
UMMBILA EMOYENI WIND FARM – PHASE ONE, MPUMALANGA PROVINCE

FINAL ENVIRONMENTAL MANAGEMENT PROGRAMME

June 2023

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EMPR DETAILS

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DEFINITIONS AND TERMINOLOGY

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

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

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

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

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

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

Construction: Construction means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity as per the EIA Regulations. Construction begins with any activity which requires Environmental Authorisation.

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

Cut-in speed: The minimum wind speed at which the wind turbine will generate usable power.

Cut-out speed: The wind speed at which shut down occurs.

Decommissioning: To take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned. This usually occurs at the end of the life of a facility.

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

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

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

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

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

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

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

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

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

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

Environmental impact assessment: Environmental Impact Assessment, as defined in the NEMA EIA Regulations, is a systematic process of identifying, assessing and reporting environmental impacts associated with an activity.

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

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

Generator: The generator is what converts the turning motion of a wind turbine blades into electricity.

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

Hazardous waste: Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.

Incident: Section 30 of NEMA defines an 'incident' as "an unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, **whether immediate or delayed.**"¹

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

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

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

Mitigation hierarchy: The mitigation hierarchy is a framework for managing risks and potential impacts related to biodiversity and ecosystem services. The mitigation hierarchy is used when planning and implementing development projects, to provide a logical and effective approach to protecting and conserving biodiversity and maintaining important ecosystem services. It is a tool to aid in the sustainable management of living, natural resources, which provides a mechanism for making explicit decisions that balance conservation needs with development priorities.

Nacelle: The nacelle contains the generator, control equipment, gearbox, and anemometer for monitoring the wind speed and direction.

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

Pre-construction: The period prior to the commencement of construction, which may include activities which do not require Environmental Authorisation (e.g. geotechnical surveys).

Rare species: Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. This category was termed Critically Rare by Hall and Veldhuis (1985) to distinguish it from the more generally used word "rare."

¹<http://ipwis.pgwc.gov.za/ipwisdoc/Public/Publications/ChemicalsMgt/A%20Procedure%20for%20Section%2030%20of%20NEMA.pdf>

Red data species: Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, and/or in terms of the South African Red Data list. In terms of the South African Red Data list, species are classified as being extinct, endangered, vulnerable, rare, indeterminate, insufficiently known or not threatened (see other definitions within this glossary).

Rotor: The portion of the wind turbine that collects energy from the wind is called the rotor. The rotor converts the energy in the wind into rotational energy to turn the generator. The rotor has three blades that rotate at a constant speed of about 15 to 28 revolutions per minute (rpm).

Significant impact: An impact that by its magnitude, duration, intensity, or probability of occurrence may have a notable effect on one or more aspects of the environment.

Tower: The tower, which supports the nacelle to which the rotor is attached, is constructed from tubular steel or concrete. It is approximately 130m tall. The nacelle and the rotor are attached to the top of the tower. The tower on which a wind turbine is mounted is not just a support structure. It also raises the wind turbine so that its blades safely clear the ground and so it can reach the stronger winds at higher elevations. The tower must be strong enough to support the nacelle and blades, and to sustain vibration, wind loading and the overall weather elements for the lifetime of the wind turbine.

Waste: Any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to the Waste Amendment Act (as amended on June 2014); or any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister.

Wind power: A measure of the energy available in the wind.

Wind speed: The rate at which air flows past a point above the earth's surface.

ABBREVIATIONS AND ACRONYMS

DFFE	National Department of Forestry, Fisheries and the Environment
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EO	Environmental Officer
EPC	Engineering, Procurement and Construction
GG	Government Gazette
GN	Government Notice
Ha	Hectare
I&AP	Interested and Affected Party
km ²	Square kilometres
kV	Kilovolt
m ²	Square meters
m/s	Meters per second
MW	Mega Watt
NEMA	National Environmental Management Act (Act No 107 of 1998)
NHRA	National Heritage Resources Act (Act No 25 of 1999)
NIRP	National Integrated Resource Planning
NWA	National Water Act (Act No 36 of 1998)
PM	Project Manager
<u>REC</u>	<u>Recommended Ecological Category</u>
<u>REIPPPP</u>	<u>Renewable Energy Independent Power Producers Procurement Programme</u>
SHE	Safety, Health and Environment
SAHRA	South African Heritage Resources Agency
SANRAL	South African National Roads Agency Limited

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CHAPTER 1: INTRODUCTION

This Environmental Management Programme has been compiled for the Umbila Emoyeni Wind Energy Facility. The project is to be developed on a site located approximately 6km south-east of Bethal and 1km east of Morgenzon. The project site is located across the Govan Mbeki, Lekwa, and Msukaligwa Local Municipalities within the Gert Sibande District in the Mpumalanga Province. The Umbila Wind Energy Facility will include up to 111 wind turbines with a contracted capacity of up to 900MW and associated infrastructure to be constructed over an area of approximately 27 819ha in extent, known as the project site. An Environmental Authorisation (EA) for the project was issued on 26 January 2023 (DFFE Ref: 14/12/16/3/3/2/2160). It is the intention of the applicant to develop the WEF in commercially viable phases. This Final EMPr has been compiled in terms of the requirements of Condition 13 of the EA amendment (DFFE Ref: 14/12/16/3/3/2/2160/AM1) and is applicable to the first phase of development, which will include 25 turbines with a total generating capacity of 155MW.

This EMPr has been developed on the basis of the findings of the Environmental Impact Assessment (EIA), and must be implemented to protect sensitive on-site and off-site features through controlling construction, operation and decommissioning activities that could have a detrimental effect on the environment, and through avoiding or minimising potential impacts. This EMPr is applicable to all Umbila Emoyeni (Pty) Ltd employees and contractors working on the pre-construction, construction, and operation and maintenance phases of the Umbila Emoyeni Wind Energy Facility. The document must be adhered to and updated as relevant throughout the project life cycle. This document fulfils the requirement of the EIA Regulations, 2014 (as amended) and forms part of the Final EIA report of the project.

In terms of the Duty of Care provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with this project is avoided, halted or minimised. In terms of NEMA, it has become the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts. While no permitting or licensing requirements arise directly by virtue of the Umbila Wind Energy Facility, this section will be applicable throughout the life cycle of the project.

CHAPTER 2: PROJECT DETAILS

The 900MW wind farm project is to be developed on a site located approximately 6km south-east of Bethal and 1km east of Morgenzon (refer to Figure 2.1). The project site is located across the Govan Mbeki, Lekwa, and Msukaligwa Local Municipalities within the Gert Sibande District in the Mpumalanga Province. The full extent of the project site (i.e., 27 819ha) was considered during the Scoping Phase of the EIA process, within which the Umbila Emoyeni Wind Energy Facility will be appropriately located from a technical and environmental sensitivity perspective. The project site consists of numerous properties as listed in Table 2.1 below.

Table 2.1: Properties which the Umbila Emoyeni Renewable Energy Farm project site will be located

Parent Farm Number	Farm Portions
Farm 261 – Naudesfontein	15 R/E, 21
Farm 264 – Geluksplaats	0, 1, 3, 4, 5, 6 R/E, 8 R/E, 9R/E, 10, 11, 12
Farm 268 – Brak Fontein Settlement	6,7,10,11,12
Farm 420 – Rietfontein	8,9,10,11,12,15 R/E,16,18,19,22,32
Farm 421 - Sukkelaar	2, 2, 7, 9, 9 10, 10 11, 11 12, 12, 22 ,25 R/E, 34, 35, 36, 37, 37, 38, 39, 40, 42, 42
Farm 422 – Klipfontein	0, 2 R/E, 3 R/E, 4, 5, 6, 7, 8 R/E, 9, 10, 12, 13 R/E, 14 R/E, 16, 17, 18, 19, 20, 21, 22, 23
Farm 423 – Bekkerust	0 R/E, 1, 2 R/E, 4, 5 R/E, 6, 10, 11, 12, 13 14, 15, 17, 19 R/E, 20, 22, 23, 24,25
Farm 454 – Oshoek	4 R/E, 13, 18
Farm 455 – Ebenhaezer	0, 1, 2, 3
Farm 456 – Vaalbank	1, 2, 3, 4, 7, 8, 13, 15, 16, 17, 18, 19
Farm 457 – Roodekrans	0, 1, 4, 5, 7, 22, 23, 23
Farm 458 – Goedgedacht	0, 2, 3, 4, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 21, 22, 23, 25, 26 R/E, 27, 28, 29, 31, 32, 33, 34, 35, 36, 37, 39, 41, 42, 43
Farm 467 – Twee Fontein	0 R/E, 1 R/E, 4 R/E, 5, 6, 7 R/E, 8, 10
Farm 469 – Klipkraal	5 R/E, 6, 7, 8
Farm 548 – Durabel	0
Farm 470 – Dorpsplaats	85
Farm 451 - Drinkwater	4, 22
Farm 452 - Brakfontein	5

A development footprint of ~390ha has been identified within the project site and assessed for the construction of the facility and its associated infrastructure. The optimal position for each turbine and associated infrastructure was determined taking into consideration the environmental sensitivities identified through the Scoping Evaluation as well as the final walkthrough conducted by ecological and heritage specialists. The turbines have been appropriately placed to optimise the energy generating potential of the wind resource while also minimising impacts on environmental sensitivities.

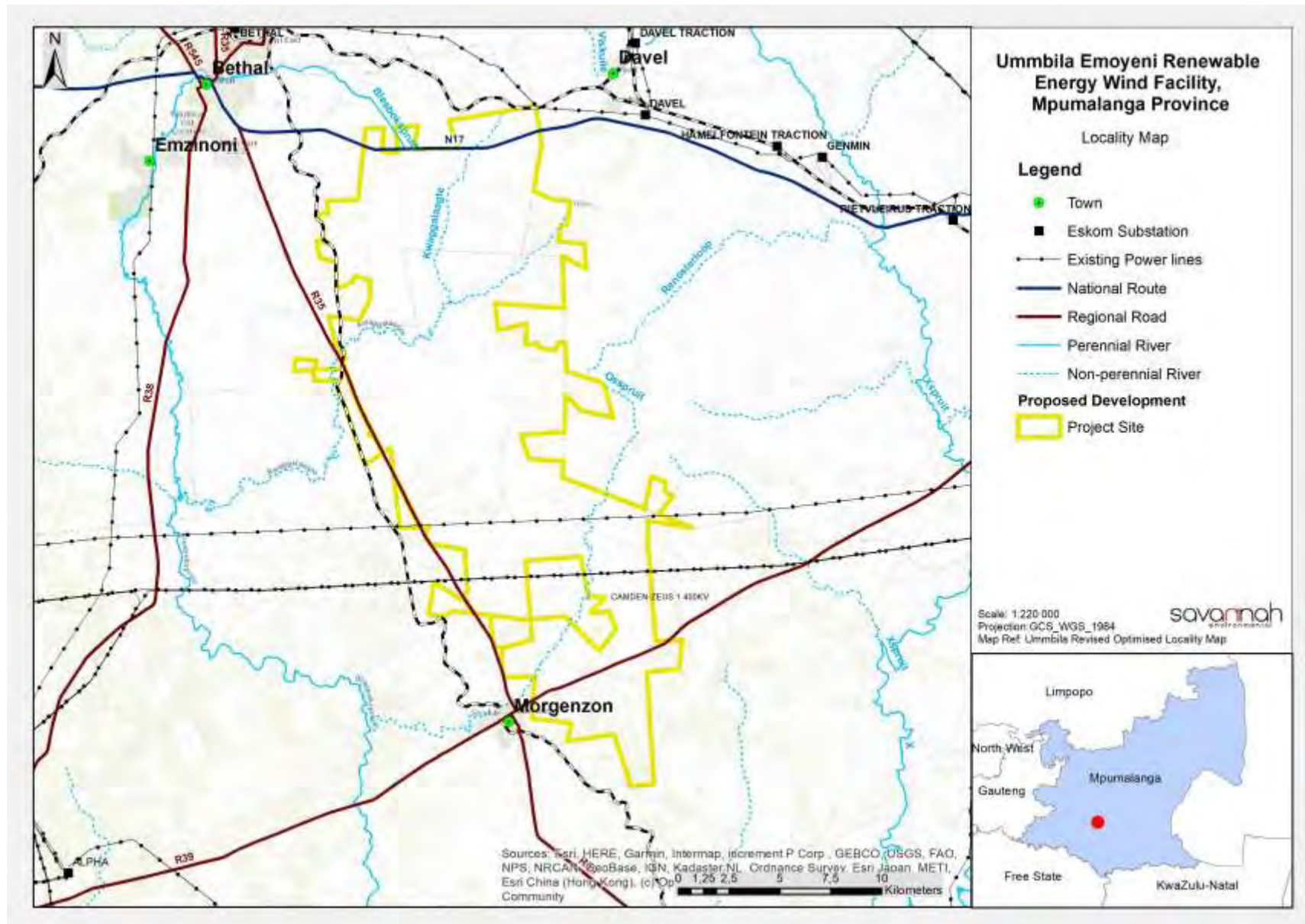


Figure 2.1: Locality map of the project site within which the Umbila Emoyeni Wind Energy Facility is proposed to be developed.

Phase 1 of the development is planned to include up to 25 turbines with a total generating capacity of 155MW. The remainder of the project will be developed in commercially viable phases which can either feed into the national grid via the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) or provide power to private third-party off-takers.

2.1. Components of the Umbila Emoyeni Phase 1 Wind Energy Facility

The development footprint is proposed to accommodate the wind turbines and all associated infrastructure which is required for such a facility, and will include:

- » Up to 25 wind turbines with a maximum hub height of up to 130m. The tip height of the turbines will be up to 250m.
- » 33kV cabling to connect the wind turbines to the onsite collector substation, to be laid underground where practical.
- » 1 x 33kV/132kV onsite collector substation (IPP Portion), being 5ha in extent.
- » Cabling between turbines, to be laid underground where practical.
- » Construction compound including site office (approximately 3ha (150m x 200m)):
 - * 1 x Batching plant of up to 4ha to 7ha.
 - * 1 x O&M office of approximately 1.5ha adjacent to a collector SS.
 - * 1 x construction compound / laydown area, including site office of 3ha (150m x 200m).
- » Laydown and crane hardstand areas (approximately 75m x 120m).
- » Access roads of 12 -13m wide, with 12m at turning circles.

A summary of the details and dimensions of the planned infrastructure associated with the project is provided in Table 2.2.

Table 2.2: Details or dimensions of typical infrastructure required for the 155MW Umbila Emoyeni Phase 1 Wind Energy Facility

Infrastructure	Footprint and dimensions
Number of turbines	Up to <u>25</u> turbines
Hub Height	Up to <u>130m</u>
Tip Height	Up to <u>250m</u>
Rotor Diameter	Up to <u>185m</u>
Contracted Capacity	Up to <u>155MW</u> (individual <u>turbines of 6.2MW</u> capacity each)
Tower Type	Steel or concrete towers can be utilised at the site. Alternatively, the towers can be of a hybrid nature, comprising concrete towers with top steel sections.
Area occupied by the on-site collector substations (IPP Portion)	On-site collector substation (IPP Portion) of 5ha. This will consist of the Eskom switching station and IPP substation.
Capacity of on-site collector substations (IPP Portion)	33kV/132kV
Cabling between the turbines	Cabling will be installed underground where feasible at a depth of up to 1.5m to connect the turbines to the on-site facility substation. Where not technically feasible to place cabling underground, this will be installed above-ground. The cabling will have a capacity of up to 33kV.

Infrastructure	Footprint and dimensions
Laydown and Operations and Maintenance (O&M) hub	<ul style="list-style-type: none"> » <u>One</u> Batching plant of up to 4ha to 7ha. » <u>One</u> O&M office of approximately 1.5ha adjacent to <u>the</u> collector SS. » <u>Two</u> construction compounds / laydown area, including site office within a total area of 6.5ha. » Laydown and crane hardstand areas (approximately 75m x 120m).
Access and internal roads	<ul style="list-style-type: none"> » Wherever possible, existing access roads will be utilised to access the project site and development footprint. » Internal roads of up to 12-13m in width will be required to access each turbine and the on-site substation. » Access roads will be 12m at turning circles.
Laydown and crane hardstand areas (at each turbine position)	~75m x 120m
Turbine foundation	Diameter of up to 40m per turbine
Grid connection	The grid connection infrastructure will include a 400/132kV MTS, to be located between the Camden and SOL Substations, which will be looped in and out of the existing Camden-Sol 400kV transmission line; on-site switching station (132kV in capacity) at the renewable energy facility (Eskom Portion); 132kV power lines from the switching station at the renewable energy facility to the new 400/132kV MTS; and a collector substation with 2 x 132kV bus bars and 4 x 132kV IPP feeder bays to the onsite IPP Substation. The grid connection infrastructure has been assessed as part of a separate S&EIA process in support of an application for EA. <u>A separate EMP has been developed for the electrical grid infrastructure authorised under that process.</u>
Temporary infrastructure	Temporary infrastructure, including laydown areas, hardstand areas and a concrete batching plant, will be required during the construction phase. All temporary infrastructure will be rehabilitated following the completion of the construction phase, where it is not required for the operation phase.

Table 2.3 provides details regarding the requirements and the activities to be undertaken during the Umbila Emoyeni Phase 1 Wind Energy Facility development phases (i.e., construction phase, operation phase and decommissioning phase).

2.2. Activities and Components associated with the Umbila Emoyeni Wind Energy Facility

Table 2.3: Details of the Umbila Emoyeni Phase 1 Wind Energy Facility project development phases (i.e., construction, operation, and decommissioning)

<u>Construction Phase</u>	
Requirements	<ul style="list-style-type: none"> » Project receives EA from the DFFE, and a Power Purchase Agreement secured with a private off taker. In addition, a Wheeling Agreement is executed. All other permits and consents as required by lenders must be in place as this will be project-financed. » Duration expected to be 24 months. » Create direct construction employment opportunities. Approximately <u>250</u> employment opportunities will be created. » No on-site labour camps. Employees to be accommodated in the nearby towns such as Bethal or Morgenzenon and transported to and from site on a daily basis by bus. » Overnight on-site worker presence would be limited to security staff. » Waste removal and sanitation will be undertaken by a sub-contractor, where possible. Waste containers, including containers for hazardous waste, will be located at easily accessible locations /turbine positions on site when construction activities are undertaken. » Electricity required for construction activities will be generated by a generator. Where low voltage connections are possible, these will be considered. » Either borehole / municipal / dam or a combination of all 3 will be used to provide water. Should water availability at the time of construction be limited, water will be transported to site via water tanks. Water will be used for sanitation and potable water on site as well as construction works. This will have the added benefit of taking mine acid water and converting it into water that can be used during construction and operation.
Activities to be undertaken	
Conduct surveys prior to construction	<ul style="list-style-type: none"> » Including, but not limited to, a geotechnical survey, site survey and confirmation of the turbine micro-siting footprint, and survey of the on-site collector substation site to determine and confirm the locations of all associated infrastructure.
Establishment of access roads to the site	<ul style="list-style-type: none"> » Internal access roads within the site will be established at the commencement of construction. » Existing access roads will be utilised, where possible, to minimise impact. It is unlikely that access roads will need to be upgraded as part of the proposed development, although maintenance may be required to ensure roads are in adequate condition to enable transportation of project components to site. » Access roads to be established between the turbines for construction and/or maintenance activities within the development footprint. » Internal service road alignment will be approximately 4.5m wide. To be determined by the final micro-siting or positioning of the wind turbines.
Undertake site preparation	<ul style="list-style-type: none"> » Including the clearance of vegetation at the footprint of each turbine, establishment of the laydown areas, the establishment of internal access roads and excavations for foundations. » Stripping of topsoil to be stockpiled, backfilled, removed from site and/or spread on site. » To be undertaken in a systematic manner to reduce the risk of exposed ground being subjected erosion. » Include search and rescue of floral species of concern (where required) and the identification and excavation of any sites of cultural/heritage value (where required).

<p>Establishment of laydown areas and batching plant on site</p>	<ul style="list-style-type: none"> » A laydown area for the storage of wind turbine components, including the cranes required for tower/turbine assembly and civil engineering construction equipment. » The laydown will also accommodate building materials and equipment associated with the construction of buildings. » A crane hardstand at each turbine position where the main lifting crane will be erected and/or disassembled. Each hardstand to be ~75m x 120m in extent. » No new borrow pits will be required. Infilling or depositing materials will be sourced from licenced borrow pits within the surrounding areas. » A temporary concrete batching plant up to 7ha in extent to facilitate the concrete requirements for turbine foundations.
<p>Construct foundation</p>	<ul style="list-style-type: none"> » Concrete foundations to be constructed at each turbine location. » Excavations to be undertaken mechanically. » Concrete foundation will be constructed to support a mounting ring. » Depending on geological conditions, the use of alternative foundations may be considered (e.g., reinforced piles).
<p>Transport of components and equipment to and within the site</p>	<ul style="list-style-type: none"> » Turbine units to be transported include the tower segments, hub, nacelle, and three rotor blades. » Components to be transported to the site in sections on flatbed trucks by the turbine supplier. There are three viable options for the port of entry for imported components - the Port of Richard's Bay in KwaZulu-Natal, and the ports of East London and Ngqura in the Eastern Cape. The most feasible port of entry is deemed to be the Port of Richard's Bay in the KwaZulu- Natal Province. » Components considered as abnormal loads in terms of the Road Traffic Act (Act No 29 of 1989) due to dimensional limitations (abnormal length of the blades) and load limitations (i.e., the nacelle) will require a permit for the transportation of the abnormal loads on public roads. » Specialised construction and lifting equipment to be transported to site to erect the wind turbines. » Civil engineering construction equipment to be brought to the site for the civil works (e.g., excavators, trucks, graders, compaction equipment, cement trucks, site offices etc.). » Components for the establishment of the onsite collector substation (including transformers) and the associated infrastructures to be transported to site. » Transportation will take place via appropriate National and Provincial roads, and the dedicated access/haul road to the site.
<p>Construction of the turbine</p>	<ul style="list-style-type: none"> » A lifting crane will be utilised to lift the tower sections, nacelle, and rotor into place. » Approximately 1 week is required to erect a single turbine depending on climatic conditions. » Lifting cranes are required to move between the turbine sites.
<p>Construction of the onsite collector substations and connection of wind turbines to the substation</p>	<ul style="list-style-type: none"> » <u>1</u> x onsite collector substation (IPP Portion) to be constructed within the development footprint. <ul style="list-style-type: none"> * The following simplified sequence is conducted for the construction of a substation: * Step 1: Surveying of the development footprint, engaging with affected landowners, environmental specialist walkthroughs to inform permitting requirements. * Step 2: Final design and micro-siting of the infrastructure based on geo-technical, topographical conditions and potential environmental sensitivities. * Step 3: Search-and-rescue activities, vegetation clearance and construction of access roads/tracks (where required), including installation of fencing.

	<ul style="list-style-type: none"> * Step 4: Trenching and ground grid conduit installation. * Step 5: Installation of concrete foundations. * Step 6: Assembly and installation of steel structures and isolators. * Step 7: Control building assembly. * Step 8: Gravel placement and commissioning. * Step 9: Rehabilitation of disturbed areas. * Step 10: Continued maintenance. <p>» Cabling will be installed underground, where feasible, between the turbines and the onsite collector substations at a depth of up to 1.5m to connect the turbines to the onsite collector substations. Where not technically feasible to place cabling underground, this will be installed above-ground. The cabling will have a capacity of up to 33kV.</p>
Establishment of ancillary infrastructure	<p>» Site offices and maintenance buildings, including workshop areas for maintenance and storage will be required.</p> <p>» Establishment will require the clearing of vegetation, levelling, and the excavation of foundations prior to construction.</p>
Connect facility to the power grid	<p>» The grid connection infrastructure will include a 400/132kV MTS, to be located between the Camden and SOL Substations, which will be looped in and out of the existing Camden-Sol 400kV transmission line; on-site switching stations (132kV in capacity) at each renewable energy facility (Eskom Portion); 132kV power lines from the switching stations at each renewable energy facility to the new 400/132kV MTS; and a collector substation with 2 x 132kV bus bars and 4 x 132kV IPP feeder bays to the onsite IPP Substation.</p>
Undertake site rehabilitation	<p>» Commence with rehabilitation efforts once construction completed in an area, and all construction equipment is removed.</p> <p>» On commissioning, access points to the site not required during the operation phase will be closed and prepared for rehabilitation.</p>
<u>Operation Phase</u>	
Requirements	<p>» Duration will be 20-30 years.</p> <p>» Requirements for security and maintenance of the project.</p> <p>» Employment opportunities relating mainly to operation activities and maintenance. Approximately 10 to 25 full-time employment opportunities will be available during the operation of the wind farm.</p> <p>» Waste containers, including containers for hazardous waste, will be located at easily accessible locations /turbine positions on site when construction activities are undertaken. Waste removal and sanitation will be undertaken by a suitably qualified contractor.</p> <p>» Either borehole / municipal / dam or a combination of all 3 will be used to provide water. Should water availability at the time of construction be limited, water will be transported to site via water tanks. Water will be used for sanitation and potable water on site as well as construction works.</p>
Activities to be undertaken	
Operation and Maintenance	<p>» Full time security, maintenance, and control room staff.</p> <p>» All turbines will be operational except under circumstances of mechanical breakdown, inclement weather conditions, or maintenance activities.</p> <p>» Wind turbines to be subject to periodic maintenance and inspection.</p> <p>» The BESS will be in place for the life of the facility and will be maintained as required throughout the operation period.</p> <p>» Disposal of waste products (e.g., oil) in accordance with relevant waste management legislation.</p> <p>» Areas which were disturbed during the construction phase to be utilised, should a laydown area be required during operation.</p>

Decommissioning Phase

Requirements	<ul style="list-style-type: none"> » Decommissioning of the Umbila Emoyeni <u>Phase 1</u> Wind Energy Facility infrastructure at the end of its economic life. » Potential for repowering of the facility, depending on the condition of the facility at the time. » Expected lifespan of approximately 20 - 30 years (with maintenance) before decommissioning is required. » Decommissioning activities to comply with the legislation relevant at the time. » Alternative options include resale of the WTGs or decommissioning and recycling of valuable materials (copper, steel, aluminium etc). Both scenarios would require removal (in part) of the remaining infrastructure, such as the substation, buildings, met mast, access roads, crane hardstand and electrical cables.
Activities to be undertaken	
Site preparation	<ul style="list-style-type: none"> » Confirming the integrity of site access to accommodate the required equipment and lifting cranes. » Preparation of the site (e.g., laydown areas and construction platform). » Mobilisation of construction equipment.
Disassemble and remove turbines	<ul style="list-style-type: none"> » Large crane required for the disassembling of the turbine and tower sections. » Components to be reused, recycled, or disposed of in accordance with regulatory requirements. » All parts of the turbine would be considered reusable or recyclable except for the blades. » Concrete will be removed to a depth as defined by an agricultural specialist and the area rehabilitated. » Cables will be excavated and removed, as may be required.
Components to be disposed of or recycled	<ul style="list-style-type: none"> » Foundation. » Tower. » Electrical facilities in tower base. » Rotor. » Generator. » Machine house. » Regarding the foundation body and sub-base of the tower, the concrete will undergo crushing and be used as combined base/wearing course. » Reinforcing steel will go through cleansing and milling to re-melt the components.

It is expected that the areas of the project site affected by the wind farm infrastructure (development footprint) will revert back to their original land-use (i.e., agriculture) once the Umbila Emoyeni Phase 1 Wind Energy Facility has reached the end of its economic life and all infrastructure has been decommissioned.

2.3. Findings of the EIA Report

The EIA Report for the 900MW Wind Farm, together with the specialist studies provide a detailed assessment of the potential impacts that may result from the development of the Umbila Emoyeni Wind Energy Facility (Savannah Environmental, 2022). No environmental fatal flaws or unacceptable impacts were identified in the detailed specialist studies conducted, provided that the recommended mitigation measures are implemented. These measures include, amongst others, the avoidance of sensitive features within the development footprint and the undertaking of the construction and operational bird and bat monitoring, as specified by the specialists.

The potential environmental impacts associated with the Umbila Emoyeni Wind Energy Facility assessed through the EIA process include:

- » Impacts on terrestrial ecology (flora and fauna).
- » Impacts on freshwater ecology.
- » Impacts on avifauna.
- » Impacts on bats.
- » Impacts on soils and agricultural potential.
- » Impacts on heritage resources, including archaeology, palaeontology and the cultural landscape.
- » Noise impacts due to the construction and operation of the wind farm.
- » Visual impacts on the area imposed by the components of the facility.
- » Positive and negative social impacts.
- » Traffic impacts.

2.4. Umbila Emoyeni Phase 1 Wind Energy Facility Final Layout

The development footprint and final layout for the Umbila Emoyeni Phase One Wind Energy Facility has been confirmed through a detailed design process and is presented within this EMPr in accordance with the requirements of Condition 12 of the EA dated January 2023. It has been confirmed through specialist walk through surveys that this layout is acceptable and avoids areas of sensitivity identified through the EIA process. This layout overlain on the sensitivity map as determined in the Final EIA Report is presented in Figure 2.2. Figure 2.3 provides the final layout of the Umbila Emoyeni Phase One Wind Energy Facility and the final layout for the EGI Phase One (which is the subject of a separate EMPr). Figures 2.4 & 2.5 provides the final layout of the Umbila Emoyeni Phase One Wind Energy Facility together with an indicative layout for the remaining extent of the authorised Wind Farm as required in terms of Condition 13A of the amended EA.

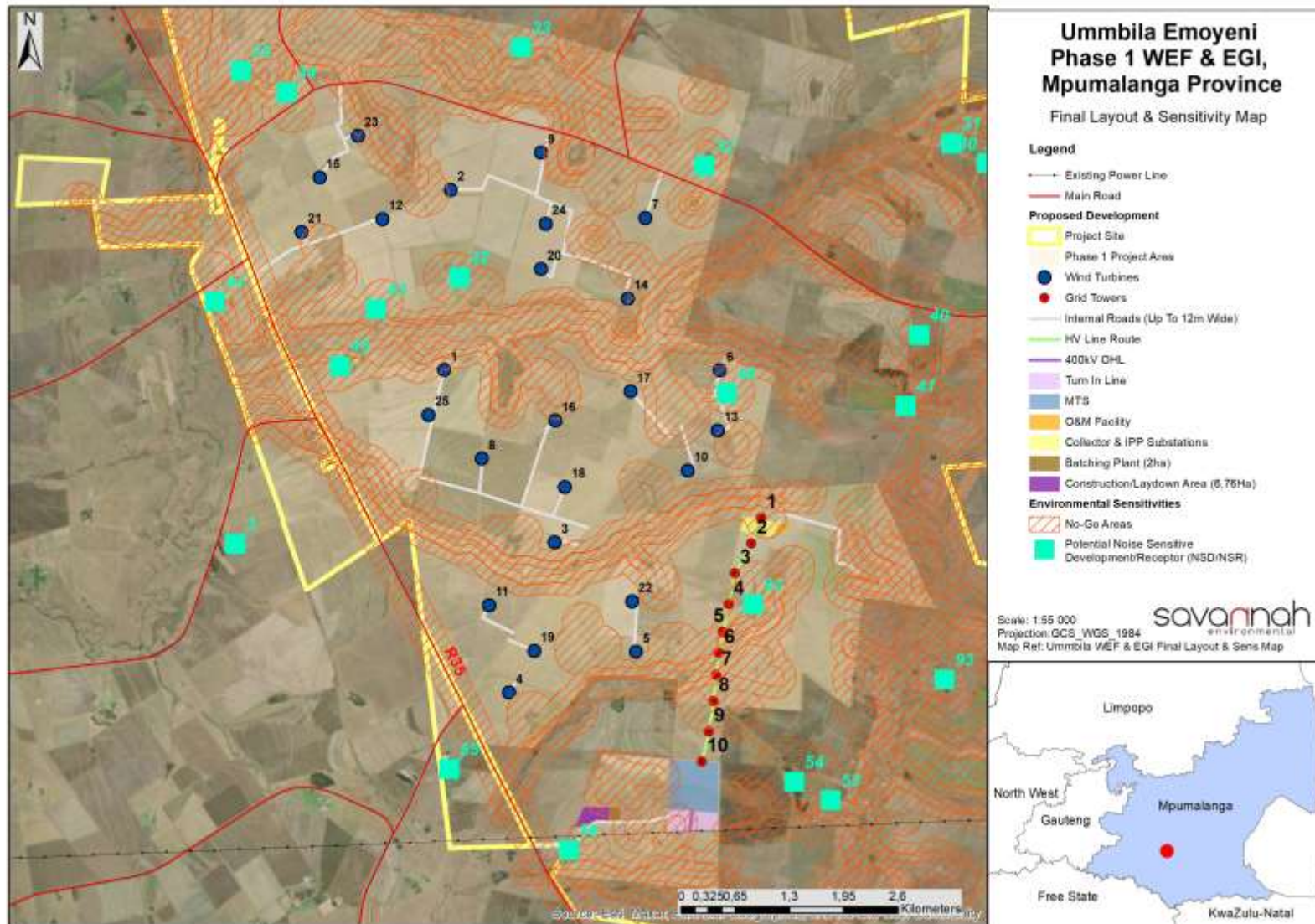


Figure 2.2: The final layout of the Umbila Emoyeni Phase 1 Wind Energy Facility overlain with the sensitivities identified in the EIA process².

² The status of the NSD/NSRs is to be confirmed.

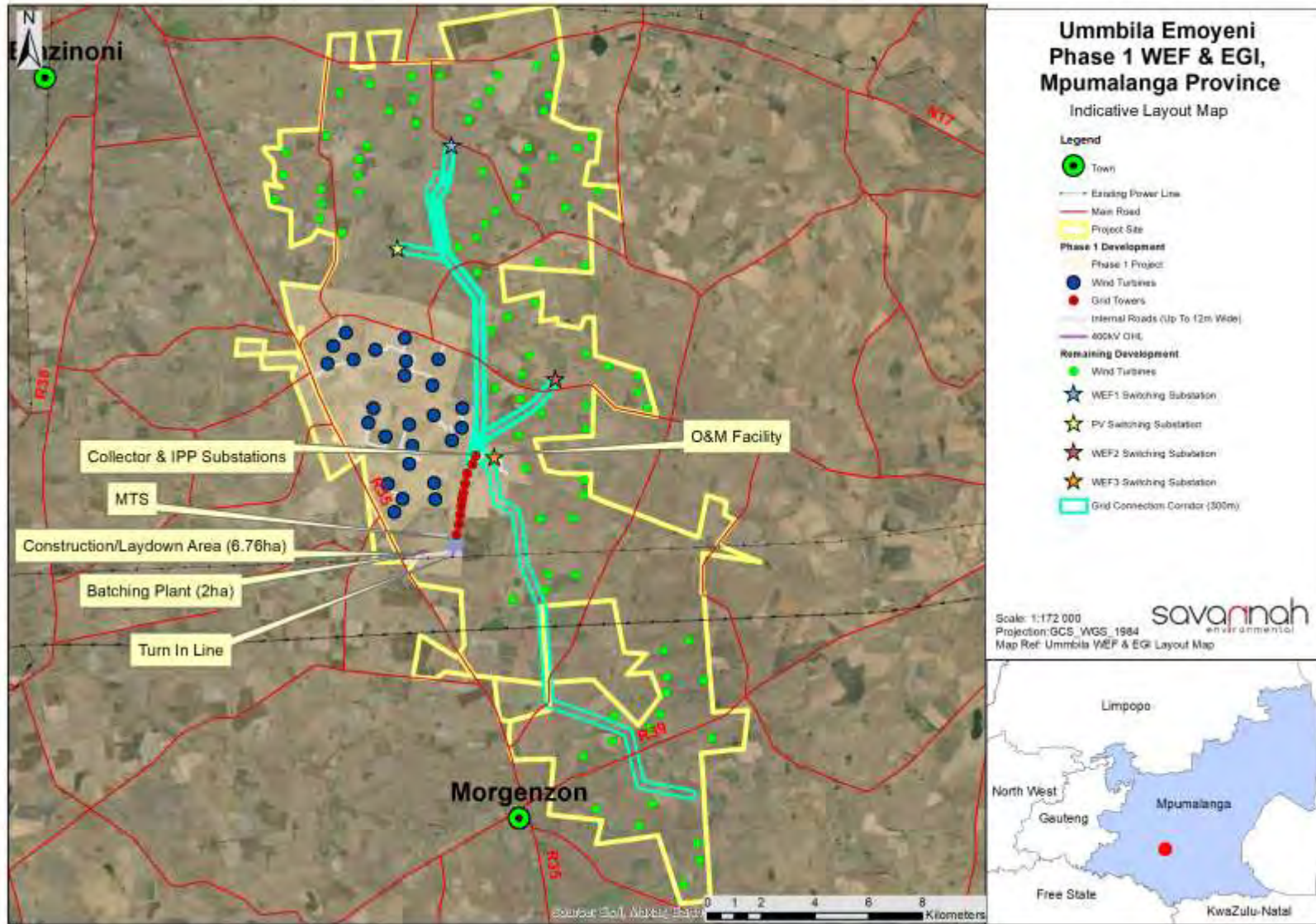


Figure 2.3: Final layout of the Umbila Emoyeni Phase 1 Wind Energy Facility together with an indicative layout for the remaining extent of the authorised Wind Farm.

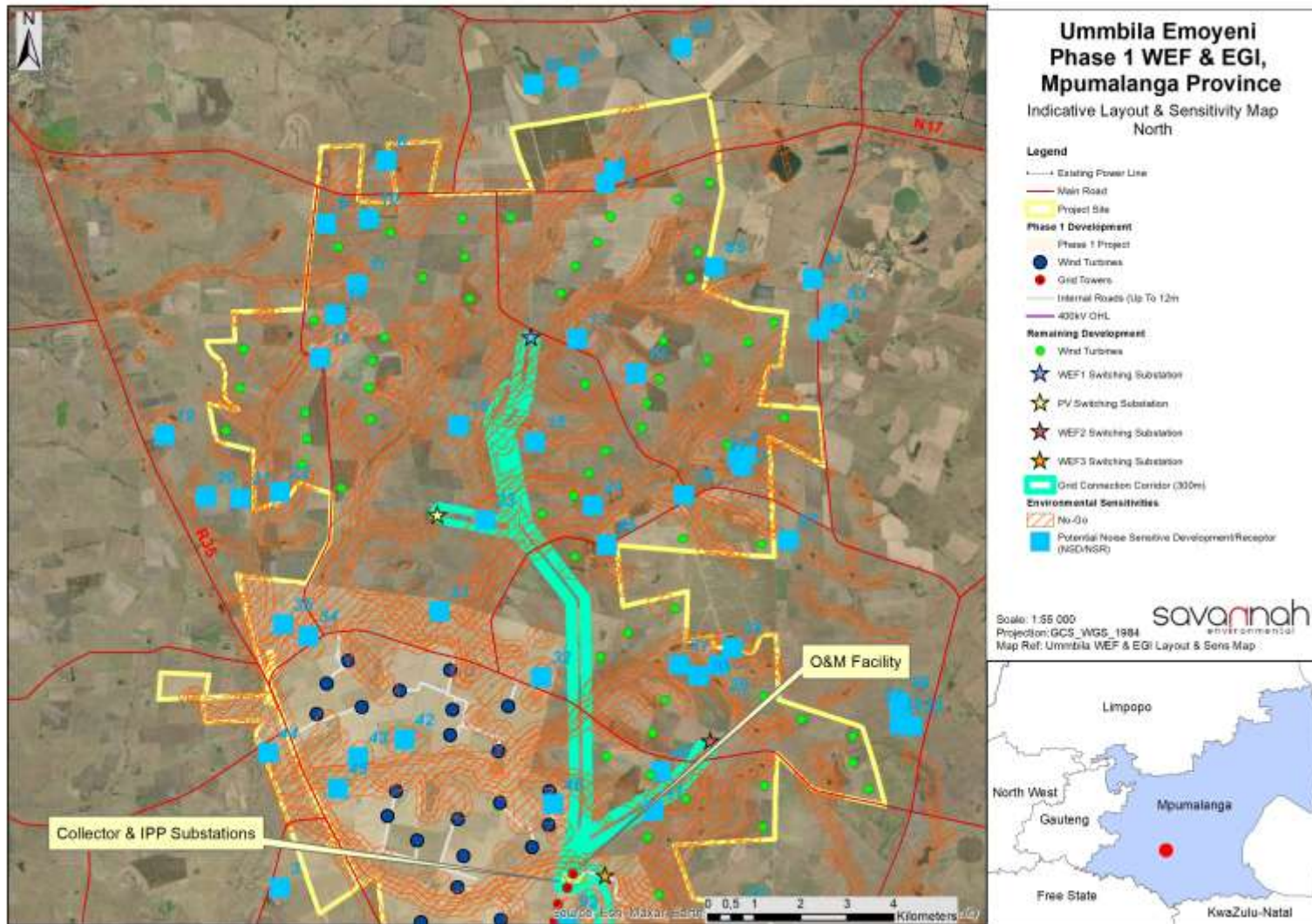


Figure 2.4: Northern final layout of the Umbila Emoyeni Phase 1 Wind Energy Facility together with an indicative layout for the remaining extent of the authorised Wind Farm overlain with the sensitivities identified in the EIA process³.

³ The status of the NSD/NSRs is to be confirmed.

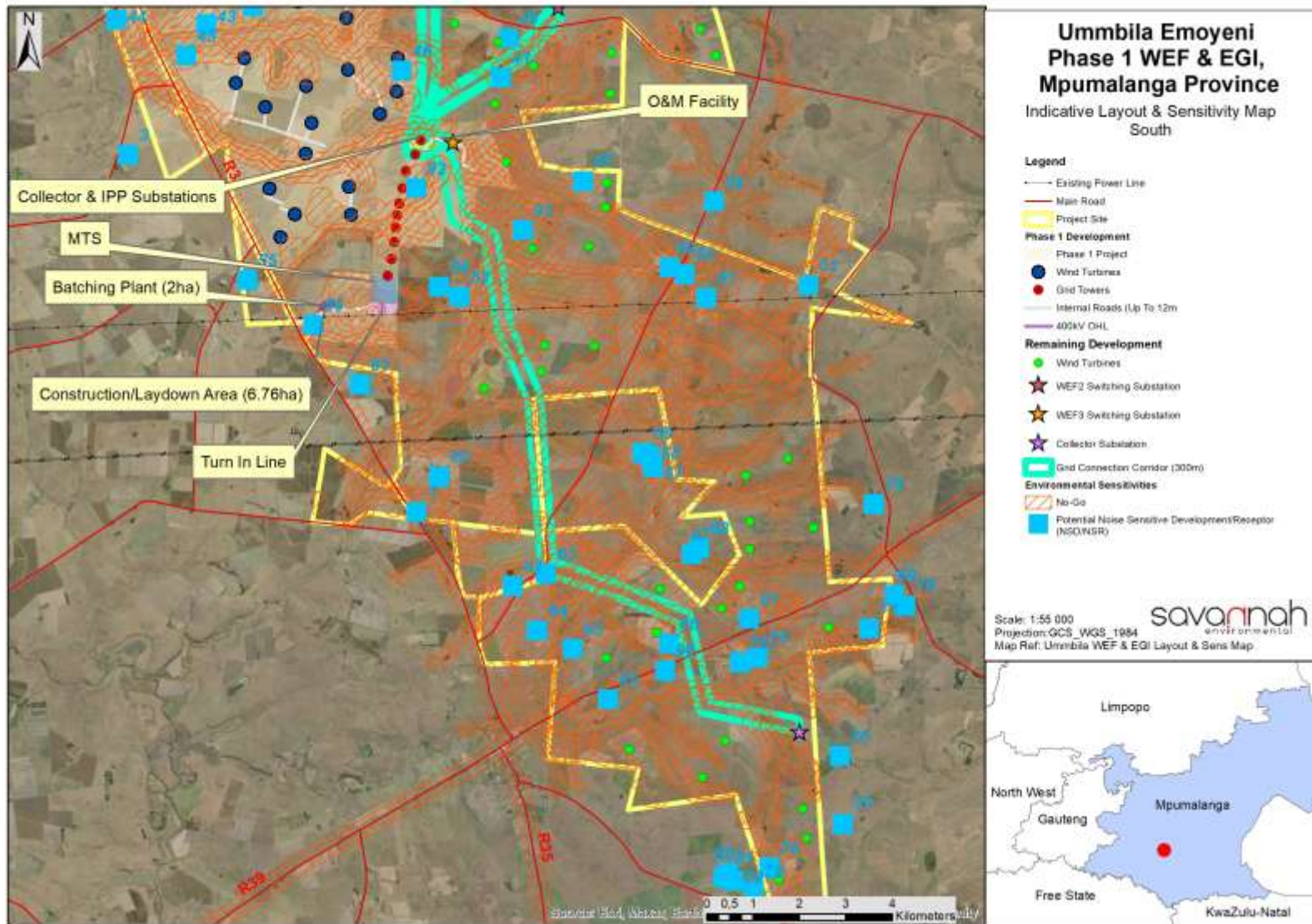


Figure 2.5: Southern final layout of the Umbila Emoyeni Phase 1 Wind Energy Facility together with an indicative layout for the remaining extent of the authorised Wind Farm overlain with the sensitivities identified in the EIA process⁴.

⁴ The status of the NSD/NSRs is to be confirmed.

CHAPTER 3: PURPOSE AND OBJECTIVES OF THE EMPr

An Environmental Management Programme (EMPr) is defined as “an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented or mitigated, and that the positive benefits of the projects are **enhanced**”. The objective of this EMPr is to provide consistent information and guidance for implementing the management and monitoring measures established in the permitting process and help achieve environmental policy goals. The purpose of an EMPr is to help ensure continuous improvement of environmental performance, reducing negative impacts and enhancing positive effects during the construction and operation of the facility. An effective EMPr is concerned with both the immediate outcome as well as the long-term impacts of the project.

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

This EMPr is applicable to all employees and contractors working on the pre-construction, construction, and operation and maintenance phases of the Umbila Emoyeni Phase 1 Wind Energy Facility. The document must be adhered to and updated as relevant throughout the project life cycle.

This EMPr has been compiled in accordance with Appendix 4 of the EIA Regulations, 2014 (as amended). This is a dynamic document and will be further developed in terms of specific requirements listed in any authorisations issued for the Umbila Emoyeni Phase 1 Wind Energy Facility and/or as the project develops. The EMPr has been developed as a set of environmental specifications (i.e. principles of environmental management). The specifications have been developed on the basis of the findings of the Environmental Impact Assessment (EIA), and must be implemented to protect sensitive on-site and off-site features through controlling construction, operation and decommissioning activities that could have a detrimental effect on the environment, and through avoiding or minimising potential impacts.

The EMPr has the following objectives:

- » Outline mitigation measures and environmental specifications which are required to be implemented for the planning, construction, rehabilitation and operation phases of the project in order to minimise the extent of environmental impacts, and to manage environmental impacts associated with the Umbila Emoyeni Phase 1 Wind Energy Facility.
- » Ensure that the construction and operation phases do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits are enhanced.
- » Identify entities who will be responsible for the implementation of the measures and outline functions and responsibilities.
- » Propose mechanisms and frequency for monitoring compliance, and prevent long-term or permanent environmental degradation.

- » Facilitate appropriate and proactive responses to unforeseen events or changes in project implementation that were not considered in the EIA process.

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

Umbila Emoyeni (Pty) Ltd must ensure that the implementation of the project complies with the requirements of all environmental authorisations, permits, and obligations emanating from relevant environmental legislation. This obligation is partly met through the development and the implementation of this EMPr, and through its integration into the relevant contract documentation provided to parties responsible for construction and/or operation activities on the site. The adequacy and efficacy of implementation is to be monitored by an independent Environmental Control Officer (ECO). Since this EMPr is part of the EIA process for the Umbila Emoyeni Phase 1 Wind Energy Facility, it is important that this document be read in conjunction with the Final EIA report compiled for this project. This will contextualise the EMPr and enable a thorough understanding of its role and purpose in the integrated environmental management process. Should there be a conflict of interpretation between this EMPr and the Environmental Authorisation, the stipulations in the Environmental Authorisation shall prevail over that of the EMPr, unless otherwise agreed by the authorities in writing. Similarly, any provisions in legislation overrule any provisions or interpretations within this EMPr.

This EMPr shall be binding on all the parties involved in the planning, construction and operational phases of the project, and shall be enforceable at all levels of contract and operational management within the project. The document must be adhered to and updated as relevant throughout the project life cycle.

CHAPTER 4: STRUCTURE OF THIS EMPR

The first three chapters provide background to the EMPr and the Umbila Emoyeni Wind Energy Facility, while the chapters which follow consider the following:

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

These chapters set out the procedures necessary for Umbila Emoyeni (Pty) Ltd as the project owner, to minimise environmental impacts and achieve environmental compliance. For each of the phases of implementation, an over-arching environmental goal is stated. In order to meet this goal, a number of objectives are listed. The EMPr has been structured in table format in order to show the links between the goals for each phase and their associated objectives, activities/risk sources, mitigation actions, monitoring requirements and performance indicators. A specific EMPr table has been established for each environmental objective. The information provided within the EMPr table for each objective is illustrated below:

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

Project component/s	List of project components affecting the objective, i.e.: <ul style="list-style-type: none"> » Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	Brief description of potential environmental impact if objective is not met.
Activity/risk source	Description of activities which could impact on achieving objective.
Mitigation: Target/Objective	Description of the target; include quantitative measures and/or dates of completion.

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

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

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

- » Planned activities change (i.e. in terms of the components of the wind farm).
- » Modification to or addition to environmental objectives and targets.
- » Additional or unforeseen environmental impacts are identified and additional measures are required to be included in the EMPr to prevent deterioration or further deterioration of the environment.
- » Relevant legal or other requirements are changed or introduced.
- » Significant progress has been made in achieving an objective or target such that it should be re-examined to determine if it is still relevant or should be modified, etc.

4.1. Project Team

This EMPr was compiled by:

- » Chantelle Geyer is the EAP on this project and the GIS Practitioner, she holds a BSc degree in Environmental Science, and a BSc Honours degree in Environmental Geology from the North-West University, South Africa. She is an Environmental Consultant and specialises in basic assessments, environmental impact assessments, GIS-mapping, public participation administration, and environmental management programmes.
- » Jo-Anne Thomas, the principle EAP on this project, is a registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA - 2019/726) and a Professional Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP). She provides technical input for projects in the environmental management field, specialising in Strategic Environmental Advice, Environmental Impact Assessment studies, environmental auditing and monitoring, environmental permitting, public participation, Environmental Management Plans and Programmes, environmental policy, strategy and guideline formulation, and integrated environmental management. Her key focus is on integration of the specialist environmental studies and findings into larger engineering-based projects, strategic assessment, and providing practical and achievable environmental management solutions and mitigation measures. Responsibilities for environmental studies include project management (including client and authority liaison and management of specialist teams); review and manipulation of data; identification and assessment of potential negative environmental impacts and benefits; review of specialist studies; and the identification of mitigation measures.
- » Nicolene Venter, the principle public participation consultant for this project, is a Board Member of IAPSA (International Association for Public Participation South Africa). She holds a Higher Secretarial Diploma and has over 25 years of experience in public participation, stakeholder engagement, awareness creation processes and facilitation of various meetings (focus group, public meetings, workshops, etc.). She is responsible for project management of public participation processes for a wide range of environmental projects across South Africa and neighbouring countries.

In order to adequately identify and assess potential environmental impacts associated with the proposed Umbila Emoyeni Wind Energy Facility, the following specialist sub-consultants have provided input into the Final EIA Report:

Specialist	Area of Expertise
Gerhard Botha of Nkurenkuru Ecology and Biodiversity (Pty) Ltd	Ecology and Surface Water
Owen Davies of Arcus Consulting	Avifauna
Jonathan Aronson of Camissa	Bats

Specialist	Area of Expertise
Matthew Mamera and Andrew Husted of the Biodiversity Company	Soils and Agricultural Potential
Morné de Jager of Enviro-Acoustic Research	Noise
Jon Marshall of Environmental Planning & Design CC	Visual
Pierre van Jaarsveld of Urban-Econ Development Economist (Pty) Ltd	Socio- Economic
Jenna Lavin of CTS Heritage	Heritage (including Archaeology Palaeontology and Cultural Heritage)
Iris Wink of JG Afrika	Traffic

The Savannah Environmental team have extensive knowledge and experience in environmental impact assessment and environmental management, having been involved in EIA processes for more than seventeen (17) years. They have managed and drafted Environmental Management Programmes for other power generation projects throughout South Africa, including numerous wind and solar energy facilities.

CHAPTER 5: ROLES AND RESPONSIBILITIES

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

For the purposes of the EMPr, the generic roles that need to be defined are those of the:

- » Project Developer;
- » Project Manager/Site Manager;
- » Environmental Control Officer;
- » Contractors; and
- » Contractor's Safety, Health and Environment Representative/Environmental Officer.

It is acknowledged that the specific titles for these functions may vary once the project is implemented. The purpose of this section of the EMPr is to give a generic outline of what these roles typically entail. It is expected that this will be further defined during project implementation.

i) The Developer

As the Proponent, Umbila Emoyeni (Pty) Ltd must ensure that the implementation of the project complies with the requirements of all environmental authorisations and all other permits, and obligations emanating from other relevant environmental legislation.

ii) Project Manager/Site Manager

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

- » Be fully conversant with the EIA for the project, the EMPr, the conditions of the Environmental Authorisation, and all relevant environmental legislation.
- » Be fully knowledgeable with the contents of all relevant licences and permits.
- » Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures.
- » Ensure all specifications and legal constraints specifically with regards to the environment are highlighted to the Contractor(s) so that they are aware of these.
- » Monitor site activities on a daily basis for compliance.
- » Ensure that the EMPr is correctly implemented throughout the project by means of site inspections and meetings. This must be documented as part of the site meeting minutes.
- » Conduct internal audits of the construction site against the EMPr.
- » Confine the construction site to the demarcated area.
- » Rectify transgressions through the implementation of corrective action.

iii) Environmental Control Officer

A suitably qualified Environmental Control Officer (ECO)⁵ must be appointed by the project proponent prior to the commencement of any authorised activities and will be responsible for monitoring, reviewing and verifying compliance by the Contractor with the environmental specifications of the EMPr and the conditions of the Environmental Authorisation. Accordingly, the ECO will:

- » Be fully knowledgeable of the contents of the EIA Report.
- » Be fully knowledgeable of the contents of the conditions of the EA.
- » Be fully knowledgeable of the contents of the EMPr.
- » Be fully knowledgeable of all the licences and permits issued to the site.
- » Be fully knowledgeable of the contents of all relevant environmental legislation.
- » Ensure that the contents of the EMPr are communicated to the Contractors site staff and that the Site Manager and Contractors are constantly made aware of the contents through ongoing discussion.
- » Ensure that the compliance of the EMPr, EA and the legislation is monitored through regular and comprehensive inspection of the site and surrounding areas.
- » Ensure that the Site Manager has input into the review and acceptance of construction methods and method statements or site-specific plans.
- » Ensure that if the EMPr, EA and/or the legislation conditions, regulations or specifications are not followed then appropriate measures are undertaken to address any non-compliances (for example an ECO may cease construction or an activity to prevent a non-compliance from continuing).
- » Ensure that any non-compliance or remedial measures that need to be applied are reported.
- » Keep records of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.
- » Independently report to the DFFE in terms of compliance with the specifications of the EMPr and conditions of the EA.
- » Keep records of all reports submitted to DFFE.

The ECO must be present full-time on site for the site preparation and initial clearing activities to ensure the correct demarcation of no-go areas, to facilitate environmental induction with construction staff and supervise any flora relocation and faunal rescue activities that may need to take place during the site clearing (i.e. during site establishment, and excavation of foundations). Thereafter, monthly compliance audits can be undertaken, provided that adequate compliance with the EA, environmental permits and EMPr is achieved. The developer should appoint a designated Environmental Officer (EO) to be present on-site full-time to deal with any environmental issues as they arise. The ECO shall remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site handed over for operation.

iv) Contractors

The Lead Contractor is responsible for the following:

- » Ensure compliance with the EA, environmental permits and the EMPr at all times during construction.
- » Have the overall responsibility of the EMPr and its implementation.

⁵ The ECO should have a relevant degree or technical diploma in environmental management and at least 2 years of experience in the field

- » Ensure that all appointed contractors and sub-contractors are aware of the EMPr and their respective responsibilities.
- » Provide all necessary supervision during the execution of the project.
- » Comply with any special conditions as stipulated by landowners.
- » Inform and educate all employees about the environmental risks associated with the various activities to be undertaken, and highlight those activities which should be avoided during the construction process in order to minimise significant impacts to the environment.
- » Maintain an environmental register which keeps a record of all incidents which occur on the site during construction. These incidents include:
 - * Public involvement / complaints
 - * Health and safety incidents
 - * Hazardous materials stored on site
 - * Non-compliance incidents
 - * Ensure that no actions are taken which will harm or may indirectly cause harm to the environment, and take steps to prevent pollution on the site.
- » Where construction activities are undertaken is close to any inhabited area, the necessary precautions shall be taken by the Contractor to safeguard the lives and property of the inhabitants.
- » Conduct audits to ensure compliance to the EMPr.
- » Ensure there is communication with the Project Manager, the ECO, and relevant discipline engineers on matters concerning the environment.
- » Should the Contractor require clarity on any aspect of the EMPr the Contractor must contact the Environmental Consultant/Officer for advice.

Contractors and Service Providers must be aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. The contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The contractor's obligations in this regard include the following:

- » Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment.
- » A copy of the EMPr must be easily accessible to all on-site staff members.
- » Employees must be familiar with the requirements of this EMPr and the environmental specifications as they apply to the construction of the wind farm.
- » Prior to commencing any site works, all employees and sub-contractors must have attended an environmental awareness training course which must provide staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- » Staff will be informed of environmental issues as deemed necessary by the ECO.

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

- » Ensuring adherence to the environmental management specifications.
- » Ensuring that Method Statements are submitted to the Site Manager (and ECO) for approval before any work is undertaken.
- » Any lack of adherence to the above will be considered as non-compliance to the specifications of the EMPr.
- » Ensuring that any instructions issued by the Site Manager on the advice of the ECO are adhered to.

- » Ensuring that a report is tabled at each site meeting, which will document all incidents that have occurred during the period before the site meeting.
- » Ensuring that a register is kept in the site office, which lists all transgressions issued by the ECO.
- » Ensuring that a register of all public complaints is maintained.
- » Ensuring that all employees, including those of sub-contractors receive training before the commencement of construction in order that they can constructively contribute towards the successful implementation of the EMPr (i.e. ensure their staff are appropriately trained as to the environmental obligations).

v) **Contractor's Environmental Representative/Environmental Officer**

The Contractor's Environmental Representative/Environmental Officer (EO), employed by the Contractor, is responsible for managing the day-to-day on-site implementation of this EMPr, and for the compilation of regular (usually weekly) Monitoring Reports. In addition, the EO must act as liaison and advisor on all environmental and related issues and ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor.

The Contractor's EO should:

- » Be well versed in environmental matters.
- » Understand the relevant environmental legislation and processes.
- » Understand the hierarchy of Environmental Compliance Reporting, and the implications of Non-Compliance.
- » Know the background of the project and understand the implementation programme.
- » Be able to resolve conflicts and make recommendations on site in terms of the requirements of this Specification.
- » Keep accurate and detailed records of all EMPr-related activities on site.

OBJECTIVE 2: Establish clear reporting, communication, and responsibilities during operation in relation to overall implementation of the EMPr during operation

Formal responsibilities are necessary to ensure that key procedures are executed during operation. Several professionals will form part of the operation team. For the purposes of the EMPr, the generic roles that need to be defined are those of the:

- » Operations Manager; and
- » Environmental Manager

It is acknowledged that the specific titles for these functions may vary once the project is implemented. The purpose of this section of the EMPr is to give a generic outline of what these roles typically entail. It is expected that this will be further defined during project implementation.

i) **Operations Manager**

The Operations Manager will:

- » Ensure that adequate resources (human, financial, technology) are made available and appropriately managed for the successful implementation of the operational EMPr.
- » Conduct annual basis reviews of the EMPr to evaluate its effectiveness.
- » Take appropriate action as a result of findings and recommendations in management reviews and audits.
- » Provide forums to communicate matters regarding environmental management.

ii) Environmental Manager

The Environmental Manager will:

- » Develop and Implement an Environmental Management System (EMS) for the wind farm and associated infrastructure.
- » Manage and report on the **wind farm's** environmental performance.
- » Maintain a register of all known environmental impacts and manage the monitoring thereof.
- » Conduct internal environmental audits and co-ordinate external environmental audits.
- » Liaise with statutory bodies (such as the National and Provincial Department of Environmental Affairs and conservation authorities) on environmental performance and other issues.
- » Conduct environmental training and awareness for the employees who operate and maintain the wind farm.
- » Compile environmental policies and procedures.
- » Liaise with interested and affected parties on environmental issues of common concern.
- » Track and control the lodging of any complaints regarding environmental matters.

The Environmental Manager must provide fourteen (14) days written notification to the DFFE that the Umbila Emoyeni Phase 1 Wind Energy Facility operation phase will commence.

CHAPTER 6: MANAGEMENT PROGRAMME: PLANNING AND DESIGN

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

- » Ensures that the design of the wind farm responds to the identified environmental constraints and opportunities.
- » Ensures that pre-construction activities are undertaken in accordance with all relevant legislative requirements.
- » Ensures that adequate regard has been taken of identified environmental sensitivities, as well as any landowner and community concerns and that these are appropriately addressed through design and planning (where applicable).
- » Enables the construction activities to be undertaken without significant disruption to other land uses and activities in the area.
- » Ensures that the best environmental options are selected for the wind farm.

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

6.1. Objectives

OBJECTIVE 1: To ensure that the design of the facility responds to the identified environmental constraints and opportunities

The final layout detailed in Figure 2.2 must be implemented. Cognisance of sensitive areas defined in Figure 2.2 and within the Final EIA Report (Savannah Environmental, 2022) must be considered when undertaking the final design of the facility.

Project component/s	<ul style="list-style-type: none"> » Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	<ul style="list-style-type: none"> » Design fails to respond optimally to the identified environmental considerations. » Employment creation for the construction, operation and decommissioning activities. » Design fails to respond optimally to the environmental considerations.
Activities/risk sources	<ul style="list-style-type: none"> » Positioning of turbines and alignment of access roads and underground cabling. » Positioning of onsite substations. » Positioning of laydown areas. » Pre-construction activities, e.g. geotechnical investigations.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure that the design of the wind farm responds to the identified environmental constraints and opportunities, including the constraints identified through the EIA process. » To ensure that pre-construction activities are undertaken in an environmentally friendly manner by e.g. avoiding identified sensitive areas. » Optimal planning of visual infrastructure to minimise visual impact.

Mitigation: Action/control	Responsibility	Timeframe
Plan and conduct pre-construction activities in an environmentally responsible manner and in a manner that does not lead to unnecessary impacts and disturbance.	Developer EPC Contractor	Pre-construction
Consider design level mitigation measures recommended by the specialists, especially with respect to noise, flora, fauna, aquatic ecology, avifauna, bats, and heritage sites, as detailed within the EIA report and relevant appendices.	Developer EPC Contractor	Design phase
Following the final design of the Umbila Emoyeni Wind Energy Facility, a revised layout must be submitted to DFFE for review and approval prior to commencing with construction. Micro-siting must take all recommended mitigation measures into consideration. No development is permitted within the identified no-go areas as detailed in Figure 2.2.	Developer EPC Contractor	Design phase
Ensure that laydown areas, construction camps and other temporary use areas are located in areas of low and medium sensitivity and are properly fenced or demarcated as appropriate and practically possible.	Developer EPC Contractor	Design phase
<p>The following buffer areas are recommended, and should be implemented for maintaining the freshwater resource features REC (Recommended Ecological Category) allowing the persistence of the current present ecological status as well as their functions and services.</p> <ul style="list-style-type: none"> » All small, endorheic seepages and depressions with a High Ecological Importance: 50m buffers from the outer edge of the freshwater resource features. » All larger interconnected wetland features with Very High Ecological Importance: 100m buffers from the outer edge of the freshwater resource features. » All freshwater features with their buffer areas have been classified as either Very High- or High sensitive and should be regarded as “No-Go” areas apart from the following activities and infrastructure which may be allowed (although restricted to an absolute minimum footprint): <ul style="list-style-type: none"> * only activities relating to the route access and cabling; * the use/upgrade of existing roads and watercourse crossings are the preferred options; * Where no suitable existing roads and watercourse crossings exist, the construction of new access roads and watercourse crossings can be allowed, however this should be deemed as a last resort. * All underground cabling should be laid either within access roads or next to access roads (as close as possible). 	Developer EPC Contractor	Design phase
<u>Drainage lines must be avoided for turbine placement and access roads, and a no-go buffer of 20 m must be applied around them.</u>	<u>Project manager,</u> <u>Environmental Officer</u>	<u>Life of operation</u>
Existing watercourse crossings should be utilised/upgraded as far as possible.	Developer EPC Contractor	Design phase

Mitigation: Action/control	Responsibility	Timeframe
Where new watercourse/wetland crossings are required, the engineering team must provide an effective means to minimise the potential upstream and downstream effects of sedimentation and erosion (erosion protection) as well minimise the loss of riparian vegetation (reduce footprint as much as possible). All crossings over watercourses/wetlands should be such that the flow within the channels is not impeded and should be constructed perpendicular to the river/wetland channel.	Developer EPC Contractor	Design phase
Road infrastructure and cable alignments should coincide as far as possible to minimise the impact.	Developer EPC Contractor	Design phase
The underground MV cabling, where crossing watercourses/wetlands, should be laid within the access roads (existing), or if not possible, within the shoulder or at least within 3m of the road shoulder. Ideally the construction disturbance footprint should be kept to an area no wider than 5m.	Developer EPC Contractor	Design phase
Under no circumstances must new channels be created for flow diversion and conveyance purposes unless approved as part of an EA or WUL.	Developer EPC Contractor	Design phase
All crossings over watercourses/wetlands should be such that the flow within the channels is not impeded and should be constructed perpendicular to the river channel/ and wetland feature.	Developer EPC Contractor	Design phase
Infrastructure to avoid avifauna Very High Sensitivity areas, linear infrastructure (including roads) permitted.	Developer EPC Contractor	Design phase
The footprint within avifauna Medium Sensitivity areas should be minimised and avoided wherever possible.	Developer EPC Contractor	Design phase
Prevent birds from nesting in substation infrastructure through exclusion covers or spikes if required (determined on a case-by-case basis).	Developer Specialist	Operation phase
The minimum footprint areas of infrastructure should be used wherever possible, including road widths and lengths.	Developer EPC Contractor	Design phase
The minimum number of WTGs should be constructed to achieve the required MW output.	Developer EPC Contractor	Design phase
The painting (red or black) of a single blade of each WTG in these areas should be investigated and employed pending approval from the Civil Aviation Authority (CAA).	Developer EPC Contractor	Design phase
Internal power lines should be buried wherever possible.	Developer EPC Contractor	Design phase
No placement of infrastructure (except roads) within 200m of key habitat features specifically including tree clumps, buildings, dams/wetlands, and rivers/streams.	Developer EPC Contractor	Design phase
Maintain a minimum blade sweep of 30m to avoid impacts to lower flying bats such as clutter-edge species (e.g., Cape serotine, Natal long-fingered bat).	Developer EPC Contractor	Design phase
Avoid all high agricultural production land and other actively cultivated areas. Where avoidance is not feasible, stakeholder engagement should occur to compensate affected landowners.	Developer EPC Contractor	Design phase

Mitigation: Action/control	Responsibility	Timeframe
Turbine foundations must be (preferably) located in already disturbed areas that are not actively cultivated.	Developer EPC Contractor	Design phase
A 50m no-go development buffer is implemented around all burial ground sites including Observations 001, 005, 006, 008, 012 and 013. A Management Plan for the ongoing conservation of these burials is to be developed prior to construction (<u>refer to Appendix J</u>), along with a Guide on how to identify marked and unmarked burials and how to proceed should previously unidentified burials be uncovered during the construction process.	Developer EPC Contractor	Design phase
The historic farm werf cluster as defined in the Heritage Impact Assessment must not be impacted by the development.	Developer EPC Contractor	Design phase
A 500m no development buffer should be implemented on either side of the R35 and R39.	Developer EPC Contractor	Design phase
A 200m no development buffer should be implemented on either side of the secondary routes that run through the development area.	Developer EPC Contractor	Design phase
A 500m no development buffer must be implemented around the identified farm werfs.	Developer EPC Contractor	Design phase
If the structures located at NSR47 are used for residential purposes at the time of constructing the project, the resident(s) must be relocated, or the WTG located within 1 000m from these NSR should be moved further than 1 000m from these NSR.	Developer EPC Contractor	Design phase
In order to minimise noise impacts on NSRs used for residential purposes within 1 000m of WTGs at the time of implementation of the project: <ul style="list-style-type: none"> » the resident(s) could be relocated, or; » the WTG located within 1 000m from these NSR be moved further than 1 000m from these NSR; or » the applicant can select to use a quieter WTG (with a SPL less than 108.5 dBA as per the IEC 61400-14 certificate) within 1 500m from NSR 40 and 46. 	Developer EPC Contractor	Design phase
Relocate turbines within 500m of main roads.	Developer EPC Contractor	Design phase
Relocate receptors affected by significant shadow flicker or implementation of a shadow flicker protection system.	Developer EPC Contractor	Design phase
Undertake careful design of security and operational lighting to minimise impacts on surrounding areas. No high mast lighting should be used.	Developer EPC Contractor	Design phase
Performance Indicator	<ul style="list-style-type: none"> » Design meets the objectives and does not degrade the environment. » Design and layouts respond to the mitigation measures and recommendations in the EIA report. 	
Monitoring	<ul style="list-style-type: none"> » Ensure that the design implemented meets the objectives and mitigation measures in the EIA report through review of the facility design by the Project Manager and ECO prior to the commencement of construction. 	

OBJECTIVE 2: Ensure that relevant permits and site-specific plans are in place to manage impacts on the environment

Project Component/s	<ul style="list-style-type: none"> » Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	<ul style="list-style-type: none"> » Impact on identified sensitive areas. » Design fails to respond optimally to the environmental considerations.
Activities/Risk Sources	<ul style="list-style-type: none"> » Positioning of all project components. » Pre-construction activities, e.g. geotechnical investigations, site surveys of substation footprint, power line servitude and internal access roads and environmental walk-through surveys. » Positioning of temporary sites.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure that the design of the power plant responds to the identified environmental constraints and opportunities. » To ensure that pre-construction activities are undertaken in an environmentally friendly manner. » To ensure that the design of the power plant responds to the identified constraints identified through pre-construction surveys.

Mitigation: Action/Control	Responsibility	Timeframe
Obtain any additional environmental permits required prior to the commencement of construction.	Developer	Pre-construction
Obtain abnormal load permits for transportation of project components to site (if required).	Contractor(s)	Prior to construction
A detailed geotechnical investigation is required for the design phase for all infrastructure components.	Developer	Design phase
Undertake ecological preconstruction walk-through of the final development footprint for protected species that would be affected and that can be translocated.	Developer Specialist	Pre-construction
Avifaunal pre-construction walk-through of the approved development footprint must be undertaken to ensure that sensitive habitats and species are avoided wherever possible. Site walkthrough should cover the final road and power line routes as well as temporary laydown areas and facilities, to identify any nests/breeding/roosting activity of sensitive species. The results of which must inform the final construction schedule in close proximity to that specific area, including abbreviating construction time, scheduling activities around breeding activity, and lowering levels of associated noise.	Developer Specialist	Pre-construction
Obtain any additional environmental permits required. Copies of permits/licenses must be submitted to the Director: Environmental Impact Evaluation at the DFFE, and kept on site during the construction and operation phases of the project.	Developer	Design phase
The necessary biodiversity permits must be obtained prior to removal of any species of concern.	Developer	Pre-construction

Mitigation: Action/Control	Responsibility	Timeframe
Should protected tree species occur in the project area, permits are required to have them removed in accordance with section (15) (1) of the National Forest Act, 1998, as amended.	Developer	Pre-construction
Search and rescue of species of conservation concern should be conducted prior to clearing activities.	Developer Contractor	Pre-construction
<u>For the threatened species that may not be destroyed, it is recommended that professional service providers that deal with plant search and rescue be used to remove such plants and use them either for later rehabilitation work or other conservation projects.</u>	<u>Project manager, Environmental Officer & Contractor</u>	<u>Planning Phase, Pre-Construction</u>
A stormwater management plan must be developed in the pre-construction phase, detailing the stormwater structures and management interventions that must be installed to manage the increase of surface water flows directly into any natural systems. The stormwater control systems must be inspected on an annual basis to ensure these are functional. Effective stormwater management must include effective stabilisation (gabions and Reno mattresses) of exposed soil and the re-vegetation of any disturbed riverbanks.	Contractor(s)	Design phase
Develop an Alien Invasive and Vegetation Rehabilitation Management Plan (refer to <u>Appendix C</u>).	Developer	Pre-construction
Develop a detailed method statement for the implementation of the plant rescue and protection plan for the site (refer to Appendix E).	Developer	Pre-construction
Develop a detailed method statement for the implementation of the re-vegetation and habitat rehabilitation plan for the site (refer to Appendix D).	Developer	Pre-construction
Develop a detailed method statement for the implementation of the traffic and transportation management plan for the site (refer to Appendix F).	Developer	Pre-construction
Develop an effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems.	<u>Contractor</u>	Pre-construction, <u>Construction</u>
Prepare a detailed Fire Management Plan in collaboration with surrounding landowners.	Developer/ <u>Contractor</u>	Pre-construction
A comprehensive rehabilitation / monitoring plan must be developed in consultation with a specialist, and must be implemented from the project onset i.e. during the detailed design phase prior to construction, to ensure a net benefit to the environment within all areas that will remain undisturbed.	Developer Contractor Specialist	Pre-construction

Performance Indicator	<ul style="list-style-type: none"> » Layout does not destroy/degrade no-go areas. » No disturbance of no-go areas. » Permits are obtained and relevant conditions complied with. » Relevant management plans and Method Statements prepared and implemented.
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Monitoring	<ul style="list-style-type: none"> » Review of the design by the Project Manager and the ECO prior to the commencement of construction. » Monitor ongoing compliance with the EMPr.
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OBJECTIVE 3: Ensure compliance of required mitigation measures and recommendations by contractors

Project Component/s	<ul style="list-style-type: none"> » Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	<ul style="list-style-type: none"> » Impact on identified sensitive areas. » Planning fails to respond optimally to the environmental considerations.
Activities/Risk Sources	<ul style="list-style-type: none"> » Positioning of all project components. » Pre-construction activities. » Positioning of temporary sites. » Employment and procurement procedures.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure that appropriate planning is undertaken by the contractor to ensure compliance with the conditions of the EA and EMPr. » To ensure that pre-construction and construction activities are undertaken in an environmentally friendly manner.

Mitigation: Action/Control	Responsibility	Timeframe
The terms of this EMPr and the Environmental Authorisation must be included in all tender documentation and Contractors <u>(including sub-contractors)</u> contracts.	Developer Contractor	Pre-construction
Organise local community meetings to advise the local labour on the project that is planned to be established and the jobs that can potentially be applied for.	Developer Contractor	Pre-construction
The developer should encourage the EPC contractor to increase the local procurement practices and promote the employment of people from local communities, as far as feasible, to maximise the benefits to the local economies.	Developer Contractor	Pre-construction
The developer should engage with local authorities and business organisations to investigate the possibility of procuring construction materials, goods and products from local suppliers where feasible.	Developer Contractor	Pre-construction

Performance Indicator	<ul style="list-style-type: none"> » Conditions of the EA and EMPr form part of all contracts. » Local employment and procurement is encouraged.
Monitoring	<ul style="list-style-type: none"> » Monitor ongoing compliance with the EMPr and method statements.

OBJECTIVE 4: To ensure effective communication mechanisms

It is important to maintain on-going communication with the public (including affected and surrounding landowners) during the construction and operation phases of the Umbila Emoyeni Wind Energy Facility. Any issues and concerns raised should be addressed as far as possible in as short a timeframe as possible.

Project component/s	<ul style="list-style-type: none"> » Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	<ul style="list-style-type: none"> » Impacts on affected and surrounding landowners and land uses.
Activity/risk source	<ul style="list-style-type: none"> » Activities associated with pre-construction phase. » Activities associated with construction of the wind farm. » Activities associated with operation.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Effective communication with affected and surrounding landowners. » Addressing any issues and concerns raised as far as possible in as short a timeframe as possible.

Mitigation: Action/control	Responsibility	Timeframe
<p>Compile and implement a grievance mechanism procedure for the public (including the affected and surrounding landowners) (using Appendix B) to be implemented during both the construction and operation phases of the wind farm and if applicable during decommissioning. This procedure should include the details of the contact person who will be receiving issues raised by interested and affected parties, and the process that will be followed to address issues. The mechanism must also include procedures to lodge complaints in order for the local community to express any complaints or grievances with the construction process. A Public Complaints register must be maintained by the Contractor to record all complaints and queries relating to the project and the actions taken to resolve the issue.</p> <p>A Project Specific Grievance Mechanism must be developed and implemented prior to construction.</p>	<p>Developer Contractor O&M Operator</p>	<p>Pre-construction (construction procedure) Pre-operation (operation procedure)</p>
<p>Develop and implement a grievance mechanism for the construction, operation and closure phases of the wind farm for all employees, contractors, subcontractors and site personnel. This procedure should be in line with the South African Labour Law.</p>	<p>Developer Contractor O&M Operator</p>	<p>Pre-construction (construction procedure) Pre-operation (operation procedure)</p>
<p>Have a detailed consultation and communication plan with neighbouring property owners to keep them informed with regards to construction progress, issues and potential dangers.</p>	<p>Developer</p>	<p>Pre-construction</p>

Performance Indicator	<ul style="list-style-type: none"> » Effective communication procedures in place for all phases as required.
Monitoring	<ul style="list-style-type: none"> » An incident reporting system used to record non-conformances to the EMPr. » Grievance mechanism procedures implemented. » Public complaints register developed and maintained.

CHAPTER 7: MANAGEMENT PROGRAMME: CONSTRUCTION

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

- » Ensures that construction activities are properly managed in respect of environmental aspects and impacts.
- » Enables construction activities to be undertaken without significant disruption to other land uses and activities in the area, in particular concerning noise impacts, farming practices, traffic and road use, and effects on local residents.
- » Minimises the impact on the indigenous natural vegetation, protected tree species, and habitats of ecological value.
- » Minimises impacts on fauna using the site.
- » Minimises the impact on heritage sites should they be uncovered.
- » Ensures rehabilitation of disturbed areas following the execution of the works, such that residual environmental impacts are remediated or curtailed.

An environmental baseline must be established during the undertaking of construction activities, where possible.

7.1. Objectives

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

OBJECTIVE 1: Securing the site and site establishment

Project component/s	<ul style="list-style-type: none"> » Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	<ul style="list-style-type: none"> » Hazards to landowners and public. » Security of materials. » Substantially increased damage to natural vegetation. » Potential impact on fauna and avifauna habitat.
Activities/risk sources	<ul style="list-style-type: none"> » Open excavations (foundations and cable trenches). » Movement of construction employees, vehicles and plant equipment in the area and on-site.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To secure the site against unauthorised entry. » To protect members of the public/landowners/residents.

Mitigation: Action/control	Responsibility	Timeframe
Secure the site, working areas and excavations in an appropriate manner. Adequate protective measures must be implemented to prevent unauthorised access to the working area and the internal access/haul routes.	Contractor EO	During site establishment Maintenance: for duration of Contract

Mitigation: Action/control	Responsibility	Timeframe
The Contractor must take all reasonable measures to ensure the safety of the public in the surrounding area. Where the public could be exposed to danger by any of the works or site activities, the Contractor must, as appropriate, provide suitable flagmen, barriers and/or warning signs in English and any other relevant indigenous languages, all to the approval of the Site Manager. All unattended open excavations shall be adequately demarcated and/or fenced.	Contractor	During site establishment Maintenance: for duration of Contract
Where necessary to control access, fence and secure the area and implement access control procedures.	Contractor	During site establishment Maintenance: for duration of Contract
Establish SABS 089: 1999 Part 1 approved bunded areas for the storage of hazardous materials and hazardous waste.	Contractor	During site establishment and during construction
Establish the necessary ablution facilities with chemical toilets and provide adequate sanitation facilities and ablutions for construction workers (1 toilet per every 15 workers) at appropriate locations on site. These must be situated outside of any delineated watercourses and pans/depressions or associated buffers.	Contractor	During site establishment and during construction
Water consumption requirements for the site for the construction if not obtained from an authorised water user within the area, must be authorised by the Department of Water and Sanitation.	Developer	Prior to water use
Supply adequate weather and vermin proof waste collection bins and skips (covered at minimum with secured netting or shadecloth) at sites where construction is being undertaken. Separate bins should be provided for general and hazardous waste. As far as possible, provision should be made for separation of waste for recycling.	Contractor	Site establishment, and duration of construction

Performance Indicator	<ul style="list-style-type: none"> » Site is secure and there is no unauthorised entry. » No members of the public/ landowners injured as a result of construction activities. » Fauna and flora is protected as far as practically possible. » Appropriate and adequate waste management and sanitation facilities provided at construction site.
Monitoring	<ul style="list-style-type: none"> » Regular visual inspection of the fence for signs of deterioration/forced access. » An incident reporting system must be used to record non-conformances to the EMPr. » Public complaints register must be developed and maintained on site. » ECO/ EO to monitor all construction areas on a continuous basis until all construction is completed; immediate reporting back to the site manager. » ECO/ EO to address any infringements with responsible contractors as soon as these are recorded.

OBJECTIVE 2: Appropriate management of the construction site and construction workers

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

Mitigation: Action/Control	Responsibility	Timeframe
To minimise impacts on the surrounding environment, contractors must be required to adopt a certain Code of Conduct and commit to restricting construction activities to areas within the development footprint. Contractors and their sub-contractors must be familiar with the conditions of the Environmental Authorisation, the EIA Report, and this EMP, as well as the requirements of all relevant environmental legislation.	Contractors	Construction
Contractors must ensure that all workers are informed at the outset of the construction phase of the conditions contained in the Code of Conduct.	Contractor and sub-contractor/s	Pre-construction
Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.	Contractor	Construction
All construction vehicles must adhere to clearly defined and demarcated roads. No driving outside of the development boundary must be permitted.	Contractor	Construction
Ensure all construction equipment and vehicles are properly maintained at all times.	Contractor	Construction
Ensure proper health and safety plans in place during the construction period to ensure safety on and around site during construction	Specialist	Pre-construction
Ensure that construction workers are clearly identifiable. All workers must carry identification cards and wear identifiable clothing.	Contractor	Construction
Undertake pre-construction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimising wildlife interactions, remaining within demarcated construction areas, etc.	Contractor	Construction
All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
or collecting species such as tortoises and snakes, which are often persecuted out of fear or superstition, waste management and the importance of not undertaking activities that could result in pollution of those watercourses.		
Regular toolbox talks should be undertaken to ensure appropriate levels of environmental awareness.	Contractor	Construction
Contact details of emergency services must be prominently displayed on site.	Contractor	Construction
Contractor must provide adequate firefighting equipment on site and provide firefighting training to selected construction staff.	Contractor	Construction
Personnel trained in first aid must be on site to deal with smaller incidents that require medical attention.	Contractor	Construction
Road borders must be regularly maintained to ensure that vegetation remains short to serve as an effective firebreak. An emergency fire plan must be developed with emergency procedures in the event of a fire.	Contractor	Duration of construction
Strict control of the behaviour of construction workers must be implemented in terms of works near watercourses.	Contractor	Construction
Ensure waste storage facilities are maintained and emptied on a regular basis.	Contractor	Duration of construction
Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.	Contractor	Duration of Contract
No liquid waste, including grey water, may be discharged into any water body or drainage line. All sewage disposal to take place at a registered and operational wastewater treatment works. Proof of disposal to be retained as proof of responsible disposal.	Contractor	Duration of construction
All contaminated water must be contained by means of careful run-off management on site.	Contractor	Construction
Ensure compliance with all national, regional and local legislation with regard to the storage, handling and disposal of hydrocarbons, chemicals, solvents and any other harmful and hazardous substances and materials.	Contractor	During construction.
Ensure ablution facilities are appropriately maintained. Ablutions must be cleaned regularly and associated waste disposed of at a registered/permitted waste disposal site. Ablutions must be removed from site when construction is completed.	Contractor and sub-contractor/s	Duration of contract
Cooking and eating of meals must take place in a designated area. No fires are allowed on site. No firewood or kindling may be gathered from the site or surrounds.	Contractor and sub-contractor/s	Duration of contract
All litter must be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area. Particular attention needs to be paid to food waste.	Contractor and sub-contractor/s	Duration of contract
Keep a record of all hazardous substances stored on site. Clearly label all the containers storing hazardous waste.	Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
Existing access routes, especially roads must be made use of. The development areas and access roads should be specifically demarcated so that during the construction phase, only the demarcated areas may be impacted upon.	Environmental Officer & Design Engineer	Construction/Operational Phase
A Method Statement must be compiled for the management of pests and vermin within the site, specifically relating to the canteen area if applicable.	Contractor	Construction
Ensure proper health and safety plans in place during the construction period to ensure safety on and around site during construction, including fencing of the property and site access restriction.	Contractor and sub-contractor/s	Pre-construction
All disturbed areas that are not used such as excess road widths, should be rehabilitated with locally occurring shrubs and grasses after construction to reduce the overall footprint of the development.	Contractor and sub-contractor/s	Construction
On completion of the construction phase, all construction workers must leave the site within one week of their contract ending.	Contractor and sub-contractor/s	Construction

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

OBJECTIVE 3: Maximise benefits and opportunities associated with the construction phase

It is acknowledged that skilled personnel are required for the construction of the wind turbines and associated infrastructure. However, where semi-skilled and unskilled labour is required, opportunities for local employment should be maximised as far as possible. Employment of locals and the involvement of local Small, Micro and Medium Enterprises (SMMEs) would enhance the social benefits associated with the wind farm, even if the opportunities are only temporary. The procurement of local goods could furthermore result in positive economic spin-offs.

Project component/s	» Construction activities associated with the establishment of the wind farm, including associated infrastructure.
Potential Impact	» The opportunities and benefits associated with the creation of local employment and business should be maximised.
Activities/risk sources	» The employment of outside contractors to undertake the work and who make use of their own labour will reduce the employment and business opportunities for locals. Employment of local labour will maximise local employment opportunities.
Mitigation: Target/Objective	» The Developer, in discussions with the local municipality, should aim to employ as many workers (skilled, semi-skilled / low-skilled) from the local areas/ towns, as possible. » The Developer should also develop a database of local BBBEE service providers.

Mitigation: Action/control	Responsibility	Timeframe
Where feasible, effort must be made to employ locally in order to create maximum benefit for the communities.	Contractor	Construction
In order to maximise the positive impact, the project should company provide training courses for employees where feasible to ensure that employees gain as much as possible from the work experience.	Contractor	Construction
Where feasible, effort must be made to employ local labour in order to create maximum benefit for the communities and limit in-migration.	Contractor	Construction
Train unemployed local community members with insufficient skills and increase absorption of local labour thereby decreasing in-migration.	Contractor	Construction

Performance Indicator	» Maximum amount of semi and unskilled labour locally sourced where possible. » Local suppliers and SMMEs contracted where possible. » Skills transfer facilitated where required. » Apprenticeship programmes established.
Monitoring and Reporting	» Contractors and appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.

OBJECTIVE 4: Control of noise pollution stemming from construction activities

Various construction activities would be taking place during the development of the facility and may pose a noise risk to the closest receptors. These activities could include temporary or short-term activities where small equipment is used (such as the digging of trenches to lay underground power lines). The impact of such activities is generally very low. Impacts may however occur where activities are undertaken at night.

Project component/s	» Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	» Increased noise levels at potentially sensitive receptors.
Activity/risk source	» Any construction activities taking place within 500m from potentially noise sensitive developments (NSD). » Site preparation and earthworks.

	<ul style="list-style-type: none"> » Construction-related transport. » Foundations or plant equipment installation. » Building activities.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Ensure that maximum noise levels at potentially sensitive receptors are less than 65dBA. » Prevent the generation of disturbing or nuisance noises. » Ensure acceptable noise levels at surrounding stakeholders and potentially sensitive receptors. » Ensure compliance with the National Noise Control Regulations. » Ensure night-time noise levels less than 45 dBA.

Mitigation: Action/control	Responsibility	Timeframe
Establish a line of communication and notify all stakeholders and NSDs of the means of registering any issues, complaints or comments.	Developer	Construction
The applicant should plan the night-time construction schedule that simultaneous activities are only required at one WTG location (located within 1 000m from an NSR). Other construction activities can continue, but should take place further than 1 000m from NSR.	Developer	Construction
The applicant should minimise active equipment at night, planning the completion of noisiest activities (such as pile driving, rock breaking and excavation) during the daytime period.	Developer	Construction
Ensure that all equipment is maintained and fitted with the required noise abatement equipment.	EPC Contractor	Weekly inspection
The construction crew must abide by the local by-laws regarding noise.	EPC Contractor	Construction phase
<u>Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to amphibian species and nocturnal mammals.</u>	<u>Environmental Officer</u>	<u>Construction Phase</u>

Performance Indicator	<ul style="list-style-type: none"> » Construction activities do not change the existing ambient sound levels by more than 7dB. » Ensure that maximum noise levels at potentially sensitive receptors are less than 65 dBA. » No noise complaints are registered.
Monitoring and Reporting	<ul style="list-style-type: none"> » Ambient sound measurements are recommended to take place prior to the construction of the wind farm.

OBJECTIVE 5: Management of dust and emissions and damage to roads

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

Project component/s	<ul style="list-style-type: none"> » Wind turbines; » Access roads; and » Associated infrastructure.
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Potential Impact	<ul style="list-style-type: none"> » Dust impacts can occur from cleared areas and from vehicle movement along gravel roads. » Release of minor amounts of air pollutants (for example NO₂, CO and SO₂) from vehicles and construction equipment.
Activities/risk sources	<ul style="list-style-type: none"> » The movement of construction vehicles and their activities on the site. » Clearing of vegetation and topsoil. » Excavation, grading and scraping. » Transport of materials, equipment and components. » Re-entrainment of deposited dust by vehicle movements. » Wind erosion from topsoil and spoil stockpiles and unsealed roads and surfaces. » Fuel burning from construction vehicles with combustion engines.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To avoid and or minimise the potential dust impacts associated with heavy vehicles, and also minimise damage to roads. » To ensure emissions from all vehicles are minimised, where possible, for the duration of the construction phase. » To minimise nuisance to the community and adjacent landowners from dust emissions and to comply with workplace health and safety requirements for the duration of the construction phase.

Mitigation: Action/control	Responsibility	Timeframe
Reduce and control construction dust using approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).	Contractor	Construction phase
Vehicles and equipment must be maintained in a road-worthy condition at all times. Road worthy certificates must be in place for all heavy vehicles at the outset of the construction phase and updated on a monthly basis.	Contractor	Construction phase
Vehicles used to transport sand and building materials must be fitted with tarpaulins or covers when travelling on roads.	Contractor	Construction phase
Ensure vehicles adhere to speed limits on public roads and speed limits set within the site by the Site Manager.	Contractor Transportation contractor	Duration of contract
Ensure that damage to gravel public roads and access roads attributable to construction vehicles is repaired before completion of the construction phase.	EPC Contractor	Before completion of construction phase
Disturbed areas must be re-vegetated as soon as practicable after construction is complete in an area.	EPC Contractor	At completion of the construction phase

Performance Indicator	<ul style="list-style-type: none"> » Appropriate dust suppression measures implemented on site during the construction phase. » Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed or before entering the site. » Road worthy certificates in place for all heavy vehicles at the outset of the construction phase and updated on a monthly basis.
Monitoring and Reporting	<ul style="list-style-type: none"> » The Developer and appointed EO must monitor indicators listed above to ensure that they have been met for the construction phase. » Immediate reporting by personnel of any potential or actual issues with nuisance dust or emissions to the Site Manager. » An incident reporting system must be used to record non-conformances to the EMPr. » Public complaints register must be developed and maintained on site.

OBJECTIVE 6: Conservation of the existing soil resource within the site and in the adjacent areas

The natural soil on the site needs to be preserved as far as possible to minimise impacts on the environment. Soil degradation including erosion (by wind and water) and subsequent deposition elsewhere is of a concern. Uncontrolled run-off relating to construction activities (excessive wetting, etc.) will also lead to accelerated erosion. Degradation of the natural soil profile due to excavation, stockpiling, compaction, pollution and other construction activities will affect soil forming processes and associated ecosystems.

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

Project component/s	<ul style="list-style-type: none"> » Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	<ul style="list-style-type: none"> » Erosion and soil loss. » Increased runoff. » Downstream sedimentation.
Activities/risk sources	<ul style="list-style-type: none"> » Rainfall and wind erosion of disturbed areas. » Excavation, stockpiling and compaction of soil. » Concentrated discharge of water from construction activity. » Stormwater run-off from sealed surfaces. » Mobile construction equipment movement on site. » Roadside drainage ditches. » Project related infrastructure, such as buildings, turbines and fences.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise erosion of soil from site during construction. » To minimise damage to vegetation by erosion or deposition. » To retain all topsoil with a stable soil surface

Mitigation: Action/control	Responsibility	Timeframe
Any erosion problems observed along access roads or any hardened/engineered surface should be rectified immediately and monitored thereafter to ensure that they do not re-occur.	Contractor	Construction
All bare areas (excluding agricultural land and the development footprint), affected by the development, should be re-vegetated with locally occurring species, to bind the soil and limit erosion potential where applicable.	Contractor	Construction
Re-instate as much of the eroded area to its pre-disturbed, "natural" geometry (no change in elevation and any banks not to be steepened) where possible.	Contractor	Construction
Construction of gabions and other stabilisation features to prevent erosion must be undertaken, if deemed necessary.	Contractor	Construction
Roads and other disturbed areas should be regularly monitored for erosion problems and problem areas should receive follow-up monitoring by the EO to assess the success of the remediation.	Contractor EO	Construction

Mitigation: Action/control	Responsibility	Timeframe
Topsoil must be removed and stored separately from subsoil. Topsoil must be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas.	Contractor	Construction
Practical phased development and vegetation clearing must be practiced so that cleared areas are not left un-vegetated and vulnerable to erosion for extended periods of time.	Contractor	Construction
Only the proposed access roads as per the development footprint are to be used to reduce any unnecessary compaction.	Contractor	Construction
Stockpile topsoil for re-use in rehabilitation phase. Maintain stockpile shape and protect from erosion.	Contractor	Construction
All material stockpiles should be located outside freshwater resource features.	Contractor	Construction
Salvaging topsoil: <ul style="list-style-type: none"> » Topsoil must always be salvaged and stored separately from subsoil and lower-lying parent rock or other spoil material. <ul style="list-style-type: none"> * Topsoil stripping removes up to 30 cm or less of the upper soils. * In cultivated areas, depth of topsoil may increase and needs to be confirmed with the land owner. » Prior to salvaging topsoil the depth, quality and characteristics of topsoil should be known for every management area. <ul style="list-style-type: none"> o This will give an indication of total volumes of topsoil that need to be stored to enable the proper planning and placement of topsoil storage. o Different types of topsoil – rocky soils and sands or loams must be stored separately. » Topsoil should be removed (and stored) under dry conditions to avoid excessive compaction whenever topsoil will have to be stored for longer than one year. 	Contractor	Construction
Silt traps should be used where there is a danger of topsoil eroding and entering streams and other sensitive areas. These silt traps must be regularly monitored and maintained and replaced / repaired immediately as and when required. These measures should be regularly checked, maintained and repaired when required to ensure that they are effective.	Contractor	Construction
Excavated soils should be stockpiled on the upslope side of the excavated trench so that eroded sediments off the stockpile are washed back into the trench.	Contractor	Construction
Storing topsoil: <ul style="list-style-type: none"> » Viability of stored topsoil depends on moisture, temperature, oxygen, nutrients and time stored. » Rapid decomposition of organic material in warm, moist topsoil rapidly decreases microbial activity necessary for nutrient cycling, and reduces the amount of beneficial micro-organisms in the soil. 	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
<ul style="list-style-type: none"> » Stockpile location should ideally be in a disturbed but weed-free area. » Storage of all topsoil that is disturbed should be of a maximum height of 2m and the maximum length of time before re-use is 18 months. » Topsoil handling should be reduced to stripping, piling (once), and re-application. Between the stockpiling and reapplication, stored topsoil should not undergo any further handling except control of erosion and (alien) invasive vegetation. » Where topsoil can be reapplied within six months to one year after excavation, it will be useful to store the topsoil as close as possible to the area of excavation and re-application, e.g. next to cabling trenches. » Do not mix overburden with topsoil stockpiles, as this will dilute the proportion of fertile soil (with less fertile subsoil or rock material). » Employ wind nets made from Hessian or similarly fibrous and biodegradable material, where required, to stabilise newly placed topsoil stockpiles and to reduce wind erosion. » In cases where topsoil has to be stored longer than 6 months or during the rainy season, soils should be kept as dry as possible and protected from erosion and degradation by: <ul style="list-style-type: none"> * Preventing ponding on or between heaps of topsoil * Covering topsoil berms * Preventing all forms of contamination or pollution * Preventing any form of compaction * Monitoring the establishment of all invasive vegetation and removing such if it appears * Keeping slopes of topsoil at a maximal 2:1 ratio * Monitoring and mitigating erosion where it appears » Where topsoil needs to be stored in excess of one year, it is recommended to either cover the topsoil or allow an indigenous grass cover to grow on it – if this does not happen spontaneously, seeding should be considered. 		
Spillages of cement to be cleaned up immediately and disposed or re-used in the construction process.	Contractor	Construction
Spill kits to be kept on active parts of the construction site and at site offices.	Contractor	Construction
Cement batching to take place in designated areas only, as approved on site layout (if applicable).	Contractor	Construction
Excavated soils will need to be replaced in the same order as excavated from the trench, i.e. sub-soil must be replaced first and topsoil must be replaced last (this will maximise opportunity for re-vegetation of disturbed areas).	Contractor	Construction
Re-applied topsoil needs to be re-vegetated as soon as possible.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » Minimal level of soil erosion around site. » Minimal level of soil degradation.
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	<ul style="list-style-type: none"> » No activity outside demarcated areas. » Progressive return of disturbed and rehabilitated areas to the desired end state. » No indications of visible topsoil loss.
Monitoring and Reporting	<ul style="list-style-type: none"> » Continual inspections of the site by the EO. » Reporting of ineffective sediment control systems and rectification as soon as possible. » If soil loss is suspected, acceleration of soil conservation and rehabilitation measures must be implemented.

OBJECTIVE 7: Minimise impacts on sensitive areas and plant species

From a botanical and ecological perspective, it was found that the full study area (27 819ha) is mostly comprised of either Moderate (7549 ha; 20.7%) or Low (14496 ha; 39.7%) sensitivity. This large extent of low sensitivity areas is fortunate and means that there are ample areas for the development to occur. Various "Very High" sensitivity areas also occur throughout the study area (comprising features such as wetlands, ephemeral rivers and streams, seepages, and other drainage lines). The dominant drainage/wetland features within the project site are the floodplain wetlands, within which almost all of the other wetland features apart from a few endorheic wetland features (7 depression wetlands and 7 seepages for the whole wind farm site), drain into directly. All of the freshwater resource features on and around the site are intermittent or ephemeral, being inundated only for brief periods each year, with periods of drought that are unpredictable in duration.

Various CBA and ESA areas occur throughout the study area. Development is highly discouraged within the areas classified as CBA Irreplaceable Areas and development within CBA Optimal Areas should be avoided as far as possible.

A total of 198 plant species were found within the study area, which consisted of 158 native, 0 Red List, 6 protected, 0 Mpumalanga endemic, 39 alien, and 11 NEM:BA listed invasive species. Within the Phase 1 footprint, one protected species was identified within the footprint of WTG 18 (*Boophane disticha*) during the walk through survey.

Project component/s	<ul style="list-style-type: none"> » Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	<ul style="list-style-type: none"> » Loss of plant cover leading to loss of faunal habitat and loss of specimens of protected plants. » Soil erosion. » Indirect impacts on downslope freshwater resource features. » Increased fire hazards. » Increased water use.
Activity/risk source	<ul style="list-style-type: none"> » Site preparation and clearing. » Soil disturbance » Introduction of plant propagules with people and vehicles. » Activities outside of designated construction areas. » Driving off designated routes.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To limit construction activities to designated areas. » Implement invasive plant clearing prior to construction, but after site demarcation.

Mitigation: Action/control	Responsibility	Timeframe
Communicate clearly to all contractors that no disturbance outside the demarcated areas will be tolerated.	Contractor	Construction
Demarcate all areas to be cleared with construction tape or other appropriate and effective means. However, caution should be exercised to avoid using material that might entangle fauna.	Contractor	Construction
Before construction commences individuals of listed species within the development footprint that would be affected, should be counted and marked and translocated where deemed necessary by the ecologist conducting the pre-construction walk-through survey, and according to the recommended ratios.	Contractor	Pre-construction Construction
Any individuals of protected species affected by and observed within the development footprint during construction should be translocated under the supervision of the ECO and/or Contractor's Environmental Officer (EO).	Contractor ECO EO	Construction
No plants may be translocated or otherwise uprooted or disturbed for rehabilitation or other purpose without express permission from the ECO and or Contractor's EO.	Contractor ECO EO	Construction
<u>Areas of indigenous vegetation, even secondary communities outside of the direct turbine footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. All activities must be restricted to flat areas as far as possible. It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon. All structure footprints to be rehabilitated and landscaped after installation is complete. Rehabilitation of the disturbed areas existing in the project area must be made a priority. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are endemic to this vegetation type.</u>	<u>Contractor Environmental Officer</u>	<u>Construction</u>
No fires should be allowed within the site as there is a risk of runaway veld fires.	Contractor	Construction
No fuelwood collection should be allowed on-site.	Contractor	Construction
Wherever excavation is necessary, topsoil should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species.	Contractor	Construction
Regular monitoring for alien plants within the development footprint as well as adjacent areas which receive runoff from the facility must be undertaken as these are also likely to be prone to invasion problems.	Contractor	Construction
Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible.	Contractor	Construction
<u>It should be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought</u>	<u>Contractor EO</u>	<u>Construction</u>

Mitigation: Action/control	Responsibility	Timeframe
<u>into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.</u>		
Vegetation clearing should occur in a phased manner in accordance with the construction programme to minimise erosion and/or run-off.	Contractor	Construction
ECO and/or Contractor's EO to provide supervision and oversight of vegetation clearing activities and other activities which may cause damage to the environment, especially at the initiation of the project, when the majority of vegetation clearing is taking place.	Contractor EO ECO	Construction
Unnecessary impacts on surrounding natural vegetation must be avoided. The construction impacts must be contained to the footprint of the wind farm.	Contractor	Construction
There should be reduced activity at the site after large rainfall events when the soils are wet. No driving off of hardened roads should occur immediately following large rainfall events until soils have dried out and the risk of bogging down has decreased.	Contractor	Construction
Where new roads need to be constructed, the existing road infrastructure should be rationalised and any unnecessary roads decommissioned and rehabilitated to reduce the disturbance of the area within the river beds.	Contractor	Construction
Where possible, culvert bases must be placed as close as possible with natural levels in mind so that these don't form additional steps / barriers.	Contractor	Construction
The duration of construction work within the watercourses/wetlands must be minimised as far as practically possible through proper planning and phasing.	Contractor	Construction
All vehicles to remain on demarcated roads and no unnecessary driving in the veld outside these areas should be allowed.	Contractor	Construction
Avoid creating conditions in which alien plants may become established: <ul style="list-style-type: none"> » Keep disturbance of indigenous vegetation to a minimum » Rehabilitate disturbed areas as quickly as possible once construction is complete in an area » Do not import soil from areas with alien plants. 	Contractor	Construction
Establish an on-going monitoring programme to detect, quantify and remove any alien species that may become established and identify the problem species (as per Conservation of Agricultural Resources Act (Act 43 of 1983) and NEM: Biodiversity Act (Act 10 of 2004).	Contractor	Construction
Immediately control any alien plants that become established using registered control methods appropriate for the particular species in question. Where necessary, obtain an opinion from a registered Pest Control Officer.	Contractor	Construction
All alien plant re-growth must be monitored and should these alien plants reoccur these plants should be re-eradicated. The scale of the development does however not warrant the use of a Landscape Architect and / or Landscape Contractor.	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
The use of herbicides and pesticides and other related horticultural chemicals should be carefully controlled and only applied by personnel adequately certified to apply pesticides and herbicides (a registered Pest Control Officer). It must be ensured that WHO Recommended Classification of Pesticides by Hazard Class 1a (extremely hazardous) or 1b (highly hazardous) are not purchased, stored or used on site along with any other nationally or internationally similarly restricted/banned products.	Contractor	Construction
A registered Pest Control Officer must be appointed to implement the invasive alien plants and weeds management plan. The Pest Control Officer must supervise the clearing team to ensure compliance with the invasive alien plants and weeds management plan.	Contractor	Construction
All cleared areas should be revegetated with indigenous perennial species from the local area.	Contractor	Construction
<u>All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area to inform contractors and site staff of the presence of Red / Orange List species, their identification, conservation status and importance, biology, habitat requirements and management requirements the Environmental Authorisation and within the EMPr. The avoidance and protection of the very high sensitivity areas must be included into a site induction. Contractors and employees must all undergo the induction and made aware of the "no-go" to be avoided.</u>	<u>Health and Safety Officer</u> <u>EO</u> <u>Contractor</u>	<u>Construction</u>

Performance Indicator	<ul style="list-style-type: none"> » No disturbance outside of designated work areas. » Limited alien infestation within project control area. » Construction activities restricted to the development footprint.
Monitoring and Reporting	<ul style="list-style-type: none"> » Observation of vegetation clearing activities by the EO throughout the construction phase. » Monitoring of alien plant establishment within the site on an on-going basis.

OBJECTIVE 8: Protection of terrestrial fauna

A total of 32 mammal species, 6 amphibians and 10 reptile species were recorded within the overall project site. No amphibian or reptile SCC were recorded within the project site; however, 5 mammal SCC were recorded within the project site namely; Serval (Near Threatened), Brown hyena (Near Threatened); Vlei rat (Near Threatened), Cape clawless otter (Near Threatened) and South African hedgehog (Near Threatened). It was determined that the development will not detrimentally impact these populations/individual SCC.

Project component/s	<ul style="list-style-type: none"> » Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	» Vegetation clearance and associated impacts on faunal habitats.

	» Traffic to and from site.
Activity/risk source	<ul style="list-style-type: none"> » Site preparation and earthworks. » Foundations or plant equipment installation. » Mobile construction equipment movement on site. » Access road construction activities. » Substation construction facilities.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise footprints of habitat destruction. » To minimise disturbance to resident and visitor faunal species.

Mitigation: Action/control	Responsibility	Timeframe
The extent of clearing and disturbance to the vegetation must be kept to a minimum so that impact on fauna and their habitats is restricted.	Contractor	Construction
During construction any fauna directly threatened by the construction activities should be removed to a safe location by a suitably qualified person.	Contractor	Construction
The illegal collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off of the construction site.	Contractor	Construction
Employees should be trained (e.g. during toolbox talks) that poisonous animals should not be killed and if encountered the ECO/ EO should be informed.	Developer EPC Contractor	Duration of contract
If any parts of the site such as construction camps must be lit at night, this should be done with low-UV type lights (such as most LEDs) as far as practically possible, which do not attract insects and which should be directed downwards.	Contractor	Construction
All construction vehicles on site should adhere to a low speed limit (30km/h) to avoid collisions with susceptible species such as snakes and tortoises.	Contractor	Construction
Construction vehicles limited to a minimal footprint on site (no movement outside of the demarcated footprint).	Contractor	Construction
If any parts of the facility are to be fenced, then no electrified strands should be placed within 30cm of the ground as some species such as tortoises are susceptible to electrocution from electric fences as they do not move away when electrocuted but rather adopt defensive behaviour and are killed by repeated shocks.	Contractor	Duration of contract
<u>The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments.</u> • Signs must be put up to enforce this	<u>Project manager,</u> <u>Environmental Officer</u>	<u>Construction</u>
<u>The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on fauna.</u>	<u>Project manager,</u> <u>Environmental Officer &</u> <u>Design Engineer</u>	<u>Construction Phase</u>
<u>Any holes/deep excavations must be dug and planted in a progressive manner and should not be left open overnight. Should the holes remain overnight they must be covered temporarily to ensure no small fauna species fall in.</u>	<u>Environmental Officer &</u> <u>Contractor, Engineer</u>	<u>Planning and</u> <u>Construction</u>

Mitigation: Action/control	Responsibility	Timeframe
<u>The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprint of the roads must be kept to prescribed widths.</u>	<u>Project manager, Environmental Officer & Contractor</u>	<u>Construction</u>

Performance Indicator	<ul style="list-style-type: none"> » No disturbance outside of designated work areas. » Minimised clearing of existing/natural vegetation and habitats for fauna. » Limited impacts on faunal species (i.e. noted/recorded fatalities), especially those of conservation concern.
Monitoring and Reporting	<ul style="list-style-type: none"> » Observation of vegetation clearing activities by the EO throughout construction phase. » Supervision of all clearing and earthworks by the EO.

OBJECTIVE 9: Protection of **avifauna**

Project component/s	<ul style="list-style-type: none"> » Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	<ul style="list-style-type: none"> » Disturbance of birds (e.g. destruction of habitat). » Displacement of birds. » Collision with project components. » Traffic to and from site.
Activity/risk source	<ul style="list-style-type: none"> » Site preparation and earthworks. » Foundations or plant equipment installation. » Mobile construction equipment movement on site. » Access road construction activities. » Substation construction facilities.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise footprints of habitat destruction. » To minimise disturbance to resident and visitor avifaunal species.

Mitigation: Action/control	Responsibility	Timeframe
The extent of clearing and disturbance to the vegetation must be kept to a minimum so that impact on avifauna and their habitats is restricted.	Contractor	Construction
Construction camps should be lit with as little light as practically possible, with the lights directed downwards where appropriate.	Contractor	Construction
The movement of construction personnel should be restricted to the construction areas on the project site.	Contractor	Construction
No dogs or cats other than those of the landowners should be allowed on site.	Contractor	Construction
The appointed <u>Developer's</u> Environmental Officer must be trained to identify the potential Red Data species as well as the signs that indicate possible breeding by these species.	Contractor EO	Construction
The Environmental Officer must, during audits/site visits, make a concerted effort to look out for such breeding activities of SCCs	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
(e.g. cranes, Secretarybird), and such efforts may include the training of construction staff (e.g. in Toolbox talks) to identify Red Data species, followed by regular questioning of staff as to the regular whereabouts on site of these species.		
If any avifaunal SCCs are confirmed to be breeding (e.g. if a nest site is found), construction activities within 500 m of the breeding site must cease, and an avifaunal specialist is to be contacted immediately for further assessment of the situation and instruction on how to proceed.	Contractor	Construction
Any holes dug should not be left open for extended periods of time to prevent entrapment by ground dwelling avifauna or their young and only be dug when required and filled in soon thereafter.	Contractor	Construction
Temporary fencing must be suitably constructed, e.g. if double layers of fencing are required for security purposes they should be positioned at least 2 m apart to reduce the probability of entrapment by larger bodied species that may find themselves between the two fences.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » No disturbance outside of designated work areas. » Minimised clearing of existing/natural vegetation and habitats for avifauna. » Limited impacts on avifaunal species (i.e. noted/recorded fatalities), especially those of conservation concern.
Monitoring and Reporting	<ul style="list-style-type: none"> » Observation of vegetation clearing activities by the EO throughout construction phase. » Supervision of all clearing and earthworks by the EO.

OBJECTIVE 10: Protection of bats

Project component/s	<ul style="list-style-type: none"> » Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	<ul style="list-style-type: none"> » Disturbance of bats (e.g. destruction of habitat). » Displacement of bats. » Traffic to and from site.
Activity/risk source	<ul style="list-style-type: none"> » Site preparation and earthworks. » Foundations or plant equipment installation. » Mobile construction equipment movement on site. » Access road construction activities. » Substation construction facilities.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise footprints of habitat destruction. » To minimise disturbance to resident and visitor bat species.

Mitigation: Action/control	Responsibility	Timeframe
Limit potential for bats to roost in project infrastructure (e.g., buildings, turbines, road culverts) by ensuring they are properly sealed such that bats cannot gain access.	Contractor	Construction
Construction activities to be avoided at night wherever possible	Contractor	Construction
Minimise clearing of vegetation, minimise disturbance and destruction of farm buildings on site, minimise removal of trees, and where this is required, these features should be examined for roosting bats. This study assumes that all buildings and trees are potentially roosts and must be buffered by 200m since numerous species use these features for roosting.	Contractor	Construction
Apply good construction abatement control practices to reduce emissions and pollutants (e.g., noise, erosion, waste) created during construction.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » No disturbance outside of designated work areas. » Minimised clearing of existing/natural vegetation and habitats for bats. » Limited impacts on bat species, especially those of conservation concern.
Monitoring and Reporting	<ul style="list-style-type: none"> » Observation of vegetation clearing activities by the EO throughout construction phase. » Supervision of all clearing and earthworks by the EO.

OBJECTIVE 11: Minimise impacts on heritage sites during the construction of the wind farm.

Project component/s	<ul style="list-style-type: none"> » Excavations of turbine foundations. » Excavations of trenches for the installation of cabling and infrastructure. » Excavation of substation foundations.
Potential Impact	<ul style="list-style-type: none"> » Loss of archaeological artefacts. » Loss of fossil resources. » Impacts on heritage sites. » Impacts on graves or burial sites. » Loss of resources going unnoticed. » Destruction of resources.
Activity/risk source	<ul style="list-style-type: none"> » All bulk earthworks.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To facilitate the likelihood of noticing heritage resources and ensure appropriate actions in terms of the relevant legislation

Mitigation: Action/control	Responsibility	Timeframe
<ul style="list-style-type: none"> » The Chance Fossil Finds Procedure must be implemented for the duration of construction activities: <ul style="list-style-type: none"> o Training: <ul style="list-style-type: none"> * Workmen and foremen need to be trained in the procedure to follow in instances of accidental discovery of fossil material, in a similar way to the Health and Safety protocol. A brief introduction to the process to follow in the event of possible accidental discovery of fossils should be conducted by the designated Environmental Control Officer 	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
<p>(ECO) for the project, or the foreman or site agent in the absence of the ECO It is recommended that copies of the attached poster and procedure are printed out and displayed at the site office so that workmen may familiarise themselves with them and are thereby prepared in the event that accidental discovery of fossil material takes place.</p> <ul style="list-style-type: none"> o Actions to be undertaken: <ul style="list-style-type: none"> * One person in the staff must be identified and appointed as responsible for the implementation of the protocol in instances of accidental fossil discovery and must report to the ECO or site agent. If the ECO or site manager is not present on site, then the responsible person on site should follow the protocol correctly in order to not jeopardize the conservation and well-being of the fossil material. * Once a workman notices possible fossil material, he/she should report this to the ECO or site agent. Procedure to follow if it is likely that the material identified is a fossil: <ul style="list-style-type: none"> - The ECO or site agent must ensure that all work ceases immediately in the vicinity of the area where the fossil or fossils have been found. - The ECO or site agent must inform SAHRA of the find immediately. This information must include photographs of the findings and GPS co-ordinates. - The ECO or site agent must compile a Preliminary Report and fill in the attached Fossil Discoveries: Preliminary Record Form within 24 hours without removing the fossil from its original position. The Preliminary Report records basic information about the find including: <ul style="list-style-type: none"> ❖ The date. ❖ A description of the discovery. ❖ A description of the fossil and its extent (e.g., position and depth of find). ❖ Where and how the find has been stored. ❖ Photographs to accompany the preliminary report: <ul style="list-style-type: none"> ✓ A scale must be used. ✓ Photos of location from several angles. ✓ Photos of vertical section should be provided. ✓ Digital images of hole showing vertical section (side). ✓ Digital images of fossil or fossils. 		

Mitigation: Action/control	Responsibility	Timeframe
<p>Upon receipt of this Preliminary Report, SAHRA will inform the ECO or site agent whether or not a rescue excavation or rescue collection by a palaeontologist is necessary.</p> <ul style="list-style-type: none"> * Exposed finds must be stabilised where they are unstable and the site capped, e.g. with a plastic sheet or sand bags. This protection should allow for the later excavation of the finds with due scientific care and diligence. SAHRA can advise on the most appropriate method for stabilisation. * If the find cannot be stabilised, the fossil may be collect with extreme care by the ECO or the site agent and put aside and protected until SAHRA advises on further action. Finds collected in this way must be safely and securely stored in tissue paper and an appropriate box. Care must be taken to remove the all fossil material and any breakage of fossil material must be avoided at all costs. * No work may continue in the vicinity of the find until SAHRA has indicated, in writing, that it is appropriate to proceed. 		

Performance Indicator	<ul style="list-style-type: none"> » Reporting of and liaison about possible finds of heritage resources. » Heritage resources noticed and rescued. » All heritage items located are dealt with as per the legislative guidelines.
Monitoring and Reporting	<ul style="list-style-type: none"> » Ensure staff are aware of heritage resources and the procedure to follow when found. » EO to conduct inspections of open excavations.

OBJECTIVE 12: Minimisation of visual impacts associated with construction

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

Project component/s	<ul style="list-style-type: none"> » Construction site. » Transportation of staff and equipment.
Potential Impact	<ul style="list-style-type: none"> » Visual impact of general construction activities, and the potential scarring of the landscape due to vegetation clearing and the resulting erosion. » Construction traffic.
Activity/risk source	<ul style="list-style-type: none"> » The viewing of visual scarring by observers in the vicinity of the wind farm or from the roads in the surrounding area.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Minimal disturbance to vegetation cover in close vicinity of the wind farm and its related infrastructure. » Minimised construction traffic, where possible. » Minimal visual intrusion by construction activities and intact vegetation cover outside of the immediate construction work areas.

Mitigation: Action/control	Responsibility	Timeframe
Minimise disturbance of the land beneath the turbine layout to ensure that associated infrastructure is sited in such a way that it minimises visual impact.	Contractor	Construction
Retain and maintain natural vegetation in all areas outside of the development footprint.	Contractor	Construction
Ensure that non reflective finishes are used on turbines, particularly blades.	Contractor	Construction
Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.	Contractor	Construction
Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts.	Contractor	Construction
Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.	Contractor	Construction
Rehabilitate all disturbed areas, construction areas, servitudes etc. immediately after the completion of construction works.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » Construction site maintained in a neat and tidy condition. » Site appropriately rehabilitated after construction is complete.
Monitoring	<ul style="list-style-type: none"> » Monitoring of vegetation clearing during construction by EO. » Monitoring of rehabilitated areas quarterly for at least a year following the end of construction (by contractor as part of construction contract).

OBJECTIVE 13: Appropriate handling and management of waste

The construction of the wind farm and associated infrastructure will involve the generation of various wastes. In order to manage the wastes effectively, guidelines for the assessment, classification, and management of wastes, along with industry principles for minimising construction wastes must be implemented. The main wastes expected to be generated by the construction activities include:

- » general solid waste
- » hazardous waste
- » inert waste (rock and soil)
- » liquid waste (including grey water and sewage)

Project Component/s	<ul style="list-style-type: none"> » Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	<ul style="list-style-type: none"> » Inefficient use of resources resulting in excessive waste generation. » Litter or contamination of the site or water through poor waste management practices.
Activity/Risk Source	<ul style="list-style-type: none"> » Packaging. » Other construction wastes. » Hydrocarbon use and storage.

	» Spoil material from excavation, earthworks and site preparation.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To comply with waste management legislation. » To minimise production of waste. » To ensure appropriate waste storage and disposal. » To avoid environmental harm from waste disposal.

Mitigation: Action/Control	Responsibility	Timeframe
Implement an integrated waste management approach that is based on waste minimisation and incorporates reduction, recycling, re-use and disposal where appropriate. Where solid waste is disposed of, such disposal shall only occur at an appropriately licensed landfill.	Contractor	Construction
Construction method and materials must be carefully considered in view of waste reduction, re-use, and recycling opportunities.	Contractor	Construction
Construction contractors must provide specific detailed waste management plans to deal with all waste streams.	Contractor	Construction
Ensure that no litter, refuse, wastes, rubbish, rubble, debris and builders wastes generated on the premises is placed, dumped or deposited on adjacent/surrounding properties.	Contractor	Construction
Specific areas must be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste (wood and metal scrap), and contaminated waste as required. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage, and vermin control.	Contractor	Construction
Where practically possible, construction and general wastes on-site must be reused or recycled. Bins and skips must be available on-site for collection, separation, and storage of waste streams (such as wood, metals, general refuse etc.).	Contractor	Construction
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Contractor	Construction
Uncontaminated waste must be removed at least weekly for disposal, if feasible; other wastes must be removed for recycling/disposal at an appropriate frequency.	Contractor	Construction
Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area and clearly labelled. This must be regularly removed and recycled (where possible) or disposed of at an appropriately licensed landfill site.	Contractor	Construction
Waste must be stored in accordance with the relevant legislative requirements.	Contractor	Construction
Waste must be kept to a minimum and must be transported by approved waste transporters to sites designated for their disposal.	Contractor	Construction
No liquid waste, including grey water, may be discharged into any water body or drainage line. All sewage disposal to take place at a registered and operational wastewater treatment works.	Contractor	Construction
All liquid wastes must be contained in appropriately sealed vessels/ponds within the footprint of the development, and be disposed of at a designated waste management facility.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Documentation (waste manifest) must be maintained detailing the quantity, nature, and fate of any regulated waste. Waste disposal records must be available for review at any time.	Contractor	Construction
Regularly serviced chemical toilet facilities and/or septic tank must be used to ensure appropriate control of sewage.	Contractor	Construction
Daily inspection of all chemical toilets and septic tanks must be performed by environmental representatives on site.	Contractor	Construction
In the event where sewage is discharged into the environment, all contaminated vegetation/ rock and soil must be removed immediately and treated as hazardous waste.	Contractor	Construction
Under no circumstances may waste be burnt or buried on site.	Contractor	Construction
Litter generated by the construction crew must be collected in rubbish bins and disposed of weekly, or at an appropriate frequency, at registered waste disposal sites.	Contractor	Construction
Upon the completion of construction, the area must be cleared of potentially polluting materials (including chemical toilets). Spoil stockpiles must also be removed and appropriately disposed of or the materials re-used for an appropriate purpose.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » No complaints received regarding waste on site or indiscriminate dumping. » Internal site audits ensuring that waste segregation, recycling and reuse is occurring appropriately. » Provision of all appropriate waste manifests for all waste streams.
Monitoring	<ul style="list-style-type: none"> » Observation and supervision of waste management practices throughout construction phase. » Waste collection will be monitored on a regular basis. » Waste documentation completed. » Proof of disposal of sewage at an appropriate wastewater treatment works. » <u>Proof of disposal of solid general and hazardous waste at appropriately licenced waste disposal site(s).</u> » A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 14: Appropriate handling and storage of chemicals, hazardous substances

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

Project Component/s	<ul style="list-style-type: none"> » Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	<ul style="list-style-type: none"> » Release of contaminated water from contact with spilled chemicals. » Generation of contaminated wastes from used chemical containers. » Soil pollution.

Activity/Risk Source	<ul style="list-style-type: none"> » Vehicles associated with site preparation and earthworks. » Construction activities of area and linear infrastructure. » Hydrocarbon spills by vehicles and machinery during levelling, vegetation clearance and transport of workers, materials and equipment and fuel storage tanks. » Accidental spills of hazardous chemicals. » Polluted water from wash bays and workshops. » Pollution from concrete mixing.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons. » To ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons. » Prevent and contain hydrocarbon leaks. » Undertake proper waste management. » Store hazardous chemicals safely in a bunded area.

Mitigation: Action/Control	Responsibility	Timeframe
Implement an emergency preparedness plan during the construction phase.	Contractor	Construction
Any liquids stored on site, including fuels and lubricants, must be stored in accordance with applicable legislation.	Contractor	Construction
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants. These must be maintained regularly.	Contractor	Construction
Losses of fuel and lubricants from the oil sumps and steering racks of vehicles and equipment must be contained using a drip tray with plastic sheeting filled with absorbent material when not parked on hard standing.	Contractor	Construction
Establish an appropriate Hazardous Stores and fuel storage area which is in accordance with the Hazardous Substance Amendment Act, No. 53 of 1992. This must include but not be limited to: <ul style="list-style-type: none"> » Designated area; » All applicable safety signage; » Firefighting equipment; » Enclosed by an impermeable bund as per the requirements of the relevant standards and any relevant by-laws: <ul style="list-style-type: none"> o Protected from the elements, o Lockable; o Ventilated; and o Has adequate capacity to contain 110% of the largest container contents. 	Contractor	Construction
The storage of flammable and combustible liquids such as oils must be stored in compliance with Material Safety Data Sheets (MSDS) (MSDS must be available at the storage area).	Contractor	Construction
Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures. Where required, a NEMA Section 30 report must be submitted to DFFE within 14 days of the incident.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Any pollution incidents originating from the proposed project must be reported to the Provincial Office of DWS within 24 hours in accordance with Section 19(1) of the National Water Act, 1998 (Act No. 36 of 1998).	Contractor	Construction
In the event of a major spill or leak of contaminants, the relevant administering authority must be immediately notified as per the notification of emergencies/incidents.	Contractor	Construction
Spilled concrete must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site.	Contractor	Construction
Accidental spillage of potentially contaminating liquids and solids must be cleaned up immediately in line with procedures by trained staff with the appropriate equipment.	Contractor	Construction
Any contaminated/polluted soil removed from the site must be disposed of at a licensed hazardous waste disposal facility.	Contractor	Construction
All machinery and equipment must be inspected regularly for faults and possible leaks,	Contractor	Construction
Routine servicing and maintenance of vehicles must not to take place on-site (except for emergencies). If repairs of vehicles must take place, an appropriate drip tray must be used to contain any fuel or oils.	Contractor	Construction
Construction machinery must be stored in an appropriately sealed area.	Contractor	Construction
Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals will be complied with.	Contractor	Construction
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations.	Contractor	Construction
The sediment control and water quality structures used on-site must be monitored and maintained in an operational state at all times.	Contractor	Construction
An effective monitoring system must be put in place to detect any leakage or spillage of all hazardous substances during their transportation, handling, installation and storage.	Contractor	Construction
Precautions must be in place to limit the possibility of oil and other toxic liquids from entering the soil or clean stormwater system.	Contractor	Construction
As much material must be pre-fabricated and then transported to site to avoid the risks of contamination associated with mixing, pouring and the storage of chemicals and compounds on site.	Contractor	Construction
Have appropriate action plans on site, and training for contractors and employees in the event of spills, leaks and other potential impacts to the aquatic systems. All waste generated on-site during construction must be adequately managed.	Contractor	Construction
Minimise fuels and chemicals stored on site.	Contractor	Construction
Implement a contingency plan to handle spills, so that environmental damage is avoided.	Contractor	Construction
Drip trays must be used during all fuel/chemical dispensing and beneath standing machinery/plant.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
In the case of petrochemical spillages, the spill must be collected immediately and stored in a designated area until it can be disposed of in accordance with the Hazardous Chemical Substances Regulations, 1995 (Regulation 15).	Contractor	Construction
<u>All materials must be removed from the project area once the construction phase has been concluded. No permanent construction structures should be permitted. No storage of vehicles or equipment will be allowed outside of the designated project areas.</u>	<u>Environmental Officer</u> <u>Contractor</u>	<u>Construction</u>

Performance Indicator	<ul style="list-style-type: none"> » No chemical spills outside of designated storage areas. » No water or soil contamination by spills. » Safe storage of hazardous chemicals. » Proper waste management.
Monitoring	<ul style="list-style-type: none"> » Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase. » A complaints register must be maintained, in which any complaints from the community will be logged. » An incident reporting system must be used to record non-conformances to the EMPr. » On-going visual assessment to detect polluted areas and the application of clean-up and preventative procedures. » Monitor hydrocarbon spills from vehicles and machinery during construction continuously and record volume and nature of spill, location and clean-up actions. » Monitor maintenance of drains and intercept drains weekly. » Analyse soil samples for pollution in areas of known spills or where a breach of containment is evident when it occurs. » Records of accidental spills and clean-up procedures and the results thereof must be audited on an annual basis by the ECO. » Records of all incidents that caused chemical pollution must be kept and a summary of the results must be reported to management annually.

OBJECTIVE 15: Effective management of concrete batching plant

Concrete is required during the construction of the wind farm. In this regard there could be a need to establish a temporary batching plant within the site. Batching plants are facilities/installations that combine various ingredients to form concrete. Some of these inputs include sand, water, aggregate (rocks, gravel, etc.), fly ash, potash, and cement.

Turbid and highly alkaline wastewater, dust emissions and noise are the key potential impacts associated with concrete batching plants. Concrete batching plants, cement, sand and aggregates can produce dust. Potential pollutants in batching plant wastewater and stormwater include cement, sand, aggregates, chemical additive mixtures, fuels and lubricants.

Project component/s	» Concrete batching plant.
Potential Impact	<ul style="list-style-type: none"> » Dust emissions. » Release of contaminated water.

	<ul style="list-style-type: none"> » Generation of contaminated wastes from used chemical containers. » Inefficient use of resources resulting in excessive waste generation.
Activity/risk source	<ul style="list-style-type: none"> » Operation of the batching plant. » Packaging and other construction wastes. » Hydrocarbon use and storage. » Spoil material from excavation, earthworks and site preparation.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure that the operation of the batching plant does not cause pollution to the environment or harm to persons.

Mitigation: Action/control	Responsibility	Timeframe
Where possible concrete batching plants should be sited such that impacts on the environment or the amenity of the local community from noise, odour or polluting emissions are minimised.	Contractor	Construction phase
The provision of natural or artificial wind barriers such as trees, fences and landforms may help control the emission of dust from the plant.	Contractor	Construction phase
Where there is a regular movement of vehicles. Access and exit routes for heavy transport vehicles should be planned to minimise noise and dust impacts on the environment.	Contractor	Construction phase
The concrete batching plant site should demonstrate good maintenance practices, including regular sweeping to prevent dust build-up.	Contractor	Construction phase
The prevailing wind direction should be considered to ensure that bunkers and conveyors are sited in a sheltered position to minimise the effects of the wind.	Contractor	Construction phase
Aggregate material should be delivered in a damp condition, and water sprays or a dust suppression agent should be correctly applied to reduce dust emissions and reduce water usage.	Contractor	Construction phase
Conveyors must be designed and constructed to prevent fugitive dust emissions. This may include covering the conveyor with a roof, installing side protection barriers and equipping the conveyor with spill trays, which directs material to a collection point. Belt cleaning devices at the conveyor head may also assist to reduce spillage.	Contractor	Construction phase
The site should be designed and constructed such that clean stormwater, including roof runoff, is diverted away from contaminated areas and directed to the stormwater discharge system.	Contractor	Construction phase
Contaminated stormwater and process wastewater should be captured and recycled where possible. A wastewater collection and recycling system should be designed to collect contaminated water.	Contractor	Construction phase
Areas where spills of oils and chemicals may occur should be equipped with easily accessible spill control kits to assist in prompt and effective spill control.	Contractor	Construction phase
Ensure that all practicable steps are taken to minimise the adverse effect of noise emissions. This responsibility includes not only the noise emitted from the plant and equipment but also	Contractor	Construction phase

Mitigation: Action/control	Responsibility	Timeframe
associated noise sources, such as radios, loudspeakers and alarms.		
Where possible, waste concrete should be used for construction purposes at the batching plant or project site.	Contractor	Construction phase

Performance Indicator	<ul style="list-style-type: none"> » No complaints regarding dust. » No water or soil contamination by chemical spills. » No complaints received regarding waste on site or indiscriminate dumping.
Monitoring and Reporting	<ul style="list-style-type: none"> » Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout the construction phase. » A complaints register must be maintained, in which any complaints from the community must be logged. Complaints will be investigated and, if appropriate, acted upon. » An incident reporting system must be used to record non-conformances to the EMP. » The Developer or appointed ECO/EO must monitor indicators listed above to ensure that they have been met for the construction phase.

OBJECTIVE 16: Traffic management and transportation of equipment and materials to site

The construction and decommissioning phases of the project will be the most significant in terms of traffic impacts resulting from the transport of equipment (including turbine components) and materials and construction crews to the site and the return of the vehicles after delivery of materials. Potential impacts associated with transportation and access relate mostly to works within the site boundary (i.e. the wind farm and ancillary infrastructure) and the external road network. This section should be read in conjunction with the Traffic and Transportation Plan attached as Appendix F.

Project component/s	<ul style="list-style-type: none"> » Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	<ul style="list-style-type: none"> » Traffic congestion, particularly on narrow roads or on road passes where overtaking is not permitted. » Risk of accidents. » Deterioration of road pavement conditions (i.e. both surfaced and gravel road) due to abnormal loads.
Activity/risk source	<ul style="list-style-type: none"> » Construction vehicle movement. » Speeding on local roads. » Degradation of local road conditions. » Site preparation and earthworks. » Foundations or plant equipment installation. » Mobile construction equipment movement on-site. » Substation construction activities.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Minimise impact of traffic associated with the construction of the wind farm on the local traffic volume, existing infrastructure, property owners, animals, and road users. » To minimise the potential for negative interaction between pedestrians or sensitive users and traffic associated with the wind farm construction. » To ensure all vehicles are roadworthy and all materials/equipment are transported appropriately and within any imposed permit/licence conditions.

Mitigation: Action/control	Responsibility	Timeframe
Develop and implement a detailed method statement for the implementation of the traffic and transportation management plan (refer to Appendix F).	Contractor(s), (Transportation sub-contractor)	Construction
Heavy vehicles travelling on secondary roads should adhere to low-speed limits to minimise noise and dust pollution.	Contractor(s), (Transportation sub-contractor)	Construction
<u>All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings, dust and erosion is limited. The speed limits should be restricted to at most 30 km/h.</u>	<u>Health and Safety Officer</u>	<u>Life of operation</u>
Provide transportation service for workers in order to reduce congestion on roads.	Contractor	Construction
Partner with local municipalities and other prominent users of the local roads to upgrade them to meet the required capacity and intensity of the vehicles related to the planned construction activities.	Contractor	Construction
Transportation contractors must adhere to the road rules and regulations.	Contractor	Construction
A designated access (or accesses) to the proposed site must be created to ensure safe entry and exit.	Contractor	Construction
Utilise only designated access routes & entrance/exits from the site.	Contractor	Construction
Implement appropriate signage & road safety measures at entrance/exit to the site and on site.	Contractor	Construction
The delivery of wind turbine components to the site must be staggered and trips must be scheduled to occur outside of peak traffic periods.	Contractor	Construction
The use of mobile batching plants and quarries in close proximity to the site must be considered as this would decrease the impact on the surrounding road network.	Contractor	Construction
Regular maintenance of gravel roads by the Contractor during the construction and decommissioning phases.	Contractor	Construction
It is recommended to avoid staggered intersections on the main access road. Intersections should rather be consolidated or realigned as far as possible.	Contractor	Construction
Dust suppression of gravel roads during the construction and decommissioning phases, as required.	Contractor	Construction
Staff and general trips should occur outside of peak traffic periods as far as possible.	Contractor	Construction
Any low hanging overhead lines (lower than 5.1 m) e.g., Eskom and Telkom lines, along the proposed routes will have to be moved to accommodate the abnormal load vehicles.	Contractor	Construction
The preferred route should be surveyed to identify problem areas e.g., intersections with limited turning radii and sections of the road with sharp horizontal curves or steep gradients, which may	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
require modification. After the road modifications have been implemented, it is recommended to undertake a "dry-run" with the largest abnormal load vehicle, prior to the transportation of any turbine components, to ensure that the delivery of the turbines will occur without disruptions. This process is to be undertaken by the haulage company transporting the components and the contractor, who will modify the road and intersections to accommodate abnormal vehicles. It needs to be ensured that the gravel sections of the haulage routes remain in good condition and will need to be maintained during the additional loading of the construction phase and reinstated after construction is completed.		
The internal gravel roads will require grading with a road grader to obtain a flat even surface and the geometric design of these gravel roads needs to be confirmed at detailed design stage. This process is to be undertaken by a civil engineering consultant or a geometric design professional. The road designer should take cognizance that roads need to be designed with smooth, relatively flat gradients to allow an abnormal load vehicle to ascend to the top of a hill.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » No traffic incidents involving project personnel or appointed contractors. » Appropriate signage in place. » No complaints resulting from traffic congestion, delays or driver negligence associated with construction of the wind farm.
Monitoring	<ul style="list-style-type: none"> » Visual monitoring of traffic control measures to ensure they are effective. » A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 17: Ensure appropriate rehabilitation of disturbed areas such that residual environmental impacts are remediated or curtailed

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

Project component/s	<ul style="list-style-type: none"> » Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	» Environmental integrity of the site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention.
Activity/risk source	<ul style="list-style-type: none"> » Site preparation and earthworks. » Excavation of foundations and trenches. » Temporary laydown areas.

	<ul style="list-style-type: none"> » Temporary access roads/tracks. » Other disturbed areas/footprints.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure and encourage site rehabilitation of disturbed areas. » To ensure that the site is appropriately rehabilitated following the execution of the works, such that residual environmental impacts (including erosion) are remediated or curtailed.

Mitigation: Action/control	Responsibility	Timeframe
A site rehabilitation programme should be compiled and implemented (refer to Appendix D).	EPC Contractor in consultation with Specialist	Construction
Following construction, rehabilitation of all areas disturbed (e.g. temporary access tracks and laydown areas) must be undertaken.	Contractor	Rehabilitation
Any areas disturbed during the construction phase should be encouraged to rehabilitate as fast and effective as possible and where deemed necessary by the ECO or Contractor's EO, artificial rehabilitation (e.g. re-seeding with collected or commercial indigenous seed mixes) should be applied in order to speed up the rehabilitation process in critical areas (e.g. steep slopes and unstable soils).	Contractor	Rehabilitation
<u>Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood and wind events. This will also reduce the likelihood of encroachment by alien invasive plant species. All livestock must always be kept out of the project area, especially areas that have been recently re-planted.</u>	<u>Environmental Officer & Contractor</u>	<u>Operation phase</u>
Rehabilitation of the working areas must be concurrent with the construction of the project.	Contractor	Construction
Closure and rehabilitation of the disturbed areas should commence as soon as the laying of underground cable has been completed.	Contractor	Construction
If natural re-vegetation is unsuccessful, seeding and planting of the area will need to be implemented.	Contractor	Rehabilitation
All temporary facilities, equipment and waste materials must be removed from site and appropriately disposed of.	Contractor	Rehabilitation
Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion.	Contractor	Rehabilitation
Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.	Contractor	Rehabilitation
On-going alien plant monitoring and removal should be undertaken on all areas of natural vegetation on an annual basis.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » All portions of site, including construction camp and working areas, cleared of equipment and temporary facilities. » Topsoil replaced on all areas and stabilised.
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		<ul style="list-style-type: none">» Disturbed areas rehabilitated and acceptable plant cover achieved on rehabilitated sites.» Closed site free of erosion and alien invasive plants.
Monitoring and Reporting		<ul style="list-style-type: none">» On-going inspection of rehabilitated areas in order to determine the effectiveness of the rehabilitation measures implemented during the operational lifespan of the wind farm.» On-going alien plant monitoring and removal should be undertaken on an annual basis.» An incident reporting system must be used to record non-conformances to the EMPr.

7.2. Detailing Method Statements

OBJECTIVE 18: Ensure all construction activities are undertaken with the appropriate level of environmental awareness to minimise environmental risk

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

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

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

Method Statements must be compiled for all activities which affect any aspect of the environment and should be applied consistently to all activities. Specific areas to be addressed in the method statement: pre, during and post construction include:

- » Site establishment (which explains all activities from induction training to offloading, construction sequence for site establishment and the different amenities and to be established etc., including a site camp plan indicating all of these).
- » Preparation of the site (i.e. clearing vegetation, compacting soils and removing existing infrastructure and waste).
- » Soil management/stockpiling and erosion control.
- » Excavations and backfilling procedure.
- » Stipulate norms and standards for water supply and usage (i.e. comply strictly to licence and legislation requirements and restrictions).
- » Stipulate the stormwater management procedures recommended in the stormwater management method statement.
- » Ablution facilities (placement, maintenance, management and servicing).

- » Solid Waste Management:
 - * Description of the waste storage facilities (on site and accumulative).
 - * Placement of waste stored (on site and accumulative).
 - * Management and collection of the waste process.
 - * Recycle, re-use and removal process and procedure.
- » Liquid waste management:
 - * Design, establish, maintain and operate suitable pollution control facilities necessary to prevent discharge of water containing polluting matter or visible suspended materials into rivers, streams or existing drainage systems.
 - * Should grey water (i.e. water from basins, showers, baths, kitchen sinks etc.) need to be disposed of, link into existing facilities or sewerage systems where possible. Where no facilities are available, grey water runoff must be controlled to ensure there is no unacceptable seepage occurs.
- » Dust and noise pollution:
 - * Describe the necessary measures to ensure that noise from construction activities is maintained within lawfully acceptable levels.
 - * Procedure to control dust at all times on the site, access roads, borrow pits and spoil sites (dust control shall be sufficient so as not to have significant impacts in terms of the biophysical and social environments). These impacts include visual pollution, decreased safety due to reduced visibility, negative effects on human health and the ecology due to dust particle accumulation.
- » Hazardous substance storage (ensure compliance with all national, regional and local legislation with regard to the storage of oils, fuels, lubricants, solvents, wood treatments, bitumen, cement, pesticides and any other harmful and hazardous substances and materials. South African National Standards apply):
 - * Lists of all potentially hazardous substances to be used.
 - * Appropriate handling, storage and disposal procedures.
 - * Prevention protocol of accidental contamination of soil at the storage and handling areas.
 - * All storage areas, (i.e. for harmful substances appropriately banded with a suitable collection point for accidental spills must be implemented and drip trays underneath dispensing mechanisms including leaking engines/machinery).
- » Fire prevention and management measures on site.
- » Fauna and flora protection process on and off site (i.e. removal to reintroduction or replanting, if necessary):
 - * Rehabilitation, re-vegetation process and bush clearing.
- » Incident and accident reporting protocol.
- » General administration.
- » Designate access road and the protocol for when roads are in use.
- » Requirements on gate control protocols.

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

Failure to submit a method statement may result in suspension of the activity concerned until such time as a method statement has been submitted and approved.

7.3. Awareness and Competence: Construction Phase of the Umbila Emoyeni Phase 1 Wind Energy Facility

OBJECTIVE 19: To ensure all construction personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm

To achieve effective environmental management, it is important that Contractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. The Contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The Contractors obligations in this regard include the following:

- » All employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment. This includes the discussion/explanation of site environmental matters during toolbox talks.
- » The content and requirements of Method Statements are to be clearly explained to all plant operators and general workers. All staff acting in a supervisory capacity is to have copies of the relevant Method Statements and be aware of the content thereof.
- » Ensuring that a copy of the EMPr is readily available on-site, and that all senior site staff is aware of the location and have access to the document. Senior site staff will be familiar with the requirements of the EMPr and the environmental specifications as they apply to the construction of the wind farm.
- » Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended an Environmental Awareness Training session. The training session must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
 - * Records must be kept of those that have completed the relevant training.
 - * Training should be done either in a written or verbal format but must be appropriate for the receiving audience.
 - * Refresher sessions must be held to ensure the contractor staff are aware of their environmental obligations as practically possible.
- » All sub-contractors must have a copy of the EMPr and sign a declaration/ acknowledgement that they are aware and familiar with the contents and requirements of the EMPr and that they will conduct work in such a manner as to ensure compliance with the requirements of the EMPr.
- » Contractors and main sub-contractors should have basic training in the identification of archaeological sites/objects, and protected flora and fauna that may be encountered on the site.
- » Awareness of any other environmental matters, which are deemed to be necessary by the ECO.
- » Ensuring that employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) are erected at prominent locations throughout the site.

Therefore, prior to the commencement of construction activities on site and before any person commences with work on site thereafter, adequate environmental awareness and responsibility are to be appropriately presented to all staff present on-site, clearly describing their obligations towards environmental controls and methodologies in terms of this EMPr. This training and awareness will be achieved in the following ways:

7.3.1 Environmental Awareness Training

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

7.3.2 Induction Training

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

This induction training should be undertaken by the Contractor's EO and should include discussing the developer's environmental policy and values, the function of the EMPr and Contract Specifications and the importance and reasons for compliance to these. The induction training must highlight the overall "do's" and "don'ts" on site and clarify the repercussions of not complying with these. The non-conformance reporting system must be explained during the induction as well. Opportunity for questions and clarifications must form part of this training. A record of attendance of this training must be maintained by the SHE Officer on site.

7.3.3 Toolbox Talks

Toolbox talks should be held on a scheduled and regular basis (at least once a week) where foremen, environmental and safety representatives of different components of the works and sub-consultants hold talks relating to environmental practices and safety awareness on site. These talks should also include discussions on possible common incidents occurring on site and the prevention of the reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

7.4. Monitoring Programme: Construction Phase of the Umbila Emoyeni Wind Energy Facility

OBJECTIVE 20: To monitor the performance of the control strategies employed against environmental objectives and standards

A monitoring programme must be in place not only to ensure conformance with the EMPr, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are, or could result in significant environmental impacts for which corrective action is required. Monitoring during construction must be on-going for the duration of this phase. The Project Manager must ensure that the monitoring is conducted and reported.

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

- » Monitor and audit compliance with the prescriptive and procedural terms of the environmental specifications

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

All documentation e.g. audit/monitoring/compliance reports and notifications, required to be submitted to the DFFE in terms of the Environmental Authorisation, must be submitted to the Director: Compliance Monitoring of the Department.

Records relating to monitoring and auditing must be kept on site and made available for inspection to any relevant and competent authority in respect of this development.

7.4.1. *Non-Conformance Reports*

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

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

7.4.2. *Incident Reports*

According to Section 30 of National Environmental Management Act (NEMA), an "Incident" is defined as an unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed.

In terms of the requirements of NEMA, the responsible person must, within 14 days of the incident, report to the Director General, provincial head of department and municipality such information as is available to enable an initial evaluation of the incident, including:

- (a) the nature of the incident;
- (b) the substances involved and an estimation of the quantity released and their possible acute effect on persons and the environment and data needed to assess these effects;
- (c) initial measures taken to minimise impacts;
- (d) causes of the incident, whether direct or indirect, including equipment, technology, system, or management failure; and
- (e) measures taken and to be taken to avoid a recurrence of such incident.

7.4.3. *Monitoring Reports*

A monitoring report will be compiled by the ECO on a monthly basis (or as dictated by the conditions of the EA) and must be submitted to the Director: Compliance Monitoring at DEA for their records. This report should include details of the activities undertaken in the reporting period, any non-conformances or incidents recorded, corrective action required, and details of those non-conformances or incidents which have been closed out, or any other aspect as per the Appendix 7 of the EIA Regulations (2014, as amended 2017). The EPC contractor must ensure that all waste manifests are provided to the ECO on a monthly basis in order to inform and update the DEA regarding waste related activities.

7.4.4. *Audit Report*

The Developer must ensure that project compliance with the conditions of the Environmental Authorisation is audited by an independent auditor, and that the audit reports are submitted to the Director: Compliance Monitoring at the DEA at intervals as dictated by the conditions of the EA. Such audits must be undertaken during both the construction and operation phases of the wind farm. The effectiveness of the mitigation measures and recommendations for amongst others the following: grievance incidents; waste management, alien and open space management, re-vegetation and rehabilitation, plant rescue and protection and traffic and transportation should be audited. The results must form part of the project monitoring and audit reports.

7.4.5. *Final Audit Report*

A final environmental audit report must be compiled by an independent external auditor and be submitted to DEA upon completion of the construction and rehabilitation activities (within 30 days of completion of the construction phase). This report must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the environmental authorisation conditions and the requirements of the EMPr.

CHAPTER 8: MANAGEMENT PROGRAMME: OPERATION

Overall Goal: To ensure that the operation of the wind farm does not have unforeseen impacts on the environment and to ensure that all impacts are monitored and the necessary corrective action taken in all cases. In order to address this goal, it is necessary to operate the Umbila Emoyeni Wind Energy Facility in a way that:

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

An environmental manager must be appointed during operation whose duty will be to ensure the implementation of the operational EMP.

8.1. Objectives

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

OBJECTIVE 1: Securing the site and general maintenance during operation

Safety issues may arise with public access to wind turbines (e.g. unauthorised entry to the site) or to the wind farm substation. Prevention and control measures to manage public access are therefore important.

General maintenance at the Umbila Emoyeni Wind Energy Facility will be required during the operation of the wind farm. The maintenance required may also include the replacement of wind turbines, if required during the operation lifetime of the facility.

Project component/s	<ul style="list-style-type: none"> » Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	» Hazards to landowners and public.
Activities/risk sources	» Uncontrolled access to the wind farm and associated infrastructure.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To secure the site against unauthorised entry. » To protect members of the public/landowners/residents.

Mitigation: Action/control	Responsibility	Timeframe
General onsite maintenance of the wind turbines during the operation phase must in no way impact or negatively affect the environment, and contractors or other service providers	O&M Operator	Operation phase

Mitigation: Action/control	Responsibility	Timeframe
providing onsite maintenance must be made aware of this EMPr and the content thereof.		
Secure access to the site and entrances.	O&M Operator	Operation phase
Post information boards about public safety hazards and emergency contact information.	O&M Operator	Operation phase
Should wind turbines be required to be replaced, the following will apply: <ul style="list-style-type: none"> » Site access must be confirmed for the transportation of the required turbine components and equipment to the site and turbine location of the infrastructure to be replaced. » Materials and turbine structures are to be stored within the previously disturbed construction laydown area. No disturbance of areas outside of these areas should occur. » Full clean-up of all materials must be undertaken after the removal and replacement of the wind turbine and associated infrastructure is complete, and disturbed areas appropriately rehabilitated. » Most of the materials used for wind turbines can be recycled. The majority of the turbine (excluding the blades) can be recovered and re-used or recycled. Recyclable materials must be transported off-site by truck and managed at appropriate facilities in accordance with relevant waste management regulations. No waste materials may be left on-site following the replacement. » Waste material which cannot be recycled shall be disposed of at an appropriately licensed waste disposal site or as required by the relevant legislation. 	O&M Operator	Operation phase
<u>Existing access routes, especially roads must be made use of. The development areas and access roads should be specifically demarcated so that during the operations phase, only the demarcated areas may be impacted upon.</u>	O&M Operator	<u>Operational Phase</u>
<u>Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes wetting of exposed soft soil surfaces. No non-environmentally friendly suppressants may be used as this could result in pollution of water sources.</u>	O&M Operator	<u>Life of operation</u>
<u>All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area to inform contractors and site staff of the presence of Red / Orange List species, their identification, conservation status and importance, biology, habitat requirements and management requirements in the Environmental Authorisation and within the EMPr. The avoidance and protection of the very high sensitivity areas must be included into a site induction. Contractors and employees must all undergo the induction and made aware of the "no-go" areas to be avoided.</u>	Health and Safety Officer	Life of operation

Performance Indicator	<ul style="list-style-type: none"> » Site is secure and there is no unauthorised entry. » No members of the public/ landowners injured. » No complaints from landowners/ public.
Monitoring and Reporting	<ul style="list-style-type: none"> » Regular visual inspection of fence for signs of deterioration/forced access. » An incident reporting system must be used to record non-conformances to the EMPr. » A public complaints register must be developed and maintained on site. » Landowners should be consulted regularly.

OBJECTIVE 2: Protection of indigenous natural vegetation, fauna and maintenance of rehabilitation

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

Project component/s	<ul style="list-style-type: none"> » Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	<ul style="list-style-type: none"> » Disturbance to or loss of vegetation and/or habitat. » Alien plant invasion. » Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention.
Activity/Risk Source	<ul style="list-style-type: none"> » Movement of employee vehicles within and around site.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Maintain minimised footprints of disturbance of vegetation/ habitats on-site. » Ensure and encourage plant regrowth in non-operational areas of post-construction rehabilitation.

Mitigation: Action/Control	Responsibility	Timeframe
Any potentially dangerous fauna such as snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location.	O&M Operator	Operation phase
The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden by anyone except landowners or other individuals with the appropriate permits and permissions where required.	O&M Operator	Operation phase
If any parts of the site need to be lit at night for security purposes, this should be done with downward-directed low-UV type lights (such as most LEDs) as far as possible, which do not attract insects.	O&M Operator	Operation phase
All vehicles accessing the site should adhere to a low-speed limit (30km/h max) to avoid collisions with susceptible species such as snakes and tortoises.	O&M Operator	Operation phase
All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk.	O&M Operator	Operation phase

Mitigation: Action/Control	Responsibility	Timeframe
Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance must be undertaken, as per the Erosion Management and Rehabilitation Plans for the project.	O&M Operator	Operation phase
All erosion problems observed must be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.	O&M Operator	Operation phase
Due to the disturbance at the site as well as the increased runoff generated by the hard infrastructure, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented. Problem plant species are already present in the area and are likely to increase rapidly if not controlled.	O&M Operator	Operation phase
Regular monitoring for alien plants within the development footprint as well as adjacent areas which receive runoff from the facility must be undertaken as these are also likely to be prone to invasion problems.	O&M Operator	Operation phase
When alien plants are detected, these must be controlled and cleared using the recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur and increase to problematic levels. Clearing methods must aim to keep disturbance to a minimum. The use of herbicides should be avoided as far as possible.	O&M Operator	Operation phase
No planting or importing any listed invasive alien plant species (all Category 1a, 1b and 2 invasive species) to the site for landscaping, rehabilitation or any other purpose must be undertaken.	O&M Operator	Operation phase
Vehicle movements must be restricted to designated roadways.	O&M Operator	Operation phase
In order to increase general faunal protection, the use of any pesticide in the wind farms area should be prohibited.	O&M Operator	Operation phase
Existing roads must be maintained to ensure limited erosion and impact on areas adjacent to roadways.	O&M Operator	Operation phase
Vegetation control within the wind farm should be by manual clearing and herbicides should not be used except to control alien plants in the prescribed manner if necessary.	O&M Operator Specialist	Operation phase
All alien plant re-growth must be monitored and should these alien plants reoccur these plants should be re-eradicated. The scale of the development does however not warrant the use of a Landscape Architect and / or Landscape Contractor.	O&M Operator	Operation phase
The use of herbicides and other related horticultural chemicals should be carefully controlled and only applied by personnel adequately certified to apply pesticides and herbicides. It must be ensured that WHO Recommended Classification of Pesticides by Hazard Class 1a (extremely hazardous) or 1b (highly hazardous) are not purchased, stored or used on site along with any other nationally or internationally similarly restricted/banned products.	O&M Operator	Operation phase
Implement an animal removal plan to ensure safety of workers and fauna.	O&M Operator	Operation phase

Mitigation: Action/Control	Responsibility	Timeframe
Fire breaks should be established, where appropriate and as discussed with the landowners. Access roads could also act as fire breaks.	O&M Operator Specialist	Duration of contract
There should be follow-up rehabilitation and revegetation of any remaining bare areas with indigenous perennial shrubs and succulents from the local area.	O&M Operator	Operation phase
Annual site inspection for erosion with follow up remedial action where problems are identified.	Specialist	Annual monitoring until successful re-establishment of vegetation in an area
Noise and disturbance on the site should be kept to a minimum during operation and maintenance activities.	O&M Operator	Operation phase
<u>It should be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.</u>	O&M Operator	<u>Life of operation</u>
<u>No trapping, killing, or poisoning of any wildlife is to be allowed. Signs must be put up to enforce this.</u>	<u>Environmental Manager</u>	<u>Life of operation</u>
<u>Schedule activities and operations during least sensitive periods, to avoid migration, nesting and breeding seasons. Driving on access roads at night should be restricted in order to reduce or prevent wildlife road mortalities which occur more frequently during this period.</u>	<u>O&M Operator</u>	<u>Life of operation</u>
<u>Ensure that cables and connections are insulated successfully to reduce electrocution risk.</u>	<u>O&M Operator</u>	<u>Life of project</u>

Performance Indicator	<ul style="list-style-type: none"> » No further disturbance to vegetation or terrestrial faunal habitats. » No erosion problems resulting from operational activities within the wind farm. » Low abundance of alien plants within affected areas. » Maintenance of a ground cover that resists erosion. » Continued improvement of rehabilitation efforts.
Monitoring	<ul style="list-style-type: none"> » Observation of vegetation on-site by environmental manager. » Regular inspections to monitor plant regrowth/performance of rehabilitation efforts and weed infestation compared to natural/undisturbed areas. » Annual monitoring with records of alien species presence and clearing actions. » Annual monitoring with records of erosion problems and mitigation actions taken, with photographs.

OBJECTIVE 3: Protection of avifauna

Project component/s	<ul style="list-style-type: none"> » Wind turbines; » Access roads; and » Associated infrastructure.
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Potential Impact	<ul style="list-style-type: none"> » Disturbance to or loss of birds as a result of collision with the turbine blades and project components. » Destruction of habitat. » Displacement of birds. » Collision with project components. » Electrocution on power line. » Traffic to and from site.
Activity/risk source	<ul style="list-style-type: none"> » Spinning turbine blades. » Substation.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » More accurately determine the impact of the operating wind farm on collision-prone Red Data species. » Minimise impacts associated with the turbines and the substation.

Mitigation: Action/control	Responsibility	Timeframe
Observer-based Shut-down-on-demand or similar technology is to be implemented for all WTGs placed in High Sensitivity areas.	Developer Specialist	Operation phase
If one or more avifaunal SCC carcasses are located and determined likely to have resulted from collisions with infrastructure in any sensitivity area over the lifespan of the facility the fatality is to be appropriately recorded and reported to an avifaunal specialist to determine the most appropriate action.	Developer Specialist	Operation phase
If double layers of fencing are required for security purposes they should be positioned at least 2 m apart to reduce the probability of entrapment by larger bodied species that may find themselves between the two fences.	Developer Specialist	Operation phase
Develop and implement a carcass search and bird activity monitoring programme in-line with the latest applicable guidelines.	Developer Specialist	Operation phase
Regular reviews of operational phase monitoring data (activity and carcass) and results to be conducted by an avifaunal specialist. These reviews should strive to identify sensitive locations including WTGs and areas of increased collisions that may require additional mitigation.	Developer Specialist	Operation phase
An operational monitoring programme for any novel overhead power lines must be implemented to locate potential collision fatalities.	Developer Specialist	Operation phase
Any fatalities located should be reported to Birdlife South Africa (BLSA) and the Endangered Wildlife Trust (EWT).	Developer Specialist	Operation phase

Performance Indicator	<ul style="list-style-type: none"> » Minimal additional disturbance to bird populations on the wind farm site. » Continued improvement of bird protection devices, as informed by the operational monitoring. » Regular provision of clearly worded, logical and objective information on the interface between the local avifauna and operating wind farm. » Clear and logical recommendations on why, how and when to institute mitigation measures to reduce avian impacts of the development, from the pre-construction to operation phase.
Monitoring and Reporting	<ul style="list-style-type: none"> » Observation of avifaunal populations and incidence of injuries/death from collisions from turbine blades. » Monitoring of facility and reporting where fatalities do occur.

- » Review of bird monitoring report on a full year of post-construction monitoring.

OBJECTIVE 4: Protection of bat species

Project component/s	<ul style="list-style-type: none"> » Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	<ul style="list-style-type: none"> » Disturbance to or loss of bats as a result of collision with turbines and/or barotrauma. » Bat mortality and destruction of habitat / roosts.
Activity/risk source	<ul style="list-style-type: none"> » Spinning turbine blades.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » More accurately determine the impact of the operating wind farm on bat species. » Minimise impacts associated with the turbines and substation.

Mitigation: Action/control	Responsibility	Timeframe
Limit potential for bats to roost in project infrastructure (e.g., buildings, turbines, road culverts) by ensuring they are properly sealed <u>through regular maintenance</u> such that bats cannot gain access.	Developer Specialist	Operation phase
Implement fatality monitoring throughout the operational phase and apply curtailment or deterrents if fatality thresholds are exceeded. Annual fatality threshold per Least Concern species = 353 individuals. Annual fatality threshold per Species of Special Concern = 1 individual for each of African Straw-coloured fruit bat, Wahlberg's Epauletted fruit bat, Percival's Short-eared Trident bat, Blasius's Horseshoe bat, Egyptian Rousette.	Developer Specialist	Operation phase
A Biodiversity Management Plan (BMP) for bats must be developed which includes the design of a post-construction fatality monitoring program (PCFM) for bats, and an adaptive management response plan that provides an escalating scale of mitigation (e.g., curtailment) should fatality thresholds be exceeded (refer to Appendix K).	Developer Specialist	Operation phase

Performance Indicator	<ul style="list-style-type: none"> » Minimal additional disturbance to bat populations on the wind farm site. » Continued improvement of bat protection devices, as informed by the operational monitoring. » Regular provision of clearly worded, logical and objective information on the interface between the local bats and the proposed/ operating wind farm. » Clear and logical recommendations on why, how and when to institute mitigation measures to reduce bat impacts of the development, from the pre-construction to operation phase.
Monitoring and Reporting	<ul style="list-style-type: none"> » Monitoring of facility and reporting where fatalities do occur. » Review of bat monitoring report on a full year of post-construction monitoring.

OBJECTIVE 5: Minimisation of visual impact

The mitigation of secondary visual impacts, such as security and functional lighting, construction activities, etc. may be possible and should be implemented and maintained on an on-going basis.

The aircraft warning lights mounted on top of the hub of the wind turbines are prescribed by the Civil Aviation Authority (CAA), and the potential to mitigate their visual impacts is low. The regulations for the CAA's *Marking of Obstacles* should be strictly adhered to, as the failure of complying with these guidelines may result in the developer being required to fit additional light fixtures at closer intervals thereby aggravating the visual impact.

Project component/s	<ul style="list-style-type: none"> » Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	<ul style="list-style-type: none"> » Risk to aircraft in terms of the potential for collision. » Enhanced visual intrusion. » Visual impact of the wind farm degradation (including operational wind turbines) and vegetation rehabilitation failure.
Activity/risk source	<ul style="list-style-type: none"> » Size/scale of turbines. » Associated lighting. » Wind turbines and other infrastructure. » Access roads. » Other associated infrastructure. » Viewing of the degradation and vegetation rehabilitation failure by observers on or near the site.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise the potential for visual impact. » To ensure that the wind farm complies with Civil Aviation Authority requirements for turbine visibility to aircraft. » Well maintained and neat facility.

Mitigation: Action/control	Responsibility	Timeframe
Maintain the general appearance of the facility as a whole, including the turbines, servitudes and the ancillary buildings.	O&M Operator	Operation and maintenance
Ensure that operational lighting is only activated, when necessary, the splitting of circuits and use of movement sensors should be considered.	O&M Operator	Operation phase
Ensure that security lighting is only activated, when necessary, the use of movement sensors and / or infra-red systems should be considered.	O&M Operator	Operation and maintenance
If turbines are to be lit at night, lighting should be kept to a minimum and should preferably not be white light. Flashing strobe-like lights should be used where possible.	O&M Operator	Operation phase

Performance Indicator	<ul style="list-style-type: none"> » Appropriate visibility of infrastructure to aircraft. » Well maintained and neat facility with intact vegetation on and in the vicinity of the wind farm.
Monitoring and Reporting	<ul style="list-style-type: none"> » Ensure that aviation warning lights or other measures are installed before construction is completed and are fully functional at all times. » Monitoring of the entire site on an ongoing basis by the operator.

OBJECTIVE 7: Appropriate management of stormwater and erosion control

Project component/s	<ul style="list-style-type: none"> » Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	<ul style="list-style-type: none"> » Erosion and soil loss. » Increased runoff. » Downstream sedimentation.
Activities/risk sources	<ul style="list-style-type: none"> » Rainfall and wind erosion of disturbed areas. » Concentrated discharge of water from project site. » Stormwater run-off from sealed surfaces. » Roadside drainage ditches. » Project related infrastructure, such as buildings, turbines and fences.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise erosion of soil from site during operation. » To minimise damage to vegetation by erosion or deposition. » To retain all topsoil with a stable soil surface

Mitigation: Action/control	Responsibility	Timeframe
Any erosion problems observed along access roads or any hardened/engineered surface should be rectified immediately and monitored thereafter to ensure that they do not re-occur.	O&M Operator	Operation phase
All bare areas (excluding agricultural land and the development footprint), affected by the development, should be re-vegetated with locally occurring species, to bind the soil and limit erosion potential where applicable.	O&M Operator	Operation phase
Re-instate as much of the eroded area to its pre-disturbed, "natural" geometry (no change in elevation and any banks not to be steepened) where possible.	O&M Operator	Operation phase
Roads and other disturbed areas should be regularly monitored for erosion problems and problem areas should receive follow-up monitoring by the EO to assess the success of the remediation.	O&M Operator	Operation phase
Any stormwater within the site must be handled in a suitable manner as per the management measures in stormwater management plan.	O&M Operator	Operation phase
Stormwater from hardstand areas, buildings and the substation must be managed using appropriate channels and swales when located within steep areas.	O&M Operator	Operation phase
No stormwater runoff must be allowed to discharge directly into the watercourses. The runoff should rather be dissipated over a broad area covered by natural vegetation or managed using appropriate channels and swales when located within steep embankments.	O&M Operator	Operation phase

Mitigation: Action/control	Responsibility	Timeframe
Stormwater run-off infrastructure must be maintained to mitigate both the flow and water quality impacts of any stormwater leaving the wind energy facility site.	O&M Operator	Operation phase
<p><u>Speed limits of 30 km/h must be put in place to reduce erosion.</u></p> <ul style="list-style-type: none"> <u>Reducing the dust generated by the listed activities above, especially the earth moving machinery, through wetting the soil surface and putting up signs to enforce speed limit as well as speed bumps built to force slow speeds;</u> <u>Signs must be put up to enforce this.</u> 	O&M Operator	<u>Life of operation</u>

Performance Indicator	<ul style="list-style-type: none"> » Minimal level of soil erosion around site. » Minimal level of soil degradation. » No activity outside demarcated areas. » Progressive return of disturbed and rehabilitated areas to the desired end state. » No indications of visible topsoil loss.
Monitoring and Reporting	<ul style="list-style-type: none"> » Continual inspections of the site by the Environmental Manager/EO. » Reporting of ineffective sediment control systems and rectification as soon as possible. » If soil loss is suspected, acceleration of soil conservation and rehabilitation measures must be implemented.

OBJECTIVE 8: Minimisation of noise impacts from turbines

From the noise impacts assessed it is stated that there will be a low significance for daytime construction activities, a medium significance for night-time construction activities (with mitigation proposed to reduce the significance to low) and a low significance for both night-time operation activities. No impacts of a high significance or fatal flaws were identified.

The specialist has indicated that a noise monitoring programme must be undertaken before the development of the wind farm as well as noise monitoring after the first year of operation of the wind farm. Thereafter, an acoustic consultant will need to recommend whether future noise monitoring is required.

Project component/s	» Wind farm (including access roads).
Potential Impact	<ul style="list-style-type: none"> » Increased noise levels at potentially sensitive receptors. » Changing ambient sound levels could change the acceptable land use capability. » Disturbing character of noise from the wind turbines.
Activity/risk source	» Simultaneous operation of a number of wind turbines.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Define ambient sound levels at NSD04 prior to the development of the wind farm. » Ensure that the change in ambient sound levels as experienced by potentially sensitive receptors is less than 7 dBA. » Prevent the generation of nuisance noises. » Ensure acceptable noise levels at surrounding stakeholders and potentially sensitive receptors. » Ensure that noises from wind turbines do not exceed 45 dBA at all NSDs.

Mitigation: Action/control	Responsibility	Timeframe
Active noise monitoring (i.e., the measurement of noise levels at identified locations) is recommended throughout the operation phase at NSRs within 2000m of a wind turbine before the development of the wind energy facility, with the measurements repeated after the first year of operation. Should any of these locations not be used for residential purposes, measurements at these NSRs would not be required.	O&M Operator	Operation phase
Should a reasonable and valid noise complaint be registered, the developer must investigate the noise complaint as per the guidelines in sub-section 12.1 and 12.2 of the noise impact assessment (Appendix J of the <u>Final</u> EIA Report). 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.	O&M Operator	Operation phase

Performance Indicator	» Ensure that the change in ambient sound levels as experienced by potentially sensitive receptors is less than 7 dBA.
Monitoring and Reporting	» Noise monitoring after the first year of operation and any additional monitoring as recommended by the specialist thereafter.

OBJECTIVE 9: Appropriate handling and management of hazardous substances and waste

The operation of the wind farm will involve the generation of limited waste products. The main wastes expected to be generated by the operation activities includes general solid waste and hazardous waste.

Project component/s	» Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	» Inefficient use of resources resulting in excessive waste generation. » Litter or contamination of the site or water through poor waste management practices.
Activity/risk source	» Generators and gearbox – turbines. » Transformers and switchgear – substation. » Fuel and oil storage.
Mitigation: Target/Objective	» To comply with waste management legislation. » To minimise production of waste. » To ensure appropriate waste disposal. » To avoid environmental harm from waste disposal.

Mitigation: Action/control	Responsibility	Timeframe
Hazardous substances must be stored in sealed containers within a clearly demarcated designated area.	O&M Operator	Operation phase

Mitigation: Action/control	Responsibility	Timeframe
Storage areas for hazardous substances must be conducted within a secured and clearly demarcated area.	O&M Operator	Operation phase
All structures and/or components replaced during maintenance activities must be appropriately disposed of at an appropriately licensed waste disposal site or sold to a recycling merchant for recycling.	O&M Operator	Operation phase
Care must be taken to ensure that spillage of oils and other hazardous substances are limited during maintenance. Handling of these materials should take place within an appropriately sealed and bunded area. Should any accidental spillage take place, it must be cleaned up according to specified standards regarding bioremediation.	O&M Operator	Operation and maintenance
Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures. Where required, a NEMA Section 30 report must be submitted to DFFE within 14 days of the incident.	O&M Operator	Operation phase
Any pollution incidents originating from the proposed project must be reported to the Provincial Office of DWS within 24 hours in accordance with Section 19(1) of the National Water Act, 1998 (Act No. 36 of 1998).	O&M Operator	Operation phase
Waste handling, collection and disposal operations must be managed and controlled by a waste management contractor.	O&M Operator / waste management contractor	Operation phase
Used oils and chemicals: <ul style="list-style-type: none"> » Where these cannot be recycled, appropriate disposal must be arranged with a licensed facility in consultation with the administering authority. » Waste must be stored and handled according to the relevant legislation and regulations. 	O&M Operator	Operation phase
General waste must be recycled where possible or disposed of at an appropriately licensed landfill.	O&M Operator	Operation phase
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	O&M Operator	Operation and maintenance
Hazardous waste (including hydrocarbons) and general waste must be stored and disposed of separately.	O&M Operator	Operation phase
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	O&M Operator/ waste management contractor	Operation phase
No waste may be burned or buried on site.	O&M Operator	Operation phase
<u>A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No</u>	<u>O&M Operator</u>	<u>Life of operation</u>

Mitigation: Action/control	Responsibility	Timeframe
<u>servicing of equipment on site unless necessary. All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them leaking and entering the environment. Construction activities and vehicles could cause spillages of lubricants, fuels and waste material potentially negatively affecting the functioning of the ecosystem. All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area.</u>		
Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures. Where required, a NEMA Section 30 report must be submitted to DFFE within 14 days of the incident.	O&M Operator	Construction
Any pollution incidents originating from the proposed project must be reported to the Provincial Office of DWS within 24 hours in accordance with Section 19(1) of the National Water Act, 1998 (Act No. 36 of 1998).	O&M Operator	Construction
<u>Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site.</u>	<u>Environmental Officer</u>	<u>Life of operation</u>
Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regard to waste management. Under no circumstances may domestic waste be burned on site	Environmental Officer, Contractor & Health and Safety Officer	Life of operation

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

OBJECTIVE 10: Maximise benefits and opportunities for local communities associated with the operation of the wind farm

Project component/s	<ul style="list-style-type: none"> » Wind farm. » Day to day operational activities associated with the wind farm including maintenance.
Potential Impact	<ul style="list-style-type: none"> » The opportunities and benefits associated with the creation of local employment and business should be maximised as far as possible.
Activity/risk source	<ul style="list-style-type: none"> » The operation phase of the wind farm will create permanent employment opportunities. » The establishment of a wind farm has the potential to create an attraction for visitors to the area. The development also has the potential to promote the benefits of renewable energy projects.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Create medium- to long-term full time employment opportunities for locals.

Mitigation: Action/control	Responsibility	Timeframe
The project developer should make effort to use locally sourced inputs where feasible in order to maximize the benefit to the local economy.	O&M Operator	Operation phase
Local Small and Medium Enterprises are to be approached to investigate the opportunities for supplying inputs required for the maintenance and operation of the facility, as far as feasible.	O&M Operator	Operation phase
Where feasible, effort must be made to employ locally in order to create maximum benefit for the communities.	O&M Operator	Operation phase

Performance Indicator	<ul style="list-style-type: none"> » Maximum amount of semi and unskilled labour locally sourced where possible. » Local suppliers and SMMEs contracted where possible.
Monitoring and Reporting	<ul style="list-style-type: none"> » Indicators listed above must be met for the operation phase.

OBJECTIVE 11: Implement an appropriate fire management plan during the operation phase

The vegetation on the site may be at risk of fire, especially during drought conditions experienced in the area. The increased presence of people on the site could increase the risk of veld fires, particularly in the dry season.

Project Component/s	» Operation and maintenance of the wind farm and associated infrastructure.
Potential Impact	» Veld fires can pose a personal safety risk to local farmers and communities, and their homes, crops, livestock and farm infrastructure, such as gates and fences. In addition, fire can pose a risk to the wind farm infrastructure.
Activities/Risk Sources	» The presence of operation and maintenance personnel and their activities on the site can increase the risk of veld fires.
Mitigation: Target/Objective	» To avoid and or minimise the potential risk of veld fires on local communities and their livelihoods.

Mitigation: Action/Control	Responsibility	Timeframe
Provide adequate firefighting equipment on site. Apply for membership to the local Fire Protection Association, should there be one.	O&M Operator	Operation phase
Provide fire-fighting training to selected operation and maintenance staff.	O&M Operator	Operation phase
Ensure that appropriate communication channels are established to be implemented in the event of a fire.	O&M Operator	Operation phase
Fire breaks should be established where and when required. Cognisance must be taken of the relevant legislation when planning and burning firebreaks (in terms of timing, etc.). Access roads may also act as fire breaks.	O&M Operator	Operation phase
Upon completion of the construction phase, an emergency evacuation plan must be drawn up to ensure the safety of the staff and surrounding land users in the case of an emergency.	O&M Operator	Operation phase
Contact details of emergency services should be prominently displayed on site.	O&M Operator	Operation phase
<u>A fire management plan must be compiled and implemented to restrict the impact fire might have on the surrounding areas (refer to Appendix L).</u>	O&M Operator	<u>Life of operation</u>

Performance Indicator	» Firefighting equipment and training provided before the operations phase commences. » Appropriate fire breaks in place. » Fire management plan in place.
Monitoring and Reporting	» The Developer must monitor indicators listed above to ensure that they have been met.

8.2. Monitoring Programme: Operation Phase of the Umbila Emoyeni Wind Energy Facility

OBJECTIVE 12: To monitor the performance of the control strategies employed against environmental objectives and standards

A monitoring programme must be in place not only to ensure conformance with the EMPr, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are, or could result in significant environmental impacts for which corrective action is required. An internal environmental audit must be conducted every 6 months and an external audit must be conducted once a year in order to confirm compliance with the requirements of all environmental permits (including the Environmental Authorisation) for the project, this EMPr, and all relevant legislation. The results of the audit reports must be made available to the DFFE and the relevant authorities on request, and must be part of monitoring and audit reports. An annual audit report must be compiled and submitted to DFFE. The aim of the auditing process would be to routinely monitor the implementation of the specified environmental specifications, in order to:

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

CHAPTER 9: MANAGEMENT PROGRAMME: DECOMMISSIONING

The turbine infrastructure which will be utilised for the Umbila Emoyeni Wind Energy Facility is expected to have a lifespan of 25 to 30 years (with maintenance). Equipment associated with this wind farm would only be decommissioned once it has reached the end of its economic life. It is most likely that decommissioning activities of the infrastructure of the wind farm would comprise the dismantling and replacement of the turbines with more appropriate technology/infrastructure available at that time. It must be noted that decommissioning activities will need to be undertaken in accordance with the legislation applicable at that time, which may require this section of the EMP to be revisited and amended.

The relevant mitigation measures contained under the construction section should be applied during decommissioning and therefore are not repeated in this section.

» *Site Preparation*

Site preparation activities will include confirming the integrity of the access to the site to accommodate the required equipment, preparation of the site (e.g. laydown areas, construction platform) and the mobilisation of construction equipment.

» *Dismantle and Remove Infrastructure*

The wind infrastructure (turbine and tower sections) of the wind farm will be dismantled once it reaches the end of its economic lifespan. A large crane would be required for dismantling the turbine and tower sections. Once dismantled, the components will be reused, recycled, or disposed of in accordance with regulatory requirements (NEMA / NEM:WA). All parts of the turbine would be considered reusable or recyclable except for the blades.

9.1. Objectives

In decommissioning the Umbila Emoyeni Wind Energy Facility, Umbila Emoyeni (Pty) Ltd must ensure that:

- » All structures not required for the post-decommissioning use of the site (may include the turbines, substation, ancillary buildings, monitoring masts) are dismantled and/or demolished, removed and waste material disposed of at an appropriately licensed waste disposal site or as required by the relevant legislation.
- » Rehabilitate access/service roads and servitudes not required for the post-decommissioning use of the site. If necessary, an ecologist should be consulted to give input into rehabilitation specifications.
- » All disturbed areas are compacted, sloped and contoured to ensure drainage and runoff and to minimise the risk of erosion.
- » Monitor rehabilitated areas quarterly for at least a year following decommissioning, and implement remedial action as and when required.
- » Any fauna encountered during decommissioning activities should be removed to safety by a suitably qualified person.
- » All vehicles to adhere to low speed limits (i.e. 30km/h max) on the site, to reduce risk of faunal collisions as well as reduce dust.
- » Retrenchments should comply with South African Labour legislation of the day.

The general specifications of Chapter 6 (Construction) and Chapter 7 (Rehabilitation) are also relevant to the decommissioning of the Umbila Emoyeni Wind Energy Facility and must be adhered to.