poor incidents reporting Poor first responders training Distance to nearest fire station and response time.	Low	Time lag for first respondent Inability to contain spillage Fire Electrocution Damage to exiting/surrounding infrastructure	During the construction phase the proposed project, first responders from the nearest major center (such as fire fighters and paramedics) must be given appropriate training on dealing with any emergency situation that may occur as a result of the operation of BESS. Such training must be provided by the technology suppliers or an appointed service provider.
Inappropriate Storage Hydrocarbon Spill Leaked battery pack coolant Leaked refrigerant Leaked cell electrolyte Rapid heating of individual cells Fires	Low	On site fires Electrical failure Electrocution Potential spillage of electrolytes or refrigerant Vented gasses Staff and personal injury Contaminated Runoff Soil and microbe contamination Groundwater seepage Downstream effects on the current terrestrial ecosystem.	Training of all staff and employees on how to handle spillages, fires and electrocutions. In terms of appropriate design measures, the holder of the EA must identify a secondary containment facility, which is to be constructed with a capacity of at least 110% of the largest storage tank's capacity and the off-loading point must be located in the bunded area to ensure that any potential spill during the off-loading of the electrolyte solutions is contained. Records must be kept for well managed operations and maintenance. Bunding of containers.

Possible Risk	Likelihood of occurrence	Potential Impact	Management / Mitigation
			Implementation of spill handling and management in line with the EMPr which ensures that run-off and dirty water does not mix with electrolyte spill. Containment areas to be sloped towards a sump. All drains to be covered. Demarcate all no-go and sensitive areas. Avoid the placement of batteries near watercourses and sensitive features. MSDS Records to be kept, as well as incidents reporting register. The batteries must be placed in a well-ventilated area, include vents (where necessary and applicable) and appropriate PPE (appropriate gloves, safety glasses/face shield, appropriate clothing) must be worn when handling the electrolyte solutions. Source batteries from reputable suppliers. The transport vehicle must be identified with appropriate symbols and signage displayed. Transport schedule and map must be implemented and kept on each drivers person, with a copy kept in the admin offices on site. Battery inspection must be conducted prior to installation.
Inappropriate disposal at the end of life Landfill Disposal Heavy Metal Pollution	Medium	Potential scenario of fluids from the batteries leaking into environment. The release of such chemicals through leaching, spills or air emissions can harm communities, ecosystems and food production. The potentially toxic materials contained in batteries means that they are classified as hazardous materials in terms of NEM:WA. There are only a few licensed hazardous waste sites in South Africa and recycling of batteries and e-waste has been identified as	The recycling of batteries and their potential use as e-waste. Disposal at a licensed hazardous waste site. Prior to construction of the D1B WEF, and BESS, the holder of the EA is to develop a dedicated Battery Recycling Programme to be adopted on-site. Records of disposal at a licensed facility must be kept.

Possible Risk	Likelihood of occurrence	Potential Impact	Management / Mitigation
		a sure way of improving the lifespans of such sites.	

9. CUMULATIVE PHASE

The cumulative impact assessment considers the combined impact of the remaining and other renewable projects within a 30 km radius, that are also in the development phase and the associated grid lines on the aquatic resources. The combination of the Hugo and Khoe WEF, as well as other similar renewable energy projects, either existing or proposed, was considered to assess cumulative visual impacts within a 30 km radius of the proposed project. Developments considered during the assessment are named below:

- Proposed Touwsrivier Solar Energy Facility;
- The Proposed Sanval 75 Mw Photovoltaic Solar Power Plant On Portion 6 Of The Farm Nuwerus 450 Near Worcester, Western Cape Province;
- Proposed Construction Of The 2.5 MW Photovoltaic (Pv) Solar Facility On Portion 0054 Of The Farm Osplaats 134 Near De Doorns Within The Breede Valley Local Municipality, Western Cape;
- Proposed Construction Of The 2.5 MW Photovoltaic (Pv) Solar Facility On Portion 0054 Of The Farm Osplaats 134 Near De Doorns Within The Breede Valley Local Municipality, Western Cape; and
- 75 MW Montague Road Solar PV Sef on Vredefort No. 34 Near Touws River within the Breede Valley Local Municipality in the Western Cape Province.

9.1 Soil, Land Use and Agricultural Potential

This cumulative impact assessment determines the quantitative loss of agricultural land if all renewable energy project applications within a 30 km radius become operational. Note that electrical grid infrastructure projects do not contribute to a loss of agricultural land and are not therefore included in this calculation of cumulative land loss. The area of land taken out of agricultural use as a result of all the projects within a 30 km radius (total generation capacity of 761 MW) will amount to a total of approximately 473 hectares. This is calculated using the industry standards of 2.5 and 0.3 hectares per megawatt for solar and wind energy generation respectively, as per the Department of Environmental Affairs (DEA) Phase 1 Wind and Solar Strategic Environmental Assessment (SEA) (2015). As a proportion of the total area within a 30 km radius (approximately 282,700 ha), this amounts to only 0.17% of the surface area. This is well within an acceptable limit in terms of loss of marginal potential agricultural land.

All the projects contributing to cumulative impact for this assessment have the same agricultural impacts in a very similar agricultural environment, and therefore the same mitigation measures apply to all.

Furthermore, it should be noted that there are few land uses, other than renewable energy, that are competing for agricultural land use in this area. The cumulative impact from developments, other than renewable energy, is therefore likely to be low.

The loss of agricultural potential by soil degradation can effectively be prevented for renewable energy developments by generic mitigation measures that are all inherent in the project engineering and/or are standard, best-practice for construction sites. Soil degradation does not therefore pose a cumulative impact risk.

Due to all the considerations discussed above, the cumulative impact of loss of future agricultural production potential is assessed as low. It will not have an unacceptable negative impact on the agricultural production capability of the area, and it is therefore recommended, from a cumulative agricultural impact perspective, that the development be approved.

9.2 Freshwater and Wetlands (Aquatics)

The rating below is based on the premise that important or sensitive features will be avoided by the various projects, while the mitigations proposed will ensure that the form and or function of downstream areas remain intact.

9.3 Terrestrial Biodiversity (Flora and Fauna)

Solar facilities typically involve more invasive vegetation clearing compared to WEFs. Consequently, this can lead to the loss of individual Species of Conservation Concern (SCC) and increased habitat fragmentation. Habitat fragmentation can reduce habitat connectivity and lead to changes in the dispersal of species, population isolation and reduced genetic diversity within landscapes. While the broad-scale impacts on habitat are concerning, it's noteworthy that the Fynbos biome is not listed as critically endangered. However, broad scale clearing of vegetation could lead to cascading effects in flow regimes, nutrient cycling, and energy flow which ultimately results in decreased biodiversity.

9.4 Avifauna

The estimated figure for all avian fatalities is 969 birds (all species) from interactions with the five solar farms within 30 km. None of these are expected to be raptors as they have not been recorded as victims of solar farms (although the data are very thin). This does not include species that may be displaced from these developments and excludes fatalities due to power line collisions.

These are medium-high totals and suggest cumulative totals must be ranked a medium-high and significant. With CRM- based mitigations (at the Hugo WEF) it is likely that these totals will be lower.

The Cumulative Impacts table with avian fatality rates are based on published studies. Data were sourced from post-construction wind energy facility avian assessments, summarised by Birdlife South Africa, from 1-2 years' post-construction monitoring (Perold et al. 2020).

9.5 Heritage and Archaeology

Impacts to the cultural landscape are considered to be the main driver of cumulative impacts on heritage resources and could be extensive if many projects are constructed in the vicinity, particularly if these projects are highly visible. These cumulative impacts cannot be fully mitigated but the implementation of the recommendations of visual consultants across all projects would likely reduce impacts from high to medium negative if highly sensitive areas are avoided.

9.6 Paleontology

As with palaeontology, cumulative impacts to archaeological sites and/or materials are difficult to assess, again because of the variable distribution of sites and materials across the landscape and because of the differences in the quality of surveys and reporting on different

projects. Field observations made in previous assessments in the vicinity of the Hugo WEF indicate that archaeological sites and materials are not common in the area and that, provided appropriate mitigation measures are implemented, a low (negative) cumulative impact significance can be expected.

9.7 Visual / Landscape

The study area is not located within a REDZ, and as such very limited renewable energy facilities can be found within a 35 km radius. No other wind energy facilities have been authorized within a 35 km radius; however, three (3) solar PV energy facilities have been approved, namely Sanral PV SEF to the north west and Touwsrivier and Montague Road Solar PV SEFs to the north east.

The proposed Hugo WEF addressed in this report is one half of a larger wind energy cluster consisting of another proposed WEF to the south, namely Khoe wind energy facility.

The cumulative visual impact of the proposed Hugo Wind Energy Facility, together with the proposed Khoe WEF (refer to Section 5.2) is expected to be very high, depending on the observer's sensitivity to wind turbine structures.

Owing to the sensitivity of the landscape, the high visual quality and the potential visual impacts on sensitive visual receptors, the cumulative visual impact is not considered to be within acceptable limits.

9.8 Noise

There is a low risk of cumulative noises from the Hugo and Ezelsjacht WEFs operating simultaneously. The addition of the Hugo WEF will result in a slight increase in noise levels, with a minor cumulative effect on NSR H-1, H-2 and H-13. Noises from the Ezelsjacht WTG might have a minor effect on H-4, H-5 and H-10.

9.9 Socio-Economic

9.10 Traffic and Transportation

10. DECOMMISSIONING PHASE

The objectives of the decommission phase are:

To promote environmental awareness.

To define roles and responsibilities for environmental management.

To ensure that the mitigation measures proposed for the decommissioning phase of the WEF is implemented and conducted appropriately.

To ensure that the recommended management plans are implemented accordingly.

Prior to the decommissioning of the WEF, a decommissioning plan must be produced by the ECO. The plan must include details on the decommissioning and dismantling of the WEF, taking in consideration the potential environmental impact associated with it. Environmental monitoring plans must be produced to ensure no pollution occurs during this phase. The plan must include the steps that will be taken to rehabilitate the area after the WEF is dismantled, as well as recycling options of the equipment and structures. Recommendations for consideration for the decommissioning plan is provided below.

Decommissioning ultimately requires the removal of wind turbine infrastructure and includes the restoration of the site as closely as possible to its original state.

10.1 Decommissioning and Restoration Plan Recommendations

A Decommissioning and Restoration Plan (DRP) should be considered to ensure that habitat and ecosystem restoration is achievable once the Wind Farm has ceased operating.

According to the *Scottish Natural Heritage Commissioned Report: Research and Guidance on restoration and decommissioning of onshore wind farms*, a logical sequence for decommissioning planning and execution of construction activities were reviewed and some of what are suggested below:

- De-energising the site, usually involves initially high voltage (HV) disconnection in the event of re-energizing of the site followed by low voltage (LV) disconnection of the affected turbines.
- Handing over the site responsibility to an experienced Contractor and management of Operator access and site setup.
- Decommissioning of structures, likely to be the reverse of the installation procedure, such as:
    - Stripping out of turbine internals and removal of transformer;
    - Controlled dismantling of turbines (blades, nacelle, tower);
    - Removal of turbine base and backfilling void;
    - Removal of cables (whole or partial) and making good trenches (throughout);
    - Removal of crane pads (whole or partial) and backfilling/landscaping;
    - Removal of Sub-station and associated buildings (when applicable);
    - Removal of access tracks (whole or partial) and associated water crossings, passing areas etc. Working from end point towards exit point;
    - Reinstating watercourses and /or removing watercourse crossings;

- Final landscaping (seeding) and making good remaining borrow pits etc;
- Make good public road junctions, if required;
- Providing 'as-built' documentation including residual risks to Landowner and Planning Authority; and
- Monitoring and maintaining the site to achieve the end-use requirement.

10.1.1 Soil Conservation and Management

Completely removing wind turbine infrastructure is likely to require a rock-based backfill into the voids left behind. Decommissioning plans have proposed options that involve the removal of turbine materials to a depth of approximately 1 m below ground level followed by surface restoration of topsoil. This approach needs to be considered carefully as it may not always be ecologically feasible. Using large quantities of off-site rock or soil for backfill could have detrimental impacts especially if the backfill's chemical composition is significantly different from that found in the natural, baseline (receiving) soil environment of the site. A recommendation would be to avoid using large quantities of backfill that do not match the receiving environment's baseline soil profile.

Other direct and indirect impacts on soil properties that may occur during construction and decommissioning phases that should be avoided include:

- Sealing soil by covering it with impermeable materials that may alter the soil's chemical and biological properties and could have adverse impacts on drainage characteristics;
- Contaminating soil through accidental spillage / use of chemicals;
- Compacting soil with heavy machinery;
- Mixing topsoil with subsoil, resulting in reduced soil quality; and
- Indirect effects on water quality – increase in dissolved organic carbon and presence of suspended soils.

Before any decommissioning and restorative design work takes place, an in-depth assessment of the available soil on site, along with soil-forming resources from the restorative layers should be carried out. It is important to understand a site's soil characteristics and their influence on habitats so that communities that are re-established are likely to sustain themselves in the long run.

Agricultural restoration would need at least a thin layer of topsoil, while semi-natural environments often require low nutrient substrates and woodland restorative planting needs a minimum depth of 1 m of suitable material.

Imported soils should match the chemical and nutrient composition of the receiving soil profile and should be free of invasive and undesired seedlings / propagules. Using imported peat or soils may result in the need for resowing if the material does not contain a viable seed bank of local provenance. Reseeding techniques will inevitably be needed as materials that were side-casted during the initial construction phase will not contain enough viable seeds to regenerate the whole restoration area. Other soil-forming materials can be used in the absence of sufficient topsoil, peat, and appropriate seed bank levels as long as soils and/or soil substitutes are aligned with the site's target ecosystem.

10.1.2 Vegetation Restoration

The objective of habitat restoration is to minimize degradation of the ecological resource and promote the re-establishment of a functional ecosystem. Decommissioning plans that involve significant disturbance of habitats (complete removal of infrastructure) require a longer recovery period in environments less resilient to disturbance (peatlands or species-rich grasslands). Habitat restoration techniques must consider the ease that different habitats can be restored and the likely success of this restoration.

10.1.3 Options for End-of-life Infrastructure

Generally, the turbine would be dismantled at ground level and transported away from the site for recycling, reuse, or disposal. The decommissioning of the turbine structure should have a minimal environmental impact. Costs are driven by haulage and craneage charges.

Installed wind turbines consist of four sections: the rotor, nacelle, tower, and foundation. It is important to know what materials were used in the construction of the turbines as this will provide insight into best practices for appropriate disposal methods.

Materials commonly used in the construction of turbines are:

- Rotor – Blades, Blade hub, Nose cone, Resin, fiberglass, cast iron.
- Nacelle – Bed frame, Main shaft, Transformer, Generator, Gearbox, Nacelle cover, Steel, Silica, copper, steel, fiberglass, resin.
- Tower - Steel, Concrete (very uncommon).
- Foundation – Footing, Ferrule, Concrete, iron, steel.
- Other material to be decommissioned are discussed below.
- Transformer - There are limited recycling options, and is therefore recommended to be removed from site for disposal or be used by others. It would be a low cost to the decommissioning plan.
- Crane Pads can be retained, regraded and then covered. Original soils must be managed to be reused for restoration. Costs involved are Low to Medium. Recycling options would be to use on-site as backfilling voids.
- Tracks and roads can be left in situ if suitable and if not hindering on any other risks such as visual, hydrology. For reinstatement, original topsoil and appropriate seed layer must be used.
- Substations can be removed from site and materials can be separated and reused. Cables made from copper material can be recycled offsite.

Turbine foundations consist of reinforced concrete gravity structures or reinforced concrete bases supported on piles. The removal of a base will involve breaking apart the reinforced concrete. The concrete is recommended to be broken into smaller sections with steel cutting equipment, hydraulic breakers, excavators, and dump trucks for their removal. It is suggested that the removal of a concrete base could take a week if only the top layer of 1 meter is removed. Should reinforced concrete be processed on-site to remove steel (for recycling purposes) and create a granular or rubble concrete material, it can be used for further construction (tracks, hardstandings) if appropriate to the site. Processed or unprocessed reinforced concrete can be removed from site and be reused or recycled.

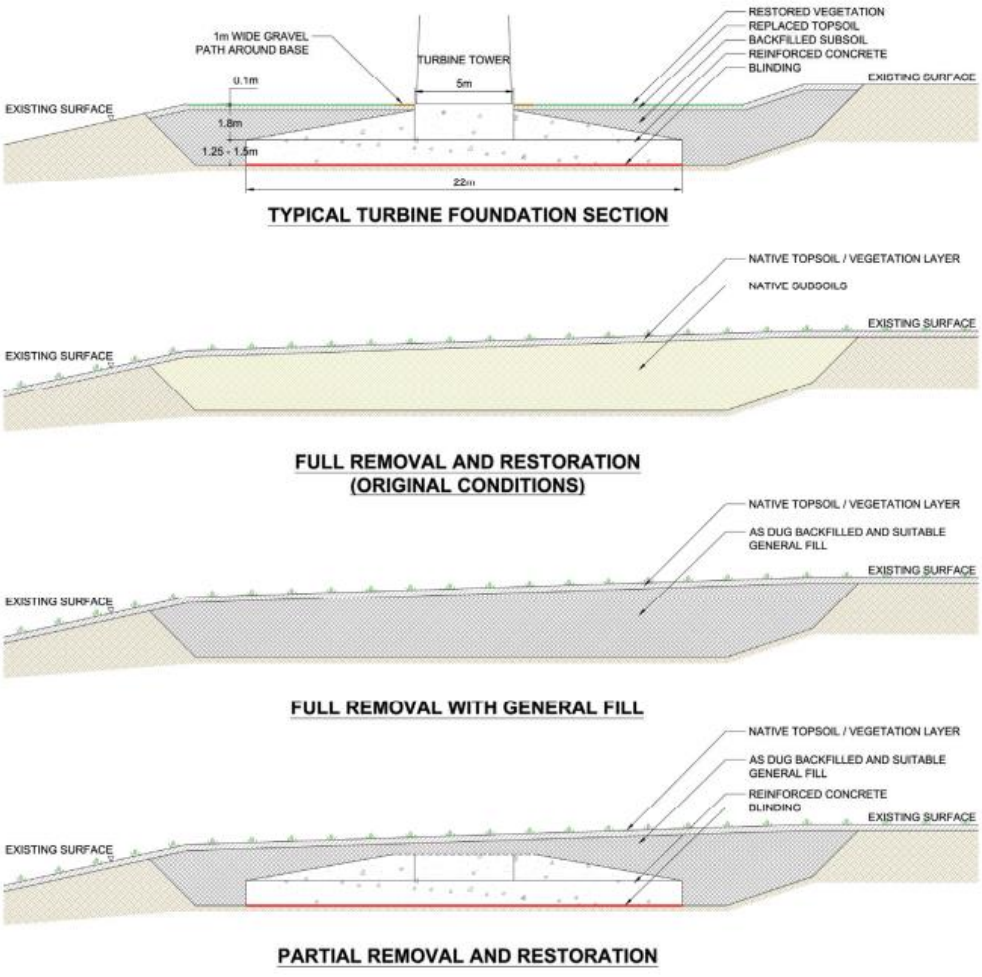
Alternatively, reinforced concrete can under normal circumstances remain *in situ* as an inert material. Concrete is inherently durable unless attacked by soils containing sulphates or low pH and other aggressive agents. The risk of rebar corrosion is low in buried concrete due to the low risk of carbonation and low levels of oxygen. Where ground conditions pose a chemical risk, it is likely that the concrete would have been designed to be resistant to acidic or alkaline conditions. Site-specific risks should be assessed in the DRP as the base has been *in situ* for 15 years.

Retaining the base *in situ* can be considered as there is a relatively low environmental risk associated with reinforced concrete. The noise, ground disturbance, and costs of excavating, processing, and transporting along with associated carbon emissions may create a larger environmental impact than leaving the base *in situ*.

Removing the concrete base without backfilling would leave a sizeable void that could pose a health and safety hazard or an unwanted feature in the visual landscape. The void would need to be filled with appropriate material as discussed in the soil conservation section.

Turbine bases supported on concrete piles are more difficult to remove. Leaving such piles *in situ* should not create an environmental hazard but it may be prone to oxidizing and staining or contamination. This is due to the depth of cover between concrete and reinforcement in the piles may be less than in gravity bases.

FIGURE 10.1 TURBINE FOUNDATION DECOMMISSIONING ALTERNATIVES



10.1.4 Reuse of Turbines

Ideally, sending off material to a landfill should be avoided or used as a last resort. There is the option of reusing wind turbine infrastructure where feasibly possible. For developing countries, buying second-hand wind turbines serve as an opportunity to gain experience with renewable energy and allow for profit from technology transfer with low capital expenditure. Wind turbines could be sold, or their materials (mainly comprised of steel, copper, and electronics) can be recycled or reused where possible.

Turbine blades are slightly more difficult to recycle as they’re made primarily from fiberglass, a composite material. Cutting the blades into smaller, manageable sizes on site is achievable, but transporting the materials off-site is costly. There are limited recycling options for composite materials. Most recycling activities for composite materials are limited to down cycling (converting waste into products of lesser quality or reduced functionality.

10.2 Potential Decommissioning Phase Impacts

Table 10.1 below provides a summary of the potential impacts of the decommissioning of the WEF, as assessed by specialists.

Recommended persons as provided in Table 10.2 below should take responsibility for the implementation and monitoring to ensure that all decommissioning mitigation measures outlined in this document, and all revisions thereof, are complied with.

TABLE 10.1 SUMMARY OF DECOMMISSIONING PHASE IMPACTS

Decommission Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Freshwater & Wetlands (Aquatics)								
Spread of Alien Vegetation	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Moderate
	With Mitigation	*Site*	*Short term*	*Partly reversible*	*Negative*	*Low*	*Possible*	*Low*
Loss of habitat/vegetation	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	*Site*	*Short term*	*Partly Reversible*	*Negative*	*Low*	*Possible*	*Low*
Loss of Critical Biodiversity Areas (CBAs)	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	*Site*	*Short term*	*Partly Reversible*	*Negative*	*Low*	*Possible*	*Low*
Loss of riparian habitat	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	*Site*	*Short term*	*Partly Reversible*	*Negative*	*Low*	*Possible*	*Low*
Changes to the hydrological regime and increase potential for erosion	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	*Site*	*Short term*	*Partly Reversible*	*Negative*	*Low*	*Possible*	*Low*
Changes to surface water quality	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	*Site*	*Short term*	*Partly Reversible*	*Negative*	*Low*	*Possible*	*Low*
Terrestrial Biodiversity								
Potential vegetation clearing	Without Mitigation	Local	Medium term	Recoverable	Negative	Moderate	Highly Probable	Medium
	With Mitigation	*Site*	*Short term*	*Recoverable*	*Negative*	*Low*	*Probable*	*Low*
Potential chemical contamination	Without Mitigation	Local	Medium term	Recoverable	Negative	Moderate	Highly Probable	High
	With Mitigation	*Site*	*Short term*	*Recoverable*	*Negative*	*Low*	*Probable*	*Medium*

Decommission Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Reduced connectivity and restricted movement of fauna	Without Mitigation	Local	Medium term	Recoverable	Negative	Moderate	Highly Probable	Medium
	With Mitigation	*Site*	*Short term*	*Recoverable*	*Negative*	*Low*	*Probable*	*Low*
Potential altered flow regime	Without Mitigation	Local	Medium term	Recoverable	Negative	Moderate	Highly Probable	Medium
	With Mitigation	*Site*	*Short term*	*Recoverable*	*Negative*	*Low*	*Probable*	*Low*
Potential disturbance and/or displacement	Without Mitigation	Regional	Medium term	Recoverable	Negative	Moderate	Highly Probable	High
	With Mitigation	*Local*	*Short term*	*Recoverable*	*Negative*	*Low*	*Probable*	*Moderate*
Potential mortality of faunal and flora species	Without Mitigation	Local	Long term	Irreversible	Negative	High	Highly Probable	Very High
	With Mitigation	*Site*	*Medium term*	*Recoverable*	*Negative*	Moderate	*Probable*	*High*
Faunal								
Direct habitat loss	Without Mitigation	Site	Medium term	Recoverable	Negative	Moderate	Highly Probable	Moderate
	With Mitigation	*Local*	*Medium term*	*Recoverable*	*Positive*	*Moderate*	*Highly Probable*	Moderate
Indirect habitat loss	Without Mitigation	Local	Medium term	Recoverable	Negative	Moderate	Probable	Moderate
	With Mitigation	*Local*	*Medium term*	*Recoverable*	*Positive*	*Moderate*	*Highly Probable*	Moderate
Displacement or disturbance	Without Mitigation	Site	Short term	Recoverable	Negative	Moderate	Highly Probable	High
	With Mitigation	*Site*	*Short term*	*Recoverable*	*Negative*	*Low*	*Low Probability*	*Moderate*

Decommission Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Direct Mortality	Without Mitigation	Site	Short term	Recoverable	Negative	Moderate	Highly Probable	High
	With Mitigation	*Site*	*Short term*	*Recoverable*	*Negative*	*Low*	*Low Probability*	*High*
Indirect Mortality	Without Mitigation	Site	Short term	Recoverable	Negative	Moderate	Highly Probable	High
	With Mitigation	*Site*	*Short term*	*Recoverable*	*Negative*	*Low*	*Low Probability*	*High*
Impacts of all phases of the proposed development on ecological processes of the area	Without Mitigation	Local	Medium term	Recoverable	Negative	Moderate	Highly Probable	High
	With Mitigation	*Local*	*Medium term*	*Recoverable*	*Positive*	*Moderate*	*Probable*	*High*
Visual								
Visual effects of construction activities on scenic resources	Without Mitigation	Long distance	Long term	Reversible	Negative	**Very high**	Definitive	Very high
	With Mitigation	Long distance	Long term	Reversible	Negative	**Very high**	Definitive	Very high
Noise								
Potential Cumulative Noise Impacts	Without Mitigation	Regional	Long term	High	Negative	Low	Possible	Low
	With Mitigation	*Regional*	*Long term*	*High*	*Negative*	*Low*	*Possible*	*Low*
Social								
Retrenchment including loss of jobs, and source of income.	Without Mitigation	Local	Short term	n/a	Negative	Moderate	Probable	Moderate
	With Mitigation	*Local*	*Short term*	*n/a*	*Negative*	*Low*	*Probable*	*Low*
Traffic								
	Without Mitigation	Regional - Local	Short term	Reversible	Negative	Low	Probable	Low

Decommission Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Additional heavy vehicles/E80's on the external road network-	*With Mitigation*	*Regional - Local*	*Short term*	*Reversible*	*Negative*	*Low*	*Probable*	*Low*
Additional heavy vehicles/E80's on the external road network-	Without Mitigation	Regional - Local	Short term	Reversible	Negative	Low	Probable	Low
	With Mitigation	*Regional - Local*	*Short term*	*Reversible*	*Negative*	*Low*	*Probable*	*Low*

TABLE 10.2 DECOMMISSIONING PHASE IMPACT MANAGEMENT

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
Impacts on Freshwater and Wetlands due to Construction of the Development		
• The development of the stormwater management plan and Aquatic Rehabilitation and Monitoring plan, coupled to micro-siting of the final layout prior to construction. • Where large cut and fill areas are required, these must be stabilised and rehabilitated during the construction process, to minimise erosion and sedimentation. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc). • Suitable stormwater management systems must be installed along roads and other areas and monitored during the first few months of use. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc). • The aquatic systems have been mapped to a finer scale and have taken cognizance of any potential CBAs. As High / No-Go have been avoided by the major infrastructure such as turbines and buildings, the aquatic zones associated within the CBA / ESAs have also been avoided. Roads will need to traverse these areas, thus it is important to try and select existing areas with impacts / crossings where possible.	Site Engineer ECO / ESO	Throughout Decommission Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
Impacts associated with the decommissioning of Development Access Roads		
• Use existing roads or upgrade existing tracks rather than constructing entirely new roads wherever possible and has been included in the proposed layout. • Use the smallest possible working corridor. Outside the working corridor, all watercourses are to be considered no go areas. Where intrusion is required, the working corridor must be kept to a minimum and demarcated clearly before any construction commences. • Removal of vegetation must only be when essential for the continuation of the project. Do not allow any disturbance to the adjoining natural vegetation cover or soils. • Where required, all pipe culverts must be removed and replaced with suitable sized box culverts, where road levels are raised. Crossings that are installed below the natural ground level are to be constructed with an appropriate drop inlet structure on the upstream side to ensure that head cut erosion does not develop because of the gradient change from the natural ground level to the invert level of the culvert. • The channel profile, regardless of the current state of the river / water course, will be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist, with a preference for low level drifts where possible. • Water diversions must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in any diversion or for any other activity within a watercourse must be in a good condition, so that they do not burst and empty sediment into the watercourse. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from construction activities. • Any fauna (frogs, snakes, etc.) that are found within the construction area must be moved to the closest point of similar habitat type outside of the areas to be impacted. • All disturbed areas beyond the construction site that are intentionally or accidentally disturbed during the construction phase must be rehabilitated.	Site Engineer ECO / ESO	Throughout Decommission Phase
Changes to the hydrological regime and increase potential for erosion due to decommissioning of the Development		

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
• No stormwater discharged may be directed to delineated aquatic zones or the associated buffers. • A detailed stormwater management plan must be compiled prior to construction once the final site layout has been completed. The SWMP should include the structures and actions that must be installed to prevent the increase of surface water flows directly into any natural systems. • Effective stormwater management must include measures to slow, spread and deplete the energy of concentrated flows thorough effective stabilisation (gabions and Reno mattresses) and the re-vegetation of any disturbed areas	Site Engineer ECO / ESO	Throughout Decommission Phase
Changes to the surface water quality characteristics due to decommissioning of the Development		
• All liquid chemicals including fuels and oil, including for the BESS, must be stored in with secondary containment (bunds or containers or berms) that can contain a leak or spill. Such facilities must be inspected routinely and must have the suitable PPE and spill kits needed to contain likely worst-case scenario leak or spill in that facility, safely. • Washing and cleaning of equipment must be done in designated wash bays, where rinse water is contained in evaporation/sedimentation ponds (to capture oils, grease cement and sediment). • Mechanical plant and bowsers must not be refueled or serviced within 100m of a river channel or wetland. • All construction camps, lay down areas, wash bays, batching plants or areas and any stores should be beyond any demarcated water courses and their respective buffers. • Littering and contamination associated with construction activity must be avoided through effective construction camp management. • No stockpiling should take place within or near a water course. • All stockpiles must be protected and located in flat areas where run-off will be minimised and sediment recoverable. • ECO monitors the site on a daily basis to ensure plant is in working order (minimise leaks), spills are prevented and if they do occur, are quickly rectified.	Site Engineer ECO / ESO	Throughout Decommission Phase
Potential vegetation clearing impacts associated with the decommissioning phase of the proposed development		

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
• The development footprint must avoid No-Go/ High Sensitivity areas as much as possible. • Limit the area of impact as much as possible. • A pre-construction walkthrough during the optimal flowering period (spring) of the finalized development layout must be conducted to ensure that No-Go and High Sensitivity areas are avoided where possible. • Ensure that lay-down and other temporary infrastructure are within Low Sensitivity areas. • Rehabilitate disturbed areas that are not required by the operational phase of the development. • All construction staff on site must attend an environmental induction to ensure that basic environmental principles are adhered to. This includes topics such as avoiding fire hazards, no littering, appropriate handling of pollution and chemical spills, minimizing wildlife interactions, remaining within demarcated construction areas, avoidance of No-Go areas and sensitive habitats etc. • Demarcate sensitive areas near the development footprint as no-go areas with construction tape or similar and clearly marked as No-Go areas. • An environmental management programme (EMPr) must be implemented and must provide a detailed description of how construction activities must be conducted to reduce unnecessary clearing and/or destruction of habitat.	Site Engineer ECO / ESO	Throughout Decommission Phase
Reduced connectivity and restricted movement of fauna impacts associated with the construction and decommissioning phase of the proposed development.		
• Minimization of length and width of road network. • Fencing and road designs to allow for passage of animals (e.g., short, wide culverts in roads and wildlife friendly fencing). • The EMPr should include wildlife monitoring and an adaptive management plan for the operational phase to ensure there are no adverse impacts observed to the fauna community. • Implement habitat enhancement and restoration measures to offset the loss of connectivity caused by construction and decommissioning activities. This can be achieved by planting native vegetation, installing nesting boxes, or creating artificial shelters to provide alternative habitats for displaced fauna species and enhance connectivity within the landscape. This should be considered in the EMPr.	Site Engineer ECO / ESO	Throughout and after Decommission Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
• All recommendations in the Terrestrial Animal Specialist Assessment must be adhered to.		
Potential disturbance and/or displacement impacts on local wildlife associated with the decommissioning phase of the proposed development		
• Disturbed areas to be rehabilitated / revegetated as soon as possible after the decommissioning phase. • Wind turbines and building structures removed at the end of the life of the project. • Hardstands and access roads no longer required to be ripped and regraded. • Exposed or disturbed areas to be revegetated and returned to grazing pasture or natural veld to blend with the surroundings.	Site Engineer ECO / ESO	Throughout Decommission Phase
Potential mortality of faunal and flora species due to direct and indirect impacts associated with the decommissioning phase of the proposed development.		
• No movement of construction vehicles and personnel between dusk and dawn. • Implementation and enforcement of speed limits. • Roadkill monitoring and recording programme. • Induction toolbox talks to personnel to increase awareness about animal SCCs present and roadkill risks. • No unauthorized movement of personnel. • No unauthorized access to the construction site. • No trenches to be left uncovered overnight. • Trenches, excavations and cattle grids to have slopes to allow for animals to escape should they fall in. • No hunting permitted. • No dogs or cats permitted (other than those of the landowner). • Waste management programme to prevent trash buildup attracting species such as crows. • Roadkill to be immediately reported, removed and suitably disposed of to prevent scavenging (e.g., buried).	Site Engineer ECO / ESO	Throughout Decommission Phase
Disturbance to Birds during the decommissioning of the wind facility		

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
• Artificial lighting during decommissioning should be minimized as much as possible, especially bright lights or spotlights. Lights should avoid skyward illumination. • Night-time decommissioning activities should be avoided as far as possible. Existing roads and tracks should be used as far as possible	Site Engineer ECO / ESO	Throughout Decommission Phase
Visual impacts from decommissioning activities		
• Remove infrastructure not required for the post-decommissioning use. • Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications.		
Social impacts associated with retrenchment including loss of jobs, and source of income. Decommissioning will also create temporary employment opportunities, which would represent a positive temporary impact.		
• The proponent should ensure that retrenchment packages are provided for all staff retrenched when the plant is decommissioned. • All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning		
Traffic impacts from decommissioning activities		
• Implementation of Traffic Management Plan		

11. ALIEN INVASIVE MANAGEMENT PLAN

11.1 Purpose of the Alien Invasive Management Plan

The purpose of the Alien Invasive Management Plan is to provide a framework for the management of alien and invasive plant species during the construction and operation of the Hugo & Khoe. The broad objectives of the plan include the following:

- Ensure alien plants do not become dominant in parts or the whole site through the control and management of alien and invasive species presence, dispersal & encroachment.
- Initiate and implement a monitoring and eradication programme for alien and invasive species.
- Promote the natural re-establishment and planting of indigenous species in order to retard erosion and alien plant invasion.

11.2 Problem Outline

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

In addition, the Conservation of Agricultural Resources Act (Act 43 of 1983), as amended in 2001, requires that land users clear *Declared Weeds* from their properties and prevent the spread of *Declared Invader Plants* on their properties.

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

- Category 1 - These plants must be removed and controlled by all land users. They may no longer be planted or propagated and all trade in these species is prohibited.
- Category 2 – These plants pose a threat to the environment but nevertheless have commercial value. These species are only allowed to occur in demarcated areas and a land user must obtain a water use licence as these plants consume large quantities of water.
- Category 3 – These plants have the potential of becoming invasive but are considered to have ornamental value. Existing plants do not have to be removed but no new plantings may occur and the plants may not be sold.

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

11.3 Vulnerable Ecosystems and Habitats

Certain habitats and environments are more vulnerable to alien plant invasion and are likely to bear the brunt of alien plant invasion problems at the site. In addition, construction activities and changes in water distribution at the site following construction are also likely to increase and alter the vulnerability of the site to alien plant invasion.

Areas at the site which are likely to require specific attention include the following:

- Wetlands, drainage lines and other mesic areas.

- Cleared and disturbed areas such as road verges, crane pads and construction footprints etc.
- Construction camps and lay-down areas which are cleared or are active for an extended period.

11.3.1 Wetlands, drainage lines and other mesic areas

There are a relatively large number of drainage lines at the site as well as a number of artificial wetlands. Disturbance within these areas often results in alien plant invasion on account of the greater water and nutrient availability in this habitat. Although there are no turbines within such areas, numerous road crossings will be required. The disturbance footprint within such areas must be minimized and these areas must be checked for alien species more than the surrounding landscape.

11.3.2 Cleared and disturbed areas

Cleared and disturbed areas are clearly vulnerable to invasion on account of the lack of existing plant cover to resist invasion as well as the disturbance created during construction which promoted the germination and establishment of alien plant species.

11.3.3 Construction camps and laydown areas

Construction camps and lay down areas are either cleared of vegetation or prolonged activities in these areas result in negative impact on indigenous vegetation. In addition, repeated vehicle and human activity in these areas usually results in the import of alien plant seed on clothes, dirty vehicles or with construction machinery and materials.

11.4 General Clearing and Guidance Principles

Alien control programs are long-term management projects and must include a clearing plan which includes follow up actions for rehabilitation of the cleared area. Alien problems at the site must be identified during pre-construction surveys of the development footprint. This may occur simultaneously to other required reaches and surveys. The clearing plan must then form part of the pre-construction reporting requirements for the site.

The plan must include a map showing the alien density & indicating dominant alien species in each area.

- Lighter infested areas must be cleared first to prevent the build-up of seed banks.
- Pre-existing dense mature stands ideally must be left for last, as they probably won't increase in density or pose a greater threat than they are currently.
- Collective management and planning with neighbours may be required in the case of large woody invaders as seeds of aliens are easily dispersed across boundaries by wind or water courses.
- All clearing actions must be monitored and documented to keep track of which areas are due for follow-up clearing.

11.5 Clearing Methods

- Different species require different clearing methods such as manual, chemical or biological methods or a combination of both.

- However care must be taken that the clearing methods used do not encourage further invasion. As such, regardless of the methods used, disturbance to the soil must be kept to a minimum. Fire is not a natural phenomenon in the area and fire must not be used for alien control or vegetation management at the site.
- The best-practice clearing method for each species identified must be used. The preferred clearing methods for most alien species can be obtained from the DWAF Working for Water Website. http://www.dwaf.gov.za/wfw/Control/.

11.6 Use of Herbicide for Alien Control

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

- Area contamination must be minimised by careful, accurate application with a minimum amount of herbicide to achieve good control.
- All care must be taken to prevent contamination of any water bodies. This includes due care in storage, application, cleaning equipment and disposal of containers, product and spray mixtures.
- Equipment must be washed where there is no danger of contaminating water sources and washings carefully disposed of in a suitable site.
- To avoid damage to indigenous or other desirable vegetation, products must be selected that will have the least effect on non-target vegetation.
- Coarse droplet nozzles must be fitted to avoid drift onto neighbouring vegetation.
- The appropriate health and safety procedures must also be followed regarding the storage, handling and disposal of herbicides.

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

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

11.7 Construction Phase Activities

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

Construction Phase Action	Frequency
The ECO is to provide permission prior to any vegetation being cleared for development.	Daily
Clearing of vegetation must be undertaken as the work front progresses – mass clearing must not occur unless the cleared areas are to be surfaced or prepared immediately afterwards.	Weekly
Where cleared areas will be exposed for some time, these areas must be protected with packed brush, or appropriately battered with fascine work. Alternatively, jute (Soil Saver) may be pegged over the soil to stabilise it.	Weekly
Cleared areas that have become invaded can be sprayed with appropriate herbicides provided that these are such that break	Weekly

Construction Phase Action	Frequency
down on contact with the soil. Residual herbicides must not be used.	
Although organic matter is frequently used to encourage regrowth of vegetation on cleared areas, no foreign material for this purpose must be brought onto site. Brush from cleared areas must be used as much as possible. The use of manure or other soil amendments is likely to encourage invasion.	Weekly
Clearing of vegetation is not allowed within 32 m of any wetland, 80 m of any wooded area, within 1:100 year floodlines, in conservation servitude areas or on slopes steeper than 1:3, unless permission is granted by the ECO for specifically allowed construction activities in these areas	Weekly
Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas. (Particular attention must be paid to imported material such as building sand or dirty earth-moving equipment.) Stockpiles must be checked regularly and any weeds emerging from material stockpiles must be removed.	Weekly
Alien vegetation regrowth on areas disturbed by construction must be controlled throughout the entire site during the construction period.	Monthly
The alien plant removal and control method guidelines must adhere to best-practice for the species involved. Such information can be obtained from the DWAF Working for Water website.	Monthly
Clearing activities must be contained within the affected zones and may not spill over into demarcated No Go areas.	Daily
Pesticides may not be used. Herbicides may be used to control listed alien weeds and invaders only.	Monthly
Wetlands and other sensitive areas must remain demarcated with appropriate fencing or hazard tape. These areas are no-go areas (this must be explained to all workers) that must be excluded from all development activities.	Daily

11.7.1 Monitoring Actions - Construction Phase

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

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

11.8 Operational Phase Activities

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

Operational Phase Action	Frequency
Surveys for alien species must be conducted regularly. Every 6 months for the first two years after construction and annually thereafter. All aliens identified must be cleared.	Every 6 months for 2 years and annually thereafter
Where areas of natural vegetation have been disturbed by construction activities, revegetation with indigenous, locally occurring species must take place where the natural vegetation is slow to recover or where repeated invasion has taken place following disturbance.	Biannually, but revegetation must take place at the start of the rainy season
Areas of natural vegetation that need to be maintained or managed to reduce plant height or biomass, must be controlled using methods that leave the soil protected, such as using a weed-eater to mow above the soil level.	When necessary
No alien species must be cultivated on-site. If vegetation is required for esthetic purposes, then non-invasive, water-wise locally-occurring species must be used.	When necessary

11.8.1 Monitoring Actions - Operational Phase

The following monitoring actions must be implemented during the operation phase of the development.

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

11.9 Decommissioning Phase Activities

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

Decommissioning Phase Action	Frequency
All damaged areas shall be rehabilitated if the infrastructure is removed and the facility is decommissioned.	Once off
All natural areas must be rehabilitated with species indigenous to the area. Re-seed with locally-sourced seed of indigenous grass species that were recorded on site pre-construction.	Once off, with annual follow up re-vegetation where required

Decommissioning Phase Action	Frequency
Maintain alien plant monitoring and removal programme for 3 years after rehabilitation.	Biannually

11.9.1 Monitoring Actions - Decommissioning Phase

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

Monitoring Action	Indicator	Timeframe
Monitor newly disturbed areas where infrastructure has been removed to detect and quantify any aliens that may become established for 3 years after decommissioning and rehabilitation	Alien plant surveys and distribution map	Biannually until such time as the natural vegetation has recovered sufficiently to resist invasion.
Monitor re-vegetated areas to detect and quantify any aliens that may become established for 3 years after decommissioning and rehabilitation	Alien plant surveys and distribution map	Biannually for 3 years
Document alien plant control measures implemented & success rate achieved	Records of control measures and their success rate. A decline in alien distribution and cover over time at the site	Annually for 3 years

12. PLANT RESCUE AND PROTECTION PLAN

The purpose of the plant rescue and protection plan is to implement avoidance and mitigation measures to reduce the impact of the development on listed and protected plant species and their habitats.

The objective of reusing plants on the project area is to prevent the loss of species either directly or through future extinction and minimising impacts of development on population dynamics of species of conservation concern.

Preserving the natural configuration of habitats as part of ecosystems, thus ensuring a diverse but stable hydrology, substrate and general environment for species to be able to become established and persist.

12.1 Effect of removing individual species of conservation concern

Species of conservation concern are declining either due to overexploitation or because their range of occupancy is limited and further infringed on by development. Most plant populations require a certain minimum number of individuals within a population or metapopulation to allow for sufficient genetic transfer between individuals. This prevents genetic erosion and hence weakening of the ability of individuals to persist in their environments. Similarly, where the distance between metapopulations is significantly increased due to fragmentation and the resultant loss of some populations, populations may suffer genetic decline due to restricted movement of pollen. Pollinators or other species that depend on a particular plant species for a specific microhabitat or food source may be equally affected because of the reduction of available resources. Therefore, the aim of plant rescue actions are always to maintain as many individuals of a plant population in as close proximity to the original habitat as possible to minimise loss of individuals and fragmentation of populations to prevent the creation of future extinction debts of the development.

12.2 Plant Rescue and Protection

Successful plant rescue can only be achieved if:

- Species can be removed from their original habitat with minimal damage to the plant, especially the roots.
- All plants removed are safely stored and treated according to their specific requirements prior to being transplanted again.
- They are relocated into a suitable habitat and protected from further damage and all disturbances to aid their re-establishment.
- Timing of planting activities is planned with the onset of the growing season.
- Steps are taken where necessary to aid the initial establishment of vegetation, including occasional watering.

12.3 Time of Planting

- All planting shall be carried out as far as is practicable during the period most likely to produce beneficial results (i.e. during the peak growing season), but as soon as possible after completion of a section of earthworks.

- Drainage line rehabilitation preparation must be done during autumn, and planting of appropriate species in these areas must commence during early spring after the first rains.

12.4 Plant Search and Rescue

Prior to construction, once all the areas where topsoil will be removed or areas will be transformed have been demarcated, the ECO and contractor will be responsible to remove all bulbous species from the topsoil, as well as succulents and small indigenous shrubs that can be transplanted. These are to be kept in a raised, protected position in a designated area until they can be replanted again as part of the rehabilitation process. Further details are listed in the Re-vegetation and Habitat rehabilitation Plan.

13. RE-VEGETATION AND HABITAT REHABILITATION PLAN

The Revegetation and Habitat Rehabilitation Plan addresses the need to mitigate all impacts leading to disturbed vegetation, loss of species and/or agricultural potential, disturbed soil surfaces, and generally bare soils prone to erosion and further degradation on the proposed development site. The plan overlaps to some degree with the Erosion Management Plan, and for successful rehabilitation, it is imperative that this plan is at all times used in conjunction with other EMPrs mentioned.

The objective of the plan is therefore to provide:

- Protocols for the removal, temporary storage and replanting of plant species of conservation concern Protocols for the rehabilitation of vegetative cover across the project area;
- Tools for planning the rehabilitation work and responding to unforeseen events Guidelines on implementation and post-implementation tasks Criteria for evaluating rehabilitation success; and
- A summary of items to be included in the rehabilitation budget to ensure that there is sufficient allocation of resources on the project budget so that the scale of EMPr-related activities is consistent with the significance of project impacts.

The objective of rehabilitation and revegetation of the development area is:

- Preventing the loss of species either directly or through future extinction and minimising impacts of development on population dynamics of species of conservation concern.
- Preserving the natural configuration of habitats as part of ecosystems, thus ensuring a diverse but stable hydrology, substrate and general environment for species to be able to become established and persist.
- Preserving or re-creating the structural integrity of natural plant communities. Actively aid the improvement of indigenous biodiversity according to a desirable end state according to a previously recorded reference state. This reference state, if healthy, will be dynamic and able to recover after occasional disturbances without returning to a degraded state.
- Improving the ecosystem function of natural landscapes and their associated vegetation.
- Successful rehabilitation can only be achieved with: »A long-term commitment »Practical, adaptive management »Viable goals of desired outcomes

Prior to vegetation rehabilitation, all stakeholders involved must be consulted to determine:

- What the rehabilitation is ultimately aiming for– rehabilitation of cropping/grazing lands or rehabilitation of indigenous vegetation, after soil erosion and storm water management is in place and IAPs have been cleared?
- A clear definition of incompatible and compatible vegetation on and in the immediate surroundings of the development must be defined and maintained as such. No tree or shrubs shall be allowed to grow to a height in excess of the horizontal distance of that tree or shrub from the nearest newly developed structure or to grow in such a manner as to endanger the development or its operation
- Who will take long-term ownership and hence responsibility for the rehabilitation and its subsequent monitoring and management? Continued monitoring of vegetation

establishment and composition, as well as erosion detection will have to be coupled with continued follow-up maintenance of rehabilitation and erosion control from commencement of activity up to the decommissioning phase.

- The ultimate objective for rehabilitation must focus on the stabilisation of soil erosion, retaining agricultural potential of transformed areas and /or the establishment of a dense and protective plant cover and the maintenance of habitats to enable vegetation to persist and flourish on rehabilitated areas indefinitely, ultimately relying only on environmental resources.

13.1 Map and Create Management Areas

The entire project area must be mapped and divided into management areas indicating:

- Current land cover
- Roads and residential
- Areas with IAPs, subdivided further in sparse or dense infestations where applicable
- Transformed areas
- Untransformed indigenous vegetation

For every one of the management areas, the project proponent, in consultation with the land users, will have to decide what intervention will be necessary, desirable, and feasible to enable the development of the project and long-term sustainable maintenance of infrastructure. Thus for every management area there must be an operational outline on:

- what will happen there
- what needs to be mitigated – including storm water- and erosion management
- which management units need priority intervention/mitigation
- how will this mitigation / intervention be done (method statements) including schedule of work
- realistic and desirable end states including list of species that must be established to initiate rehabilitation after initial revegetation
- approximate timeframes
- monitoring protocol to evaluate success or failures of interventions
- establish permanently marked transects and monitor with fixed-point photography who will be responsible for doing what how will different actions be integrated to achieve and maintain or improve the desirable end state of the environment of that management unit

Special attention will have to be given to drainage zones, as these not only have very active morphodynamics, but are also distributers of seeds – both indigenous and of IAPs. Thus clearing a downstream invasion of aliens to enable maintenance of the development will be futile if the upstream IAPs are not cleared or at least aggressively controlled.

13.2 Setting Realistic Rehabilitation Goals

Rehabilitation efforts typically aim at improving ecosystem function that consists of a series of processes, which can in the end be evaluated against a desired outcome or reference state of the vegetation and environment.

Attainable goals of rehabilitation on the project area must be possible and viable for at least the following:

- Stabilisation of soils
- Stabilisation of riparian areas
- Storm water reduction through management and wetland integrity
- Clearing of IAPs
    - The degree to which IAPs can be cleared from the project area needs to be determined according to desirability, available project funding, personnel and project requirements
- Restoring and/or rehabilitating vegetative cover on non-transformed areas to obtain an acceptable vegetation cover that can be maintained or persists on its own indefinitely.

13.3 Remove or Ameliorate the Cause of Degradation

This will include:

- Physical rehabilitation of topsoil where it has been removed.
- Topsoil on areas that have not been cultivated are considered as the upper 20 - 30 cm only. These contain the most important nutrients, micro flora and –fauna essential for nutrient cycling processes. Topsoils are also an important source of seeds.
- Subsoils and overburden substrata lack the above elements and will first have to be used for physical rehabilitation of landscapes as and where necessary, and then overlain with topsoils.
- Stabilisation of topsoils and prevention of erosion – refer to the Erosion management plan.
- Removal of all invasive vegetation – refer to the Alien Invasive Management Plan

Where it is desirable to use brush or logs of the cleared vegetation for soil stabilisation, such material must be free of regenerative material – e.g. seeds or root suckers.

13.4 Initial Revegetation

Immediately after clearing of vegetation, the soil surface must be inspected for signs of erosion and stabilised as soon as possible. After completion of construction, such erosion stabilisation must preferably be with a cover of vegetation. A dense initial grass or other perennial cover will be desirable. The appropriate seed mix must be determined in consultation with an ecologist familiar with the area. The aim of the first vegetation cover is to form a protective, relatively dense indigenous layer to slow runoff, increase moisture infiltration into the soil, and gradually change the soil nutrient status in order for it to be more favourable for other desirable indigenous vegetation to become established.

13.5 Natural seed banks and improvement of plant structural and compositional diversity

It is expected that soil seed banks of indigenous vegetation will be present to initiate initial vegetation cover, but may not be sufficient to establish an acceptable cover of desirable species. After deciding which indigenous species must be re-introduced, seed must be ideally collected from site or an environmentally-matched site nearby.

Seed collection may be done throughout the year as seed ripens, but can also be restricted to summer, when a large amount of the perennial seed should have ripened. Seeds must be

stored in paper or canvas bags dusted with insecticide, and sown at the onset of the rainy season.

Alternatively, slower-growing perennials may be raised from seed or cuttings in a nursery and then transplanted once established. It will be beneficial to investigate if community members would be able to create and maintain such a nursery, or if there are nurseries in the area, that raise indigenous flora from the area.

The final vegetation cover must resemble the original (non-encroached) vegetation composition and structure as far as practicable possible or permissible within each management unit.

For drainage areas:

- First restore drainage line morphology following the guidelines of the Erosion Management Plan – without that ecological recovery cannot be initiated;
- Determine if natural seed sources may be present further upstream;
- If such upstream seed sources are still present, rehabilitation of riparian vegetation after soil erosion management will most likely occur naturally, PROVIDED that follow-up monitoring of the establishment of vegetation is carried out, and all invasive species eradicated as they emerge. This can only be achieved with a long-term commitment (> 5 years minimum); and
- Should no upstream seed resources be available, suitable species (as determined in consultation with an ecologist) must be sown or planted.

13.6 Monitoring and Follow-Up Action

Throughout the lifecycle of the development, regular monitoring and adaptive management must be in place to detect any new degradation of ecosystems affected by the development, and remedy these as soon as detected.

During the construction phase, the ECO and contractor will be responsible for initiating and maintaining a suitable monitoring system. Once the development is operational, the project proponent will have to identify a suitable entity that will be able to take over and maintain the monitoring cycle and initiate adaptive management as soon as it is required. Monitoring personnel must be adequately trained.

The following are the minimum criteria that must be monitored:

- Composition and density of replanted vegetation, distinguishing between species introduced for initial revegetation only and species that are part of the pre-determined desirable end state;
- Associated nature and stability of surface soils
    - It is recommended that permanent transects are marked and surveyed annually according to the LFA technique (Tongway and Hindley 2004), adapted to integrate both surface soil characteristics and the vegetation to be monitored
- Re-emergence of IAPs
    - If noted, remedial action must be taken immediately according to Working for Water specifications
- Nature and dynamics of riparian zones

- Stability of riparian vegetation,
- Any form of bank erosion, slumping or undercutting, and
- Stability of channel form and width of streams – if this increases, it shows that vegetation on plains and/or riparian areas and upper drainage lines are not yet in a stable enough state to be fully functional in reducing excess runoff and the ecosystem overall is losing valuable resources.

13.7 Timeframes and Duration

- Rehabilitation will occur during construction, as areas for the re-application of topsoil and revegetation become available or where revegetation can be initiated after clearing of invasives or to stabilise erosion.
- The initial revegetation period post construction is estimated to be over a period of 6 (minimum) to 12 months (maximum), or a time period specified by the Horticultural Landscape Contractor, particularly if planting of trees and shrubs occurs.
- The rehabilitation phase (including post seeding maintenance) must be at least 12 months (depending on time of seeding and rainfall) to ensure establishment of an acceptable plant cover is achieved (excluding invasive plant species or weeds).
- If the plants have not established and the acceptable plant cover is not achieved within the specified maintenance period, maintenance of these areas shall continue until at acceptable plant cover is achieved (excluding alien plant species or weeds).
- Additional seeding or planting may be necessary to achieve acceptable plant cover. Hydroseeding may have to be considered as an option in this case.
- Any plants that die, during the maintenance period, shall be replaced by the Horticultural Landscape Contractor (at the Horticultural Landscape Contractor's cost if it was due to insufficient maintenance).
- Succession of natural plant species must be encouraged
- Monitoring of rehabilitation success and follow-up adaptive management, together with clearing of emerging invasives shall be carried on until the decommissioning phase has been completed.

14. OPEN SPACE MANAGEMENT PLAN

The objective of open space management is to restore, enhance and rehabilitate open spaces, improve climate change adaptations through the minimisation of biodiversity loss, and mitigate against environmental degradation. Management actions consider open spaces and natural areas as well as community perceptions of these.

In the context of the proposed grid connections and substations the primary purpose of the open plan management plan is therefore to:

- Minimise visual impact on the character of the area; and
- Maintain biodiversity within the area to ensure that no long-term negative impacts occur on the local environment.

In order to maintain biodiversity, the Alien Invasive, Plant Rescue and Protection and Re-vegetation and Habitat Management Plans must be adhered to.

In addition, the following actions must be implemented by the Contractor and Project Company:

- Promote environmental awareness in all employees and sub-contractors and create an understanding of the environmental sensitivities of the project site;
- No waste, including organic matter may be disposed of anywhere on site, except in provided bins placed at convenient locations, especially during the construction period. Disciplinary actions must be taken against littering;
- Open spaces are to be kept free of alien plants and weeds;
- Indigenous plants may not be collected or removed from the site;
- Access to the facility must be strictly controlled;
- All visitors and contractors must be required to sign-in;
- Signage at the entrance must indicate that disturbance to fauna and flora is strictly prohibited.

The following activities must not be permitted by anyone except the landowner or his representatives:

- No fires within the site;
- No hunting, collecting or disturbance of fauna and flora, except where required for the safe operation of the facility and only by the Environmental Officer on duty and with the appropriate permits and landowner permission;
- No driving off of demarcated road; and
- No interfering with livestock.

14.1 Grazing Management

The development of the wind energy facility will not prevent the site from being used for its current land use, however it may reduce the grazing on site as the development footprint will be rezoned from agriculture to mixed-use development land. Parts of the farm are used for cultivation of planted pasture and small grain grazing – all used only for grazing. There is no small grain harvested on the farm. Grazing is compatible with biodiversity maintenance

provided that it is implemented according to the basic principles of sustainable grazing management. While the majority of these are beyond the scope of the current plan, the following basic principles are recommended for implementation to:

- A grazing management plan for the development footprint should be developed in cooperation with Agricultural Extension services.
- The stocking rate applied should be within the recommended limits as identified by the Department of Agriculture.
- Livestock should be rotated through the different paddocks at the site in a manner which allows for the growth and recovery of the vegetation between grazing events.
- Precautions must be taken to ensure that the development of the site does not increase the risk of stock theft within the facility. These include access control as previously described, as well as security patrols.

15. TRAFFIC MANAGEMENT PLAN

The objective of the traffic management plan is the prevention of incidents from the use of vehicles and disturbance of local traffic on public roads during the construction, operation and decommissioning phases of the development. Traffic volumes are most likely to increase during the construction phase. Operations, maintenance and decommissioning phase traffic is expected to be insignificant, except where a major WEF component (i.e. replace damaged turbine blade) could be required.

The development must be accessible to passenger cars, buses, trucks and abnormal multi-vehicle combinations which will be delivering WT components. Access to the site needs to be safe and practical to minimise the risk of pedestrian and vehicle accidents through:

- The provision of adequate traffic control; and
- Clear visibility by ensuring sufficient stopping sight distances and sufficient markings and warnings signs.

The traffic management plan to be implemented during construction and decommissioning should consist of the following recommended mitigation measures:

- The arrival and departure of construction vehicles should be staggered during off- peak periods to have a distributed effect over low volume traffic periods.
- All vehicles with abnormal loads should have exemption permits as required by the National Road Traffic Act 93 of 1996.
- The Contractor and Site Safety Officer / ESO, during construction and decommissioning should ensure correct signage and safety precautions are in place for vehicles and pedestrians on-site and at the site access. These may include warning signs, construction vehicle signage and flagmen.
- Unpaved roads must be watered to lesson dust generation and routine maintenance on road surface to maintain condition.
- Vehicles transporting materials that can be blown away and cause dust must be securely covered and adhere to speed limits.
- Community participation/stakeholder involvement at every stage of the project is recommended to allow the community to be informed before the start of site activities.
- A comprehensive assessment of the entire route is recommended on award of the project.
- Prohibit WEF equipment and materials transportation at night, during the school December holiday period, on public holidays, during festivals or other special events.

Actions to be implemented by the Contractor and the Developer:

- Limit use of private cars by arranging mini bus transport service for workers;
- Monitor for overloading of vehicles;
- Use only well trained, suitably qualified and experienced drivers in possession of an appropriate and valid driver’s license;
- All vehicles must be roadworthy and serviced regularly;
- Clear and visible signage must be placed on and around site, clearly demarcating safe entry and exit points;

- Require all drivers to abide by standard road and safety procedures on site;
- When travelling on public roads all speed limits and rules of the road must be adhered to; and
- Limit dust generation by applying dust suppressants and postponing dust generating activities during period of strong winds and enforcing a strict speed limit of 40 km/h on unpaved roads.

Monitoring actions to be conducted by the ECO / ESO:

- Maintain incidents/complaints register for community complaints;
- Monitor dust generation and implementation of management actions detailed above.

16. TRANSPORTATION MANAGEMENT PLAN

The Transportation Management Plan aims to ensure the safe transportation of all components required for the construction of the development to the construction site. This includes the, turbines, substation transformers, BESS, electrical cables and pylon structures.

The following actions must be implemented by the developer and Contractor:

- Apply for all relevant permits for abnormal loads and route clearances with the relevant authorities prior to construction;
- Appoint a qualified specialist to conduct a detailed site-specific Transport Risk Assessment during the detailed design phase and prior to construction;
- Determine the pre-construction condition of the road immediately prior to construction by carrying out a condition assessment or from recent pavement management system condition assessments if available from the Provincial Authorities;
- Public notices regarding any planned abnormal load transports must be placed at the construction site to inform affected parties;
- Abnormal loads must conform with legal maximum dimensions, and vehicles carrying abnormal loads must display sufficient signage;
- Any roads damaged during the transportation of components, or from other construction vehicles must be rehabilitated and returned to pre-construction conditions.

The following monitoring activities must be carried out by the ECO / ESO:

- Conduct site audits and report non-compliance with the above-mentioned conditions.

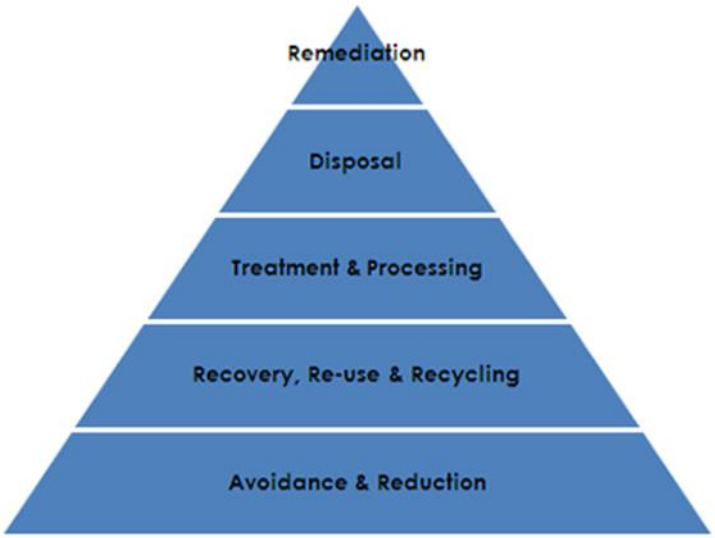
17. WASTE MANAGEMENT PLAN

A waste management plan (WMP) is important to ensure a safe and healthy environment and that sustainable waste management and procedures are followed throughout the lifecycle of the project. The DFFE promulgated the National Environmental Management: Waste Act 59 of 2008 (Waste Act) and in 2010 developed the National Waste Management Strategy (NWMS). The WMP provides recommended measures for the collection, temporary storage and safe disposal of the various waste streams associated with the project and includes recommendations for the recovery, re-use and recycling of waste. The purpose of this plan is therefore to ensure that effective procedures are implemented for the handling, storage, transportation, and disposal of waste generated from the project activities on site.

The National Waste Information Regulations published in GN No. R. 625 of 13 August 2012 must be adhered to in terms of any hazardous waste generated on the site. The Developer must apply for registration as a "hazardous waste generator" with the Department's Integrated Pollutant and Waste Information System ("IPWIS") (http://ipwis.pgwc.gov.za/ipwis3/public/login) should the need for hazardous waste disposal arise. The application can be completed within 30 days of the commencement of the waste generation activity.

The introduction of an internationally best-known practice in waste management, the Waste hierarchy (Figure 17.1 below) is one of the best mechanisms that came into effect with the promulgation of the waste act. The waste act promotes the exercising of the duty of care and the implementation of the waste hierarchy while protecting the environment.

FIGURE 17.1 WASTE HIERARCHY- NATIONAL WASTE MANAGEMENT STRATEGY 2010



(Source: https://www.dffe.gov.za/projectsprogrammes/workingonwaste)

17.1 Construction Phase Waste Management

A method statement to detail the specific (hazardous) waste management practices must be prepared by the Contractor prior to the commencement of activities.

General Waste Management

- Construction methods and materials must be carefully considered and implemented in view of waste reduction, re-use, and recycling opportunities.
- The ESO / ECO must conduct waste classification and rating in terms of SANS 10288 and Government Notice 634 published under the NEM: WA.
- The ESO / ECO must develop, implement and maintain a waste inventory reflecting all waste generated during construction for both general and hazardous waste.
- A dedicated waste area must be established on site for the storage of all waste streams before removal from site. The storage period must not trigger listed waste activities as per the NEMWA, GN 921 of November 2013.
- Waste collection bins and hazardous waste containers must be provided by the contractor and placed at strategic locations around the site for the storage of organic, recyclable and hazardous waste.
- Hazardous waste must be stored separate from other forms of waste to avoid contamination. The following items are hazardous: Batteries, Light bulbs (fluorescent, LED, Halide), Electronic waste, used oils, chemicals and chemical containers.
- The location of all temporary waste storage areas must aim to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage, and vermin control, while being reasonably placed in terms of centrality and accessibility on site. Where required, an additional temporary waste storage area must be designated, provided identical controls are exercised for these locations.
- Waste storage shall be in accordance with all Regulations and best-practice guidelines and under no circumstances must waste be burnt on site.
- All waste removed from site must be done by a registered / licensed subcontractor, who must supply information regarding how waste recycling / disposal will be achieved. The registered subcontractor must provide waste manifests for all removals at least once a month or for every disposal made, records of which must be kept on file at the site camp for the duration of the construction period.
- Waste must be stored in designated containers and not on the ground.
- Hazardous waste must be stored in a lockable container on an impermeable surface and bunded, should the need arise.
- Waste generated on site must be removed on a regular basis. This frequency must change during construction depending on waste volumes generated at different stages of the construction process, however removal must occur prior to the storage capacity being reached to avoid overflow of containers and poor waste storage.
- Waste must not be dumped, buried or burned on site.
- Reduce waste transportation and disposal costs by ensuring full loads of waste are transported instead of half loads.
- Setting up a reverse logistics system (products move from supplier to customer and vice-versa) would minimise waste and reduce disposal costs, i.e, suppliers deliver batteries and collect used batteries.

Waste Management Practices

- To achieve sustainable waste management, it is recommended a procurement policy be implemented that takes into account the waste that will be generated at the end of the construction phase. Sourcing local goods would reduce costs of transportation and carbon emissions. Purchasing and using environmentally safe cleaning and building materials as well as considering reusable/recyclable goods will help to achieve reduced waste.
- Once a waste inventory has been established, targets for the recovery of waste (minimisation, re-use, recycling) must be set.
- Recyclable materials must be identified as part of the site's waste management monitoring records.
- Waste manifests and waste acceptance approvals (i.e. receipts) from designated waste facilities must be kept on file at the site office, in order to record and prove continual compliance for future auditing.
- It is the responsibility of the ESO / ECO to ensure that each subcontractor implements their own waste recycling system, i.e. separate bins for food waste, plastics, paper, wood, glass cardboard, metals, etc. Such practises must be made contractually binding upon appointment of the subcontractors. Signage / colour coding must be used to differentiate disposal areas for the various waste streams (i.e. paper, cardboard, metals, food waste, glass etc.).
- Septic tanks and portable toilets must be maintained regularly and monitored by the ESO / ECO. Below ground storage of septic tanks must withstand the external forces of the surrounding environment. The area above the tank must be demarcated to prevent any vehicles or heavy machinery from moving around in the surrounding area.
- Hazardous waste must be stored within a bunded area constructed according to SABS requirements, and must ensure complete containment of the spilled material in the event of a breach. As such, appropriate bunding material, design, capacity and type must be utilised to ensure that no contamination of the surrounding environment will occur despite a containment breach. The net capacity of a bunded compound in a storage facility must be at least 120% of the net capacity of the largest tank and must also take into consideration the capacity displaced by other tanks within the same bunded area and any foundations.
- Interconnected tanks must be treated as a single tank of equivalent total volume for the purposes of the bund design criteria.
- Inspections and maintenance of bunds must be undertaken regularly. Bunds must be inspected for leaks or cracks in the foundation and walls. If any leaks occur in the bund, these must be removed immediately.
- The position of all waste storage areas must be located so as to ensure minimal degradation to the environment. The main waste storage area must have a suitable stormwater system separating clean and contaminated stormwater.
- Bund systems must be designed to avoid dewatering of contaminated water, but to rather separate oil and hydrocarbons from water prior to dewatering.
- It is assumed that any rainwater collected inside the bund is contaminated and must be treated by oil / water separation (or similar method) prior to dewatering, or removed and stored as hazardous waste, and not released into the environment.

- Following rainfall event bunds must always be dewatered in order to maintain a sufficient storage capacity in the event of a breach.
- No mixing of hazardous and general waste is allowed.

The success of the Waste Management Plan is determined by measuring criteria such as waste volumes, cost recovery from recycling and cost of disposal. Recorded data can indicate the effect of training and education, or the need for education. It will provide trends and benchmarks for setting goals and standards and provide clear evidence of the success or otherwise of the plan.

- Documentation (waste manifest, certificate of issue or safe disposal) must be kept detailing the quantity, nature, and fate of any regulated waste for audit purposes.
- Waste management must form part of the monthly reporting requirements in terms of volumes generated, types, storage, and final disposal.
- Training and awareness regarding waste management shall be provided to all employees and contractors.

17.2 Operation Phase Waste Management

Operation phase activities will result in the production of limited amounts of general waste consisting mostly of cardboard, paper, plastic, tins, metals and a variety of synthetic compounds. Hazardous wastes (including grease, oils) will also be generated. All waste generated will be required to be temporarily stored at the facility in appropriate sealed containers prior to disposal at a permitted landfill site or other facilities.

Waste Management Practices

- The Operational Manager must develop, implement and maintain a waste inventory reflecting all waste generated during operation for both general and hazardous waste streams.
- Adequate waste collection bins at site must be supplied. Separate bins must be provided for general and hazardous waste.
- Recyclable waste must be removed from the waste stream and stored separately.
- All waste must be stored in appropriate temporary storage containers (separated between different operation wastes, and contaminated or wet waste).
- Waste storage shall be in accordance with all best-practice guidelines and under no circumstances can waste be burnt on site.
- Waste generated on site must be removed on a regular basis throughout the operation phase.
- Waste must be removed by a suitably qualified contractor and disposed at an appropriately licensed landfill site. Proof of appropriate disposal must be provided by the contractor and kept on site.
- Records must be kept of the volumes / mass of the different waste streams that are collected from the site throughout the life of the project. The appointed waste contractor is to provide monthly reports to the operator containing the following information:
  - Monthly volumes / mass of the different waste streams collected;
  - Monthly volumes / mass of the waste that is disposed of at a landfill site;

- Monthly volumes / mass of the waste that is recycled; and
- Data illustrating progress compared to previous months.

This report will aid in monitoring the progress and relevance of the waste management procedures that are in place. If it is found that the implemented procedures are not as effective as required, this WMP is to be reviewed and amended accordingly. This report must from part of the ESO's reports to the ECO on a monthly basis.

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18. STORMWATER MANAGEMENT PLAN

The objective of the storm water management plan (SWMP) is to prevent increased soil erosion, to contain any contaminated run-off and to avoid water logging and pollution.

- The Erosion Management Plan (see below) must therefore be seen in conjunction with the SWMP. Actions are listed that will ensure that storm water is channelled in a controlled manner from roads and substations towards natural drainage lines, without impeded natural surface flows.
- Develop and implement a site-specific storm water management plan during the detailed design phase of the projects and prior to construction;
- In the detailed design phase of the project minimise any water crossings and utilise existing roads wherever possible;
- Enforce 32 m construction buffers of all rivers, streams and waterbodies;
- Should new roads be required to cross any banks or channels these must be secured with erosion protection (i.e. gabions etc);
- Monitor for erosion during the clearing of vegetation;
- Avoid hard-engineered surfaces (i.e. construct gravel roads and not asphalt roads wherever possible);
- Roads in steep areas must be equipped with side drainages and culverts that channel the run-off to natural drainage lines without gaining velocity and causing erosion;
- Construction camps and temporary ablution facilities must be located beyond the 1:100 year floodline;
- Stockpiles must be located on flat areas and protected from erosion;
- The substation site design must include side water outlets and an adequate slope to allow storm water run-off from the paved areas;
- Any run-off from the BESS area must be controlled and managed before entering any stormwater channel; and
- Prevent surface run-off from areas of potential contamination.

Guidelines and Stormwater Management:

- Where buildings/ infrastructure occur on-site, the developer should ensure that all stormwater flow paths are protected against erosion. All inlets to piped systems must be fitted with a screen/grating to prevent debris and refuse from entering the stormwater system. Screens/ grating must be installed immediately after the installation of piped infrastructure. Buildings, earthworks, or any other infrastructure may obstruct or encroach on a watercourse inside or outside the site without approved plans. The approved plans must not compromise the SWMP or any other required Authority approvals.
- Designs must ensure that rainfall run-off from roofing, not subjected to increases in pollution, can be captured for re-use for on-site irrigation and non-potable water uses. Where storage for re-use and ground conditions permit, rainwater run-off should connect to detention areas to maximise groundwater recharge. Detention areas must be designed to attenuate run-off.

- Parking or paved areas should be structured to reduce stormwater runoff by allowing ponding or infiltration. Stormwater from these areas should be discharged and controlled as overland sheet flow or attenuation facilities.
- Designed roads must avoid concentration of flow along and off the road. Where flow concentration is unavoidable, incorporating the road into the major stormwater system must be considered.
- Subsurface disposal must be designed to ensure that slope instability, concentrated saturation or inundation does not occur.
- Channels may be constructed to convey stormwater directly to a natural watercourse where deemed necessary and unavoidable. The channels must be suitably lined to prevent erosion and provide maximum possible energy dissipation of the flow.
- Open trenches should not be unprotected for extended periods and should be progressively backfilled as construction proceeds. Excavated material to be used as a backfill must be placed close to the trench on the upstream side to avoid loose material from washing away.
- Materials to be stockpiled away from drainage paths and loose material such as stone, sand or gravel must be covered or kept damp to minimise dust. The stormwater systems should be free from materials that could harm the water systems' fauna, flora, and aquatic life.

19. EROSION MANAGEMENT PLAN

19.1 Purpose

The purpose of the erosion management plan is to implement avoidance and mitigation measures to reduce the erosion potential and the likely impact of erosion associated with the construction and operational phases of the proposed facility. As part of the management plan, measures to protect hydrological features from erosion damage are included.

19.2 Scope and Limitations

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

19.3 Background

19.3.1 Types of Erosion

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

19.3.1.1 Raindrop impact

This is the erosion that occurs due to the “bomb blast” effect of raindrop impact. Soil particles can be blasted more than a meter into the air. Apart from loosening soil particles, the effect can also break soil aggregates apart and form a clay seal on the surface which resists infiltration and results in increased levels of runoff. This effect is most important when large areas of exposed soils are present. If the site is cleared, then this effect will play an important role as it results in the soil surface becoming sealed which reduces infiltration and increases runoff, leading to erosion.

19.3.1.2 Sheet Erosion

This is the removal of a shallow and uniform layer of soil from the surface. It is caused initially by raindrop splash and then by runoff. Sheet erosion is often difficult to see as no perceptible channels are formed. Accumulated sediment at the bottom of the slope is often the only indicator. This is likely to be an important erosion type at the site given the gently sloping nature of the site and the susceptible soils.

19.3.1.3 Rill Erosion

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

19.3.1.4 Gully Erosion

This is the removal of soil from the surface and sub-surface caused by concentrated runoff eroding channels greater than 300mm deep. Gully erosion often begins as rill erosion.

19.3.1.5 Wind Erosion

Wind erosion results from soil particles being picked up, bounced or moved by the wind. Wind erosion is primarily a problem in arid areas and may affect sands soils as well as fine-textured soils. Vegetation cover is usually an effective barrier to wind erosion, but large soils losses or degradation can occur in disturbed areas or on croplands.

19.3.2 Promoting Factors

19.3.2.1 Rainfall characteristics

High-intensity, short-duration storm events have much greater erosion potential than low intensity, longer duration storm events with the same runoff volume. Intense storms produce larger raindrops, and are more likely to break up the soil and dislodge particles.

19.3.2.2 Soil erodibility

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

19.3.2.3 Length and Steepness of Slope

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

19.3.2.4 Soil Surface Cover

Soil surface cover such as vegetation and mulch protect the soil surface from raindrop impact, reduce flow velocity, disperse flow, and promote infiltration and the deposition of sediment. This is a basic principle underlying many erosion control approaches which aim to modify the surface characteristics in order to reduce the flow velocity and reduce the potential for erosion. In this regard it is important to note that many of the practices which are used to enhance rehabilitation potential are also useful in reducing erosion potential.

19.3.3 Erosion and Sediment Control Principles

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

- Protect the land surface from erosion;
- Intercept and safely direct run-on water from undisturbed upslope areas through the site without allowing it to cause erosion within the site or become contaminated with sediment.
- Progressively revegetate or stabilise disturbed areas.
- Prevent damage to hydrological features such as drainage lines or wetlands, either within or adjacent to the site.

These goals can be achieved by applying the following principles:

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

19.3.4 On-Site Erosion Management

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

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

- Soil loss will be greater during wet periods than dry periods. Intense rainfall events outside of the wet season, such as occasional unseasonal showers can also however cause significant soil loss. Therefore, precautions to prevent erosion must be present throughout the year.
- Soil loss is related to the length of time that soils are exposed prior to rehabilitation or stabilization. Therefore, the gap between construction activities and rehabilitation must be minimized. Allied to this the fact that topsoil does not store well and must preferably be used within a month or at most within 3 months to aid in the revegetation and rehabilitation of disturbed areas.
- Phased construction and progressive rehabilitation are important elements of the erosion control strategy.
- The extent of disturbance will influence the risk and consequences of erosion. Therefore, large areas must not be cleared at a time, especially in areas such as slopes where the risk of erosion is higher.

19.4 Concentration of flows into downstream areas

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

- Culverts must be adequately spaced such that they do not result in shrinkage of downstream wetlands. Where roads cross minor drainage channels, a single culvert may be adequate, aligned with the downstream drainage line. Where more substantial wetland systems are intercepted by a road, sufficient culverts must be provided such that

downstream shrinkage of wetland width does not occur. Moreover, culverts must be aligned, as far impossible, with existing, natural channels.

- All crossings of drainage systems must ensure that both surface and shallow subsurface flows can be accommodated where appropriate and that unnatural channelisation does not occur downstream.

19.5 Runoff Concentration

The increase in hardened surfaces associated with roads, and other infrastructure will lead to a significant increase in volume and velocity of flow generated from these areas during large rainfall events.

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

19.5.1 Diversion of Flows

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

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

19.6 Monitoring Requirements

19.6.1 Construction Phase

The following monitoring actions must be implemented during the construction phase of the development:

Monitoring Action	Indicator	Timeframe
Identify all river and drainage line crossings affected by the development	Map of sites of potential concern	Preconstruction
Monitor cleared areas for erosion problems	Record of monitoring site, problems encountered and remedial actions implemented	Monthly during the rainy season and following significant rainfall events otherwise
Monitor vegetation clearing activities near sensitive areas such as wetlands or drainage lines	Activity log of monitoring actions and any mitigation and avoidance measures implemented	Monthly during the rainy season and following significant rainfall events otherwise
Monitor revegetated and stabilised areas	Record of monitoring site, problems encountered and remedial actions implemented	Monthly during the rainy season and following significant rainfall events otherwise

19.6.2 Operational Phase

The following monitoring actions must be implemented during the operational phase of the development:

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

20. FUEL STORAGE MEASURES

20.1 Storage Tanks

The storage tanks will be within contained areas to prevent spills contaminating soil and water, and with a design to capture and contain a volume of spill of at least 110% of the volume of stored fuel. These containers can be built in concrete and painted with anti-corrosive paint. The floor of the container must be inclined to permit the collection of the spilled liquids.

The storage tanks must also have a cover protection on top, prepared for drainage and collection of runoff.

20.2 General Procedures

- Transport routes for the transport of fuel will be clearly indicated;
- Pollution control equipment (spill and leak cleaning kits) must be readily available;
- Ensure personnel training, including: measures to prevent fuel spills, to treat/clean fuel spills, how to react on spill of flammable liquids on clothing and in the inhalation of vapours, leaks simulations; fuel vapour recovery processes, etc. Keep records of all training;
- Maintain the premises and equipment in a clean and tidy state;
- Regularly clean outdoor areas with a broom;
- Wastewater from outside areas must be directed to the contaminated water drainage system, and not enter the storm water system;
- Used oils (waste oil) will be collected, re-used, stored and disposed of in line with disposal procedures for hazardous wastes;
- Ensure the proper management of other hazardous wastes (contaminated soils, used spilling kits, waste lube, etc.); and
- All hazardous waste should be collected by a licensed service provider and transported to a licensed disposal facility.

20.2.1 Filling Operations

- Isolate the area by cones and a rope;
- Prohibit refuelling operations during tank filling operations;
- Avoiding having people who are not involved in the operation within a 10 metre radius;
- Prohibit smoking and the use of mobile telephones or any other ignition sources during tank filling operations or vehicle refuelling, within a 3 metre radius;
- Use a tight-fill cap to completely seal off the connections between the tubing and the truck’s and station’s tanks;
- Engines must be turned off during refuelling;
- Prevent overflowing and spilling situations when the storage tanks are being filled (verify filling sensors and be aware of overflow alarms).

20.2.2 Preventing Accidents with fuel mixtures

Establish a procedure to deal with the potential occurrence of these situations, such as:

- The chemicals and reaction mechanisms associated with the substances mixed or blended must be well understood and documented
- Chemical and process hazards must be understood and addressed and the facilities must ensure that process equipment, controls, and procedures are designed, installed and maintained to safely operate the process
- All employees must understand the chemical and process hazards
- Facilities must establish a system for Standard Operating Procedures and ensure that they are understood and followed
- Display clear and informative messages for users of the station, as to how to deal with this situation;
- Prepare a procedure to suitably dispose of wastes recovered from the batches of fuel mixture.

20.2.3 Spill Kits

- Emergency spill kits of absorbent material (e.g. sand) must be provided and stored next to the higher risk sites, and must be easily-accessible, ideally outside, in order to allow an immediate response when a spill occurs. This will be clearly labelled and ready for use.
- Drums for the storage of contaminated material must be provided.
- An accurate drawing of the local drainage system shall be posted next to the spill kit.

20.2.4 Closure Phase

- During the closure phase, there may be loss of product into the soil, as a result of a deliberate or accidental release during closure and removal of tanks and tubing. In addition, this risk may arise outside of the facility site, if the tanks and/or tubing are not properly disposed of.
- In the closure phase, it is important to remove all tanks and pipes. A risk may arise if the tanks are left on site with residual products. As the integrity of the equipment will no longer be ensured or monitored.
- During closure, it must be ensured that facilities do not present a risk to the environment, health or safety. Measures must be taken to ensure that the closure does not result in an unacceptable risk, including:
    - Any and all waste products will be removed from the tanks. Care will be taken to ensure that no product is lost into the soil. Tank closure must be carried out safely, with the removal of explosive vapours, for example by filling the tanks with water or inert gases. All tanks will be safe prior to their removal from the ground. Similar methods will be employed prior to the removal of the pipes.
    - Water used in this process will be contaminated with residual product, and thus a water contamination risk may arise if the contaminated water is not disposed of in a way which is appropriate for hydrocarbon contamination. This would normally imply the removal to a suitable waste handling facility.
    - According to best environmental practices, the tanks, tubing and distributors will be disposed of. However, if the tanks remain in situ, it will be ensured that the procedure is safe. After making the tanks inert and safe, they will be filled in with sand, concrete, inert mud or hydrophobic foam.

- The tanks and associated tubing which are no longer considered appropriate or safe for fuel storage will not be used for storage of other hydrocarbons, without first ensuring their integrity.
- The oil/water separators will be removed for disposal, off the facility site. Otherwise they will be filled in a similar way to the tanks. Regardless of the fate of the oil/water separator, all liquid and mud waste will be removed (off the facility site) and all the inlets and outlets will be sealed.
- Whatever drainage system left behind will be modified to ensure that it does not serve as a path for pollutants to reach groundwater or other waters.
- If the deactivation is temporary, product can be left in the tanks. In this case, all monitoring procedures will be carried out as if the facility were in operation. If for any reason the monitoring cannot carry on, the tanks will be emptied and made inert.
- Personnel involved in the closure of a filling and fuel station will be aware and respect obligations with regards to waste disposal, in line with the best practices described above.

Environmental Aspect	**Action or Measure**
Prevent accidental spills from entering the stormwater drainage system	Provide cleaning equipment conceived specifically to deal with minor spills as may occur at the station. Place a clearly-identified spill kit in a visible location for each fuelling line.
	Develop a step-by-step guide to use of the spill kit.
	Develop an evacuation plan and/or response procedures for emergencies involving large fuel spills.
	Train the whole team in the emergency response procedures. Make sure that all staff knows where the emergency equipment is to be found and is acquainted with its maintenance.
	Label all of the stormwater drains on site in the proximity of the facilities as “Clean Water Only”.
	Inspect the fuel distribution area in order to confirm that rainwater drained or emptied from the roof doesn’t enter the areas marked out.
	Check whether the embankment around the fuel distribution area is in good condition and has the capacity to contain a fuel leak in the event of an emergency.
Minimise the risks of environmental contamination and from issues of workers’ health and safety	Provide training to the staff regarding the disposal of material contaminated with fuel, such as absorbent material from the spill kit, soaked in fuel.

	Ensure that the product safety cards for all fuels and oils are up-to-date and accessible at all times.
	Should any contamination be found on-site during the decommissioning phase of the existing / proposed facility, the Western Cape Province Pollution and Chemicals Management Directorate must be informed of such contamination, as required in terms of Part 8 of the National Environmental Management Waste Act, 2008 (Act No. 59 of 2008) ("NEM: WA").
	Should more than 100m3 of general waste and/or or more than 80m3 of hazardous waste be stored at the proposed WEF for a period exceeding 90 days, the applicant will need to register in terms of, and adhere to, the NEM: WA National Norms and Standards for the Storage of Waste promulgated in GN No. 926 of 29 November 2013.
Minimise the risks of fuel leaks as may result in pollution of the sub-soil and groundwater	Check if there is fuel, from a possible leak, in the spill containment sumps installed at the tank's discharge nozzle.
	Check if there is fuel, from a possible leak, in the all tanks containment sumps, installed on the manhole to the storage tanks. In the event of suspected leakage, report it immediately.
	Check if there is fuel or lube, from a possible leak in the containment sumps installed under the tanks.
Minimise the risks of fuel leaks as this may result in pollution of the sub-soil and groundwater	Check if there is fuel, from a possible leak, in the chambers of the containment sumps installed under the pumps
Minimise the risks of harmful emissions to the atmosphere and the loss of fuel	Check that lids, flanges and connections are closed.
	Confirm that the ventilation conduits are not blocked.
	Supervise the fuel deliveries.
Minimise the risks of water pollution	Carry out an Oil-Water Separator inspection to ensure effective treatment.
Integrity control	Adequate maintenance and calibration of the monitoring equipment

21. FIRE MANAGEMENT PLAN

The National Veld and Forest Fires Act (Act 101 of 1998) states that it is the landowner' and / or relevant contractors in the context of the WEFs' responsibility to ensure that the appropriate equipment as well as trained personnel are available to combat fires.

Although fires are not a regular occurrence at the site, fires may occasionally occur under the right circumstances. Ignition risk sources in the area include the following:

- Lightning strikes.
- Personnel within the facility.
- Infrastructure such as transmission lines.

A fire management plan in compliance with Veld Fire Management Act should be compiled by the main contractor prior to the commencement of construction.

21.1 Firebreaks

Extensive firebreaks are not recommended as a fire risk management strategy at the site. The site is very large compared to the extent of the infrastructure and the maintenance of firebreaks would impose a large management burden on the operation of the facility. In addition, the risk of fires is not distributed equally across the site and within many of the lowlands of the site, there is not sufficient biomass to carry fires and the risk of fires within these areas is very low. Rather targeted risk management must be implemented around vulnerable or sensitive elements of the facility such as substations or other high risk components. Within such areas, the extent over which management action needs to be applied is relatively limited and it is recommended that firebreaks are created by mowing and that burning to create firebreaks is not used as this in itself poses a risk of runaway fires. Where such firebreaks need to be built such as around substations, a strip of vegetation 5 - 10 m wide can be cleared manually and maintained relatively free of vegetation through manual clearing on an annual basis. However, if alien species colonise these areas, more regular clearing must be implemented.

22. AVIFAUNA MANAGEMENT AND MONITORING PLAN

Given the possible impact of the proposed HUGO Wind energy facility development, the overall impact on avifaunal species requires systematic monitoring at both the construction-phase and operational-phase of the wind energy facility. This is a recommendation of the BARESG guidelines (Jenkins et al. 2015).

The guidelines suggest an adaptive and systematic monitoring of bird displacement (comparing avian densities before and after construction, particularly for Priority collision-prone and Red Data species) and particularly the monitoring of all turbine-related fatalities. The latter must take account of biases introduced by scavengers removing carcasses and observers failing to detect bird-remains below the turbines.

The monitoring should include the following (as per BARESG guidelines):

- **Construction-phase** monitoring should begin at the same time as construction begins – bearing in mind that the effects of construction on the environment can be higher than the operational phase. This phase should include monitoring nests and roosts and bustard leks on site to determine any disturbance or habitat loss where it may cause irreparable harm. These are more checks on the most important (threatened) components of the biodiversity on site than systematic surveys covering all species. This should cover a minimum 18-24 months.
- **Post-construction** monitoring can be divided into two categories:
  a) quantifying bird numbers and movements (replicating baseline data collection), and
  b) estimating bird mortalities.
- Carcass monitoring should be undertaken by trained observers, able to cover 4-5 turbines per day in all weather conditions throughout the year at ~40% or more of all turbines, overseen by an ornithologist competent to determine species identification, and a manager to collate and analyse each years' data.
- Estimating bird fatality rates includes:
  a) estimation of searcher efficiency and scavenger removal rates using carcasses;
  b) carcass searches; and
  c) data analysis incorporating systematically collected data from (a) and (b); these biases should then inform the fatality rates.

A minimum of 30-40% of the wind energy facility footprint should be methodically searched for fatalities, throughout the year, with a search interval informed by scavenger removal trials and objective monitoring. Any evidence of mortalities or injuries within the remaining area should be recorded and included in reports as incidental finds.

- The search area should be defined and consistently applied throughout monitoring.
- The duration and scope of post-construction monitoring should be informed by the outcomes of the previous year's monitoring and reviewed annually.
- Post-construction monitoring of bird abundance and movements, and fatality surveys, should span 2-3 years to take inter-annual variation into account, particularly in arid areas; and

- If significant problems are found or suspected, the post-construction monitoring should continue in conjunction with adaptive management and mitigations – accounting for the risks related to that particular site and those species involved.

An assessment guided by these principles is required not only to enact and test the effectiveness of different mitigation measures where significant mortality occurs but allow data to be collected that will benefit the welfare of avifauna at other renewable energy farms. This is also important for a study of cumulative avian impacts for the increasing number of wind energy facilitys planned for South Africa.

Management interventions: Where avian fatalities are found to occur:

(i) to *Critically Endangered/ Endangered* Red Data species (at a level of one RD fatality per turbine year); or

(ii) should two or more individuals of other Red Data species (i.e., *Vulnerable* or *Near Threatened*) or a Least Concern Priority species be killed per turbine year, then a specific response and bird fatality threshold must be discussed and implemented within 30 days for those turbines causing the fatalities. This should be tailored to the rarity of the species involved such that the more range-restricted or rare the species is the lower the threshold (i.e., 2 vs 3 vs 4 fatalities) is at which mitigation action is triggered.

(ii) a full threshold-response plan, as detailed above should be initiated for Priority species avian fatalities. This requires workshopping a consensus on the "acceptable" levels of fatalities for each species. However, where fatalities occur for *Endangered* or *Critically Endangered* species the threshold remains at one bird fatality per turbine per year as a trigger for an immediate response (this is to avoid protracted negotiations that may well see other individuals of the same species unnecessarily killed by the same turbine).

Experiments, with bird deterrent techniques including Shut Down on Demand and such as patterned blades painted with black or signal red paint are encouraged (Martin and Banks 2023), or the initiation of human-led, or automated, shut-down-on-demand (SDOD) within 60 days to reduce fatality rates. The results of these experiments should be publicised so that other wind energy facilitys, with similar issues, can be informed.

We would encourage Developers to release the results of the annual monitoring to Birdlife South Africa, such that South Africa-wide fatality and displacement results can be collated and assessed. In this way cumulative impacts assessments, currently crudely estimated, can be refined, region by region.

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23. BAT MANAGEMENT AND MONITORING PLAN

The following Management Plan was recommended by the specialist for implementation to minimise the potential negative affects the development can impose:

Impact	**Mitigation/Management Objectives**	**Mitigation/Management Actions**	**Monitoring**		
			Methodology	**Frequency**	Responsibility
DESIGN PHASE					
Negative impacts on bats.	Mitigate impacts on bat habitat caused by destruction, disturbance, and displacement.	Ensure the design of the wind energy facility takes the sensitivity mapping of the bat specialist into account to avoid and reduce impacts on bat species and bat important features. Maintain buffers around these sensitive areas.	Ensure that high-sensitivity areas are identified and excluded from turbine placement. High-sensitivity areas should be avoided and treated as No-go areas for operational wind turbine components during the planning and design phase.	Before construction during the design and planning phase.	Project Developer
	Prevent bat activity in sensitive areas.	Minimize artificial light at night during the design phase. Do not install roll-up garage doors.	Choice of lights and light placement is crucial. Bats can get trapped in roll-up garage doors and die.	Final design Site planning phase.	Project Developer
	Minimise the footprint of the construction to an acceptable level.	Turbines need to be approximately 250 m apart from blade tip to blade tip.	Final layout design	During design and before construction commences.	Project Developer

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	Responsibility
	Avoid habitat loss and destruction caused by the clearing of vegetation for the working areas and construction, and landscape modifications.	Appoint an ECO before construction to oversee that the EMPr is adhered to. Plan to use existing road networks as far as possible and ensure no off-road driving.	Monitor whether proposed measures are adhered to. ECO should be trained to recognise possible roost locations. If buildings, trees, or structures providing potential roosts need to be demolished, a specialist visit is required before the commencement of the work.	ECO should contact the bat specialist and be trained/informed before construction commences.	Project Developer Operational bat specialist should work with/inform ECO
CONSTRUCTION PHASE					
Active roost destruction, potential roost destruction, and habitat loss.	Minimise impacts on bats during construction activities. Keep construction out of high bat-sensitive areas as far as possible. Avoid the destruction of rock formations along ridge lines. Avoid the destruction of trees as far as possible. Take care before destroying dense bushes/trees to avoid unnecessary roost destruction. All aardvark holes, derelict holes, or excavations should be carefully investigated for roosts before destruction.	Adhere to high-sensitivity areas incorporated into the final layout. Appoint an independent ECO to oversee that the EMPr is being adhered to. Bat specialist to train ECO, if necessary, to identify possible bat roosts or signs of bat presence. Clearance and removal of natural vegetation should be kept to a minimum. Avoid pollution of water courses. No off-road driving.	Visual inspection and continuous monitoring of high-sensitivity areas. ECO to be in contact with a bat specialist if bat roosts are encountered.	Throughout construction. ECO to be present during all site clearance activities. Access to bat specialist if ECO needs information or confirmation concerning bat presence.	Project Developer. Holder of EA to appoint ECO. Appointed bat specialist to train the ECO, if necessary.

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	Responsibility
Creating new habitats amongst the turbines that might attract bats. This includes buildings with roofs that could serve as roosting spaces or open water sources from quarries or excavations where water could accumulate.	Avoid creating new bat habitats that might attract bats to the wind farm.	Inspect all existing buildings and infrastructure for possible roosting opportunities. No roll-up garage doors should be used on site.	Carefully seal off the roofs of buildings to prevent bat roosting. Note that bats can move into a space of 1 X 1 cm. Bats could roost in roll-up garage doors and get killed when the doors are opened.	Throughout construction phase.	Project Developer. ECO.
Construction noise, especially during night-time.	Prevent disturbance to bat activity and behaviour.	Noise levels should be prevented as far as possible.	Monitor construction to reduce noise and minimise disturbance in bat-sensitive areas. Avoid construction activities at night.	Throughout construction phase.	Project Developer. ECO. All on-site personnel.
OPERATIONAL PHASE					
The fatality of resident bats through direct collision or barotrauma.	Monitor potential impacts on bats during the operation of the wind farm. Prevent activities that will attract bats to the site.	Maintain a register of action taken regarding bat mortality/injury as well as queries or complaints. Adhere to mitigation measures as per the pre-construction bat monitoring report. Adapt mitigation measures in consultation with an operational bat specialist.	Relevant SABAA guideline documents. Monitoring reports.	Throughout operational bat monitoring.	Project Developer. ECO.

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	Responsibility
Bat fatality of migratory species.	Monitor potential impacts on bats during the operation of the wind farm. Prevent activities that will attract bats to the site.	Maintain a register of action taken regarding bat mortality/injury as well as queries or complaints. Adhere to mitigation measures as per the pre-construction bat monitoring report. Adapt mitigation measures in consultation with an operational bat specialist.	Relevant SABAA guideline documents. Monitoring reports.	Throughout operational bat monitoring.	Project Developer. ECO.
Loss of bats of conservation value.	Monitor potential impacts on bats during the operation of the wind farm. Prevent activities that will attract bats to high-risk areas on-site.	Bat fatalities should be monitored by fatality searches and a record kept of the date, time, location, sex, and cause of death. Carcasses should be photographed to be used for searcher efficiency and carcass removal trails. Adhere to mitigation measures as per the pre-construction bat monitoring report. Adapt mitigation measures in consultation with an operational bat specialist.	Relevant SABAA guideline documents. Monitoring reports.	Throughout operational bat monitoring.	Project Developer. ECO.
Bat fatality due to the attraction of bats to turbine blades.	Prevent activities that will attract bats to turbines.	Maintain a register of action taken regarding bat mortality/injury as well as queries or complaints. Adhere to mitigation measures as per the pre-construction bat monitoring report. Adapt mitigation measures in consultation with an operational bat specialist.	Relevant SABAA guideline documents. Monitoring reports.	Throughout operational bat monitoring.	Project Developer. ECO.

Impact	**Mitigation/Management Objectives**	**Mitigation/Management Actions**	**Monitoring**		
			Methodology	**Frequency**	Responsibility
Loss of habitat and foraging space during operation of the wind turbines.	Monitor potential impacts on bats during the operation of the wind farm. Prevent activities that will attract bats to high-risk areas on-site.	Maintain a register of action taken regarding bat mortality/injury as well as queries or complaints. Adhere to mitigation measures as per the pre-construction bat monitoring report. Adapt mitigation measures in consultation with an operational bat specialist.	Relevant SABAA guideline documents. Monitoring reports.	Throughout operational bat monitoring.	Project Developer and ECO.
Reduction in size, genetic diversity, resilience, and persistence of bat populations.	Monitor potential impacts on bats during the operation of the wind farm. Prevent activities that will attract bats to high-risk areas on-site.	Maintain a register of action taken regarding bat mortality/injury as well as queries or complaints. Adhere to mitigation measures as per the pre-construction bat monitoring report. Adapt mitigation measures in consultation with an operational bat specialist.	Relevant SABAA guideline documents. Monitoring reports.	Throughout operational bat monitoring.	Project Developer. ECO.
DECOMMISSIONING PHASE					
Decommissioning activities and noise, especially at night- time.	Mitigate disturbance due to decommissioning activities.	Develop a decommissioning and remedial rehabilitation plan and adhere to the compliance monitoring plan.	Implement the decommissioning and rehabilitation plan to reduce the footprint of the development to a pre-construction state.	During decommissioning phase.	Project Developer. ECO. Commitment from all levels of management.

24. NOISE MANAGEMENT AND MONITORING PLAN

24.1 Monitoring Plan

Environmental Noise Monitoring can be divided into two distinct categories, namely:

- Passive monitoring – the registering of any complaints (reasonable and valid from NSR living within 2,500m from any WTG of the Hugo WEF) regarding noise; and
- Active monitoring – the measurement of noise levels at identified locations.

After the implementation of mitigation measures, noise levels could be higher than 42 dBA (more than 7 dBA of the night-time rating level of a rural noise district) and active noise monitoring is recommended and required.

In addition, should a reasonable and valid noise complaint be registered, the Developer should investigate the noise complaint as per the guidelines. These guidelines should be used as a rough guideline as site-specific conditions may require that the monitoring locations, frequency or procedure be adapted.

24.1.1 Measurement Localities and Frequency

Ambient sound levels could be measured at NSR H-6 before the development of the WEF (at the minimum), with the measurements repeated after the first year of operation. In addition, should there be a valid and reasonable noise complaint, once-off noise measurements must be conducted at the location of the person that registered a valid and reasonable noise complaint. The measurement location should consider the direct surroundings to ensure that other sound sources cannot influence the reading. These measurement locations can be reduced accordingly if the NSRs are relocated or the dwellings are no longer used for residential purposes.

24.1.2 Measurement Procedures

Ambient sound measurements should be collected as defined in SANS 10103:2008. Due to the variability that naturally occurs in sound levels at most locations, it is recommended that semi-continuous measurements are conducted over a period of at least 5 days, covering at least five full night-time (22:00 – 06:00) periods. Spectral frequencies should also be measured to define the potential origin of noise. When a noise complaint is being investigated, measurements should be collected during a period or in conditions similar to when the receptor experienced the disturbing noise event.

24.2 ENVIRONMENTAL MANAGEMENT

Environmental Management Objectives are difficult to be defined for noise because ambient sound levels would slowly increase as developmental pressures increase in the area. This is due to increased traffic associated with increased development, human habitation, agriculture and even eco-tourism. While these increases in ambient sound levels may be low (and insignificant) it has the effect of cumulatively increasing the ambient sound levels over time.

The moment the WEF facility stops operation, ambient sound levels will drop to levels similar to the pre-WEF levels, or to new levels (typical of other areas with a similar developmental character) if other developments have occurred in the interim.

For the purpose of this report potential environmental management objectives would be:

- That the development (construction and operational phase) of the WEF project not result in noise levels exceeding 52 dBA (when measured over a period of at least 1 hour) during the day; and
- That the development (construction and operational phase) of the WEF project should not result in noise levels exceeding 45 dBA (when measured over a period of at least 1 hour) at night.

As noise levels will not exceed 52 dBA during both the construction and operational phases, Environmental Management is mainly focusing on the night-time period as summarized in:

- **Table 24.1** for the planning phase (to ensure that noise levels are with the acceptable limits during the future operational phase:
- **Table 24.2** for night-time activities during the construction phase; and
- **Table 24.3** for the operational of the WTG.

TABLE 24.1 ENVIRONMENTAL MANAGEMENT FOR PLANNING PHASE

Objective: **Calculated noise rating levels less than 7 dBA from the zone sound level (acceptable rating level)**			
Project Components:	Future construction and operational activities of WTG of the Hugo WEF		
Potential Impact:	Noise levels impacting on the quality of living of NSR		
Activity/Risk source	Future construction and operational activities		
Mitigation: Target	Daytime noise levels less than 52 dBA, night-time noise levels less than 45 dBA at locations used for residential purposes		
Mitigation: Action / Control		**Responsibility**	**Timeframe**
Applicant to re-evaluate the noise impact once the WTG specifications are finalized.		Applicant	Planning phase, before development of WEF
If noise levels, after the evaluation of the selected WTG are higher than 45 dBA, the applicant must design a noise abatement programme (or define appropriate mitigation measures) that will ensure that operational noise levels are less than 45 dBA at all verified NSR.		Applicant	Planning phase, before development of WEF
Applicant to re-evaluate the noise impact should the layout be revised (as part of an amendment process post EA) where any WTG, located within 2,500 m from a confirmed NSR, are moved closer to the NSR.		Applicant	Planning phase, before development of WEF
Applicant to re-evaluate the noise impact should the layout be revised (as part of an amendment process post EA) where any new WTG are introduced within 2,500 m from an NSR		Applicant	Planning phase, before development of WEF
Applicant to re-evaluate the noise impact should the layout be revised (as part of an amendment process post EA) where the number of WTG within 2,500 m from an NSR are increased		Applicant	Planning phase, before development of WEF

Applicant to re-evaluate the noise impact should the applicant make use of a wind turbine with a maximum PWL exceeding 108.4 dBA re 1 pW	Applicant	Planning phase, before development of WEF
Applicant to implement noise monitoring program to define the ambient sound levels at selected locations (NSR H-6) before the construction phase start.	Applicant	Planning phase, before development of WEF
Performance Indicator	Calculated daytime noise levels should be less than 52 dBA, with night-time noise levels being less than 45 dBA at structures used residential purposes	
Monitoring	No monitoring required during planning phase	

TABLE 24.2 ENVIRONMENTAL MANAGEMENT FOR NIGHT-TIME CONSTRUCTION ACTIVITIES

Objective: **Construction activities not to result in noise levels exceeding 52 dBA during the day-time period** **Construction activities not to result in noise levels exceeding 45 dBA during the night-time period**		
Project Components:	Construction activities and construction equipment generating disturbing and nuisance noises	
Potential Impact:	Night-time noise levels impacting on the quality of living of NSR	
Activity/Risk source	Construction activities	
Mitigation: Target	Daytime noise levels less than 52 dBA, night-time noise levels less than 45 dBA at locations used for residential purposes	
Mitigation: Action / Control	**Responsibility**	**Timeframe**
ECO to ensure that equipment is well maintained and fitted with the correct and appropriate noise abatement measures;	ECO	Ongoing during construction phase
ECO to include a component covering environmental noise in the Health and Safety Induction to sensitize all employees and contractors about the potential impact from noise;	ECO	Ongoing during construction phase
ECO to notify NSR (and/or land owner(s)) before night-time construction activities are to take place within 1,200 m from an NSR (if the structures are used for residential activities during the proposed construction period).	ECO	Construction activities within 1,500 m from NSR, if NSR is used for residential purposes
Performance Indicator	Daytime noise levels from construction activities less than 52 dBA at NSR Night-time noise levels from construction activities less than 45 dBA at NSR	
Monitoring	Inspection of equipment by ECO. Measurement of noise levels at dwellings of NSR after noise complaints (	

TABLE 24.3 ENVIRONMENTAL MANAGEMENT FOR NIGHT-TIME OPERATIONAL PERIOD

Objective: **Operational activities not to result in noise levels exceeding 52 dBA during the day-time period**

Operational activities not to result in noise levels exceeding 45 dBA during the night-time period			
Project Components:	Operation of WTG within 2,500 m from structure used for residential purposes		
Potential Impact:	Noises from WTG impacting on the quality of living of NSR		
Activity/Risk source	Operation of WTG		
Mitigation: Target	Daytime noise levels from operational activities less than 52 dBA at NSR Night-time noise levels from operational activities less than 45 dBA at NSR		
Mitigation: Action / Control		**Responsibility**	**Timeframe**
Applicant to conduct noise monitoring when a reasonable and valid noise complaint are received from an NSR living within 2,500m from a WTG of the project.		EO / Applicant	Within 2 months after a noise complaint is registered
Noise monitoring to confirm that noise levels associated with operating WTG are less than 45 dBA at all NSR.		EO	During the first year once the project is operational. Noise specialist to confirm need for future measurements.
Performance Indicator	Daytime noise levels from operating WTG less than 52 dBA, with night-time noise levels due to operating WTG being less than 45 dBA		

25. VISUAL MANAGEMENT AND MONITORING PLAN

During the **construction phase**, ensure that visual management measures are included and monitored by an Environmental Control Officer (ECO). This includes siting of any construction camps, stockpiles, temporary laydown areas and batching plants outside of identified no-go areas unless otherwise approved by the visual specialist. Dust suppression and litter control measures should be implemented as well. Rehabilitation efforts must commence immediately after construction activities are completed.

Responsibility: ECO / Contractor.

Timeframe: Preparation of the EMPr during the planning phase and monitoring during the construction phase.

For the **operation phase**, visual mitigation measures must be monitored by management on an on-going basis, including the maintenance of rehabilitated areas, as well as control of any signage, lighting and wastes at the proposed wind farm. Interim inspections must be conducted by the environmental officer based on site to ensure all of the above.

Responsibility: Wind Farm Operator and ECO.

Timeframe: During the operational life of the project.

Throughout the **decommissioning phase**, ensure that procedures for the removal of wind turbines and building structures are implemented. This includes recycling of materials and rehabilitation of the site to a visually acceptable standard, and signed off by the delegated authority. It is assumed that some access roads and concrete pads would remain. Those that are not required should be ripped and vegetation or cropland reinstated to match the surroundings. The revegetation measures are not described as they would fall under the auspices of the appropriate specialist.

Responsibility: ECO / Contractor / qualified rehabilitation ecologist or horticulturist.

Timeframe: During the decommissioning contract phase, as well as a prescribed maintenance period thereafter (usually one year).

26. CONCLUSION

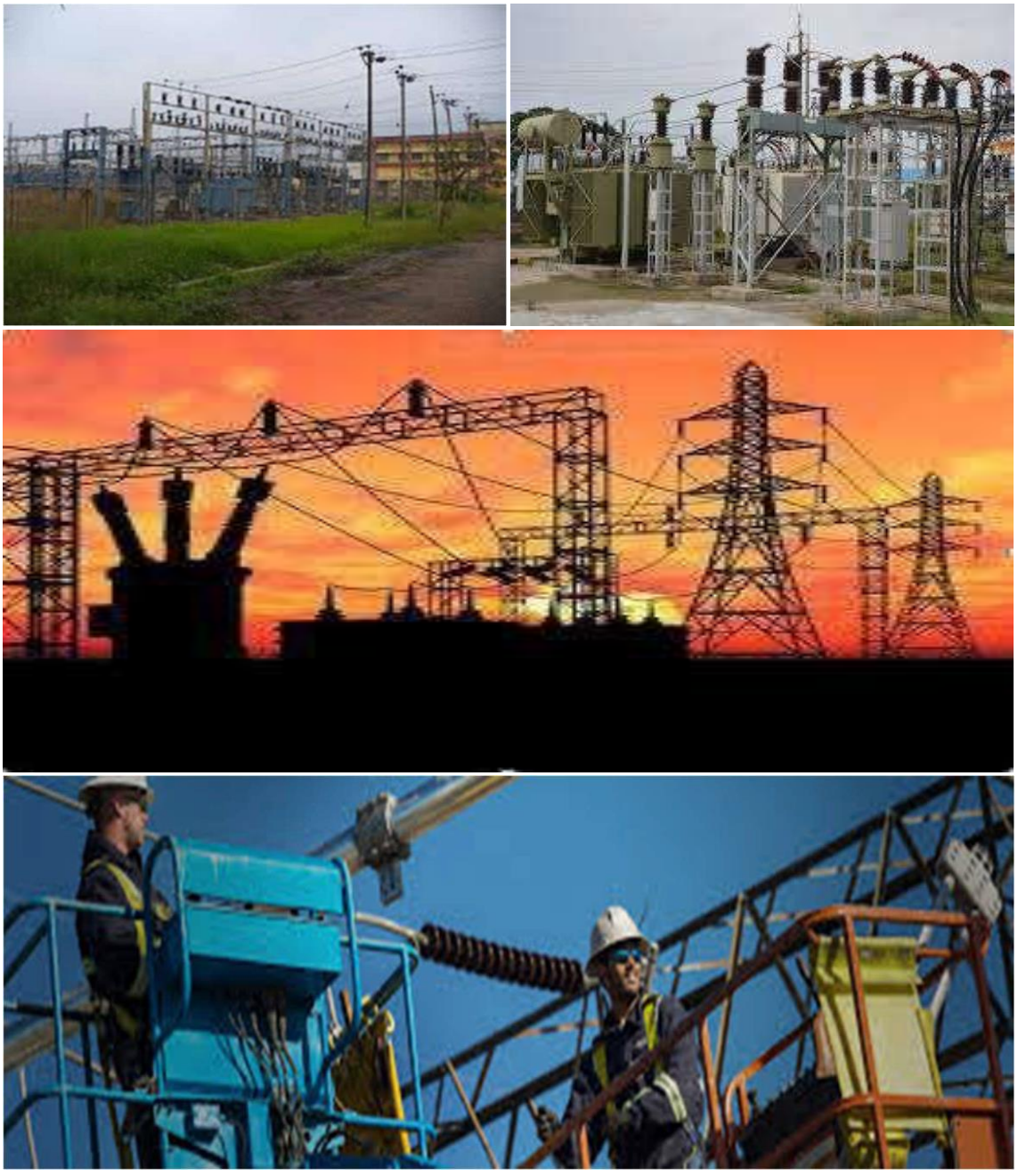
In terms of the National Environmental Management Act 107 of 1998, as amended, everyone is required to take reasonable measures to ensure that they do not pollute the environment. Reasonable measures include informing and educating employees about the environmental risks of their work and training them to operate in an environmentally acceptable manner.

Although all foreseeable actions and potential mitigation measures and management actions are contained in this document, the EMPr should be seen as a day-to-day management document. The EMPr thus sets out the environmental and social standards, which would be required to minimise the negative impacts and maximise the positive benefits of the Hugo & Khoe. The EMPr could thus change daily, and if managed correctly lead to successful construction and operational phases of the development.

Furthermore, in terms of the 'Act', the cost to repair any environmental damage shall be borne by the person responsible for the damage. It is therefore imperative that the management plan is successfully implemented, as a failure to comply could have legal implications. The environmental impacts on the site will not be significant if the construction management is well implemented, and a set of operational guidelines are developed by the long-term site management body.

APPENDIX A GENERIC EMPR FOR SUBSTATION INFRASTRUCTURE

GENERIC ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr) FOR THE DEVELOPMENT AND EXPANSION OF SUBSTATION INFRASTRUCTURE FOR THE TRANSMISSION AND DISTRIBUTION OF ELECTRICITY



environmental affairs
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REPUBLIC OF SOUTH AFRICA

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INTRODUCTION

1. Background

The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) requires that an environmental management programme (EMPr) be submitted where an environmental impact assessment (EIA) has been identified as the environmental instrument to be utilised as the basis for a decision on an application for environmental authorisation (EA). The content of an EMPr must either contain the information set out in Appendix 4 of the Environmental Impact Assessment Regulations, 2014, as amended (EIA Regulations) or must be a generic EMPr relevant to an application as identified and gazetted by the Minister in a government notice. Once the Minister has identified, through a government notice that a generic EMPr is relevant to an application for EA, that generic EMPr must be applied by all parties involved in the EA process, including but not limited to the applicant and the competent authority (CA).

2. Purpose

This document constitutes a generic EMPr relevant to applications for the development or expansion of substation infrastructure for the transmission and distribution of electricity, and all listed and specified activities necessary for the realisation of such infrastructure.

3. Objective

The objective of this generic EMPr is to prescribe and pre-approve generally accepted impact management outcomes and impact management actions, which can commonly and repeatedly be used for the avoidance, management and mitigation of impacts and risks associated with the development or expansion of substation infrastructure for the transmission and distribution of electricity. The use of a generic EMPr is intended to reduce the need to prepare and review individual EMPrs for applications of a similar nature.

4. Scope

The scope of this generic EMPr applies to the development or expansion of substation infrastructure for the transmission and distribution of electricity requiring EA in terms of NEMA. This generic EMPr applies to activities requiring EA, mainly activity 11 and 47 of the Environmental Impact Assessment Regulations Listing Notice 1 of 2014, as amended, and activity 9 of the Environmental Impact Assessment Regulations Listing Notice 2 of 2014, as amended, and all associated listed or specified activities necessary for the realization of such infrastructure.

5. Structure of this document

This document is structured in three parts with an Appendix as indicated in the table below:

Part	Section	Heading	Content
A		Provides general guidance and information and is **not legally binding**	Definitions, acronyms, roles & responsibilities and documentation and reporting.
B	1	Pre-approved generic EMPr template	Contains generally accepted impact management outcomes and impact management actions required for the avoidance, management and mitigation of impacts and risks associated with the development or expansion of substation infrastructure for the transmission and distribution of electricity, which are presented in the form of a template that has been pre- approved. The template in this section is to be completed by the contractor, with each completed page signed and dated by the holder of the EA prior to commencement of the activity. Where an impact management outcome is not relevant, the words "not applicable" can be inserted in the template under the "responsible persons" column. Once completed and signed, the template represents the EMPr for the activity approved by the CA and is legally binding. The template **is not required** to be submitted to the CA as once the generic EMPr is gazetted for implementation, it has been approved by the CA. To allow interested and affected parties access to the pre-approved EMPr template for consideration through the decision-making process, the EAP on behalf of the applicant /proponent must make the hard copy of this EMPr available at a public location and where the applicant has a website, the EMPr should also be made available on such publicly accessible website.
	2	Site specific information	Contains preliminary infrastructure layout and a declaration that the applicant/holder of the EA

Part	Section	Heading	Content
			will comply with the pre-approved generic EMPr template contained in Part B: Section 1, and understands that the impact management outcomes and impact management actions are **legally binding**. The preliminary infrastructure layout must be finalized to inform the final EMPr that is to be submitted with the basic assessment report (BAR) or environmental impact assessment report (EIAR), ensuring that all impact management outcomes and impact management actions have been either pre-approved or approved in terms of Part C. This section **must be** submitted to the CA together with the final BAR or EIAR. The information submitted to the CA will be considered to be incomplete should a signed copy of Part B: section 2 not be submitted. Once approved, this Section forms part of the EMPr for the development and is legally binding.
C		Site specific sensitivities/ attributes	If any specific environmental sensitivities/ attributes are present on the site which require site specific impact management outcomes and impact management actions, not included in the pre-approved generic EMPr, to manage impacts, these specific impact management outcomes and impact management actions must be included in this section. These specific environmental attributes must be referenced spatially and impact management outcomes and impact management actions must be provided. These specific impact management outcomes and impact management actions must be presented in the format of the pre- approved EMPr template (Part B: section 1) This section will not be required should the site contain no specific environmental sensitivities or attributes. However, if Part C is applicable to the site, it **is required** to be submitted together with the BAR or EIAR, for consideration of, and decision on, the application for EA. The information in this section must be prepared by an EAP and must contain his/her name and expertise including a curriculum vitae. Once

Part	Section	Heading	Content
			approved, Part C forms part of the EMPr for the site and is legally binding. This section applies only **to additional** impact management outcomes and impact management actions that are necessary for the avoidance, management and mitigation of impacts and risks associated with the specific development or expansion and which are not already included in Part B: section 1.
Appendix 1			Contains the method statements to be prepared prior to commencement of the activity. The method statements are **not required** to be submitted to the competent authority.

6. Completion of part B: section 1: the pre-approved generic EMPr template

The template is to be completed prior to commencement of the activity, by providing the following information for each environmental impact management action:

- For implementation
  - a 'responsible person',
  - a method for implementation,
  - a timeframe for implementation
- For monitoring
  - a responsible person
  - frequency
  - evidence of compliance.

The completed template must be signed and dated by the holder of the EA prior to commencement of the activity. The method statements prepared and agreed to by the holder of the EA must be appended to the template as Appendix 1. Each method statement must be signed and dated on each page by the holder of the EA. This template once signed and dated is legally binding. The holder of the EA will remain responsible for its implementation.

7. Amendments of the impact management outcomes and impact management actions

Once the activity has commenced, a holder of an EA may make amendments to the impact management outcomes and impact management actions in the following manner:

- Amendment of the impact management outcomes: in line with the process contemplated in Regulation 37 of the EIA Regulations; and
- Amendment of the impact management actions: in line with the process contemplated in Regulation 36 of the EIA Regulations.

8. Documents to be submitted as part of part B: section 2 site specific information and declaration

Part B: Section 2 has three distinct sub-sections. The first and third sub-sections are in a template format. Sub-section two requires a map to be produced.

Sub-section 1 contains the project name, the applicant's name and contact details, the site information, which includes coordinates of the property or farm in which the proposed substation infrastructure is proposed as well as the 21-digit Surveyor General code of each cadastral land parcel and, where available, the farm name.

Sub-section 2 is to be prepared by an EAP and must contain his/her name and expertise including a curriculum vitae. This sub-section must include a map of the site sensitivity overlaid with the preliminary infrastructure layout using the national web based environmental screening tool, when available for compulsory use at: https://screening.environment.gov.za/screeningtool. The sensitivity map shall identify the nature of each sensitive feature e.g. threatened plant species, archaeological site, etc. Sensitivity maps shall identify features both within the planned working area and any known sensitive features and within 50 m from the development footprint.

Sub-section 3 is the declaration that the applicant (s)/proponent (s) or holder of the EA in the case of a change of ownership must complete which confirms that the applicant/EA holder will comply with the pre-approved 'generic EMPr' template in Section 1 and understands that the impact management outcomes and impact management actions are legally binding.

(a) Amendments to Part B: Section 2 – site specific information and declaration

Should the EA be transferred, Part B: Section 2 must be completed by the new applicant/proponent and submitted with the application for an amendment of the EA in terms of regulations 29 or 31 of the EIA Regulations, whichever applies. The information submitted as part of such an application for an amendment to an EA will be considered to be incomplete should a signed copy of Part B: Section 2 not be submitted. Once approved, Part B: Section 2 forms part of the EMPr for the development and the EMPr becomes legally binding to the new EA holder.

PART A – GENERAL INFORMATION

1. DEFINITIONS

In this EMPr any word or expression to which a meaning has been assigned in the NEMA or EIA Regulations has that meaning, and unless the context requires otherwise –

"clearing" means the clearing and removal of vegetation, whether partially or in whole, including trees and shrubs, as specified;

"construction camp" is the area designated for key construction infrastructure and services, including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management;

"contractor" - The Contractor has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract, are in line with the Environmental Management Programme and that Method Statements are implemented as described.

"**hazardous substance**" is a substance governed by the Hazardous Substances Act, 1973 (Act No. 15 of 1973) as well as the Hazardous Chemical and Substances Regulations, 1995;

"method statement" means a written submission by the Contractor to the Project Manager in response to this EMPr or a request by the Project Manager and ECO. The method statement must set out the equipment, materials, labour and method(s) the Contractor proposes using to carry out an activity identified by the Project Manager when requesting the Method Statement. This must be done in such detail that the Project Manager and ECO is able to assess whether the Contractor's proposal is in accordance with this specification and/or will produce results in accordance with this specification;

The method statement must cover as a minimum applicable details with regard to:

(i) Construction procedures;
(ii) Plant, materials and equipment to be used;
(iii) Transporting the equipment to and from site;
(iv) How the plant/ material/ equipment will be moved while on site;
(v) How and where the plant/ material/ equipment will be stored;
(vi) The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
(vii) Timing and location of activities;
(viii) Compliance/ non-compliance; and
(ix) Any other information deemed necessary by the Project Manager.

"slope" means the inclination of a surface expressed as one unit of rise or fall for so many horizontal units;

"solid waste" means all solid waste, including construction debris, hazardous waste, excess cement/ concrete, wrapping materials, timber, cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers);

"spoil" means excavated material which is unsuitable for use as material in the construction works or is material which is surplus to the requirements of the construction works;

"topsoil" means a varying depth (up to 300 mm) of the soil profile irrespective of the fertility, appearance, structure, agricultural potential, fertility and composition of the soil;

"works" means the works to be executed in terms of the Contract

2. ACRONYMS and ABBREVIATIONS

CA	Competent Authority
cEO	Contractors Environmental Officer
dEO	Developer Environmental Officer
DPM	Developer Project Manager
DSS	Developer Site Supervisor
EAR	Environmental Audit Report
ECA	Environmental Conservation Act No. 73 of 1989
ECO	Environmental Control Officer
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
ERAP	Emergency Response Action Plan
EMPr	Environmental Management Programme Report
EAP	Environmental Assessment Practitioner
FPA	Fire Protection Agency
HCS	Hazardous chemical Substance
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act ,2004 (Act No. 10 of 2004)
NEMWA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
MSDS	Material Safety Data Sheet
RI&AP's	Registered Interested and affected parties

3. ROLES AND RESPONSIBILITIES FOR ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr) IMPLEMENTATION

The effective implementation of this generic EMPr is dependent on established and clear roles, responsibilities and reporting lines within an institutional framework. This section of the EMPr gives guidance to the various environmental roles and reporting lines, however, project specific requirements will ultimately determine the need for the appointment of specific person(s) to undertake specific roles and or responsibilities. As such, it must be noted that in the event that no specific person, for example, an environmental control officer (ECO) is appointed, the holder of the EA remains responsible for ensuring that the duties indicated in this document for action by the ECO are undertaken.

Table 1: *Guide to roles and responsibilities for implementation of an EMPr*

Responsible Person(s)	**Role and Responsibilities**
Developer's Project Manager (DPM)	Role The Project Developer is accountable for ensuring compliance with the EMPr and any conditions of approval from the competent authority (CA). Where required, an environmental control officer (ECO) must be contracted by the Project Developer to objectively monitor the implementation of the EMPr according to relevant environmental legislation, and the conditions of the environmental authorisation (EA). The Project Developer is further responsible for providing and giving mandate to enable the ECO to perform responsibilities, and he must ensure that the ECO is integrated as part of the project team while remaining independent. Responsibilities - Be fully conversant with the conditions of the EA; - Ensure that all stipulations within the EMPr are communicated and adhered to by the Developer and its Contractor(s); - Issuing of site instructions to the Contractor for corrective actions required; - Monitor the implementation of the EMPr throughout the project by means of site inspections and meetings. Overall management of the project and EMPr implementation; and - Ensure that periodic environmental performance audits are undertaken on the project implementation.

Responsible Person(s)	Role and Responsibilities
Developer Site Supervisor (DSS)	Role The DSS reports directly to the DPM, oversees site works, liaises with the contractor(s) and the ECO. The DSS is responsible for the day to day implementation of the EMPr and for ensuring the compliance of all contractors with the conditions and requirements stipulated in the EMPr. Responsibilities - Ensure that all contractors identify a contractor's Environmental Officer (cEO); - Must be fully conversant with the conditions of the EA. Oversees site works, liaison with Contractor, DPM and ECO; - Must ensure that all landowners have the relevant contact details of the site staff, ECO and cEO; - Issuing of site instructions to the Contractor for corrective actions required; - Will issue all non-compliances to contractors; and - Ratify the Monthly Environmental Report.
Environmental Control Officer (ECO)	Role The ECO should have appropriate training and experience in the implementation of environmental management specifications. The primary role of the ECO is to act as an independent quality controller and monitoring agent regarding all environmental concerns and associated environmental impacts. In this respect, the ECO is to conduct periodic site inspections, attend regular site meetings, pre-empt problems and suggest mitigation and be available to advise on incidental issues that arise. The ECO is also required to conduct compliance audits, verifying the monitoring reports submitted by the cEO. The ECO provides feedback to the DSS and Project Manager regarding all environmental matters. The Contractor, cEO and dEO are answerable to the Environmental Control Officer for non-compliance with the Performance Specifications as set out in the EA and EMPr. The ECO provides feedback to the DSS and Project Manager, who in turn reports back to the Contractor and potential and Registered Interested &Affected Parties' (RI&AP's), as required. Issues of non-compliance raised by the ECO must be taken up by the Project Manager, and resolved with the Contractor as per the conditions of his contract. Decisions regarding environmental procedures, specifications and requirements which have a cost implication (i.e. those that are deemed to be a variation, not allowed for in the

Responsible Person(s)	Role and Responsibilities
	Performance Specification) must be endorsed by the Project Manager. The ECO must also, as specified by the EA, report to the relevant CA as and when required. <u>Responsibilities</u> The responsibilities of the ECO will include the following: - Be aware of the findings and conclusions of all EA related to the development; - Be familiar with the recommendations and mitigation measures of this EMPr; - Be conversant with relevant environmental legislation, policies and procedures, and ensure compliance with them; - Undertake regular and comprehensive site inspections / audits of the construction site according to the generic EMPr and applicable licenses in order to monitor compliance as required; - Educate the construction team about the management measures contained in the EMPr and environmental licenses; - Compilation and administration of an environmental monitoring plan to ensure that the environmental management measures are implemented and are effective; - Monitoring the performance of the Contractors and ensuring compliance with the EMPr and associated Method Statements; - In consultation with the Developer Site Supervisor order the removal of person(s) and/or equipment which are in contravention of the specifications of the EMPr and/or environmental licenses; - Liaison between the DPM, Contractors, authorities and other lead stakeholders on all environmental concerns; - Compile a regular environmental audit report highlighting any non-compliance issues as well as satisfactory or exceptional compliance with the EMPr; - Validating the regular site inspection reports, which are to be prepared by the contractor Environmental Officer (cEO); - Checking the cEO's record of environmental incidents (spills, impacts, legal transgressions etc.) as well as corrective and preventive actions taken; - Checking the cEO's public complaints register in which all complaints are recorded, as well as action taken;

Responsible Person(s)	Role and Responsibilities
	- Assisting in the resolution of conflicts; - Facilitate training for all personnel on the site – this may range from carrying out the training, to reviewing the training programmes of the Contractor; - In case of non-compliances, the ECO must first communicate this to the Senior Site Supervisor, who has the power to ensure this matter is addressed. Should no action or insufficient action be taken, the ECO may report this matter to the authorities as non-compliance; - Maintenance, update and review of the EMPr; - Communication of all modifications to the EMPr to the relevant stakeholders.
developer Environmental Officer (dEO)	<u>Role</u> The dEOs will report to the Project Manager and are responsible for implementation of the EMPr, environmental monitoring and reporting, providing environmental input to the Project Manager and Contractor's Manager, liaising with contractors and the landowners as well as a range of environmental coordination responsibilities. <u>Responsibilities</u> - Be fully conversant with the EMPr; - Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures; - Ensure that all stipulations within the EMPr are communicated and adhered to by the Employees, Contractor(s) - Confine the development site to the demarcated area; - Conduct environmental internal audits with regards to EMPr and authorisation compliance (on cEO); - Assist the contractors in addressing environmental challenges on site; - Assist in incident management: - Reporting environmental incidents to developer and ensuring that corrective action is taken, and lessons learnt shared; - Assist the contractor in investigating environmental incidents and compile investigation reports; - Follow-up on pre-warnings, defects, non-conformance reports; - Measure and communicate environmental performance to the Contractor;

Responsible Person(s)	Role and Responsibilities
	- Conduct environmental awareness training on site together with ECO and cEO; - Ensure that the necessary legal permits and / or licenses are in place and up to date; - Acting as Developer's Environmental Representative on site and work together with the ECO and contractor;
Contractor	Role The Contractor appoints the cEO and has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract are in line with the EMPr and that Method Statements are implemented as described. External contractors must ensure compliance with this EMPr while performing the onsite activities as per their contract with the Project Developer. The contractors are required, where specified, to provide Method Statements setting out in detail how the impact management actions contained in the EMPr will be implemented during the development or expansion of substation infrastructure for the transmission and distribution of electricity activities. Responsibilities - project delivery and quality control for the development services as per appointment; - employ a suitably qualified person to monitor and report to the Project Developer's appointed person on the daily activities on-site during the construction period; - ensure that safe, environmentally acceptable working methods and practices are implemented and that equipment is properly operated and maintained, to facilitate proper access and enable any operation to be carried out safely; - attend on site meeting(s) prior to the commencement of activities to confirm the procedure and designated activity zones; - ensure that contractors' staff repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in EMPr, to the satisfaction of the ECO.
contractor Environmental Officer (cEO)	Role Each Contractor affected by the EMPr should appoint a cEO, who is responsible for the on-site implementation of the EMPr (or relevant sections of the EMPr). The Contractor's representative can be the site agent; site engineer; a dedicated environmental officer; or an independent consultant. The Contractor must ensure that the Contractor's Representative is suitably qualified to perform the necessary tasks and is

Responsible Person(s)	Role and Responsibilities
	appointed at a level such that she/he can interact effectively with other site Contractors, labourers, the Environmental Control Officer and the public. As a minimum the cEO shall meet the following criteria: <u>Responsibilities</u> - Be on site throughout the duration of the project and be dedicated to the project; - Ensure all their staff are aware of the environmental requirements, conditions and constraints with respect to all of their activities on site; - Implementing the environmental conditions, guidelines and requirements as stipulated within the EA, EMPr and Method Statements; - Attend the Environmental Site Meeting; - Undertaking corrective actions where non-compliances are registered within the stipulated timeframes; - Report back formally on the completion of corrective actions; - Assist the ECO in maintaining all the site documentation; - Prepare the site inspection reports and corrective action reports for submission to the ECO; - Assist the ECO with the preparing of the monthly report; and - Where more than one Contractor is undertaking work on site, each company appointed as a Contractor will appoint a cEO representing that company.

4. ENVIRONMENTAL DOCUMENTATION REPORTING AND COMPLIANCE

To ensure accountable and demonstrated implementation of the EMPr, a number of reporting systems, documentation controls and compliance mechanisms must be in place for all substation infrastructure projects as a minimum requirement.

4.1 Document control/Filing system

The holder of the EA is solely responsible for the upkeep and management of the EMPr file. As a minimum, all documentation detailed below will be stored in the EMPr file. A hard copy of all documentation shall be filed, while an electronic copy may be kept where relevant. A duplicate file will be maintained in the office of the DSS (where applicable). This duplicate file must remain current and up-to-date. The filing system must be updated and relevant documents added as required. The EMPr file must be made available at all times on request by the CA or other relevant authorities. The EMPr file will form part of any environmental audits undertaken as prescribed in the EIA Regulations.

4.2 Documentation to be available

At the outset of the project the following preliminary list of documents shall be placed in the filing system and be accessible at all times:

- Full copy of the signed EA from the CA in terms of NEMA, granting approval for the development or expansion;
- Copy of the generic and site specific EMPr as well as any amendments thereof;
- Copy of declaration of implementing generic EMPr and subsequent approval of site specific EMPr and amendments thereof;
- All method statements;
- Completed environmental checklists;
- Minutes and attendance register of environmental site meetings;
- An up-to-date environmental incident log;
- A copy of all instructions or directives issued;
- A copy of all corrective actions signed off. The corrective actions must be filed in such a way that a clear reference is made to the non-compliance record;
- Complaints register.

4.3 Weekly Environmental Checklist

The ECOs are required to complete a Weekly Environmental Checklist, the format of which is to be agreed prior to commencement of the activity. The ECOs are required to sign and date the checklist, retain a copy in the EMPr file and submit a copy of the completed checklist to the DSS on a weekly basis.

The checklists will form the basis for the Monthly Environmental Reports. Copies of all completed checklists will be attached as Annexures to the Environmental Audit Report as required in terms of the EIA Regulations.

4.4 Environmental site meetings

Minutes of the environmental site meetings shall be kept. The minutes must include an attendance register and will be attached to the Monthly Report that is distributed to attendees. Each set of minutes must clearly record "Matters for Attention" that will be reviewed at the next meeting.

4.5 Required Method Statements

The method statement will be done in such detail that the ECOs are enabled to assess whether the contractor's proposal is in accordance with the EMPr.

The method statement must cover applicable details with regard to:

- development procedures;
- materials and equipment to be used;
- getting the equipment to and from site;
- how the equipment/ material will be moved while on site;
- how and where material will be stored;
- the containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
- timing and location of activities;
- compliance/ non-compliance with the EMPr; and
- any other information deemed necessary by the ECOs.

Unless indicated otherwise by the Project Manager, the Contractor shall provide the following method statements to the Project Manager no less than 14 days prior to the commencement date of the activity:

- Site establishment – Camps, Lay-down or storage areas, satellite camps, infrastructure;
- Batch plants;
- Workshop or plant servicing;
- Handling, transport and storage of Hazardous Chemical Substance's;
- Vegetation management – Protected, clearing, aliens, felling;
- Access management – Roads, gates, crossings etc.;
- Fire plan;
- Waste management – transport, storage, segregation, classification, disposal (all waste streams);
- Social interaction – complaints management, compensation claims, access to properties etc.;
- Water – use (source, abstraction and disposal), access and all related information, crossings and mitigation;
- Emergency preparedness – Spills, training, other environmental emergencies;
- Dust and noise management methodologies;
- Fauna interaction and risk management – only if the risk was identified – wildlife interaction especially on game farms; and
- Heritage and palaeontology management.

The ECOs shall monitor and ensure that the contractors perform in accordance with these method statements. Completed and agreed method statements between the holder of the EA and the contractor shall be captured in Appendix 1.

4.6 Environmental Incident Log (Diary)

The ECOs are required to maintain an up-to-date and current Environmental Incident Log (environmental diary). The Environmental Incident Log is a means to record all environmental incidents and/or all non-compliance notice would not be issued. An environmental incident is defined as:

- Any deviation from the listed impact management actions (listed in this EMPr) that may be addressed immediately by the ECOs. (For example a contractor's staff member littering or a drip tray that has not been emptied);
- Any environmental impact resulting from an action or activity by a contractor in contravention of the environmental stipulations and guidelines listed in the EMPr which as a single event would have a minor impact but which if cumulative and continuous would have a significant effect (for example no toilet paper available in the ablutions for an afternoon); and
- General environmental information such as road kills or injured wildlife.

The ECOs are to record all environmental incidents in the Environmental Incident Log. All incidents regardless of severity must be reported to the Developer. The Log is to be kept in the EMPr file and at a minimum the following will be recorded for each environmental incident:

- The date and time of the incident;
- Description of the incident;
- The name of the Contractor responsible;
- The incident must be listed as significant or minor;
- If the incident is listed as significant, a non-compliance notice must be issued, and recorded in the log;
- Remedial or corrective action taken to mitigate the incident; and
- Record of repeat minor offences by the same contractor or staff member.

The Environmental Incident Log will be captured in the EAR.

4.7 Non-compliance

A non-compliance notice will be issued to the responsible contractor by the ECOs via the DSS or Project Manager. The non-compliance notice will be issued in writing; a copy filed in the EMPr file and will at a minimum include the following:

- Time and date of the non-compliance;
- Name of the contractor responsible;
- Nature and description of the non-compliance;
- Recommended / required corrective action; and
- Date by which the corrective action to be completed.
- The contractors shall act immediately when a notice of non-compliance is received and correct whatever is the cause for the issuing of the notice. Complaints received regarding activities on the development site pertaining to the environment shall be

recorded in a dedicated register and the response noted with the date and action taken. The ECO should be made aware of any complaints. Any non-compliance with the agreed procedures of the EMPr is a transgression of the various statutes and laws that define the manner by which the environment is managed. Failure to redress the cause shall be reported to the relevant CA for them to deal with the transgression, as it deems fit. The contractor is deemed not to have complied with the EMPr if, inter alia, There is a deviation from the environmental conditions, impact management outcomes and impact management actions activities, as approved in generic and site specific EMPr as relevant as set out in the EMPr, which deviation has, or may cause, an environmental impact.

4.8 Corrective action records

For each non-compliance notice issued, a documented corrective action must be recorded. On receiving a non-compliance notice from the DSS, the contractor's cEO will ensure that the corrective actions required take place within the stipulated timeframe. On completion of the corrective action the cEO is to issue a Corrective Action Report in writing to the ECOs. If satisfied that the corrective action has been completed, the ECOs are to sign-off on the Corrective Action Report, and attach the report to the non-compliance notice in the EMPr file. A corrective action is considered complete once the report has signed off by the ECOs.

4.9 Photographic record

A digital photographic record will be kept. The photographic record will be used to show before, during and post rehabilitation evidence of the project as well used in cases of damages claims if they arise. Each image must be dated and a brief description note attached.

The Contractor shall:

1. Allow the ECOs access to take photographs of all areas, activities and actions.

The ECOs shall keep an electronic database of photographic records which will include:

1. Pictures of all areas designated as work areas, camp areas, development sites and storage areas taken before these areas are set up;
2. All bunding and fencing;
3. Road conditions and road verges;
4. Condition of all farm fences;
5. Topsoil storage areas;
6. All areas to be cordoned off during construction;
7. Waste management sites;
8. Ablution facilities (inside and out);
9. Any non-conformances deemed to be "significant";
10. All completed corrective actions for non-compliances;
11. All required signage;
12. Photographic recordings of incidents;
13. All areas before, during and post rehabilitation; and
14. Include relevant photographs in the Final Environmental Audit Report.

4.10 Complaints register

The ECOs shall keep a current and up-to-date complaints register. The complaints register is to be a record of all complaints received from communities, stakeholders and individuals. The Complaints Record shall:

1. Record the name and contact details of the complainant;
2. Record the time and date of the complaint;
3. Contain a detailed description of the complaint;
4. Where relevant and appropriate, contain photographic evidence of the complaint or damage (ECOs to take relevant photographs); and
5. Contain a copy of the ECOs written response to each complaint received and keep a record of any further correspondence with the complainant. The ECO's written response will include a description of any corrective action to be taken and must be signed by the Contractor, ECO and affected party. Where a damage claim is issued by the complainant, the ECOs shall respond as described in (**section 4.11**) below.

4.11 Claims for damages

In the event that a Claim for Damages is submitted by a community, landowner or individual, the ECOs shall:

1. Record the full detail of the complaint as described in (**section 4.10**) above;
2. The DPM will evaluate the claim and associated damage and submit the evaluation to the Senior Site Representative for approval;
3. Following consideration by the DPM, the claim is to be resolved and settled immediately, or the reason for not accepting the claim communicated in writing to the claimant. Should the claimant not accept this, the ECO shall, in writing report the incident to the Developer's negotiator and legal department; and
4. A formal record of the response by the ECOs to the claimant as well as the rectification of the method of making payments not amount will be recorded in the EMPr file.

4.12 Interactions with affected parties

Open, transparent and good relations with affected landowners, communities and regional staff are an essential aspect to the successful management and mitigation of environmental impacts.

The ECOs shall:

1. Ensure that all queries, complaints and claims are dealt within an agreed timeframe;
2. Ensure that any or all agreements are documented, signed by all parties and a record of the agreement kept in the EMPr file;
3. Ensure that a complaints telephone numbers are made available to all landowners and affected parties; and
4. Ensure that contact with affected parties is courteous at all times;

4.13 Environmental audits

Internal environmental audits of the activity and implementation of the EMPr must be undertaken. The findings and outcomes included in the EMPr file and submitted to the CA at intervals as indicated in the EA.

The ECOs must prepare a monthly EAR. The report will be tabled as the key point on the agenda of the Environmental Site Meeting. The Report is submitted for acceptance at the meeting and the final report will be circulated to the Project Manager and filed in the EMPr file. At a frequency determined by the EA, the ECOs shall submit the monthly reports to the CA. At a minimum the monthly report is to cover the following:

- Weekly Environmental Checklists;
- Deviations and non-compliances with the checklists;
- Non-compliances issued;
- Completed and reported corrective actions;
- Environmental Monitoring;
- General environmental findings and actions; and
- Minutes of the Bi-monthly Environmental Site Meetings.

4.14 Final environmental audits

On final completion of the rehabilitation and/or requirements of the EA a final EAR is to be prepared and submitted to the CA. The EAR must comply with Appendix 7 of the EIA Regulations.

PART B: SECTION 1: Pre-approved generic EMPr template

5. IMPACT MANAGEMENT OUTCOMES AND IMPACT MANAGEMENT ACTIONS

This section provides a pre-approved generic EMPr template with aspects that are common to the development of substation infrastructure for the transmission and distribution of electricity. There is a list of aspects identified for the development or expansion of substation infrastructure for the transmission and distribution of electricity, and for each aspect a set of prescribed impact management outcomes and associated impact management actions have been identified. Holders of EAs are responsible to ensure the implementation of these outcomes and actions for all projects as a minimum requirement, in order to mitigate the impact of such aspects identified for the development or expansion of substation infrastructure for the transmission and distribution of electricity.

The template provided below is to be completed by providing the information under each heading for each environmental impact management action.

The completed template must be signed and dated on each page by both the contractor and the holder of the EA prior to commencement of the activity. The method statements prepared and agreed to by the holder of the EA must be appended to the template as Appendix 1. Each method statement must also be duly signed and dated on each page by the contactor and the holder of the EA. This template, once signed and dated, is legally binding. The holder of the EA will remain responsible for its implementation.

5.1 Environmental awareness training

Impact management outcome: All onsite staff are aware and understands the individual responsibilities in terms of this EMPr.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All staff must receive environmental awareness training prior to commencement of the activities; – The Contractor must allow for sufficient sessions to train all personnel with no more than 20 personnel attending each course; – Refresher environmental awareness training is available as and when required; – All staff are aware of the conditions and controls linked to the EA and within the EMPr and made aware of their individual roles and responsibilities in achieving compliance with the EA and EMPr; – The Contractor must erect and maintain information posters at key locations on site, and the posters must include the following information as a minimum: a) Safety notifications; and b) No littering. – Environmental awareness training must include as a minimum the following: a) Description of significant environmental impacts, actual or potential, related to their work activities;	**ECO and cEO**	**Environmental Induction training; Toolbox talks; other pertinent training aids**	**Initially prior to construction commencing ECO to induct Construction Management and cEO, and thereafter repeated for all new employees and yearly. Toolbox talks to be presented weekly**	**ECO**	**Monthly**	**Signed induction and toolbox talk, or training registers**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
b) Mitigation measures to be implemented when carrying out specific activities; c) Emergency preparedness and response procedures; d) Emergency procedures; e) Procedures to be followed when working near or within sensitive areas; f) Wastewater management procedures; g) Water usage and conservation; h) Solid waste management procedures; i) Sanitation procedures; j) Fire prevention; and k) Disease prevention. – A record of all environmental awareness training courses undertaken as part of the EMPr must be available; – Educate workers on the dangers of open and/or unattended fires; – A staff attendance register of all staff to have received environmental awareness training must be available. – Course material must be available and presented in appropriate languages that all staff can understand.						

5.2 Site Establishment development

Impact management outcome: Impacts on the environment are minimised during site establishment and the development footprint are kept to demarcated development area.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– A method statement must be provided by the contractor prior to any onsite activity that includes the layout of the construction camp in the form of a plan showing the location of key infrastructure and services (where applicable), including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous materials storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management; – Location of camps must be within approved area to ensure that the site does not impact on sensitive areas identified in the environmental assessment or site walk through; – Sites must be located where possible on previously disturbed areas; – The camp must be fenced in accordance with ***Section 5.5: Fencing and gate installation***; and – The use of existing accommodation for contractor staff, where possible, is encouraged.	**Contractor**	**Method Statement compilation and communication of Method Statements to employees. Use of EIA and Specialist Studies to locate site camps**	**Prior to construction**	**ECO**	**Monthly**	**Signed Method Statements; signed proof of communication register; Liaison with ECO regarding site camp placement**

5.3 Access restricted areas

Impact management outcome: Access to restricted areas prevented.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identification of access restricted areas is to be informed by the environmental assessment, site walk through and any additional areas identified during development; – Erect, demarcate and maintain a temporary barrier with clear signage around the perimeter of any access restricted area, colour coding could be used if appropriate; and – Unauthorised access and development related activity inside access restricted areas is prohibited.	**Contractor**	**Use of EIA/BA and Specialist Studies to locate sensitive areas and 'no-go' areas**	**Prior to construction in new areas**	**ECO**	**Monthly**	**Contractor compliance with sensitive areas and 'no-go' areas identified in EIA/BA and Specialist Studies**

5.4 Access roads

Impact management outcome: Minimise impact to the environment through the planned and restricted movement of vehicles on site.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance

– An access agreement must be formalised and signed by the DPM, Contractor and landowner before commencing with the activities; – All private roads used for access to the servitude must be maintained and upon completion of the works, be left in at least the original condition – All contractors must be made aware of all these access routes. – Any access route deviation from that in the written agreement must be closed and re-vegetated immediately, at the contractor's expense; – Maximum use of both existing servitudes and existing roads must be made to minimize further disturbance through the development of new roads; – In circumstances where private roads must be used, the condition of the said roads must be recorded in accordance with ***section 4.9: photographic record***; prior to use and the condition thereof agreed by the landowner, the DPM, and the contractor; – Access roads in flattish areas must follow fence lines and tree belts to avoid fragmentation of vegetated areas or croplands – Access roads must only be developed on a pre-planned and approved roads.	**Contractor**	**Implementation of mitigation measures**	**Ongoing.**	**ECO**	**Monthly**	**Signed access agreements and maintenance of access roads**

5.5 Fencing and Gate installation

Impact management outcome: Minimise impact to the environment and ensure safe and controlled access to the site through the erection of fencing and gates where required.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Use existing gates provided to gain access to all parts of the area authorised for development, where possible; – Existing and new gates to be recorded and documented in accordance with **section *4.9: photographic record***; – All gates must be fitted with locks and be kept locked at all times during the development phase, unless otherwise agreed with the landowner; – At points where the line crosses a fence in which there is no suitable gate within the extent of the line servitude, on the instruction of the DPM, a gate must be installed at the approval of the landowner; – Care must be taken that the gates must be so erected that there is a gap of no more than 100 mm between the bottom of the gate and the ground; – Where gates are installed in jackal proof fencing, a suitable reinforced concrete sill must be provided beneath the gate; – Original tension must be maintained in the fence wires; – All gates installed in electrified fencing must be re-electrified; – All demarcation fencing and barriers must be maintained in good working order for the duration of the development activities;	**Contractor and Applicant**	**Implementation of the mitigation measures**	**Ongoing.**	**ECO**	**Monthly**	**Site observation; public complaints register**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Fencing must be erected around the camp, batching plants, hazardous storage areas, and all designated access restricted areas, where applicable; – Any temporary fencing to restrict the movement of life-stock must only be erected with the permission of the land owner. – All fencing must be developed of high quality material bearing the SABS mark; – The use of razor wire as fencing must be avoided; – Fenced areas with gate access must remain locked after hours, during weekends and on holidays if staff is away from site. Site security will be required at all times; – On completion of the development phase all temporary fences are to be removed; – The contractor must ensure that all fence uprights are appropriately removed, ensuring that no uprights are cut at ground level but rather removed completely.						

5.6 Water Supply Management

Impact management outcome: Undertake responsible water usage.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All abstraction points or bore holes must be registered with the DWS and suitable water meters installed to ensure that the abstracted volumes are measured on a daily basis; – The Contractor must ensure the following: a. The vehicle abstracting water from a river does not enter or cross it and does not operate from within the river; b. No damage occurs to the river bed or banks and that the abstraction of water does not entail stream diversion activities; and c. All reasonable measures to limit pollution or sedimentation of the downstream watercourse are implemented. – Ensure water conservation is being practiced by: a. Minimising water use during cleaning of equipment; b. Undertaking regular audits of water systems; and c. Including a discussion on water usage and conservation during environmental awareness training. d. The use of grey water is encouraged.	**Contractor and Applicant**	**Application to DWS where applicable. Implementation of mitigation measures**	**Construction**	**ECO**	**Monthly**	**Proof of water source used; submission of above proof to DWS**

5.7 Storm and waste water management

Impact management outcome: Impacts to the environment caused by storm water and wastewater discharges during construction are avoided.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Runoff from the cement/ concrete batching areas must be strictly controlled, and contaminated water must be collected, stored and either treated or disposed of off-site, at a location approved by the project manager; – All spillage of oil onto concrete surfaces must be controlled by the use of an approved absorbent material and the used absorbent material disposed of at an appropriate waste disposal facility; – Natural storm water runoff not contaminated during the development and clean water can be discharged directly to watercourses and water bodies, subject to the Project Manager's approval and support by the ECO; – Water that has been contaminated with suspended solids, such as soils and silt, may be released into watercourses or water bodies only once all suspended solids have been removed from the water by settling out these solids in settlement ponds. The release of settled water back into the environment must be subject to the Project Manager's approval and support by the ECO.	**Contractor**	**Employ methods to prevent water pollution**	**Construction**	**ECO**	**Weekly**	**Inspection of areas where construction takes place near watercourses**

5.8 Solid and hazardous waste management

Impact management outcome: Wastes are appropriately stored, handled and safely disposed of at a recognised waste facility.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All measures regarding waste management must be undertaken using an integrated waste management approach; – Sufficient, covered waste collection bins (scavenger and weatherproof) must be provided; – A suitably positioned and clearly demarcated waste collection site must be identified and provided; – The waste collection site must be maintained in a clean and orderly manner; – Waste must be segregated into separate bins and clearly marked for each waste type for recycling and safe disposal; – Staff must be trained in waste segregation; – Bins must be emptied regularly; – General waste produced onsite must be disposed of at registered waste disposal sites/ recycling company; – Hazardous waste must be disposed of at a registered waste disposal site; – Certificates of safe disposal for general, hazardous and recycled waste must be maintained.	**Contractor**	**Following good waste management practices outlined in approved method statement**	**Construction**	**ECO**	**Weekly**	**Waste safe disposal slips; Service Level Agreements**

5.9 Protection of watercourses and estuaries

Impact management outcome: Pollution and contamination of the watercourse environment and or estuary erosion are prevented.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All watercourses must be protected from direct or indirect spills of pollutants such as solid waste, sewage, cement, oils, fuels, chemicals, aggregate tailings, wash and contaminated water or organic material resulting from the Contractor's activities; – In the event of a spill, prompt action must be taken to clear the polluted or affected areas; – Where possible, no development equipment must traverse any seasonal or permanent wetland – No return flow into the estuaries must be allowed and no disturbance of the Estuarine functional Zone should occur; – Development of permanent watercourse or estuary crossing must only be undertaken where no alternative access to tower position is available; – There must not be any impact on the long term morphological dynamics of watercourses or estuaries; – Existing crossing points must be favored over the creation of new crossings (including temporary access) – When working in or near any watercourse or estuary, the following environmental controls and consideration must be taken: a) Water levels during the period of construction;	**Contractor**	**Method statements; Stormwater Management Plan**	**Construction**	**ECO**	**Weekly**	**Method Statement compliance**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
No altering of the bed, banks, course or characteristics of a watercourse b) During the execution of the works, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented e.g. including ensuring that construction equipment is well maintained; c) Where earthwork is being undertaken in close proximity to any watercourse, slopes must be stabilised using suitable materials, i.e. sandbags or geotextile fabric, to prevent sand and rock from entering the channel; and d) Appropriate rehabilitation and re-vegetation measures for the watercourse banks must be implemented timeously. In this regard, the banks should be appropriately and incrementally stabilised as soon as development allows.						

5.10 Vegetation clearing

Impact management outcome: Vegetation clearing is restricted to the authorised development footprint of the proposed infrastructure.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
General: – Indigenous vegetation which does not interfere with the development must be left undisturbed; – Protected or endangered species may occur on or near the development site. Special care should be taken not to damage such species; – Search, rescue and replanting of all protected and endangered species likely to be damaged during project development must be identified by the relevant specialist and completed prior to any development or clearing; – Permits for removal must be obtained from the relevant CA prior to the cutting or clearing of the affected species, and they must be filed; – The Environmental Audit Report must confirm that all identified species have been rescued and replanted and that the location of replanting is compliant with conditions of approvals; – Trees felled due to construction must be documented and form part of the Environmental Audit Report; – Rivers and watercourses must be kept clear of felled trees, vegetation cuttings and debris;	**Contractor and Applicant**	**Specialist recommendations; Method statement; Search and Rescue Plan; Alien vegetation removal Plan (approved plans and strategies used by Eskom), site awareness**	**Pre-Construction and Construction and Operation**	**ECO**	**Pre-Construction and weekly during construction**	**Compliance to method statements and Search and Rescue Plan; Alien vegetation removal Plan. Approved plans and strategies used by Eskom.**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Only a registered pest control operator may apply herbicides on a commercial basis and commercial application must be carried out under the supervision of a registered pest control operator, supervision of a registered pest control operator or is appropriately trained; – A daily register must be kept of all relevant details of herbicide usage; – No herbicides must be used in estuaries; – All protected species and sensitive vegetation not removed must be clearly marked and such areas fenced off in accordance to ***Section 5.3: Access restricted areas***. Alien invasive vegetation must be removed and disposed of at a licensed waste management facility.						

5.11 Protection of fauna

Impact management outcome: Disturbance to fauna is minimised.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– No interference with livestock must occur without the landowner's written consent and with the landowner or a person representing the landowner being present;	**Contractor**	**Method statement and adherence to**	**Construction**	**ECO**	**Weekly**	**Public complaints register;**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The breeding sites of raptors and other wild birds species must be taken into consideration during the planning of the development programme; – Breeding sites must be kept intact and disturbance to breeding birds must be avoided. Special care must be taken where nestlings or fledglings are present; – Special recommendations of the avian specialist must be adhered to at all times to prevent unnecessary disturbance of birds; – No poaching must be tolerated under any circumstances. All animal dens in close proximity to the works areas must be marked as Access restricted areas; – No deliberate or intentional killing of fauna is allowed; – In areas where snakes are abundant, snake deterrents to be deployed on the pylons to prevent snakes climbing up, being electrocuted and causing power outages; and – No Threatened or Protected species (ToPs) and/or protected fauna as listed according NEMBA (Act No. 10 of 2004) and relevant provincial ordinances may be removed and/or relocated without appropriate authorisations/permits.		**exclusion/no-go zones; site awareness**				**adherence to exclusion/no-go zones and method statements**

5.12 Protection of heritage resources

Impact management outcome: Impact to heritage resources is minimised.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identify, demarcate and prevent impact to all known sensitive heritage features on site in accordance with the No- Go procedure in ***Section 5.3: Access restricted areas***; – Carry out general monitoring of excavations for potential fossils, artefacts and material of heritage importance; – All work must cease immediately, if any human remains and/or other archaeological, palaeontological and historical material are uncovered. Such material, if exposed, must be reported to the nearest museum, archaeologist/ palaeontologist (or the South African Police Services), so that a systematic and professional investigation can be undertaken. Sufficient time must be allowed to remove/collect such material before development recommences.	**Contractor**	**Method Statement; Heritage management plan**	**Pre-construction and construction**	**ECO**	**Weekly and daily for zones highlighted by Heritage Specialist where potsherds were found**	**Monitoring of construction areas, adherence to management plan if change finds found.**

5.13 Safety of the public

Impact management outcome: All precautions are taken to minimise the risk of injury, harm or complaints.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identify fire hazards, demarcate and restrict public access to these areas as well as notify the local authority of any potential threats e.g. large brush stockpiles, fuels etc.; – All unattended open excavations must be adequately fenced or demarcated; – Adequate protective measures must be implemented to prevent unauthorised access to and climbing of partly constructed towers and protective scaffolding; – Ensure structures vulnerable to high winds are secured; – Maintain an incidents and complaints register in which all incidents or complaints involving the public are logged.	**Contractor**	**Landowner agreements; Method Statement**	**Construction**	**ECO**	**Weekly**	**Site works barricaded, safe working site maintained, public complaints register.**

5.14 Sanitation

Impact management outcome: Clean and well maintained toilet facilities are available to all staff in an effort to minimise the risk of disease and impact to the environment.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Mobile chemical toilets are installed onsite if no other ablution facilities are available; – The use of ablution facilities and or mobile toilets must be used at all times and no indiscriminate use of the veld for the purposes of ablutions must be permitted under any circumstances; – Where mobile chemical toilets are required, the following must be ensured: a) Toilets are located no closer than 100 m to any watercourse or water body; b) Toilets are secured to the ground to prevent them from toppling due to wind or any other cause; c) No spillage occurs when the toilets are cleaned or emptied and the contents are managed in accordance with the EMPr; d) Toilets have an external closing mechanism and are closed and secured from the outside when not in use to prevent toilet paper from being blown out; e) Toilets are emptied before long weekends and workers holidays, and must be locked after working hours; f) Toilets are serviced regularly and the ECO must inspect toilets to ensure compliance to health standards; – A copy of the waste disposal certificates must be maintained.	**Contractor**	**Service level agreement with Service provider; Method statement; site awareness**	**Construction**	**ECO**	**Weekly**	**Service level agreement with service provider, proof of safe disposal of waste**

5.15 Prevention of disease

Impact Management outcome: All necessary precautions linked to the spread of disease are taken.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Undertake environmentally-friendly pest control in the camp area; – Ensure that the workforce is sensitised to the effects of sexually transmitted diseases, especially HIV AIDS; – The Contractor must ensure that information posters on AIDS are displayed in the Contractor Camp area; – Information and education relating to sexually transmitted diseases to be made available to both construction workers and local community, where applicable; – Free condoms must be made available to all staff on site at central points; – Medical support must be made available; – Provide access to Voluntary HIV Testing and Counselling Services.	**Contractor**	**Method statement, awareness training**	**Construction**	**ECO**	**Monthly**	**Method statement, proof of awareness training**

5.16 Emergency procedures

Impact management outcome: Emergency procedures are in place to enable a rapid and effective response to all types of environmental emergencies.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Compile an Emergency Response Action Plan (ERAP) prior to the commencement of the proposed project; – The Emergency Plan must deal with accidents, potential spillages and fires in line with relevant legislation; – All staff must be made aware of emergency procedures as part of environmental awareness training; – The relevant local authority must be made aware of a fire as soon as it starts; – In the event of emergency necessary mitigation measures to contain the spill or leak must be implemented (see ***Hazardous Substances section 5.17***).	**Contractor**	**Environmental Emergency Response Action Plan**	**Construction**	**ECO**	**Monthly**	**Adherence /compliance to ERAP**

5.17 Hazardous substances

Impact management outcome: Safe storage, handling, use and disposal of hazardous substances.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The use and storage of hazardous substances to be minimised and non-hazardous and non-toxic alternatives substituted where possible; – All hazardous substances must be stored in suitable containers as defined in the Method Statement; – Containers must be clearly marked to indicate contents, quantities and safety requirements; – All storage areas must be bunded. The bunded area must be of sufficient capacity to contain a spill / leak from the stored containers; – Bunded areas to be suitably lined with a SABS approved liner; – An Alphabetical Hazardous Chemical Substance (HCS) control sheet must be drawn up and kept up to date on a continuous basis; – All hazardous chemicals that will be used on site must have Material Safety Data Sheets (MSDS); – All employees working with HCS must be trained in the safe use of the substance and according to the safety data sheet; – Employees handling hazardous substances / materials must be aware of the potential impacts and follow appropriate safety measures. Appropriate personal protective equipment must be made available;	**Contractor**	**Method Statement, OHS requirements; adequate and responsible use and storage of Hazardous Substances, Hazardous Substances storage register**	**Construction**	**ECO**	**Weekly**	**Hazardous Substance Storage Register, MSDS, Method Statement**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The Contractor must ensure that diesel and other liquid fuel, oil and hydraulic fluid is stored in appropriate storage tanks or in bowsers; – The tanks/ bowsers must be situated on a smooth impermeable surface (concrete) with a permanent bund. The impermeable lining must extend to the crest of the bund and the volume inside the bund must be 110% of the total capacity of all the storage tanks/ bowsers; – The floor of the bund must be sloped, draining to an oil separator; – Provision must be made for refueling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained; – All empty externally dirty drums must be stored on a drip tray or within a bunded area; – No unauthorised access into the hazardous substances storage areas must be permitted; – No smoking must be allowed within the vicinity of the hazardous storage areas; – Adequate fire-fighting equipment must be made available at all hazardous storage areas; – Where refueling away from the dedicated refueling station is required, a mobile refueling unit must be used. Appropriate ground protection such as drip trays must be used;						

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– An appropriately sized spill kit kept onsite relevant to the scale of the activity/s involving the use of hazardous substance must be available at all times; – The responsible operator must have the required training to make use of the spill kit in emergency situations; – An appropriate number of spill kits must be available and must be located in all areas where activities are being undertaken; – In the event of a spill, contaminated soil must be collected in containers and stored in a central location and disposed of according to the National Environmental Management: Waste Act 59 of 2008. Refer to ***Section 5.7*** for procedures concerning ***storm and waste water management*** and ***5.8*** for ***solid and hazardous waste management.***						

5.18 Workshop, equipment maintenance and storage

Impact management outcome: Soil, surface water and groundwater contamination is minimised.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where possible and practical all maintenance of vehicles and equipment must take place in the workshop area; – During servicing of vehicles or equipment, especially where emergency repairs are effected outside the workshop area, a suitable drip tray must be used to prevent spills onto the soil. The relevant local authority must be made aware of a fire as soon as it starts; – Leaking equipment must be repaired immediately or be removed from site to facilitate repair; – Workshop areas must be monitored for oil and fuel spills; – Appropriately sized spill kit kept onsite relevant to the scale of the activity taking place must be available; – The workshop area must have a bunded concrete slab that is sloped to facilitate runoff into a collection sump or suitable oil / water separator where maintenance work on vehicles and equipment can be performed; – Water drainage from the workshop must be contained and managed in accordance Section ***5.7: Storm and waste water management***.	**Contractor**	**Method Statement, OHS requirements; Hazardous Substances storage register, vehicle daily checklist, vehicle service register**	**Construction**	**ECO**	**Weekly**	**Method Statement, Hazardous Substances storage register, vehicle daily checklist, vehicle service register**

5.19 Batching plants

Impact management outcome: Minimise spillages and contamination of soil, surface water and groundwater.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Concrete mixing must be carried out on an impermeable surface; – Batching plants areas must be fitted with a containment facility for the collection of cement laden water. – Dirty water from the batching plant must be contained to prevent soil and groundwater contamination – Bagged cement must be stored in an appropriate facility and at least 10 m away from any water courses, gullies and drains; – A washout facility must be provided for washing of concrete associated equipment. Water used for washing must be restricted; – Hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licenced disposal facility; – Empty cement bags must be secured with adequate binding material if these will be temporarily stored on site; – Sand and aggregates containing cement must be kept damp to prevent the generation of dust (Refer to ***Section 5.20: Dust emissions***) – Any excess sand, stone and cement must be removed or reused from site on completion of construction period and disposed at a registered disposal facility;	**Contractor**	**Method Statement**	**Construction**	**ECO**	**Weekly**	**Compliance to mitigation and method statement**

– Temporary fencing must be erected around batching plants in accordance with Section ***5.5: Fencing and gate installation***.						

5.20 Dust emissions

Impact management outcome: Dust prevention measures are applied to minimise the generation of dust.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Take all reasonable measures to minimise the generation of dust as a result of project development activities to the satisfaction of the ECO; – Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces must be re-vegetated or stabilised as soon as is practically possible; – Excavation, handling and transport of erodible materials must be avoided under high wind conditions or when a visible dust plume is present; – During high wind conditions, the ECO must evaluate the situation and make recommendations as to whether dust- damping measures are adequate, or whether working will cease altogether until the wind speed drops to an acceptable level; – Where possible, soil stockpiles must be located in sheltered areas where they are not exposed to the erosive effects of the wind;	**Contractor**	**Method Statement, Vehicle Speed limit, dust suppression**	**Construction**	**ECO**	**Monthly**	**Site observations, dust suppression register**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where erosion of stockpiles becomes a problem, erosion control measures must be implemented at the discretion of the ECO; – Vehicle speeds must not exceed 40 km/h along dust roads or 20 km/h when traversing unconsolidated and non-vegetated areas; – Straw stabilisation must be applied at a rate of one bale/10 m² and harrowed into the top 100 mm of top material, for all completed earthworks; – For significant areas of excavation or exposed ground, dust suppression measures must be used to minimise the spread of dust.						

5.21 Blasting

Impact management outcome: Impact to the environment is minimised through a safe blasting practice.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Any blasting activity must be conducted by a suitably licensed blasting contractor; and	**Contractor**	**Relevant legislation and regulation**	**Construction**	**ECO**	**Monthly**	**Public complaints register; proof of**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Notification of surrounding landowners, emergency services site personnel of blasting activity 24 hours prior to such activity taking place on Site.						**registration of blasting contractor.**

5.22 Noise

Impact Management outcome: Prevent unnecessary noise to the environment by ensuring that noise from development activity is mitigated.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The Contractor must keep noise level within acceptable limits, Restrict the use of sound amplification equipment for communication and emergency only; – All vehicles and machinery must be fitted with appropriate silencing technology and must be properly maintained; – Any complaints received by the Contractor regarding noise must be recorded and communicated. Where possible or applicable, provide transport to and from the site on a daily basis for construction workers; – Develop a Code of Conduct for the construction phase in terms of behaviour of construction staff. Operating hours as determined by the environmental authorisation are adhered	**Contractor**	**Restriction of site hours to working hours Monday to Friday**	**Construction**	**ECO**	**Monthly**	**Public Complaints Register**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
to during the development phase. Where not defined, it must be ensured that development activities must still meet the impact management outcome related to noise management.						

5.23 Fire prevention

Impact management outcome: Prevention of uncontrollable fires.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Designate smoking areas where the fire hazard could be regarded as insignificant; – Firefighting equipment must be available on all vehicles located on site; – The local Fire Protection Agency (FPA) must be informed of construction activities; – Contact numbers for the FPA and emergency services must be communicated in environmental awareness training and displayed at a central location on site; – Two-way swop of contact details between ECO and FPA.	**Contractor**	**Emergency Response Action Plan; Method Statement**	**Construction**	**ECO**	**Monthly**	**Public complaints register; compliance to ERAP**

5.24 Stockpiling and stockpile areas

Impact management outcome: Reduce erosion and sedimentation as a result of stockpiling.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All material that is excavated during the project development phase (either during piling (if required) or earthworks) must be stored appropriately on site in order to minimise impacts to watercourses, watercourses and water bodies; – All stockpiled material must be maintained and kept clear of weeds and alien vegetation growth by undertaking regular weeding and control methods; – Topsoil stockpiles must not exceed 2 m in height; – During periods of strong winds and heavy rain, the stockpiles must be covered with appropriate material (e.g. cloth, tarpaulin etc.); – Where possible, sandbags (or similar) must be placed at the bases of the stockpiled material in order to prevent erosion of the material.	**Contractor**	**Method Statement**	**Construction**	**ECO**	**Monthly**	**Method Statement and site observations**

5.25 Civil works

Impact management outcome: Impact to the environment minimised during civil works to create the substation terrace.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where terracing is required, topsoil must be collected and retained for the purpose of re-use later to rehabilitate disturbed areas not covered by yard stone; – Areas to be rehabilitated include terrace embankments and areas outside the high voltage yards; – Where required, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled; – These areas can be stabilised using design structures or vegetation as specified in the design to prevent erosion of embankments. The contract design specifications must be adhered to and implemented strictly; – Rehabilitation of the disturbed areas must be managed in accordance with ***Section 5.35: Landscaping and rehabilitation***; – All excess spoil generated during terracing activities must be disposed of in an appropriate manner and at a recognised landfill site; and – Spoil can however be used for landscaping purposes and must be covered with a layer of 150 mm topsoil for rehabilitation purposes.	**Contractor**	**Method Statement**	**Construction**	**ECO**	**Monthly**	**Site observation**

5.26 Excavation of foundation, cable trenching and drainage systems

Impact management outcome: No environmental degradation occurs as a result of excavation of foundation, cable trenching and drainage systems.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All excess spoil generated during foundation excavation must be disposed of in an appropriate manner and at a licensed landfill site, if not used for backfilling purposes; – Spoil can however be used for landscaping purposes and must be covered with a layer of 150 mm topsoil for rehabilitation purposes; – Management of equipment for excavation purposes must be undertaken in accordance with ***Section 5.18: Workshop, equipment maintenance and storage***; and – Hazardous substances spills from equipment must be managed in accordance with ***Section 5.17: Hazardous substances***.	**Contractor**	**Method Statement and Engineering Drawings**	**Construction**	**ECO**	**Weekly**	**Adherence to method statements**

5.27 Installation of foundations, cable trenching and drainage systems

Impact management outcome: No environmental degradation occurs during the installation of foundation, cable trenching and drainage system.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Batching of cement to be undertaken in accordance with **Section *5.19: Batching plants***; and – Residual solid waste must be disposed of in accordance with **Section *5.8: Solid waste and hazardous management***.	**Contractor**	**Method Statement**	**Construction**	**Contractor and ECO**	**Weekly**	**Method Statement and site observations**

5.28 Installation of equipment (circuit breakers, current Transformers, Isolators, Insulators, surge arresters, voltage transformers, earth switches)

Impact management outcome: No environmental degradation occurs as a result of installation of equipment.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Management of dust must be conducted in accordance with Section ***5. 20: Dust emissions***; – Management of equipment used for installation must be conducted in accordance with Section ***5.18: Workshop, equipment maintenance and storage***; – Management hazardous substances and any associated spills must be conducted in accordance with Section ***5.17: Hazardous substances***; and	**Contractor**	**Method Statement**	**Construction**	**ECO**	**Weekly**	**Method Statement and site observation**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Residual solid waste must be recycled or disposed of in accordance with ***Section 5.8: Solid waste and hazardous management***.						

5.29 Steelwork Assembly and Erection

Impact management outcome: No environmental degradation occurs as a result of steelwork assembly and erection.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– During assembly, care must be taken to ensure that no wasted/unused materials are left on site e.g. bolts and nuts – Emergency repairs due to breakages of equipment must be managed in accordance with ***Section 5. 18: Workshop, equipment maintenance and storage*** and ***Section 5.16: Emergency procedures***.	**Contractor**	**Method Statement**	**Construction**	**ECO**	**Weekly**	**Site Observations**

5.30 Cabling and Stringing

Impact management outcome: No environmental degradation occurs as a result of stringing.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Residual solid waste (off cuts etc.) shall be recycled or disposed of in accordance with **Section *6.8: Solid waste and hazardous Management***; – Management of equipment used for installation shall be conducted in accordance with **Section *5.18: Workshop, equipment maintenance and storage***; – Management hazardous substances and any associated spills shall be conducted in accordance with ***Section 5.17: Hazardous substances***.	**Contractor**	**Method Statement, adherence to exclusion zones**	**Construction**	**ECO**	**Weekly**	**Site observations**

5.31 Testing and Commissioning (all equipment testing, earthing system, system integration)

Impact management outcome: No environmental degradation occurs as a result of Testing and Commissioning.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Residual solid waste must be recycled or disposed of in accordance with ***Section 5.8: Solid waste and hazardous management***.	**Contractor**	**Method Statement**	**Construction**	**ECO**	**Weekly**	**Site observation**

5.32 Socio-economic

Impact management outcome: enhanced socio-economic development.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Develop and implement communication strategies to facilitate public participation; – Develop and implement a collaborative and constructive approach to conflict resolution as part of the external stakeholder engagement process; – Sustain continuous communication and liaison with neighboring owners and residents	**Contractor**	**Landowner Agreements; Issues and Complaints Register**	**Construction**	**ECO**	**Monthly**	**Landowner Agreement; Issues and Complaints Register**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Create work and training opportunities for local stakeholders; and – Where feasible, no workers, with the exception of security personnel, must be permitted to stay over-night on the site. This would reduce the risk to local farmers.						

5.33 Temporary closure of site

Impact management outcome: Minimise the risk of environmental impact during periods of site closure greater than five days.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Bunds must be emptied (where applicable) and need to be undertaken in accordance with the impact management actions included in ***sections 5.17: Hazardous substances and 5.18: Workshop, equipment maintenance and storage***; – Hazardous storage areas must be well ventilated; – Fire extinguishers must be serviced and accessible. Service records to be filed and audited at last service; – Emergency and contact details displayed must be displayed; – Security personnel must be briefed and have the facilities to contact or be contacted by relevant management and emergency personnel;	**Contractor**	**Method statement**	**Construction – when applicable**	**ECO**	**Monthly – when applicable**	**Method statement** **ECO reports**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Night hazards such as reflectors, lighting, traffic signage etc. must have been checked; – Fire hazards identified and the local authority must have been notified of any potential threats e.g. large brush stockpiles, fuels etc.; – Structures vulnerable to high winds must be secured; – Wind and dust mitigation must be implemented; – Cement and materials stores must have been secured; – Toilets must have been emptied and secured; – Refuse bins must have been emptied and secured; – Drip trays must have been emptied and secured.						

5.34 Dismantling of old equipment

Impact management outcome: Impact to the environment to be minimised during the dismantling, storage and disposal of old equipment commissioning.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All old equipment removed during the project must be stored in such a way as to prevent pollution of the environment; – Oil containing equipment must be stored to prevent leaking or be stored on drip trays;	**Contractor**	**Method statement**	**Construction and decommissioning**	**ECO**	**Monthly – when applicable**	**Site observation**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All scrap steel must be stacked neatly and any disused and broken insulators must be stored in containers; – Once material has been scrapped and the contract has been placed for removal, the disposal Contractor must ensure that any equipment containing pollution causing substances is dismantled and transported in such a way as to prevent spillage and pollution of the environment; – The Contractor must also be equipped to contain and clean up any pollution causing spills; and – Disposal of unusable material must be at a licensed waste disposal site.						

5.35 Landscaping and rehabilitation

Impact management outcome: Areas disturbed during the development phase are returned to a state that approximates the original condition.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All areas disturbed by construction activities must be subject to landscaping and rehabilitation; All spoil and waste must be disposed of to a registered waste site;	**Contractor**	**Method Statements; erosion protection; alien eradication plan**	**Concurrent with Construction**	**ECO**	**Monthly**	**Adequately revegetated work areas; no erosion or**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All slopes must be assessed for contouring, and to contour only when the need is identified in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983 – All slopes must be assessed for terracing, and to terrace only when the need is identified in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983; – Berms that have been created must have a slope of 1:4 and be replanted with indigenous species and grasses that approximates the original condition; – Where new access roads have crossed cultivated farmlands, that lands must be rehabilitated by ripping which must be agreed to by the holder of the EA and the landowners; – Rehabilitation of access roads outside of farmland; – Indigenous species must be used for with species and/grasses to where it compliments or approximates the original condition; – Stockpiled topsoil must be used for rehabilitation (refer to ***Section 5.24: Stockpiling and stockpiled areas***); – Stockpiled topsoil must be evenly spread so as to facilitate seeding and minimise loss of soil due to erosion; – Before placing topsoil, all visible weeds from the placement area and from the topsoil must be removed; – Subsoil must be ripped before topsoil is placed; – The rehabilitation must be timed so that rehabilitation can take place at the optimal time for vegetation establishment;						**invasive plant species**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where impacted through construction related activity, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled; – Sloped areas stabilised using design structures or vegetation as specified in the design to prevent erosion of embankments. The contract design specifications must be adhered to and implemented strictly; – Spoil can be used for backfilling or landscaping as long as it is covered by a minimum of 150 mm of topsoil. – Where required, re-vegetation including hydro-seeding can be enhanced using a vegetation seed mixture as described below. A mixture of seed can be used provided the mixture is carefully selected to ensure the following: a) Annual and perennial plants are chosen; b) Pioneer species are included; c) Species chosen must be indigenous to the area with the seeds used coming from the area; d) Root systems must have a binding effect on the soil; e) The final product must not cause an ecological imbalance in the area						

6 ACCESS TO THE GENERIC EMPr

Once completed and signed, to allow the public access to the generic EMPr, the holder of the EA must make the EMPr available to the public in accordance with the requirements of Regulation 26(h) of the EIA Regulations.

PART B: SECTION 2

7 SITE SPECIFIC INFORMATION AND DECLARATION

7.1 Sub-section 1: contact details and description of the project

7.1.1 Details of the applicant: **FE Hugo & Khoe (PTY) LTD**

Name of applicant: **FE Hugo & Khoe (PTY) LTD**

Tel No: **+ 33 622 665932**

Fax No: n/a

Postal Address**: 15 Bridgeway Road, Bridgeways Precinct, Century City, Cape Town**

Physical Address: **Same as above**

7.1.2 Details and expertise of the EAP:

Name of applicant: **Environmental**

Resource Management Southern

Africa (Pty) Ltd

Tel No: +27105963502

Fax No: **N/A**

E-mail address: stephanie.gopaul@erm.com / hugokhoe@erm.com

Expertise of the EAP (Curriculum Vitae included): **Masters in Environmental Management, University of the Free State, South Africa, 2012 BSc. Environmental and Engineering Geology, University of KwaZulu Natal, South Africa, 2005**

7.1.3 Project name:

The proposed Hugo WEF is located near De Doorns within the Breede Valley Local Municipality in the Western Cape Province.

7.1.4 Description of the project:

The Hugo WEF is located near De Doorns within the Breede Valley Local Municipality in the Western Cape Province. The proposed Hugo WEF project site is proposed to accommodate infrastructure (as detailed below), which will enable the wind farm to supply a contracted capacity of up to 336 MW. The development footprint of the site will be up to 100 ha, dependent on the sensitivities in the area. The proposed development will comprise of the following infrastructure:

Hugo WEF components:

- Up to 42 wind turbines with a maximum tip height of up to 250 m and a rotor diameter of up to 200 m.
- Each turbine will have a capacity of up to 8 MW.
- A transformer at the base of each turbine.
- Concrete turbine foundations - approximately up to 1,000 m^2 per turbine.

- Each turbine will have a hardstand of approximately up to 7,500m^2 per turbine.
- Temporary laydown areas (with a footprint of up to 9 ha), which will accommodate the boom erection, storage and assembly area.
- BESS (with a footprint of up to approximately 5 ha).
- Cabling between the turbines, to be laid underground where practical.
- One on-site substation of up to 2.5 ha in extent to facilitate the connection between the WEF and the electricity grid.
- Access roads to the site and between project components inclusive of stormwater infrastructure. A 13.5 m road corridor may be temporarily impacted upon during construction and rehabilitated to 6 m wide after construction.
- A temporary site camp establishment and concrete batching plants (with a combined footprint of up to 1 ha).
- Operation and Maintenance (O&M) buildings (with a combined footprint of up to 1 ha) including a gate house, security building, control centre, offices, warehouses, a workshop and visitor's centre.

The project is expected to have a 20-25-year life span, but with possible refurbishment this could be extended if deemed feasible at the time.

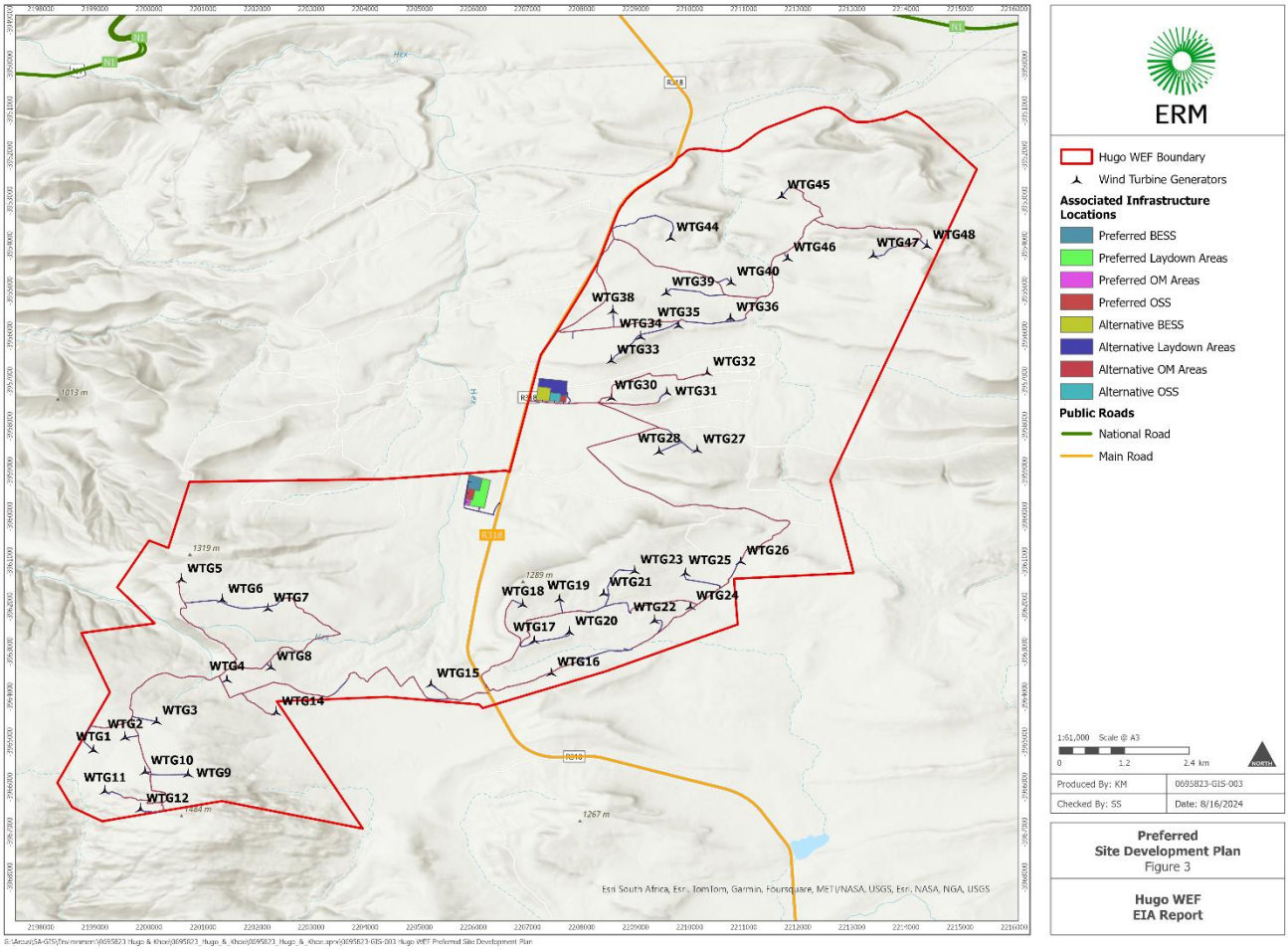
7.1.5 Project location:

NO	FARM NAME(if applicable)	FARM NUMBER(if applicable)	PORTION NAME	PORTION NUMBER	LATITUDE	LONGITUDE
	Ou de Kraal	145		RE		
	Stinkfonteins Berg	147		RE		
	Stinkfontein	172		RE		
	Driehoek	173		0		
	Presents Kraal	174		RE		
	Helpmekaar	148		9		

Proposed Hugo WEF Site Boundary		
Aspect	Latitude	Longitude
Reference Point 1	33° 25' 5.41" S	19° 52' 34.15" E
Reference Point 2	33° 25' 45.85" S	19° 54' 1.13" E
Reference Point 3	33° 28' 49.57" S	19° 52' 34.48" E
Reference Point 4	33° 29' 44.63" S	19° 52' 48.24" E
Reference Point 5	33° 29' 47.80" S	19° 51' 37.40" E
Reference Point 6	33° 30' 14.92" S	19° 51' 38.75" E
Reference Point 7	33° 31' 5.43" S	19° 49' 7.10" E
Reference Point 8	33° 31' 2.35" S	19° 47' 4.33" E
Reference Point 9	33° 32' 16.45" S	19° 47' 54.47" E
Reference Point 10	33° 32' 0.538" S	19° 46' 30.43" E
Reference Point 11	33° 32' 13.39" S	19° 45' 20.59" E
Reference Point 12	33° 31' 49.58" S	19° 44' 52.11" E
Reference Point 13	33° 30' 20.36" S	19° 45' 7.29" E
Reference Point 14	33° 30' 14.75" S	19° 45' 50.19" E
Reference Point 15	33° 28' 51.93" S	19° 46' 12.05" E
Reference Point 16	33° 28' 43.29" S	19° 49' 20.97" E

Proposed Hugo WEF Site Boundary		
Reference Point 17	33° 28' 43.29" S	19° 49' 20.97" E

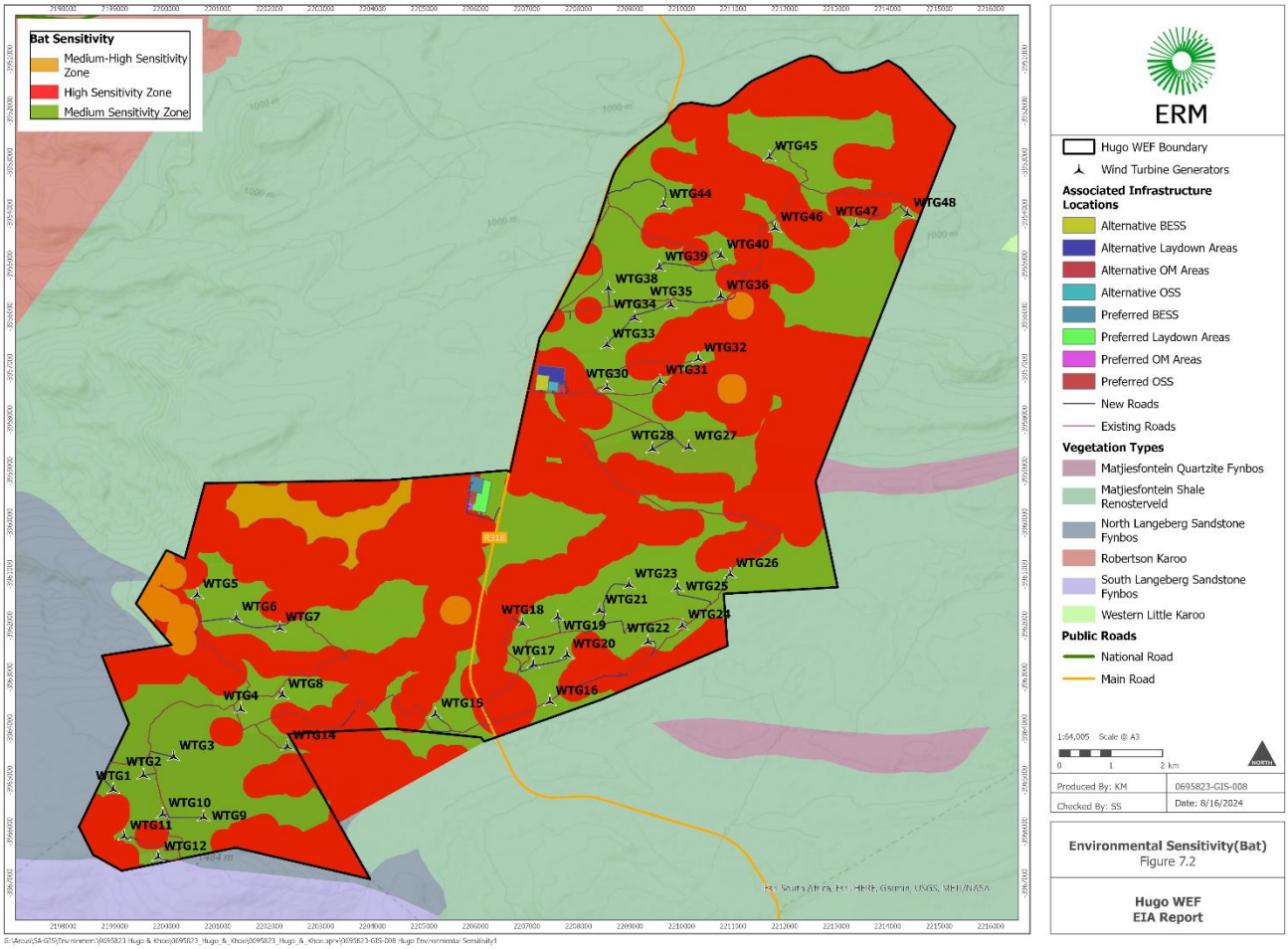
*Figure **Error! No text of specified style in document.**-1 Sire Development Plan*

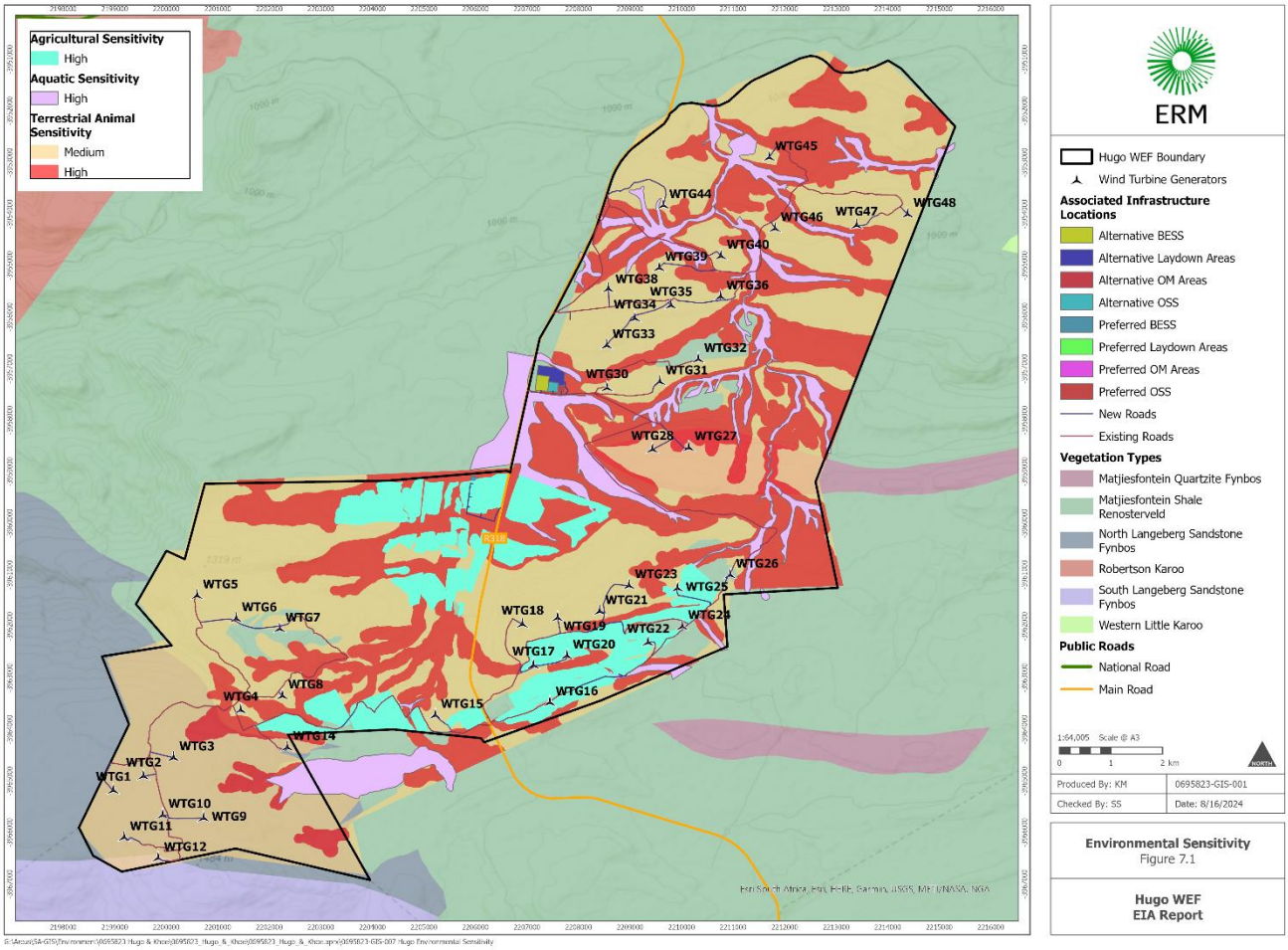


7.2 Sub-section 2: Development footprint site map

This sub-section must include a map of the site sensitivity overlaid with the preliminary infrastructure layout. The sensitivity map must be prepared from the national web based environmental screening tool, when available for compulsory use at: https://screening.environment.gov.za/screeningtool. The sensitivity map shall identify the nature of each sensitive feature e.g. threatened plant species, archaeological site, etc. Sensitivity maps shall identify features both within the planned working area and any known sensitive features within 50 m from the development footprint.

*Figure **Error! No text of specified style in document.**-2,3,4 Environmental Sensitivity Overlay*




Agricultural Sensitivity
High
Aquatic Sensitivity
High
Terrestrial Animal Sensitivity
Medium
High
WTG1
WTG2
WTG3
WTG4
WTG5
WTG6
WTG7
WTG8
WTG9
WTG10
WTG11
WTG12
WTG14
WTG15
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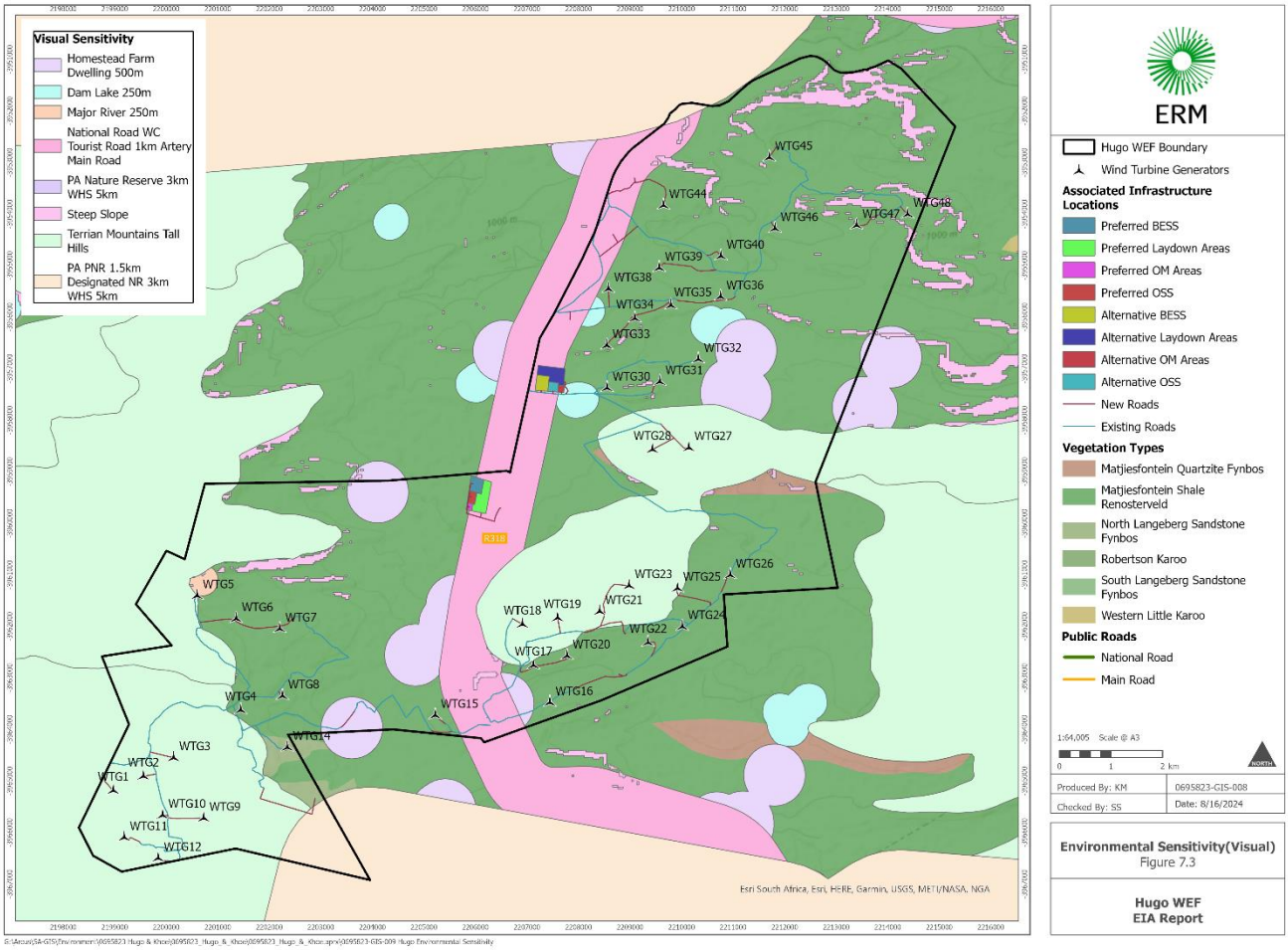
WTG36
WTG38
WTG39
WTG40
WTG44
WTG45
WTG46
WTG47
WTG48
R318
Esri South Africa, Esri, HERE, Garmin, USGS, INEGI, NASA, NGA
ERM
Hugo WEF Boundary
Wind Turbine Generators
Associated Infrastructure Locations
Alternative BESS
Alternative Laydown Areas
Alternative OM Areas
Alternative OSS
Preferred BESS
Preferred Laydown Areas
Preferred OM Areas
Preferred OSS
New Roads
Existing Roads
Vegetation Types
Matjiesfontein Quartzite Fynbos
Matjiesfontein Shale Renosterveld
North Langeberg Sandstone Fynbos
Robertson Karoo
South Langeberg Sandstone Fynbos
Western Little Karoo
Public Roads
National Road
Main Road
1:64,005 Scale @ A3
0 1 2 km
NORTH
Produced By: KM
0695823-GIS-001
Checked By: SS
Date: 8/16/2024
Environmental Sensitivity
Figure 7.1
Hugo WEF
EIA Report


Visual Sensitivity
Homestead Farm Dwelling 500m
Dam Lake 250m
Major River 250m
National Road WC Tourist Road 1km Artery Main Road
PA Nature Reserve 3km WHS 5km
Steep Slope
Terrian Mountains Tall Hills
PA PNR 1.5km Designated NR 3km WHS 5km
WTG1
WTG2
WTG3
WTG4
WTG5
WTG6
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WTG10
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WTG44
WTG45
WTG46
WTG47
WTG48
R318
Esri South Africa, Esri, HERE, Garmin, USGS, MET/NASA, NGA
ERM
Hugo WEF Boundary
Wind Turbine Generators
Associated Infrastructure Locations
Preferred BESS
Preferred Laydown Areas
Preferred OM Areas
Preferred OSS
Alternative BESS
Alternative Laydown Areas
Alternative OM Areas
Alternative OSS
New Roads
Existing Roads
Vegetation Types
Matjiesfontein Quartzite Fynbos
Matjiesfontein Shale Renosterveld
North Langeberg Sandstone Fynbos
Robertson Karoo
South Langeberg Sandstone Fynbos
Western Little Karoo
Public Roads
National Road
Main Road
1:64,005 Scale @ A3
0 1 2 km
NORTH
Produced By: KM
0695823-GIS-008
Checked By: SS
Date: 8/16/2024
Environmental Sensitivity(Visual)
Figure 7.3
Hugo WEF
EIA Report

7.3 Sub-section 3: Declaration

The proponent/applicant or holder of the EA affirms that he/she will abide and comply with the prescribed impact management outcomes and impact management actions as stipulated in part B: section 1 of the generic EMPr and have the understanding that the impact management outcomes and impact management actions are legally binding. The proponent/applicant or holder of the EA affirms that he/she will provide written notice to the CA 14 day prior to the date on which the activity will commence of commencement of construction to facilitate compliance inspections.

Signature Proponent/applicant/holder of EA Date:

7.4 Sub-section 4: amendments to site specific information (Part B; section 2)

Should the EA be transferred to a new holder, Part B: Section 2 must be completed by the new holder and submitted with the application for an amendment of the EA in terms of Regulations 29 or 31 of the EIA Regulations, whichever applies. The information submitted for an amendment to an environmental authorisation will be considered to be incomplete should a signed copy of Part B: Section 2 not be submitted. Once approved, Part B: Section 2 forms part of the EMPr for the development and the EMPr becomes legally binding to the new EA holder.

PART C

8 SITE SPECIFIC ENVIRONMENTAL ATTRIBUTES

If any specific environmental sensitivities/attributes are present on the site which require more specific impact management outcomes and actions, not included in the pre-approved generic EMPr template, to manage impacts, those impact management outcomes and impact management actions must be included in this section. These specific management controls must be referenced spatially, and must include impact management outcomes and impact management actions. The management controls including impact management outcomes and impact management actions must be presented in the format of the pre-approved generic EMPr template. This applies only to additional impact management outcomes and impact management actions that are necessary.

If Part C is applicable to the development as authorised in the EA, it is required to be submitted to the CA together with the BAR or EIAR, for consideration of, and decision on, the application for EA. The information in this section must be prepared by an EAP and the name and expertise of the EAP, including the curriculum vitae are to be included. Once approved, Part C forms part of the EMPr for the site and is legally binding.

This section will **not be required** should the site contain no specific environmental sensitivities or attributes.

The following specialist studies were undertaken as part of this project:

- Avifauna Impact Assessment
- Terrestrial Biodiversity Impact Assessment;
- Agricultural Impact Assessment;
- Heritage Impact Assessment (including Paleontology, Archaeology & Cultural Landscape);
- Social Economic Impact Assessment;
- Traffic and Transportation Impact Assessment;
- Visual Impact Assessment;
- Noise Impact Assessment;
- Fauna Impact Assessment;
- Aquatics Impact Assessment;
- Flora Impact Assessment and
- Bats Impact Assessment.

The specific mitigation measures provide by the Specialists through the Impact Assessment process are included below.

Pre-construction walk-through of the approved development footprint will be conducted to ensure that sensitive habitats and species are avoided where possible.

Specific Mitigations and Recommendations included in EAIr:

Soil, Land use and Agricultural Potential

Generic mitigation measures that are effective in preventing soil degradation are all inherent in the engineering of such a project and/or are standard, best-practice for construction sites.

- A system of storm water management, which will prevent erosion on and downstream of the site, will be an inherent part of the engineering design on site. Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring there. As part of the system, the integrity of the existing contour bank systems of erosion control on croplands, where they occur on steeper slopes, must be kept intact.
- Any excavations done during the construction phase, in areas that will be re-vegetated at the end of the construction phase, must separate the upper 25 cm of topsoil from the rest of the excavation spoils and store it in a separate stockpile. When the excavation is back-filled, the topsoil must be back-filled last, so that it is at the surface. Topsoil should only be stripped in areas that are excavated. Across the majority of the site, including construction lay down areas, it will be much more effective for rehabilitation, to retain the topsoil in place. If levelling requires significant cutting, topsoil should be temporarily stockpiled and then re-spread after cutting, so that there is a covering of topsoil over the entire cut surface.

Furthermore, there are no areas to be avoided in terms of agricultural impacts and no buffers are applicable.

Avifauna

The specialist recommends three ways to mitigate risk to birds:

- Move proposed turbines out of the highest risk areas predicted by the fRM (i.e., above Class 5.0). This has been undertaken by the applicant and, therefore, this mitigation has been enacted (reflected in the Figures in this report). The current layout will have reduced the risk by between 3.5- and 8-fold for the main Priority species.
- For turbines proposed in medium-risk areas (those lower than Class 5.0), we recommend that patterned blades are installed from the start on 50% of the remaining turbines.

We recommend the following set of mitigations, contingent on the risk class that each turbine falls into:

- Turbines falling in the risk Class 5.0 and above should be moved into lower risk classes .Turbines falling into Class 4.5 must be mitigated with either patterned/striped-blades or SDOD.
- Turbines in Class 4 and below without mitigation.
- Should any turbines kill one *Critically Endangered*/*Endangered/Vulnerable* Red Data species per year they must be (retro-)fitted with some form of mitigation (patterned blade, SDOD, hourly/daily/seasonal curtailment) to reduce fatalities to negligible level. This mitigation is recommended because it is essential that an immediate response is forthcoming. This covers, in particular, Black Harrier, a species for which population viability modelling indicates that we cannot afford to lose even one more adult bird (Cervantes et al. 2022).
- For other Red Data species (*Near Threatened*) and other collision-prone species a specific response and bird fatality threshold must be discussed and implemented within 30 days by an avifauna specialist appropriate to the rarity (and population viability) of the species involved.
- Ideally this should be a separate and adaptive management plan for the site prior to construction. This policy could be included as an annexure to the operational EMP for the WEF. Most importantly, this plan should identify the number of bird fatalities of Priority species which will trigger a management response, the appropriate response, and timelines for such responses. Fatalities of Priority bird species are usually rare events (but with very

high consequences) so such fatalities should be responded to immediately and as they occur. It is, therefore, important to have a threshold policy in place to proactively assist adaptive management.

- Given the extensive modelling of risk by the CRM/FRM, based on a data set collected in a high species-richness and abundance year, resulting in the re-location of all turbines outside the high-risk areas by the client, the likelihood that fatalities will occur is low, and these additional mitigations are unlikely to be required.

Freshwater AND WETLANDS (Aquatics)

The following are key recommendations, which are also critical to the proposed mitigations:

- Any of the activities, should also be monitored by the appointed Environmental Officer /Environmental Control Officer (EO/ECO) on a daily basis, especially during periods of river flow during construction.
- Any points of erosion should be stabilised immediately (sand bags in the short term) using gabions and reno mattress as required. No activities should take place outside of the demarcated servitude, to prevent additional cumulative impacts on these systems.
- The EMPr, must include a Construction Specific Monitoring and Rehabilitation Plan related to the water course and wetland crossings, and specifically to the prevention of erosion and sedimentation as these systems are prone to scour, with rehabilitation options being limited due to the sparse nature of the vegetation.
- Monitoring should occur on a monthly basis for 6 months post construction and where any unstable soils occur, these must be protected with temporary stabilisation dependent on the scale of the impact i.e. sand bags - hay bales) until areas become revegetated. If any areas require permanent erosion protection (e.g. gabions or stone pitching) then the WULA/GA must be amended to include these areas.

Palaeontology
With regard to palaeontological resources the PIA makes the following recommendations:

- A Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the Environmental Control Officer (ECO) or other responsible person once excavations have commenced, they should be rescued and a palaeontologist called to assess and collect a representative sample, unless HWC recommends and alternative approach.

Archaeology
The field survey identified very little surface archaeological material within the area that will form part of the Hugo WEF. It is TerraMare Archaeology's experience that there may be archaeological material buried within the Quaternary sands which mantle portions of the site, potentially covering the whole range from the ESA to the LSA and possibly historical archaeology. Earthworks and excavations for the project may encounter and disturb such buried archaeological material if it is present and the following mitigation measure is recommended:

- A pre-construction archaeological walkdown survey of the final WEF layout must be conducted by a suitably qualified archaeologist.
- In the event of archaeological resources being encountered during the course of development, work in the immediate area must be halted and the find reported to the ECO. The ECO must inform HWC so that mitigatory action can be determined and be implemented if necessary. The find may require inspection or collection/excavation by an archaeologist. Such heritage is the property of the state.

Aside from the Hugo graveyard on the farm Stinkfontein, no other identifiable graves have been recorded in the development areas but it is possible that human remains could be encountered during construction work. It is recommended that:

- Should human remains be encountered, activities work in the vicinity of the find must cease, the remains must be left *in situ* but made secure and HWC must be notified immediately so that mitigatory action can be determined and be implemented.

Cultural Landscape
Impacts to the cultural landscape arising from construction of the Hugo WEF can be reduced if suitable measures to mitigate the intrusion of WEF infrastructure and activities associated with the project in the landscape are implemented. It is recommended that such mitigation measures could include:

- The screening of infrastructure area(s) from the R318,
- Keeping the construction and decommissioning duration as short as possible and as much of the activity as possible out of the public view,
- Ensuring that night-time light pollution is minimized, and
- Keeping construction and maintenance-related activities in designated and approved areas.

The traffic management plan to be implemented during construction and decommissioning should consist of the following recommended mitigation measures:

- The arrival and departure of construction vehicles should be staggered during off- peak periods to have a distributed effect over low volume traffic periods.
- All vehicles with abnormal loads should have exemption permits as required by the National Road Traffic Act 93 of 1996.
- The Contractor and Site Safety Officer / ESO, during construction and decommissioning should ensure correct signage and safety precautions are in place for vehicles and pedestrians on-site and at the site access. These may include warning signs, construction vehicle signage and flagmen.
- Unpaved roads must be watered to lesson dust generation and routine maintenance on road surface to maintain condition.

- Vehicles transporting materials that can be blown away and cause dust must be securely covered and adhere to speed limits.
- Community participation/stakeholder involvement at every stage of the project is recommended to allow the community to be informed before the start of site activities.
- A comprehensive assessment of the entire route is recommended on award of the project.
- Prohibit WEF equipment and materials transportation at night, during the school December holiday period, on public holidays, during festivals or other special events.

Actions to be implemented by the Contractor and the Developer:

- Limit use of private cars by arranging mini bus transport service for workers;
- Monitor for overloading of vehicles;
- Use only well trained, suitably qualified and experienced drivers in possession of an appropriate and valid driver's license;
- All vehicles must be roadworthy and serviced regularly;
- Clear and visible signage must be placed on and around site, clearly demarcating safe entry and exit points;
- Require all drivers to abide by standard road and safety procedures on site;
- When travelling on public roads all speed limits and rules of the road must be adhered to; and
- Limit dust generation by applying dust suppressants and postponing dust generating activities during period of strong winds and enforcing a strict speed limit of 40 km/h on unpaved roads.

Monitoring actions to be conducted by the ECO / ESO:

- Maintain incidents/complaints register for community complaints;
- Monitor dust generation and implementation of management actions detailed abov

Traffic and Transportation

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- All vehicles with abnormal loads should have exemption permits as required by the National Road Traffic Act 93 of 1996.
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- A comprehensive assessment of the entire route is recommended on award of the project.
- Prohibit WEF equipment and materials transportation at night, during the school December holiday period, on public holidays, during festivals or other special events.

Visual and Landscape

During the **construction phase**, ensure that visual management measures are included and monitored by an Environmental Control Officer (ECO). This includes siting of any construction camps, stockpiles, temporary laydown areas and batching plants outside of identified no-go areas unless otherwise approved by the visual specialist. Dust suppression and litter control measures should be implemented as well. Rehabilitation efforts must commence immediately after construction activities are completed.

- Responsibility: ECO / Contractor.
- Timeframe: Preparation of the EMPr during the planning phase and monitoring during the construction phase.

For the **operation phase**, visual mitigation measures must be monitored by management on an on-going basis, including the maintenance of rehabilitated areas, as well as control of any signage, lighting and wastes at the proposed wind farm. Interim inspections must be conducted by the environmental officer based on site to ensure all of the above.

- Responsibility: Wind Farm Operator and ECO.
- Timeframe: During the operational life of the project.

Throughout the **decommissioning phase**, ensure that procedures for the removal of wind turbines and building structures are implemented. This includes recycling of materials and rehabilitation of the site to a visually acceptable standard, and signed off by the delegated authority. It is assumed that some access roads and concrete pads would remain. Those that are not required should be ripped and vegetation or cropland reinstated to match the surroundings. The revegetation measures are not described as they would fall under the auspices of the appropriate specialist.

- Responsibility: ECO / Contractor / qualified rehabilitation ecologist or horticulturist.
- Timeframe: During the decommissioning contract phase, as well as a prescribed maintenance period thereafter (usually one year).

Monitoring Plan

Environmental Noise Monitoring can be divided into two distinct categories, namely:

- Passive monitoring – the registering of any complaints (reasonable and valid from NSR living within 2,500m from any WTG of the Hugo WEF) regarding noise; and
- Active monitoring – the measurement of noise levels at identified locations.

After the implementation of mitigation measures, noise levels could be higher than 42 dBA (more than 7 dBA of the night-time rating level of a rural noise district) and active noise monitoring is recommended and required.

In addition, should a reasonable and valid noise complaint be registered, the Developer should investigate the noise complaint as per the guidelines. These guidelines should be used as a rough guideline as site-specific conditions may require that the monitoring locations, frequency or procedure be adapted.

Measurement Localities and Frequency

Ambient sound levels could be measured at NSR H-6 before the development of the WEF (at the minimum), with the measurements repeated after the first year of operation. In addition, should there be a valid and reasonable noise complaint, once-off noise measurements must be conducted at the location of the person that registered a valid and reasonable noise complaint. The measurement location should consider the direct surroundings to ensure that other sound sources cannot influence the reading. These measurement locations can be reduced accordingly if the NSRs are relocated or the dwellings are no longer used for residential purposes.

Measurement Procedures

Ambient sound measurements should be collected as defined in SANS 10103:2008. Due to the variability that naturally occurs in sound levels at most locations, it is recommended that semi-continuous measurements are conducted over a period of at least 5 days, covering at least five full night-time (22:00 – 06:00) periods. Spectral frequencies should also be measured to define the potential origin of noise. When a noise complaint is being investigated, measurements should be collected during a period or in conditions similar to when the receptor experienced the disturbing noise event.

ENVIRONMENTAL MANAGEMENT

Environmental Management Objectives are difficult to be defined for noise because ambient sound levels would slowly increase as developmental pressures increase in the area. This is due to increased traffic associated with increased development, human habitation, agriculture and even eco-tourism. While these increases in ambient sound levels may be low (and insignificant) it has the effect of cumulatively increasing the ambient sound levels over time.

The moment the WEF facility stops operation, ambient sound levels will drop to levels similar to the pre-WEF levels, or to new levels (typical of other areas with a similar developmental character) if other developments have occurred in the interim.

For the purpose of this report potential environmental management objectives would be:

- That the development (construction and operational phase) of the WEF project not result in noise levels exceeding 52 dBA (when measured over a period of at least 1 hour) during the day; and
- That the development (construction and operational phase) of the WEF project should not result in noise levels exceeding 45 dBA (when measured over a period of at least 1 hour) at night.

As noise levels will not exceed 52 dBA during both the construction and operational phases, Environmental Management is mainly focusing on the night-time period as summarized in:

APPENDIX 1: METHOD STATEMENTS

To be prepared by the contractor prior to commencement of the activity. The method statements are **not required** to be submitted to the CA

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