UMMBILA EMOYENI WIND FARM – PHASE ONE, MPUMALANGA PROVINCE

FINAL ENVIRONMENTAL MANAGEMENT PROGRAMME

May 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 or 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
REC	Recommended Ecological Category
REIPPPP	Renewable Energy Independent Power Producers Procurement Programme
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 Ummbila 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 Ummbila 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 Ummbila Emoyeni (Pty) Ltd employees and contractors working on the pre-construction, construction, and operation and maintenance phases of the Ummbila 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 Ummbila 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 Ummbila 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 Ummbila 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.

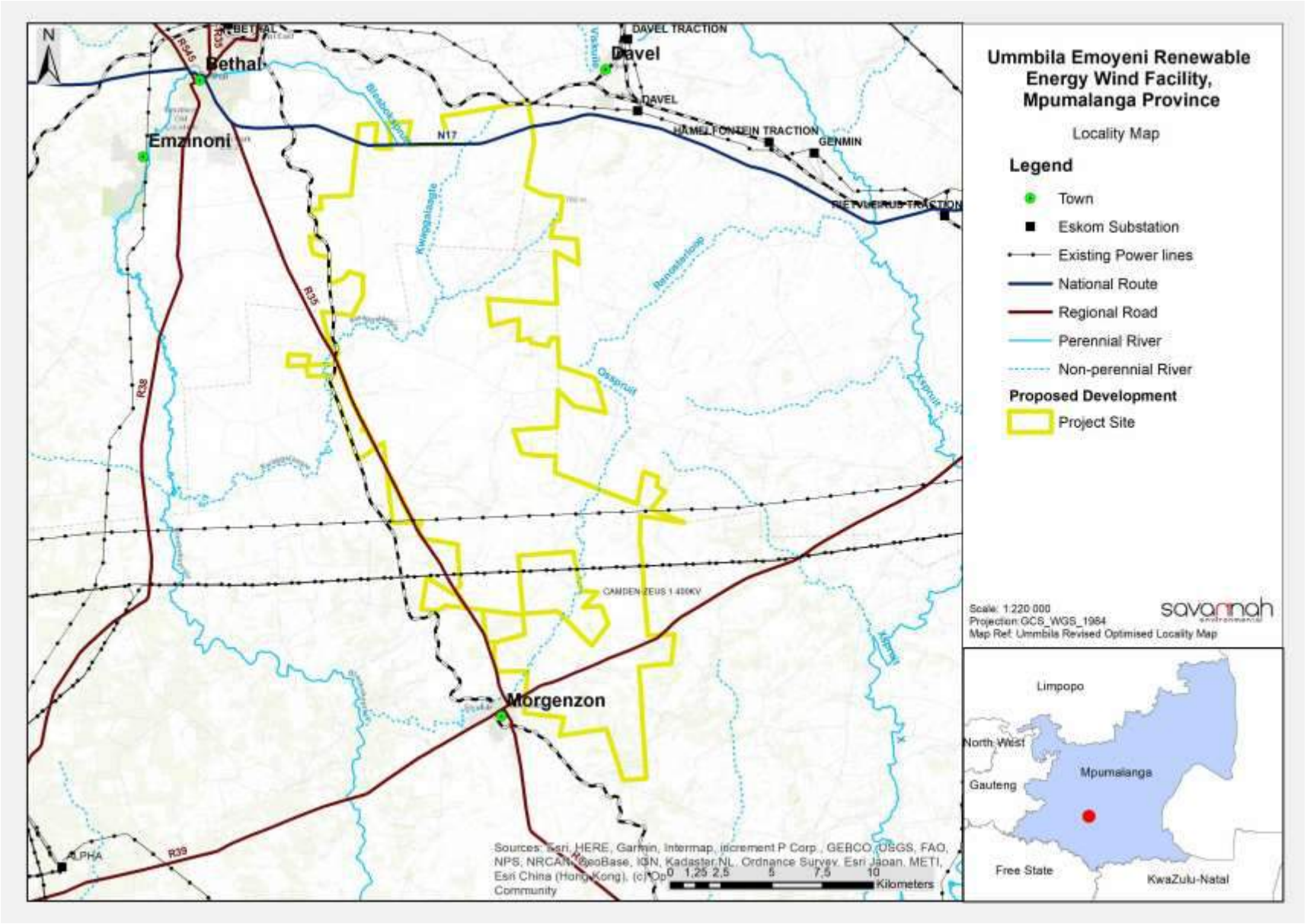


Figure 2.1: Locality map of the project site within which the Ummbila Emoyeni Wind Energy Facility is proposed to be developed.

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 Ummbila 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 Ummbila Emoyeni Phase 1 Wind Energy Facility

Infrastructure	Footprint and dimensions
Number of turbines	Up to 25 turbines
Hub Height	Up to 130m
Tip Height	Up to 250m
Rotor Diameter	Up to 185m
Contracted Capacity	Up to 155MW (individual turbines of 6.2MW 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	» One Batching plant of up to 4ha to 7ha. » One O&M office of approximately 1.5ha adjacent to the collector SS. » Two 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	» 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 be12m 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. A separate EMPr has been developed for the electrical grid infrastructure authorised under that process.
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 Ummbila 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 Ummbila Emoyeni Wind Energy Facility

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

Construction Phase	
Requirements	» 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 250 employment opportunities will be created. » No on-site labour camps. Employees to be accommodated in the nearby towns such as Bethal or Morgenzon 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	» 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	» 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	» 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).

Establishment of laydown areas and batching plant on site	» 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.
Construct foundation	» 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).
Transport of components and equipment to and within the site	» 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.
Construction of the turbine	» 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.
Construction of the onsite collector substations and connection of wind turbines to the substation	» 1 x onsite collector substation (IPP Portion) to be constructed within the development footprint. * 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.

	* 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. » 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.
Establishment of ancillary infrastructure	» Site offices and maintenance buildings, including workshop areas for maintenance and storage will be required. » Establishment will require the clearing of vegetation, levelling, and the excavation of foundations prior to construction.
Connect facility to the power grid	» 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.
Undertake site rehabilitation	» Commence with rehabilitation efforts once construction completed in an area, and all construction equipment is removed. » On commissioning, access points to the site not required during the operation phase will be closed and prepared for rehabilitation.
Operation Phase	
Requirements	» Duration will be 20-30 years. » Requirements for security and maintenance of the project. » 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. » 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. » 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.
Activities to be undertaken	
Operation and Maintenance	» Full time security, maintenance, and control room staff. » All turbines will be operational except under circumstances of mechanical breakdown, inclement weather conditions, or maintenance activities. » Wind turbines to be subject to periodic maintenance and inspection. » The BESS will be in place for the life of the facility and will be maintained as required throughout the operation period. » Disposal of waste products (e.g., oil) in accordance with relevant waste management legislation. » Areas which were disturbed during the construction phase to be utilised, should a laydown area be required during operation.

Decommissioning Phase	
Requirements	» Decommissioning of the Ummbila Emoyeni Phase 1 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	» 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	» 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	» 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 Ummbila 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 Ummbila 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 Ummbila 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. Ummbila Emoyeni Phase 1 Wind Energy Facility Final Layout

The development footprint and final layout for the Ummbila 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 Ummbila 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 Ummbila 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.

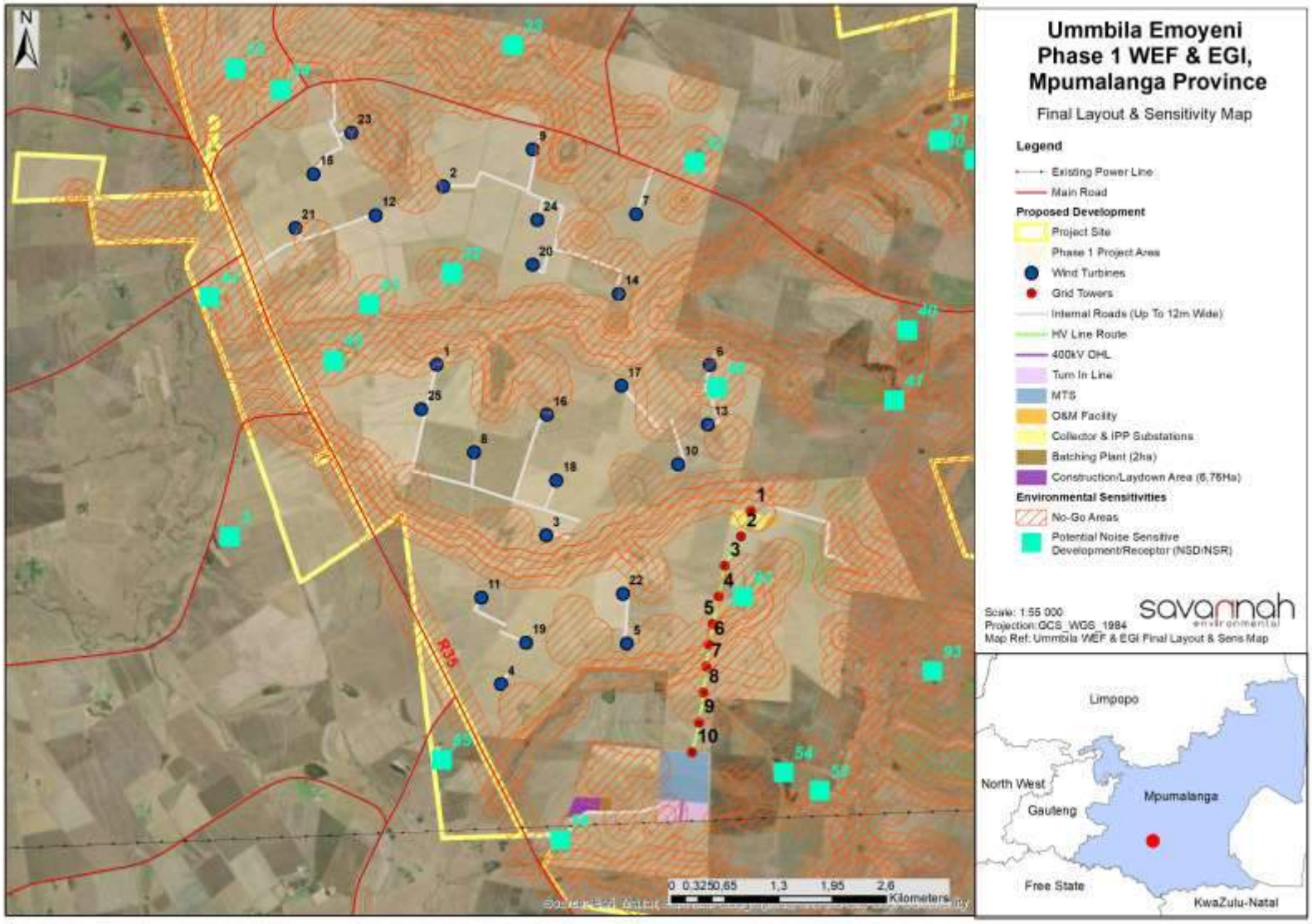


Figure 2.2: The final layout of the Ummbila Emoyeni Phase 1 Wind Energy Facility overlain with the sensitivities identified in the EIA process[2].

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

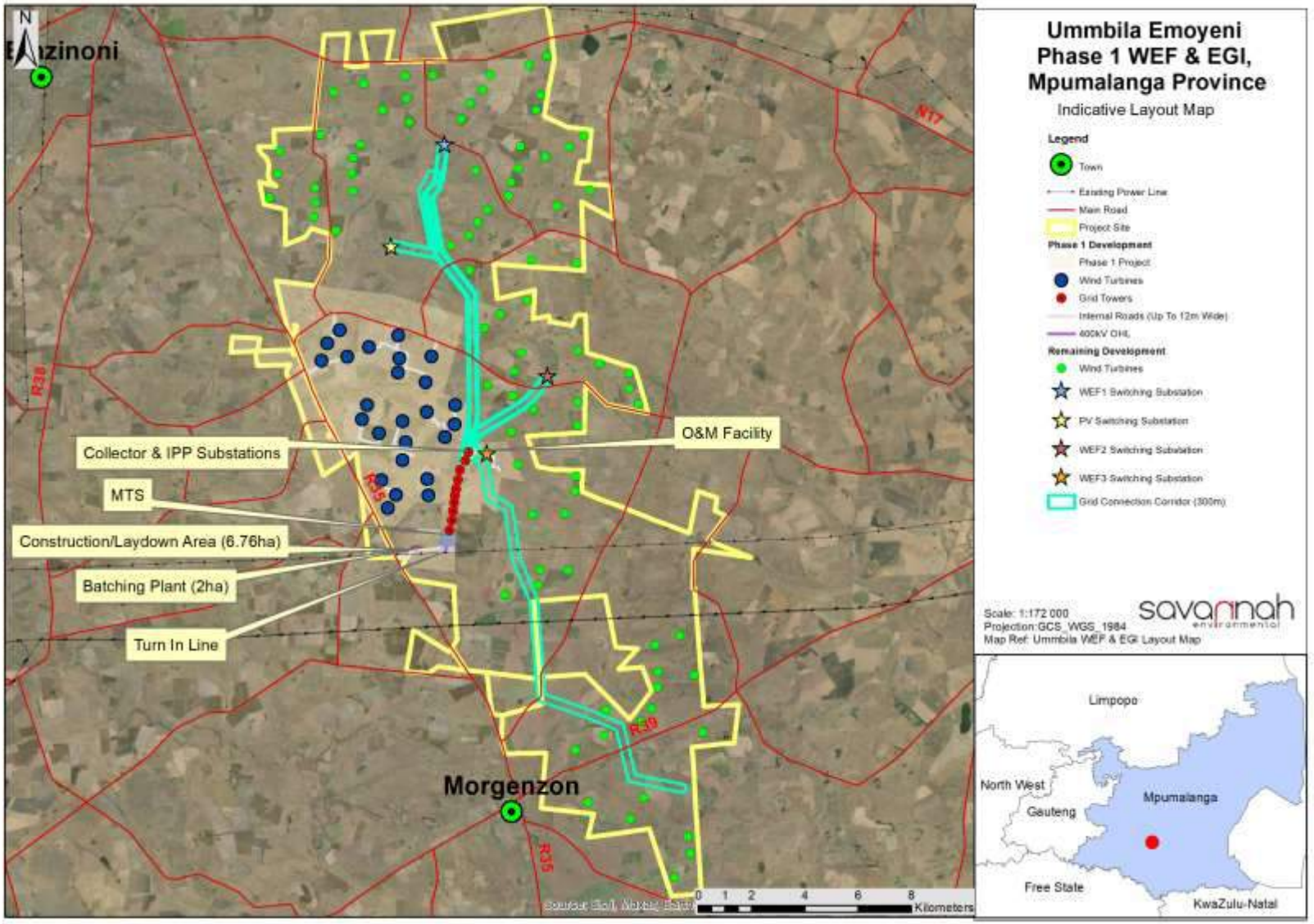


Figure 2.3: Final layout of the Ummbila Emoyeni Phase 1 Wind Energy Facility together with an indicative layout for the remaining extent of the authorised Wind Farm.

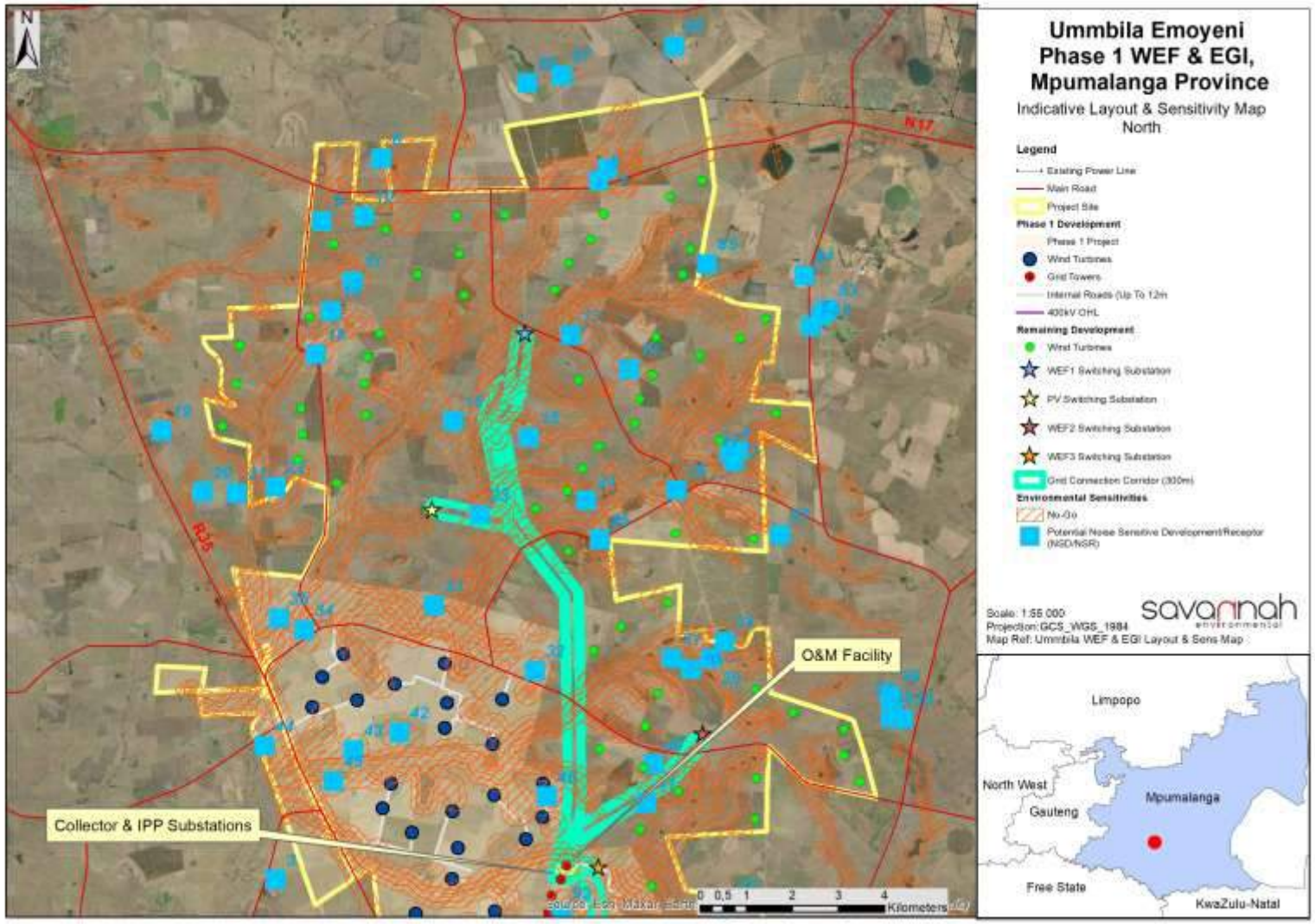


Figure 2.4: Northern final layout of the Ummbila Emoyeni Phase 1 Wind Energy Facility together with an indicative layout for the remaining extent of the authorised Wind Farm overlain with the sensitivities identified in the EIA process[3].

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

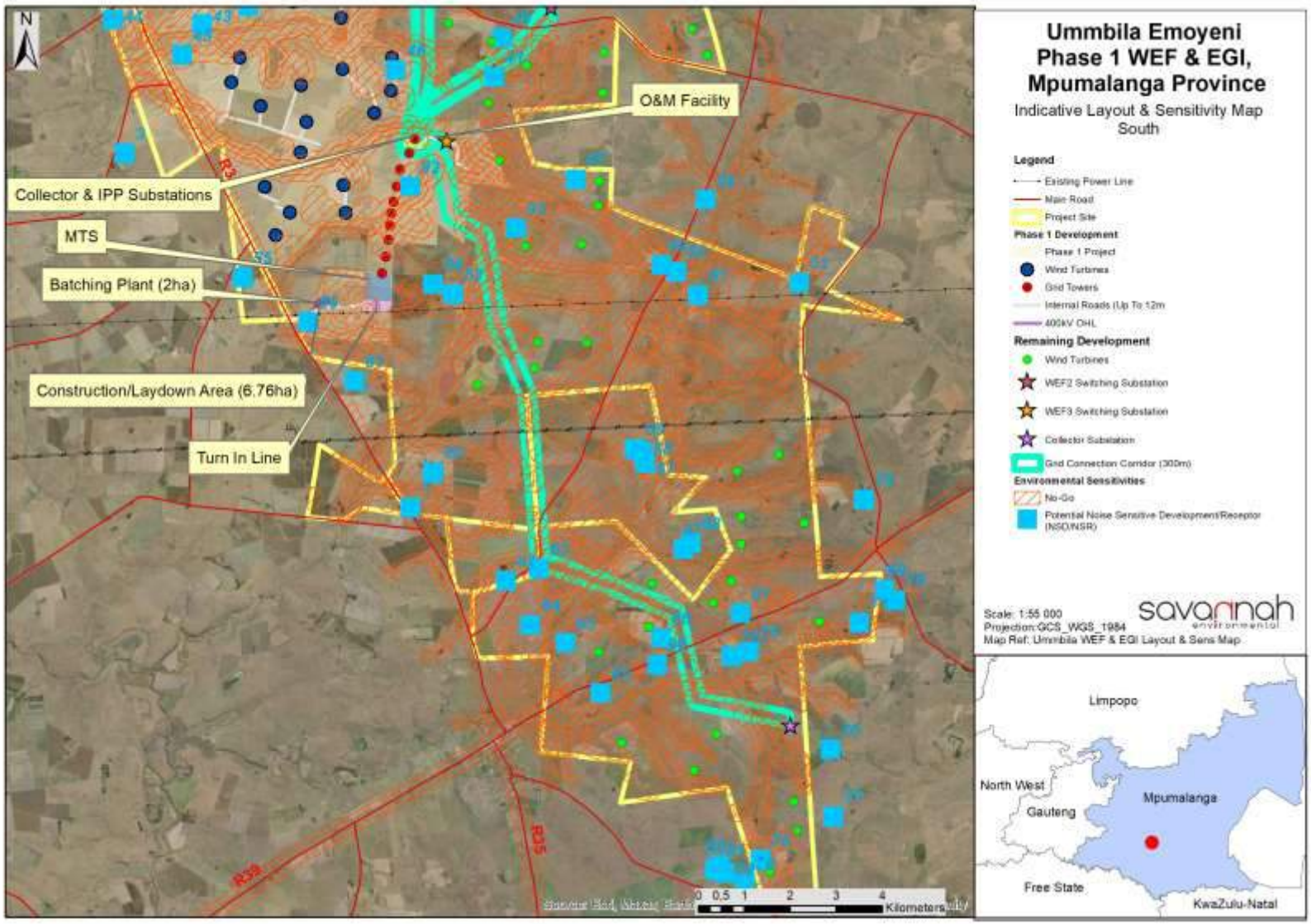


Figure 2.5: Southern final layout of the Ummbila Emoyeni Phase 1 Wind Energy Facility together with an indicative layout for the remaining extent of the authorised Wind Farm overlain with the sensitivities identified in the EIA process[4].

[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 Ummbila 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 Ummbila 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 Ummbila 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.

Ummbila 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 Ummbila 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 Ummbila 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 Ummbila 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.: » 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 21 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 Ummbila 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, Ummbila 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 Ummbila 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	» Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	» 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	» 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	» 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 Ummbila 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
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. » 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): * 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
Drainage lines must be avoided for turbine placement and access roads, and a no-go buffer of 20 m must be applied around them.	Project manager, Environmental Officer	Life of operation
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 (refer to **Appendix J**), 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: » 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	» 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	» 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	» Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	» Impact on identified sensitive areas. » Design fails to respond optimally to the environmental considerations.
Activities/Risk Sources	» 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	» 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
Search and rescue of species of conservation concern should be conducted prior to clearing activities.	Developer Contractor	Pre-construction

Mitigation: Action/Control	Responsibility	Timeframe
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.	Project manager, Environmental Officer & Contractor	Planning Phase, Pre-Construction
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 **Appendix C**).	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.	Contractor	Pre-construction, Construction
Prepare a detailed Fire Management Plan in collaboration with surrounding landowners.	Developer/ Contractor	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	» 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.
Monitoring	» Review of the design by the Project Manager and the ECO prior to the commencement of construction. » Monitor ongoing compliance with the EMPr.

OBJECTIVE 3: Ensure compliance of required mitigation measures and recommendations by contractors

Project Component/s	» Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	» Impact on identified sensitive areas. » Planning fails to respond optimally to the environmental considerations.
Activities/Risk Sources	» Positioning of all project components. » Pre-construction activities. » Positioning of temporary sites. » Employment and procurement procedures.
Mitigation: Target/Objective	» 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 (including sub-contractors) 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	» Conditions of the EA and EMPr form part of all contracts. » Local employment and procurement is encouraged.
Monitoring	» 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 Ummbila 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	» Wind turbines; » Access roads; and

	» Associated infrastructure.
Potential Impact	» Impacts on affected and surrounding landowners and land uses.
Activity/risk source	» Activities associated with pre-construction phase. » Activities associated with construction of the wind farm. » Activities associated with operation.
Mitigation: Target/Objective	» 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
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. A Project Specific Grievance Mechanism must be developed and implemented prior to construction.	Developer Contractor O&M Operator	Pre-construction (construction procedure) Pre-operation (operation procedure)
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.	Developer Contractor O&M Operator	Pre-construction (construction procedure) Pre-operation (operation procedure)
Have a detailed consultation and communication plan with neighbouring property owners to keep them informed with regards to construction progress, issues and potential dangers.	Developer	Pre-construction

Performance Indicator	» Effective communication procedures in place for all phases as required.
Monitoring	» 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	» Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	» Hazards to landowners and public. » Security of materials. » Substantially increased damage to natural vegetation. » Potential impact on fauna and avifauna habitat.
Activities/risk sources	» Open excavations (foundations and cable trenches). » Movement of construction employees, vehicles and plant equipment in the area and on-site.
Mitigation: Target/Objective	» 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	» 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	» 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	» Wind turbines; » Access roads; and

	» Associated infrastructure.
Potential Impact	» 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	» 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 EMPr, leading to unnecessary impacts on the surrounding environment.
Mitigation: Target/Objective	» 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 EMPr, 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	» Code of Conduct drafted by the Developer 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	» 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.

	» Construction-related transport. » Foundations or plant equipment installation. » Building activities.
Mitigation: Target/Objective	» 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
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.	Environmental Officer	Construction Phase

Performance Indicator	» 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	» 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	» Wind turbines; » Access roads; and » Associated infrastructure.

Potential Impact	» Dust impacts can occur from cleared areas and from vehicle movement along gravel roads. » Release of minor amounts of air pollutants (for example NO_2, CO and SO_2) from vehicles and construction equipment.
Activities/risk sources	» 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	» 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	» 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	» 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	» Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	» Erosion and soil loss. » Increased runoff. » Downstream sedimentation.
Activities/risk sources	» 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	» 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: » Topsoil must always be salvaged and stored separately from subsoil and lower-lying parent rock or other spoil material. ∗ 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. 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: » 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
» 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: ∗ 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	» 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	» 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	» Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	» 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	» 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	» 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
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.	Contractor Environmental Officer	Construction
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
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	Contractor EO	Construction

Mitigation: Action/control	Responsibility	Timeframe
into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.		
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: » 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
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.	Health and Safety Officer EO Contractor	Construction

Performance Indicator	» No disturbance outside of designated work areas. » Limited alien infestation within project control area. » Construction activities restricted to the development footprint.
Monitoring and Reporting	» 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	» 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	» 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	» 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
The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments, • Signs must be put up to enforce this	Project manager, Environmental Officer	Construction
The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on fauna.	Project manager, Environmental Officer & Design Engineer	Construction Phase
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.	Environmental Officer & Contractor, Engineer	Planning and Construction

Mitigation: Action/control	Responsibility	Timeframe
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.	Project manager, Environmental Officer & Contractor	Construction

Performance Indicator	» 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	» 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	» Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	» Disturbance of birds (e.g. destruction of habitat). » Displacement of birds. » Collision with project components. » Traffic to and from site.
Activity/risk source	» 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	» 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 Developer's 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	» 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	» 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	» Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	» Disturbance of bats (e.g. destruction of habitat). » Displacement of bats. » Traffic to and from site.
Activity/risk source	» 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	» 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	» 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	» 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	» Excavations of turbine foundations. » Excavations of trenches for the installation of cabling and infrastructure. » Excavation of substation foundations.
Potential Impact	» 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	» All bulk earthworks.
Mitigation: Target/Objective	» To facilitate the likelihood of noticing heritage resources and ensure appropriate actions in terms of the relevant legislation

Mitigation: Action/control	Responsibility	Timeframe
» The Chance Fossil Finds Procedure must be implemented for the duration of construction activities: o Training: * 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
(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. o Actions to be undertaken: * 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: - 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: ❖ 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: ✓ 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
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. * 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	» 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	» 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	» Construction site. » Transportation of staff and equipment.
Potential Impact	» 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	» 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	» 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	» Construction site maintained in a neat and tidy condition. » Site appropriately rehabilitated after construction is complete.
Monitoring	» 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	» 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	» Packaging. » Other construction wastes. » Hydrocarbon use and storage.

	» Spoil material from excavation, earthworks and site preparation.
Mitigation: Target/Objective	» 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	» 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	» 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. » Proof of disposal of solid general and hazardous waste at appropriately licenced waste disposal site(s). » 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	» Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	» Release of contaminated water from contact with spilled chemicals. » Generation of contaminated wastes from used chemical containers. » Soil pollution.

Activity/Risk Source	» 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	» 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: » 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; 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 compiled 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
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.	Environmental Officer Contractor	Construction

Performance Indicator	» No chemical spills outside of designated storage areas. » No water or soil contamination by spills. » Safe storage of hazardous chemicals. » Proper waste management.
Monitoring	» 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	» Dust emissions. » Release of contaminated water.

	» Generation of contaminated wastes from used chemical containers. » Inefficient use of resources resulting in excessive waste generation.
Activity/risk source	» 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	» 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	» 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	» 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 EMPr. » 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	» Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	» 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	» 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	» 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
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.	Health and Safety Officer	Life of operation
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	» 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	» 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	» 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	» Site preparation and earthworks. » Excavation of foundations and trenches. » Temporary laydown areas.

	» Temporary access roads/tracks. » Other disturbed areas/footprints.
Mitigation: Target/Objective	» 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
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.	Environmental Officer & Contractor	Operation phase
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	» All portions of site, including construction camp and working areas, cleared of equipment and temporary facilities. » Topsoil replaced on all areas and stabilised.

	» Disturbed areas rehabilitated and acceptable plant cover achieved on rehabilitated sites. » Closed site free of erosion and alien invasive plants.
Monitoring and Reporting	» 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 EMPr will be met. That is, the Contractor will be required to describe how specified requirements will be achieved through the submission of written Method Statements to the Site Manager and ECO.

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

- 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 bunded 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 Ummbila 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 Ummbila 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 Ummbila 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 EMPr.

8.1. Objectives

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

OBJECTIVE 1: 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 Ummbila 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	» 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	» 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: » 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
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.	O&M Operator	Operational Phase
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.	O&M Operator	Life of operation
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.	Health and Safety Officer	Life of operation

Performance Indicator	» Site is secure and there is no unauthorised entry. » No members of the public/ landowners injured. » No complaints from landowners/ public.
Monitoring and Reporting	» 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	» Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	» 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	» Movement of employee vehicles within and around site.
Mitigation: Target/Objective	» 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
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.	O&M Operator	Life of operation
No trapping, killing, or poisoning of any wildlife is to be allowed. Signs must be put up to enforce this.	Environmental Manager	Life of operation
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.	O&M Operator	Life of operation
Ensure that cables and connections are insulated successfully to reduce electrocution risk.	O&M Operator	Life of project

Performance Indicator	» 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	» 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	» Wind turbines; » Access roads; and » Associated infrastructure.

Potential Impact	» 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	» Spinning turbine blades. » Substation.
Mitigation: Target/Objective	» 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	» 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	» 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	» Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	» 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	» Spinning turbine blades.
Mitigation: Target/Objective	» 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 through regular maintenance 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	» 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	» 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	» Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	» 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	» 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	» 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	» 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	» 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	» Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	» Erosion and soil loss. » Increased runoff. » Downstream sedimentation.
Activities/risk sources	» 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	» 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
Speed limits of 30 km/h must be put in place to reduce erosion. • 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; • Signs must be put up to enforce this.	O&M Operator	Life of operation

Performance Indicator	» 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	» 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	» 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	» 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 Final 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: » 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
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	O&M Operator	Life of operation

Mitigation: Action/control	Responsibility	Timeframe
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.		
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
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.	Environmental Officer	Life of operation
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	» 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	» 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	» Wind farm. » Day to day operational activities associated with the wind farm including maintenance.
Potential Impact	» The opportunities and benefits associated with the creation of local employment and business should be maximised as far as possible.
Activity/risk source	» 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	» 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	» Maximum amount of semi and unskilled labour locally sourced where possible. » Local suppliers and SMMEs contracted where possible.
Monitoring and Reporting	» 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
A fire management plan must be compiled and implemented to restrict the impact fire might have on the surrounding areas (refer to **Appendix L**).	O&M Operator	Life of operation

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 Ummbila 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 Ummbila 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 EMPr 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.

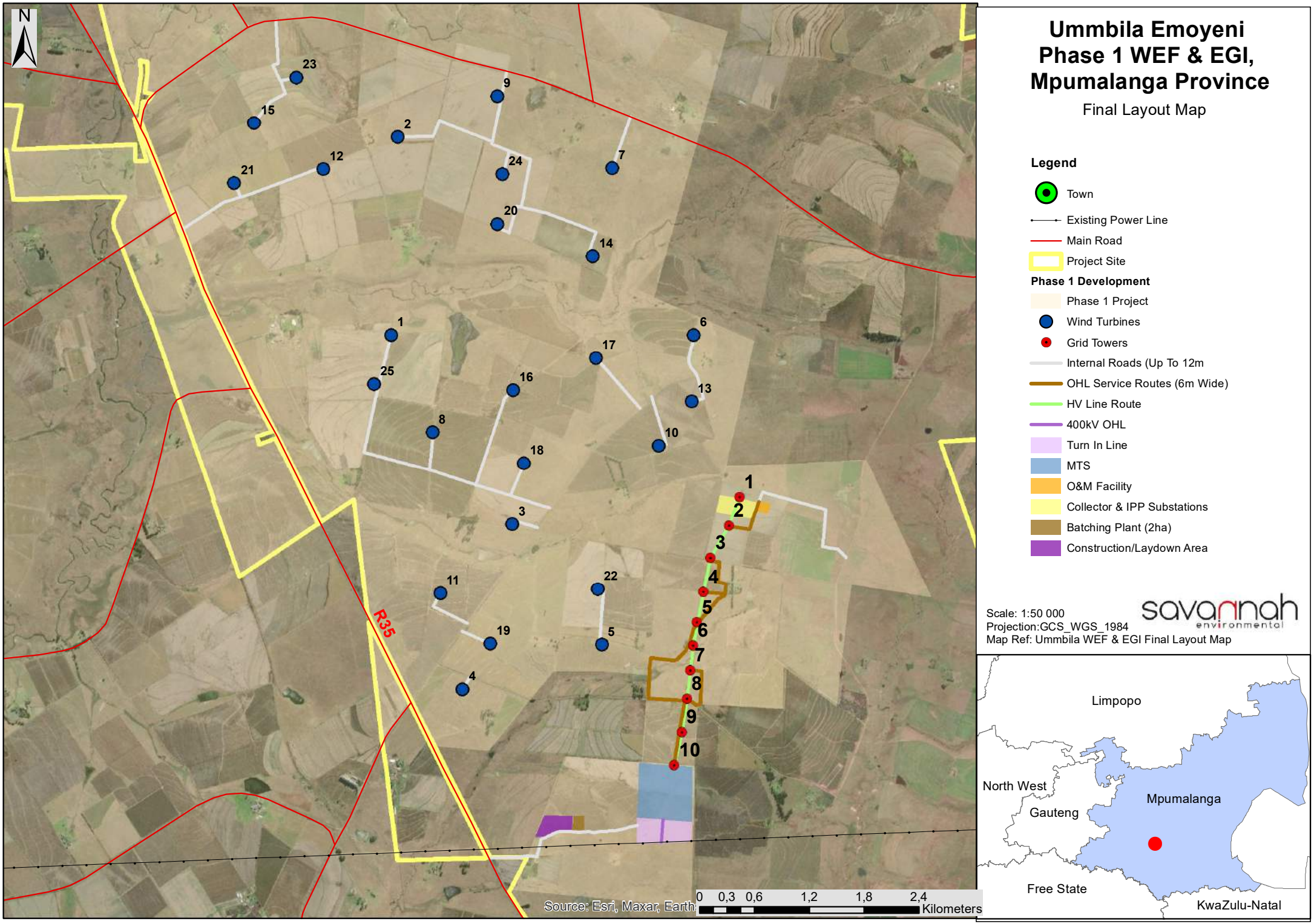
9.1. Objectives

In decommissioning the Ummbila Emoyeni Wind Energy Facility, Ummbila 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 Ummbila Emoyeni Wind Energy Facility and must be adhered to.

APPENDIX A:
FACILITY LAYOUT AND SENSITIVITY MAPS



Ummbila Emoyeni Phase 1 WEF & EGI, Mpumalanga Province

Final Layout Map

Legend

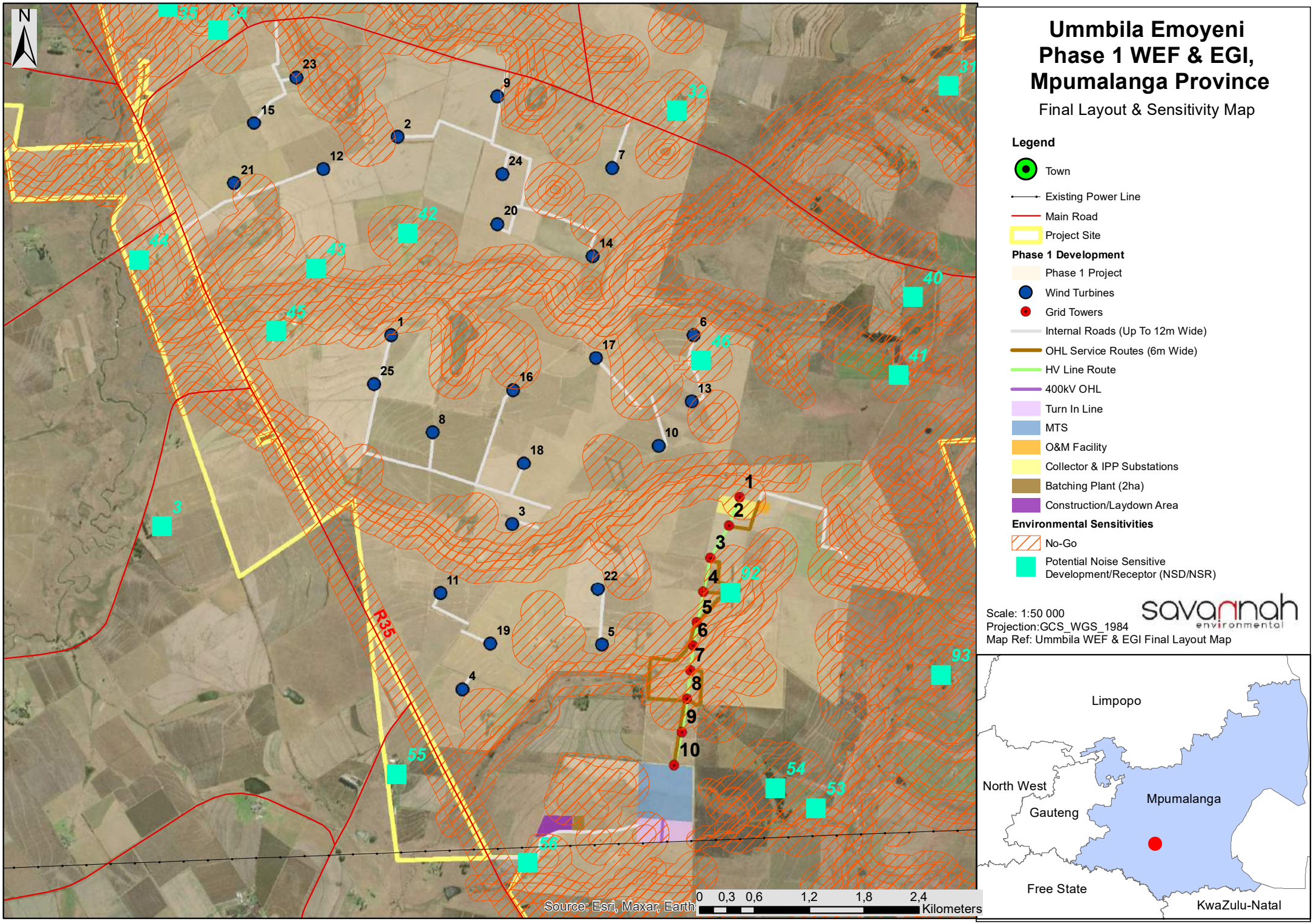
- Town
- Existing Power Line
- Main Road
- Project Site

Phase 1 Development

- Phase 1 Project
- Wind Turbines
- Grid Towers
- Internal Roads (Up To 12m
- OHL Service Routes (6m Wide)
- HV Line Route
- 400kV OHL
- Turn In Line
- MTS
- O&M Facility
- Collector & IPP Substations
- Batching Plant (2ha)
- Construction/Laydown Area

Scale: 1:50 000
Projection:GCS_WGS_1984
Map Ref: Ummbila WEF & EGI Final Layout Map

savannah environmental


N
Ummbila Emoyeni
Phase 1 WEF & EGI,
Mpumalanga Province
Final Layout & Sensitivity Map
Legend
Town
Existing Power Line
Main Road
Project Site
Phase 1 Development
Phase 1 Project
Wind Turbines
Grid Towers
Internal Roads (Up To 12m Wide)
OHL Service Routes (6m Wide)
HV Line Route
400kV OHL
Turn In Line
MTS
O&M Facility
Collector & IPP Substations
Batching Plant (2ha)
Construction/Laydown Area
Environmental Sensitivities
No-Go
Potential Noise Sensitive Development/Receptor (NSD/NSR)
Scale: 1:50 000
Projection:GCS_WGS_1984
Map Ref: Ummbila WEF & EGI Final Layout Map
savannah environmental
R35
Source: Esri, Maxar, Earth
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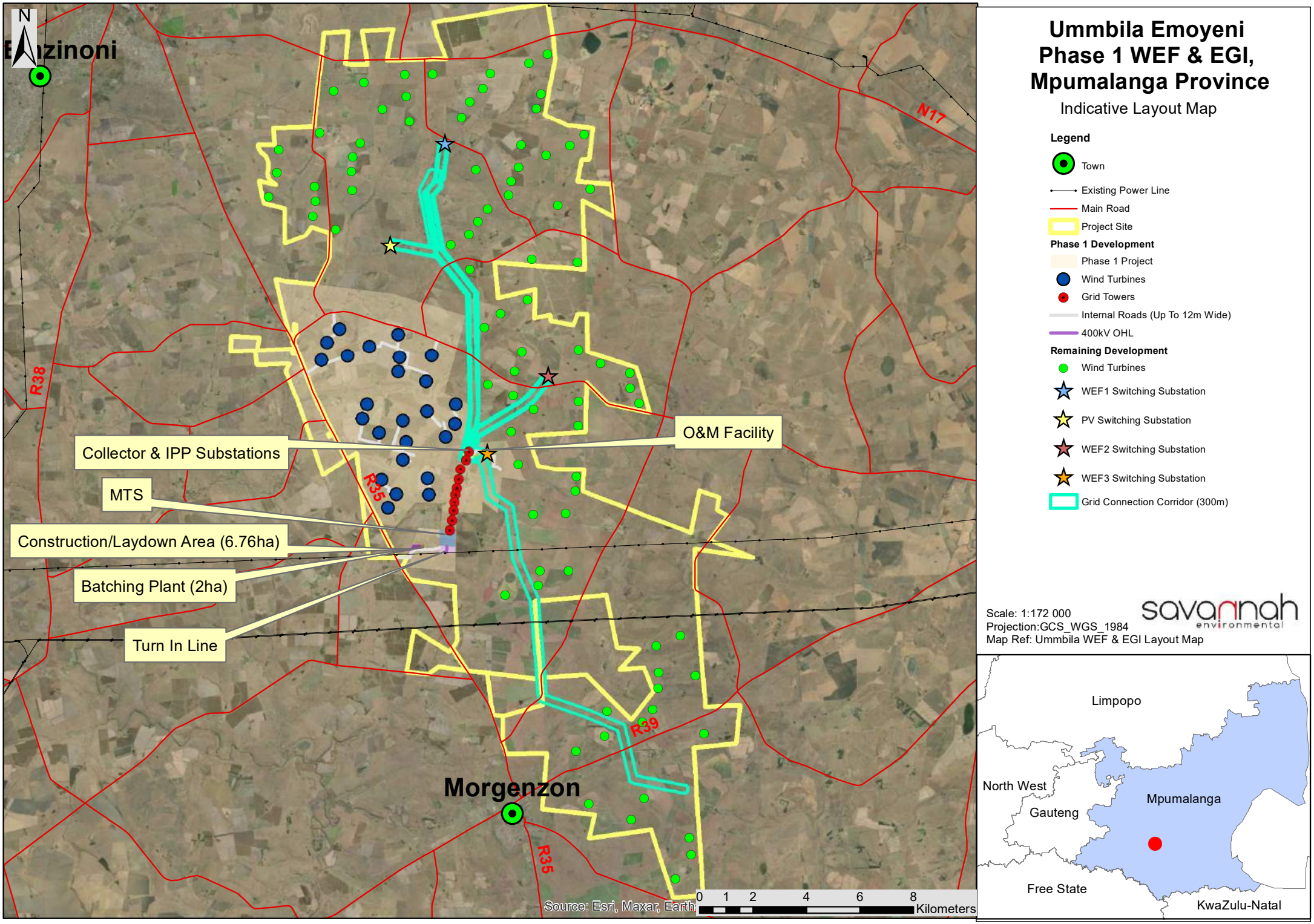
Kilometers
Limpopo
North West
Gauteng
Mpumalanga
Free State
KwaZulu-Natal



Ummbila Emoyeni Phase 1 WEF & EGI, Mpumalanga Province

Indicative Layout Map

Legend

- Town
- Existing Power Line
- Main Road
- Project Site

Phase 1 Development

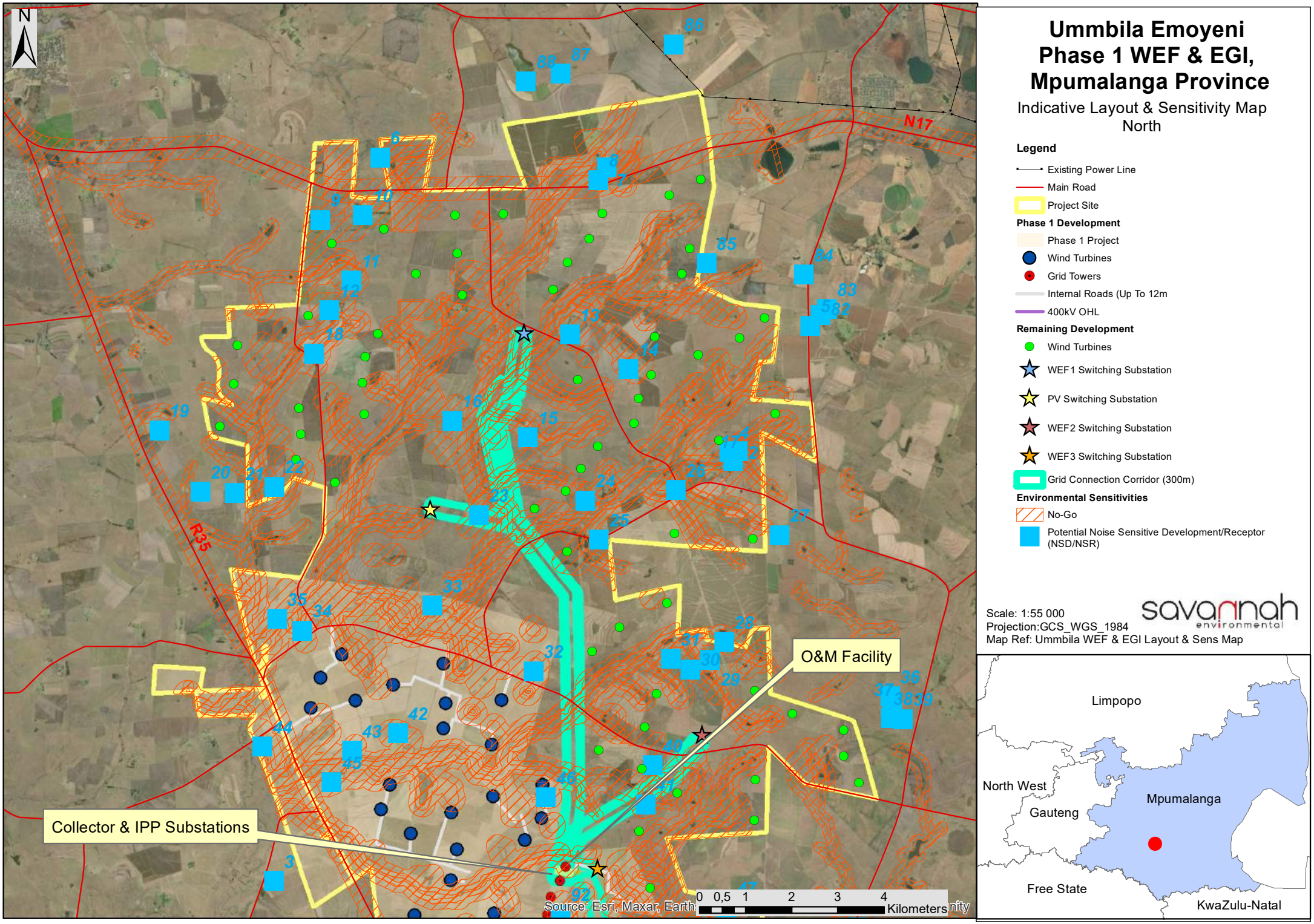
- Phase 1 Project
- Wind Turbines
- Grid Towers
- Internal Roads (Up To 12m Wide)
- 400kV OHL

Remaining Development

- Wind Turbines
- WEF1 Switching Substation
- PV Switching Substation
- WEF2 Switching Substation
- WEF3 Switching Substation
- Grid Connection Corridor (300m)

Scale: 1:172 000
Projection:GCS_WGS_1984
Map Ref: Ummbila WEF & EGI Layout Map

savannah environmental



Ummbila Emoyeni Phase 1 WEF & EGI, Mpumalanga Province

Indicative Layout & Sensitivity Map North

Legend

- Existing Power Line
- Main Road
- Project Site

Phase 1 Development

- Phase 1 Project
- Wind Turbines
- Grid Towers
- Internal Roads (Up To 12m
- 400kV OHL

Remaining Development

- Wind Turbines
- WEF1 Switching Substation
- PV Switching Substation
- WEF2 Switching Substation
- WEF3 Switching Substation
- Grid Connection Corridor (300m)

Environmental Sensitivities

- No-Go
- Potential Noise Sensitive Development/Receptor (NSD/NSR)

Scale: 1:55 000
Projection:GCS_WGS_1984
Map Ref: Ummbila WEF & EGI Layout & Sens Map

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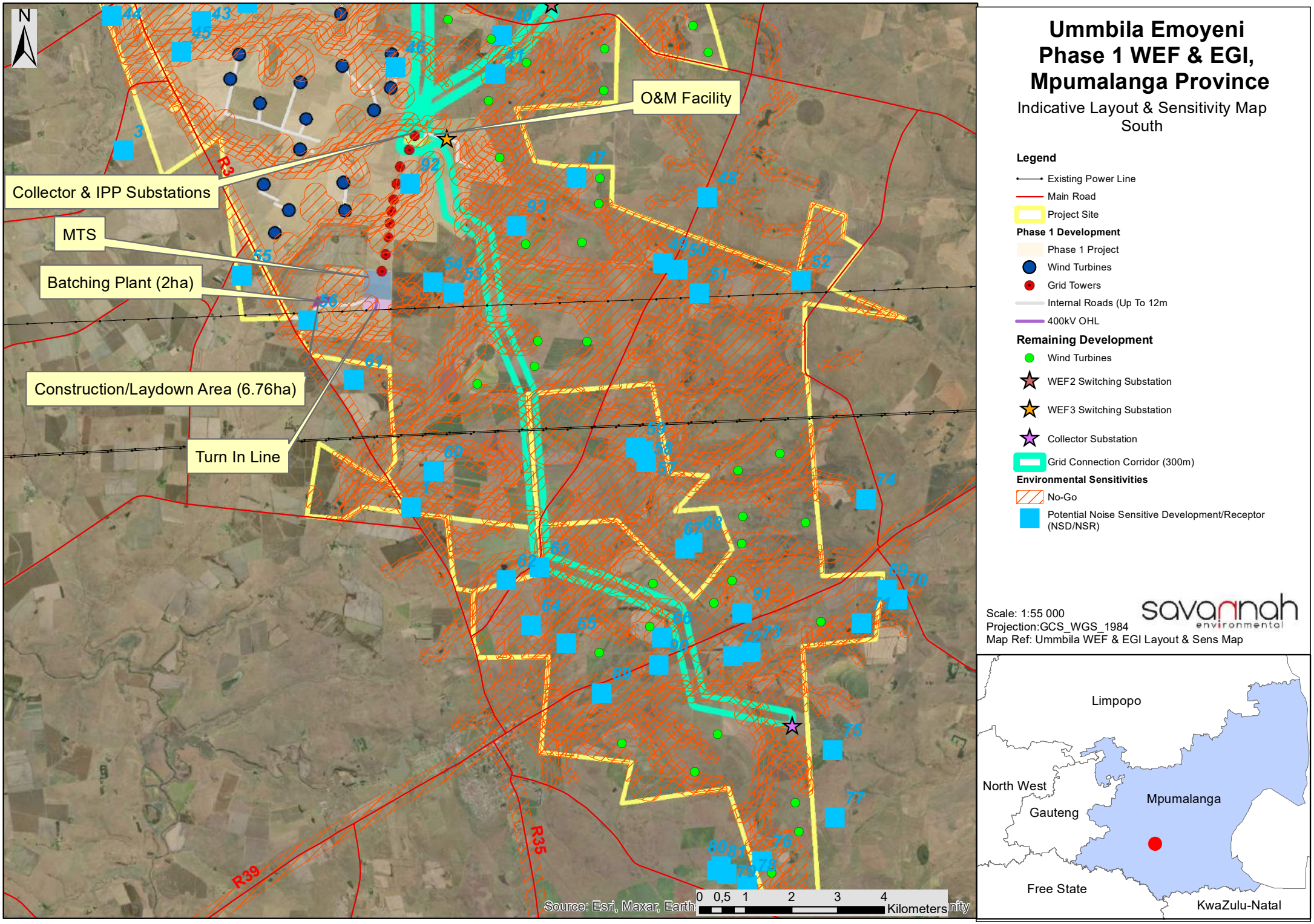
O&M Facility
Collector & IPP Substations
MTS
Batching Plant (2ha)
Construction/Laydown Area (6.76ha)
Turn In Line
R3
R35
R39
N
0 0,5 1 2 3 4
Kilometers
Source: Esri, Maxar, Earth
Ummbila Emoyeni
Phase 1 WEF & EGI,
Mpumalanga Province
Indicative Layout & Sensitivity Map
South
Legend
Existing Power Line
Main Road
Project Site
Phase 1 Development
Phase 1 Project
Wind Turbines
Grid Towers
Internal Roads (Up To 12m
400kV OHL
Remaining Development
Wind Turbines
WEF2 Switching Substation
WEF3 Switching Substation
Collector Substation
Grid Connection Corridor (300m)
Environmental Sensitivities
No-Go
Potential Noise Sensitive Development/Receptor (NSD/NSR)
Scale: 1:55 000
Projection:GCS_WGS_1984
Map Ref: Ummbila WEF & EGI Layout & Sens Map
savannah environmental
Limpopo
North West
Gauteng
Mpumalanga
Free State
KwaZulu-Natal

APPENDIX B:
GRIEVANCE MECHANISM FOR COMPLAINTS AND ISSUES

GRIEVANCE MECHANISM / PROCESS

1. PURPOSE

This Grievance Mechanism has been developed to receive and facilitate the resolution of concerns and grievances regarding the project's environmental and social performance. The aim of the Grievance Mechanism is to ensure that grievances or concerns raised by stakeholders are addressed in a manner that:

- Provides a predictable, accessible, transparent, and credible process to all parties, resulting in outcomes that are fair and equitable, accountable and efficient.
- Promotes trust as an integral component of broader community relations activities.
- Enables more systematic identification of emerging issues and trends, facilitating corrective action and pre-emptive engagement.

The aim of this Grievance Mechanism is to provide a process to address grievances in a manner that does not require a potentially costly and time-consuming legal process.

2. PROCEDURE FOR RECEIVING AND RESOLVING GRIEVANCES

The following proposed grievance procedures are to be complied with throughout the construction, operation and decommissioning phases of the project. These procedures should be updated as and when required to ensure that the Grievance Mechanism is relevant for the project and effective in providing the required processes.

- Local landowners, communities and authorities must be informed in writing by the Developer of the grievance mechanism and the process by which grievances can be brought to the attention of the Developer through its designated representative. This must be undertaken with the commencement of the construction phase.
- A company representative must be appointed as the contact person to which grievances can be directed. The name and contact details of the contact person must be provided to local landowners, communities and authorities when requested.
- Project related grievances relating to the construction, operation and or decommissioning phases must be addressed in writing to the contact person. The contact person should assist local landowners and/ or communities who may lack resources to submit/prepare written grievances, by recording grievances and completing written grievance notices where applicable, translating requests or concerns or by facilitating contact with relevant parties who can address the raised concerns. The following information should be obtained, as far as possible, regarding each written grievance, which may act as both acknowledgement of receipt as well as record of grievance received:
    a. The name and contact details of the complainant;
    b. The nature of the grievance;
    c. Date raised, received, and for which the meeting was arranged;
    d. Persons elected to attend the meeting (which will depend on the grievance); and
    e. A clear statement that the grievance procedure is, in itself, not a legal process. Should such avenues be desired, they must be conducted in a separate process and do not form part of this grievance mechanism.

- The grievance must be registered with the contact person who, within 2 working days of receipt of the grievance, must contact the Complainant to discuss the grievance and, if required, agree on a suitable date and venue for a meeting in order to discuss the grievances raised. Unless otherwise agreed, the meeting should be held within 2 weeks of receipt of the grievance.
- The contact person must draft a letter to be sent to the Complainant acknowledging receipt of the grievance, the name and contact details of Complainant, the nature of the grievance, the date that the grievance was raised, and the date and venue for the meeting (once agreed and only if required).
- A grievance register must be kept on site (in electronic format, so as to facilitate editing and updating), and shall be made available to all parties wishing to gain access thereto.
- Prior to the meeting being held the contact person must contact the Complainant to discuss and agree on the parties who should attend the meeting, as well as a suitable venue. The people who will be required to attend the meeting will depend on the nature of the grievance. While the Complainant and or Developer are entitled to invite their legal representatives to attend the meeting/s, it should be made clear to all the parties involved in the process that the grievance mechanism process is not a legal process, and that if the Complainant invites legal representatives, the cost will be their responsibility. It is therefore recommended that the involvement of legal representatives be limited as far as possible, as a matter of last resort, and that this process be primarily aimed at stakeholder relationship management as opposed to an arbitration or litigation mechanism.
- The meeting should be chaired by the Developer's representative appointed to address grievances. The Developer must supply and nominate a representative to capture minutes and record the meeting/s.
- Draft copies of the minutes must be made available to the Complainant and the Developer within 5 working days of the meeting being held. Unless otherwise agreed, comments on the Draft Minutes must be forwarded to the company representative appointed to manage the grievance mechanism within 5 working days of receipt of the draft minutes.
- The meeting agenda must be primarily the discussion of the grievance, avoidance and mitigation measures available and proposed by all parties, as well as a clear indication of the future actions and responsibilities, in order to put into effect the proposed measures and interventions to successfully resolve the grievance.
- In the event of the grievance being resolved to the satisfaction of all the parties concerned, the outcome must be recorded and signed off by the relevant parties. The record should provide details of the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
- In the event of a dispute between the Complainant and the Developer regarding the grievance, the option of appointing an independent mediator to assist with resolving the issue should be discussed. The record of the meeting/s must note that a dispute has arisen and that the grievance has not been resolved to the satisfaction of all the parties concerned.
- In the event that the parties agree to appoint a mediator, the Developer will be required to identify three (3) mediators and forward the names and CVs to the Complainant within 2 weeks of the dispute being declared. The Complainant, in consultation with the Developer, must identify the preferred mediator and agree on a date for the next meeting. The cost of the mediator must be borne by the Developer. The Developer must supply and nominate a representative to capture minutes and record the meeting/s.

- In the event of the grievance, with the assistance of the mediator, being resolved to the satisfaction of all the parties concerned, the outcome must be recorded and signed off by the relevant parties, including the mediator. The record should provide details on the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
- In the event of the dispute not being resolved, the mediator must prepare a draft report that summaries the nature of the grievance and the dispute. The report should include a recommendation by the mediator on the proposed way forward with regard to the addressing the grievance.
- The draft report must be made available to the Complainant and the Developer for comment before being finalised and signed by all parties, which signature may not be unreasonably withheld by either party. Unless otherwise agreed, comments on the draft report must be forwarded to the company representative appointed to manage the grievance mechanism within 5 working days. The way forward will be informed by the recommendations of the mediator and the nature of the grievance.

A Complaint is closed out when no further action is required, or indeed possible. Closure status must be classified and captured following mediation or successful resolution in the Complaints Register as follows:

- Resolved. Complaints where a resolution has been agreed and implemented and the Complainant has signed the Confirmation Form.
- Unresolved. Complaints where it has not been possible to reach an agreed resolution despite mediation.
- Abandoned. Complaints where the Complainant is not contactable after one month following receipt of a Complaint and efforts to trace his or her whereabouts have been unsuccessful.

The grievance mechanism does not replace the right of an individual, community, group or organization to take legal action should they so wish. In the event of the grievance not being resolved to the satisfaction of Complainant and or the Developer, either party may be entitled to legal action if an appropriate option, however, these grievance mechanisms aim to avoid such interactions by addressing the grievances within a short timeframe, and to mutual satisfaction, where possible.

APPENDIX C:
OPEN SPACE MANAGEMENT PLAN

ALIEN PLANT AND OPEN SPACE MANAGEMENT PLAN

1. PURPOSE

Invasive alien plant species pose the second largest threat to biodiversity after direct habitat destruction. The purpose of this Alien Plant and Open Space Management Plan is to provide a framework for the management of alien and invasive plant species during the construction and operation of the Ummbila Emoyeni Wind Energy Facility. The broad objectives of the plan include the following:

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

This plan should be updated throughout the life-cycle of the project, as required in order to ensure that appropriate measures are in place to manage and control the establishment of alien and invasive plant species and to ensure compliance with relevant legislation. This plan should be implemented with specific focus on sensitive areas.

2. LEGISLATIVE CONTEXT

Conservation of Agricultural Resources Act (Act No. 43 of 1983)

In terms of the amendments to the regulations under the Conservation of Agricultural Resources Act (Act No. 43 of 1983), all declared alien plant species must be effectively controlled. Landowners are legally responsible for the control of invasive alien plants on their properties. In terms of this Act alien invasive plant species are ascribed to one of the following categories:

- Category 1: Prohibited and must be controlled.
- Category 2 (commercially used plants): May be grown in demarcated areas provided that there is a permit and that steps are taken to prevent their spread.
- Category 3 (ornamentally used plants): May no longer be planted. Existing plants may be retained as long as all reasonable steps are taken to prevent the spreading thereof, except within the flood line of watercourses and wetlands.

National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004)

The National Environmental Management: Biodiversity Act (NEM:BA) regulates all invasive organisms in South Africa, including a wide range of fauna and flora. Regulations have been published in Government Notices R.506, R.507, R.508 and R.509 of 2013 under NEM:BA. According to this Act and the regulations, any species designated under Section 70 cannot be propagated, grown, bought or sold without a permit. Below is an explanation of the three categories:

- **Category 1a:** Invasive species requiring compulsory control. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.

- **Category 1b:** Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.
- **Category 2:** Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones.
- **Category 3:** Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones.

Plants listed under the categories above are detailed within the Alien and Invasive Species published in GNR1003 of 18 September 2020. The following guide is a useful starting point for the identification of alien species: Bromilow, C. 2010. Problem Plants and Alien Weeds of South Africa. Briza, Pretoria.

It is important to note that alien plant species that are regulated in terms of the Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA) as weeds and invader plants are exempted from NEM:BA. This implies that the provisions of the CARA in respect of listed weed and invader plants supersede those of NEM: BA.

3. ALIEN PLANT MANAGEMENT PRINCIPLES

3.1. Prevention and early eradication

A prevention strategy should be considered and established, including regular surveys and monitoring for invasive alien plants, effective rehabilitation of disturbed areas and prevention of unnecessary disturbance of natural areas.

Monitoring plans should be developed which are designed to identify Invasive Alien Plant Species already on site, as well as those that are introduced to the site by the construction activities. Keeping up to date on which weeds are an immediate threat to the site is important, but efforts should be planned to update this information on a regular basis. When additional Invasive Alien Plant Species are recorded on site, an immediate response of locating the site for future monitoring and either hand-pulling the weeds or an application of a suitable herbicide (where permissible only) should be planned. It is, however, better to monitor regularly and act swiftly than to allow invasive alien plants to become established on site.

3.2. Containment and control

If any alien invasive plants are found to become established on site, action plans for their control should be developed, depending on the size of the infestations, budgets, manpower considerations and time. Separate plans of control actions should be developed for each location and/or each species. Appropriate registered chemicals and other possible control agents should be considered in the action plans for each site/species. The uses of chemicals are not recommended for any wetland areas. Herbicides should be applied directly to the plant and not to the soil. The key is to ensure that no invasions get out of control. Effective containment and control will ensure that the least amount of energy and resources are required to maintain this status over the long-term. This will also be an indicator that natural systems are impacted to the smallest degree possible.

3.3. General Clearing and Guiding Principles

Alien species control programmes are long-term management projects and should consist of a clearing plan which includes follow up actions for rehabilitation of the cleared area. The lighter infested areas should be cleared first to prevent the build-up of seed banks. Pre-existing dense mature stands ideally should be left for last, as they probably won't increase in density or pose a greater threat than they are currently. Collective management and planning with neighbours may be required in the case of large woody invaders as seeds of alien species are easily dispersed across boundaries by wind or watercourses. All clearing actions should be monitored and documented to keep records of which areas are due for follow-up clearing.

i. Clearing Methods

Different species require different clearing methods such as manual, chemical or biological methods or a combination of both. Care should however be taken that the clearing methods used do not encourage further invasion and that they are appropriate to the specific species of concern. As such, regardless of the methods used, disturbance to the soil should be kept to a minimum.

Fire should not be used for alien species control or vegetation management at the site. The best-practice clearing method for each species identified should be used.

» **Mechanical control**
This entails damaging or removing the plant by physical action. Different techniques could be used, e.g. uprooting, felling, slashing, mowing, ringbarking or bark stripping. This control option is only really feasible in sparse infestations or on a small scale, and for controlling species that do not coppice after cutting. Species that tend to coppice, need to have the cut stumps or coppice growth treated with herbicides following the mechanical treatment. Mechanical control is labour intensive and therefore expensive, and could cause severe soil disturbance and erosion.

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

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

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

- Working for Water: Policy on the Use of Herbicides for the Control of Alien Vegetation.
- Pesticide Management Policy for South Africa published in terms of the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947) – GNR 1120 of 2010.
- South African Bureau of Standards, Standard SANS 10206 (2010).

According to Government Notice No. 13424 dated 26 July 1992, it is an offence to "*acquire, dispose, sell or use an agricultural or stock remedy for a purpose or in a manner other than that specified on the label on a container thereof or on such a container*".

Contractors using herbicides need to have a valid Pest Control Operators License (limited weeds controller) according to the Fertilizer, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No. 36 of 1947). This is regulated by the Department of Agriculture, Forestry and Fisheries.

» **Biological control**

Biological weed control consists of the use of natural enemies to reduce the vigour or reproductive potential of an invasive alien plant. Biological control agents include insects, mites, and micro-organisms such as fungi or bacteria. They usually attack specific parts of the plant, either the reproductive organs directly (flower buds, flowers or fruit) or the seeds after they have dropped. The stress caused by the biological control agent may kill a plant outright or it might impact on the plant's reproductive capacity. In certain instances, the reproductive capacity is reduced to zero and the population is effectively sterilised. All of these outcomes will help to reduce the spread of the species.

To obtain biocontrol agents, provincial representatives of the Working for Water Programme or the Directorate: Land Use and Soil Management (LUSM), Department of Agriculture, Forestry and Fisheries (DAFF) can be contacted.

3.4. General management practices

The following general management practices should be encouraged or strived for:

- Establish an on-going monitoring programme for the construction phase to detect and quantify any alien species that may become established.
- Alien vegetation regrowth on areas disturbed by construction must be immediately controlled.
- Care must be taken to avoid the introduction of alien invasive plant species to the site. Particular attention must be paid to imported material such as building sand or dirty earth-moving equipment. Stockpiles should be checked regularly and any weeds emerging from material stockpiles should be removed.
- Cleared areas that have become invaded by alien species can be sprayed with appropriate herbicides provided that these herbicides break down on contact with the soil. Residual herbicides should not be used.
- The effectiveness of vegetation control varies seasonally and this is also likely to impact alien species. Control early in the wet season will allow species to re-grow, and follow-up control is likely to be required. It is tempting to leave control until late in the wet season to avoid follow-up control. However, this may allow alien species to set seed before control, and hence will not contribute towards reducing alien species abundance. Therefore, vegetation control should be aimed at the

middle of the wet season, with a follow-up event towards the end of the wet season. There are no exact dates that can be specified here as each season is unique and management must therefore respond according to the state and progression of the vegetation.

- » Alien plant management is an iterative process and it may require repeated control efforts to significantly reduce the abundance of a species. This is often due to the presence of large and persistent seed banks. However, repeated control usually results in rapid decline once seed banks become depleted.
- » Some alien species are best individually pulled by hand. Regular vegetation control to reduce plant biomass within the site should be conducted. This should be timed so as to coincide with the critical growth phases of the most important alien species on site. This will significantly reduce the cost of alien plant management as this should contribute towards the control of the dominant alien species and additional targeted control will be required only for a limited number of species.
- » No alien species should be cultivated on-site. If vegetation is required for aesthetic purposes, then non-invasive, water-wise locally-occurring species should be used.
- » During operation, surveys for alien species should be conducted regularly. It is recommended that this be undertaken every 6 months for the first two years after construction and annually thereafter. All alien plants identified should be cleared using appropriate means.

3.5. Monitoring

In order to assess the impact of clearing activities, rehabilitation efforts, follow-ups and monitoring must be undertaken. This section provides a description of a possible monitoring programme that will provide an assessment of the magnitude of alien plant invasion on site, as well as an assessment of the efficacy of the management programme.

In general, the following principles apply for monitoring:

- » Photographic records must be kept of areas to be cleared prior to work starting and at regular intervals during initial clearing activities. Similarly, photographic records should be kept of the area from immediately before and after follow-up clearing activities. Rehabilitation processes must also be recorded.
- » Simple records must be kept of daily operations, e.g. area/location cleared, labour units and, if ever used, the amount of herbicide used.
- » It is important that, if monitoring results in detection of invasive alien plants, that this leads to immediate action.

The following monitoring should be implemented to ensure management of alien invasive plant species.

Construction Phase

Monitoring Action	Indicator	Timeframe
Document alien species present at the site	List of alien plant species	Preconstruction Monthly during Summer and Autumn (Middle November to end of March) 3 Monthly during Winter and Spring
Document alien plant distribution	Alien plant distribution map within priority areas	3 Monthly
Document & record alien plant control measures implemented	Record of clearing activities	3 Monthly

Operation Phase

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

APPENDIX D:
RE-VEGETATION AND HABITAT REHABILITATION PLAN

Freshwater Rehabilitation Plan & Monitoring for the Ummbila Wind Energy Facility (WEF) Project

Bethal, Mpumalanga Province

April 2023

CLIENT

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Report Name	**Freshwater Rehabilitation Plan & Monitoring for the Ummbila Wind Energy Facility (WEF) Project**
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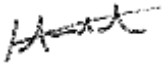
Report Writer	**Andrew Husted** 
	Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 12 years' experience in the environmental consulting field. Andrew has completed numerous wetland training courses, and is an accredited wetland practitioner, recognised by the DWS, and also the Mondi Wetlands programme as a competent wetland consultant.
Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

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1 Introduction

The Biodiversity Company was commissioned by Savannah Environmental to develop an aquatic Rehabilitation and Monitoring Plan for the Ummbila Emoyeni Wind Energy Facility (WEF), located in the Lekwa Local Municipality, Mpumalanga Province. This plan is a requirement of the issued environmental authorisation (EA).

The rehabilitation plan has been compiled to facilitate the rehabilitation of degraded freshwater systems, including wetlands associated with the WEF development area.

A wetland rehabilitation plan is required for the degraded wetlands in accordance with the requirements of the Department of Water & Sanitation (DWS) and in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) and National Water Act (Act No. 36 of 1998) (NWA) with regards to wetland protection and remediation.

1.1 Background

A freshwater resource study and assessment was completed by Nkurenkuru Ecology and Biodiversity (2022) for the area, and the following is summarised from the assessment:

- The development area is located within Kwaggalaagt River's catchment which is an important tributary of the Blesbokspruit River. The development is likely to have a cumulative impact on this important freshwater resource feature as well as the wetland features associated with this river;
- Based on the proposed location of the Ummbila Emoyeni Solar Photovoltaic (PV) facilities as well as the Ummbila Emoyeni WEF's turbine locations, no freshwater resource features will be directly impacted by the mentioned infrastructure as the infrastructure are located well outside of any freshwater resource features as well as their recommended buffer areas; and
- The most significant potential impact associated with the Ummbila Emoyeni Renewable Energy project are as a result of the associated infrastructure, most notably access roads and watercourse/wetland crossings.
- A total of 27 freshwater resource features were identified and delineated within the proposed development area and include:
    - Twenty-six (26) wetland features have been delineated within the 132 kV grid corridor, whilst no wetland features were recorded within the 400 kV grid corridor;
    - Of these 26 wetland features, located within the survey area, approximately 22 - 24 features will likely be spanned by the power line and crossed by service roads;
    - No wetland features have been identified within the footprint of the Main Transmission Substation;
    - No wetland features have been identified within the footprint of Collector Substations 1 and 2;

- A small seepage wetland has been identified and delineated within the footprint of the Collector Substation 3.

- 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;
- A wetland buffer area of 11 m from the outer edge of wetland features are recommended, and should be implemented; and
- 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):
  - only activities relating to the route access and the spanning of the gridlines;
  - the use/upgrade of existing roads and watercourse crossings are the preferred options; and
  - 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.

1.2 Strategic Framework

A strategic framework for improved wetland management in eThekwini's Northern Spatial Development Plan Area (Macfarlane, 2015) was consulted for the provision for infrastructure requirements. The framework recognises that some infrastructure development may be required in these areas and with the need for supporting service infrastructure, further impacts can be expected. It is however important that infrastructure development (including roads and service infrastructure) minimises impacts to wetland management zones and seeks to avoid disruption of natural corridors as far as practicable. The following design principles are applicable to roads and underground cables:

- **Road** crossings should be aligned perpendicular to flow (not near-parallel), located in areas of least sensitivity (along existing corridors of disturbance), placed at a narrow section of the wetland / riverine system and designed in a manner that causes least disturbance to natural habitat through the incorporation and implementation of the following objectives and best practice design measures:

  i) Avoid and/or minimize the constriction of riverine and/or wetland flows. This should be achieved through the establishment of an adequate number and adequately sized culverts across the riverine and wetland systems, taking into account the full extent / width of these systems.

  ii) Avoid and/or minimize the deactivation of valley bottom and floodplain areas. This should be achieved through ensuring impedance of flow and sediment distribution is limited through appropriate bridge design and by minimizing encroachment of road fill embankments. In this regard, bridges should be widened and/or culverts should be installed within fill embankments to maintain the natural distribution of flows and sediment across the relevant fluvial surfaces.

iii) Maintenance and/or establishment of faunal movement and habitat connectivity. Wetland, aquatic and terrestrial faunal movement and habitat connectivity must be maintained (or improved) as far as practicable through the establishment of adequately sized culverts and bridges.

iv) Reduce visual impact. Infrastructure features should be designed to be aesthetically pleasing and not detract from the open space.

- **Pipeline** crossings should be aligned perpendicular to flow (not near-parallel), located in areas of least sensitivity (along existing corridors of disturbance), placed at a narrow section of the wetland / riverine system and designed in a manner that causes least disturbance to natural habitat through the incorporation and implementation of the following objectives and best practice design measures:

  i) Avoid and/or minimize the extent of direct physical disturbance. Pipe bridges are preferred over underground trenched crossings. In this regard, the number of piers/plinths established within the riverine / wetland habitat must be minimized and where possible the riverine / wetland habitat must be spanned. Where possible, such infrastructure should be accommodated alongside existing road networks.

  ii) Minimize indirect erosion, sedimentation and pollution / water quality impacts. Where relevant:

    (1) Sewer pipelines should not be located within 30 m of the riverine and wetland systems and where crossings are unavoidable, pipelines must cut across the watercourses at as close to perpendicular to flow as possible.

    (2) Sewer manholes should not be located within 30 m of the riverine and wetland systems except at unavoidable crossings. In this regard, no manholes should be located within 10 m of the riverine and wetland habitat.

    (3) No sewer pump stations must be located within 10 m of the riverine and wetland systems and the pump stations must have emergency generators and at least 24hrs freeboard.

  iii) Reduce visual impact. Infrastructure features should be designed to be aesthetically pleasing and not detract from the open space.

1.3 Key Legislative Requirements

Section 24 of the Constitution of South Africa states that, '*everyone has the right to an environment that is not harmful to their health or well-being; and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development'*.

There are several legal stipulations that require wetlands to undergo rehabilitation. These stipulations are referred to in some capacity in the following Acts:

- National Environmental Management Act 107 of 1998 (NEMA);

- National Environmental Management: Biodiversity Act 10 of 2004 (NEM:BA);
- National Water Act 36 of 1998 (NWA); and
- Conservation of Agricultural Resources Act 43 of 1983 (CARA).

A key consideration is the requirement of 'duty of care' with regards to environmental remediation: stipulated in Section 28 of NEMA (National Environmental Management Act, Act 107 of 1998): '*Every person who causes has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot be reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment*.'

2 Project Area

Emoyeni Renewable Energy Farm (Pty) Ltd is proposing the development of a commercial wind farm. The authorised Ummbila Emoyeni WEF, referred to as the Project Area for the purposes of this report, is situated ~8 km south-east of the town of Bethal in the Lekwa Local Municipality, Mpumalanga (Figure 2-1).

The energy facility infrastructure comprises:

- 25 wind turbines;
- On-site 132 kV substation;
- Power line linking to the existing Eskom transmission infrastructure;
- Underground cables linking the turbines to the substations;
- Crane platforms;
- Operations and maintenance compound area;
- Car park;
- Storage area; and
- Internal access roads (12-13 m wide) to each turbine.

Figure 2-2 presents the details of the Infrastructure Area and its relation to nearby important habitat features.

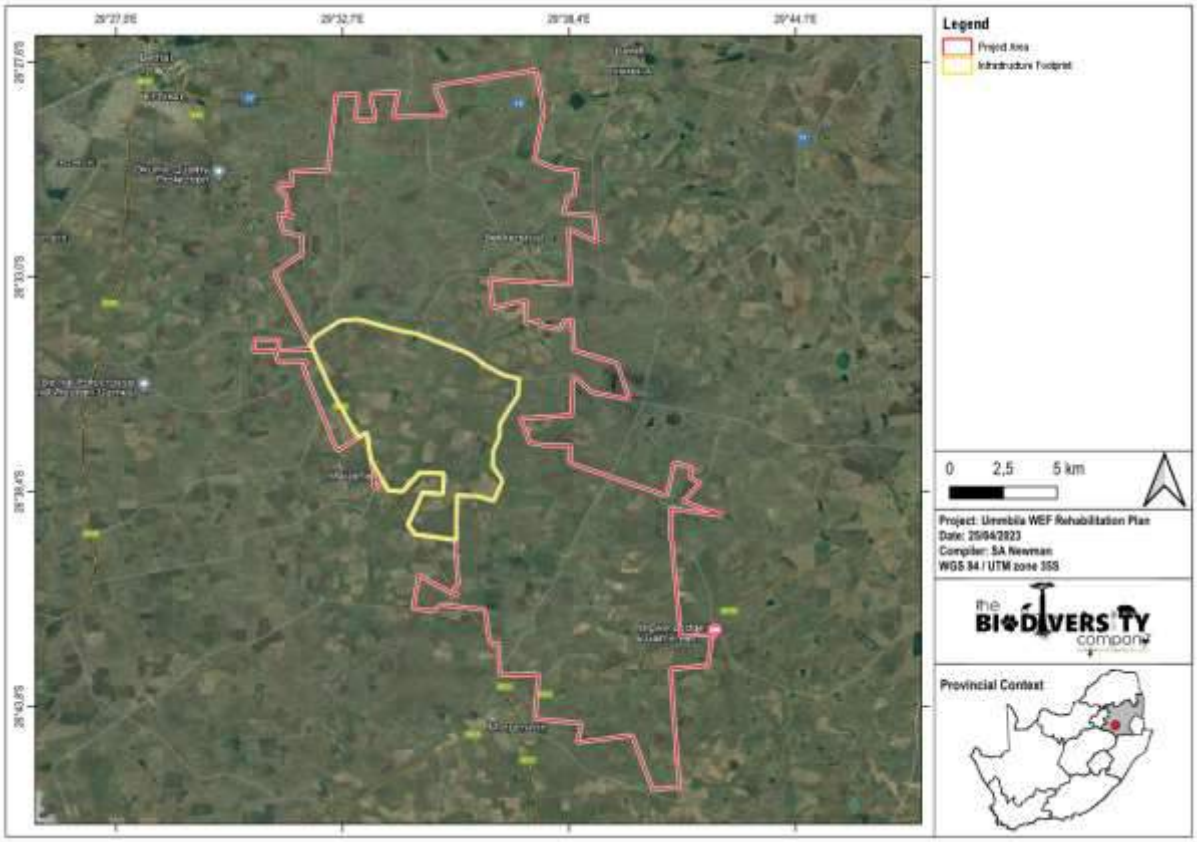

Figure 2-1 Map illustrating the proposed Ummbila Emoyeni Phase One Area (yellow) and the overall Project Area (red)

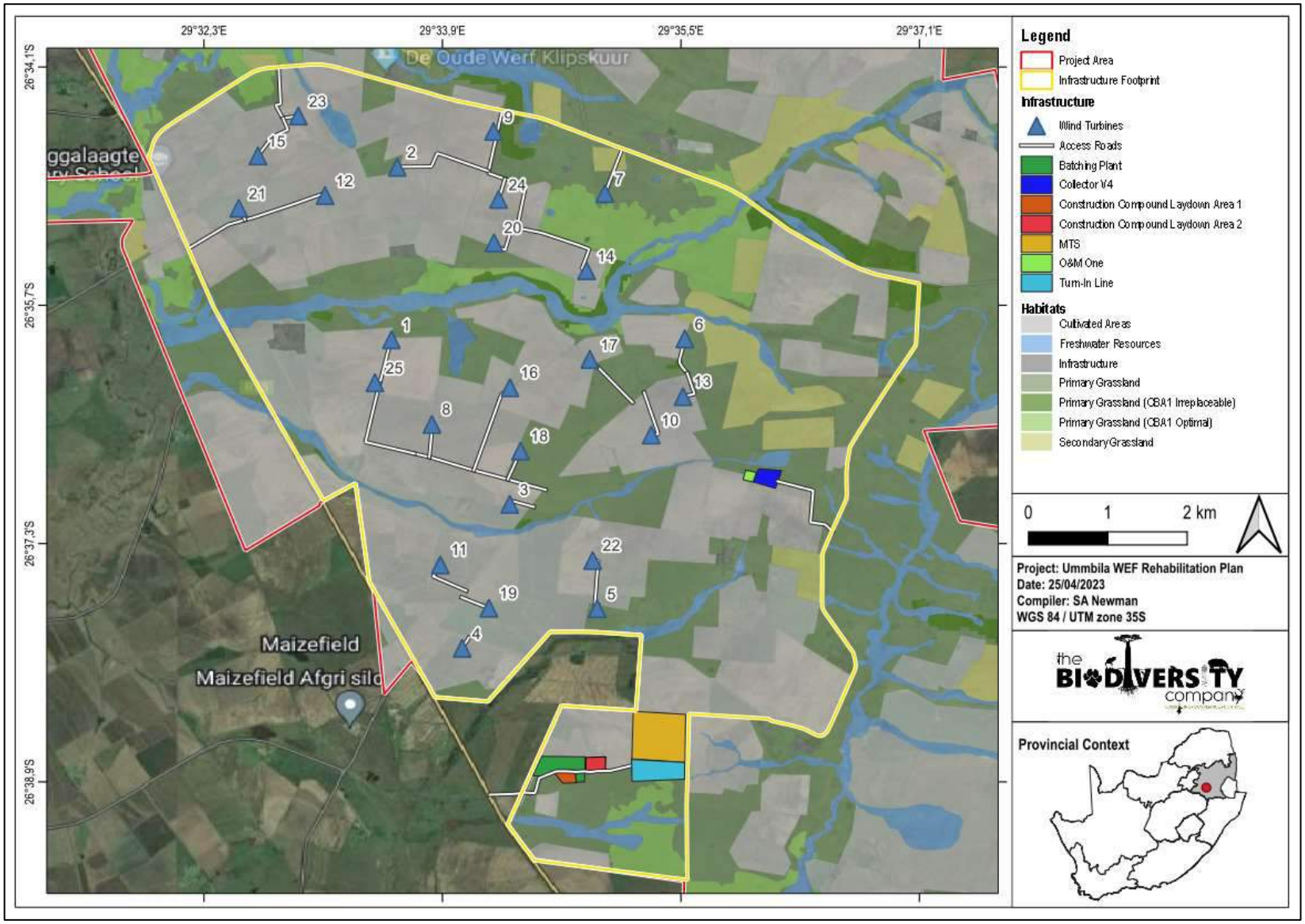

Figure 2-2 The location and details of the Project Area, including associated important habitat features

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3 Rehabilitation Plan

3.1 Rehabilitation Measures

The assessment completed by Nkurenkuru Ecology and Biodiversity (2022) indicated that no freshwater resource features will be directly impacted by the mentioned infrastructure as the infrastructure are located well outside of any freshwater resource features as well as their recommended buffer areas. The most significant potential impact associated with the Ummbila Emoyeni Renewable Energy project are because of the associated infrastructure, most notably access roads and watercourse/wetland crossings. These infrastructure areas are the priority (and focus) for the rehabilitation plan. However, the subsequent measures remain applicable for the entire development area.

3.1.1 Re-vegetation / landscaping for vegetation establishment

Agricultural crops located within the delineated water resources and associated buffers must be removed from these areas, and these areas re-vegetated with indigenous vegetation. The following is recommended for this measure:

- Remove crops from delineated resources and associated buffer areas;
- Crops located on the development area beyond the water resources and buffers must be cleared on a needs basis only. These areas are to be cleared as development progresses, minimising the extent of open and bare ground in the catchment area. This clearing must be undertaken in a phased approach; and
- The buffer areas must be re-vegetated with an indigenous grass species by means of seed application. The establishment of this ground cover will minimise erosion of the cleared areas, stabilising soils for the establishment of vegetation.

All planting and seed-mix application must be carried out as far as is practicable during the period most likely to produce beneficial results but as soon as possible after the soil properties are estimated to be adequate. The seasonal period is from the beginning of April to the end of October.

3.1.1.1 Ripping compacted areas

The buffer areas that will be cleared and all other areas that may be degraded (by means of vehicles, laydown yards, ablution facilities etc.) must be ripped where compaction has taken place. According to the Department of Primary Industries and Regional Development (Agriculture and Food) (2017), ripping tines must penetrate to just below the compacted horizons (approximately 300 – 400 mm) with soil moisture being imperative to the success of ripping. Ripping must take place within 1-3 days after seeding, and also following a rain event to ensure a higher moisture content. To summarise;

- Rip all compacted areas outside of the wetland delineations that have been compacted;
- This must be done by means of a commercial ripper that has at least two rows of tines; and

- Ripping must take place between 1 and 3 days after seeding and following a rainfall event (seeding must therefore be carried out directly after a rainfall event).

3.1.1.2 Vegetation composition

Areas denuded by disturbances, site clean-up (soil scraping and washing) and landscaping activities must be re-vegetated. Re-vegetation must follow landscaping activities in a phased approach over two consecutive growing seasons. This approach ensures that the entire system is not denuded of vegetation all at once and that any challenges / short comings identified in the first phase can be rectified in the second phase. Several zones for re-vegetation have been identified and a species composition recommended. These re-vegetation zones essentially represent different water resources and also varying zones of saturation.

Rehabilitation must seek to re-establish a wetland vegetation comprised of short, dense hydromorphic grasses in the temporary to seasonal zone with slightly taller sedges becoming more prevalent in the permanent zones along the flow path. Avoid creating a monoculture, species diversity is the key to wetland health and the provision of important ecosystem services such as erosion control and water quality enhancement. To achieve this outcome the following approach is advocated:

- Attempts must be made to maximise the diversity of low hydromorphic grasses and sedges throughout;
- Re-vegetation must involve the use of both re-seeding and mechanical transplanting. Re-seeding must occur in both the flow path and banks to establish a vegetation base while mechanical transplanting of wetland plant sods must take place mainly within the flow path;
- As the saturation, nutrient and oxygen levels will vary markedly depending on the hydrological zonation (permanent, seasonal and temporary) care must be taken to sow or plant the appropriate plant species in each re-vegetation zone (flow path or bank). The species are generally common and adaptable species that show a tolerance to disturbed soil conditions;
- Only locally indigenous species that are adapted to local climatic conditions must be used. Perennial species must be prioritised for transplanting. Good quality planting material or seed must be readily available;
- Re-vegetation must commence immediately after landscaping and the preparation of the seedbed, preferably in early spring when conditions for germination and rootstock establishment are optimal. Planting must preferably be timed to take place 1-3 days following a significant rainfall event when soils are within 10% of the field capacity (maximum saturation level);
- Topsoil must be stored for later use and where necessary supplemented with imported topsoil. With correct storage and replacement of topsoil species diversity must improve rapidly as species present in the seedbank also germinate;
- Transplanted vegetation can be sourced from nurseries and / or sustainably harvested from local wetlands, with due authorisation. Most of the plants must be harvested from

the areas that will be scraped during the site clean-up and landscaped and supplemented with plants from surrounding wetlands. Harvesting must target sedges, rushes and grasses;

- Harvesting would involve carefully digging up parent plants and separating the material into as many individual sods as possible. Parent plants must be large specimens with a high root biomass. These plants must be temporarily stored onsite and transplanted later. Try to minimise the time the harvested plants spend in nurseries between harvesting and replanting back in the wetland;
- Try to limit collection and disturbance to wetlands when collecting sods by sticking to the designated collection areas and utilising a single access path. Once complete the soil along the collection paths must be loosened;
- The sods must be planted to an approximate depth. This will vary depending on the size of the plant but will be around 200 mm on average. The recommended planting density depends on plant size (range from 1 plant / m^2 for large plants such as rushes to 8 plants / m^2 for small sedges and grasses) but is generally around 2–3 plants / m^2 for average sized plants. When transplanting sods attempt to retain as much of their roots and soil as possible and maintain saturation levels similar to where they were removed from;
- For larger sedges and rushes trim the foliage (about 100 to 150 mm) to reduce evaporative losses during transplanting. At least some live foliage must remain above ground after planting to drive water uptake and survival;
- Keep plants that are being prepared for later transplanting out of direct sunlight (fodder bags work well) and bag / re-plant as soon as possible. Uprooted plants left in the sun for several hours will die. Conversely, those left in bags for several days will begin to rot; and
- Avoid the use of fertilizers or any other chemicals or soil enhancers during re-vegetation.

Table 3-1 Recommended species for revegetation

Embankment	Seep	Saturated Zone / Channels
Digitaria eriantha	*Imperata cylindrica*	*Echinochloa pyramidalis*
Cynodon dactylon	*Agrostis lachnantha*	*Leersia hexandra*
Eragrostis curvula	*Setaria sphacelata var sericea*	*Cyperus congestus*
Eragrostis chloromelas		*Cyperus longus*
Eragrostis lehmanniana		*Cyperus esculentus*
Themeda triandra		*Cyperus marginatus*
Setaria sphacelata var sphacelata		*Setaria pumila*
		Schoenoplectus decipiens

3.1.1.3 Re-vegetate wetland areas

According to Russell (2009), areas characterised by a loss of soil resources must be revegetated by means of vegetation with vigorous growth, stolons or rhizomes that more or less resembles the natural vegetation in the area.

The dominant hydrophytes within the permanently saturated wetland zones, should be sustainably harvested throughout the wetland areas that are to remain intact to ultimately use to revegetate degraded areas. According to Russell (2009), the following is crucial when revegetating whole plants;

- The planting of whole plants must take place just before or at the beginning of the wet season;
- Whole plants must be dug up with as much of the root intact as possible;
- Roots must be dug up with the soil around it still intact and undisturbed;
- After the plants have been dug up/harvested, all plants must be stockpiled in damp or wet bags and be kept in the shade;
- The soil around the revegetated plants must be manually compacted after planting;
- Holes excavated for re-vegetation must be approximately 300 to 500 mm deep;
- Soil must be stockpiled according to relevant horizons and backfilled in the same order prior to re-vegetation (the first 300 mm must be stockpiled separately from the rest of the soil reserves).

3.1.1.4 Re-vegetate buffer areas

The associated buffer areas must be re-vegetated by means of indigenous grass species. Mixed stands or monocultures will work sufficiently for re-vegetation purposes. Mixed stands tend to blend in with indigenous vegetation species and are more natural. Monocultures however could achieve high productivity. In general, indigenous vegetation must always be preferred due to various reasons including the aesthetical presence thereof as well as the ability of the species to adapt to its surroundings.

The areas to be grassed must consist of suitable material and the areas must be scarified to a minimum depth of 100 mm with furrows spaced at 250-300 mm centres. Scarifying along slopes must run parallel to the contours, forming horizontal terraces. All loose stones and other excess material must be removed during trimming. Where topsoil is required the surface must be left slightly rough during trimming to ensure a proper bond between the topsoil and the sub-soil. The topsoil must be placed on the prepared surfaces and trimmed to the uniform thickness and unless otherwise specified, a 75 mm layer of topsoil must be placed. The top 150 mm of the prepared surfaces must have the adequate amount and type of chemical soil properties required for establishing proper growth conditions for grass.

Plant phase plants which are characterised by fast growing and rapid spreading conditions. Seed germination, seed density and seed size are key aspects to consider before implementing re-vegetation activities. The amount of seed must be limited to ensure that competition between plants are kept to a minimum. During the establishment of seed density, the percentage of seed germination must be taken into consideration. *Cynodon dactylon* is

one of the species recommended due to the ease with which it germinates. This species is also easily sown by means of hand propagation and hydro seeding. The following species are recommended for re-vegetation of the buffer areas:

- *Digitaria eriantha;*
- *Cynodon dactylon;*
- *Eragrostis curvula*
- *Eragrostis chloromelas;*
- *Eragrostis lehmanniana;* and
- *Themeda triandra.*

3.1.2 Alien vegetation removal & control

It is recommended that all invasive species located within the water resources and buffer areas be controlled/removed. This is to improve the conditions of the wetland as well as to, most importantly, decrease competition between the revegetated and alien invasive species. The main species of Alien Invasive Plants (AIP) can be seen listed in Table 3-2 below.

Table 3-2 Some dominant AIP species recorded in the Project Area (Terrestrial Biodiversity and Ecological Study and Impact Assessment, Gerhard Botha and Dr. Jan-Hendrik Keet)

Family	Taxon	Common Name	NEMBA Category
Asteraceae	*Cirsium vulgare*	Spear thistle	1b
Asteraceae	*Xanthium strumarium*	Large Cocklebur	1b
Fabaceae	*Gleditsia triacanthos*	Honey Locust	1b
Myrtaceae	*Eucalyptus camaldulensis*	River Red Gum	1b
Rosaceae	*Pyracantha angustifolia*	Narrowleaf Firethorn	1b
Rosaceae	*Pyracantha crenulata*	Nepal Firethorn	1b
Rosaceae	*Rosa rubiginosa*	Sweet Brier	1b
Solanaceae	*Datura stramonium*	Common Thorn Apple	1b
Verbenaceae	*Verbena bonariensis*	Tall Verbena	1b
Verbenaceae	*Verbena brasiliensis*	Brazilian Vervain	1b
Verbenaceae	*Verbena rigida*	Slender Vervain	1b

3.1.2.1 Monitoring and Mitigation

Regular monitoring and maintenance (such as removing AIP/weeds and encroachment) are required for successful revegetation/rehabilitation projects. Monitoring consists of photo points and documentation of observations. It is recommended seasonally for the first two years of establishment and at least annually thereafter;

- General maintenance will involve AIP and weed control as well as thinning of encroachment. Continued weed control is critical to the success of re-vegetation and must be high priority. Weeding may be necessary to avoid competition and stress;

- AIP & Weed control during the first 2 years after rehabilitation established would likely control the undesired species until they can be outcompeted or shaded out. As with site preparation, weed maintenance after can be accomplished by mechanical means. Care must be taken not to damage the emerging plants or the soil layer. Stringent weed management eventually will increase the site's resistance to further weed invasion by favouring the growth and establishment from the seedbank;
- If possible, the rehabilitated areas must be irrigated at regular intervals, taking care not to cause erosion or damage the soil surface by using an excessive force of water; and
- The project area is to be left undisturbed and all access prohibited, except when maintenance is being undertaken and domestic animals must be kept out of the area.

3.1.3 Shaping to reinstate drainage & stormwater measures

Russell (2009) states it would possibly be more cost effective to accept an objective of stabilisation rather than restoration.

Figure 3-1 presents a guiding approach for a particular intervention for the development. The following is recommended for the decommissioning of drainage channels:

- Topsoil sources from the development area, sourced during construction can be filled into the drainage channels within the water resources and buffers (Figure 3-2). Topsoil material must not be mixed with the excavated material. These backfilled channels must then be re-vegetated. Backfilling drains is preferred for smaller and shallower drains;
- An alternative measure is to install 'earth plugs' at frequent (15 – 20 m) intervals along each drain. The construction of a series of smaller structures within the drain (or gully) would be required, which will catch up some sediment (Figure 3-3). The channels will become silted-up upstream of the plug and these silted areas will establish vegetation naturally in due course. Earth plugs are preferred for deeper and larger drains. Rock packs could be implemented for smaller drains that are not susceptible to high run-off volumes (and velocities) (Figure 3-4); and
- The stormwater management plan (Struxit Projects, 2022) proposes gabion structures be installed in the channels to prevent the stormwater from flowing out of the site at an uncontrolled rate and high velocity. These facilities will improve attenuation of the systems and also trap suspended sediment.

It is recommended that in principle, as part of the rehabilitation measures the top 300 mm of the excavated soil resources (topsoil) must be stockpiled separately from that below 300 mm. The soil resources can then be utilised across the development for rehabilitation efforts. Avoid mixing of soil layers.

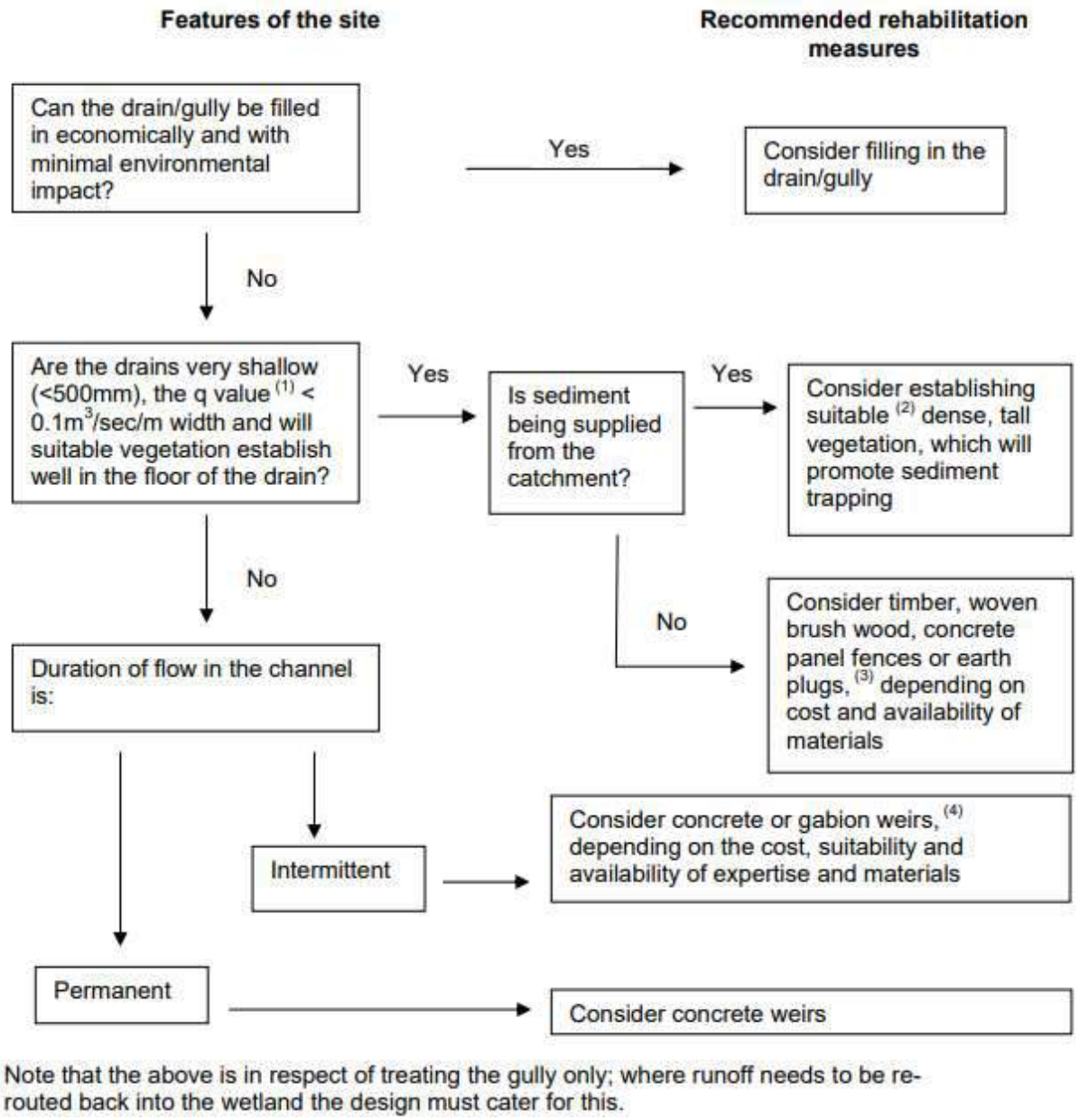


Figure 3-1 Decision tree for choosing appropriate rehabilitation measures for gullies and drainage ditches in wetlands (Russell, 2009)

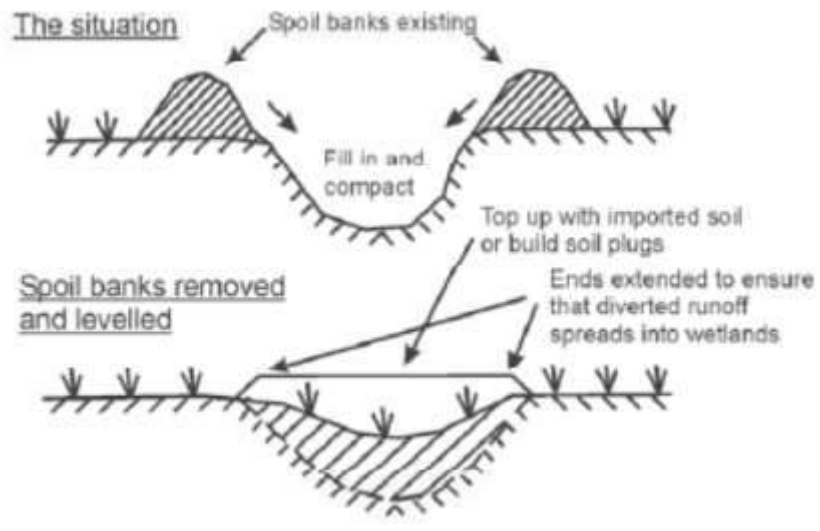


Figure 3-2 Example to backfill a drain / gully (Russell, 2009)

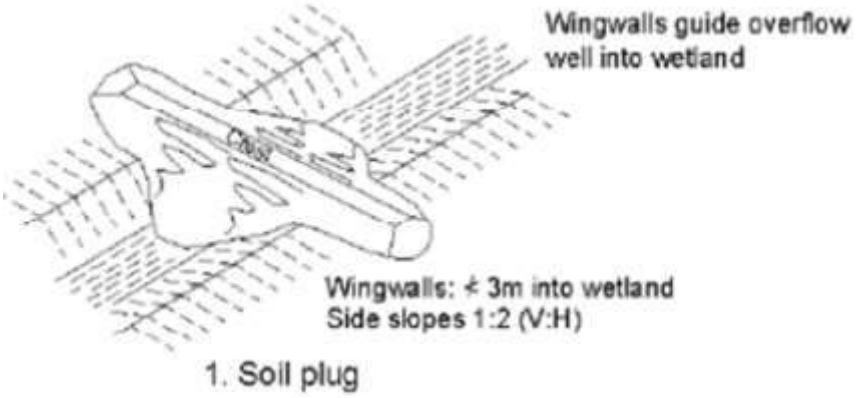


Figure 3-3 Example of an 'earth plug' (Russell, 2009)

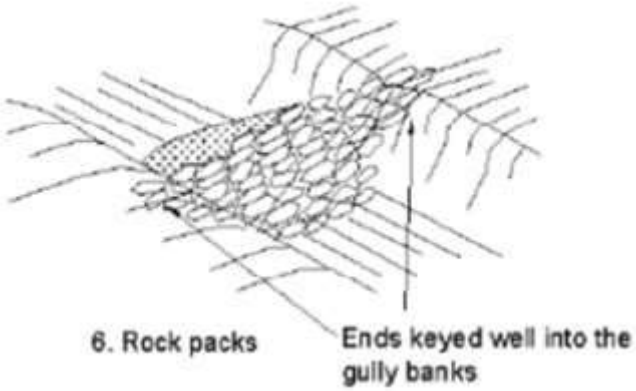


Figure 3-4 Example of 'rock packs' for drains (Russell, 2009)

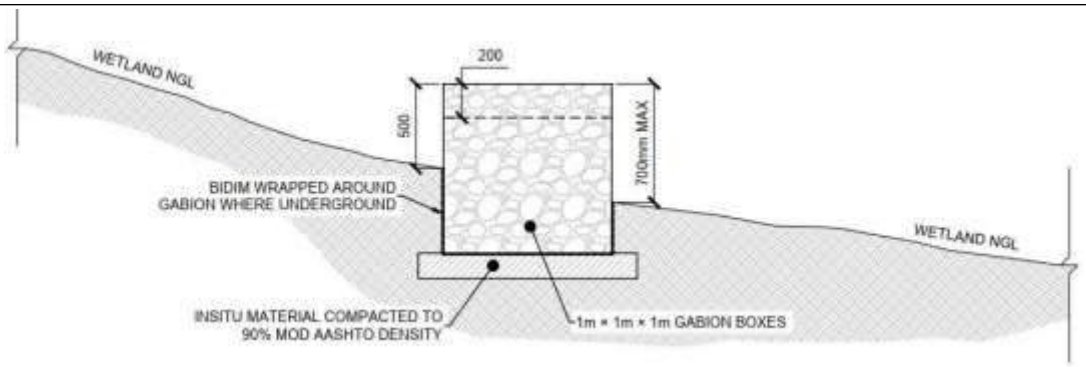


Figure 3-5 Gabion 'plugs' designed for the development (Struxit Projects, 2022)

3.1.3.1 Gully erosion

The water resource units must be inspected for areas of headcut erosion. These headcuts, erosion gullies and channels that are incised or susceptible to erosion and that extend from the water resource area into the upper catchment area must be addressed. Figure 3-8 presents a guiding approach for a particular intervention for the development. The following is recommended for the decommissioning of incised channels:

- Dryland eroded channels can be backfilled with topsoil and sub-soils from the development area, together with other non-toxin materials and compacted to these channels (Figure 3-6). The following is recommended:
    - Stockpile excavated material according to horizons (the top 300 mm separate from the rest of the material);
    - First introduce the sub-soil into the channel and then gently compact the soil; and
    - Then introduce the topsoil into the channel and then compact the soil gently.
- In the event the backfilling on channels is unsuccessful, then investigate the feasibly of hard-engineering structures such as weirs with aprons (Figure 3-7).

These measures must be informed by the stormwater management plan developed for the project, and a hydrologist must advise on the feasibility and suitability of the preferred option.

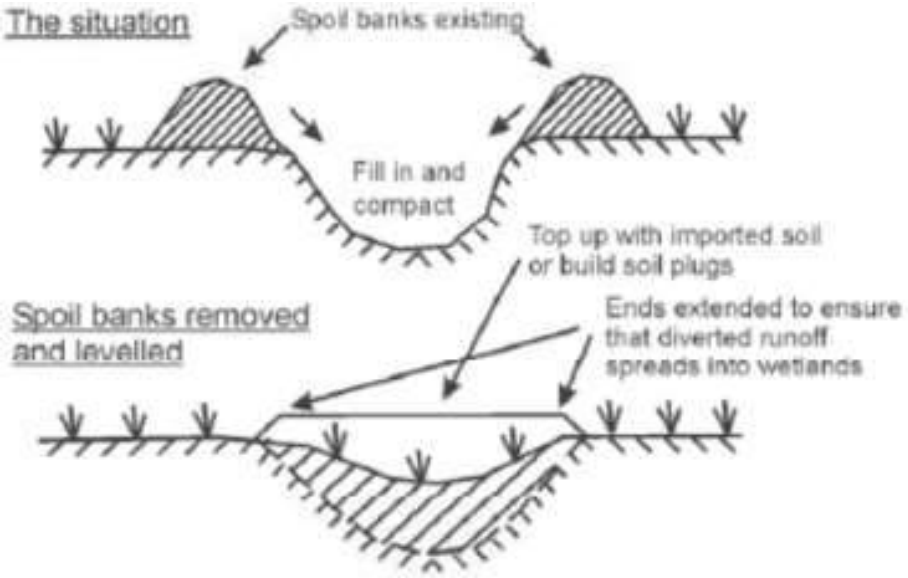


Figure 3-6 Back-filling of drains / gullies (Russell, 2009)

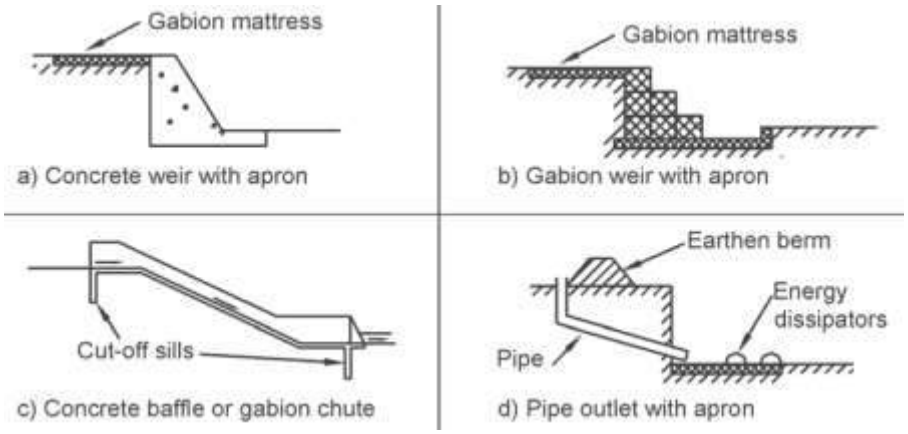


Figure 3-7 Side views of various structures to stabilize headcuts (Russell, 2009)

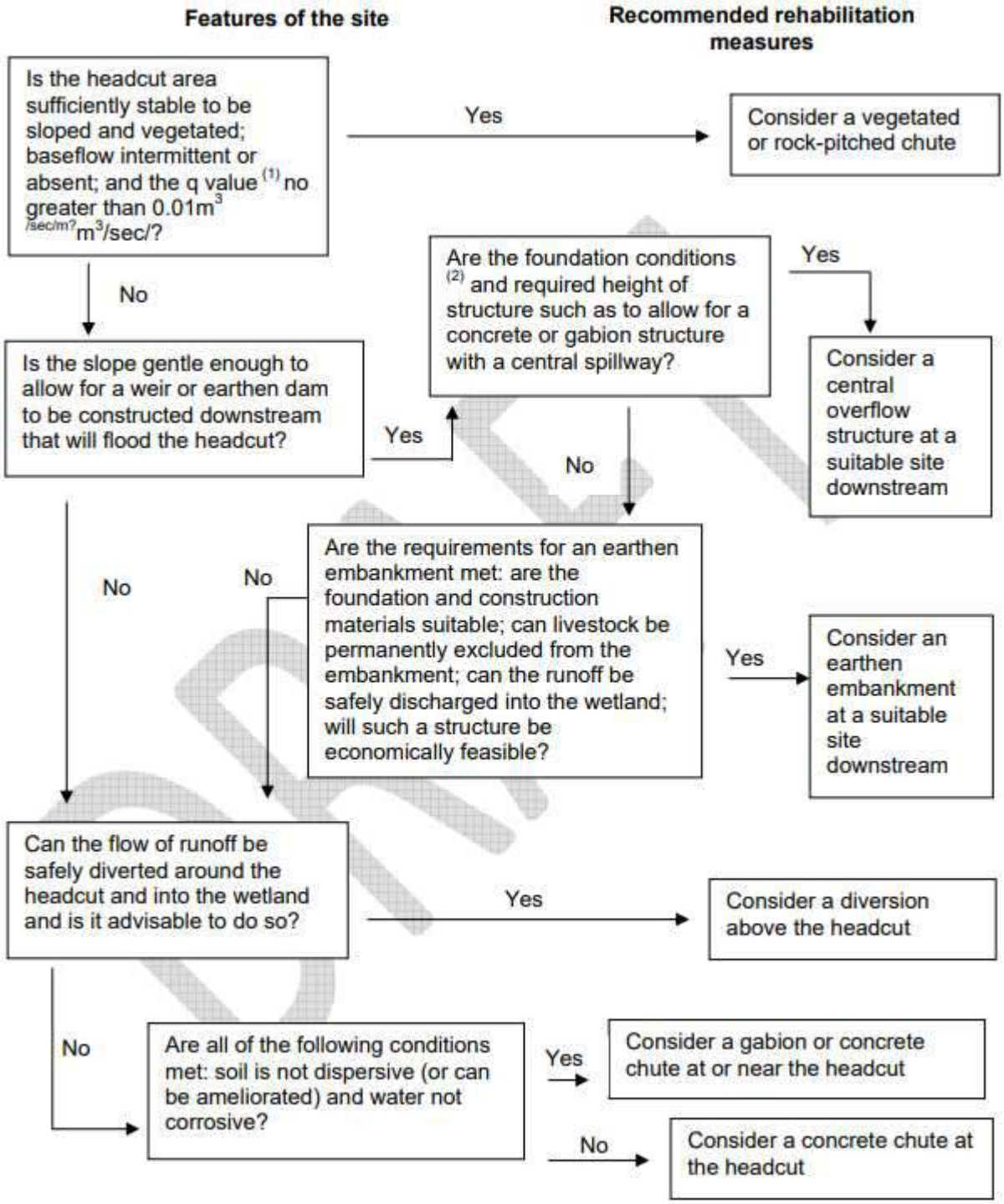


Figure 3-8 Decision tree for choosing a mechanism to stabilize active headcut erosion (Russell, 2009)

3.1.3.2 Backfill

During the period in which the excavated material is stockpiled, some of the material may be lost due to wind and water carrying lighter particles away. To compensate for the loss of this material, topsoil must be used to completely fill the excavated areas as well as degraded areas that have experienced a loss of soil reserves. It is worth noting that the topsoil material must not be mixed with the excavated material, but rather introduced to the surface. The surface of

this topsoil area outside of the delineated wetland must be slightly compacted to compensate for subsidence of this material.

As part of the rehabilitation measures, the top 300 mm of the excavated soil resources must be stockpiled separately from that below 300 mm. The soil resources must be reintroduced back into the excavated pits/trenches according to the order excavated. In cases where stockpiled material has been lost, topsoil must be reintroduced into areas with insufficient material. It is imperative that weed free topsoil be used.

To summarise;

- Stockpile excavated material according to horizons (the top 300 mm separate from the rest of the material);
- Reintroduce the sub-soil into the excavated areas and then gently compact the soil; and
- Reintroduce the topsoil into the excavated area and then compact the soil gently.

3.1.4 Bank stabilisation, reduce erosion risk

The clearance of vegetation from the water resources must be used as an opportunity to inspect the resources for signs of erosion. These erosion risk areas must be identified and demarcated for interventions. These areas will likely need to be shaped and re-vegetated to provide bank / channel stability. The following is recommended for bank stabilisation:

- Shape the embankments manually using labour and a Bobcat excavator to create a slope / embankment that represents the natural topography of the catchment. The profile of the bank must be consistent with the slope of the catchment, avoid creating unnecessarily steep or raised slopes. These areas can then be re-vegetated following the same processes presented in previous sections; and
- In the event the abovementioned soft engineering approach does not succeed, then the suitability of gabion baskets and reno mattresses must be investigated.

3.1.4.1 Shaping

The natural slope or topography of the area that has been affected by the clearing needs to be restored in order to ensure that the flow of water and the growth of vegetation occurs naturally. The re-adjustment of the topography will also improve the general aesthetics of the area. The removal of all the piles within the project area such as vegetation, soil and old rubble is compulsory. The building rubble and general litter must be removed entirely from the area and disposed of at licensed facilities. The following are methods that can be used to reshape the slope of the area, and are also applicable to dryland areas:

- Sand Bags
    - Only biodegradable bags are to be used, this includes Geojute sacks or similar. No plastic bags may be utilised. The bags must be filled with a sand or rock mixture under no circumstances may any contaminants be put into the bags (i.e., cementitious material, soil with chemical spill or fuel etc.). This must be checked by the Environmental Control Officer (ECO).
- Terracing and Soil Stabilisation

    - For this process rows of straw, hay or bundles of cut vegetation may be used. The hay, straw or vegetation is dug into the soil in contours, in order to help slow surface wash and capture eroded soil. The spacing between rows would be dependent on slope and the specific area.

- Geojute Netting
    - Netting or matting (biodegradable) can also be utilised on slopes to protect the soil from wind and water erosion. This assists with soil retention, weed control and vegetation establishment. Plants can be installed by making small incisions for planting. This would be an effective method in this area due to the high level of wind present. It is however important that this cannot be placed over existing vegetation growth and can only be used right after sloping have been performed.
- Geojute Rolls
    - Cylindrical rolls of Geojute fabric filled with sand (as described in the sandbag section) are effective on slopes and large cleared areas. This method is very effective in assisting with erosion control. Geojute rolls are kept in place with the use of pegs (alien invasive plant material can be utilised for this).
- Gabion Baskets and Reno Mattresses
    - These represent engineered solutions to steep slopes and banks; in this instance it would be relevant to the edges of the water resources. These methods are to be utilised in areas where drainage and flooding is a concern. Gabion baskets are 1m x 1m x 1m wire baskets that are filled with uniform sizes rocks. Reno mattresses are generally used to cover a larger area and is made of flat baskets. These two features are often used to enhance one another.

3.2 General Rehabilitation Measures

The following procedures will apply to site rehabilitation activities:

- The construction footprint must be kept as small as possible in order to minimise the impact on the surrounding environment;
- All personnel and contractors must undergo Environmental Awareness Training, with particular reference to the watercourses and the associated buffer areas;
- The ECO must ensure that the contractor and all subcontractors are aware of their roles and responsibilities;
- The ECO must oversee the immediate rehabilitation of any accidental disturbance to habitat falling outside of the demarcated construction footprint area;
- It is important that a stormwater management plan be implemented from the onset of the project, and continued for the life of the project to prevent significant impacts on the hydrological functioning of the system;
- Areas which are to be cleared of vegetation, must remain as small as possible to reduce the risk of further proliferation of alien vegetation, and in order to keep a level

of protection to the watercourses during construction through slowing stormwater runoff and sediment trapping;

- Clearing should take place in a phased approach in order to reduce the overall extent of exposed land, which will contribute to minimising large sediment depositions into the watercourse areas;
- Make use of existing access routes;
- Only indigenous plant species, preferably species that are indigenous to the natural vegetation of the area, should be used for revegetating transformed areas;
- Naturally occurring flora should be preserved as far as possible, especially in the watercourse and buffer areas;
- Alien invasive plant species are to be removed along the project area and are to be disposed of in the correct manner;
- Restrict construction activities within the designated areas as indicated on the construction layout plan;
- Any discharge of runoff must be done in such a way as to prevent erosion;
- Energy dissipaters should be installed at stormwater outlet structures;
- Silt traps or sandbags should be installed at stormwater outlets to prevent silt laden water from entering the watercourse;
- Litter traps should be at stormwater outlets to prevent litter from entering the watercourse;
- Dewatering of trenches must pass through a silt fence/sock to prevent siltation of the watercourses;
- No stockpiling of soils is to take place within the watercourse or their associated buffer zones, and stockpiles may not exceed 2 m in height;
- Any remaining soils following the completion of construction activities are to be levelled and re-seeded with indigenous flora species to minimise the risk of further sedimentation of the watercourses;
- Properly marked waste collection bins should be supplied by the contractor and all solid waste collected shall be disposed of at a licensed waste disposal facility;
- Topsoil must be preserved and used during the rehabilitation phase;
- Any possible contamination of topsoil by hydrocarbons, concrete or concrete water must be avoided. Spill kits must be available and on hand to clean these spills; and
- Hazardous materials must be stored in bunded areas that can accommodate the required volumes.

3.2.1 Erosion and Sedimentation of Watercourses

The following management measures must be implemented to prevent erosion and sedimentation of watercourses:

- Where possible, construction activities in close proximity to watercourses should be limited to the dry winter months in order to reduce erosion and sedimentation as a result of stormwater runoff;
- Clearing should take place in a phased approach in order to reduce the overall extent of exposed land, which will contribute to minimising large sediment depositions into the watercourse areas;
- Temporary and permanent erosion control methods should be implemented and may include silt fences, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed areas, erosion mats, and mulching;
- Areas which are to be cleared of vegetation, must remain as small as possible in order to keep a level of protection to the watercourses during construction through slowing stormwater runoff and sediment trapping;
- Erosion control measures must be implemented with guidance from the ECO;
- Any discharge of runoff into a watercourse must be done in such a way as to prevent erosion. This can include the diversion of stormwater runoff and sheet runoff away from areas susceptible to erosion;
- Energy dissipaters should be installed at stormwater outlet structures;
- Silt traps or sandbags should be installed at stormwater outlets to prevent silt laden water from entering the watercourse;
- Should silt fences or traps be installed these should be cleared of sediment on a regular basis, at least once a week;
- The contractor must ensure silt fences / traps are adequately maintained. The ECO must monitor that this is undertaken;
- The contractor/ECO must inspect the site and watercourses for erosion damage and sedimentation after heavy rainfall events and on the completion of construction;
- Should erosion or sedimentation be noted the damage must be rehabilitated immediately under the guidance of the ECO. Rehabilitation measures may include the filling of erosion gullies and rills and the stabilization of gullies with silt fences;
- Topsoil and sub-soil removed during construction must be stockpiled separately at designated stockpile areas for future rehabilitation activities;
- No stockpiling of soils is to take place within the watercourse or their associated buffer zones, and stockpiles may not exceed 2 m in height;
- If necessary, stockpiles should be stabilised with geotextiles in order to prevent erosion;
- Any possible contamination of topsoil by hydrocarbons, concrete or concrete water must be avoided. Spill kits must be available and on hand to clean these spills;
- The topsoil stockpiles must be kept free of alien invasive species, litter, building materials, excess vegetation and any other foreign materials; and

- Cleared vegetation and soils which will not be utilised for rehabilitation purposes must be disposed of at a registered waste disposal facility.

3.2.2 Alien and Invasive Species Management

The following measures must be implemented to control the proliferation of alien and invasive vegetation:

- Alien and invasive species encountered during clearing activities must be eradicated and the residual plant material kept separate in order to avoid spreading thereof;
- The use of herbicides should be avoided; and
- Alien and invasive species removed must be disposed of at a registered waste disposal facility.

3.2.3 Water Quality Management Measures

- Restrict construction activities within the designated areas as indicated on the construction layout plan;
- The contractor must inspect heavy machinery on a daily basis for possible leaks;
- Servicing of vehicles and refuelling may not take place on site or in close proximity of any watercourse;
- All Hazardous Chemical Substances (HCS) should be stored within suitable secondary containment structure(s) and may not be stored within the watercourses or their buffer zones;
- Drip trays or other suitable secure weather-proof containers should be kept on site in the event of a vehicle leakage or spillages;
- No vehicle or machinery is allowed to be washed within a watercourse or its buffer area, and should preferably take place of site;
- Drip trays or any form of oil absorbent material must be placed underneath construction vehicles/machinery and equipment when not in use;
- Leaking equipment shall be removed from site to facilitate repair; and
- The contractor is responsible for cleaning up any spillages (e.g. concrete, oil, fuel), immediately and contaminated soil must be removed and disposed of appropriately.

3.2.4 Hydrological Management Measures

The following measures must be implemented to prevent alterations to the hydrological regime of watercourses:

- Ensure that hydrological connectivity between areas upstream and downstream of construction activities are maintained throughout the construction phase;
- The crossings must cater for hydrological and ecological connectivity over the width of the watercourses;

- The crossings design must allow for sufficient dispersion of water through the watercourses to prevent the concentration of flow and the resultant scouring and incision of the channels of the systems; and
- Ensure that the beds and banks of the watercourses at the road crossing area are restored to the natural base level to prevent erosion or upstream ponding.

4 Monitoring Plan

The monitoring plan (Table 4-1) has been designed to be achievable and realistic for the nature of the project. The plan provides details as to the frequency of the monitoring efforts, the location of these efforts and what should be monitored. The primary focus for the monitoring plan is to evaluate the success of the rehabilitation efforts. Numerous monitoring frequencies have been proposed for this aspect of the project.

Rehabilitation: During rehabilitation, monitoring is essential to ensure that all recommended rehabilitation aspects are successfully applied. This monitoring must be undertaken by the ECO appointed to oversee the rehabilitation process.

Post-rehabilitation: After completion of the rehabilitation phase wetland areas should be monitored to evaluate the success of the rehabilitation efforts. In the unlikely event of potential "risks" to the systems being identified, this inspection may allow for corrective measures to be applied. This monitoring must be undertaken by the appointed ECO.

Seasonal monitoring: The applicant must appoint an independent service provider to conduct seasonal (wet season) monitoring for a period of two years after the completion of the rehabilitation measures. The monitoring should be conducted during October or shortly after the first summer rains, and then towards the end of the growing season. The monitoring should inspect the following:

- Recovery of the vegetation layer;
- Extent of alien vegetation establishment;
- Hydrology and inundation of the systems;
- The formation of erosion gullies and sedimentation of the wetlands; and
- The removal of solid waste from the wetland and buffer areas.

Table 4-1 The proposed monitoring plan for the project

Variables	Methods	Monitoring Frequency	Indicators	Targets
Wetland (unit) monitoring	• Wetland Present Ecological State, Functioning & Ecological Importance & Sensitivity • Determine if habitat quality deterioration is occurring.	• Bi-annual for 2-years as a minimum, thereafter to be determined by the wetland specialist in agreement with the relevant Department.	• Wetland WET-Series • Monitor for presence erosion, alien vegetation, wetland rehabilitation succession, and sedimentation	Wetland unit Recommended Ecological Class
	• Determine if water quality deterioration is occurring.	• Quarterly for 2-years as a minimum, thereafter to be determined by the wetland specialist in agreement with the relevant Department.	• Changes in water quality trends, spatial and temporal. Samples must include a reference site and a minimum of three monitoring sites.	Target Water Quality Requirements for aquatic ecosystems (DWAF, 1996)
Variables	**Methods**	**Monitoring Frequency**	**Indicator**	**Corrective Action**
Vegetation cover	• Monitor species and cover abundance; • Monitor indigenous vs alien plant encroachment; and • Fixed point photography	• After rehabilitation; and • Seasonal for the first two years.	• Establishment of primarily indigenous plants; and • Ground cover abundance is approximately 60% after the first year, and 80% after year two and 100% thereafter.	Replanting of indigenous grass species should be implemented if natural Re-vegetation is not successful after one year.
Erosion	• On-site inspection; • Fixed point photography; and • Compare to adjacent areas	• After rehabilitation; and • Seasonal for the first two year.	• Areas with no cover; • Erosion gullies; • Wetland outlet; and • Eroded wetland systems	• Short term: Rocks / boulders, and on-site debris; • Medium term: Replanting of indigenous vegetation; and • Long term: Rehab methods that may include gabion baskets, mattresses and should be discussed with specialists
Sedimentation	• On-site inspection; and • Fixed point photography	• After rehabilitation; and • Seasonal for the first two years.	• Excess sediment in wetlands	Sources of sedimentation should be noted and addressed If possible, excess sediment can be removed manually.
Invasive Plant Species	• Monitor invasive plant encroachment; • On-site inspection; and • Fixed point photography	• After rehabilitation and follow- up clearing; and • Seasonal for the first two years.	• Establishment of invasive plant species	Removal of invasive plants. Consult a botanist on what removal measures are best suited per species. Do not use chemicals for the removal process.
Solid waste	• On-site inspection; and • Fixed point photography	• After rehabilitation and follow-up clearing; and • Monthly (by O&M or Project Company / representatives)	The presence of: • Litter; • Dumping material; and/or • Building rubble.	Removal of solid waste and disposal at a licensed facility.

5 Conclusion

The Rehabilitation Plan must be implemented, with particular focus placed on the associated infrastructure, most notably access roads and watercourse/wetland crossings. Measures prescribed in the plan remain applicable to the development area (as a whole).

The plan must be implemented from the onset of the construction phase of the project. The accompanying monitoring plan is to be implemented in support of the rehabilitation plan.

6 References

Macfarlane, D.M., 2015. A strategic framework for improved wetland management in eThekwini's Northern Spatial Development Plan Area. Unpublished report prepared by Eco-Pulse Environmental Consulting Services. Version 0.3. December 2015.

Rodriguez, J. 2019. Backfilling Trenches and Other Excavations. Backfill is the key to a solid stable grading.

Russell, W. 2009. WET-RehabMethods. National guidelines and methods for wetland rehabilitation.

Soil Classification Working Group. (1991). Soil Classification A Taxonomic system for South Africa. Pretoria: The Department of Agricultural Development.

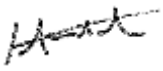
Soil Classification Working Group. (2018). Soil Classification A Taxonomic system for South Africa. Pretoria: The Agricultural Research Council.

7 Appendix A: Specialist Declarations

DECLARATION

I, Andrew Husted, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.



Andrew Husted

Freshwater Ecologist

The Biodiversity Company

April 2023

APPENDIX E:
PLANT RESCUE AND PROTECTION PLAN

SEARCH AND RESCUE AND PROTECTION PLAN

1. PURPOSE

The purpose of the Search and Rescue and Protection Plan is to implement avoidance and mitigation measures, in addition to the mitigations included in the EMPr to reduce the impact of the wind energy facility's establishment on listed and protected plant species and their habitats during construction and operation. This subplan is required in order to ensure compliance with national and provincial legislation for vegetation clearing and any required destruction or translocation of provincially and nationally protected species within the development footprint.

The Plan first provides some legislative background on the regulations relevant to listed and protected species, under the TOPS, The Mpumalanga Nature Conservation Act, No. 10 of 1998and National List of Protected Tree Species. This is followed by an identification of protected species present within the development area and actions that should be implemented to minimise impact on these species and comply with legislative requirements.

2. IDENTIFICATION OF SPECIES OF CONSERVATION CONCERN

Plant species are protected at the national level as well as the provincial level and different permits may be required for different species depending on their protection level. At the national level, protected trees are listed by the Department of Forestry, Fisheries and Environment (DFFE) under the National List of Protected Trees, which is updated on a regular basis. Any clearing of nationally protected trees requires a permit from DFFE. At the provincial level, all species red-listed under the Red List of South African plants (http://redlist.sanbi.org/) as well as species listed under the the Mpumalanga Nature Conservation Act, No. 10 of 1998 protected and require provincial permits.

Protected fauna species red-listed under the Red List of South African plants (http://redlist.sanbi.org/) as well as species listed under the Mpumalanga Nature Conservation Act, No. 10 of 1998 are protected and require provincial permits.

3. IDENTIFICATION OF LISTED SPECIES

A total of 102 SoCC, namely 19 Red List and 88 protected species (note that some of the Red List species are also protected; thus some overlap occurs between these numbers) (Table 1). The protected species are listed under Schedule 11 (Protected Plants) of the Mpumalanga Nature Conservation Act, no. 10 of 1998. The initial screening report also revealed the potential presence of an additional three Medium Sensitive species, namely species 851, 691, and 1252 (for their protection, the identities of these species will not made public). No protected tree species were identified within the project site.

Table 1: Species of Conservation Concern that have been recorded within the broader region surrounding the study area, as per the SANBI POSA online database.

Family	Species	IUCN	Protection Schedule
Apocynaceae	*Schizoglossum peglerae*	EN	
Asparagaceae	*Asparagus fractiflexus*	EN	

Family	Species	IUCN	Protection Schedule
Aizoaceae	*Khadia carolinensis*	VU	
Amaryllidaceae	*Nerine gracilis*	VU	
Apocynaceae	*Aspidoglossum xanthosphaerum*	VU	
Apocynaceae	*Miraglossum davyi*	VU	
Apocynaceae	*Pachycarpus suaveolens*	VU	
Asphodelaceae	*Aloe hlangapies*	VU	11
Iridaceae	*Gladiolus paludosus*	VU	11
Apocynaceae	*Stenostelma umbelluliferum*	NT	
Asphodelaceae	*Kniphofia typhoides*	NT	11
Asteraceae	*Cineraria austrotransvaalensis*	NT	
Fabaceae	*Argyrolobium campicola*	NT	
Hyacinthaceae	*Merwilla plumbea*	NT	
Iridaceae	*Gladiolus robertsoniae*	NT	11
Orchidaceae	*Habenaria barbertoni*	NT	11
Euphorbiaceae	*Acalypha caperonioides var. caperonioides*	DD	
Hyacinthaceae	*Drimia elata*	DD	
Iridaceae	*Hesperantha rupestris*	DD	
Agapanthaceae	*Agapanthus inapertus subsp. intermedius*	LC	11
Amaryllidaceae	*Boophone disticha*	LC	11
Amaryllidaceae	*Brunsvigia natalensis*	LC	11
Amaryllidaceae	*Brunsvigia radulosa*	LC	11
Amaryllidaceae	*Crinum bulbispermum*	LC	11
Amaryllidaceae	*Crinum graminicola*	LC	11
Amaryllidaceae	*Cyrtanthus breviflorus*	LC	11
Amaryllidaceae	*Cyrtanthus stenanthus*	LC	11
Amaryllidaceae	*Cyrtanthus tuckii*	LC	11
Amaryllidaceae	*Haemanthus humilis subsp. hirsutus*	LC	11
Amaryllidaceae	*Haemanthus montanus*	LC	11
Amaryllidaceae	*Scadoxus puniceus*	LC	11
Araceae	*Zantedeschia albomaculata subsp. albomaculata*	LC	11
Araceae	*Zantedeschia albomaculata subsp. macrocarpa*	LC	11
Araceae	*Zantedeschia rehmannii*	LC	11
Asphodelaceae	*Aloe boylei*	LC	11
Asphodelaceae	*Aloe davyana*	LC	11
Asphodelaceae	*Aloe ecklonis*	LC	11
Asphodelaceae	*Aloe graciliflora*	LC	11
Asphodelaceae	*Aloe jeppeae*	LC	11
Asphodelaceae	*Aloe maculata subsp. maculata*	LC	11
Asphodelaceae	*Kniphofia albescens*	LC	11
Asphodelaceae	*Kniphofia porphyrantha*	LC	11
Dioscoreaceae	*Dioscorea dregeana*	LC	11
Hyacinthaceae	*Eucomis montana*	LC	11
Hyacinthaceae	*Eucomis pallidiflora subsp. pallidiflora*	LC	11
Iridaceae	*Gladiolus crassifolius*	LC	11
Iridaceae	*Gladiolus dalenii subsp. dalenii*	LC	11

Family	Species	IUCN	Protection Schedule
Iridaceae	*Gladiolus ecklonii*	LC	11
Iridaceae	*Gladiolus elliotii*	LC	11
Iridaceae	*Gladiolus longicollis subsp. longicollis*	LC	11
Iridaceae	*Gladiolus longicollis subsp. platypetalus*	LC	11
Iridaceae	*Gladiolus papilio*	LC	11
Iridaceae	*Gladiolus sericeovillosus subsp. calvatus*	LC	11
Iridaceae	*Gladiolus sericeovillosus subsp. sericeovillosus*	LC	11
Iridaceae	*Gladiolus vinosomaculatus*	LC	11
Iridaceae	*Gladiolus woodii*	LC	11
Iridaceae	*Hesperantha coccinea*	LC	11
Iridaceae	*Watsonia bella*	LC	11
Iridaceae	*Watsonia pulchra*	LC	11
Orchidaceae	*Brachycorythis ovata subsp. ovata*	LC	11
Orchidaceae	*Brachycorythis pubescens*	LC	11
Orchidaceae	*Brownleea parviflora*	LC	11
Orchidaceae	*Disa aconitoides subsp. aconitoides*	LC	11
Orchidaceae	*Disa cooperi*	LC	11
Orchidaceae	*Disa nervosa*	LC	11
Orchidaceae	*Disa patula var. transvaalensis*	LC	11
Orchidaceae	*Disa stachyoides*	LC	11
Orchidaceae	*Disa versicolor*	LC	11
Orchidaceae	*Disperis cooperi*	LC	11
Orchidaceae	*Disperis fanniniae*	LC	11
Orchidaceae	*Eulophia cooperi*	LC	11
Orchidaceae	*Eulophia hians var. hians*	LC	11
Orchidaceae	*Eulophia hians var. inaequalis*	LC	11
Orchidaceae	*Eulophia hians var. nutans*	LC	11
Orchidaceae	*Eulophia ovalis var. bainesii*	LC	11
Orchidaceae	*Eulophia ovalis var. ovalis*	LC	11
Orchidaceae	*Eulophia parvilabris*	LC	11
Orchidaceae	*Habenaria clavata*	LC	11
Orchidaceae	*Habenaria dives*	LC	11
Orchidaceae	*Habenaria epipactidea*	LC	11
Orchidaceae	*Habenaria falcicornis subsp. caffra*	LC	11
Orchidaceae	*Habenaria lithophila*	LC	11
Orchidaceae	*Neobolusia tysonii*	LC	11
Orchidaceae	*Orthochilus foliosus*	LC	11
Orchidaceae	*Orthochilus leontoglossus*	LC	11
Orchidaceae	*Orthochilus welwitschii*	LC	11
Orchidaceae	*Pterygodium dracomontanum*	LC	11
Orchidaceae	*Pterygodium nigrescens*	LC	11
Orchidaceae	*Satyrium hallackii subsp. ocellatum*	LC	11
Orchidaceae	*Satyrium neglectum subsp. neglectum var. neglectum*	LC	11
Orchidaceae	*Satyrium parviflorum*	LC	11
Orchidaceae	*Satyrium trinerve*	LC	11

Family	Species	IUCN	Protection Schedule
Orchidaceae	*Schizochilus zeyheri*	LC	11
Proteaceae	*Protea roupelliae subsp. roupelliae*	LC	11
Hyacinthaceae	*Eucomis autumnalis subsp. clavata*	NE	11
Orchidaceae	*Satyrium longicauda var. longicauda*	NE	11
Apocynaceae	*Ceropegia breviflora*		11
Apocynaceae	*Ceropegia rehmannii*		11
Iridaceae	*Gladiolus sp.*		11
Orchidaceae	*Eulophia sp.*		11
Orchidaceae	*Orthochilus sp.*		11
Orchidaceae	*Orthochilus vinosus*		11

4. MITIGATION & AVOIDANCE OPTIONS

The primary mitigation and avoidance measure that must be implemented at the pre-construction phase is the Pre-construction Walk-Through of the development footprint. This defines which and how many individuals of listed and protected species are found within the development footprint. This information is required for the DFFE and The Mpumalanga Nature Conservation Act, No. 10 of 1998 permits which must be obtained before construction can commence.

Where listed species fall within the development footprint and avoidance is not possible, then it may be possible to translocate the affected individuals outside of the development footprint. However, not all species are suitable for translocation as only certain types of plants are able to survive the disturbance. Suitable candidates for translocation include most geophytes and succulents. Although there are exceptions, the majority of woody species do not survive translocation well and it is generally not recommended to try and attempt to translocate such species. Recommendations in this regard would be made following the walk-through of the facility footprint before construction, where all listed and protected species within the development footprint will be identified and located.

5. RESCUE AND PROTECTION PLAN

5.1. Pre-construction

» Identification of all listed species which may occur within the site, based on the SANBI POSA database as well as the specialist studies for the site and any other relevant literature.
» Before construction commences at the site, the following actions should be taken:
- A walk-through of the final development footprint by a suitably qualified botanist/ecologist to locate and identify all listed and protected species which fall within the development footprint. This should happen during the flowering season at the site which, depending on rainfall, is likely to be during spring to early summer (August-October).
- A walk-through report following the walk-through which identifies areas where minor deviations to roads and other infrastructure can be made to avoid sensitive areas and important populations of listed species must be compiled. The report should also contain a full list of localities where listed species occur within the development footprint and the number of affected individuals in each instance, so that this information can be used to comply with the permit conditions required by the relevant legislation. Those species suitable for search as rescue should be identified in the walk-through report.

- A permit to clear the site and relocate species of concern is required from the Mpumalanga provincial conservation authority before construction commences.
- A tree clearing permit is also required from DFFE to clear protected trees from the site (if recorded).
- Once the permits have been issued, there should be a search and rescue operation of all listed species that cannot be avoided, which have been identified in the walk-through report as being suitable for search and rescue within the development footprint. Affected individuals should be translocated to a similar habitat outside of the development footprint and marked for monitoring purposes.

5.2. Construction

» Vegetation clearing should take place in a phased manner, so that large cleared areas are not left standing with no activity for long periods of time and pose a wind and water erosion risk. This will require coordination between the contractor and EO, to ensure that the EO is able to monitor activities appropriately.
» All cleared material should be handled according to the Revegetation and Rehabilitation Plan and used to encourage the recovery of disturbed areas.
» The EO shouldmonitor vegetation clearing at the site. Any deviations from the plans that may be required should first be checked for listed species by the EO and any listed species present which are able to survive translocation should be translocated to a safe site.
» All areas to be cleared should be demarcated with construction tape, survey markers or similar. All construction vehicles should work only within the designated area.
» Plants suitable for translocation or for use in rehabilitation of already cleared areas should be identified and relocated before general clearing takes place.
» Any listed species observed within the development footprint that were missed during the pre-construction plant sweeps should be translocated to a safe site before clearing commences.
» Many listed species are also sought after for traditional medicine or by collectors and so the EO and ECO should ensure that all staff attend environmental induction training in which the legal and conservation aspects of harvesting plants from the wild are discussed.
» The EO should monitor construction activities in sensitive habitats such as in dune areas carefully to ensure that impacts to these areas are minimised.

5.3. Operation

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

6. MONITORING & REPORTING REQUIREMENTS

The following reporting and monitoring requirements are recommended as part of the plant rescue and protection plan:

» Pre-construction walk-through report detailing the location and distribution of all listed and protected species must be compiled. This should include a walk-through of all infrastructure including all new access roads, cables, buildings and substations. The report should include recommendations of route

adjustments where necessary, as well as provide a full account of how many individuals of each listed species will be impacted by the development. Details of plants suitable for search and rescue must also be included.

- Permit applications to DEA&DP and DFFE. This requires the walk-through report as well as the identification and quantification of all listed and protected species within the development footprint. The permit is required before any search and rescue or vegetation clearance can take place. Where large numbers of listed species are affected, a site inspection and additional requirements may be imposed by DEA&DP and DFFE as part of the permit conditions. All documentation associated with this process needs to be retained and the final clearing permit should be kept at the site.
- Active daily monitoring of clearing during construction by the EO must be undertaken to ensure that listed species and sensitive habitats are avoided. All incidents should be recorded along with the remedial measures implemented.
- Post construction monitoring of plants translocated during search and rescue to evaluate the success of the intervention. Monitoring for a year post-transplant should be sufficient to gauge success.

APPENDIX F:
TRAFFIC AND TRANSPORTATION MANAGEMENT PLAN

PRINCIPLES FOR TRAFFIC MANAGEMENT

1. PURPOSE

The purpose of this Traffic Management Plan (TMP) is to address regulatory compliance, traffic management practices, and protection measures to help reduce impacts related to transportation and the construction of temporary and long-term access within the vicinity of the Compton Solar PV Facility project site. The objectives of this plan include the following:

- To ensure compliance with all legislation regulating traffic and transportation within South Africa (National, Provincial, Local & associated guidelines).
- To avoid incidents and accidents while vehicles are being driven and while transporting personnel, materials, and equipment to and from the project site.
- To raise greater safety awareness in each driver and to ensure the compliance of all safe driving provisions for all the vehicles.
- To raise awareness to ensure drivers respect and follow traffic regulations.
- To avoid the deterioration of access roads and the pollution that can be created due to noise and emissions produced by equipment, machinery, and vehicles.

2. TRAFFIC AND TRANSPORTATION MANAGEMENT PRINCIPLES

- Prior to the commencement of construction the contractor must develop their own detailed Transport Management Plan (TMP) based on traffic volumes and road carry capacity outlines in this plan
- The transport contractor must ensure that all required permits for the transportation of abnormal loads are in place prior to the transportation of equipment and project components to the site. Specific abnormal load routes must be developed with environmental factors taken into consideration.
- Before construction commences, authorised access routes must be clearly marked in the field with signs or flagging. The Construction Contractor must review the location of designated access and will be responsible for ensuring construction travel is limited to designated routes. The entrance of the main access road must not be constructed before a blind rise or on a bend of the public road.
- All employees must attend an environmental training program (e.g. toolbox talks) by the Environmental Officer (EO). Through this program, employees will be instructed to use only approved access roads, drive within the delineated road limits, and obey jurisdictional and posted speed limits to minimise potential impacts to the environment and other road users.
- The contractor will be responsible for making sure that their suppliers, vendors, and subcontractors strictly comply with the principles of this TMP and the contractor's TMP.
- Adjacent landowners must be notified of the construction schedule.
- Access roads and entrances to the site should be carefully planned to limit any intrusion on the neighbouring property owners and road users.
- Signs must be posted in the project area to notify landowners and others of the construction activity.
- Flagging must be provided at access points to the site and must be maintained until construction is completed on the site.
- Speed limits must be established prior to commencement of construction and enforced over all construction traffic.
- Speed controls and implementation of appropriate dust suppression measures must be enforced to minimise dust pollution.

- Throughout construction the contractor will be responsible for monitoring the condition of roads used by project traffic and for ensuring that roads are maintained in a condition that is comparable to the condition they were in before the construction began.
- Drivers must have an appropriate valid driver's license and other operation licences required by applicable legislation.
- All vehicles must be maintained in good mechanical, electrical, and electronic condition, including but not limited to the brake systems, steering, tires, windshield wipers, side mirrors and rear view mirror, safety belts, signal indicators, and lenses.
- Any traffic delays attributable to construction traffic must be co-ordinated with the appropriate authorities.
- No deviation from approved transportation routes must be allowed, unless roads are closed for reasons outside the control of the contractor.
- Impacts on local communities must be minimised. Consideration should be given to limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time.

3. MONITORING

- The principal contractor must ensure that all vehicles adhere to the speed limits.
- A speeding register must be kept with details of the offending driver.
- Repeat offenders must be penalised.
- Where traffic signs are not being adhered to, engineering structures must be used to ensure speeds are reduced.

4. SITE-SPECIFIC TRANSPORTATION MANAGEMENT (TRAFFIC IMPACT ASSESSMENT)

EIA REPORT:

UMMBILA EMOYENI RENEWABLE ENERGY FACILITY: WIND ENERGY FACILITY, MPUMALANGA PROVINCE

TRANSPORT STUDY

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Second Issue

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SYNOPSIS

Preparation of a Transport Study for the proposed Ummbila Emoyeni Renewable Wind Energy facility near Bethal in the Mpumalanga Province, pertaining to all relevant traffic and transportation engineering aspects.

KEY WORDS:

EIA Report, Wind Energy Facility, Wind Farm, Renewable Energy Facility, Transport Study

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QUALITY VERIFICATION

This report has been prepared under the controls established by a quality management system that meets the requirements of ISO 9001: 2015 which has been independently certified by DEKRA Certification.

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PROPOSED UMMBILA EMOYENI RENEWABLE ENERGY WIND FACILITY, MPUMALANGA PROVINCE

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PROPOSED UMMBILA EMOYENI RENEWABLE ENERGY WIND FACILITY, MPUMALANGA PROVINCE

1 INTRODUCTION AND METHODOLOGY

1.1 Scope and Objectives

Emoyeni Renewable Energy Farm (Pty) Ltd is proposing the development of a commercial Wind Energy Facility (WEF), named Ummbila Emoyeni Wind Energy Facility, consisting of a commercial wind farm and associated infrastructure, located approximately 6km southeast of Bethal in the Mpumalanga Province of South Africa. The project is located across the Govan Mbeki Lekwa and Msukaligwa Local Municipalities within the Gert Sibande District (see **Figure 1-1**).

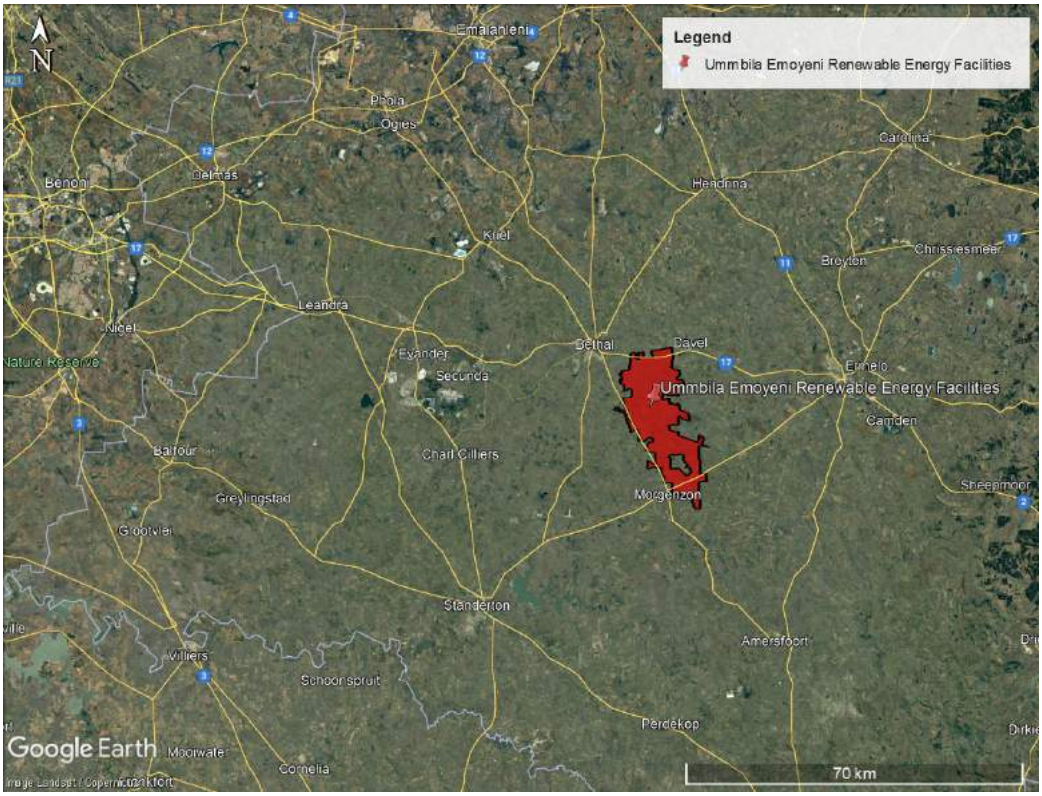

Figure 1-1: Aerial View of location of the site for the Ummbila Renewable Wind Energy Facility

As part of the Environmental Impact Assessment (EIA) process undertaken, the services of a Transportation Specialist are required to conduct a Transport Study and JG Afrika (Pty) Ltd was consequently appointed to conduct the Traffic Impact Assessment for the commercial wind farm.

The following two main transportation activities will be investigated:

- Abnormal load vehicles transporting components to the site.
- The transportation of construction materials, equipment, and people to and from the site/facility.

The transport study will aim to provide the following objectives:

- Assess activities related to traffic movement for the construction and operation (maintenance) phases of the facility.
- Recommend a preliminary route for the transportation of the components to the proposed site.
- Recommend a preliminary transportation route for the transportation of materials, equipment, and people to site.
- Recommend alternative or secondary routes where possible.

1.2 Terms of Reference

General:

A specialist report prepared in terms of the Regulations must contain the following:

(a) details of-
  (i) the specialist who prepared the report; and
  (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;
(c) an indication of the scope of, and the purpose for which, the report was prepared;
  (cA) an indication of the quality and age of base data used for the specialist report
  (cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;
(d) the duration date and season of the site investigation and the relevance of the season to the outcome of the assessment;
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;
(g) an identification of any areas to be avoided, including buffers;
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;
(k) any mitigation measures for inclusion in the EMPr;
(I) any conditions for inclusion in the environmental authorisation;
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;
(n) a reasoned opinion-
  (i) whether the proposed activity, activities or portions thereof should be authorised; and (considering impacts and expected cumulative impacts).

(iA) regarding the acceptability of the proposed activity or activities, and
(ii) if the opinion is that the proposed activity, activities, or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;

(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;

(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and

(q) any other information requested by the competent authority.

Specific:

- Extent of the transport study and study area;
- The proposed development;
- Trip generation for the facility during construction and operation;
- Traffic impact on external road network;
- Accessibility and turning requirements;
- National and local haulage routes;
- Assessment of internal roads and site accesses;
- Assessment of freight requirements and permitting needed for abnormal loads; and
- Traffic accommodation during construction.

1.3 Approach and Methodology

The report deals with the traffic impact on the surrounding road network in the vicinity of the proposed sites:

- during the construction of the access roads;
- construction of the facility; and
- operation and maintenance during the operational phase.

This transport study was informed by the following:

Project Assessment

- Overview of project background information including location maps, component specs and any possible resulting abnormal loads to be transported.
- Research of all available documentation and information relevant to the proposed facility.

The transport study considered and assessed the following:

Traffic and Haul Route Assessment

- Estimation of trip generation;
- Discussion on potential traffic impacts;
- Assessment of possible haul routes; and
- Construction and operational (maintenance) vehicle trips.

Site layout, Access Points, and Internal Roads Assessment per Site

- Description of the surrounding road network;

- Description of site layout; and
- Assessment of the proposed access points.

1.4 Assumptions and Limitations

The following assumptions and limitations apply:

- This study is based on the project information provided by Savannah Environmental (Pty) Ltd.
- According to the Eskom Specifications for Power Transformers (Eskom Power Series, Volume 5: Theory, Design, Maintenance and Life Management of Power Transformers), the following dimensional limitations need to be kept when transporting the transformer – total maximum height 5 000mm, total maximum width 4 300mm and total maximum length 10 500mm.
- Maximum vertical height clearances along the haulage route are 5.2m for abnormal loads.
- Imported elements will be transported from the most feasible port of entry, which is deemed to be the Port of Richard's Bay.
- All haulage trips will occur on either surfaced national and provincial roads or existing gravel roads.
- Construction materials will be sourced locally as far as possible.
- Approximately 30 full-time employees will be stationed at each of the four sites during the operational phase.

1.5 Source of Information

Information used in a transport study includes:

- Project Information provided by the Client;
- Google Earth.kmz provided by the Client;
- Google Earth Satellite Imagery;
- Road Traffic Act, 1996 (Act No. 93 of 1996)
- National Road Traffic Regulations, 2000
- SANS 10280/NRS 041-1:2008 - Overhead Power Lines for Conditions Prevailing in South Africa
- The Technical Recommendations for Highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads; and
- Project research of all available information.

2 DESCRIPTION OF PROJECT ASPECTS RELEVANT TO THE TRANSPORT STUDY

2.1 Port of Entry

It is assumed that if components are imported to South Africa, it will be via the Port of Richard's Bay, which is located in KwaZulu-Natal. The Port is located approximately 460km from the proposed site. The Port of Richard's Bay is a deep-sea water port boasting 13 berths. The terminals handle abnormal loads and among others dry bulk ores, minerals, and break-bulk consignments. The terminal exports over 30 varied commodities from magnetite to ferrochrome, woodchips to aluminium and steel. A large percentage of dry bulk commodities are handled via a computer-controlled network of conveyor belts extending 40 km to seven harbour bound industries. The Richards Bay Port is operated by Transnet Port Terminal.

Alternatively, components can be imported via the Port of East London, located approximately 1130km from the proposed site, or from the Port of Ngqura, approximately 1200km from the proposed site, both being located in the province of the Eastern Cape. Please note that shorter routes exist between the Port of East London and the proposed site, but the poor condition of these roads aren't suitable for transport with heavy and/or abnormal vehicles.

2.2 Selected Candidate Turbine

The possible range of wind turbines varies largely with various wind turbine manufacturers operating worldwide. The project information states that a turbine with a hub height of up to 200m and a tip height of up to 300m is to be considered.

In general, each turbine unit consists of a tower, a Nacelle (final weight dependent on the supplier and whether the nacelle has gears or not) and rotor blades.

2.3 Transportation requirements

2.3.1 Abnormal Load Considerations

Abnormal permits are required for vehicles exceeding the following permissible maximum dimensions on road freight transport in terms of the Road Safety Act (Act No. 93 of 1996) and the National Road Traffic Regulations, 2000:

- Length: 22m for an interlink, 18.5m for truck and trailer and 13.5m for a single unit truck
- Width: 2.6m
- Height: 4.3m measured from the ground. Possible height of load – 2.7m.
- Weight: Gross vehicle mass of 56t resulting in a payload of approximately 30t
- Axle unit limitations: 18t for dual and 24t for triple-axle units
- Axle load limitation: 7.7t on the front axle and 9t on the single or rear axles

Any dimension / mass outside the above will be classified as an Abnormal Load and will necessitate an application to the Department of Transport and Public Works for a permit that will give authorisation for the conveyance of said load. A permit is required for each Province that the haulage route traverses.

2.3.2 Further Guideline Documentation

The Technical Recommendations for Highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outlines the rules and conditions that apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts.

The general conditions, limitations and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power / mass ratio, mass distribution and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the Road Traffic Act and the relevant regulations.

2.3.3 Permitting – General Rules

The limits recommended in the TRH 11 guideline document are intended to serve as a guide to the Permit Issuing Authorities. It must be noted that each Administration has the right to refuse a permit application or to modify the conditions under which a permit is granted. It is understood that:

a) A permit is issued at the sole discretion of the Issuing Authority. The permit may be refused because of the condition of the road, the culverts and bridges, the nature of other traffic on the road, abnormally heavy traffic during certain periods or for any other reason.
b) A permit can be withdrawn if the vehicle upon inspection is found in any way not fit to be operated.
c) During certain periods, such as school holidays or long weekends an embargo may be placed on the issuing of permits. Embargo lists are compiled annually and are obtainable from the Issuing Authorities.

2.3.4 Load Limitations

The maximum load that a road vehicle or combination of vehicles will be allowed to carry legally under permit on a public road is limited by:

- the capacity of the vehicles as rated by the manufacturer;
- the load which may be carried by the tyres;
- the damaging effect on pavements;
- the structural capacity on bridges and culverts;
- the power of the prime mover(s);
- the load imposed by the driving axles; and
- the load imposed by the steering axles.

2.3.5 Dimensional Limitations

A load of abnormal dimensions may cause an obstruction and danger to other traffic. For this reason, all loads must, as far as possible, conform to the legal dimensions. Permits will only be considered for indivisible loads, i.e., loads that cannot, without disproportionate effort, expense, or risk of damage, be divided into two or more loads for the purpose of

transport on public roads. For each of the characteristics below there is a legally permissible limit and what is allowed under permit:

- Width;
- Height;
- Length;
- Front Overhang;
- Rear Overhang;
- Front Load Projection;
- Rear Load Projection;
- Wheelbase;
- Turning Radius; and
- Stability of Loaded Vehicles.

2.3.6 Transporting Wind Turbine Components

Wind turbine components can be transported in a number of ways with different truck / trailer combinations and configurations, which will be decided upon at a later stage by the transporting contractor and the plant hire companies, when applying for the necessary permits from the Permit Issuing Authorities. All required permits will need to be obtained prior to the commencement of construction.

2.3.6.1 Nacelle

The heaviest component of a wind turbine is the nacelle (approximately 100 tons depending on manufacturer and design of the unit). Combined with road-based transport, it has a total average vehicle mass of approximately 145 000kg for a 100-ton unit. For larger turbines, the maximum weight can even increase to around 180 tons. Route clearances and permits will therefore be required for transporting the nacelle by road-based transport. The unit will require a minimum height clearance of 5.2m.

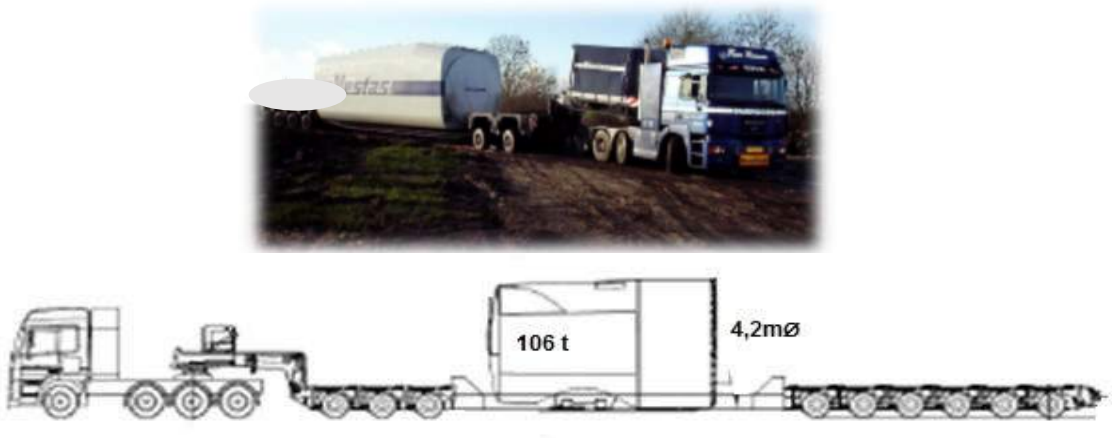

Figure 2-1: Example - Transporting the Nacelle

2.3.6.2 Blades

These are the longest and possibly most vulnerable components of a wind turbine and hence need to be transported with utmost care. The blades need to be transported on an extendible blade transport trailer or in a rigid container with rear steerable dollies. The blades can generally be transported individually, in pairs or in three's; although different manufacturers have different methods of packaging and transporting the blades. It should be noted that larger blades are transported individually. The transport vehicle exceeds the dimensional limitation (length) of 22 m and will only be allowed under permit, provided the trailer is fitted with steerable rear axles or dollies.

For the candidate turbines of this study, the blades will need to be transported individually (see example in **Figure 2.2** and **Figure 2.3**). At present, there are no suitable abnormal load trucks available within South Africa to transport such large blades and suitable trucks will therefore need to be sourced from overseas and shipped to South Africa.

Figure 2-2: Example -Transport of Blades on extendible trailers

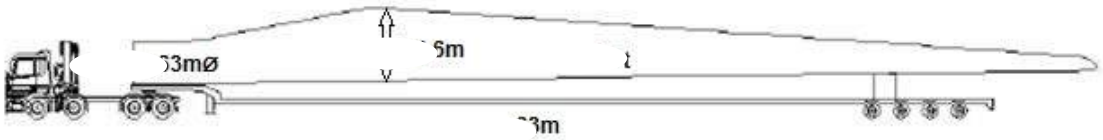

Figure 2-3: Example of Blade Transport

Due to the abnormal length, special attention needs to be given to the route planning, especially to suitable turning radii and adequate sweep clearance. Vegetation or/and road signage may have to be removed before transportation commences. Once transported to site, the blades need to be carefully stored at the respective laydown area before being installed onto the rotary hub.

2.3.6.3 Tower Sections

Steel towers generally consist of 20m long sections, the number of sections being dependent on the selected hub height. A hub height of 200 metres would therefore consist of approximately ten (10) tower sections. Each section is transported separately to site on a low-bed trailer. Depending on the trailer configuration and height when loaded, some of these components may not meet the dimensional limitations (height and width) but will be permitted under certain permit conditions.

Figure 2-4: Example – Transportation of Tower Sections

2.3.6.4 Turbine Hub and Rotary Units

These components need to be transported separately, due to their significant weights – a hub unit weighs between 45 and 60 tons and the rotary unit weighs over 90 tons.

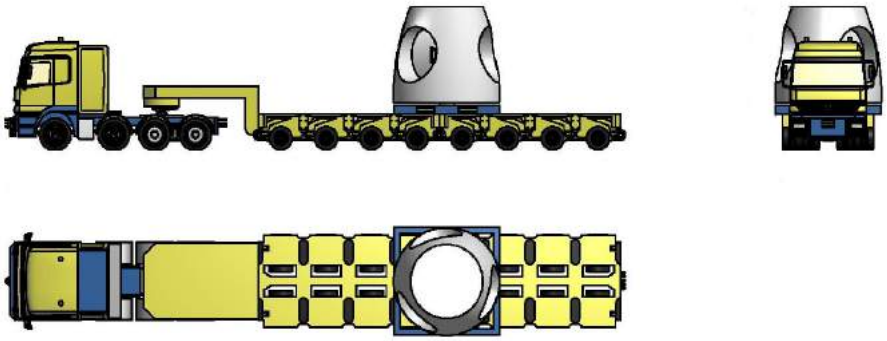

Figure 2-5: Transporting the Hub and Rotary Units

2.3.6.5 Transporting Cranes, Mobile Crane, and other Components

One main crane and at least one supporting crane are required per wind turbine erection, with the auxiliary crane able to change position several times during the turbine erection.

This technology has developed rapidly, and several different heavy lifting options are available on the market. Costs involved to hire cranes or import suitable cranes (if necessary) vary and should therefore be compared in advance. For this assessment, possible crane options are discussed hereafter.

2.3.6.6 Cranes for Assembly and Erection on Site

Option 1: Crawler Crane & Assembly Crane

One possible option is that the main crane performing the required lifts, i.e., lifting the tower sections into position, lifting the nacelle to the hub height, and lifting the rotor and blades into place, needs to be similar to the Liebherr Crawler Crane LR1750 with a SL8HS (Main Boom and Auxiliary Jib) configuration. A smaller 200-ton Liebherr Mobile Crane LTM 1200- 5.1 is also required to lift the components and assist in the assembly of the crawler crane at each turbine location.

- *Crawler Crane LR1750 with the SL8HS boom system (Main Lifting Crane):*

The Crawler Crane will be transported to site in sections and the heaviest load will be the superstructure and crawler centre section (83 tons). The gross combination mass (truck, trailer, and load) will be approximately 133 000 kg. The boom sections, counterweights and other equipment will be transported on conventional tri-axle trailers and assembled on site. It will require a number of truckloads of components to be delivered for assembly of the Crawler Crane before it can be mobilised to perform the heavy lifts.

- *Mobile Crane LTM 1200-5.1 (Assembly Crane):*

The Liebherr LTM 1200-5.1 crane is a 5-axle vehicle with rubber tyres, which will travel to site on its own. However, the counterweights will be transported on conventional tri-axle trailers and then assembled on site. The assembly crane is required to assemble the main lift crane as well as assist in the installation of the wind turbine components.

Option 2: GTK 1100 Crane & Assembly Crane

The GTK 1100 hydraulic crane was used for the assembly of the single wind turbine at Coega (see example in picture below). The GTK 1100 was designed to lift ultra-heavy loads to extreme heights.

Figure 2-6: Example - Cranes at work

• *Mobile Crane LTM 1200-5.1 (Assembly Crane):*
A smaller 200-ton Liebherr Mobile Crane LTM 1200-5.1 is also required to lift the components and assist in the assembly of the hydraulic crane at each turbine location.

2.3.6.7 Cranes at Port of Entry

Most shipping vessels importing the turbine components will be equipped with on-board cranes for safe off-loading of wind turbine components to the abnormal load transport vehicles, parked adjacent to the shipping vessels.

Figure 2-7: Example - Cranes at Port of Entry

The imported turbine components may be transported from the Port of Entry to the nearby turbine laydown area. Mobile cranes will be required at these turbine laydown areas to position the respective components at their temporary storage location.

2.3.6.8 Transporting Other Plant, Material and Equipment

In addition to transporting the specialised lifting equipment, the normal civil engineering construction materials, plant, and equipment will need to be brought to the site (e.g., sand, stone, cement, concrete batching plant, gravel for road building purposes, excavators, trucks, graders, compaction equipment, cement mixers, transformers in the sub-station, cabling, transmission pylons etc.). Other components, such as electrical cables, pylons, and substation transformers, will also be transported to site during construction. The transportation of these items will generally be undertaken with normal heavy load vehicles.

3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1 Description of the site

The proposed Ummbila Emoyeni Renewable Wind Energy Facility will be located approximately 6km southeast of Bethal in the Mpumalanga Province, as shown in **Figure 3-1**. The proposed site is bounded by the N17 to the north, the R39 to the east and south and the R35 to the west.

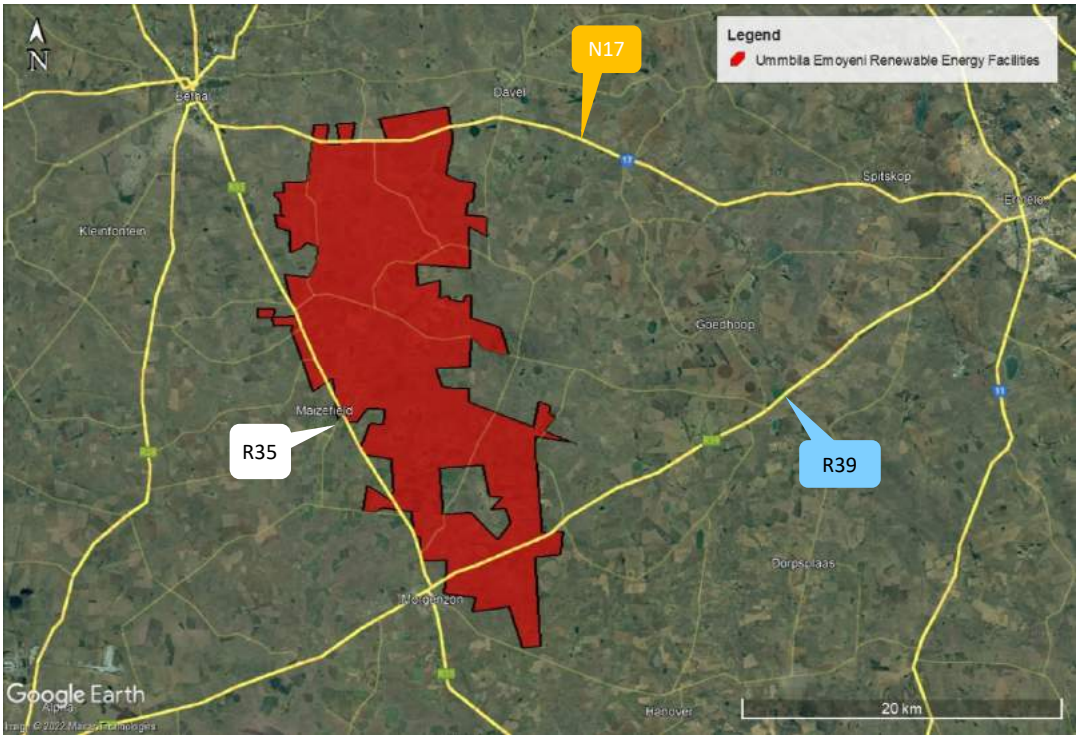

Figure 3-1: Aerial View of the proposed Ummbila Emoyeni Renewable Energy Facility

A preferred project focus area with an extent of 27 819ha been identified by Emoyeni Renewable Energy Farm (Pty) Ltd as a technically suitable area for the development of the Ummbila Emoyeni Renewable Wind Energy Farm with a contracted capacity of up to 666MW. The proposed solar facility of 150MW has been addressed in a separate transport report.

The project site comprises the following farm portions:

Table 3-1: Farm Portions comprising the project site

Parent Farm Number	Farm Portions
Farm 261 – Naudesfontein	15, 21
Farm 264 – Geluksplaats	0, 1, 3, 4, 5, 6, 8, 9, 11, 12
Farm 268 – Brak Fontein Settlement	6,7,10,11,12
Farm 420 – Rietfontein	8,9,10,11,12,15,16,18,19,22,32
Farm 421 - Sukkelaar	2, 2, 7, 9, 9 10, 10 11, 11 12, 12 22 ,25, 34, 35, 36, 37, 37, 38, 39, 40, 42, 42

Farm 422 – Klipfontein	0, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23
Farm 423 – Bekkerust	0, 1, 2, 4, 5, 6, 10, 11, 12, 13 14, 15, 17, 19, 20, 22, 23, 2425
Farm 452 – Brakfontein	5
Farm 454 – Oshoek	4, 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, 7, 22, 23, 23
Farm 458 – Goedgedacht	0, 2, 4, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 21, 22, 25, 26, 27, 28, 29, 31, 32, 33, 34, 35, 37, 39
Farm 467 – Twee Fontein	0, 1, 4, 5, 6, 7, 8, 10
Farm 469 – Klipkraal	5, 6, 7, 8
Farm 548 – Durabel	0

The wind farm is proposed to accommodate the following infrastructure:

- Up to 111 wind turbines with a maximum hub height of up to 200m. The tip height of the turbines will be up to 300m.
- 33kV cabling to connect the wind turbines to the onsite collector substations, to be laid underground where practical.
- 3 x 33kV/132kV onsite collector substation (IPP Portion), each being 5ha.
- Battery Energy Storage System (BESS).
- Cabling between turbines, to be laid underground where practical.
- Construction compounds including site office (approximately 300m x 300m in total but split into 3ha each of 150m x 200m):
  - Batching plant of up to 4ha to 7ha.
  - 3 x O&M office of approximately 1.5ha each adjacent to each collector SS.
  - 3 x construction compound / laydown area, including site office of 3ha each (150m x 200m each).
- Laydown and crane hardstand areas (approximately 75m x 120m).
- Access roads of 12 -13m wide, with 12m at turning circles.

The grid connection infrastructure will include a 400/132kV Main Transmission Substation (MTS), to be located between 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); and 132kV power lines from the switching stations at each renewable energy facility to the new 400/132kV MTS. The grid connection infrastructure will be assessed as part of a separate Environmental Impact Assessment process in support of an application for Environmental Authorisation.

It is anticipated that the power generated by the project will be bid into the Department of Mineral Resources and Energy's (DMRE's) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme and/or into private off take opportunities.

An aerial view of the proposed turbine locations and internal roads to the turbines is shown in **Figure 3-2**.

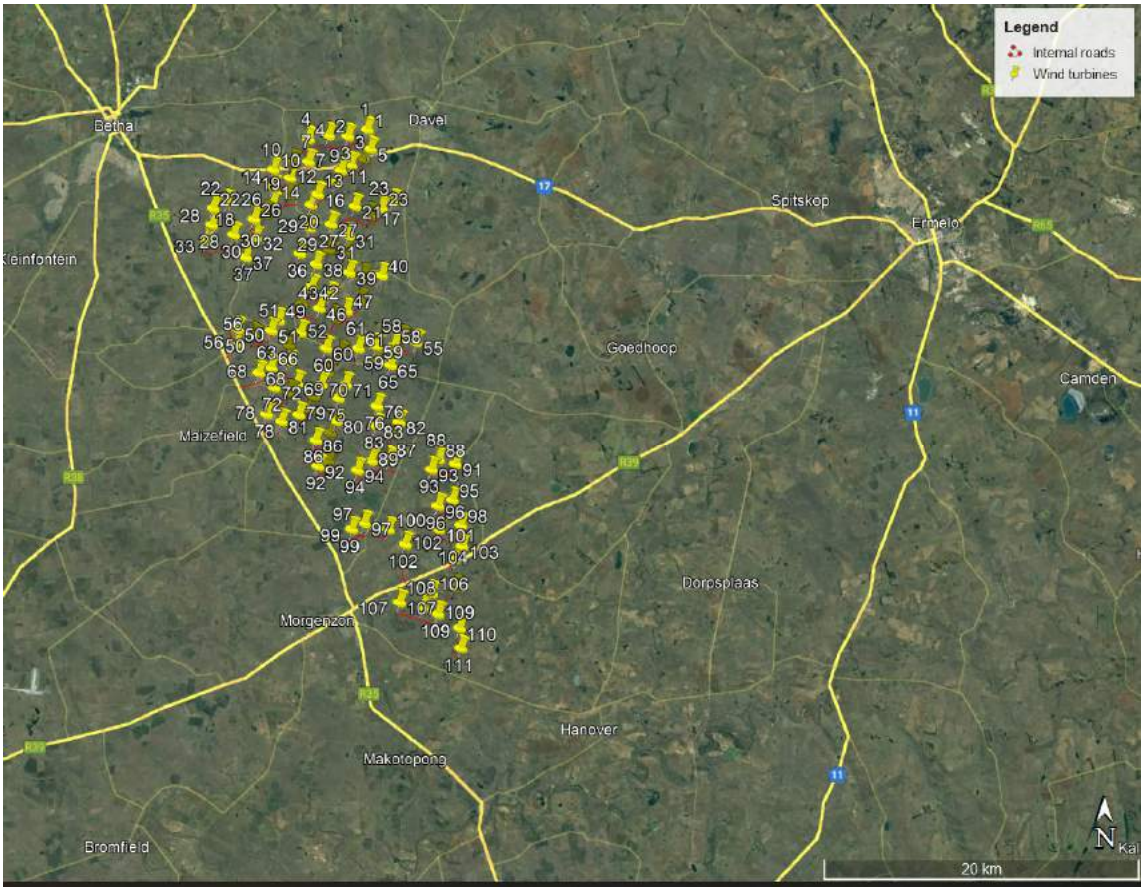

Figure 3-2: Aerial View of Turbines

3.2 National Route to Site for Imported Components

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 Port of Richard's Bay is located approximately 460km travel distance from the proposed site whilst the Port of East London and Ngqura is respectively located approximately 1130km and 1200km travel distance from the proposed site. The Port of Richard's Bay is the preferred port of entry, however, the Ports of East London and Ngqura can be used as alternatives should the Port of Richard's Bay not be available.

The preferred route from the Port of Richard's Bay is shown in yellow in **Figure 3-3** below. The route is approximately 460km and follows the N2 north, passing through Pongola and

Piet Retief before turning off on to the N17 in Ermelo that leads to an unnumbered gravel road towards the proposed site.

The alternative route from the Port of East London, shown in green in **Figure 3-3**, will follow the N6 north-west to Bloemfontein before taking the N1 north-east to Johannesburg. Vehicles will head east on the N12 and N17, passing through Bethal before turning off onto an unnumbered gravel road that leads to the proposed site.

The Port of Ngqura can also be considered as an alternative and the route is shown in blue in **Figure 3-3**. The route is approximately 1200km long and follows the N10 north up to Cradock before taking the R390 further north, passing through the town of Steynsburg and turning onto the N1 at Gariep. The route will continue north-east along the N1, through Bloemfontein, up to Johannesburg. Vehicles will head east on the N12 and N17, passing through Bethal before turning off onto an unnumbered gravel road that leads to the proposed site.

It should be noted that, although shorter routes exist, travel on national routes are proposed as the condition of some of the roads on the shorter routes are poor and not deemed suitable for hauling with heavy vehicles. There are also a number of toll plazas located on the national routes, but alternative roads can be considered in order to bypass these toll roads. This can however only be done at a later stage when more information is available regarding the type of heavy/abnormal vehicles, number of trips, etc.

Figure 3-3: Preferred and Alternative Routes

It is critical to ensure that the abnormal load vehicle will be able to move safely and without obstruction along the preferred route. The preferred route should be surveyed prior to construction to identify any problem areas, e.g., intersections with limited turning radii and sections of the road with sharp horizontal curves or steep gradients, which may 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 components, to ensure that the delivery will occur without disruptions.

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.

3.3 Proposed main access road and access points to the Proposed Development

The proposed site is bounded by the N17 in the north, the R39 in the south and the east and the R35 in the west, as shown in **Figure 3-4**.. Access to the proposed site can be obtained from any of these three roads, depending on the traffic volumes of each road. The road carrying the least traffic will be considered as the best option. However, the N17 is a toll route and should be avoided as main access if other alternatives exist along either the R39 or the R35.

There is also an existing network of unnumbered gravel roads that might be suitable as a main access road to the proposed site as shown in pink and blue in **Figure 3-4**. Once the site layout and project capacity has been reduced as a result of the environmental constraints identified during the EIA and Scoping process, the options for a main access road and assess points can be further investigated.

The proposed main access road should link to the site access road, and possible access points are shown in **Figure 3-5.**

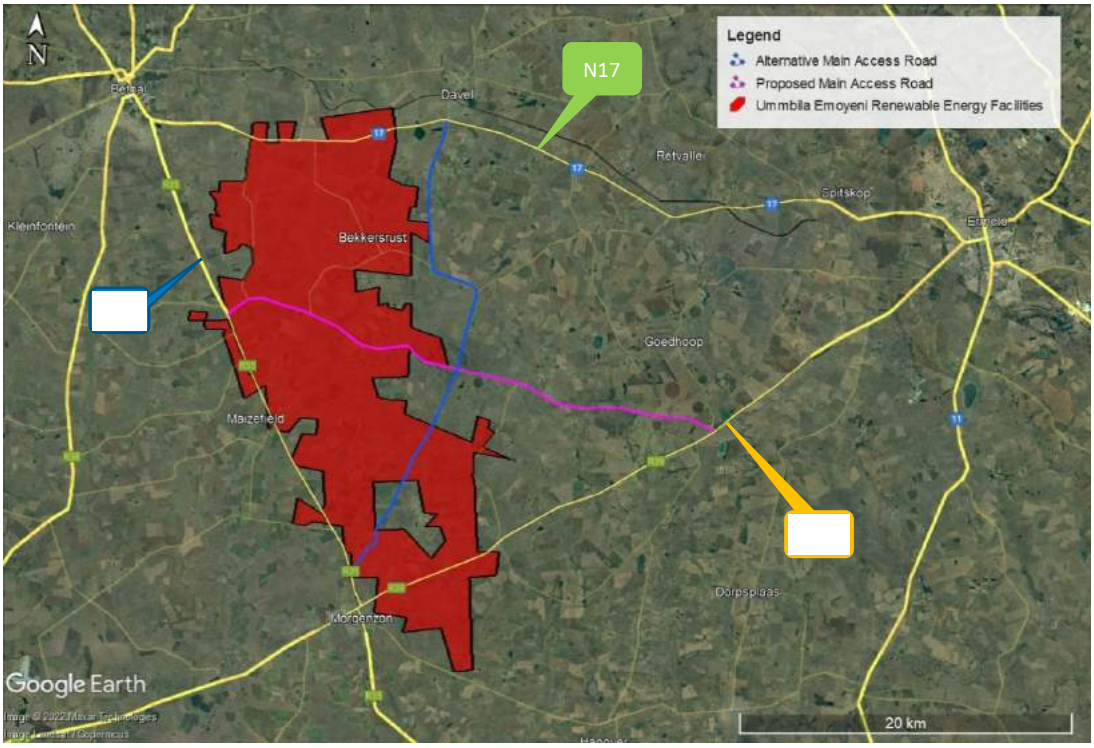

Figure 3-4: Proposed Main Access Roads and alternatives

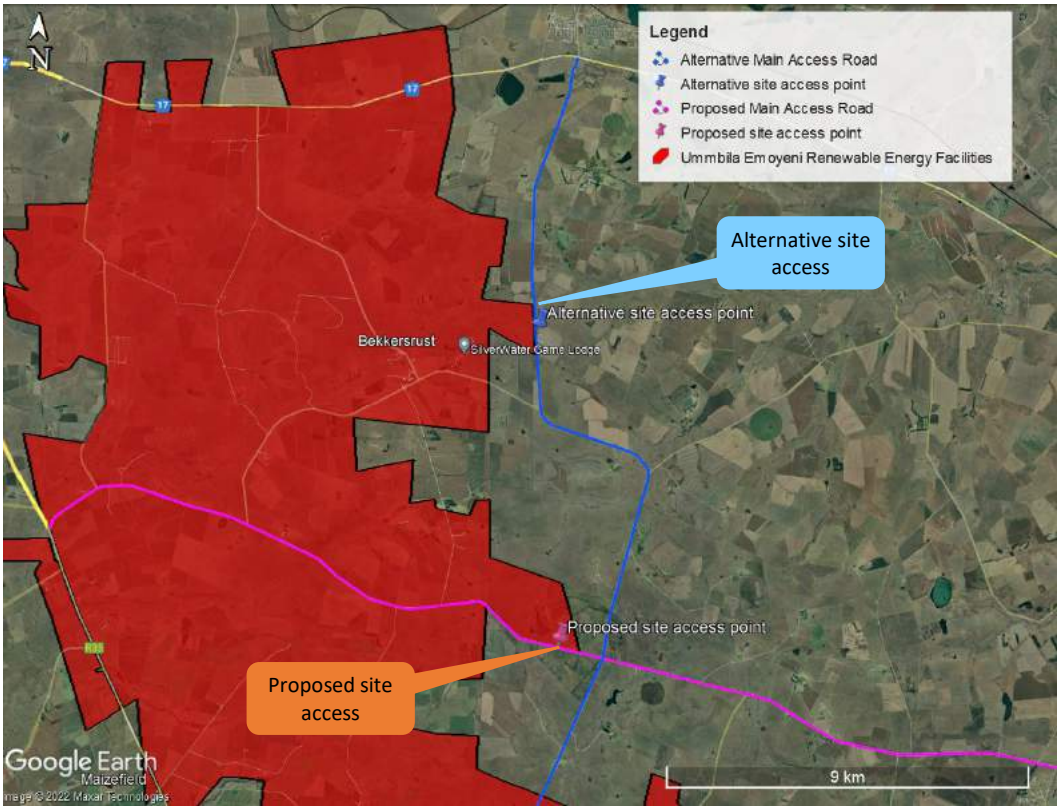

Figure 3-5: Proposed site access points

Other alternative site access roads and points can be investigated at a later stage once the project area has been more clearly defined. All options should, however, conform to the requirements of access spacing and sufficient shoulder sight distances at these locations.

3.4 Main Route for the Transportation of Materials, Plant and People to the proposed site

The nearest towns in relation to the proposed development site are Standerton, Secunda, Bethal and Kriel. It is envisaged that most materials, water, plant, services, and people can be procured within an 60km radius of the proposed facility. However, this would be informed by the REIPPPP requirements. The nearest city, Johannesburg, is located approximately 180km from the proposed development site.

Concrete batch plants and quarries in the vicinity could be contracted to supply materials and concrete during the construction phase, which would reduce the impact on traffic on the surrounding road network. Alternatively, mobile concrete batch plants and temporary construction material stockpile yards could be commissioned on vacant land near the proposed site. Delivery of materials to the mobile batch plant and the stockpile yard could be staggered to minimise traffic disruptions.

4 APPLICABLE LEGISLATION AND PERMIT REQUIREMENTS

Key legal requirements pertaining to the transport requirements for the proposed development are:

- Abnormal load permits, (Section 81 of the National Road Traffic Act)
- Port permit (Guidelines for Agreements, Licenses and Permits in terms of the National Ports Act No. 12 of 2005), and
- Authorisation from Road Authorities to modify the road reserve to accommodate turning movements of abnormal loads at intersections.

5 IDENTIFICATION OF KEY ISSUES

5.1 Identification of Potential Impacts

The potential transport related impacts are described below.

5.1.1 Construction Phase

Potential impact

- Construction related traffic
- The construction traffic would also lead to noise and dust pollution.
- This phase also includes the construction of roads, excavations, trenching for electrical cables and other ancillary construction works that will temporarily generate the most traffic.

5.1.2 Operational Phase

During operation, it is expected that staff and security will periodically visit the facility. It is assumed that approximately 30 full-time employees will be stationed on the site. The traffic generated during this phase will be minimal and will not have an impact on the surrounding road network.

5.1.3 Cumulative Impacts

- Traffic congestion/delays on the surrounding road network.
- Noise and dust pollution

6 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

6.1 Potential Impact (Construction Phase)

Nature of the impact

- Potential traffic congestion and delays on the surrounding road network and associated noise, dust, and exhaust pollution.

Significance of impact without mitigation measures

- Traffic generated by the construction of the facility will have a significant impact on the surrounding road network. The exact number of trips generated during construction will be determined by the contractor and the haulage company transporting the components to site, the staff requirements and where equipment is sourced from.

It is expected that the delivery of the components to the site during the construction phase will not result in a significant increase in traffic.

For the transportation of the turbines to the proposed site, it was assumed that the turbine blades will be transported to site individually. 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.

As a general assumption, for each wind turbine three (3) abnormal loads will be required for the blades, nine (9) abnormal loads for the tower sections and one (1) abnormal load for the nacelle. All further components can be transported with normal limitation haulage vehicles. With approximately thirteen (13) abnormal loads trips (3 trips for blades, 9 trips for tower sections and 1 trip for the nacelle), the total trips to deliver the components of 111 turbines to the proposed site will be around 1 443 trips (13 trips x 111 turbines). This would amount to 2.73 vehicle trips per day (1 443 trips / 24 months / 22 working days per month) for a construction period of 24 months. Should the turbines be delivered during an 18-month period, the vehicle trips would amount to 3.64 vehicle trips per day.

Several normal haulage vehicles will be required to transport materials, equipment, plant, and staff to the site. The construction of roads and concrete footings will also have an impact on the surrounding road network as vehicles deliver materials to the site. A concrete footing (approximately 600 m^3) adds around 100 trips by concrete trucks to the surrounding road network. It is therefore advised to have concrete batching plants on site or in close vicinity to reduce trips.

The significance of the transport impact without mitigation measures during the construction and decommissioning phases can be rated as medium to high. However, considering that this is temporary and short term in nature, the impact can be mitigated to an acceptable level of low to medium significance.

- *Proposed mitigation measures*
    - The delivery of wind turbine components to the site must be staggered and trips must be scheduled to occur outside of peak traffic periods.
    - Dust suppression of gravel roads during the construction and decommissioning phases, as required.

- Regular maintenance of gravel roads by the Contractor during the construction and decommissioning phases.
- The use of mobile batching plants and quarries near the site would decrease the impact on the surrounding road network.
- Staff and general trips should occur outside of peak traffic periods as far as possible.
- 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.
- 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 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.
- Design and maintenance of internal roads. 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.

- *Significance of impact with mitigation measures*
  The proposed mitigation measures for the construction traffic will result in a minor reduction of the impact on the surrounding road network, but the impact on the local traffic will remain low as the existing traffic volumes are deemed to be low. The dust suppression, however, significantly reduces the impact.

6.2 Potential Impact (Operational Phase)

The operational phase will not generate any significant traffic volumes. During operation, it is expected that maintenance and security staff will periodically visit the facility. It is assumed that approximately 30 full-time employees will be stationed on site (subject to change). Based on experience with similar projects, the number of full-time employees is generally low and consequently, the associated trips are negligible. The traffic generated during this phase will be minimal and will not have an impact on the surrounding road network.

6.3 Potential Impact (Decommissioning Phase)

The decommissioning phase will result in the same impact as the construction phase as similar trips are expected. The potential traffic impact will be of medium significance before mitigation measures during the construction and decommissioning phases. However,

considering that this is temporary and short term in nature, the impact can be mitigated to an acceptable level of low significance.

7 NO-GO ALTERNATIVE

The no-go alternative implies that the proposed development of the Ummbila Renewable Wind Energy Facility does not proceed. This would mean that there will be no negative environmental impacts and no traffic impact on the surrounding network during the construction and decommissioning phases of the facility. However, this would also mean that there would be no socio-economic benefits to the surrounding communities, and it will not assist government in meeting its' targets for renewable energy. **Hence, the no-go alternative is not a preferred alternative.**

8 IMPACT ASSESSMENT SUMMARY

The assessment of impacts and recommendation of mitigation measures as discussed above are collated in the tables below. The assessment methodology is attached as **Annexure C.**

8.1 Construction Phase

Table 8-1: Impact Rating - Construction Phase – Traffic Congestion

Nature: **Traffic congestion during the construction phase**			
Impact description: The impact will occur due to added pressure on the road network due to the increase in traffic associated with the transport of equipment, material, and staff to site during the construction phase. Traffic congestion possible along the N17, R39 and R35, depending on the main access route selected.			
	Rating	**Motivation**	**Significance**
Prior to Mitigation			
Duration	Short-term (2)	The construction period will last between 1 – 2 years.	**Medium Negative (40)**
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Moderate (6)	The increase in traffic will have a moderate impact on traffic operations.	
Probability	Highly Probable (4)	The possibility of the impact on the traffic operations is highly probable.	
Mitigation/Enhancement Measures			
Mitigation: • Stagger component delivery to site • Reduce the construction period • The use of mobile batch plants and quarries in close proximity to the site • Staff and general trips should occur outside of peak traffic periods. • Regular maintenance of gravel roads by the Contractor during the construction phase and by Client/Facility Manager during operation phase. • It its recommended to avoid staggered intersections on the main access road. Intersections should rather be consolidated or realigned as far as possible.			
Post Mitigation/Enhancement Measures			
Duration	Short-term (2)	The construction period will last between 1 – 2 years.	**Low Negative (18)**
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Low (2)	The increase in traffic will have a low impact on traffic operations.	
Probability	Probable (3)	The possibility of the impact on the traffic operations is probable.	
Cumulative impacts: The duration of the construction phase is short term (i.e., the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network). Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.			
Residual Risks: Traffic will return to normal levels after construction is completed.			

9 CUMULATIVE IMPACTS

To assess the cumulative impact, it was assumed that all renewable energy projects within 50km currently proposed and authorized, would be constructed at the same time. This is the precautionary approach as in reality; these projects would be subject to a highly competitive bidding process. Only a handful of projects would be selected to enter into a power purchase agreement with Eskom, and construction is likely to be staggered depending on project-specific issues.

The construction and decommissioning phases are the only significant traffic generators for renewable energy projects. The duration of these phases is short term (i.e., the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network). Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.

The assessments of cumulative impacts are collated in the table below.

Table 9-1: Cumulative Impact rating

Nature: *Traffic generated by the proposed development and the associated noise and dust pollution.* Traffic congestion and associated noise and dust pollution possible along the N17, R35, R39 and the existing gravel road network, depending on the main access route selected.		
	Overall impact of the proposed project considered in isolation (Post mitigation)	**Cumulative impact of the project and other projects in the area**
Extent	medium (2)	High (5)
Duration	Short term (2)	medium term (3)
Magnitude	minor (2)	High (8)
Probability	Probable (3)	Improbable (2)
Significance	**Low (18)**	**Medium (32)**
Status (positive/negative)	Negative	Negative
Reversibility	High	High
Loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Confidence in findings: High.		
Mitigation: • *Stagger component delivery to site* • *Dust suppression* • *Reduce the construction period* • *The use of mobile batch plants and quarries in close proximity to the site* • *Staff and general trips should occur outside of peak traffic periods*		
Description of expected significance of impact The significance of the transport impact can be rated as high. *The increase in traffic cannot be completely mitigated but mitigation measures will significantly reduce the impact. Noise and dust pollution is limited to the construction and decommissioning periods.* *It should be noted that even if all the facilities are constructed and decommissioned at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.*		

10 ENVIRONMENTAL MANAGEMENT PROGRAM INPUTS

OBJECTIVE: It is recommended that dust suppression and maintenance of gravel roads form part of the EMPr. This would be required during the Construction phase where an increase in vehicle trips can be expected. No traffic related mitigation measures are envisaged during the operational phase due to the negligible traffic volume generated during this phase.

Project component/s	Construction Phase traffic
Potential Impact	Dust and noise pollution due to increase in traffic volume
Activity/risk source	Transportation of material, components, equipment, and staff to site
Mitigation: Target/Objective	Minimize impacts on road network and surrounding communities

Mitigation: Action/control	Responsibility	Timeframe
• Stagger component delivery to site • The use of mobile batch plants and quarries near the site would decrease the impact on the surrounding road network • Dust suppression • Reduce the construction period as far as possible • Maintenance of gravel roads • Apply for abnormal load permits prior to commencement of delivery via abnormal loads • Assess the preferred route and undertake a 'dry run' to test • Staff and general trips should occur outside of peak traffic periods as far as possible. • Any low hanging overhead lines (lower than 5.1m) e.g., Eskom and Telkom lines, along the proposed routes will have to be moved to accommodate the abnormal load vehicles, if required	• Holder of the EA	• Before construction commences and regularly during construction phase

Performance Indicator	Staggering or reducing the construction trips will reduce the impact of dust and noise pollution.
Monitoring	• Regular monitoring of road surface quality. • Monitoring congestion levels (increase in vehicle trips) • Apply for required permits prior to commencement of construction

11 CONCLUSION AND RECOMMENDATIONS

This scoping report addressed key issues and alternatives to be considered for the proposed Ummbila Emoyeni Wind Energy Facility:

- The preferred Port of Entry for imported components is the Port of Richard's Bay.
- Several access points are feasible for this project, which have been discussed in this report.
- Alternative route should be determined where needed to avoid toll routes where abnormal and heavy vehicles cannot be accommodated, or to avoid excessive toll costs.
- It needs to be ensured that the gravel sections of the haulage routes remain in good condition and will hence need to be maintained during the additional loading of the construction phase and then reinstated after construction is completed. The gravel roads will require grading with a grader to obtain a flat even surface and the geometric design of these gravel roads needs to be confirmed at detailed design stage.
- The construction phase traffic, although significant, will be temporary and can be mitigated to an acceptable level.
- During operation, it is expected that staff and security will periodically visit the facility. It is assumed that approximately 30 full-time employees will be stationed on the site. The traffic generated during this phase will be minimal and will not have an impact on the surrounding road network.
- The construction and decommissioning phases of the development is the only significant traffic generator and therefore noise and dust pollution will be higher during this phase. The duration of this phase is short term i.e., the impact of the traffic on the surrounding road network is temporary and wind energy facilities, when operational, do not add any significant traffic to the road network.
- The traffic generated during the construction phase, although significant, will be temporary and impacts are considered to be negative and of medium significance before and of low significance after mitigation.

The potential mitigation measures mentioned in the construction and decommissioning phases are:

- Dust suppression
- Component delivery to/ removal from the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.
- The use of mobile batching plants and quarries near the site would decrease the impact on the surrounding road network.
- Staff and general trips should occur outside of peak traffic periods.
- A "dry run" of the preferred route.
- Design and maintenance of internal roads.
- Any low hanging overhead lines (lower than 5.1m) e.g., Eskom and Telkom lines, along the proposed routes will have to be moved or raised to accommodate the abnormal load vehicles.

The construction and decommissioning phases of a wind farm are the only significant traffic generators and therefore noise, dust and exhaust pollution will be higher during these phases. The duration of these phases is short term i.e., the impact of the Wind Farm on traffic on the surrounding road network is temporary.

The access point to the proposed site has been assessed and was found to be acceptable from a transport perspective.

The development is supported from a transport perspective provided that the recommendations and mitigations contained in this report are adhered to.

12 REFERENCES

- Google Earth Pro
- SANS 10280/NRS 041-1:2008 - Overhead Power Lines for Conditions Prevailing in South Africa
- Road Traffic Act (Act No. 93 of 1996)
- National Road Traffic Regulations, 2000
- The Technical Recommendations for Highways (TRH 11): “Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads

Annexure A – SPECIALIST EXPERTISE

IRIS SIGRID WINK

Profession	Civil Engineer (Traffic & Transportation)
Position in Firm	Associate
Area of Specialisation	Manager: Traffic & Transportation Engineering
Qualifications	PrEng, MSc Eng (Civil & Transportation)
Years of Experience	20 Years
Years with Firm	10 Years

SUMMARY OF EXPERIENCE

Iris is a Professional Engineer registered with ECSA (20110156). She joined JG Afrika (Pty) Ltd. in 2012. Iris obtained a Master of Science degree in Civil Engineering in Germany and has more than 19 years of experience in a wide field of traffic and transport engineering projects. Iris left Germany in 2003 and has worked as a traffic and transport engineer in South Africa and Germany. She has technical and professional skills in traffic impact studies, public transport planning, non- motorised transport planning and design, design and development of transport systems, project planning and implementation for residential, commercial, and industrial projects and providing conceptual designs for the abovementioned. She has also been involved with transport assessments for renewable energy projects and traffic safety audits.

Iris is registered with the International Road Federation as a Global Road Safety Audit Team Leader.

PROFESSIONAL REGISTRATIONS & INSTITUTE MEMBERSHIPS

PrEng - Registered with the Engineering Council of South Africa No. 20110156
Registered Mentor with ECSA for the Cape Town Office of JG Afrika
MSAICE - Member of the South African Institution of Civil Engineers
ITSSA - Member of ITS SA (Intelligent Transport Systems South Africa)
SAWEA - Member of the South African Wind Energy Association
SARF - South African Road Federation: Committee Member of Council
SARF WR - South African Road Federation Western Region Committee Member
SARF RSC - South African Road Federation National Road Safety Committee
IRF - Global Road Safety Audit Team Leader

EDUCATION

1996 - Matric – Matric (Abitur) – Carl Friedrich Gauss Schule, Hemmingen, Germany
1998 - Diploma as Draughtsperson – Lower Saxonian State Office for Road and Bridge Engineering
2003 - MSc Eng (Civil and Transportation) – Leibniz Technical University of Hanover, Germany

SPECIFIC EXPERIENCE (Selection)

JG Afrika (Pty) Ltd (Previously Jeffares & Green (Pty) Ltd)
2016 – Date
Position – Associate

- **Transport Impact Assessments and Management Plan** - Euronotus Wind&Solar Energy Cluster in the Western Cape, Client: WSP on behalf of G7 Energies
- **Transport Impact Assessment for De Aar Solarfarm** - Client: Mulilo
- **Transport Impact Assessments for the Mpumalanga Windfarms** - Client: Enertrag
- **Transport Impact Assessment for the Hyperion Thermal Plant** - Client: Red Rocket
- **Transport Impact Assessment for the Richards Bay Gas to Power Facility** - Client: Savannah
- **Transport Impact Assessment for the Pienaarspoort Wind Energy Facility** - Client: Savannah
- **Transport Impact Assessment for Oya Black Mountain Solar Farm** - Client: G7 Energies
- **Traffic Impact Assessment for the Nooiensfontein Housing Development** - Client: City of Cape Town
- **Kudusberg Windfarm** – Transport study for the proposed Kudusberg Windfarm near Sutherland, Northern Cape – Client: G7 Renewable Energies
- **Kuruman Windfarm –** Transport study for the proposed Kuruman Windfarm in Kuruman, Northern Cape – Client: Mulilo Renewable Project Developments
- **Coega West Windfarm** – Transportation and Traffic Management Plan for the proposed Coega Windfarm in Coega, Port Elizabeth – Client: Electrawinds Coega
- **Traffic and Parking Audits** for the Suburb of Groenvallei in Cape Town – Client: City of Cape Town Department of Property Management.
- **Road Safety Audit** for the Upgrade of N1 Section 4 Monument River – Client: Aurecon on behalf of SANRAL
- **Sonop Windfarm** – Traffic Impact Assessment for the proposed Sonop Windfarm, Coega, Port Elizabeth – Client: Founders Engineering
- **Universal Windfarm** - Traffic Impact Assessment for the proposed Universal Windfarm, Coega, Port Elizabeth – Client: Founders Engineering
- **Road Safety Audit** for the Upgrade of N2 Section 8 Knysna to Wittedrift – Client: SMEC on behalf of SANRAL
- **Road Safety Audit** for the Upgrade of N1 Section 16 Zandkraal to Winburg South – Client: SMEC on behalf of SANRAL
- **Traffic and Road Safety Studies** for the Improvement of N7 Section 2 and Section 3 (Rooidraai and Piekenierskloof Pass) – Client: SANRAL
- **Road Safety Appraisal**s for Northern Region of Cape Town – Client: Aurecon on behalf of City of Cape Town (TCT)
- **Traffic Engineering Services** for the Enkanini Informal Settlement, Kayamandi - Client: Stellenbosch Municipality
- **Lead Traffic Engineer** for the Upgrade of a 150km Section of the National Route N2 from Kangela to Pongola in KwaZulu-Natal, Client: SANRAL
- **Traffic Engineering Services** for the Kosovo Informal Settlement (which is part of the Southern Corridor Upgrade Programme), Client: Western Cape Government

- **Traffic and Road Safety Studies** for the proposed Kosovo Informal Housing Development (part of the Southern Corridor Upgrade Program), Client: Western Cape Government.
- **Road Safety Audit** Stage 3 – Upgrade of the R573 Section 2 between Mpumalanga/Gauteng and Mpumalanga/Limpopo, Client: AECOM on behalf of SANRAL
- **Road Safety Audit** Stage 1 and 3 – Upgrade of the N2 Section 5 between Lizmore and Heidelberg, Client: Aurecon on behalf of SANRAL
- **Traffic Safety Studies** for Roads Upgrades in Cofimvaba, Eastern Cape – Client: Cofimvaba Municipality
- **Road Safety Audit** Stage 1 and 3 – Improvement of Intersections between Olifantshoek and Kathu, Northern Cape, Client: Nadeson/Gibb on behalf of SANRAL
- **Road Safety Audit** Stage 3 – Upgrade of the Beacon Way Intersection on the N2 at Plettenberg Bay, Client: AECOM on behalf of SANRAL
- **Traffic Impact Assessment** for a proposed Primary School at Die Bos in Strand, Somerset West, Client: Edifice Consulting Engineers
- **Road Safety Audit** Stage 1 and 3 – Improvement of R75 between Port Elizabeth and Uitenhage, Eastern Cape, Client: SMEC on behalf of SANRAL

Annexure B – ASSESSMENT METHODOLOGY

Assessment of Impacts

Direct, indirect, and cumulative impacts of the issues identified through the scoping study, as well as all other issues identified in the EIA phase must be assessed in terms of the following criteria:

» The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
» The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
» The **duration**, wherein it will be indicated whether:
  - the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  - medium-term (5–15 years) – assigned a score of 3;
  - long term (> 15 years) - assigned a score of 4; or
  - permanent - assigned a score of 5;
» The **magnitude**, quantified on a scale from0-10, where a score is assigned:
  - 0 is small and will have no effect on the environment
  - 2 is minor and will not result in an impact on processes
  - 4 is low and will cause a slight impact on processes
  - 6 is moderate and will result in processes continuing but in a modified way
  - 8 is high (processes are altered to the extent that they temporarily cease)
  - 10 is very high and results in complete destruction of patterns and permanent cessation of processes
» The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring.
  Probability will be estimated on a scale of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
» The **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium, or high; and
» The **status**, which will be described as either positive, negative, or neutral.
» The degree to which the impact can be reversed.
» The degree to which the impact may cause irreplaceable loss of resources.
» The *degree* to which the impact can be *mitigated.*

The **significance** is calculated by combining the criteria in the following formula:
S=(E+D+M)P
S = Significance weighting
E = Extent
D = Duration
M =Magnitude
P = Probability

The **significance weightings** for each potential impact are as follows:

- < 30 points: Low (i.e., where this impact would not have a direct influence on the decision to develop in the area),
- 30-60 points: Medium (i.e., where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- > 60 points: High (i.e., where the impact must have an influence on the decision process to develop in the area).

APPENDIX G:
STORMWATER AND EROSION MANAGEMENT PLAN

STORMWATER AND EROSION MANAGEMENT PLAN

1. PURPOSE

By taking greater cognisance of natural hydrological patterns and processes it is possible to develop storm water management systems in a manner that reduces potentially negative impacts and mimics nature. The main risks associated with inappropriate storm water management are increased erosion risk and risks associated with flooding. Therefore, this Storm water Management Plan and the Erosion Management Plan are closely linked to one another and should be managed together.

This Storm water Management Plan addresses the management of storm water runoff from the development site and significant impacts relating to resultant impacts such as soil erosion and downstream sedimentation. The main factors influencing the planning of storm water management measures and infrastructure are:

» Topography and slope gradients;
» Placing of infrastructure and infrastructure design;
» Annual average rainfall; and
» Rainfall intensities.

The objective of the plan is therefore to provide measures to address runoff from disturbed portions of the site, such that they:

» Do not result in concentrated flows into natural watercourses i.e. provision should be made for temporary or permanent measures that allow for attenuation, control of velocities and capturing of sediment upstream of natural watercourses.
» Do not result in any necessity for concrete or other lining of natural watercourses to protect them from concentrated flows off the development if not necessary.
» Do not divert flows out of their natural flow pathways, thus depriving downstream watercourses of water.

This Storm water Management Plan must be updated and refined once the construction/ civil engineering plans have been finalised following detailed design.

2. RELEVANT ASPECTS OF THE SITE

The study site is located primarily (>95% of project site) within one Quaternary Drainage Region/Catchment (QDR) namely C11H QDR (Blesbokspruit River). Small portions of the project site extend into QDRs C11G and C11J, however almost all of the proposed infrastructure is restricted to the C11H QDR, with only one turbine falling within the C11J QDR. All of the above mentioned QDRs are located within the Upper Vaal Water Management Area. These QDRs are drained by numerous wetlands and watercourses with the larger drainage features being perennial, lower and upper foothill freshwater resource features. The smaller tributaries are typically non-perennial/seasonal, transitional and headwater freshwater resource features. The larger perennial freshwater resource features tend to drain in a south-western direction, whilst the smaller tributaries tend to drain perpendicular to the larger features (north-western, south-eastern).

The main drainage features within the region are the Blesbokspruit- Kwaggaslaagte- and Osspruit River. Both the Kwaggaslaagte- and Osspruit Rivers drain in south-western directions to feed into the Blessbokspruit River,

which is regarded as an important upper tributary of the Vaal River (CSIR, 2018) (Van Deventer, et al., 2018) ((DWAF), 2006).

The Blesbokspruit River, itself is located approximately 7km west of the project site, with two smaller tributaries draining some of the central portions of the project site. On the other hand, both the Kwaggaslaagte- and Osspruit Rivers, flow through the project site (Kwaggaslaagte River flows across the north-western portion of the project site, whilst the Osspruit River flows across the southern portion). These freshwater resource features themselves drain fairly small portions of the project site, with the majority of the project site being drained by small, short tributaries of these rivers. As mentioned, most of the larger freshwater resource features are lower and upper foothill features, with the lower foothill features characterised by floodplains confined on one side (V2), whilst the upper foothill features are characterised by confined valley flood plains and wetlands (V4) (Rowntree & Wadeson, 1999). The smaller tributary freshwater resource features are typically characterised by confined valley floodplains (V4) and v-shaped valleys (V6).

The proposed WEF project is located within the Highveld ecoregion (11.05 level 2 ecoregion) (Kleynhans, et al., 2005). Numerous prominent and important rivers have their sources within this region namely the; Vet, Modder, Riet, Vaal, Olifants, Steelport, Maric, Crocodiver (west), Crocodile (east) and the Great Usutu. The project site falls within the Vaal River catchment. The characteristics of the ecoregion are:

- Topography can be described as plains with a moderate to low relief, as well as various grassland vegetation types (with moist types present towards the east and drier types towards the west and south);
- Rainfall varies from low to moderately high, with an increase from west to east. Coefficient of variation of annual precipitation are moderately high in the west, decreasing to low in the east;
- Drainage density is mostly low, but medium in some areas;
- Stream frequency varies between low to medium
- Median annual simulated runoff is moderately low to moderate, and
- Mean annual temperature is hot in the west and moderate in the east.

The proposed development area is situated within the Highveld Geomorphic Province, and the North-western Highveld Sub-province (Partridge, et al., 2010) and is drained by the north-bank Vaal River tributaries. The Blesbokspruit River flow in a valley with a broad and wide cross-sectional profile and flat to medium slope so that the sediment storage surrogate descriptors for this river and its tributaries are predominantly BF (broad valley widths and flat slopes) and WM (wide valley width and medium slopes). The potential for sediment storage within these surrogate descriptors is regarded as high. Furthermore, the Bleskbokspruit River and its tributaries are mainly characterised as having concave longitudinal profiles and linear BFCs (Best Fit Curves).

In terms of wetland features, characterising the project site, numerous wetland features have been identified within NBA's 2018 National Wetland MAP 5 (157 wetland features have been mapped) (refer to Table 3 below). Furthermore, four hydrogeomorphic units have been identified within the project site namely, channelled valley-bottom wetlands, floodplain wetlands, seepage wetlands and depression wetlands. Wetlands within the project site were predominantly seepages (67% of all wetlands) and combined, covered the second largest area within the project site (648.9 ha) (Table 3 and Figure 4). Second to the seepages were the channelled valley-bottom wetlands with 39 units identified within the project site (25%). However, even though these wetlands were fewer, they collectively covered a significantly larger area (1886.3 ha). Even though only three floodplain units were identified within the project site, these three units collectively covered just a few hectares less than the seeps (612.8 ha). Nine depression wetlands were identified within the project site and only covered a combined area of 4 ha.

3. STORMWATER MANAGEMENT PRINCIPLES

In the design phase, various storm water management principles should be considered including:

- Prevent concentration of storm water flow at any point where the ground is susceptible to erosion.
- Reduce storm water flows as far as possible by the effective use of attenuating devices (such as swales, berms, and silt fences). As construction progresses, the storm water control measures are to be monitored and adjusted to ensure complete erosion and pollution control at all times.
- Silt traps must be used where there is a danger of topsoil or material stockpiles eroding and entering streams and other sensitive areas.
- Construction of gabions and other stabilisation features on steep slopes may be undertaken to prevent erosion, if deemed necessary.
- Minimise the area of exposure of bare soils to minimise the erosive forces of wind, water and all forms of traffic.
- Ensure that development does not increase the rate of storm water flow above that which the natural ground can safely accommodate at any point in the sub-catchments.
- Ensure that all storm water control works are constructed in a safe and aesthetic manner in keeping with the overall development.
- Plan and construct storm water management systems to remove contaminants before they pollute surface waters or groundwater resources.
- Contain soil erosion, whether induced by wind or water forces, by constructing protective works to trap sediment at appropriate locations. This applies particularly during construction.
- Avoid situations where natural or artificial slopes may become saturated and unstable, both during and after the construction process.
- Design and construct roads to avoid concentration of flow along and off the road. Where flow concentration is unavoidable, measures to incorporate the road into the pre-development storm water flow should not exceed the capacity of the culvert. To assist with the storm water run-off, gravel roads should typically be graded and shaped with a 2-3% cross fall back into the slope, allowing storm water to be channelled in a controlled manner towards the, natural drainage lines and to assist with any sheet flow on the site.
- Design culvert inlet structures to ensure that the capacity of the culvert does not exceed the pre-development storm water flow at that point. Provide detention storage on the road and/or upstream of the storm water culvert.
- Design outlet culvert structures to dissipate flow energy. Any unlined downstream channel must be adequately protected against soil erosion.
- Where the construction of a building causes a change in the vegetative cover of the site that might result in soil erosion, the risk of soil erosion by storm water must be minimised by the provision of appropriate artificial soil stabilisation mechanisms or re-vegetation of the area. Any inlet to a piped system should be fitted with a screen or grating to prevent debris and refuse from entering the storm water system.
- Preferably all drainage channels on site and contained within the larger area of the property (i.e. including buffer zone) should remain in the natural state so that the existing hydrology is not disturbed.

3.1. Engineering Specifications

Detailed engineering specifications for a Storm water Management Plan describing and illustrating the proposed storm water control measures must be prepared by the Civil Engineers during the detailed design phase and should be based on the underlying principles of this Storm water Management Plan. This should include erosion control measures. Requirements for project design include:

- Erosion control measures to be implemented before and during the construction period, including the final storm water control measures (post construction) must be indicated within the Final/Updated Storm water Management Plan.
- All temporary and permanent water management structures or stabilisation methods must be indicated within the Final/Updated Storm water Management Plan.
- The drainage system for the site should be designed to specifications that can adequately deal with a 1:50 year intensity rainfall event or more to ensure sufficient capacity for carrying storm water around and away from infrastructure.
- Procedures for storm water flow through a project site need to take into consideration both normal operating practice and special circumstances. Special circumstances in this case typically include severe rainfall events.
- An on-site Engineer or Environmental Officer is to be responsible for ensuring implementation of the erosion control measures on site during the construction period.
- The EPC Contractor holds ultimate responsibility for remedial action in the event that the approved storm water plan is not correctly or appropriately implemented and damage to the environment is caused.

During the construction phase, the contractor must prepare a Storm water Control Method Statement to ensure that all construction methods adopted on site do not cause, or precipitate soil erosion and shall take adequate steps to ensure that the requirements of the Storm water Management Plan are met before, during and after construction. The designated responsible person on site, must be indicated in the Storm water Control Method Statement and shall ensure that no construction work takes place before the relevant storm water control measures are in place.

An operation phase Storm water Management Plan should be designed and implemented if not already addressed by the mitigations implemented as part of construction, with a view to preventing the passage of concentrated flows off hardened surfaces and onto natural areas.

4. EROSION MANAGEMENT PRINCIPLES

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

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

These goals can be achieved by applying the management practices outlined in the following sections.

4.1. On-Site Erosion Management

Soil erosion is a frequent risk associated with developments such as the wind energy facilty on account of the vegetation clearing and disturbance associated with the construction phase of the development and

may continue occurring throughout the operation phase. Service roads and installed infrastructure will generate increased direct runoff during intense rainfall events and may exacerbate the loss of topsoil and the effects of erosion. These eroded materials may enter the nearby watercourses and may potentially impact these systems through siltation and change in chemistry and turbidity of the water. General factors to consider regarding erosion risk at the site includes the following:

- Due to the sandy nature of soils in the study area, soil loss will be greater during dry periods as it is more prone to wind erosion. Therefore, precautions to prevent erosion should be present throughout the year.
- Reduction of a stable vegetation cover and associated below-ground biomass that currently increases soil surface porosity, water infiltration rates and thus improves the soil moisture availability. Without the vegetation, the soil will be prone to extensive surface capping, leading to accelerated erosion and further loss of organic material and soil seed reserves from the local environment.
- Soil loss is related to the length of time that soils are exposed prior to rehabilitation or stabilisation. Therefore, the gap between construction activities and rehabilitation should be minimised. Phased construction and progressive rehabilitation, where practically possible, are therefore important elements of the erosion control strategy.
- The extent of disturbance will influence the risk and consequences of erosion. Therefore, site clearing should be restricted to areas required for construction purposes only. As far as possible, large areas should not be cleared all at once, especially in areas where the risk of erosion is higher.
- Roads should be planned and constructed in a manner which minimises their erosion potential. Roads should therefore follow the natural contour as far as possible. Roads parallel to the slope direction should be avoided as far as possible.
- Where necessary, new roads constructed should include water diversion structures with energy dissipation features present to slow and disperse the water into the receiving area.
- Roads used for project-related activities and other disturbed areas should be regularly monitored for erosion. Any erosion problems recorded should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.
- Runoff may have to be specifically channelled or storm water adequately controlled to prevent localised rill and gully erosion.
- Compacted areas should have adequate drainage systems to avoid pooling and surface flow. Heavy machinery should not compact those areas which are not intended to be compacted as this will result in compacted hydrophobic, water repellent soils which increase the erosion potential of the area. Where compaction does occur, the areas should be ripped.
- All bare areas should be revegetated with appropriate locally occurring species, to bind the soil and limit erosion potential.
- Silt fences should be used where there is a danger of topsoil or material stockpiles eroding and entering streams and other sensitive areas.
- Gabions and other stabilisation features must be used on steep slopes and other areas vulnerable to erosion to minimise erosion risk as far as possible.
- Activity at the site after large rainfall events when the soils are wet and erosion risk is increased should be reduced. No driving off of hardened roads should occur at any time, and particularly immediately following large rainfall events.
- Topsoil should be removed and stored in a designated area separately from subsoil and away from construction activities (as per the recommendations in the EMPr). Topsoil should be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation in cleared areas.
- Regular monitoring of the site for erosion problems during construction (on-going) and operation (at least twice annually) is recommended, particularly after large summer thunderstorms have been

experienced. The ECO will determine the frequency of monitoring based on the severity of the impacts in the erosion prone areas.

4.1.1 Erosion control mechanisms

The contractor may use the following mechanisms (whichever proves more appropriate/ effective) to combat erosion when necessary:

- Reno mattresses;
- Slope attenuation;
- Hessian material;
- Shade catch nets;
- Gabion baskets;
- Silt fences;
- Storm water channels and catch pits;
- Soil bindings;
- Geofabrics;
- Hydro-seeding and/or re-vegetating;
- Mulching over cleared areas;
- Boulders and size varied rocks; and
- Tilling.

4.2. Engineering Specifications

A detailed engineering specifications Storm water Management Plan describing and illustrating the proposed stormwater control measures must be prepared by the Civil Engineers during the detailed design phase and should be based on the underlying principles of the Storm water Management Plan and this should include erosion control measures. Requirements for project design include:

- Erosion control measures to be implemented before and during the construction period, including the final storm water control measures (post construction).
- All temporary and permanent water management structures or stabilisation methods must be indicated within the Storm water Management Plan.
- An on-site Engineer or Environmental Officer (EO)/ SHE Representative to be responsible for ensuring implementation of the erosion control measures on site during the construction period. The ECO should monitor the effectiveness of these measures on the interval agreed upon with the Site Manager and EO.
- The EPC Contractor holds ultimate responsibility for remedial action in the event that the approved Storm water Management Plan is not correctly or appropriately implemented and damage to the environment is caused.

4.3 Monitoring

The site must be monitored continuously during construction and operation in order to determine any indications of erosion. If any erosion features are recorded as a result of the activities on-site the Environmental Officer (EO)/ SHE Representative (during construction) or Environmental Manager (during operation) must:

- Assess the significance of the situation.
- Take photographs of the soil degradation.
- Determine the cause of the soil erosion.
- Inform the contractor/operator that rehabilitation must take place and that the contractor/operator is to implement a rehabilitation method statement and management plan to be approved by the Site/Environmental Manager in conjunction with the ECO.
- Monitor that the contractor/operator is taking action to stop the erosion and assist them where needed.
- Report and monitor the progress of rehabilitation weekly and record all the findings in a site register (during construction).
- All actions with regards to the incidents must be reported on a monthly compliance report which should be kept on file for if/when the Competent Authority requests to see it (during construction) and kept on file for consideration during the annual audits (during construction and operation).

The Contractor (in consultation with an appropriate specialist, e.g. an engineer) must:

- Select a system/mechanism to treat the erosion.
- Design and implement the appropriate system/mechanism.
- Monitor the area to ensure that the system functions like it should. If the system fails, the method must be adapted or adjusted to ensure the accelerated erosion is controlled.
- Continue monitoring until the area has been stabilised.

5. CONCLUSION

The Erosion Management Plan is a document to assist the Proponent/ EPC Contractor with guidelines on how to manage erosion during all phases of the project. The implementation of management measures is not only good practice to ensure minimisation of degradation, but also necessary to ensure compliance with legislative requirements. This document forms part of the EMPr, and is required to be considered and adhered to during the design, construction, operation and decommissioning phases of the project (if and where applicable). During the construction phase, the contractor must prepare an Erosion Control Method Statement to ensure that all construction methods adopted on site do not cause, or precipitate soil erosion and shall take adequate steps to ensure that the requirements of this plan are met before, during and after construction. The designated responsible person on site, must be indicated in the Method Statement and shall ensure that relevant erosion control measures are in place throughout the construction phase.

An operation phase Erosion Management Plan should be designed and implemented if not already addressed by the mitigations implemented as part of construction, with a view to preventing the passage of concentrated flows off hardened surfaces and onto natural areas.

APPENDIX H:
WASTE MANAGEMENT PLAN

WASTE MANAGEMENT PLAN

1. PURPOSE

A Waste Management Plan (WMP) plays a key role in achieving sustainable waste management throughout all phases of the project. The plan prescribes measures for the collection, temporary storage and safe disposal of the various waste streams associated with the project and includes provisions for the recovery, re-use and recycling of waste. The purpose of this plan is therefore to ensure that effective procedures are implemented for the handling, storage, transportation and disposal of waste generated from the project activities on site.

This WMP has been compiled as part of the project EMPr and is based on waste stream information available at the time of compilation. Construction and operation activities must be assessed on an ongoing basis in order to determine the efficacy of the plan and whether further revision of the plan is required. This plan should be updated should further detail regarding waste quantities and categorisation become available, during the construction and/or operation stages.

2. RELEVANT ASPECTS OF THE SITE

It is expected that the development of the Ummbila Emoyeni Wind Energy Facility will generate construction solid waste, general waste and hazardous waste during the lifetime of the wind farm.

Waste generated on site, originates from various sources, including but not limited to:

- Concrete waste generated from spoil and excess concrete.
- Contaminated water, soil, rocks and vegetation due to hydrocarbon spills.
- Hazardous waste from vehicle, equipment and machinery parts and servicing, fluorescent tubes, used hydrocarbon containers, and waste ink cartridges.
- Recyclable waste in the form of paper, glass, steel, aluminium, wood/ wood pallets, plastic (PET bottles, PVC, LDPE) and cardboard.
- Organic waste from food waste as well as alien and endemic vegetation removal.
- Sewage from portable toilets and septic tanks.
- Inert waste from spoil material from site clearance and trenching works.

3. LEGISLATIVE REQUIREMENTS

Waste in South Africa is currently governed by several regulations, including:

- National Environmental Management: Waste Act (NEM:WA), 2008 (Act 59 of 2008);
- National Environmental Management: Waste Amendment Act, 2014 (Act 26 of 2014);
- The South African Constitution (Act 108 of 1996);
- Hazardous Substances Act (Act 5 of 1973);
- Health Act (Act 63 of 1977);
- Environment Conservation Act (Act 73 of 1989);
- Occupational Health and Safety Act (Act 85 of 1993);
- National Water Act (Act 36 of 1998);
- The National Environmental Management Act (Act 107 of 1998) (as amended);

» Municipal Structures Act (Act 117 of 1998);
» Municipal Systems Act (Act 32 of 2000);
» Mineral and Petroleum Resources Development Act (Act 28 of 2002); and
» Air Quality Act (Act 39 of 2004).

Storage of waste must be conducted in accordance with the National Norms and Standards for the Storage of Waste, published in GNR 926.

4. WASTE MANAGEMENT PRINCIPLES

An integrated approach to waste management is needed on site. Such an approach is illustrated in **Figure 1**.

It is important to ensure that waste is managed with the following objectives in mind during all phases of the project:

» Reducing volumes of waste is the greatest priority;
» If reduction is not feasible, the maximum amount of waste is to be recycled; and
» Waste that cannot be recycled is to be disposed of in the most environmentally responsible manner.

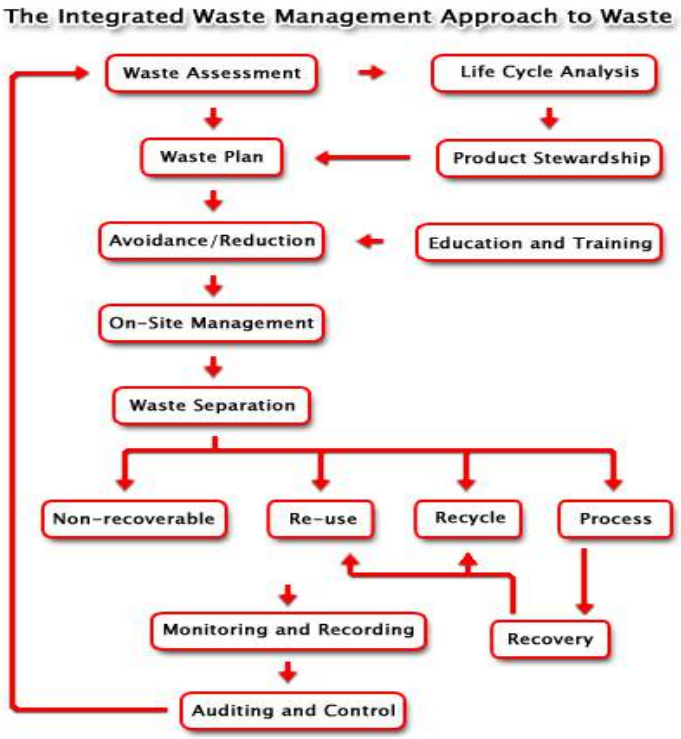

Figure 1: Integrated Waste Management Flow Diagram
(Source: http://www.enviroserv.co.za/pages/content.asp?SectionId=496)

4.1. Construction phase

A plan for the management of waste during the construction phase is detailed below. A Method Statement detailing specific waste management practices during construction should be prepared by the Contractor prior to the commencement of construction, for approval by the Resident Engineer and/or ECO.

4.1.1. Waste Assessment / Inventory

- The Environmental Officer (EO), or designated staff member, must develop, implement and maintain a waste inventory reflecting all waste generated during construction for both general and hazardous waste streams.
- Construction methods and materials should be carefully considered in view of waste reduction, re-use, and recycling opportunities, to be pro-actively implemented.
- Once a waste inventory has been established, targets for the recovery of waste (minimisation, re-use, recycling) should be set.
- The EO must conduct waste classification and rating in terms of SANS 10288 and Government Notice 634 published under the NEM: WA.

4.1.2. Waste collection, handling and storage

- It is the responsibility of the EO to ensure that each subcontractor implements their own waste recycling system, i.e. separate bins for food waste, plastics, paper, wood, glass cardboard, metals, etc. Such practises must be made contractually binding upon appointment of the subcontractors.
- Waste manifests and waste acceptance approvals (i.e. receipts) from designated waste facilities must be kept on file at the site office, in order to record and prove continual compliance for future auditing.
- Septic tanks and portable toilets must be monitored by the EO or responsible subcontractor and maintained regularly. Below ground storage of septic tanks must withstand the external forces of the surrounding environment. The area above the tank must be demarcated to prevent any vehicles or heavy machinery from moving around in the surrounding area.
- Waste collection bins and hazardous waste containers must be provided by the principal contractor and subcontractors and placed at strategic locations around the site for the storage of organic, recyclable and hazardous waste.
- A dedicated waste area must be established on site for the storage of all waste streams before removal from site. The storage period must not trigger listed waste activities as per the NEMWA, GN 921 of November 2013.
- Signage/ colour coding must be used to differentiate disposal areas for the various waste streams (i.e. paper, cardboard, metals, food waste, glass etc.).
- Hazardous waste must be stored within a bunded area constructed according to SABS requirements, and must ensure complete containment of the spilled material in the event of a breach. As such, appropriate bunding material, design, capacity and type must be utilised to ensure that no contamination of the surrounding environment will occur despite a containment breach. The net capacity of a bunded compound in a storage facility should be at least 120% of the net capacity of the largest tank.
- Take into consideration the capacity displaced by other tanks within the same bunded area and any foundations.
- Treat interconnected tanks as a single tank of equivalent total volume for the purposes of the bund design criteria

- The location of all temporary waste storage areas must aim to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage, and vermin control, while being reasonably placed in terms of centrality and accessibility on site. Where required, an additional temporary waste storage area may be designated, provided identical controls are exercised for these locations.
- Waste storage shall be in accordance with all Regulations and best-practice guidelines and under no circumstances may waste be burnt on site.
- A dedicated waste management team must be appointed by the principal contractors' SHE Officer, who will be responsible for ensuring the continuous sorting of waste and maintenance of the area. The waste management team must be trained in all areas of waste management and monitored by the SHE Officer.
- All waste removed from site must be done by a registered/ licensed subcontractor, who must supply information regarding how waste recycling/ disposal will be achieved. The registered subcontractor must provide waste manifests for all removals at least once a month or for every disposal made, records of which must be kept on file at the site camp for the duration of the construction period.

4.1.3. Management of waste storage areas

- The position of all waste storage areas must be located so as to ensure minimal degradation to the environment. The main waste storage area must have a suitable stormwater system separating clean and contaminated stormwater.
- Collection bins placed around the site and at subcontractors' camps (if at a different location than the main site camp) must be maintained and emptied on a regular basis by the principal contractor to avoid overflowing receptacles.
- Inspections and maintenance of the main waste storage area must be undertaken daily. Skips and storage containers must be clearly marked or colour coded and well-maintained. Monitor for rodents and take corrective action if they become a problem.
- Waste must be stored in designated containers and not on the ground.
- Inspections and maintenance of bunds must be undertaken regularly. Bunds must be inspected for leaks or cracks in the foundation and walls.
- It is assumed that any rainwater collected inside the bund is contaminated and must be treated by oil/water separation (or similar method) prior to dewatering, or removed and stored as hazardous waste, and not released into the environment.
- If any leaks occur in the bund, these must be removed immediately.
- Bund systems must be designed to avoid dewatering of contaminated water, but to rather separate oil and hydrocarbons from water prior to dewatering.
- Following rainfall event bunds must always be dewatered in order to maintain a sufficient storage capacity in the event of a breach.
- No mixing of hazardous and general waste is allowed.

4.1.4. Disposal

- Waste generated on site must be removed on a regular basis. This frequency may change during construction depending on waste volumes generated at different stages of the construction process, however removal must occur prior to the storage capacity being reached to avoid overflow of containers and poor waste storage.

» Waste must be removed by a suitably qualified contractor and disposed of at an appropriately licensed landfill site. Proof of appropriate disposal must be provided by the contractor to the EO and ECO.

4.1.5. Record keeping

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

» Documentation (waste manifest, certificate of issue or safe disposal) must be kept detailing the quantity, nature, and fate of any regulated waste for audit purposes.
» Waste management must form part of the monthly reporting requirements in terms of volumes generated, types, storage and final disposal.

4.1.6. Training

Training and awareness regarding waste management shall be provided to all employees and contractors as part of the toolbox talks or on-site awareness sessions with the EO and at the frequency as set out by the ECO.

4.2. Operation phase

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

The following waste management principles apply during the operation phase:

» The SHE Manager must develop, implement and maintain a waste inventory reflecting all waste generated during operation for both general and hazardous waste streams.
» Adequate waste collection bins at site must be supplied. Separate bins should be provided for general and hazardous waste.
» Recyclable waste must be removed from the waste stream and stored separately.
» All waste must be stored in appropriate temporary storage containers (separated between different operation wastes, and contaminated or wet waste).
» Waste storage shall be in accordance with all best-practice guidelines and under no circumstances may waste be burnt on site.
» Waste generated on site must be removed on a regular basis throughout the operation phase.
» Waste must be removed by a suitably qualified contractor and disposed at an appropriately licensed landfill site. Proof of appropriate disposal must be provided by the contractor and kept on site.

5. Monitoring of Waste Management Activities

Records must be kept of the volumes/ mass of the different waste streams that are collected from the site throughout the life of the project. The appointed waste contractor is to provide monthly reports to the operator containing the following information:

- Monthly volumes/ mass of the different waste streams collected;
- Monthly volumes/ mass of the waste that is disposed of at a landfill site;
- Monthly volumes/ mass of the waste that is recycled;
- Data illustrating progress compared to previous months.

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

APPENDIX I:
EMERGENCY PREPARDENESS, RESPONSE AND FIRE MANAGEMENT PLAN

EMERGENCY PREPAREDNESS, RESPONSE AND FIRE MANAGEMENT PLAN

1. PURPOSE

The purpose of the Emergency Preparedness and Response Plan is:

- To assist contractor personnel to prepare for and respond quickly and safely to emergency incidents, and to establish a state of readiness which will enable prompt and effective responses to possible events.
- To control or limit any effect that an emergency or potential emergency may have on site or on neighbouring areas.
- To facilitate emergency responses and to provide such assistance on the site as is appropriate to the occasion.
- To ensure communication of all vital information as soon as possible.
- To facilitate the reorganisation and reconstruction activities so that normal operations can be resumed.
- To provide for training so that a high level of preparedness can be continually maintained.

This plan outlines response actions for potential incidents of any size. It details response procedures that will minimise potential health and safety hazards, environmental damage, and clean-up efforts. The plan has been prepared to ensure quick access to all the information required in responding to an emergency event. The plan will enable an effective, comprehensive response to prevent injury or damage to the construction personnel, public, and environment during the project. Contractors are expected to comply with all procedures described in this document. A Method Statement should be prepared at the commencement of the construction phase detailing how this plan is to be implemented as well as details of relevant responsible parties for the implementation. The method statement must also reflect conditions of the IFC Performance Standard 1 and include the following:

- Identification of areas where accidents and emergency situations may occur;
- Communities and individuals that may be impacted;
- Response procedure;
- Provisions of equipment and resources;
- Designation of responsibilities;
- Communication; and
- Periodic training to ensure effective response to potentially affected communities.

2. PROJECT-SPECIFIC DETAILS

The project site has been identified by the applicant as a technically feasible site which has the potential for the development of 100 MW Compton Photovoltaic Solar Energy Facility, Battery Energy Storage System (BESS) and associated infrastructure located near Ceres in the Cape Winelands District Municipality, Western Cape Province of South Africa.

The project site has been identified as a technically feasible site which has the potential for the development of a wind facility, including a Battery Energy Storage System (BESS) through the consideration of a number of technical factors. A development area of approximately ~390ha has been identified within the project site by the proponent for the development.

Due to the scale and nature of this development, it is anticipated that the following risks could potentially arises during the construction and operation phases:

» Fires;
» Leakage of hazardous substances;
» Storage of flammable materials and substances;
» Flood events;
» Accidents; and
» Natural disasters.

3. EMERGENCY RESPONSE PLAN

There are three levels of emergency as follows:

» Local Emergency: An alert confined to a specific locality.
» Site Emergency: An alert that cannot be localised and which presents danger to other areas within the site boundary or outside the site boundary.
» Evacuation: An alert when all personnel are required to leave the affected area and assemble in a safe location.

If there is any doubt as to whether any hazardous situation constitutes an emergency, then it must be treated as an Evacuation.

Every effort must be made to control, reduce or stop the cause of any emergency provided it is safe to do so. For example, in the event of a fire, isolate the fuel supply and limit the propagation of the fire by cooling the adjacent areas. Then confine and extinguish the fire (where appropriate) making sure that re-ignition cannot occur.

3.1. Emergency Scenario Contingency Planning

3.1.1. Scenario: Spill which would result in the contamination of land, surface or groundwater

i. Spill Prevention Measures

Preventing spills must be the top priority at all operations which have the potential of endangering the environment. The responsibility to effectively prevent and mitigate any scenario lies with the Contractor and the ECO. In order to reduce the risk of spills and associated contamination, the following principles should be considered during construction and operation activities:

» All equipment refuelling, servicing and maintenance activities should only be undertaken within appropriately sealed/contained or bunded designated areas.
» All maintenance materials, oils, grease, lubricants, etc. should be stored in a designated area in an appropriate storage container.
» No refuelling, storage, servicing, or maintenance of equipment should take place within sensitive environmental resources in order to reduce the risk of contamination by spills.
» No refuelling or servicing should be undertaken without absorbent material or drip pans properly placed to contain spilled fuel.

- Any fluids drained from the machinery during servicing should be collected in leak-proof containers and taken to an appropriate disposal or recycling facility.
- If these activities result in damage or accumulation of product on the soil, the contaminated soil must be disposed of as hazardous waste. Under no circumstances shall contaminated soil be added to a spoils pile and transported to a regular disposal site.
- Chemical toilets used during construction must be regularly cleaned. Chemicals used in toilets are also hazardous to the environment and must be controlled. Portable chemical toilets could overflow if not pumped regularly or they could spill if dropped or overturned during moving. Care and due diligence should be taken at all times.
- Contact details of emergency services and HazMat Response Contractors are to be clearly displayed on the site. All staff are to be made aware of these details and must be familiar with the procedures for notification in the event of an emergency.

ii. Procedures

The following action plan is proposed in the event of a spill:

1. Spill or release identified.
2. Assess person safety, safety of others and environment.
3. Stop the spill if safely possible.
4. Contain the spill to limit entering surrounding areas.
5. Identify the substance spilled.
6. Quantify the spill (under or over guideline/threshold levels).
7. Notify the Site Manager and emergency response crew and authorities (in the event of major spill).
8. Inform users (and downstream users) of the potential risk.
9. Clean up of the spill using spill kit or by HazMat team.
10. Record of the spill incident on company database.

a) Procedures for containing and controlling the spill (i.e. on land or in water)

Measures can be taken to prepare for quick and effective containment of any potential spills. Each contractor must keep sufficient supplies of spill containment equipment at the construction sites, at all times during and after the construction phase. These should include specialised spill kits or spill containment equipment. Other spill containment measures include using drip pans underneath vehicles and equipment every time refuelling, servicing, or maintenance activities are undertaken.

Specific spill containment methods for land and water contamination are outlined below.

Containment of Spills on Land

Spills on land include spills on rock, gravel, soil and/or vegetation. It is important to note that soil is a natural sorbent, and therefore spills on soil are generally less serious than spills on water as contaminated soil can be more easily recovered. It is important that all measures be undertaken to avoid spills reaching open water bodies located outside of the project site. The following methods could be used:

- *Dykes* - Dykes can be created using soil surrounding a spill on land. These dykes are constructed around the perimeter or down slope of the spilled substance. A dyke needs to be built up to a size that will

ensure containment of the maximum quantity of contaminant that may reach it. A plastic tarp can be placed on and at the base of the dyke such that the contaminant can pool up and subsequently be removed with sorbent materials or by pump into barrels or bags. If the spill is migrating very slowly, a dyke may not be necessary and sorbents can be used to soak up contaminants before they migrate away from the source of the spill.

» *Trenches* - Trenches can be dug out to contain spills. Spades, pick axes or a front-end loader can be used depending on the size of the trench required. Spilled substances can then be recovered using a pump or sorbent materials.

b) Procedures for transferring, storing, and managing spill related wastes

Used sorbent materials are to be placed in plastic bags for future disposal. All materials mentioned in this section are to be available in the spill kits. Following clean up, any tools or equipment used must be properly washed and decontaminated, or replaced if this is not possible.

Spilled substances and materials used for containment must be placed into empty waste oil containers and sealed for proper disposal at an approved disposal facility.

c) Procedures for restoring affected areas

Criteria that may be considered include natural biodegradation of oil, replacement of soil and revegetation. Once a spill of reportable size has been contained, the ECO and the relevant Authority must be consulted to confirm that the appropriate clean up levels are met.

3.1.2. Scenario: Fire (and fire water handling)

i. Action Plan

The following action plan is proposed in the event of a fire:

1. Quantify risk.
2. Assess person safety, safety of others and environment.
3. If safe – attempt to extinguish the fire using appropriate equipment.
4. If not safe to extinguish, contain fire.
5. Notify the Site Manager and emergency response crew and authorities.
6. Inform users of the potential risk of fire.
7. Record the incident on the company database or filing register.

ii. Procedures

Because large scale fires may spread very fast it is most advisable that the employee/contractor not put his/her life in danger in the case of an uncontrolled fire.

Portable firefighting equipment must be provided at strategic locations throughout the site, in line with the Building Code of South Africa and the relevant provincial building code. All emergency equipment including portable fire extinguishers, hose reels and hydrants must be maintained and inspected by a qualified contractor in accordance with the relevant legislation and national standards.

Current evacuation signs and diagrams for the building or site that are compliant to relevant state legislation must be provided in a conspicuous position, on each evacuation route. Contact details for the relevant emergency services should be clearly displayed on site and all employees should be aware of procedures to follow in the case of an emergency.

a) Procedures for initial actions

Persons should not fight the fire if any of the following conditions exist:

» They have not been trained or instructed in the use of a fire extinguisher.
» They do not know what is burning.
» The fire is spreading rapidly.
» They do not have the proper equipment.
» They cannot do so without a means of escape.
» They may inhale toxic smoke.

b) Reporting procedures

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.

- Report fire immediately to the site manager, who will determine if it is to be reported to the relevant emergency services and authorities.
- The site manager must have copies of the Report form to be completed.

» SUMMARY: RESPONSE PROCEDURE

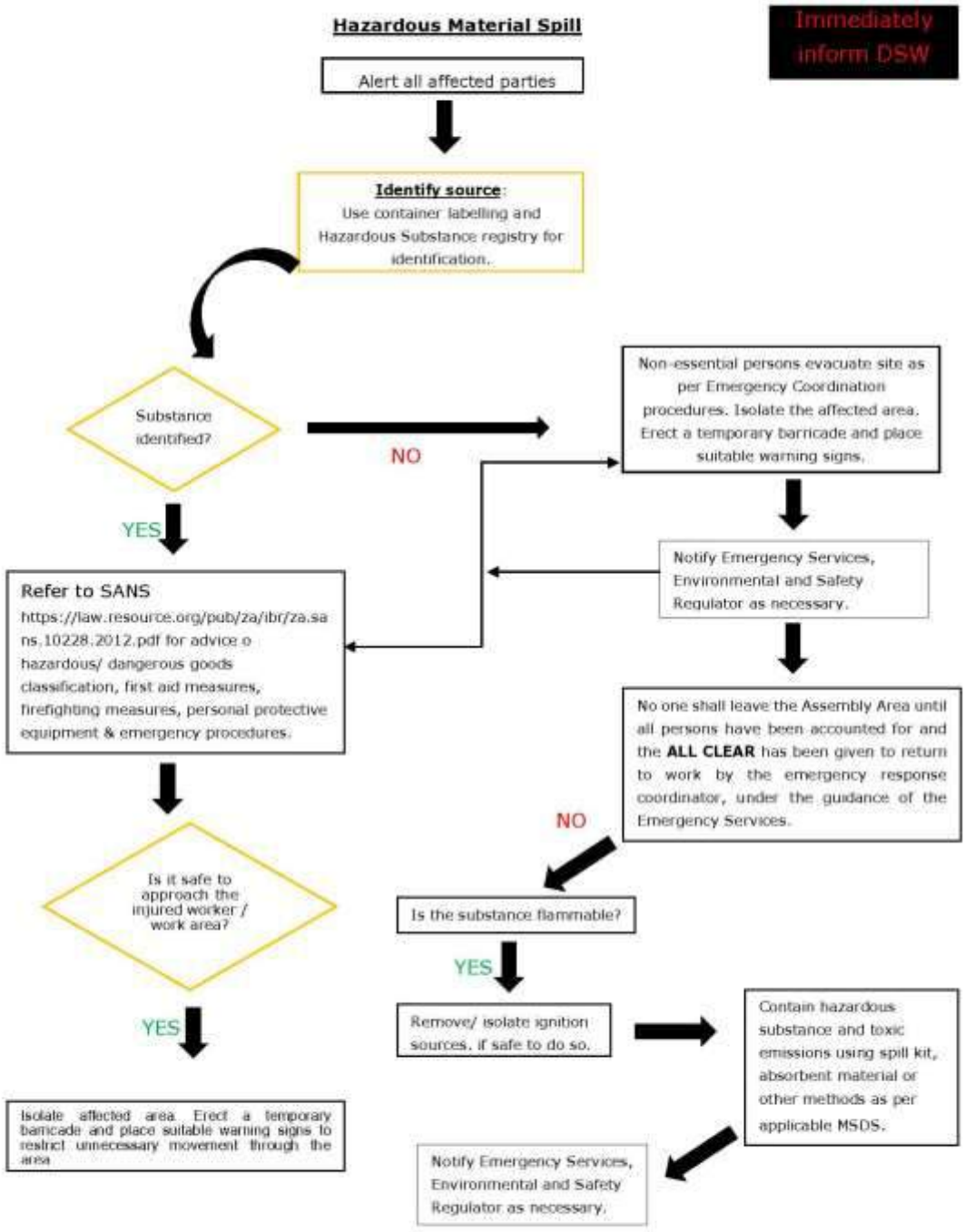

Figure 1: Hazardous Material Spill

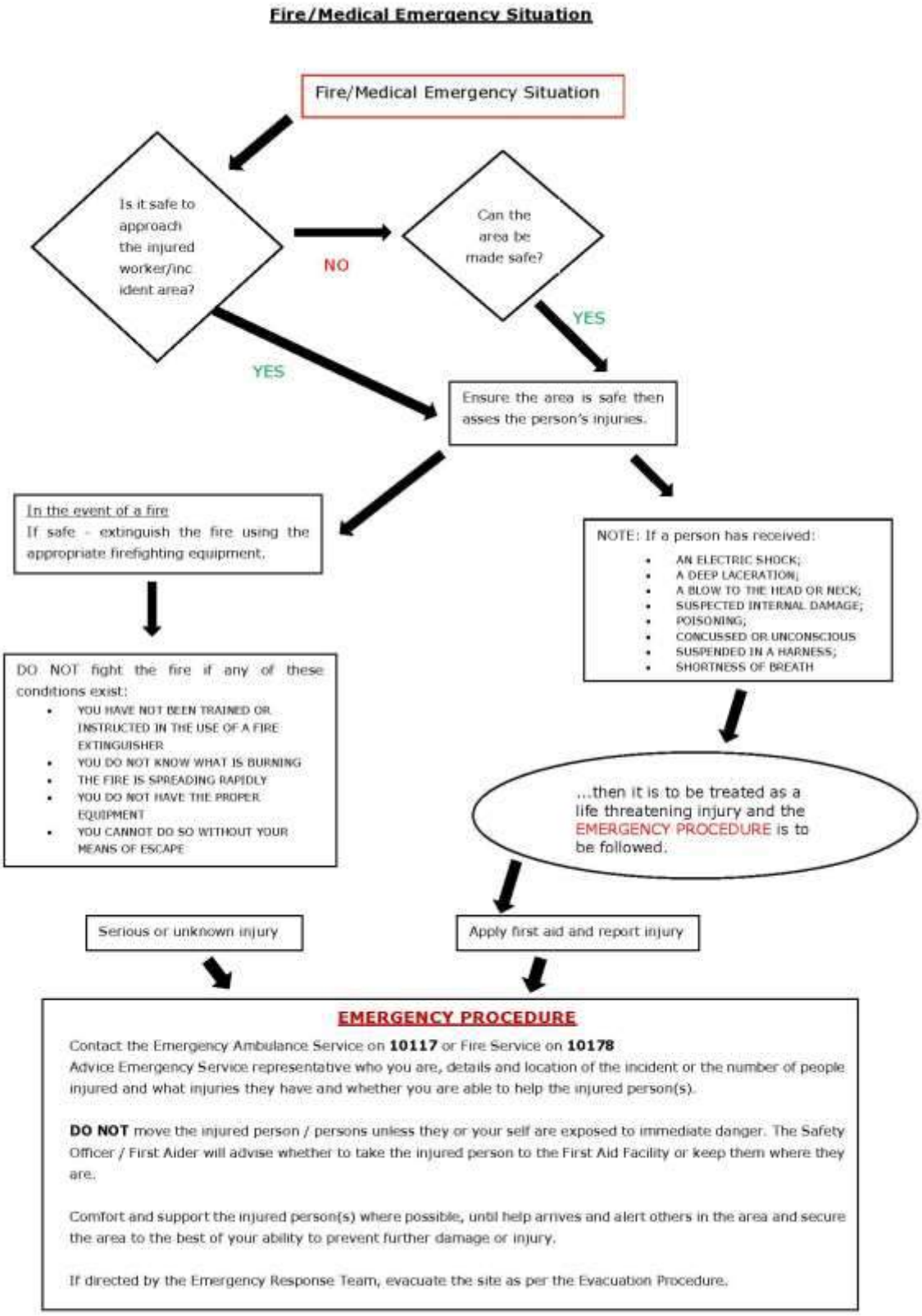

Figure 2: Emergency Fire/Medical

4. PROCEDURE RESPONSIBILITY

The Contractor's Safety, Health and Environment (SHE) Representative, employed by the Contractor, is responsible for managing the day-to-day on-site implementation of this Plan, and for the compilation of regular (usually weekly) Monitoring Reports. In addition, the SHE must act as liaison and advisor on all environmental and related issues.

The local authorities will provide their assistance when deemed necessary, or when it has been requested and/or indicated in Section 30 (8) of NEMA. The provincial authority will provide assistance and guidance where required and conduct awareness programmes.

APPENDIX J:
HERITAGE CONSERVATION MANAGEMENT PLAN

HERITAGE CONSERVATION MANAGEMENT PLAN

UMMBILA EMOYENI RENEWABLE ENERGY WIND AND SOLAR PV FACILITIES, MPUMALANGA PROVINCE

CTS HERITAGE

Prepared by CTS Heritage

Jenna Lavin

For

Savannah Environmental

April 2023

CTS HERITAGE

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1. INTRODUCTION

Ummbila Emoyeni Renewable Energy Farm (Pty) Ltd is proposing the development of renewable energy facilities, collectively known as the Ummbila Emoyeni Renewable Energy Facility (REF), consisting of a commercial wind farm, solar PV facility, and associated grid infrastructure, including a battery energy storage system, located approximately 6km southeast of Bethal in the Mpumalanga Province of South Africa.

A preferred project focus area with an extent of 27 819ha been identified by Ummbila Emoyeni (Pty) Ltd as a technically suitable area for the development of the Ummbilla Emoyeni Renewable Energy Farm with a contracted capacity of up to 666MW of wind energy and 150MW of solar energy. This layout, and project capacity, will be reduced as the EIA and scoping process identifies environmental constraints that exclude areas for development.

The wind farm is proposed to accommodate the following infrastructure:

- Up to 111 wind turbines with a maximum hub height of up to 200m. The tip height of the turbines will be up to 300m.
- 33kV / 132kV onsite collector substations
- Battery Energy Storage System (BESS)
- Cabling between turbines, to be laid underground where practical
- Laydown and O&M hub (approximately 300m x 300m):
    - Batching plant of 4ha to 7ha
    - Construction compound (temporary) of 6 Ha approximately
    - Operation and Maintenance office of 1.5Ha approximately ,
- Laydown and crane hardstand areas (approximately 75m x 120m)
- Access roads of 12-13m wide, with 12m at turning circles.

The solar PV facility is proposed to accommodate the following infrastructure:

- PV modules and mounting structures with a capacity per panel of 350W to 450W and dependent on optimization and cost.
- Inverters and transformers
- 33kV/132kV onsite collector substation
- Battery Energy Storage System (BESS)
- Cabling between project components
- Laydown and O&M hub (approximately 300m x 300m):

- Construction compound (temporary),
- Maintenance office

- Access roads (up to 12m wide)

The project will include associated grid infrastructure that is required to connect the Ummbila Emoyeni Renewable Energy Facility to the national grid. The grid connection solution entails establishing a 400/132 kV MTS, between Camden and SOL Substations, which will be looped in and out of the existing Camden-Sol 400 kV line[1]. The location of the MTS will be refined through an ongoing process of communication with Eskom Planning but will be within close proximity to the 400kV line in order to cut into this line.

It is anticipated that the power generated by the project will be bid into the REIPPPP tender process (DMRE) and/or into private off take opportunities. The LILO corridor will intersect with either the Camden-Zeus 1 400kV, Camden-Zeus 2 400kV or Camden-Tutuka 400kV power line.

1.1 Location of Site

The development is located on the eastern side of the R35 that runs between Bethal and Morgenzon in Mpumalanga. The project site comprises the following farm portions:

Table 1: Farm Portions

Parent Farm Number	**Farm Portions**
Farm 261 – Naudesfontein	15, 21
Farm 264 – Geluksplaats	0, 1, 3, 4, 5, 6, 8, 9, 11, 12
Farm 268 – Brak Fontein Settlement	6,7,10,11,12
Farm 420 – Rietfontein	8,9,10,11,12,15,16,18,19,22,32
Farm 421 - Sukkelaar	2, 2, 7, 9, 9 10, 10 11, 11 12, 12 22 ,25, 34, 35, 36, 37, 37, 38, 39, 40, 42, 42
Farm 422 – Klipfontein	0, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23
Farm 423 – Bekkerust	0, 1, 2, 4, 5, 6, 10, 11, 12, 13 14, 15, 17, 19, 20, 22, 23, 2425
Farm 452 – Brakfontein	5
Farm 454 – Oshoek	4, 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, 7, 22, 23, 23

Farm 458 – Goedgedacht	0, 2, 4, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 21, 22, 25, 26, 27, 28, 29, 31, 32, 33, 34, 35, 37, 39
Farm 467 – Twee Fontein	0, 1, 4, 5, 6, 7, 8, 10
Farm 469 – Klipkraal	5, 6, 7, 8
Farm 548 – Durabel	0

1.2 Ownership and responsibility for site

Landowners

The land on which the Ummbila Emoyeni REF is located is privately owned:

Table 2: Landowner Contact Information

No.	**Portion**	**Landowner**	**Contact Details**
261	15	NICJAC PIETERSE BOERDERY CC	Jacobus H Pieterse - 082 783 2687 Simon N Pieterse - 087 550 0930 Jacques - 082 783 2687 Nico - 082 567 8085 andre@njptransport.co.za jacques@njptransport.co.za nico@njptransport.co.za
261	21	Johannes Fourie	
264	0	NICJAC PIETERSE BOERDERY CC	Jacobus H Pieterse - 082 783 2687 Simon N Pieterse - 087 550 0930 Jacques - 082 783 2687
264	1	NICJAC PIETERSE BOERDERY CC	Nico - 082 567 8085 andre@njptransport.co.za jacques@njptransport.co.za nico@njptransport.co.za
264	3	ROOIBLOM BOERDERY NO 1 TRUST	Neil Claasen - 082 809 9967 - niel@rooiblom.co.za
264	4	ROOIBLOM BOERDERY NO 1 TRUST	Neil Claasen - 082 809 9967 - niel@rooiblom.co.za
264	5	ROOIBLOM BOERDERY NO 1 TRUST	Neil Claasen - 082 809 9967 - niel@rooiblom.co.za
264	6	HENNIE FOURIE TRUST	Sterk Gert' - 0828944275
264	8	GELUKSPLAATS BELEGGINGS TRUST	Bertus Louw - 082 492 0945

264	9	PIETER FRANCOIS ERASMUS - Pietman	Pietman - 082 571 5561 - pietman.bekkersrust@gmail.com
264	11	JOHAN A LOMBARD	JOHAN A LOMBARD - jalombard84@gmail.com - 0132915516 & 0823883103
264	12	GELUKSPLAATS BELEGGINGS TRUST	Bertus Louw082 492 0945
268	6	PIETER FRANCOIS ERASMUS - Pietman	Pietman - 082 571 5561 - pietman.bekkersrust@gmail.com
268	7	GERT FOURIE BOERDERY TRUST	
268	10	GERT FOURIE BOERDERY TRUST	
268	11	HENNIE FOURIE TRUST	Sterk Gert - 0828944275
268	12	HENNIE FOURIE TRUST	Sterk Gert - 0828944275
420	8	ROUX FRANCINA JOHANNA 4105020022086	Hennie Roux - 083 232 6236 - hennie958@gmail.com
420	9	MARIUS CARINUS TRUST 1259/98	Marius Carinus – 0827813662 - carienmarius@gmail.com
420	10	NICJAC PIETERSE BOERDERY CC	Jacobus H Pieterse - 082 783 2687 Simon N Pieterse - 087 550 0930 Jacques - 082 783 2687
420	11	NICJAC PIETERSE BOERDERY CC	Nico - 082 567 8085 andre@njptransport.co.za jacques@njptransport.co.za
420	12	NICJAC PIETERSE BOERDERY CC	nico@njptransport.co.za
420	15	DEUTRANS LANDBOU EIENDOMME CC 200903881523	Tony Brand - 0833031058
420	16	NICJAC PIETERSE BOERDERY CC	Jacobus H Pieterse - 082 783 2687 Simon N Pieterse - 087 550 0930 Jacques - 082 783 2687 Nico - 082 567 8085 andre@njptransport.co.za jacques@njptransport.co.za nico@njptransport.co.za

420	18	DEUTRANS LANDBOU EIENDOMME CC 200903881523	Tony Brand - 0833031058
420	19	NICJAC PIETERSE BOERDERY CC	Jacobus H Pieterse - 082 783 2687 Simon N Pieterse - 087 550 0930 Jacques - 082 783 2687
420	22	NICJAC PIETERSE BOERDERY CC	Nico - 082 567 8085 andre@njptransport.co.za jacques@njptransport.co.za nico@njptransport.co.za
420	32	MARIUS CARINUS TRUST1259/98	Marius Carinus – 0827813662 - carienmarius@gmail.com
421	2	HENDRIKSPAN BOERDERY CC 200205330223	Flippie v Dyk - flippievandyk73@gmail.com
421	2	HENDRIKSPAN BOERDERY CC 200205330223	Flippie v Dyk - flippievandyk73@gmail.com
421	7	Frik Human Plase cc	Brother to Hannes - Frik Human - 0824742799
421	9	Klipfontein Family Trust	
421	9	Klipfontein Family Trust	
421	10	Klipfontein Family Trust	
421	10	Klipfontein Family Trust	
421	11	Frik Human Plase cc	
421	11	Frik Human Plase cc	
421	12	Frik Human Plase cc	
421	12	Frik Human Plase cc	
421	22	Klipfontein Family Trust	
421	25	Klipfontein Family Trust	
421	34	KLIPFONTEIN BOERDERY TRUST 5771/1996	Hannes Human - hanneshuman1@gmail.com - 082 550 3670
421	35	Frik Human Plase cc	Brother to Hannes - Frik Human - 0824742799
421	36	KLIPFONTEIN BOERDERY TRUST 5771/1996	Hannes Human - hanneshuman1@gmail.com - 082 550 3670
421	37	Frik Human Plase cc	

421	37	Frik Human Plase cc	
421	38	Klipfontein Family Trust	
421	39	Van Rooyen	
421	40	ROUX FRANCINA JOHANNA4105020022086	Hennie Roux - 083 232 6236 - hennie958@gmail.com
421	42	ROUX FRANCINA JOHANNA4105020022086	
421	42	ROUX FRANCINA JOHANNA4105020022086	
422	0	VON WIELLIGH CHRISTIAAN LODEWYK WENTZEL	Alida von Wielligh - 0823371218 or 0178195896
422	2	ROUX FRANCINA JOHANNA4105020022086	Hennie Roux - 083 232 6236 - hennie958@gmail.com
422	3	Klipfontein Family Trust	Hannes Human - hanneshuman1@gmail.com - 082 550 3670
422	4	PIETER FRANCOIS ERASMUS - Pietman	Pietman - 082 571 5561 - pietman.bekkersrust@gmail.com
422	5		

Environmental Authorisation (EA) Holder

The EA Holder would be the Project Company, Ummbila Emoyeni (Pty) Ltd, who, through the EA acquires the right to develop the project (considering all other permits and consents have been acquired from all other relevant competent authorities). The Project Company does not, however, own the land on which it intends to develop.

Contact Person: Mr Peter Carl Venn

Address: 15 Chaplin, Cnr Oxford and Chaplin Roads, Illovo, 2196

Telephone: 083 689 3063

Email: peter.venn@seritigreen.com

Implementation of EA

The person responsible for the implementation of the conditions in the EA would be the contractors during the construction phase. However, any non-compliance would fall onto Ummbila Emoyeni (Pty) Ltd as the holder of the EA. All non-compliance would be audited by an independent ECO which would be appointed by Ummbila Emoyeni (Pty) Ltd. Ummbila Emoyeni (Pty) Ltd would operate the facility. For decommissioning, the responsible parties would again be the contractors and audited by ECO but overall compliance would fall on Ummbila Emoyeni (Pty) Ltd.

Heritage Authorities

The area proposed for development is located in the Mpumalanga Province. As such, the area is subject to two different heritage management authorities. All impacts to archaeological and palaeontological heritage in the Mpumalanga Province are managed by SAHRA. Any impacts to these resources are subject to the recommendations and best practice processes established by SAHRA for archaeology and palaeontology.

All impacts to structures that are older than 60 years in the Mpumalanga Province are managed by the Mpumalanga Provincial Heritage Resources Authority (MPHRA). Any impacts to these resources are subject to the recommendations and best practice processes established by MPHRA.

1.3 Site Description

The area proposed for development is dominated by agriculture and Soweto Highveld Grassland. The study area consists of a gentle to medium undulating landscape with a few prominent rocky outcrops visible consisting largely of shale, dolerite and sandstone.

The vegetation of the study area alternates between cultivated cornfields, grasslands for grazing, and the typical grass tundras of the Highveld plateau. There are narrow streams and small scattered wetlands present across the study area. Dirt roads, main roads and farmlands bound the site to the north, south, east and west. Evidence of crop rotation and different types of cultivation is visible in areas of the development footprint. Scraped dirt roads, large farm vehicles and cargo trucks are present, moving through wet turf soil resulting in turbation of the roads.

The area is predominantly cornfields and grasslands in various stages of harvesting. In addition, large hay bales indicate that many “natural” grasslands are grown for animal feed. Therefore, it was clear that much of the area has been subjected to continuous agricultural activities and

anthropogenic disturbances for a very long time.

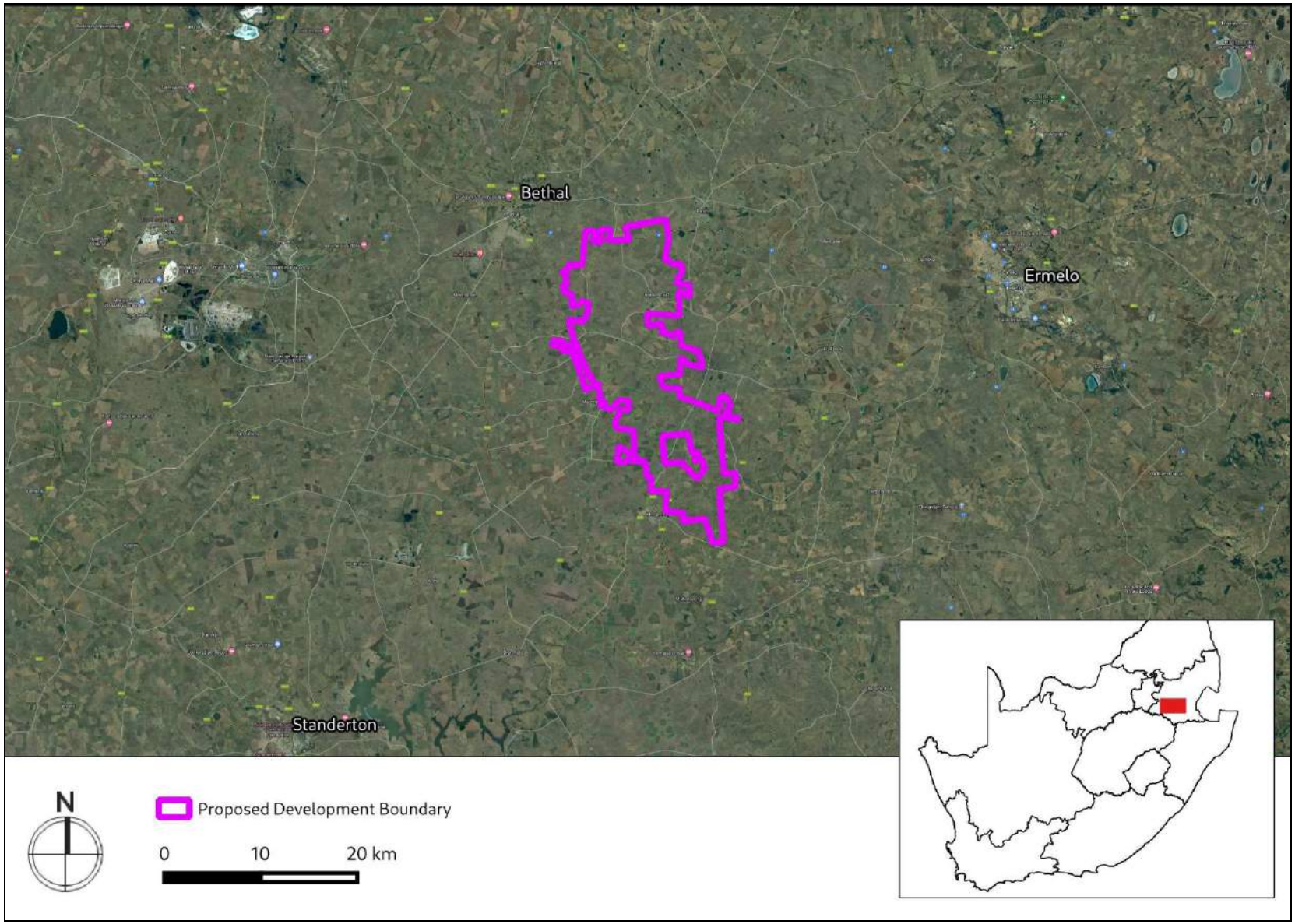


Figure 1: Location of Site

1.4 Statement of Site significance

General points on significance

The cultural significance of a site determines the appropriateness and extent to which protection measures are required. The value or importance of the site to society in general, to specific past and present groups, and to posterity, includes:

- Spiritual/social value - the traditional and consistent use of a site for religious, spiritual or social purposes, even if the religious use no longer continues
- Aesthetic/artistic value - the recognition by scholars and the general public that a cultural site represents a high point of creative achievement
- Historic value - the achievements and knowledge of the past as vehicles for enlightening the present and future
- Scientific/research value - the site, or feature within the site, providing a source of knowledge that is unobtainable elsewhere

Since cultural significance can be interpreted differently by different people, and evaluations can change with time and circumstances, it is important to assess the significance of a site in terms of:

- The importance of a particular site in relation to other sites so as to decide on the appropriate level of management
- Ascertaining what all these values are so as not to inadvertently damage one value that a site has, while preserving another.

Details of the grading system used are provided in section 3 of the NHRA. In addition, the system outlined in Heritage Western Cape's Guideline for Grading: Implications and Management was used. As per this system, heritage significance is indicated on a sliding scale:

- Grade I - National Significance
- Grade II - Regional/Provincial Significance
- Grade IIIA - High Local Significance
- Grade IIIB - Moderate Local Significance
- Grade IIIC - Low Local Significance
- NCW - Not Conservation-Worthy

Significance of Heritage Resources

A number of heritage resources located within the Ummbila Emoyeni Renewable Energy Facility development area were identified through the initial Heritage Impact Assessment process (CTS Heritage 2022). All of the identified heritage resources have been graded in terms of the provisions of section 3 of the National Heritage Resources Act and the HWC Guide on the Implications of Grading (2016). As such, the grading methodology is not repeated here.

While not exhaustive, the list of known heritage resources located within the Ummbila Emoyeni Renewable Energy Facility development area provides insight into the nature and significance of the heritage resources common in the broader area.

As per the intentions of the NHRA, the grading of a heritage resource is indicative of its cultural significance and therefore informs its management and conservation strategies.

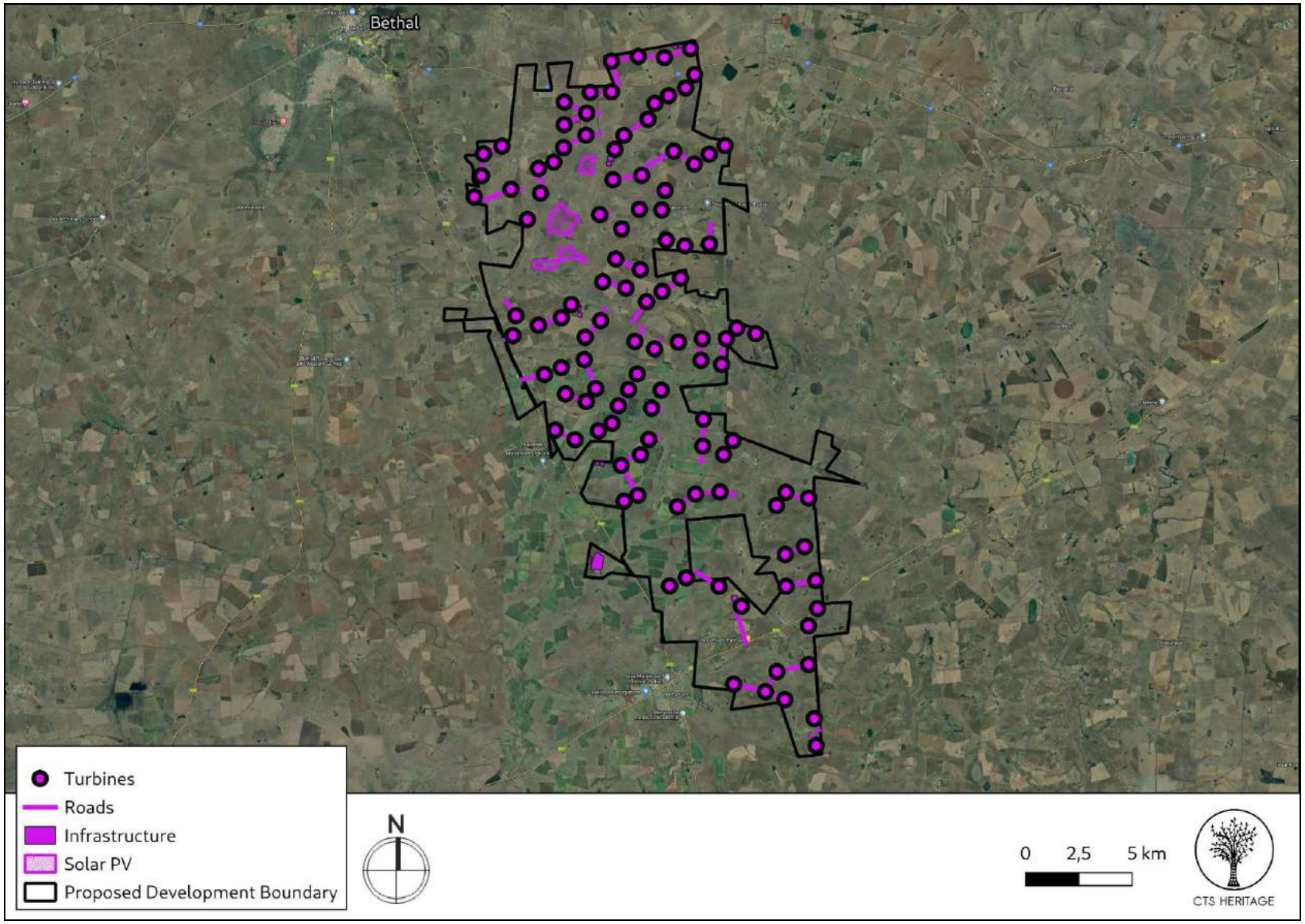


Figure 2: Ummbila Emoyeni WEF and PV Layout

1.5 Objectives of Management Plan

The purpose of this management plan is to guide the activities affecting the heritage resources to retain their significance by conserving it for future generations. A management plan is a living document in the sense that it can be updated as the situation changes and should therefore be reviewed regularly.

This management plan identifies:

- **what needs to be managed** - by surveying and recording the archaeological site in detail and summarising information on the location of sites and what they comprise;
- **who will manage the heritage resources** - by listing the people who have interests in the place and might be involved in its management;
- **the significance of the heritage** in relation to other local, provincial and national sites because the plan is designed to retain this significance;
- **key issues that must be addressed** to retain the significance through consultation with stakeholders;
- **the goals, objectives and strategies** for management and how they will be implemented; and
- **a documentation and monitoring plan** for the ruins so that any changes can be detected and the steps that have been taken can be documented.

1.6 Revision of Plan

The management plan should be reviewed every 5 years and revised as required, or as necessary when circumstances require it. Any revisions must be submitted to SAHRA for approval.

2. RECORDING AND RESEARCH

2.1 Objectives of Recording and Research

Thorough recording of archaeological and heritage sites allows site managers and heritage authorities to manage and identify the changes taking place at a site over time. The heritage resources located within this development have been previously recorded through the Heritage Impact Assessment conducted for the renewable energy facility (CTS Heritage, 2022).

It is anticipated that proposed clearance of vegetation and excavation associated with the construction of the facility and its associated infrastructure may reveal additional heritage resources that are currently hidden by the vegetation and surface soil.

The heritage resources identified within this site, and that are the subject of this management plan, are the burials and burial grounds identified in the HIA (CTS Heritage, 2022). These resources have high levels of local cultural significance and require proactive management interventions to ensure their conservation.

2.2 Background context

CTS Heritage (2022) drafted a concise background of the broader context of this area in the HIA originally drafted for the development. The background to the site is summarised here.

2.2.1 Palaeontological Background

According to the SAHRIS Palaeosensitivity Map, the area proposed for development is underlain by sediments of zero, moderate and very high palaeontological sensitivity. According to the extract from the Council of Science Map for East Rand 2628, the palaeontologically sensitive geology of the area is ascribed to the Vryheid Formation of the Ecca Group of sediments. Groenewald (2014, SAHRIS NID 167013) completed a field-based palaeontological assessment for the Waaihoek WEF in which he interrogates the palaeontological sensitivity of this formation. In this assessment, Groenewald (2014) notes that “The Vryheid Formation consists of interbedded very coarse-grained sandstone and mudstone that yields plant and trace fossils as well as some prominent coal seams.” In this assessment, Groenewald (2014) made the following recommendations for the WEF development within the Vryheid Formation “The PEA and CEO be made aware of the possibility of finding fossils in the Vryheid and Volksrust Formation sediments during excavation of the foundations for the turbines and other infrastructure. A professional palaeontologist is appointed to monitor possible palaeontological finds during excavation of turbine foundations and infrastructure where turbine

positions and infrastructure fall on Vryheid and Volksrust Formation sediments." The sediments underlying the development area have very high levels of palaeontological sensitivity, the nature of the excavations associated with Renewable Energy facilities tends to be deep and as such, the likelihood of impacting intact Vryheid Formation sediments is high. Further investigation of the palaeontological sensitivity of the development area is recommended.

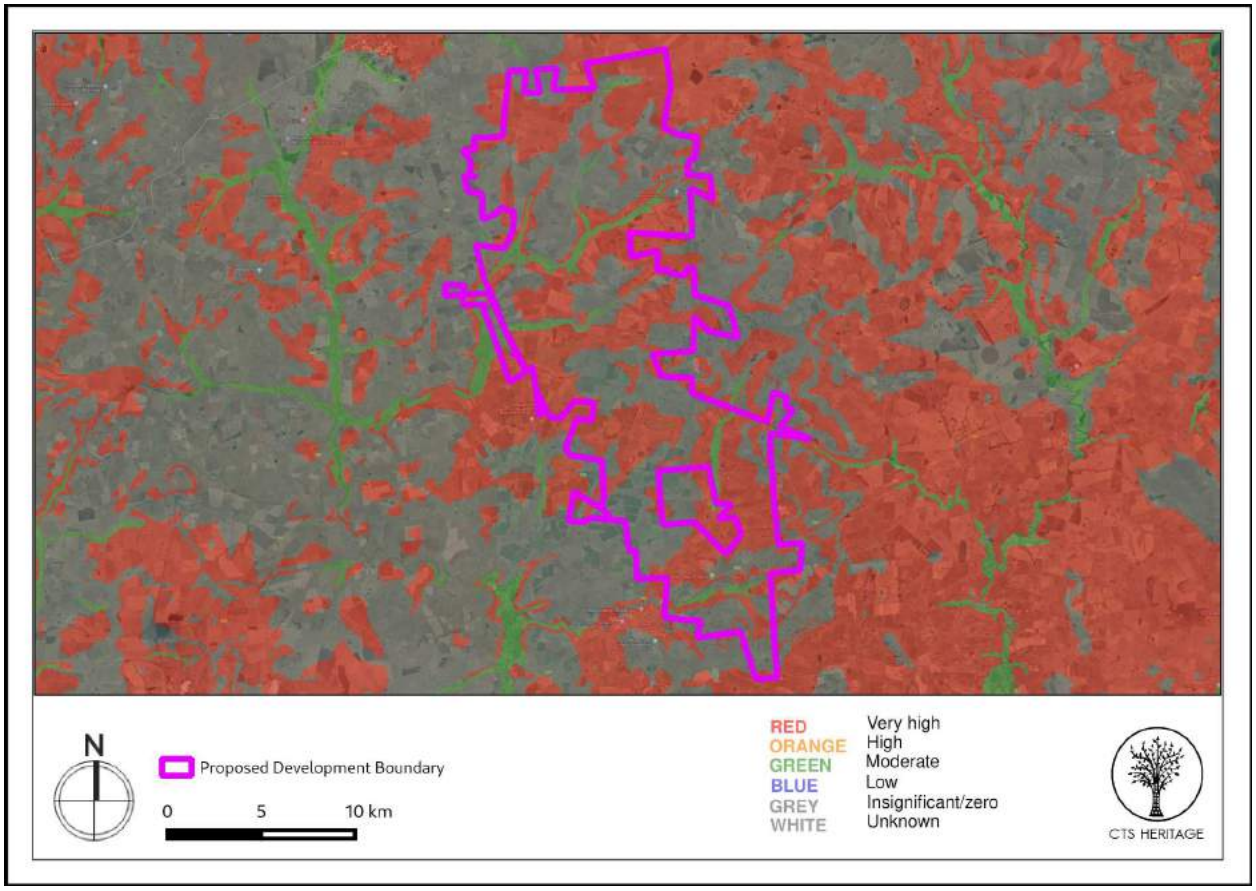


Figure 3.1: Palaeosensitivity Map. Indicating Zero to Very High fossil sensitivity underlying the study area for the facility

A PIA was completed for the renewable energy facility by Groenewald (2022). No palaeontological no-go areas have been identified within the project areas. With the exception of one fossil site of low scientific value, none of the recorded fossil sites overlaps directly with, or lies close to (< 20 m) the proposed infrastructure and no modification of the layouts through micro-siting is proposed here on palaeontological grounds.

One fossil site (UMB10) is located in close proximity to a proposed road and turbine; however, this site has low palaeontological significance and has been sufficiently recorded. No further mitigation is recommended for this site.

The potential for rare, unrecorded fossil sites of high scientific and/or conservation value is very high in the areas proposed for development located within the Vryheid Formation and where excavation depth will exceed 1.5m. These are best handled through a Chance Fossil Finds Protocol as per the recommendations below.

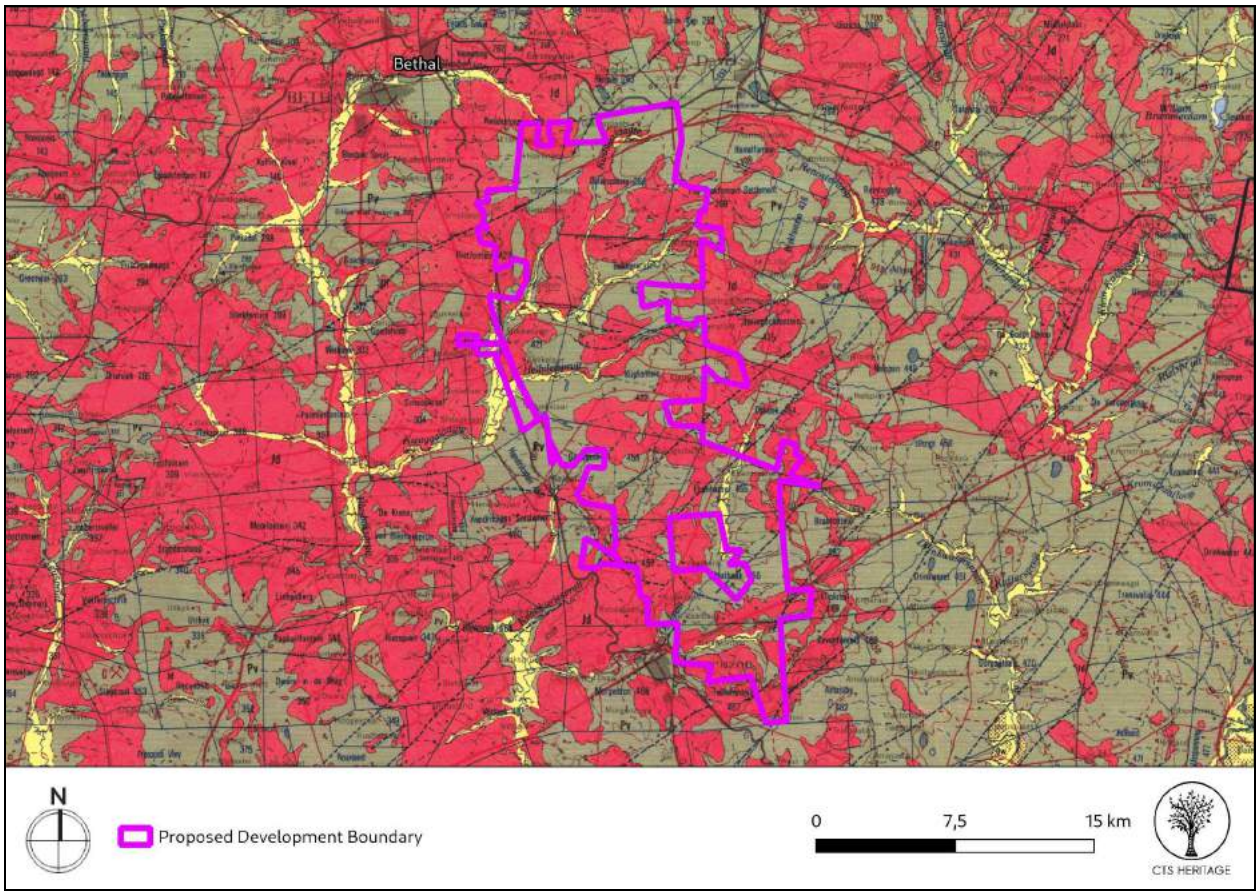


Figure 3.2: Geology Map. Extract from the CGS 2628 East Rand Map indicating that the development area for the REF development is underlain by sediments of Pv: Vryheid Formation of the Ecca Group and Jd: Jurassic Dolerite as well as Quaternary Sands

2.2.2 Archaeological Background

Heritage Impact Assessments have been completed nearby for projects in Secunda and these can be used to infer the archaeological sensitivity in the development area. Van Vollenhoven (2015) notes that the geographical area around the towns of Standerton and Bethal is not known to conserve Stone Age archaeology. He notes that "No such sites are indicated on maps contained in a historical atlas of this area (Bergh 1999: 4-5). However, this may only be since no research has actually been done in this area. The closest known Stone Age occurrences are a Late Stone Age site at the town of Ermelo and rock art sites far to the west of Standerton (Bergh 1999: 4-5)." Van Vollenhoven (2015) noted no natural shelters during the survey; however, the good vegetation in the surrounding area and the rivers indicate that ample grazing and water may have been available, making it a prime spot for hunting in the past. Therefore one may assume that Stone Age people probably would have moved through the area. Late Iron Age sites are found in a large area around the towns of Bethal and Standerton and number at least 585 such sites.

In the heritage assessment of a powerline upgrade at the nearby Syferfontein Mine, Nel & Karodia (2013), noted that "*a heritage assessment was conducted in 2000 by the National Cultural History Museum and included in the Syferfontein Mine EMP in 2010. During the survey, a few Stone Age artefacts were identified. These artefacts were not considered to have any primary context and therefore were interpreted to have low significance value. No Early Iron Age sites were identified. The Late Iron Age sites found here conform to those identified in the literature for the Southern Highveld area (former southern Transvaal, northern Orange Free State) as Type V sites. As the soil is mostly turf, Iron Age settlement usually took place on the various dolerite outcrops. The added benefit of choosing these locations was that it was located at the source of building material used in constructing the settlements. One such site shows interesting features as the living units were actually excavated to obtain enough building material for the surrounding walls. A few of the farmsteads dating to early part of this century were identified as possibly having historical-architectural significance. A number of abandoned homesteads are located in the areas that were investigated. These seem to belong to farm labourers and were all abandoned within the last few years. They are therefore not viewed to be of cultural or historical significance. However, some graves are located in the vicinity of the homesteads and it is possible that more graves will be located nearby*".

In the field assessment completed for the renewable energy facility development (CTS Heritage, 2022), no Stone Age or Iron age archaeology was identified during the field assessment. Some historical ruins and kraals of contextual historic significance, graded IIIC, were identified; however, none of these are likely to be impacted as per the layout provided.

A number of burial grounds and/or graves were identified during the field assessment (Grade IIIA) and some of these fall within areas likely to be impacted as per the proposed layout.

2.3 Heritage Resources Identified

The development area has been thoroughly assessed by CTS Heritage in the report dated August 2022. In this assessment, a number of sites of heritage significance were identified:

Sites identified during the field assessment development area

ID	Site Name	Description	Co-ordinates		Grading	Mitigation
1	Umbila Emoyeni 001	10? GRAVES Not all the cairns are intact	-26.50822222	29.57985	IIIA	No direct impact anticipated. Part of historic cluster
2	Umbila Emoyeni 002	STONE STRUCTURE Part of the historical identity of the area, including stone structures and foundations.	-26.51131389	29.57884167	IIIC	No direct impact anticipated. Part of historic cluster
3	Umbila Emoyeni 003	STONE FOUNDATION Part of the historical identity of the area, including stone structures and foundations.	-26.51185278	29.57861111	NCW	Likely to be impacted by the Solar PV Layout
4	Umbila Emoyeni 004	AREA WITH OLD STONE HOUSE STONE CIRCLES STONE KRAAL Part of the historical identity of the area, including stone structures and foundations.	-26.74378611	29.69147222	IIIC	Not impacted by the current development layout
5	Umbila Emoyeni 005	41 GRAVES Fieldstone cairns, with a few cement headstones. Headstones are marked, challenging to discern dates. Graves are situated right next to a cornfield, with a wire fence dissecting what may be more graves	-26.7268	29.68093056	IIIA	No direct impact anticipated however possibility of more burials in the area
6	Umbila Emoyeni 006	15 GRAVES Fieldstone cairns. No inscriptions that could be read. Graves are situated on top of the koppie, within the wind turbine footprint.	-26.69272778	29.67026111	IIIA	Turbine must be relocated more than 300m east of its present location
7	Umbila Emoyeni 007	OLD STRUCTURES Part of the historical identity of the area, including stone structures and foundations.	-26.51163056	29.64264722	NCW	Not impacted by the current development layout
8	Umbila Emoyeni 008	POSSIBLE GRAVE One stone cairn	-26.50435	29.59498889	IIIA	No direct impact anticipated
9	Umbila Emoyeni 009	HISTORIC YARD MIDDEN Part of the historical identity of the area, including stone structures and	-26.50869722	29.58020833	IIIC	No direct impact anticipated. Part of historic cluster

		foundations.				
10	Umbila Emoyeni 010	HISTORICAL HOUSE AND YARD Part of the historical identity of the area, including stone structures and foundations.	-26.50905278	29.58053611	IIIC	No direct impact anticipated. Part of historic cluster
11	Umbila Emoyeni 011	LARGE STONE KRAAL Part of the historical identity of the area, including stone structures and foundations.	-26.51104444	29.58501667	IIIC	No direct impact anticipated. Part of historic cluster
12	Umbila Emoyeni 012	5 GRAVES Metal cross, fieldstone cairns. Graves are along the proposed powerline route	-26.54944722	29.56575833	IIIA	No direct impact anticipated
13	Umbila Emoyeni 013	80 GRAVES Fieldstone cairns and headstones, painted cement frames and headstones, cement and concrete slabs and headstones. Some of the graves have inscriptions; dates indicated as the 1940s and 1950s. Approximately 80 graves within a rectangular packed stone border Graves are along the proposed powerline route	-26.58522222	29.60138611	IIIA	Road/grid must be realigned to ensure a minimum of a 50m no development buffer is implemented around the site
14	Umbila Emoyeni 014	HISTORICAL PUMP	-26.58596389	29.60083611	NCW	No direct impact anticipated
15	Umbila Emoyeni 015	SITE SURFACE SCATTERS METAL Surface scatters of glass, large metal objects, farm implements and a cast-iron pot. Could be associated with the graveyard at WP 013 GR	-26.58672222	29.59949444	IIIC	No direct impact anticipated

These sites have been mapped in Figure 4 below.

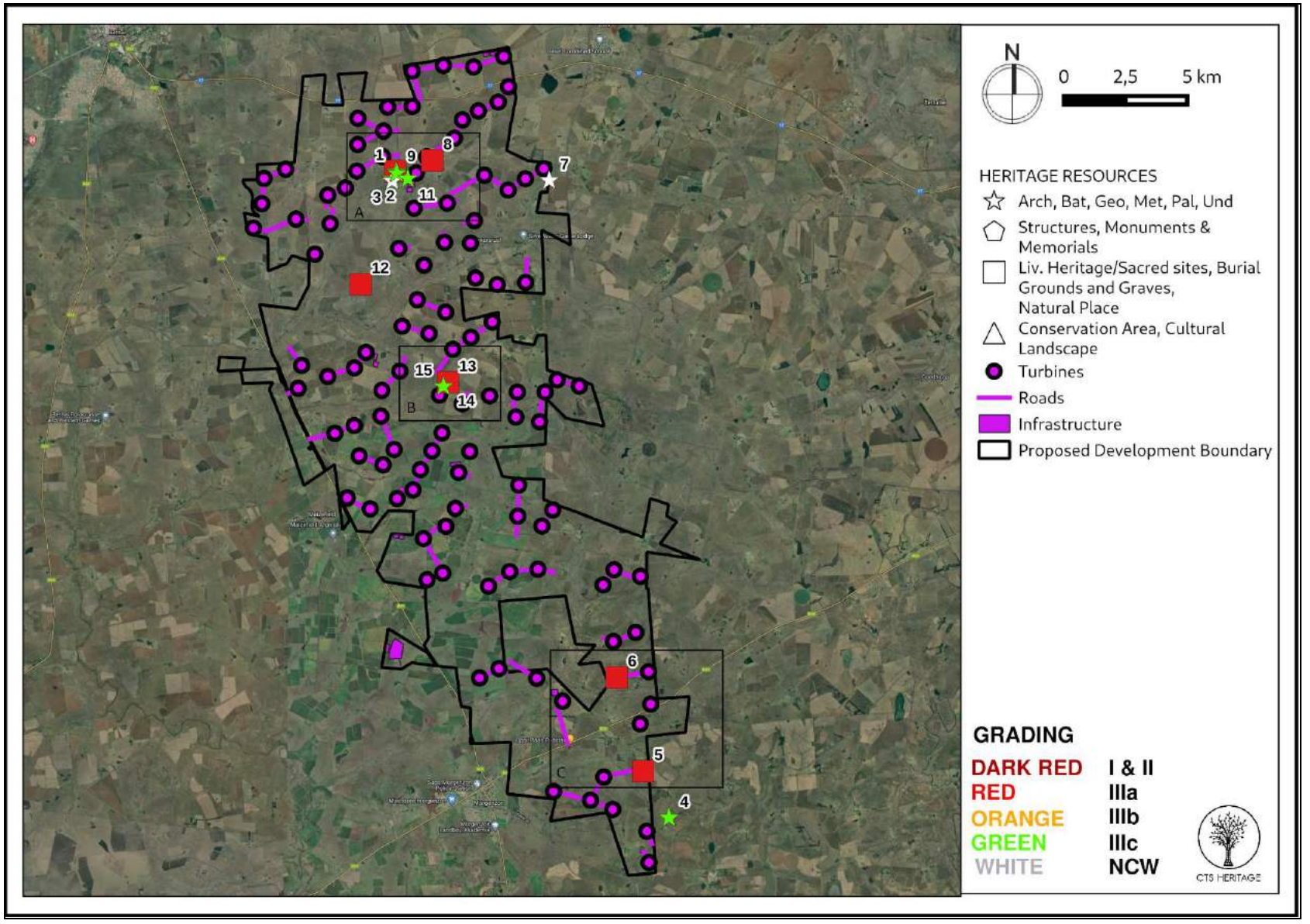


Figure 4.: Map of archaeological heritage resources within the proposed development area

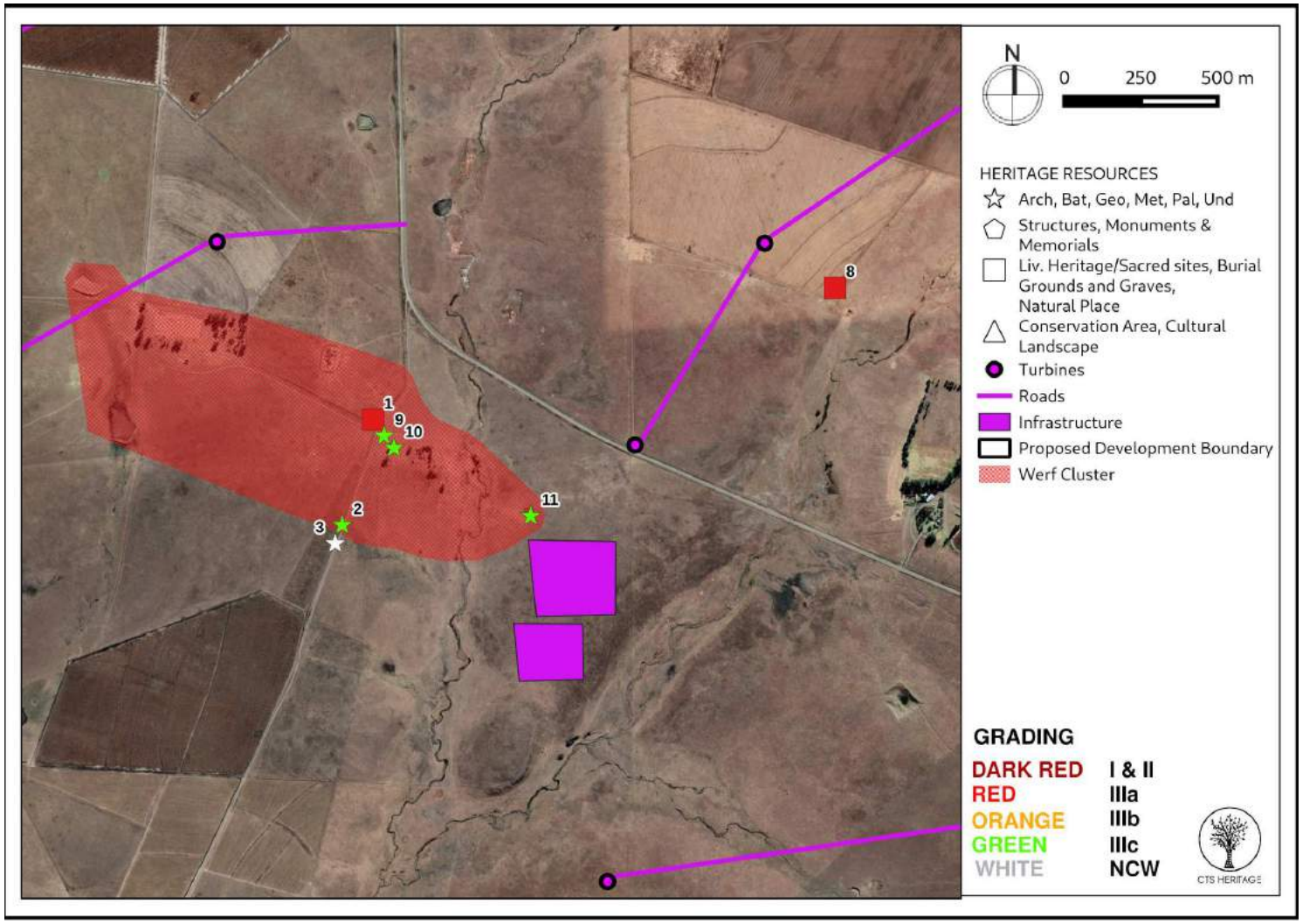


Figure 4.1: Map of all sites and observations noted within the development area - Inset A

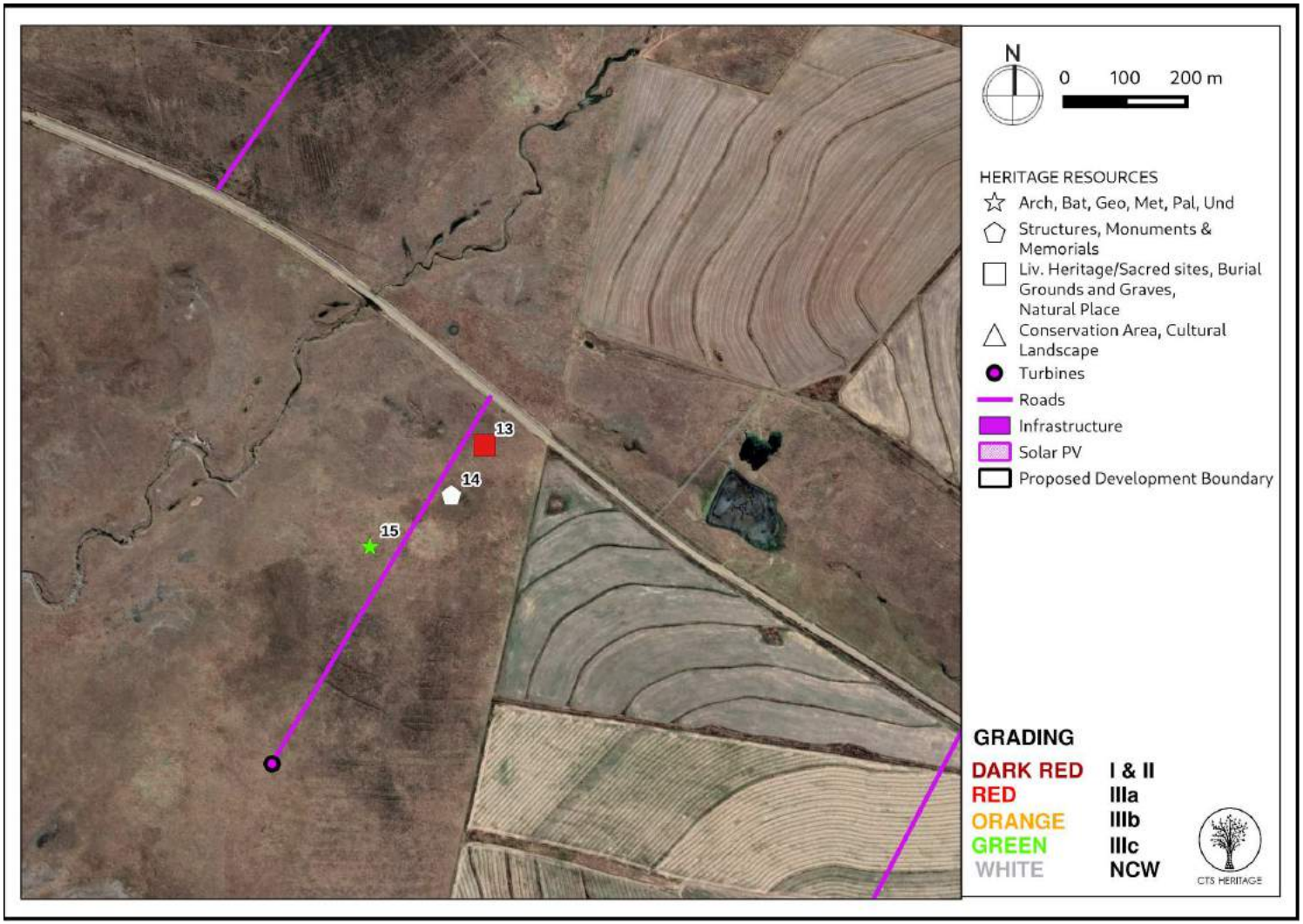


Figure 4.2: Map of all sites and observations noted within the development area - Inset B

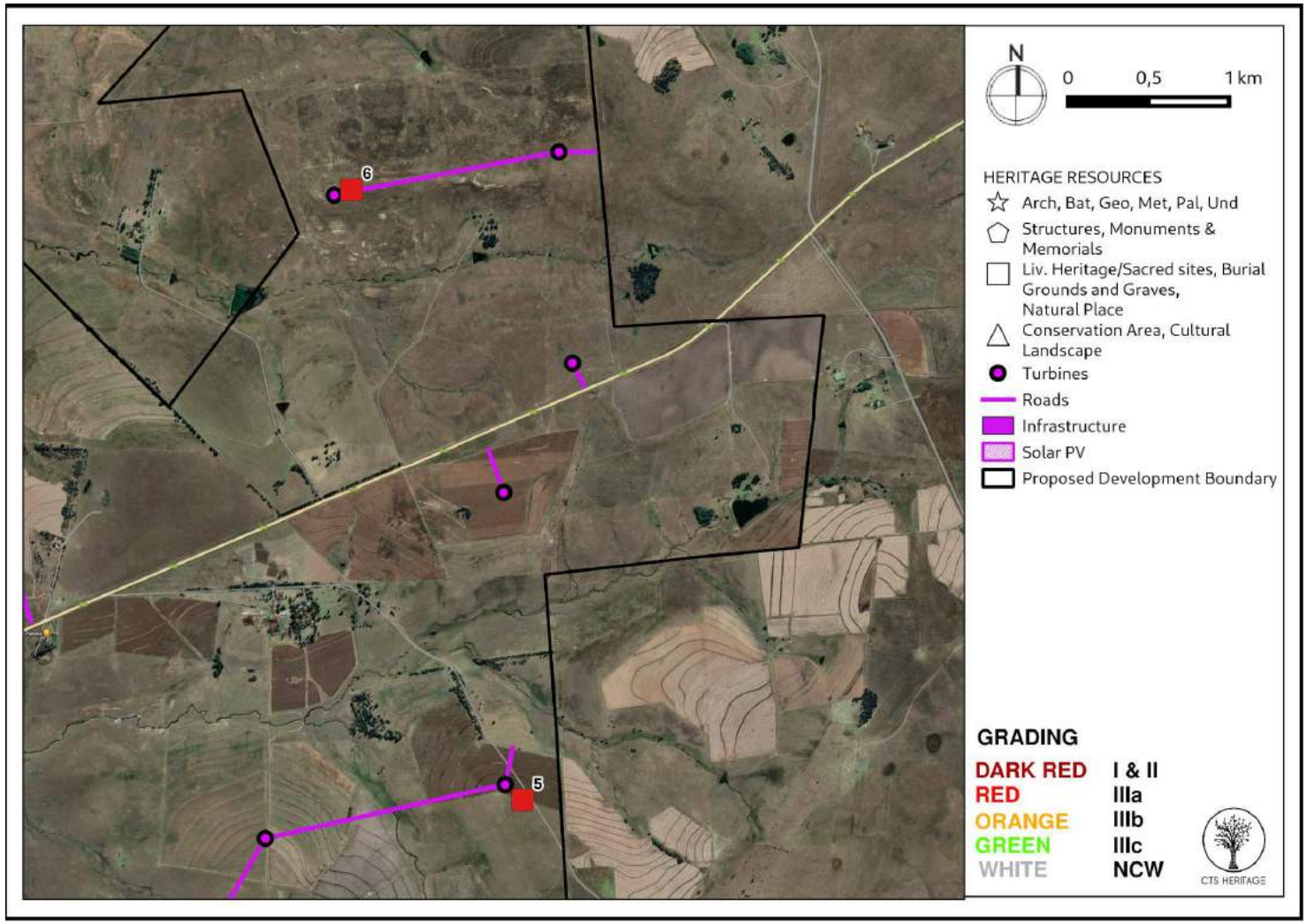


Figure 4.3: Map of all sites and observations noted within the development area - Inset C

3. SITE MANAGEMENT

3.1 Objectives of site management

The objectives of the heritage management plan for the Renewable Energy Facility are to ensure that the heritage resources identified within the area proposed for the development are properly conserved and any further impacts to these heritage resources are appropriately managed.

The Heritage Management Plan identifies the steps required for the appropriate management of these heritage resources including:

- Regular monitoring of the physical integrity of the identified heritage resources
- Details regarding procedures and processes to follow in the event of negative impact to identified or new heritage resources during the construction or operational phases of the development
- Mitigation of potential impacts resulting from the construction, operational and decommissioning phases to the identified heritage resources

3.2 Potential Impacts to identified heritage resources

A. Construction Phase

- ***Palaeontology***

The final layout does not impact any known palaeontological heritage resources. The construction of any infrastructure that requires excavation into bedrock or is located at sites of surface exposures of bedrock may have **high** impacts to fossil resources and as such, the attached Chance Fossil Finds Procedure (Appendix 2) must be implemented. However, due to the lack of irreplaceable, unique or rare fossils within the development footprint, and the extensive superficial deposits overlying the sensitive deposits, the significance of the overall impact of the development is expected to be **very low.**

- ***Archaeology***

The final layout does not impact any known archaeological heritage resources of significance. Stone Age archaeology is very sparse in this area, with only a very few, isolated artefacts found in the vicinity of the development footprint.

- ***Burial Grounds and Graves***

A number of significant burial sites have been identified within the development area. High cultural value is placed on human remains and as such, no impact to these sites can take place. There is a high risk of accidental impact or disturbance to these sites during the construction phase of

development. Recommendations pertaining to the management of impact to these sites are included below. Furthermore, buried burial grounds or graves may be accidentally uncovered during this phase.

- ***Built Environment***

The final layout does not impact any known structures directly. Structures of low significance have been identified within the development area; however no impact to these structures is anticipated. Should it be necessary that structures that have been graded or structures that are older than 60 years require alteration or demolition during this phase, MPHRA must be contacted regarding permission in terms of section 34 of the NHRA. Contact details are provided in Appendix 1.

B. Operational Phase

- ***Palaeontology***

Operational activities will not impact any known palaeontological heritage resources and impacts are unlikely during the operational phase. Should any palaeontological heritage be accidentally uncovered during this phase, the Chance Fossil Finds Procedure (Appendix 2) must be implemented.

- ***Archaeology***

Operational activities will not impact any known archaeological heritage resources of significance and impacts are unlikely during the operational phase. Should any archaeological resources be accidentally uncovered during this phase, SAHRA must be contacted regarding a way forward. Contact details are provided in Appendix 1.

- ***Burial Grounds and Graves***

A number of significant burial sites have been identified within the development area. High cultural value is placed on human remains and as such, no impact to these sites can take place. Allowance must be made for access to these burial sites by relatives and relevant communities. Recommendations pertaining to the management of impact to these sites are included below.

Other than this, operational activities will not impact any known burial grounds or graves and impacts are unlikely during the operational phase. Should any burial grounds or graves be accidentally uncovered during this phase, SAHRA must be contacted regarding a way forward. Contact details are provided in Appendix 1.

- ***Built Environment***

Operational activities will not impact any known structures directly and impacts are unlikely during the operational phase. Should it be necessary that structures that have been graded or structures

that are older than 60 years require alteration or demolition during this phase, HFS must be contacted regarding permission in terms of section 34 of the NHRA. Contact details are provided in Appendix 1.

C. Decommissioning Phase

- ***Palaeontology***

Infrastructure removal should not impact any known palaeontological heritage resources and impacts are unlikely during the decommissioning phase. Should any palaeontological heritage be accidentally uncovered during this phase, the Chance Fossil Finds Procedure (Appendix 2) must be implemented.

- ***Archaeology***

Infrastructure removal should not impact any known archaeological heritage resources of significance and impacts are unlikely during the decommissioning phase. Should any archaeological resources be accidentally uncovered during this phase, SAHRA must be contacted regarding a way forward. Contact details are provided in Appendix 1.

- ***Burial Grounds and Graves***

Infrastructure removal should not impact any known burial grounds or graves and impacts are unlikely during the decommissioning phase. Should any burial grounds or graves be accidentally uncovered during this phase, SAHRA must be contacted regarding a way forward. Contact details are provided in Appendix 1.

- ***Built Environment***

Infrastructure removal should not impact any known structures directly and impacts are unlikely during the decommissioning phase. Should it be necessary that structures that have been graded or structures that are older than 60 years require alteration or demolition during this phase, HFS must be contacted regarding permission in terms of section 34 of the NHRA. Contact details are provided in Appendix 1.

3.3 Conservation and management requirements

Mitigation measures to reduce the anticipated negative impacts to the identified heritage resources during the various phases of the development include:

- A 500m no development buffer should be implemented on either side of the N17, R35 and R39
- A 200m no development buffer should be implemented on either side of the secondary routes that run through the development area
- A 500m no development buffer must be implemented around the identified farm werfs

- 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 developed prior to construction, 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. *This document satisfies this requirement*
- The historic farm werf cluster is not impacted by the development.
- Turbine 101 must be relocated 300m east along the road alignment to ensure that no human remains are impacted by the development.
- The road to Turbine 60 must be relocated to ensure that a no-development buffer of at least 50m is implemented around the burial site 013 so that no impact takes place.
- The Chance Fossil Finds Procedure (Appendix 3) must be strictly adhered to for excavations exceeding 1.5m located within the Vryheid Formation
- Although all possible care has been taken to identify sites of cultural importance during the investigation of the study area, it is always possible that hidden or subsurface sites could be overlooked during the assessment. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils, burials or other categories of heritage resources are found during the proposed development, work must cease in the vicinity of the find and SAHRA must be alerted immediately to determine an appropriate way forward.

3.4 Consultation

The main stakeholders for the site currently are the owners of the property, the Local Authorities, the managers of the facility and the heritage authority for the Mpumalanga Province (SAHRA and MPHRA).

Additional stakeholders include the present occupants of the property as well as the relatives and relevant community members associated with the burial sites identified within the development area.

4. MONITORING

4.1 Objectives of Monitoring

The following recommendations are made for long-term management of the identified heritage resources to conserve the significance of the place as part of the irreplaceable history and shared cultural heritage of the landscape. The following management goals provide guidelines for use and maintenance of the heritage, acceptable physical protection and conservation, visitor education, monitoring and research.

4.2 Monitoring and Site Maintenance

Action	Responsible party	Performance Indicators	Evidence
CONSTRUCTION PHASE			
All site crew should be informed of the heritage significance of the resources in the study area	ECO	Once-off meeting held with site crew	Minutes of meeting
All sites within the development area should be inspected by the ECO during the construction phase to ensure they are being respected and that no impact takes place	ECO	Site inspections conducted at all sites at regular intervals	Monthly Site Inspection and Monitoring Report to be submitted to SAHRA
All burial sites must be fenced using clearview fencing to ensure visual permeability and continuity in terms of sense of place. A gate must be created for access purposes for relatives and relevant community members. The position of this gate must be such that it can be accessed without risk to the renewable energy facility. This fencing must be placed 5m from the nearest identifiable burial.	ECO	Fences appropriately erected with gates	Existing fences with gates
No impact may take place within the fenced area. All development associated with the facility must take place more than 45m from the erected fence providing a 50m buffer between the burials and construction activities as per the recommendations in the HIA	ECO	Site inspections conducted at all sites at regular intervals	Monthly Site Inspection and Monitoring Report to be submitted to SAHRA
Contact must be made with the present and past occupants of the property in order to identify relevant relatives of the deceased	ECO	Engagement with occupants and family members	Contact list for visitors

and relevant community members. A list of relevant relatives and community members that are likely to want access to the burial sites must be compiled and lodged with the WE Facility management. The individuals on this list will have access to the burial sites as required.			
Significant fossil finds to be reported to the South African Heritage Resources Agency (SAHRA) for recording and sampling by a professional palaeontologist;	ECO	Implementation of the Chance Fossil Finds Procedure	Written correspondence with relevant heritage authority regarding the find and minutes of relevant meetings
Implementation of the Chance Fossil Finds Procedure	ECO	Implementation of the Chance Fossil Finds Procedure	Written correspondence with relevant heritage authority regarding the find and minutes of relevant meetings
If any archaeological material or human burials are uncovered during the course of development, then work in the immediate area should be halted at once. The find should be reported to the heritage authorities (SAHRA) and may require inspection by an archaeologist to determine whether mitigation should take place and what form that mitigation should take.	ECO	No unplanned impact or unplanned impact managed Halted within 4 hours	Written correspondence with relevant heritage authority regarding and minutes of relevant meetings
Should it be necessary that structures that have been graded or structures that are older than 60 years require alteration or demolition during this phase, HFS must be contacted regarding permission in terms of section 34 of the NHRA. Contact details are provided in Appendix 1.	ECO	Section 34 permit application to MPHRA	Permit issued in terms of section 34 from the relevant heritage authority or correspondence in this regard.
OPERATIONAL PHASE			
Keep all disturbance within existing development footprint and ensure identified buffers and no-go areas are adhered to	Site Manager	No unplanned impact or unplanned impact managed halted within 4 hours	Site Inspection every 5 years and Monitoring Report to be submitted to SAHRA

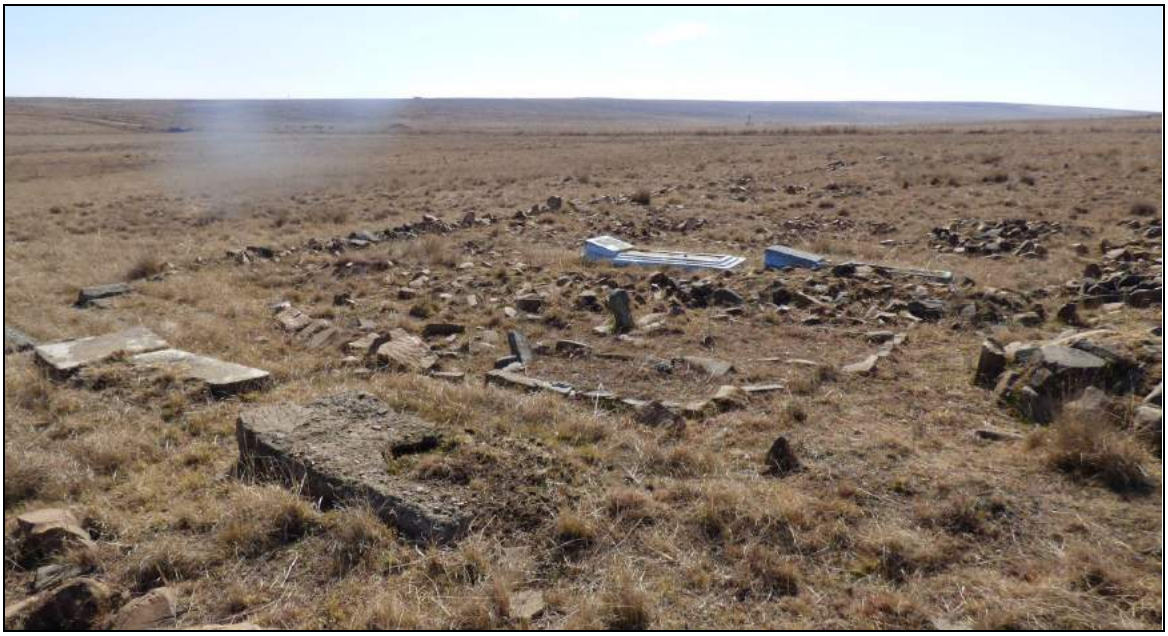
All site crew should be informed of the heritage significance of the resources in the study area	Site Manager	Meeting held with site crew	Minutes of meeting
Visitors are to be allowed access to the burial sites as per the list of identified relatives and community members. A visitor protocol must be developed and implemented	Site Manager	Record of names and dates of visitors to be kept Visitor protocol to be developed.	Database of names and dates of visitors to the burial sites
Implementation of the Chance Fossil Finds Procedure	Site Manager	Implementation of the Chance Fossil Finds Procedure	Written correspondence with relevant heritage authority regarding finds and minutes of relevant meetings
If any archaeological material or human burials are uncovered during the course of operations, then work in the immediate area should be halted at once. The find should be reported to the heritage authorities (SAHRA) and may require inspection by an archaeologist to determine whether mitigation should take place and what form that mitigation should take.	Site Manager	No unplanned impact or unplanned impact halted within 4 hours	Written correspondence with relevant heritage authority regarding finds and minutes of relevant meetings
Should it be necessary that structures that have been graded or structures that are older than 60 years require alteration or demolition during this phase, HFS must be contacted regarding permission in terms of section 34 of the NHRA. Contact details are provided in Appendix 1.	Site Manager	Section 34 permit application to MPHRA	Permit issued in terms of section 34 from the relevant heritage authority or correspondence in this regard.
DECOMMISSIONING PHASE			
Keep all disturbance within existing development footprint and ensure identified buffers and no-go areas are adhered to	Site Manager/ECO	No unplanned impact or unplanned impact managed halted within 4 hours	Monthly Site Inspection and Monitoring Report to be submitted to SAHRA
All site crew should be informed of the heritage significance of the resources in the study area	Site Manager/ECO	Meeting held with site crew	Minutes of meeting
Implementation of the Chance Fossil Finds Procedure	Site Manager/ECO	Implementation of the Chance Fossil Finds Procedure	Written correspondence with relevant heritage authority regarding

			and minutes of relevant meetings
If any archaeological material or human burials are uncovered during the course of operations, then work in the immediate area should be halted at once. The find should be reported to the heritage authorities (SAHRA) and may require inspection by an archaeologist to determine whether mitigation should take place and what form that mitigation should take.	Site Manager	No unplanned impact or unplanned impact halted within 4 hours	Written correspondence with relevant heritage authority regarding and minutes of relevant meetings
Should it be necessary that structures that have been graded or structures that are older than 60 years require alteration or demolition during this phase, HFS must be contacted regarding permission in terms of section 34 of the NHRA. Contact details are provided in Appendix 1.	Site Manager	Section 34 permit application to HFS	Permit issued in terms of section 34 from the relevant heritage authority or correspondence in this regard.

4.3 Guide on how to identify marked and unmarked burials and how to proceed should previously unidentified burials be uncovered during the construction process

4.3.1 Marked Burials

Marked burials are visible on the ground surface and are often marked by headstones or markers, or by cement blocks. Historic and modern burials are usually fenced or walled, and can be clearly discerned.



Sometimes, especially in more rural areas, burials are marked by piles of stones stacked on top of eachother, laid out parallel to one another. Often, burials are oriented in an east-west direction to reflect the movement of the sun.

4.3.2 Unmarked Burials

Unmarked burials will not be visible from the ground surface, and often the only evidence of human remains is once the skeletal material itself is disturbed.

During excavation activities, the site foreman must be aware of any changes or variation in soil colour or texture. Often, the soil immediately surrounding buried human remains is dense and rich in nutrients. Buried human skeletal material is soft to the touch, and often orange in colour, and can break very easily.

4.3.3 How to proceed

At the first signs of any skeletal material in the construction phase, work must cease at the site of the observation, the area must be cordoned off and SAHRA and SAPS must be contacted to complete a site inspection. As noted in the comment from SAHRA, "If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Ngqabutho Madida 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. Non-compliance with section of the NHRA is an offence in terms of section 51(1)e of the NHRA and item 5 of the Schedule."

The site inspection should determine: whether or not the skeletal material is:

- Modern (SAPS) or
- Archaeological (older than 60 years, SAHRA)

Should the human remains be determined to be younger than 60 years, SAPS must determine the way forward. Should the human remains be older than 60 years, SAHRA must determine the way forward.

It must first be noted that human remains have very high levels of social cultural value and as such, the removal of human remains from their place of internment must be considered a last resort. It is preferable to leave the human remains *in situ* and relocate infrastructure. Should it be impossible to relocate the infrastructure, for any reason, application must be made to relocate the human remains.

Should the skeletal material be determined to be older than 60 years but younger than 100 years, the processes for applying for a permit to impact burial grounds and graves as per section 36 of the NHRA and as per the guidelines published by SAHRA must be followed.

Should the skeletal material be determined to be older than 100 years, the processes for applying for a permit to excavate archaeological material remains as per section 35 of the NHRA and as per the guidelines published by SAHRA must be followed.

5. APPLICABLE LEGISLATION

The development of the Wind Energy acility triggers sections 38(1) and 38(8) of the National Heritage Resources Act (Act 25 of 1999) as this proposed development constitutes a change of character to a site exceeding 5000m^2. As such, this proposed development requires an evaluation of impacts to heritage resources in terms of other legislation (NEMA). This section states that the consenting authority must ensure that the assessment completed for impacts to heritage satisfies the requirements of the relevant heritage authority in terms of section 38(3) of the NHRA (SAHRA in Mpumalanga), and that the recommendations of the relevant heritage authority must be taken into consideration prior to the granting of consent.

Section 38(3) of the NHRA details the information that MUST be included in a Heritage Impact Assessment drafted in terms of section 38 of the NHRA. Furthermore, SAHRA has published Minimum Standards for Archaeological and Palaeontological Impact Assessments. All such guidelines and minimum standards have been complied with in the HIA that was conducted for the Ummbila Emoyeni Renewable Energy Facility (CTS Heritage, 2022).

In terms of section 38(10) of the NHRA, if the applicant complies with the recommendations and requirements of the relevant heritage authority issued in terms of section 38(8) of the NHRA, then the applicant MUST be exempted from compliance with all other (general) protections included in the NHRA. As such, as long as the requirements of the heritage authority are satisfied, no permit application is required for the destruction of or impact to any heritage resource ***that has been identified in the HIA.***

In the instance of the Section 38 process followed for the Ummbila Emoyeni WEF, PV Facility and EGI, no further additional specific conditions are provided for the development in the comments received from SAHRA.

Should any heritage resources be newly uncovered during excavation activities ie. heritage resources that were not identified in the HIA, then as per the monitoring table above, work must cease in that area and the relevant heritage authority must be contacted regarding a way forward. Any alteration

or destruction to or of heritage resources NOT anticipated in the HIA remains subject to the general protections and require permission from the relevant heritage authority.

- Impacts to any structures older than 60 years require a permit from MPHRA (Mpumalanga) in terms of section 34 of the NHRA
- Impacts to archaeological or palaeontological heritage not anticipated in the HIA requires a permit from SAHRA (Mpumalanga) in terms of section 35 of the NHRA
- Impacts to burial grounds or graves that are older than 60 years requires a permit from SAHRA (Mpumalanga) in terms of section 36 of the NHRA

6. DOCUMENTATION AND MONITORING

All site record sheets, digital photos and mapping have been loaded securely to SAHRIS so that the EA holder, site manager and ECO are able to access the information online. Access to the database is governed by SAHRA and certain categories of information are not freely available to the general public without special permission such as GPS coordinates of archaeological sites.

Please see the following links for information:

- Case Application on SAHRIS - WEF (Case ID 18576) https://sahris.sahra.org.za/cases/ummbila-emoyeni-renewable-energy-wind-facilities-mpumalanga-province
- Case Application on SAHRIS - PV (Case ID 18577) https://sahris.sahra.org.za/cases/ummbila-emoyeni-renewable-energy-solar-pv-facilities-mpumalanga-province
- Case Application on SAHRIS - EGI (Case ID 18578) https://sahris.sahra.org.za/cases/ummbila-emoyeni-renewable-energy-facilities-egi-mpumalanga-province

It is important that any new or previously unrecorded heritage resources identified during the course of the Construction, Operational or Decommissioning Phases are recorded on SAHRIS.

7. REFERENCES

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
157393	Heritage Statement	Shahzaadee Karodia Khan, Johan Nel	01/02/2014	HERITAGE STATEMENT FOR THE BASIC ASSESSMENT UNDERTAKEN FOR A POWERLINE UPGRADE, SYFERFONTEIN MINE, SECUNDA, MPUMALANGA PROVINCE
358403	HIA Phase 1	Anton van Vollenhoven	10/08/2015	A report on a Cultural Heritage Impact Assessment for the Development of a De-stoning Plan at the New Denmark Colliery, close to Standerton, Mpumalanga Province
5014	AIA Phase 1	Julius CC Pistorius	01/06/2007	A Phase 1 Heritage Impact Assessment Study for the Proposed New 88 kV Power Line Running from the Majuba Power Station near Amersfoort to the Camden Power Station near Ermelo in the Mpumalanga Province
5059	AIA Phase 1	Johnny Van Schalkwyk	01/05/2003	Archaeological Survey of a Section of the Secunda-Mozambique Gas Pipeline Bethal and Highveld Ridge
5700	AIA Phase 1	Johnny Van Schalkwyk	01/10/2002	A Survey of Cultural Resources for the Proposed New Tutuka-Alpha Standerton Power Transmission Line, Standerton District
7920	AIA Phase 1	Johnny Van Schalkwyk	01/02/2004	Heritage Impact Assessment for the Planned Sivukile Extension 4 Township Lekwa Municipality

APPENDICES

APPENDIX 1:

A Summary of the SAHRA Minimum Standards for Archaeological Site Museums and Rock Art Sites open to the Public

The archaeological heritage of South Africa is unique and it is non-renewable. Archaeological sites, including those with rock paintings or rock engravings, are especially vulnerable to damage caused by visitors. All such sites are protected by the National Heritage Resources Act (Act No. 25 of 1999). Anyone opening a site to the public, either as a formal site museum or simply as a place of interest, must take basic precautions to ensure the safety of the site and its contents. This guide is also applicable to mitigate the negative impacts of increased human activity in proximity to significant archaeological sites.

Expert advice should be sought from the South African Heritage Resources Agency (SAHRA) and/or from one of the museums or university departments listed below. Interventions should be reversible and the integrity of the site should be maintained as far as possible. No site should be opened to the public without a prior professional investigation that includes a conservation management plan approved by the appropriate heritage agency and, for rock art sites, complete documentation in case of later damage.

Remember that a permit is required for ANY disturbance at an archaeological site for activities that fall outside of those activities assessed in a formal Heritage Impact Assessment process and this includes erecting noticeboards, boardwalks, fences, etc. Liaison with the local publicity office and regional services council is recommended.

THE FOLLOWING MINIMUM STANDARDS MUST FORM PART OF THE MANAGEMENT PLAN:

1. Notify SAHRA of intention to open site

2. Engage a professional with specialist knowledge to document the site, draw up a conservation management plan and advise on interpretation of the site.

3. Approach to the Site

3.1 Arrangements for visiting

* if the site is open at all times, there should be adequate signposting;

* if the site is kept locked, there should be clear arrangements for the collection and return of a key;
* if it is open only by appointment, there should be a specialist guide or a specially trained local guide who has had clear instructions on what to do and say.

3.2 Provision for vehicles

* there should be an adequate and well-maintained road, preferably paved to limit dust, with off-road parking;
* the parking should not encroach on the site: vehicles should not park closer than about 100 m from the edge of the site;
* the parking area should be marked by a barrier between it and the start of the path.

3.3 Facilities

* there should be a litter bin at the parking lot and it should he emptied regularly;
* consider the need for toilets and the supply of refreshments and other facilities such as a shop, public telephone, restroom, etc., depending on the number of visitors expected;
* consider the need to establish an interpretive centre separate from the site, where people can see displays and where you may be able to store material, provide accommodation, etc. Remember that a permit from HWC is required to collect any archaeological material and so displays are best done in collaboration with a professional or institution.

3.4 Design of the path

* make sure that the path to the site is distinct;
* the path should follow the contours to avoid unnecessary erosion of any hill slope;
* make sure there are discreet signs to indicate direction where the path crosses a rocky area;
* the path should not enter the site at a position where the deposits or the rock art can be damaged;
* the introductory notice board should be displayed at the end of the path and the beginning of the site, where it will not interfere with good photographic views.

4. Provision of Information

* at least an introductory notice board explaining that the site is protected by law;
* where appropriate, a display with more detailed information on what can be seen at the site and what it means;

* a visitors' book in a container to protect it from the weather, or at a farmhouse or other convenient place (copies of these can be sent to HWC for record purposes);
* a leaflet or pamphlet explaining visitor etiquette.
* an explanatory leaflet or pamphlet that is specific to the site.

5. Guides

* specialist guides or specially trained local guides ensure that the meaning of the rock art or, in the case of archaeological sites, the story of the people who used the site is interpreted and so enhance the experience for the visitor. They also teach appropriate visitor etiquette and contribute to the safety of the site.

6. Protection of the Site

* measures used to protect archaeological deposits should be effective, reversible and recognisable, yet harmonious. It is important that visitors appreciate that the site is being well looked after, so it should be clean and as natural as possible. Remember that a permit is required for any disturbance or intervention at a site.

7. Protection of the Art

* a psychological or physical barrier should be set up between the visitor and the rock art, or display area, in the form of anything from a low wooden railing to a fence that encloses the entire site, depending on the vulnerability of the site or precautions necessary for the safety of the visitor;
* boardwalks are recommended and may include railings. They must be of treated wood or non-flammable material,
* every effort should be made to remove graffiti from the site, as it attracts more graffiti. A permit is required to remove graffiti at a rock art site.

8. Protection of the Surface and Deposits

* an effective cover should be put on the floor of the site to prevent dust being kicked up and damaging rock art and to stop people picking up material on the surface. Cover can be provided by a boardwalk, geotextile, or medium to large slabs of natural rock from the surrounds of the site.
* excavated sections should be backfilled, in consultation with HWC

9. Regular Maintenance

* arrangements should be made with the appropriate heritage agency or museum for a monitoring programme.

* provision should be made for regular visits to the site by the manager or property owner to check on litter, damage, graffiti, etc., which should be reported to the heritage agency.
* there should be regular monitoring of vegetation around the site so that, if necessary:
    - measures can be taken to protect it against trampling,
    - potentially dangerous plants such as those with thorns can be controlled,
    - dead wood can be removed so that damage by veld fires can be avoided,
    - firebreaks can be maintained.

10. Avoid having:

* a litter bin on site unless very large groups are catered for;
* braai or picnic places on the site or right next to it;
* camping places within 500 m of an archaeological site;
* plastic sheeting or plastic bags exposed to view unless there is no other option;
* concrete barriers or surfaces;
* metal poles or wire in contact with rock shelter or cave walls as they rust and stain the rock;
* a sandy surface on the outer side of a fence as this will be eroded by people walking there and the fence will be under-cut.

11. Contact Information

South African Heritage Resources Agency (SAHRA)

Contact Person: Mr Phillip Hine

Tel: 021 462 4502

Email: phine@sahra.org.za

Website: www.sahra.org.za

Mpumalanga PHRA

Contact Person: Mr Benjamin Moduka

Tel: 013 766 5196

Email: bmoduka@mpg.gov.za

National Museum of Bloemfontein

Contact Person: Dr Will Archer

Tel: +27 51 447 9609

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Website: www.nasmus.co.za

University of Cape Town: Archaeology Department

Contact Person: Prof. Deano Stynder

Tel: 021 650 2353

Email: deano.stynder@uct.ac.za

Website: http://www.archaeology.uct.ac.za/

APPENDIX 2:

Chance Fossil Finds Procedure

APPENDIX K:
UMMBILA EMOYENI PHASE ONE WIND ENERGY FACILITY
MPUMALANGA, SOUTH AFRICA
BIODIVERSITY MANAGEMENT PLAN
BATS

UMMBILA EMOYENI ONE WIND ENERGY FACILITY
MPUMALANGA, SOUTH AFRICA
BIODIVERSITY MANAGEMENT PLAN
BATS

April 2023

Produced for
Ummbila Emoyeni (Pty) Ltd

Produced by
Camissa Sustainability Consulting

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Annexure 1: Results of Step 2 - Determine Species Sensitivity

Annexure 2: Results of Step 3 - Determine Overall Risk and Priority Species

1 INTRODUCTION

Ummbila Emoyeni (Pty) Ltd has received an environmental authorisation for the construction and operation of the Ummbila Emoyeni One wind farm in the Mpumalanga province, South Africa. The wind farm will consist of 25 Gold Wind turbines (Figure 1) which will have a hub height of 130 m and rotor diameter of 183.4 m. The minimum and maximum blade sweep height is 38.3 m and 221.7 m respectively.

As part of the EIA requirements, a Biodiversity Management Plan (BMP) has been developed to manage impacts of the project on bats during operation of the facility. This document describes how this will be achieved, and accordingly, the objectives of this BMP are to:

1. Define and identify priority bat species.
2. Present an adaptive management framework that will enable the project to manage impacts with respect to priority bat species.
3. Provide biologically meaningful fatality thresholds for priority species.
4. Describe how impacts to bats will be monitored during operation of the wind farm
5. Outline a mitigation strategy if thresholds are exceeded based on the results of operational monitoring.

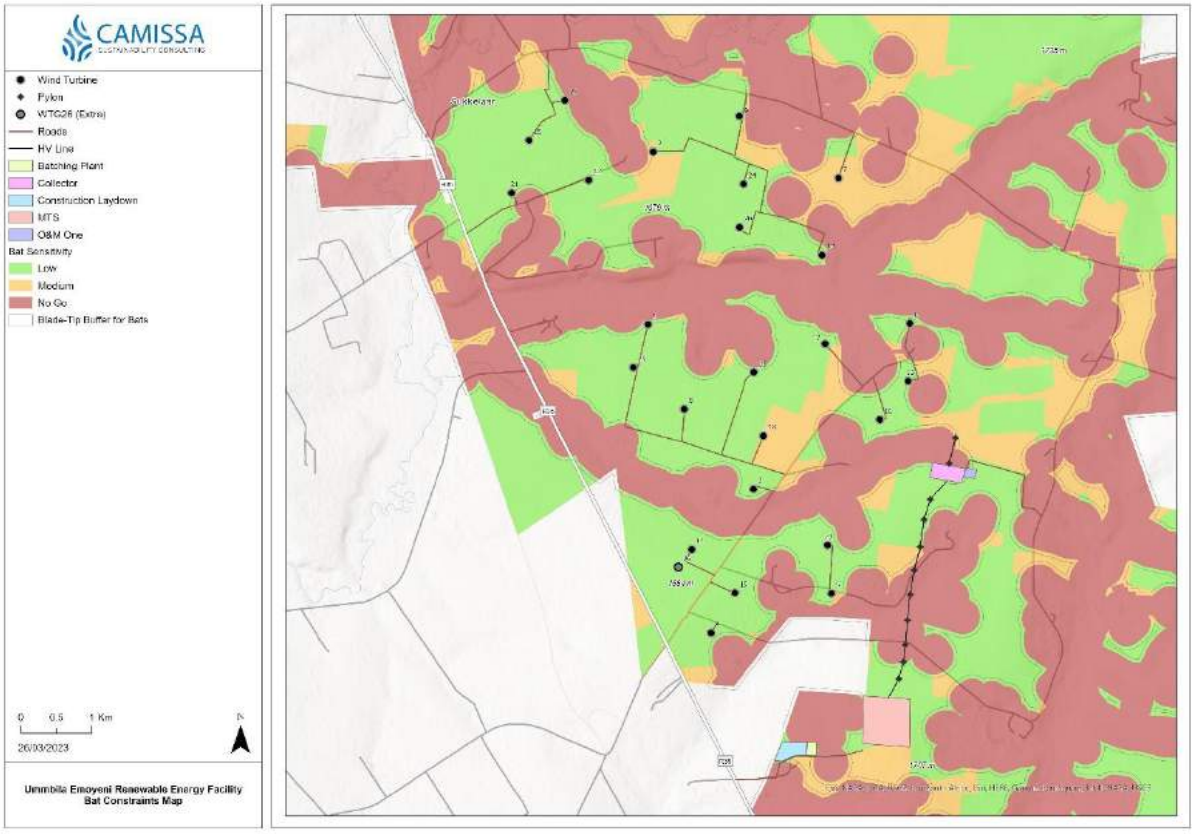

Figure 1: Layout of the Ummbila Emoyeni One Wind Farm, Mpumalanga Province, South Africa showing bat constraints including areas that are No Go for turbine placement.

2 PRIORITY SPECIES

A systematic method was used to identify priority bat species considered to be at highest risk from Ummbila Emoyeni One infrastructure. In the context of this BMP, risk is primarily focused on collisions with wind turbines since this represents the major direct impact to bats because collisions can result in mortality. Non-collision risks such as habitat loss and displacement are considered to be indirect impacts and were assessed as having low impact in the EIA and thus

do not form part of this BMP. Priority species were determined by using the following step-by-step screening process:

Step 1: Develop a list of species potentially at risk from the effects of Ummbila Emoyeni One and identify a Unit of Analysis for each.

Step 2: Determine the sensitivity of each species defined as a combination of their *vulnerability* and the *relative importance* of the study area to each species

Step 3: Determine the overall risk of Ummbila Emoyeni One to each species through a combination of their sensitivity and the likelihood that each species will be affected. If any priority species were identified at this step, a fatality threshold will be developed, representing the limits of acceptable change so as to avoid impacts to their long-term population viability.

In addition to the above process, the determination of priority species was also guided by best practice standards in South Africa as recommended in MacEwan et al. (2018). This document provides a list of specific frugivorous, conservation important and rare/range-restricted species which this BMP includes as priority species.

2.1 Step 1: Species list and Unit of Analysis

Baseline surveys were undertaken at the project which identified bat species populations present. This list was cross-referenced against the African Chiroptera Report (2020) and Monadjem et al. (2020) to determine if any additional species not recorded during the baseline surveys might be present. For each bat species, the Unit of Analysis (UoA) was assigned as their South African Population since this is the most relevant population scale. This step produced a list of 24 bat species that may be at risk of project impacts.

2.2 Step 2: Determine Species Sensitivity

Species differ in their sensitivity to wind energy impacts based on their vulnerability and the relative importance to them of the study area which is to be impacted.

2.2.1 Vulnerability

Vulnerability was determined based on an aggregate of the National Red List threat category (Child et al. 2016), population trend (IUCN 2021) and risk to wind energy (Table 3). Each of these three metrics was assigned points which were summed to produce an overall vulnerability score. This vulnerability score was then ranked into one of four vulnerability classes (Table 4). For example, a LC species (0 points), with unknown population trend (1 point) and high collision risk (2 points) would score 3 points (0 + 1 + 2 points), and be classed as medium vulnerability.

Table 3: Ecology and Life-History Based Collision Risk Determination for Bats

Foraging Strategy	Description	Collision Risk
I	Insectivorous bats that forage in the highly cluttered airspace within vegetation	Low
II	Insectivorous bats that forage in partially cluttered spaces such as clearings, streams, or other tunnels within vegetation or above vegetation (edge and gap foragers)	Medium
III	Insectivorous bats that forage in airspaces found in large clearings or high above vegetation (open-space foragers)	High
IV	Fruit bats	High

Table 4: Vulnerability Scoring for Bats

Red List Threat Status[1] (A)	IUCN Population Trend (B)	Collision Risk (C)	Points	Sum of Points (A+B+C)	Vulnerability
LC on RSA Red List	Stable or Increasing	Low	0	0	Negligible
DD or NT on RSA Red List	Unknown	Medium	1	1	Low
VU on RSA Red List	Decreasing	High	2	2 and 3	Medium
CR or EN on RSA Red List	-	-	3	≥ 4	High

2.2.2 Relative Importance

Relative importance is an estimate of the proportion of each species' population likely to use the wind farm area relative to the UoA. For bats, population data are lacking and instead, relative importance was determined as the ratio of the species extent of occurrence (EOO) within the wind farm relative to the EOO of that species in South Africa. Species EOO was determined from range maps obtained from the IUCN Red List (IUCN 2021) and the study area was defined as a minimum convex polygon around the wind turbines at the project (Figures 1) plus a 10 km buffer. Relative importance was then assigned to one of four classes (Table 5).

Table 5: Relative Importance Scoring for Bats

Relative Importance	Species EOO (km^2) within study area / EOO (km^2) in South Africa × 100
Negligible	≤ 0.5
Low	> 0.5 and ≤ 1
Medium	> 1 and ≤ 10
High	> 10

2.2.3 Sensitivity rating

Upon completion of the above process, sensitivity was determined using a matrix which combined the vulnerability and relative importance rankings (Table 6). Bat species that were scored as having negligible sensitivity were scoped out of the priority species identification process after this step, and not considered further. However, this BMP includes an adaptive management framework that will allow for risks to all bat species to be iteratively assessed based on the results of fatality monitoring program, including those scoped out at this stage. Species with low sensitivity and higher continued onto Step 3. Of the original 24 bat species assessed, 19 species were retained for Step 3 (see Annexure 1 for scoring).

Table 6: Bat Species Sensitivity Matrix

Sensitivity (e.g., Negligible Relative Importance + Low Vulnerability = Negligible Sensitivity)				
Vulnerability	Relative Importance			
	Negligible	Low	Medium	High
Negligible	Negligible	Negligible	Low	Low
Low	Negligible	Low	Low	Medium
Medium	Low	Low	Medium	High
High	Low	Medium	High	High

[1] Conservation Status: LC = Least Concern, DD = Data Deficient, NT = Near Threatened, VU = Vulnerable

2.3 Step 3: Determine Overall Risk and Priority Species

2.3.1 Likelihood of effect

Following the identification of bat species sensitive to Ummbila Emoyeni One impacts, the extent of this risk was assessed by combining sensitivity with the likelihood of the effect occurring to each species.

Likelihood of Effect (LoE) was determined as a combination of two factors: 1) the magnitude of median bat activity recorded at 60 m and 120 m for each species during the baseline monitoring based on reference values in MacEwan et al. (2020b) and 2) published fatality records for bats in South Africa based on Aronson (2022), providing a reasonable indication of which species might appear as collision victims at Ummbila Emoyeni One.

Each of these metrics was assigned points which were summed to produce an overall LoE score. This LoE score was then ranked into one of four classes (Table 7).

Table 7: Likelihood of Effect (LoE) Scoring

Baseline Bat Activity Levels (A)	% of Carcasses per species in Aronson (2022) (B)	Points	Sum of Points (A+B)	Likelihood of Effect
Not Recorded	No Fatalities Reported	0	0	Negligible
Low median activity	≤ 10 % carcasses Reported	1	1	Low
Medium median activity	> 10 % ≤ 20 % carcasses Reported	2	2 and 3	Medium
High median activity	> 20 % carcasses Reported	3	≥ 4	High

2.3.2 Overall risk rating

The overall risk to bats of the project was determined using a matrix which combined sensitivity and the likelihood of effect (Table 8). Using this matrix, species that emerged with high or medium overall risk scores were classified as priority species, while those with negligible and low overall risk scores classified as non-priority species (see Annexure 2 for scoring).

Table 8: Overall Project Risk Matrix

Overall Risk				
Sensitivity	Likelihood of effect			
	Negligible	Low	Medium	High
Negligible	Negligible	Negligible	Low	Low
Low	Negligible	Low	Low	Medium
Medium	Low	Low	Medium	High
High	Low	Medium	High	High

One bat species, Egyptian free-tailed bat (*Tadarida aegyptiaca*), emerged as having a medium overall risk and hence is classified as a priority species at Ummbila Emoyeni One. In addition to this species, based on MacEwan et al. (2018), the following species are also considered priority species for the project:

- Percival's Short-eared Trident bat (*Cloeotis percivali*)
- Wahlberg's Epauletted fruit bat (*Epomophorus wahlbergi*)
- African Straw-coloured fruit bat (*Eidolon helvum*)
- Egyptian Rousette (*Rousettus aegyptiacus*)
- Blasius's Horseshoe bat (*Rhinolophus blasii*)

3 ADAPTIVE MANAGEMENT FRAMEWORK

The intention of this BMP is to provide an adaptive management framework that will enable Ummbila Emoyeni to manage impacts to priority bat species. The adaptive management framework consists of several components which guide on-site management responses to meet this objective.

The first component is the post-construction fatality monitoring program (PCFM) which will provide a quantitative measure of fatality for bat species. The second component is the development and use of quantitative fatality thresholds for priority species. The final component entails the evaluation of the fatality thresholds against estimated fatality and an adaptive management response mechanism that provides an escalating scale of mitigation if thresholds are exceeded, including a process to review fatality thresholds and any mitigation implemented.

3.1 Post-Construction Fatality Monitoring (PCFM)

Fatality monitoring at operational wind farms is a fundamental component of a BMP because it forms the basis for understanding how wind energy impacts biodiversity. The fundamental objectives of a PCFM include the following:

- To collect sufficient, robust, unbiased data which can be used to estimate fatality and assess the impact of a wind farm on particular species of interest.
- To determine if operational changes or other mitigation measures at a wind farm are required based on fatality estimates and to test the efficacy of such management responses.

PCFM will be initiated once the wind farm becomes operational. A detailed PCFM must be designed and implemented by a competent bat ecologist based on South African best practise (Aronson et al. 2020). An initial design has been provided here (Table 9) based on the minimum requirements for monitoring which will be implemented during the first year of the wind farms operation and which may be adjusted based on the Adaptive Management Process outlined in Section 3.3. PCFMs are typically iterative and might change as understanding of collision risk develops during the operational lifespan of a wind farm. Ummbila Emoyeni (Pty) Ltd must ensure that size of the carcass search team is sufficient to execute the desired search effort.

Table 9: Initial PCFM Design Parameters for Bats at Ummbila Emoyeni One Wind Farm

Parameter	Details
Search Period	Two years (24 months)*
Search Interval	Twice a week**
Transect Spacing	6 m
Sampling Fraction	100 % (All 25 turbines searched)
Search Plot Shape and Size	Square, 120 m x 120 m

*Monitoring must be repeated for an additional year in year 5 of operation, and then every 5 years for the duration of the operation of the wind farm.
**The search interval must be updated after the first year of monitoring to reflect carcass persistence rates measured during scavenger bias trials to reflect site specific persistence rates.

The core output of the PCFM will be an unbiased estimate of bat fatality generated using GenEst (Simonis et al. 2018) for a particular time period. These fatality estimates can be used to evaluate the impact of the wind farm on bats by comparing the estimates to pre-established fatality thresholds. All bat carcasses collected must be stored and maintained for record keeping. Carcasses must be identified to species, and the age and sex of carcasses determined.

3.2 Fatality Thresholds

Management interventions for bats at operating wind farms in South Africa are benchmarked against fatality thresholds. These thresholds attempt to manage impacts to bats by considering potential population level effects, with the threshold values set below the rate at which populations may decline due to anthropogenic pressures (MacEwan et al. 2018). These thresholds represent the estimated number of carcasses that would need to be found during carcass

searching above which the project may have an impact on the long-term viability of the population of a given species relative to the Unit of Analysis. Exceeding these thresholds would trigger an adaptive management response to avoid such population level impacts.

Six species emerged as priority through the screening process and therefore a threshold was set to guide management actions for these species. Should other species emerge as priority based on findings of the PCFM, thresholds may also be set for these. For all species except Egyptian free-tailed bat, the fatality threshold was set to 1 bat per annum (Table 10). This is because these 5 species are frugivorous, conservation important and/or rare/range-restricted (MacEwan et al. 2018).

For Egyptian free-tailed bat, the threshold setting process was based on the following formula:

$$Bat\ fatality\ threshold\ = (a \times b)\ c$$

Where,

- *a:* the area of influence of the Ummbila Emoyeni One wind turbines

  Based on MacEwan et al. (2018), this area was calculated as a minimum convex polygon around all 25 wind turbines. To account for the rotor swept area, a buffer of 91 m (the turbine blade length) was added to this polygon.

- *b:* an estimate of the bat occupancy rate per hectare for different ecoregions in South Africa

  Based on MacEwan et al. (2018), this specific value varies by terrestrial ecoregion since bat occupancy per hectare varies with environmental conditions. The project is situated in the Highveld Grasslands ecoregion (Dinerstein et al. 2019) however reference values are not available for this ecoregion in MacEwan et al. (2018). Instead, reference values for the Drakensberg Grasslands, Woodlands and Forest ecoregion were used instead. While bat activity levels differ between these two ecoregions this difference is small (MacEwan et al. 2020a).

- *c:* an estimate of the annual % reduction in the Egyptian free-tailed bat population, that if exceeded could result in adverse impacts on the long-term viability of its population.

  Based on MacEwan et al. (2018), it was assumed that a 2 % annual reduction in the number of individuals would lead to declines in the population.

Based on the input parameters, an estimated threshold of 48 Egyptian free-tailed bats was obtained:

$$Bat\ \text{fatality}\ threshold\ = (a \times b)\ c$$

$$Bat\ \text{fatality}\ threshold\ = (2{,}316.42 \times 1.02)\ 0.02$$

$$Bat\ fatality\ threshold\ =\ 48\ \text{individuals per annum}$$

This fatality threshold is the unbiased, corrected fatality estimates generated by GenEst. Should this be exceeded, an adaptive management response is triggered as described in Section 3.3.

Table 10: Ummbila Emoyeni One Wind Farm Fatality Thresholds

Common Name	Species Name	Threshold (bats/year)
Percival's Short-eared Trident bat	*Cloeotis percivali*	1
Wahlberg's Epauletted fruit bat	*Epomophorus wahlbergi*	1
African Straw-coloured fruit bat	*Eidolon helvum*	1
Egyptian Rousette	*Rousettus aegyptiacus*	1
Blasius's Horseshoe bat	*Rhinolophus blasii*	1
Egyptian free-tailed bat	*Tadarida aegyptiaca*	48

3.3 Adaptive Management Process

The adaptive management process (Figure 2) is a mechanism that allows the project to monitor impacts to priority species, to ensure that appropriate mitigation is applied, and to track adherence to the fatality thresholds. The process follows a set of actions described below:

1. A PCFM is initiated and produces a fatality estimate for each priority species.
2. The fatality estimate is compared to the fatality threshold every 6 months.
    a. If the fatality threshold has not been exceeded, fatality monitoring continues based on best practise, until the next periodic review. Depending on project findings, adjustments to the PCFM and thresholds may be required to continue to optimize the program.
    b. If the fatality thresholds have been exceeded, an investigation must be initiated to determine the primary reasons why a threshold was exceeded. Any mitigation measures that have already been implemented should be reviewed to determine why thresholds were exceeded and adjusted accordingly. Fatality monitoring continues again until the next periodic review (i.e. following an additional 6 months) of the fatality thresholds relative to the fatality estimate.

The mitigation response can take several forms depending on the scale of impacts. Several mitigation options are available (e.g. curtailment and acoustic deterrents) and in addition to these, the decision to not implement mitigation following a periodic review can also be taken. Because of the number of assumptions associated with fatality thresholds, exceeding the fatality threshold would not automatically require mitigation to be initiated. Instead, the project findings (i.e., fatality estimates, scale of impacts etc.) should be reviewed through discussions with the projects appointed bat ecologist/consultant, and the wind farm operator. These discussions should focus on interpreting the fatality estimates relative to threshold values and knowledge (or uncertainty) of species ecology and local population status. The aim of these reviews would be to determine the appropriate mitigation response for each species in question and the scale of action required.

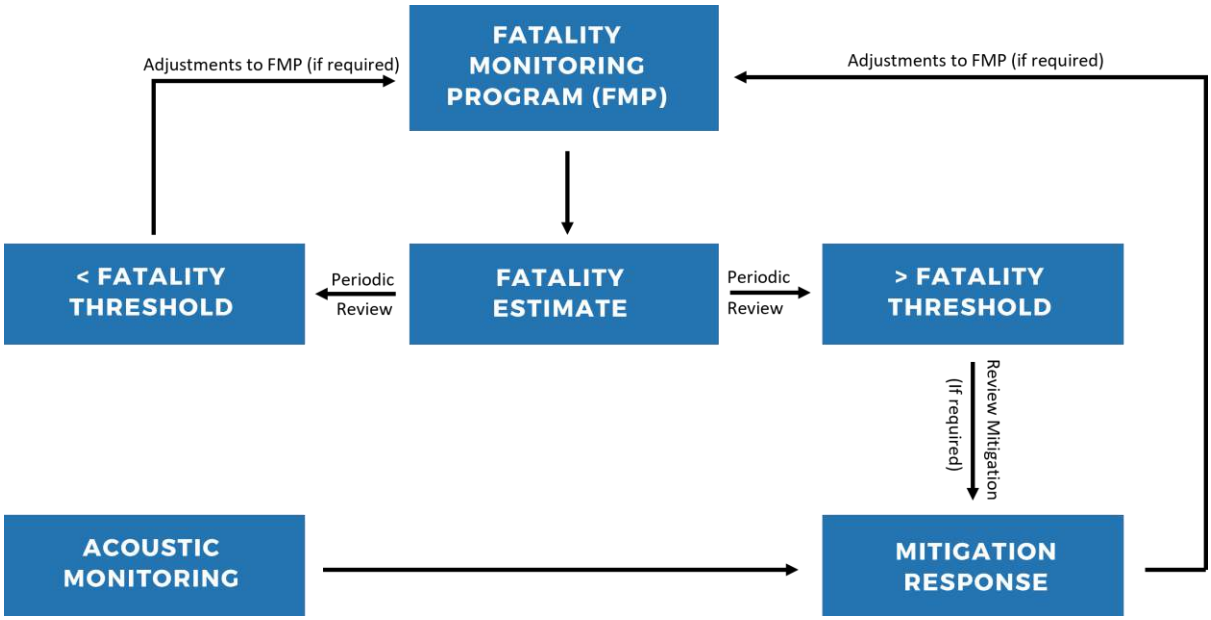

Figure 2: Summary of the Adaptive Management Process

3.3.1 Mitigation Options

This BMP provides a general discussion on the mitigation options that may be used, as and when appropriate for bats. Future iterations of this BMP must be updated to include any specific

mitigation protocols that will be implemented. The PCFM may need to be adjusted to allow the efficacy of any mitigation measures applied to be tested.

Options to mitigate impacts to bats at operational wind farms include curtailing (i.e., stopping and/or reducing) turbine operation and acoustic deterrents (i.e. broadcasting ultrasound to deter bats from entering specific airspace).

Curtailment is achieved in two primary ways. The first is blade feathering which is simple to implement and does not require increasing the cut-in speed of turbines and should therefore be used before more stringent curtailment. Blade feathering entails adjusting the angle of the rotor blades parallel to the wind, or turning the nacelle out of the wind, to slow or stop blade rotation. The second mechanism involves increasing turbine cut-in speed to a particular wind speed (e.g., 4 m/s, 5 m/s etc.) to avoid turbine blades spinning at lower wind speeds. Both mechanisms have been shown to reduce impacts to bats in North America (Arnett 2011, Good et al. 2012) and Europe (Behr et al. 2017).

Curtailment is typically implemented for bats during periods of elevated bat activity linked to meteorological conditions that are conducive for bat activity. As per Aronson et al. (2020) bat acoustic activity monitoring must take place in parallel with the PCFM to collect the data needed to develop and refine the curtailment algorithm.

Bat activity can be modelled as a function of a range of meteorological conditions such as temperature and wind speed. These models can then be used to guide when curtailment should be initiated. Data from the pre-construction monitoring surveys have been analysed to develop an initial curtailment algorithm that can be implemented in the event that fatality thresholds are exceeded as part of the adaptive management process (Table 11). This initial curtailment algorithm must be updated based on acoustic and meteorological data collected during the PCFM and tested on site in relation to bat fatality. It is recommended that an energy yield assessment be undertaken for this level of curtailment to assess its impact on operations.

Table 11: Ummbila Emoyeni One Initial Curtailment Parameters

Parameter	September - November (Spring)	December - February (Summer)	March - May (Autumn)
Time Period	18h00 – 23h00	18h00 – 00h00	18h00 – 23h00
Temperature (˚C)	Above 17.5	Above 17.5	Above 16
Wind Speed (m/s)	< 7 m/s	< 6 m/s	< 5 m/s

An alternative to curtailment is to use acoustic deterrents which can also reduce impacts to some bat species (Romano et al. 2019, Weaver et al. 2020). These devices are attached to wind turbines and broadcast ultrasound at specific frequencies which interferes with bats ability to perceive echoes from their echolocation calls. Acoustic deterrents therefore do not require interruptions to turbine operation and hence may be favourable to curtailment.

4 SUMMARY

This BMP provides a framework for managing impacts to bats at the Ummbila Emoyeni One wind farm. Given the complex nature of wind energy and wildlife interactions, this document identified six priority bat species that will form the basis for initial management responses (Table 10). Additional species may be identified during the PCFM process. The adaptive management process for Ummbila Emoyeni One wind farm includes the following:

1. Post-Construction Fatality Monitoring (an initial design provided in Table 9) which will generate a fatality estimate for each priority species.
2. These fatality estimates must be compared to fatality thresholds for each priority species (Table 10) every 6 months.
3. If the fatality thresholds have been exceeded, a review must be initiated to determine the primary reasons why a threshold was exceeded. Pending this review, mitigation options to manage impacts include implementing blade feathering, curtailment (an initial design is provided in Table 11) or acoustic deterrents.

4. PCFM continues (either adjusted or unadjusted) and the review process continues until it can be reasonable demonstrated that the fatality estimates for the wind farm are consistently below fatality threshold levels.

Management of wind energy impacts to wildlife will likely be needed for the duration of the wind farms operation with continuous monitoring and evaluation of impacts needed depending on project specific impacts. As a minimum, monitoring and evaluation will be needed in the first two years of operation, in year five, and then every five years (Aronson et al. 2020). Ummbila Emoyeni One (Pty) Ltd will therefore need to engage with a wildlife ecologist with expertise in bats to assist in the management of impacts to bats at Ummbila Emoyeni One wind farm.

5 REFERENCES

ACR. 2020. African Chiroptera Report 2020. V. Van Cakenberghe and E.C.J. Seamark (Eds). AfricanBats NPC, Pretoria. i-xv + 8542 pp.

Arnett, E. B. 2011. Altering turbine speed reduces bat mortality at wind-energy facilities. Frontiers in Ecology and the Environment **9**:209-214.

Aronson, J. 2022. Current state of knowledge of wind energy impacts to bats in South Africa. Acta Chiropterologica **24(1)**.

Aronson, J., E. Richardson, K. MacEwan, D. Jacobs, W. Marais, P. Taylor, S. Sowler, H. C., and L. Richards. 2020. South African Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy Facilities – ed 2. South African Bat Assessment Association.

Behr, O., R. Brinkmann, K. Hochradel, J. Mages, F. Korner-Nievergelt, I. Niermann, M. Reich, R. Simon, N. Weber, and M. Nagy. 2017. Mitigating Bat Mortality with Turbine-Specific Curtailment Algorithms: A Model Based Approach. Pages 135-160 Wind Energy and Wildlife Interactions. Springer.

Child, M. F., L. Roxburgh, E. Do Linh San, D. Raimondo, and H. T. Davies-Mostert, editors. 2016. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.

Dinerstein, E., C. Vynne, E. Sala, A. R. Joshi, S. Fernando, T. E. Lovejoy, J. Mayorga, D. Olson, G. P. Asner, J. E. M. Baillie, N. D. Burgess, K. Burkart, R. F. Noss, Y. P. Zhang, A. Baccini, T. Birch, N. Hahn, L. N. Joppa, and E. Wikramanayake. 2019. A Global Deal For Nature: Guiding principles, milestones, and targets. Science Advances **5**:eaaw2869.

Good, R. E., W. Erickson, A. Merrill, S. Simon, K. Murray, and K. Bay. 2012. Bat monitoring studies at the Fowler Ridge Wind Energy Facility, Benton County, Indiana. Prepared for Fowler Ridge Wind Farm by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming.

IUCN. 2021. The IUCN Red List of Threatened Species. Version 2021-1. https://www.iucnredlist.org. Downloaded on 11 Aug 2021.

MacEwan, K., J. Aronson, E. Richardson, P. Taylor, B. Coverdale, D. Jacobs, L. Leeuwner, W. Marais, and L. Richards. 2018. South African Bat Fatality Threshold Guidelines – ed 2. South African Bat Assessment Association.

MacEwan, K., T. W. Morgan, C. A. Lötter, and A. T. Tredennick. 2020a. Bat Activity Across South Africa: Implications for Wind Energy Development. African Journal of Wildlife Research **50**.

MacEwan, K., S. Sowler, J. Aronson, and C. A. Lötter. 2020b. South African Best Practice Guidelines for Pre-construction Monitoring of Bats at Wind Energy Facilities - ed 5. South African Bat Assessment Association.

Monadjem, A., P. J. Taylor, F. P. D. Cotterill, and M. C. Schoeman. 2020. Bats of Southern and Central Africa: A Biogeographic and Taxonomic Synthesis. 2nd edition.

Romano, W. B., J. R. Skalski, R. L. Townsend, K. W. Kinzie, K. D. Coppinger, and M. F. Miller. 2019. Evaluation of an acoustic deterrent to reduce bat mortalities at an Illinois wind farm. Wildlife Society Bulletin **43**:608-618.

Simonis, J., M. Huso, D. Dalthorp, J. Mintz, L. Madsen, P. Rabie, and J. Studyvin. 2018. GenEst user guide—Software for a generalized estimator of mortality: U.S. Geological Survey Techniques and Methods, book 7, chap. C19, 72 p., https://doi.org/10.3133/tm7C19.

Weaver, S. P., C. D. Hein, T. R. Simpson, J. W. Evans, and I. Castro-Arellano. 2020. Ultrasonic acoustic deterrents significantly reduce bat fatalities at wind turbines. Global Ecology and Conservation:e01099.

Annexure 1: Results of Step 2 - Determine Species Sensitivity

Binomial	Common name	Threat status	Population trend	Foraging Strategy	Red List Threat Score	IUCN Trend Score	Wind Energy Risk Score	Vulnerability Score	Vulnerability	Study Area EOO	RSA EOO	EOO Score	Relative Importance	Sensitivity
Taphozous mauritianus	Mauritian tomb bat	LC	unknown	3	0	1	2	3	Medium	519.0	305826.7	0.2	Negligible	Low
Hipposideros caffer	Sundevall's Leaf-nosed bat	LC	declining	1	0	2	0	2	Medium	519.0	244600.7	0.2	Negligible	Low
Cloeotis percivali	Percival's Short-eared Trident bat	EN	unknown	1	3	1	0	4	High	519.0	199930.0	0.3	Negligible	Low
Miniopterus natalensis	Natal Long-fingered bat	LC	unknown	2	0	1	1	2	Medium	519.0	496702.0	0.1	Negligible	Low
Chaerephon pumilus	Little Free-tailed bat	LC	unknown	3	0	1	2	3	Medium	519.0	105038.6	0.5	Negligible	Low
Mops midas	Midas Free-tailed bat	LC	declining	3	0	2	2	4	High	519.0	15141.8	3.4	Medium	High
Tadarida aegyptiaca	Egyptian Free-tailed bat	LC	unknown	3	0	1	2	3	Medium	519.0	1193357.5	0.0	Negligible	Low
Nycteris thebaica	Egyptian Slit-faced bat	LC	unknown	1	0	1	0	1	Low	519.0	856680.1	0.1	Negligible	Negligible
Epomophorus wahlbergi	Wahlberg's Epauletted fruit bat	LC	stable	4	0	0	2	2	Low	519.0	280957.6	0.2	Negligible	Negligible
Eidolon helvum	African Straw-coloured fruit bat	LC	declining	4	0	2	2	4	High	519.0	668016.0	0.1	Negligible	Low
Rousettus aegyptiacus	Egyptian Rousette	LC	stable	4	0	0	2	2	Medium	519.0	379575.4	0.1	Negligible	Low
Rhinolophus clivosus	Geoffroy's Horseshoe bat	LC	unknown	1	0	1	0	1	Low	519.0	729899.8	0.1	Negligible	Negligible
Rhinolophus simulator	Bushveld Horseshoe bat	LC	declining	1	0	2	0	2	Medium	519.0	223252.0	0.2	Negligible	Low
Rhinolophus blasii	Blasius's Horseshoe bat	NT	declining	1	1	2	0	3	Medium	519.0	34661.3	1.5	Medium	Medium
Rhinolophus darlingi	Darling's Horseshoe bat	LC	unknown	1	0	1	0	1	Low	519.0	654218.9	0.1	Negligible	Negligible
Laephotis capensis	Cape Serotine	LC	stable	2	0	0	1	1	Low	519.0	1140060.6	0.0	Negligible	Negligible
Myotis tricolor	Temminck's Myotis	LC	unknown	2	0	1	1	2	Medium	519.0	362242.1	0.1	Negligible	Low
Myotis welwitschii	Welwitsch's Myotis	LC	unknown	2	0	1	1	2	Medium	519.0	337995.6	0.2	Negligible	Low
Scotophilus dinganii	Yellow-bellied house bat	LC	unknown	2	0	1	1	2	Medium	519.0	582661.3	0.1	Negligible	Low
Scotophilus viridis	Green House bat	LC	unknown	2	0	1	1	2	Medium	519.0	38404.9	1.4	Medium	Medium
Pipistrellus hesperidus	Dusky Pipistrelle	LC	unknown	2	0	1	1	2	Medium	519.0	98877.5	0.5	Negligible	Low
Pipistrellus rusticus	Rusty Pipistrelle	LC	unknown	2	0	1	1	2	Medium	519.0	142229.8	0.4	Negligible	Low
Eptesicus hottentotus	Long-tailed Serotine	LC	unknown	2	0	1	1	2	Medium	519.0	964421.0	0.1	Negligible	Low
Laephotis botswanae	Botswana Long-eared bat	LC	unknown	2	0	1	1	2	Medium	519.0	49285.3	1.1	Medium	Medium

Annexure 2: Results of Step 3 - Determine Overall Risk and Priority Species

Family	Binomial	Common name	Database	Unit of Analysis	Sensitivity	Likelihood of Effect	Overall Risk	Priority Species
EMBALLONURIDAE	*Taphozous mauritianus*	Mauritian tomb bat	ACR	RSA pop^{n}	Low	Low	Low	No
HIPPOSIDERIDAE	*Hipposideros caffer*	Sundevall's Leaf-nosed bat	ACR	RSA pop^{n}	Low	Negligible	Negligible	No
HIPPOSIDERIDAE	*Cloeotis percivali*	Percival's Short-eared Trident bat	ACR	RSA pop^{n}	Low	Negligible	Negligible	**Yes**
MINIOPTERIDAE	*Miniopterus natalensis*	Natal Long-fingered bat	ESIA/Baseline	RSA pop^{n}	Low	Medium	Low	No
MOLOSSIDAE	*Chaerephon pumilus*	Little Free-tailed bat	ESIA/Baseline	RSA pop^{n}	Low	Medium	Low	No
MOLOSSIDAE	*Mops midas*	Midas Free-tailed bat	ACR	RSA pop^{n}	High	Negligible	Low	No
MOLOSSIDAE	*Tadarida aegyptiaca*	Egyptian Free-tailed bat	ESIA/Baseline	RSA pop^{n}	Low	High	Medium	**Yes**
NYCTERIDAE	*Nycteris thebaica*	Egyptian Slit-faced bat	ACR	RSA pop^{n}	Negligible	Low	Negligible	No
PTEROPODIDAE	*Epomophorus wahlbergi*	Wahlberg's Epauletted fruit bat	ACR	RSA pop^{n}	Negligible	Low	Negligible	**Yes**
PTEROPODIDAE	*Eidolon helvum*	African Straw-coloured fruit bat	ACR	RSA pop^{n}	Low	Negligible	Negligible	**Yes**
PTEROPODIDAE	*Rousettus aegyptiacus*	Egyptian Rousette	ACR	RSA pop^{n}	Low	Low	Low	**Yes**
RHINOLOPHIDAE	*Rhinolophus clivosus*	Geoffroy's Horseshoe bat	ACR	RSA pop^{n}	Negligible	Negligible	Negligible	No
RHINOLOPHIDAE	*Rhinolophus simulator*	Bushveld Horseshoe bat	ACR	RSA pop^{n}	Low	Negligible	Negligible	No
RHINOLOPHIDAE	*Rhinolophus blasii*	Blasius's Horseshoe bat	ACR	RSA pop^{n}	Medium	Negligible	Low	**Yes**
RHINOLOPHIDAE	*Rhinolophus darlingi*	Darling's Horseshoe bat	ACR	RSA pop^{n}	Negligible	Negligible	Negligible	No
VESPERTILIONIDAE	*Laephotis capensis*	Cape Serotine	ESIA/Baseline	RSA pop^{n}	Negligible	High	Low	No
VESPERTILIONIDAE	*Myotis tricolor*	Temminck's Myotis	ACR	RSA pop^{n}	Low	Low	Low	No
VESPERTILIONIDAE	*Myotis welwitschii*	Welwitsch's Myotis	ACR	RSA pop^{n}	Low	Negligible	Negligible	No
VESPERTILIONIDAE	*Scotophilus dinganii*	Yellow-bellied house bat	ESIA/Baseline	RSA pop^{n}	Low	Low	Low	No
VESPERTILIONIDAE	*Scotophilus viridis*	Green House bat	ACR	RSA pop^{n}	Medium	Negligible	Low	No
VESPERTILIONIDAE	*Pipistrellus hesperidus*	Dusky Pipistrelle	ACR	RSA pop^{n}	Low	Negligible	Negligible	No
VESPERTILIONIDAE	*Pipistrellus rusticus*	Rusty Pipistrelle	ACR	RSA pop^{n}	Low	Negligible	Negligible	No
VESPERTILIONIDAE	*Eptesicus hottentotus*	Long-tailed Serotine	ESIA/Baseline	RSA pop^{n}	Low	Low	Low	No
VESPERTILIONIDAE	*Laephotis botswanae*	Botswana Long-eared bat	ACR	RSA pop^{n}	Medium	Negligible	Low	No

APPENDIX L:
FIRE MANAGEMENT PLAN

Fire Management Plan for the Ummbila Wind Energy Facility (WEF) Project

Bethal, Mpumalanga Province

April 2023

CLIENT

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Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

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Figure 2-1 Project area in relation to the SA vegetation map (SANBI, 2018). 7

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1 Introduction

The Biodiversity Company was appointed by Savannah Environmental to compile a fire management plan for the Ummbila Emoyeni Wind Energy Facility (WEF), located in the Lekwa Local Municipality, Mpumalanga Province. This plan is a requirement of the issued environmental authorisation (EA).

1.1 Project Background and Location

Ummbila Emoyeni (Pty) Ltd is proposing the development of a commercial wind farm. The authorised Ummbila Emoyeni (Phase 1) WEF, referred to as the Project Area for the purposes of this report (Figure 1-1) is situated ~8 km south-east of the town of Bethal in the Lekwa Local Municipality, Mpumalanga (Figure 1-2).

The energy facility infrastructure comprises:

- 25 wind turbines;
- On-site 132 kV substation;
- Power line linking to the existing Eskom transmission infrastructure;
- Underground cables linking the turbines to the substations;
- Crane platforms;
- Operations and maintenance compound area;
- Car park;
- Storage area; and
- Internal access roads (12-13 m wide) to each turbine.

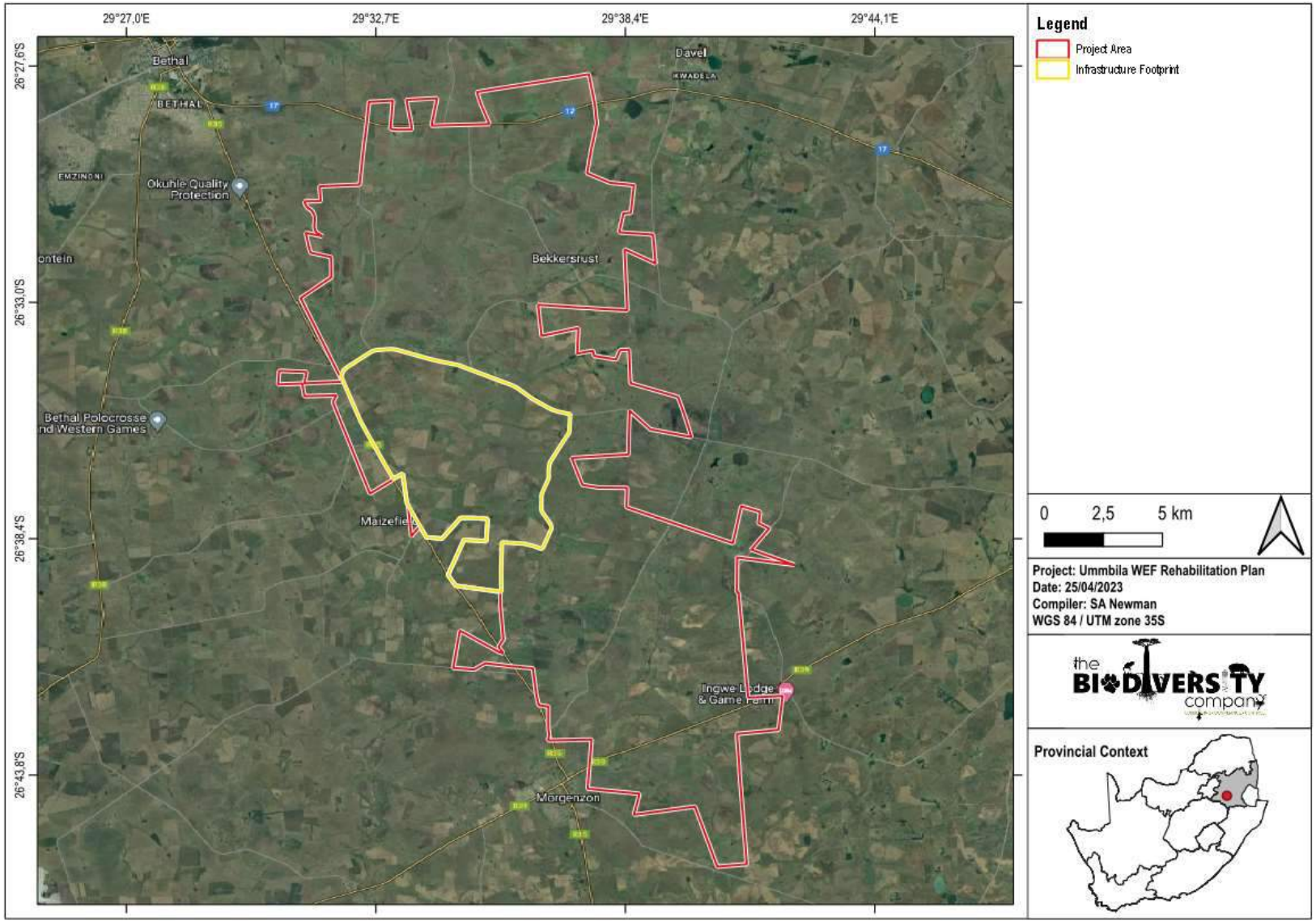

Figure 1-1 Map illustrating the Ummbila Emoyeni Phase 1 Footprint (yellow) and the overall Project Footprint (red)

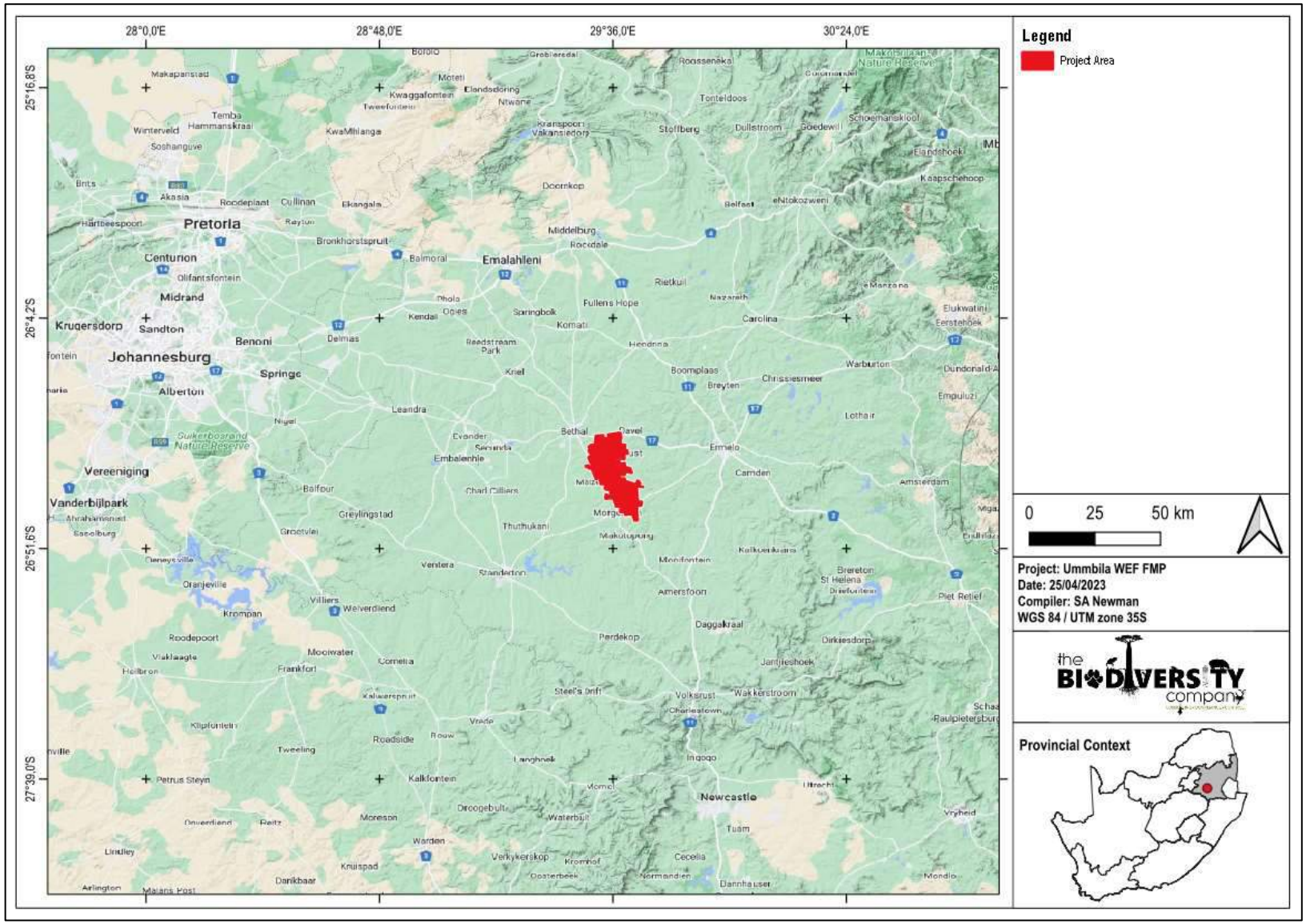

Figure 1-2 Map illustrating the regional context of the Project Area

1.2 Terms of Reference

A Fire Management Plan for the Wind Energy Facility (WEF) is a necessity due to the risk of unplanned fires which may result in damage to the energy facility and surrounding areas. Some systems are in place to prevent this, but in case of an unplanned fire, a management plan needs to be in place. The fire management plan includes management protocols to ensure that the surrounding natural environment will not be affected by an unplanned fire sourcing from the facility, thus meeting the condition of the Environmental Management Programme (EMPr).

1.3 Legislation

The following legislation is pertinent to the project:

- National Veld and Forest Fire Act No. 101 of 1998. Chapter 4 of the Act prescribes requirements for veldfire prevention through firebreaks; and
- Emergency preparedness, and incident and accident-reporting requirements as required by the Occupatinal Health and Safety Act,1993 (Act No 85 of 1993).

1.4 Limitations

The following limitations should be noted in the development of this plan:

- No survey was conducted for this fire management plan;
- The fire risk of any associated powerlines or power stations have not been included; and
- The project description is based on information provided by Savannah (2023) and is regarded as accurate.

2 Desktop Vegetation Assessment

Vegetation type is an important aspect to consider as it affects the management of fire, determining the material present that may burn. The project area is found within the Soweto Highveld Grassland vegetation type (Figure 2-1). This vegetation type forms part of the grassland biome.

2.1 Grassland Biome

The Project Area is situated within the grassland biome. This biome is centrally located in southern Africa, and adjoins all except the desert, fynbos and succulent Karoo biomes (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the grassland biome include:

- Seasonal precipitation; and
- The minimum temperatures in winter (Mucina & Rutherford, 2006).

The grassland biome is found chiefly on the high central plateau of South Africa, and the inland areas of KwaZulu-Natal and the Eastern Cape. The topography is mainly flat and rolling but includes the escarpment itself. Altitude varies from near sea level to 2 850 m above sea level.

Grasslands are dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. The grassland biome experiences summer rainfall and dry winters with frost (and fire), which are unfavourable for tree growth. Thus, trees are typically absent, except in a few localised habitats. Geophytes (bulbs) are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees.

The Project Area is situated in the Soweto Highveld Grassland vegetation type (Figure 2-1).

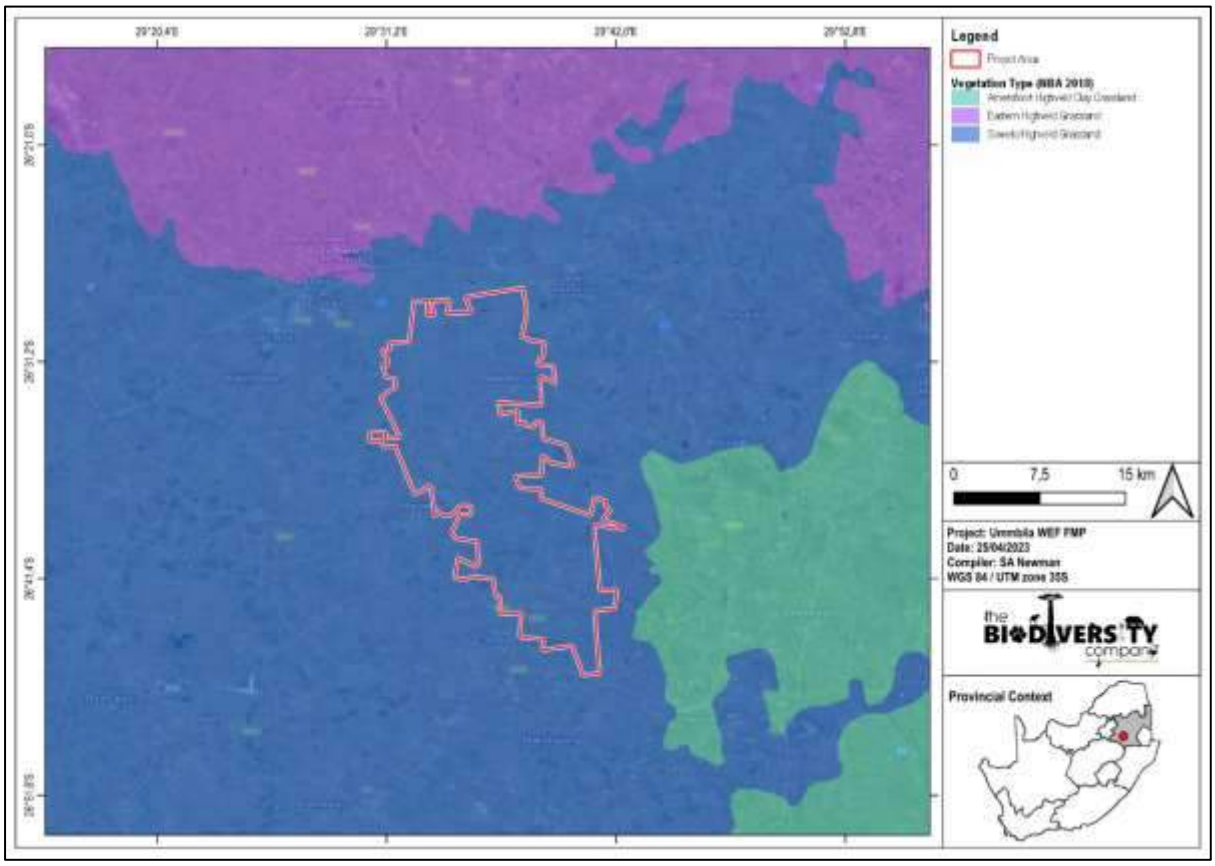

Figure 2-1 Project area in relation to the SA vegetation map (SANBI, 2018).

2.2 Fire History

Based on the FIRMS: Fire Information for Resource Management System for the period between 1 January 2000 and 31 March 2023, numerous fires have occurred in the project area, although the exact number of fires is unknown. The frequency of fires within the project area has been found to be low (Figure 2-2) but should be considered in conjunction with the Veldfire Risk outlined in the following section. This highlights the importance of a fire management plan as the area has historically been prone to fires, albeit relatively few, and does have sufficient fuel to sustain a fire.

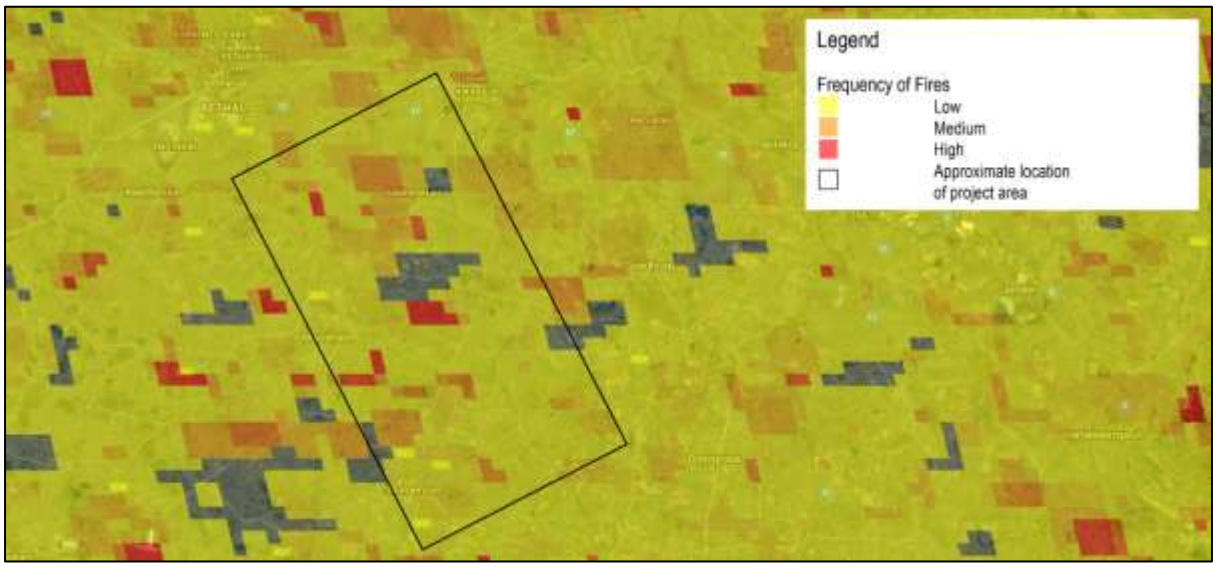

Figure 2-2 The frequency of fires in the area based on data for the period between 1 January 2000 and 31 March 2023 (FIRMS, 2021).

2.3 Fire Risk

SANBI (2010), provides a shape file of the fire risk of areas for the implementation of veldfire management interventions. This model is based on the social, economic and environmental risk scenarios. The level of risk for each fire scenario was then assessed using the product of likelihood and consequence and categorised as being Extreme, High, Medium or Low (Forsyth *et al.,* 2010). The risk associated with the Project Area was rated as High, with a small portion rated as Extreme (Figure 2-3). Based on the surrounding land use it can be speculated that this risk is mainly due to the grassland habitat that has high levels of available fuel that would also be fast burning.

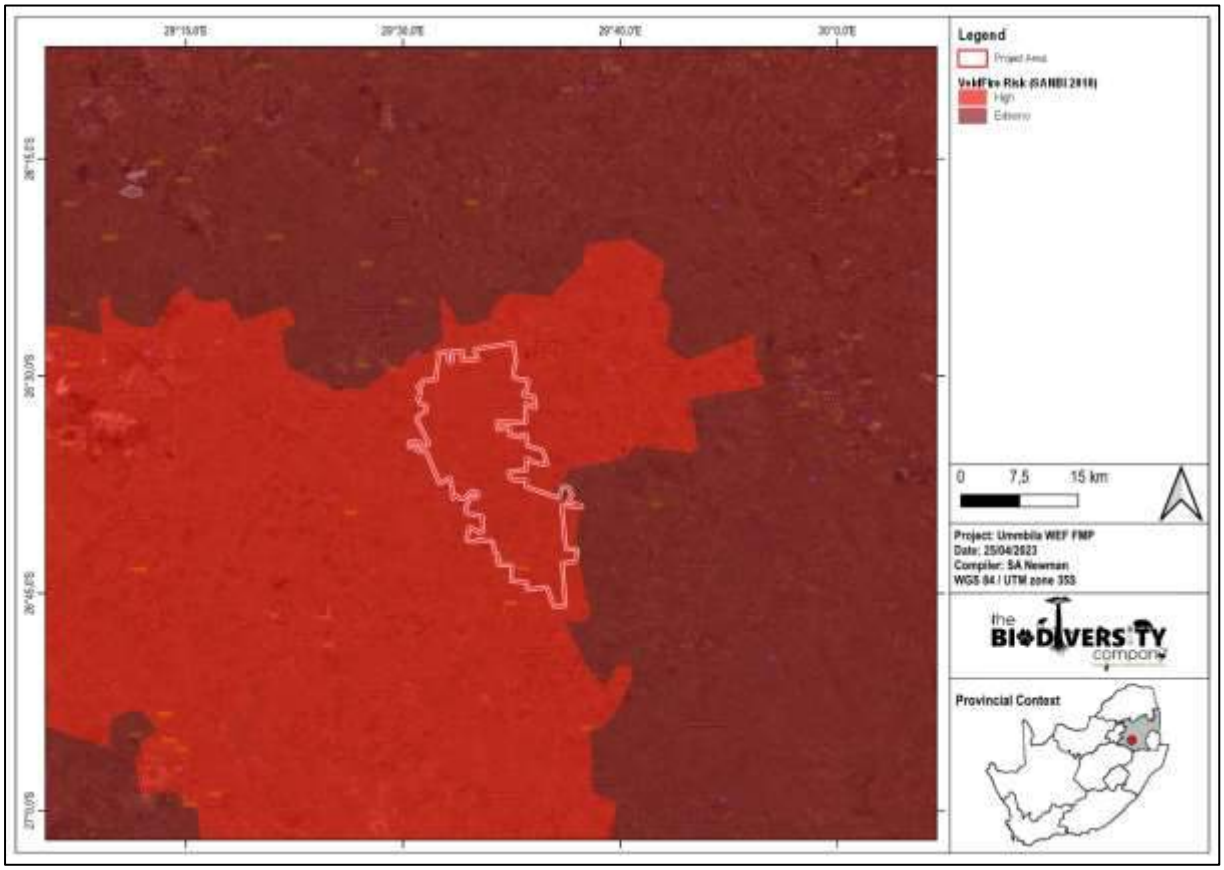

Figure 2-3 Project area in relation to the Veldfire Risk (SANBI, 2010)

3 Background

3.1 Fire management

“Fire is regarded as a natural factor of the environment of southern Africa; it is thought to have occurred from time immemorial” (Tainton, 1999).

The type of fire that burns influences vegetation differently and will play a part when determining the fire that will be used for various applications. According to Brown & Davies (1973) as well as literature by Luke & McArthur (1978) three types of fires are recognised:

- Crown fires, which burn the canopies of trees and shrubs;

- Surface fires, which burn in the surface fuels, including grass, small shrubs and forbs. This is the most common fire that occurs throughout South Africa; and
- Ground fires, which burn below the surface of the ground in layers of organic material, for example, if a wetland dries up and is burnt, the peat that burns will be known as a ground fire.

According to Tainton (1999) the way a fire behaves is controlled by various environmental factors, which need to be considered and monitored when planning a controlled fire or the management of fire:

- Fuel load: The amount of vegetation available that can be burned (Tainton,1999). The fuel load influences the intensity of the fire and consists mainly of the amount of phytomass (biomass) available to burn;
- Air temperature: The higher the air temperature the more intense the fire will be (i.e. a fire in cold conditions is less intense);
- Moisture content: The moisture content of fully dried out fuels is relative to the humidity in the immediate area of the fuel at any given time, therefore affecting the intensity of the fire. The higher the humidity, the less intense the fire will be (Tainton, 1999);
- Wind: Controls the direction and speed of a fire. The direction as well as the speed of the wind will affect the possibility and the type of burn. A fire occurring in high velocity winds will create a scenario where the fire will behave in an unpredictable way, creating an unfavourable situation (Tainton, 1999). The direction of the wind has to be considered depending on your objectives; a head fire burns with the wind whereas a back-burn progresses against the wind, a head-fire causes less damage to the herbaceous layer when compared to a back-burn, thus indicating how wind can be used; and
- Angle or the slope in the terrain in the given area: This affects the controllability of the fire and thus the difficulty of controlling the fire itself. “The forward spread rate of surface fires is influenced by the slope by modifying the extent to which the material ahead of the fire is pre-heated” (Tainton, 1999). Burning up a slope causes a situation where the fire will behave as a head fire due to the material being pre-heated while material burning down slope will act as a back burn.

The tools of the trade that may be required when doing controlled burning/firebreaks and fighting fires (Krynauw, 2013):

- Ignition torches that can easily make a line of fire, this will be needed to create a fire where needed as quick as possible;
- Knapsack sprayers carried on the back of personnel which sprays a controllable stream of water. Firefighting machines that consist of a water tank, which can be loaded onto a vehicle and has a petrol motor which pumps water into a hosepipe to spray large amounts of water; and
- Fire beaters which usually consist of rubber conveyer belt used to beat fires.

4 Fire Management Plan

Fires caused by wind turbines are rare, but not impossible. In rare cases, overheating or faulty wiring may result in a fire. In the case of an unplanned fire, a management plan needs to be in place to reduce damage to the infrastructure and surrounding areas. The fire management plan includes management protocols to ensure that the surrounding natural environment will not be affected by an unplanned fire sourcing from the facility. The main objective of the fire management plan is to prevent fires on site, and to extinguish fires locally inside the areas before they spread.

4.1 WEF Specific Fire Management Systems

The systems that are standard to be part of the fire protection protocol for the specific WEF project will be addressed superficially below, as it assumed these systems are in place. The structure and design of the WEF is also assumed to follow national standards and no further guidelines are provided.

Standard mitigations that should be followed include:

- A fire officer must be appointed who is responsible for ensuring appropriate action in the event of a fire;
- All personnel should be made aware of the procedure to be followed in the event of a fire;
- Fire fighting equipment must be made available on site, particularly near grid connection points;
- Tall woody plants within 10 m of the wind turbines and electrical connections/high risk areas must be cut on a regular basis and removed to minimise the fire risk;
- The grass cover within 10 m of the wind turbines and electrical connections/high risk areas must be kept short to minimise the fire risk;
- No making of fires for any purpose will be allowed within the site unless specifically for controlled fire break creation;
- Fire breaks must be maintained. The roads network in the WEF must be planned to act as fire breaks;
- Advisory and warning signage must be visibly displayed throughout the site, particularly with reference to not flicking cigarette butts into vegetated areas;
- Smoking should only be permitted in designated areas and appropriate waste disposal containers must be provided for the disposal of cigarette butts;
- Inform and invite the local fire department closest to your property to discuss WEF hazards. An adequate emergency response is the key to avoiding an uncontrolled fire;
- Standard Operating Procedures (SOP) and Standard Operating Guidelines (SOG) are of major importance and must be updated and tested on a regular basis;
- All joints must be checked on a monthly basis for the presence of any loose cables;

- All the underground powerline connections must be checked routinely on an annual basis; and
- Mobile electrostatic equipment must be used on a yearly basis to ensure the system is grounded correctly.

4.2 Fire Breaks

Fire breaks prevent external fires from entering a farm property and obstruct internal fires from spreading to neighbouring areas. Firebreaks are enforced by law and are found in the:

- National Veld and Forest Fire Act, 101 of 1998:
    - Duty to prepare and maintain fire breaks: A fire break is recommended by law; it must exist to prevent any veld fire from spreading from an area owned by one person to an area owned by another person. The fire break must be long and wide enough to defend oneself in court as well as prevent soil erosion (Bothma & Du Toit, 2010).

Fire breaks are usually essential on the periphery of any portion of owned land. Firebreaks are created/burnt as soon as the herbaceous component starts losing moisture, which is a few months after the last summer rainfall; usually in autumn (April-May). It is important to burn at this time of year due to many accidental fires occurring because of the dry state of vegetation where any ignition source, like an ember, cigarette or matchstick, could lead to an unstoppable accidental fire. Roads usually act as the main fire breaking tool, in order to increase the width of the firebreak, the vegetation on the roadside can also be slashed or burned. The width of the vegetation burned on the roadside should not exceed 3 m to restrict the impact on the vegetation community.

The periphery of the farm portion/property and the WEF footprint areas must have a fire break to prevent any fires from spreading, firstly, from the footprints onto the rest of the property, and, secondly, onto neighbouring farms in the case that the fire cannot be contained within the infrastructure footprints.

The creation/burning of a fire break can be completed by consulting a contractor, however, based on the maintenance road around the periphery of the property it may be constructed internally if large earth moving machinery is available. This being said, it is assumed all Environmental Authorisations (EA) are in order for any suggested actions contained within the Environmental Impact Assessment (EIA). Should protected tree and plant species occur in the project area, permits are required to have them removed, i.e., it is assumed that if any protected trees or plants may need to be destroyed for the creation of a firebreak or areas need to be cleared, that the correct permit/EA will be in hand. It is recommended that regular photos are taken of the fire breaks, especially the size and extent of the fire break, to be able to defend the WEF site in the case of presumption of negligence.

4.3 Management Plan

The aim of this section is to present actions which should be incorporated into the existing EMPr which will allow for the successful implementation and auditing of mitigation and monitoring actions. The proposed summarised actions are presented in Table 4-1.

Table 4-1 Management measures, including requirements for timeframes, roles and responsibilities for this report

Fire			
Impact Management Actions	**Implementation**	**Monitoring**	
	Responsible Party	**Aspect**	**Frequency**
Staff/contractors or visitors must be educated about fire risk associated with smoking and cooking actions, discarding of lit cigarette butts and/or glowing embers from cooking fires. A designated smoking area within the project area must be provided and should have a fireproof sand filled container for extinguishing cigarettes. Smoking shall otherwise be prohibited across the site and in the work areas. Educate construction workers regarding risks and correct disposal of cigarettes.	Project manager, Environmental Officer & Health and Safety Officer.	Fire Risk Awareness and training	Ongoing
Portable firefighting equipment must be provided at strategic locations throughout the site, in line with the Building Code of South Africa and the relevant provincial building code. All emergency equipment including portable fire extinguishers, hose reels and hydrants must be maintained and inspected by a qualified contractor in accordance with the relevant legislation and national standards.	Health and Safety Officer.	Portable firefighting equipment	As per the standards
Each employee, subcontractor or any other visitor must be made aware of the provisions of the fire management plan and made familiar with the location and proper use of firefighting equipment, as well as the location of assembly points.	Health and Safety Officer.	Fire's safety awareness and training	Ongoing
Fire management training for all staff about the correct steps to take in case of an accidental fire, including the reporting of a fire as well as the use of the available equipment.	Health and Safety Officer.	Fire's safety awareness and training	Monthly
Fire occurrence emergency protocol training.	Project manager, Environmental Officer	Fire emergency drill tests	From April until October, every two months
The creation and maintenance of a firebreak wide enough to prevent a fire from crossing as well as the monitoring of this fire break.	Environmental Officer	Size and condition of fire break	Bi-annually (Wet and Dry season) but also every two weeks at the end of the dry season (July-Sep) when the risk is high
The state and size of the firebreak must be assessed to ensure that it is large enough and devoid of vegetation that may allow a fire to pass across. The establishment and proliferation of Alien Invasive Plants (AIP) at the firebreaks must be monitored.	Environmental Officer & Contractor	Assess the state of fire break and establishment /encroachment of alien vegetation	Quarterly, especially during the dry season.

Fire			
Impact Management Actions	**Implementation**	**Monitoring**	
	Responsible Party	**Aspect**	**Frequency**
Fire risk must be reduced by removing the dry vegetation or combustible materials from any hazardous material storage areas, cooking areas, smoking areas or vehicle/equipment that may create a spark.	Project manager, Environmental Officer & Health and Safety Officer.	Removal of dry vegetation or combustible material	Daily
Local firefighting/fire protection agencies must be contacted in order to establish a relationship and must have access to the WEF and the access road must allow any relevant fire fighting vehicle/truck to travel without hinder.	Project manager, Environmental Officer & Health and Safety Officer.	Access to wind energy facility	Ongoing
The number of the Goven Mbeki Municipality Emergency Services (017 624 3171) and Lekwa Local Municipality (Fire: 017 712 9681/2 / 017 712 5551) must be displayed in the site offices.	Health and Safety Officer.	Number displayed in site office	Ongoing
Adjacent landowners must be informed in the case of any fire.	Environmental Officer & Health and Safety Officer.	Case of fire	In the occurrence of any fire
No open fires are allowed at sites. Fires for cooking must be restricted to designated areas, extra care should be taken to ensure to prevent veld fires from occurring. Cooking facilities within a designated area must be provided.	Project manager, Environmental Officer & Health and Safety Officer.	Incidence of open fires and cooking within designated areas	Daily
A Fire Prevention and Fire Emergency Method must be in order and limited to the following: • Fire Fighting training for designated site staff; • Sources of fire risk and hazards; • How to comply with any requirements of local authority fire departments and standards; • How to minimise the risk of accidental fires; and • How to control accidental fires.	Health and Safety Officer.	Availability and Awareness of the Fire Prevention and Fire Emergency Method	Ongoing
The “fire team” must attend a comprehensive fire-fighting training program. They must also have access to and manage the fire extinguishers and fire fighting vehicles available on site.	Project manager, Environmental Officer & Health and Safety Officer as well as the Fire Team	Fire Management in case of occurrence	Daily
The WEF must be part of or form a Fire Protection Association (FPA). (https://www.fpasa.co.za/).	Project manager, Environmental Officer	Membership of an FPA.	Ongoing
Routine checking of all the connections and WEF site.	Electrician	Presence of any loose wiring, malfunctioning parts	Ongoing, with a check of all connections yearly

Fire			
Impact Management Actions	**Implementation**	**Monitoring**	
	Responsible Party	**Aspect**	**Frequency**
Mobile electrostatic equipment must be used to ensure the system is grounded correctly.	Technician	Presence of an electrostatic reading	Monthly
Check for animals and nests in the WEF site.	Environmental Officer	Presence of animals and nests	Bi-weekly
A lightning rod must be installed as per national guidelines.	Contractor	Lightning strike events	Once, during the construction phase
All joints must be checked on a monthly basis for the presence of any loose cables of the aboveground powerlines.	Electrician	Presence of any loose wiring, malfunctioning parts	Monthly
Routine checking of all the powerline connections.	Electrician	Presence of any loose wiring, malfunctioning parts	Ongoing, with a check of all connections yearly

5 References

Brown, A.A. & Davis, K.P. (1973). Forest fire control and use: Second edition. New York, NY: McGraw-Hill. 686 pp.

Bothma, J.P. & du Toit, J.G. (2010). Game Ranch Management: Fifth edition. Pretoria: Van Schaik.

Fire Information for Resource Management System (FIRMS). (2021). MODIS Collection 6 NRT Hotspot / Active Fire Detections MCD14DL. Available at https://earthdata.nasa.gov/firms. doi:10.5067/FIRMS/MODIS/MCD14DL.NRT.006 (Accessed April 2023)

Forsyth, G.G., Kruger, F. & Le Maitre, D. (2010). National veldfire risk assessment: analysis of exposure of social, economic and environmental assets to veldfire hazards in South Africa. Stellenbosch, CSIR Natural Resources and the Environment. CSIR Report No: CSIR/NRE/ECO/ER/2010/0023/C.

Krynauw, D.J. (2013). Plant studies III notes, Module 3: Management of fire in natural vegetation and wildlife areas in southern Africa. Pretoria: Tshwane University of Technology.

Luke, R.H. & McArthur, A.G. (1978). Bushfires in Australia. Australian Government Publishing Services, Canberra.

Morrow, H. (2001) Environmental and human health impact assessment of battery systems, in: Used battery collection and recycling, Editors: Pistoia, G., Wiaux, J-P., Wolsky, S.P., Industrial Chemistry Library Vol. 10, Elsevier Science, Amsterdam, p. 1-34

Mucina, L. & Rutherford, M.C. (Eds.). (2006). The vegetation of South Africa, Lesotho and Swaziland. Strelizia 19. South African National Biodiversity Institute, Pretoria South African.

Raimonde, D. (2009). Red list of South African Plants. SANBI, Pretoria.

SANBI (South African National Biodiversity Institute). (2010). National veldfire risk assessment. http://bgis.sanbi.org/

SANBI. (2018). Terrestrial ecosystem threat status and protection level layer [Vector] 2018. Available from the Biodiversity GIS website: http://bgis.sanbi.org/SpatialDataset/Detail/2675.

Sepanski, A., Reil., F, Vaaben, W., Janknecht, E., Hupach, U., Bogdanski, N. & van Heeckeren, B. (2018). Assessing Fire Risks in Photovoltaic Systems and Developing Safety Concepts for Risk Minimization. TÜV Rheinland Energie und Umwelt GmbH Fraunhofer-Institut für Solare Energiesysteme (ISE).

Tainton, N.M. (1999). Veld Management in South Africa. Pietermaritzburg: University of Natal Press.

6 Appendices

Appendix A Specialist declarations

DECLARATION

I, Sarah Newman, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Sarah Newman

Environmental Consultant

The Biodiversity Company

April 2023

DECLARATION

I, Andrew Husted, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Andrew Husted

Ecologist

The Biodiversity Company

February 2023

Appendix B Specialists CVs

Sarah Newman

M.Sc Entomology

Cell: +27 73 391 6933
Email: sarah@thebiodiversitycompany.com
Identity Number: 9312170034086
Date of birth: 17 December 1993

Profile Summary

Work experience in South Africa, Lesotho and Costa Rica.

Extensive experience working in the Sani Pass region of southern Africa investigating the patterns and drivers of ant diversity across an elevation gradient.

Experience with sea turtle monitoring and conservation in Costa Rica.

Areas of Interest

Entomology, Zoology, Biodiversity, Conservation and Community Ecology.

Key Experience

- Terrestrial Ecological Assessments
- Monitoring programmes
- Field work and research
- Taxonomic classification of insects

Country Experience

South Africa

Lesotho

Costa Rica

Nationality

South African

Languages

English – Proficient

Afrikaans – Conversational

Spanish – Basic

Qualifications

- MSc Entomology (*Distinction*), University of Pretoria
- BSc (Hons) Zoology, University of Pretoria
- BSc Zoology, University of Pretoria
- Cand Sci Nat (158474)

CURRICULUM VITAE: Sarah Newman

CURRICULUM VITAE: Sarah Newman

OVERVIEW

An overview of the specialist technical expertise include the following:

- Terrestrial Ecological Assessments
- Faunal surveys which include mammals, birds, amphibians and reptiles
- Management plan compilation (Fire Management Plan)

EMPLOYMENT EXPERIENCE

Environmental Consultant at The Biodiversity Company (November 2022 - Present)

Terrestrial biodiversity surveys and assessments.

Research Technician (Contract) for the University of Pretoria (February 2022 – July 2022)

Taxonomic identification of invertebrates.

Sea Turtle Research Assistant for Ecology Project International at Pacuare Reserve, Costa Rica (February 2021 – November 2021)

Conducted sea turtle monitoring, conservation activities and data management, along with overseeing jaguar camera trapping surveys and performing teaching activities with visiting student groups and tourists.

Compliance and Regulatory Officer for Cell Path Services (Pty) Ltd (June 2019 – November 2020)

Ensured the company adhered to all regulatory requirements outlined by the relevant regulatory bodies.

ACADEMIC QUALIFICATIONS

University of Pretoria, Pretoria (2018): Master of Science (MSc) in Entomology with *Distinction*

Title: Taxonomic and Functional Diversity of Ants Across Environmental Gradients

University of Pretoria, Pretoria (2016): Bachelor of Science Honours (BSc (Hons)) in Zoology

Title: Rolling versus tunnelling: An evolutionary history of dung relocation and burial behaviour in African dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae)

University of Pretoria, Pretoria (2015): Bachelor of Science (BSc) in Zoology

APPENDIX M:
CVs OF PROJECT TEAM

savannah environmental

1st Floor, Block 2, 5 Woodlands Drive Office Park
Woodlands Drive, Woodmead
Johannesburg, South Africa

Email: joanne@savannahsa.com
Tel: +27 (11) 656 3237

CURRICULUM VITAE OF JO-ANNE THOMAS

Profession:	Environmental Management and Compliance Consultant; Environmental Assessment Practitioner
Specialisation:	Environmental Management; Strategic environmental advice; Environmental compliance advice & monitoring; Environmental Impact Assessments; Policy, strategy & guideline formulation; Project Management; General Ecology
Work experience:	Twenty four (24) years in the environmental field

VOCATIONAL EXPERIENCE

Provide 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. Key focus 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. Compilation of the reports for environmental studies is in accordance with all relevant environmental legislation.

Undertaking of numerous environmental management studies has resulted in a good working knowledge of environmental legislation and policy requirements. Recent projects have been undertaken for both the public- and private-sector, including compliance advice and monitoring, electricity generation and transmission projects, various types of linear developments (such as National Road, local roads and power lines), waste management projects (landfills), mining rights and permits, policy, strategy and guideline development, as well as general environmental planning, development and management.

SKILLS BASE AND CORE COMPETENCIES

- Project management for a range of projects
- Identification and assessment of potential negative environmental impacts and benefits through the review and manipulation of data and specialist studies
- Identification of practical and achievable mitigation and management measures and the development of appropriate management plans
- Compilation of environmental reports in accordance with relevant environmental legislative requirements
- External and peer review of environmental reports & compliance advice and monitoring
- Formulation of environmental policies, strategies and guidelines
- Strategic and regional assessments; pre-feasibility & site selection
- Public participation processes for a variety of projects
- Strategic environmental advice to a wide variety of clients both in the public and private sectors
- Working knowledge of environmental planning processes, policies, regulatory frameworks and legislation

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- B.Sc Earth Sciences, University of the Witwatersrand, Johannesburg (1993)
- B.Sc Honours in Botany, University of the Witwatersrand, Johannesburg (1994)
- M.Sc in Botany, University of the Witwatersrand, Johannesburg (1996)

Short Courses:

- Environmental Impact Assessment, Potchefstroom University (1998)
- Environmental Law, Morgan University (2001)
- Environmental Legislation, IMBEWU (2017)
- Mining Legislation, Cameron Cross & Associates (2013)
- Environmental and Social Risk Management (ESRM), International Finance Corporation (2018)

Professional Society Affiliations:

- Registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA) (2019/726)
- Registered with the South African Council for Natural Scientific Professions as a Professional Natural Scientist: Environmental Scientist (400024/00)
- Registered with the International Associated for Impact Assessment South Africa (IAIAsa): 5601
- Member of the South African Wind Energy Association (SAWEA)

EMPLOYMENT

Date	Company	Roles and Responsibilities
January 2006 - Current:	Savannah Environmental (Pty) Ltd	Director Project manager Independent specialist environmental consultant, Environmental Assessment Practitioner (EAP) and advisor.
1997 – 2005:	Bohlweki Environmental (Pty) Ltd	Senior Environmental Scientist at. Environmental Management and Project Management
January – July 1997:	Sutherland High School, Pretoria	Junior Science Teacher

PROJECT EXPERIENCE

Project experience includes large infrastructure projects, including electricity generation and transmission, wastewater treatment facilities, mining and prospecting activities, property development, and national roads, as well as strategy and guidelines development.

RENEWABLE POWER GENERATION PROJECTS: PHOTOVOLTAIC SOLAR ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Christiana PV 2 SEF, North West	Solar Reserve South Africa	Project Manager & EAP
De Aar PV facility, Northern Cape	iNca Energy	Project Manager & EAP
Everest SEF near Hennenman, Free State	FRV Energy South Africa	Project Manager & EAP
Graafwater PV SEF, Western Cape	iNca Energy	Project Manager & EAP
Grootkop SEF near Allanridge, Free State	FRV Energy South Africa	Project Manager & EAP
Hertzogville PV 2 SEF with 2 phases, Free State	SunCorp / Solar Reserve	Project Manager & EAP

Project Name & Location	Client Name	Role
Karoshoek CPV facility on site 2 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Kgabalatsane SEF North-East for Brits, North West	Built Environment African Energy Services	Project Manager & EAP
Kleinbegin PV SEF West of Groblershoop, Northern Cape	MedEnergy Global	Project Manager & EAP
Lethabo Power Station PV Installation, Free State	Eskom Holdings SoC Limited	Project Manager & EAP
Majuba Power Station PV Installation, Mpumalanga	Eskom Holdings SoC Limited	Project Manager & EAP
Merapi PV SEF Phase 1 – 4 South-East of Excelsior, Free State	SolaireDirect Southern Africa	Project Manager & EAP
Sannaspos Solar Park, Free State	SolaireDirect Southern Africa	Project Manager & EAP
Ofir-Zx PV Plant near Keimoes, Northern Cape	S28 Degrees Energy	Project Manager & EAP
Oryx SEF near Virginia, Free State	FRV Energy South Africa	Project Manager & EAP
Project Blue SEF North of Kleinsee, Northern Cape	WWK Development	Project Manager & EAP
S-Kol PV Plant near Keimoes, Northern Cape	S28 Degrees Energy	Project Manager & EAP
Sonnenberg PV Plant near Keimoes, Northern Cape	S28 Degrees Energy	Project Manager & EAP
Tutuka Power Station PV Installation, Mpumalanga	Eskom Transmission	Project Manager & EAP
Two PV sites within the Northern Cape	MedEnergy Global	Project Manager & EAP
Two PV sites within the Western & Northern Cape	iNca Energy	Project Manager & EAP
Upington PV SEF, Northern Cape	MedEnergy Global	Project Manager & EAP
Vredendal PV facility, Western Cape	iNca Energy	Project Manager & EAP
Waterberg PV plant, Limpopo	Thupela Energy	Project Manager & EAP
Watershed Phase I & II SEF near Litchtenburg, North West	FRV Energy South Africa	Project Manager & EAP
Alldays PV & CPV SEF Phase 1, Limpopo	BioTherm Energy	Project Manager & EAP
Hyperion PV Solar Development 1, 2, 3, 4, 5 & 6, Northern Cape	Building Energy	Project Manager & EAP
Vrede & Rondavel PV, Free State	Mainstream Renewable Energy Developments	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Aberdeen PV SEF, Eastern Cape	BioTherm Energy	Project Manager & EAP
Christiana PV 1 SEF on Hartebeestpan Farm, North-West	Solar Reserve South Africa	Project Manager & EAP
Heuningspruit PV1 & PV 2 facilities near Koppies, Free State	Sun Mechanics	Project Manager & EAP
Kakamas PV Facility, Northern Cape	iNca Energy	Project Manager & EAP
Kakamas II PV Facility, Northern Cape	iNca Energy	Project Manager & EAP
Machadodorp 1 PV SEF, Mpumalanga	Solar To Benefit Africa	Project Manager & EAP
PV site within the Northern Cape	iNca Energy	Project Manager & EAP
PV sites within 4 ACSA airports within South Africa, National	Airports Company South Africa (ACSA)	Project Manager & EAP
RustMo1 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
RustMo2 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
RustMo3 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
RustMo4 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP

Project Name & Location	Client Name	Role
Sannaspos PV SEF Phase 2 near Bloemfontein, Free State	SolaireDirect Southern Africa	Project Manager & EAP
Solar Park Expansion within the Rooiwal Power Station, Gauteng	AFRKO Energy	Project Manager & EAP
Steynsrus SEF, Free State	SunCorp	Project Manager & EAP
Sirius Solar PV Project Three and Sirius Solar PV Project Four (BA in terms of REDZ regulations), Northern Cape	SOLA Future Energy	Project Manager & EAP
Northam PV, Limpopo Province	Northam Platinum	Project Manager & EAP
Kolkies PV Suite (x 6 projects) and Sadawa PV Suite (x 4 projects), Western Cape	Mainstream Renewable Energy Developments	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Allemans Fontein SEF near Noupoort, Northern Cape	Fusion Energy	Project Manager & EAP
Amandel SEF near Thabazimbi, Limpopo	iNca Energy	Project Manager & EAP
Arola/Doornplaat SEF near Ventersdorp, North West	FRV & iNca Energy	Project Manager & EAP
Bloemfontein Airport PV Installation, Free State	The Power Company	Project Manager & EAP
Brakspruit SEF near Klerksorp, North West	FRV & iNca Energy	Project Manager & EAP
Carolus Poort SEF near Noupoort, Northern Cape	Fusion Energy	Project Manager & EAP
Damfontein SEF near Noupoort, Northern Cape	Fusion Energy	Project Manager & EAP
Everest SEF near Welkom, Free State	FRV & iNca Energy	Project Manager & EAP
Gillmer SEF near Noupoort, Northern Cape	Fusion Energy	Project Manager & EAP
Grootkop SEF near Allansridge, Free State	FRV & iNca Energy	Project Manager & EAP
Heuningspruit PV1 & PV 2 near Koppies, Free State	Cronimat	Project Manager & EAP
Kimberley Airport PV Installation, Northern Cape	The Power Company	Project Manager & EAP
Kolonnade Mall Rooftop PV Installation in Tshwane, Gauteng	Momentous Energy	Project Manager & EAP
Loskop SEF near Groblersdal, Limpopo	S&P Power Unit	Project Manager & EAP
Marble SEF near Marble Hall, Limpopo	S&P Power Unit	Project Manager & EAP
Morgenson PV1 SEF South-West of Windsorton, Northern Cape	Solar Reserve South Africa	Project Manager & EAP
OR Tambo Airport PV Installation, Gauteng	The Power Company	Project Manager & EAP
Oryx SEF near Virginia, Free State	FRV & iNca Energy	Project Manager & EAP
Rhino SEF near Vaalwater, Limpopo	S&P Power Unit	Project Manager & EAP
Rustmo2 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
Spitskop SEF near Northam, Limpopo	FRV & iNca Energy	Project Manager & EAP
Steynsrus PV, Free State	Suncorp	Project Manager & EAP
Tabor SEF near Polokwane, Limpopo	FRV & iNca Energy	Project Manager & EAP
UpingtonAirport PV Installation, Northern Cape	The Power Company	Project Manager & EAP
Valeria SEF near Hartebeestpoort Dam, North West	Solar to Benefit Africa	Project Manager & EAP
Watershed SEF near Lichtenburg, North West	FRV & iNca Energy	Project Manager & EAP
Witkop SEF near Polokwane, Limpopo	FRV & iNca Energy	Project Manager & EAP
Woodmead Retail Park Rooftop PV Installation, Gauteng	Momentous Energy	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO and bi-monthly auditing for the construction of the Adams Solar PV Project Two South of Hotazel,	Enel Green Power	Project Manager

Project Name & Location	Client Name	Role
Northern Cape		
ECO for the construction of the Kathu PV Facility, Northern Cape	REISA	Project Manager
ECO and bi-monthly auditing for the construction of the Pulida PV Facility, Free State	Enel Green Power	Project Manager
ECO for the construction of the RustMo1 SEF, North West	Momentous Energy	Project Manager
ECO for the construction of the Sishen SEF, Northern Cape	Windfall 59 Properties	Project Manager
ECO for the construction of the Upington Airport PV Facility, Northern Cape	Sublanary Trading	Project Manager
Quarterly compliance monitoring of compliance with all environmental licenses for the operation activities at the Kathu PV facility, Northern Cape	REISA	Project Manager
ECO for the construction of the Konkoonsies II PV SEF and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager
ECO for the construction of the Aggeneys PV SEF and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager

Compliance Advice and ESAP Reporting

Project Name & Location	Client Name	Role
Aggeneys Solar Farm, Northern Cape	BioTherm Energy	Environmental Advisor
Airies II PV Facility SW of Kenhardt, Northern Cape	BioTherm Energy	Environmental Advisor
Kalahari SEF Phase II in Kathu, Northern Cape	Engie	Environmental Advisor
Kathu PV Facility, Northern Cape	Building Energy	Environmental Advisor
Kenhardt PV Facility, Northern Cape	BioTherm Energy	Environmental Advisor
Kleinbegin PV SEF West of Groblershoop, Northern Cape	MedEnergy	Environmental Advisor
Konkoonises II SEF near Pofadder, Northern Cape	BioTherm Energy	Environmental Advisor
Konkoonsies Solar Farm, Northern Cape	BioTherm Energy	Environmental Advisor
Lephalale SEF, Limpopo	Exxaro	Environmental Advisor
Pixley ka Seme PV Park, South-East of De Aar, Northern Cape	African Clean Energy Developments (ACED)	Environmental Advisor
RustMo1 PV Plant near Buffelspoort, North West	Momentous Energy	Environmental Advisor
Scuitdrift 1 SEF & Scuitdrift 2 SEF, Limpopo	Building Energy	Environmental Advisor
Sirius PV Plants, Northern Cape	Aurora Power Solutions	Environmental Advisor
Upington Airport PV Power Project, Northern Cape	Sublunary Trading	Environmental Advisor
Upington SEF, Northern Cape	Abengoa Solar	Environmental Advisor
Ofir-ZX PV SEF near Keimoes, Northern Cape	Networx S28 Energy	Environmental Advisor
Environmental Permitting for the Steynsrus PV1 & PV2 SEF's, Northern Cape	Cronimet Power Solutions	Environmental Advisor
Environmental Permitting for the Heuningspruit PV SEF, Northern Cape	Cronimet Power Solutions	Environmental Advisor

Due Diligence Reporting

Project Name & Location	Client Name	Role
5 PV SEF projects in Lephalale, Limpopo	iNca Energy	Environmental Advisor
Prieska PV Plant, Northern Cape	SunEdison Energy India	Environmental Advisor
Sirius Phase One PV Facility near Upington, Northern Cape	Aurora Power Solutions	Environmental Advisor

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Biodiversity Permit & WULA for the Aggeneys SEF near Aggeneys, Northern Cape	BioTherm Energy	Project Manager & EAP
Biodiversity Permit for the Konkoonises II SEF near Pofadder, Northern Cape	BioTherm Energy	Project Manager & EAP
Biodiversity Permitting for the Lephalale SEF, Limpopo	Exxaro Resources	Project Manager & EAP
Environmental Permitting for the Kleinbegin PV SEF West of Groblershoop, Northern Cape	MedEnergy	Project Manager & EAP
Environmental Permitting for the Upington SEF, Northern Cape	Abengoa Solar	Project Manager & EAP
Environmental Permitting for the Kathu PV Facility, Northern Cape	Building Energy	Project Manager & EAP
Environmental Permitting for the Konkoonsies Solar Farm, Northern Cape	BioTherm Energy	Project Manager & EAP
Environmental Permitting for the Lephalale SEF, Limpopo	Exxaro Resources	Project Manager & EAP
Environmental Permitting for the Scuitdrift 1 SEF & Scuitdrift 2 SEF, Limpopo	Building Energy	Project Manager & EAP
Environmental Permitting for the Sirius PV Plant, Northern Cape	Aurora Power Solutions	Project Manager & EAP
Environmental Permitting for the Steynsrus PV1 & PV2 SEF's, Northern Cape	Cronimet Power Solutions	Project Manager & EAP
Environmental Permitting for the Heuningspruit PV SEF, Northern Cape	Cronimet Power Solutions	Project Manager & EAP
Permits for the Kleinbegin and UAP PV Plants, Northern Cape	MedEnergy Global	Project Manager & EAP
S53 Application for Arriesfontein Solar Park Phase 1 – 3 near Danielskuil, Northern Cape	Solar Reserve / SunCorp	Project Manager & EAP
S53 Application for Hertzogville PV1 & PV 2 SEFs, Free State	Solar Reserve / SunCorp	Project Manager & EAP
S53 Application for the Bloemfontein Airport PV Facility, Free State	Sublunary Trading	Project Manager & EAP
S53 Application for the Kimberley Airport PV Facility, Northern Cape	Sublunary Trading	Project Manager & EAP
S53 Application for the Project Blue SEF, Northern Cape	WWK Developments	Project Manager & EAP
S53 Application for the Upington Airport PV Facility, Free State	Sublunary Trading	Project Manager & EAP
WULA for the Kalahari SEF Phase II in Kathu, Northern Cape	Engie	Project Manager & EAP

RENEWABLE POWER GENERATION PROJECTS: CONCENTRATED SOLAR FACILITIES (CSP)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Ilanga CSP 2, 3, 4, 5, 7 & 9 Facilities near Upington, Northern Cape	Emvelo Holdings	Project Manager & EAP
Ilanga CSP near Upington, Northern Cape	Ilangethu Energy	Project Manager & EAP

Project Name & Location	Client Name	Role
Ilanga Tower 1 Facility near Upington, Northern Cape	Emvelo Holdings	Project Manager & EAP
Karoshoek CPVPD 1-4 facilities on site 2 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Karoshoek CSP facilities on sites 1.4; 4 & 5 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Karoshoek Linear Fresnel 1 Facility on site 1.1 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the !Khi CSP Facility, Northern Cape	Abengoa Solar	Project Manager
ECO for the construction of the Ilanga CSP 1 Facility near Upington, Northern Cape	Karoshoek Solar One	Project Manager
ECO for the construction of the folar Park, Northern Cape	Kathu Solar	Project Manager
ECO for the construction of the KaXu! CSP Facility, Northern Cape	Abengoa Solar	Project Manager
Internal audit of compliance with the conditions of the IWUL issued to the Karoshoek Solar One CSP Facility, Northern Cape	Karoshoek Solar One	Project Manager

Screening Studies

Project Name & Location	Client Name	Role
Upington CSP (Tower) Plant near Kanoneiland, Northern Cape	iNca Energy and FRV	Project Manager & EAP

Compliance Advice and ESAP reporting

Project Name & Location	Client Name	Role
Ilanga CSP Facility near Upington, Northern Cape	Ilangethu Energy	Environmental Advisor
Ilangalethu CSP 2, Northern Cape	FG Emvelo	Environmental Advisor
Kathu CSP Facility, Northern Cape	GDF Suez	Environmental Advisor
Lephalale SEF, Limpopo	Cennergi	Environmental Advisor
Solis I CSP Facility, Northern Cape	Brightsource	Environmental Advisor

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Environmental Permitting for the Ilanga CSP Facility near Upington, Northern Cape	Ilangethu Energy	Project Manager & EAP
Environmental Permitting for the Kathu CSP, Northern Cape	GDF Suez	Project Manager & EAP
WULA for the Solis I CSP Facility, Northern Cape	Brightsource	Project Manager & EAP

RENEWABLE POWER GENERATION PROJECTS: WIND ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Sere WEF, Western Cape	Eskom Holdings SoC Limited	EAP
Aberdeen WEF, Eastern Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Amakhala Emoyeni WEF, Eastern Cape	Windlab Developments	Project Manager & EAP
EXXARO West Coast WEF, Western Cape	EXXARO Resources	Project Manager & EAP
Goereesoe Wind Farm near Swellendam, Western Cape	iNca Energy	Project Manager & EAP
Hartneest WEF, Western Cape	Juwi Renewable Energies	Project Manager & EAP
Hopefield WEF, Western Cape	Umoya Energy	EAP
Kleinsee WEF, Northern Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Klipheuwel/Dassiesfontein WEF within the Overberg area, Western Cape	BioTherm Energy	Project Manager & EAP
Moorreesburg WEF, Western Cape	iNca Energy	Project Manager & EAP
Oyster Bay WEF, Eastern Cape	Renewable Energy Resources Southern Africa	Project Manager & EAP
Project Blue WEF, Northern Cape	Windy World	Project Manager & EAP
Rheboksfontein WEF, Western Cape	Moyeng Energy	Project Manager & EAP
Spitskop East WEF near Riebeeck East, Eastern Cape	Renewable Energy Resources Southern Africa	Project Manager & EAP
Suurplaat WEF, Western Cape	Moyeng Energy	Project Manager & EAP
Swellendam WEF, Western Cape	IE Swellendam	Project Manager & EAP
Tsitsikamma WEF, Eastern Cape	Exxarro	Project Manager & EAP
West Coast One WEF, Western Cape	Moyeng Energy	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Amakhala Emoyeni Wind Monitoring Masts, Eastern Cape	Windlab Developments	Project Manager & EAP
Beaufort West Wind Monitoring Masts, Western Cape	Umoya Energy	Project Manager & EAP
Hopefield Community Wind Farm near Hopefield, Western Cape	Umoya Energy	Project Manager & EAP
Koekenaap Wind Monitoring Masts, Western Cape	EXXARO Resources	Project Manager & EAP
Koingnaas WEF, Northern Cape	Just Palm Tree Power	Project Manager & EAP
Laingsburg Area Wind Monitoring Masts, Western Cape	Umoya Energy	Project Manager & EAP
Overberg Area Wind Monitoring Masts, Western Cape	BioTherm Energy	Project Manager & EAP
Oyster Bay Wind Monitoring Masts, Eastern Cape	Renewable Energy Systems Southern Africa (RES)	Project Manager & EAP
Wind Garden & Fronteer WEFs, Eastern Cape	Wind Relc	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Albertinia WEF, Western Cape	BioTherm Energy	Project Manager & EAP
Koingnaas WEF, Northern Cape	Just Pal Tree Power	Project Manager & EAP
Napier Region WEF Developments, Western Cape	BioTherm Energy	Project Manager & EAP
Tsitsikamma WEF, Eastern Cape	Exxarro Resources	Project Manager & EAP

Project Name & Location	Client Name	Role
Various WEFs within an identified area in the Overberg area, Western Cape	BioTherm Energy	Project Manager & EAP
Various WEFs within an identified area on the West Coast, Western Cape	Investec Bank Limited	Project Manager & EAP
Various WEFs within an identified area on the West Coast, Western Cape	Eskom Holdings Limited	Project Manager & EAP
Various WEFs within the Western Cape	Western Cape Department of Environmental Affairs and Development Planning	Project Manager & EAP
Velddrift WEF, Western Cape	VentuSA Energy	Project Manager & EAP
Wind 1000 Project	Thabo Consulting on behalf of Eskom Holdings	Project Manager & EAP
Wittekleibosch, Snylip & Doriskraal WEFs, Eastern Cape	Exxarro Resources	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the West Coast One WEF, Western Cape	Aurora Wind Power	Project Manager
ECO for the construction of the Gouda WEF, Western Cape	Blue Falcon	Project Manager
EO for the Dassiesklip Wind Energy Facility, Western Cape	Group 5	Project Manager
Quarterly compliance monitoring of compliance with all environmental licenses for the operation activities at the Gouda Wind Energy facility near Gouda, Western Cape	Blue Falcon	Project Manager
Annual auditing of compliance with all environmental licenses for the operation activities at the West Coast One Wind Energy facility near Vredenburg, Western Cape	Aurora Wind Power	Project Manager
External environmental and social audit for the Amakhala Wind Farm, Eastern Cape	Cennergi	Project Manager
External environmental and social audit for the Tsitsikamma Wind Farm, Eastern Cape	Cennergi	Project Manager
ECO for the construction of the Excelsior Wind Farm and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager
External compliance audit of the Dassiesklip Wind Energy Facility, Western Cape	BioTherm Energy	Project Manager

Compliance Advice

Project Name & Location	Client Name	Role
Amakhala Phase 1 WEF, Eastern Cape	Cennergi	Environmental Advisor
Dassiesfontein WEF within the Overberg area, Western Cape	BioTherm Energy	Environmental Advisor
Excelsior Wind Farm, Western Cape	BioTherm Energy	Environmental Advisor
Great Karoo Wind Farm, Northern Cape	African Clean Energy Developments (ACED)	Environmental Advisor
Hopefield Community WEF, Western Cape	African Clean Energy Developments (ACED)	Environmental Advisor

Rheboksfontein WEF, Western Cape	Moyeng Energy	Environmental Advisor
Tiqua WEF, Western Cape	Cennergi	Environmental Advisor
Tsitsikamma WEF, Eastern Cape	Cennergi	Environmental Advisor
West Coast One WEF, Western Cape	Moyeng Energy	Environmental Advisor

Due Diligence Reporting

Project Name & Location	Client Name	Role
Witteberg WEF, Western Cape	EDPR Renewables	Environmental Advisor
IPD Vredenburg WEF within the Saldanha Bay area, Western Cape	IL&FS Energy Development Company	Environmental Advisor

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Biodiversity Permitting for the Power Line between the Tsitikamma Community WEF & the Diep River Substation, Eastern Cape	Cennergi	Project Manager & EAP
Biodiversity Permitting for the West Coast One WEF, Western Cape	Aurora Wind Power	Project Manager & EAP
Environmental Permitting for the Excelsior WEF, Western Cape	BioTherm Energy	Project Manager & EAP
Plant Permits & WULA for the Tsitsikamma Community WEF, Eastern Cape	Cennergi	Project Manager & EAP
S24G and WULA for the Rectification for the commencement of unlawful activities on Ruimsig AH in Honeydew, Gauteng	Hossam Soror	Project Manager & EAP
S24G Application for the Rheboksfontein WEF, Western Cape	Ormonde - Theo Basson	Project Manager & EAP
S53 Application & WULA for Suurplaat and Gemini WEFs, Northern Cape	Engie	Project Manager & EAP
S53 Application for the Hopefield Community Wind Farm near Hopefield, Western Cape	Umoya Energy	Project Manager & EAP
S53 Application for the Project Blue WEF, Northern Cape	WWK Developments	Project Manager & EAP
S53 for the Oyster Bay WEF, Eastern Cape	RES	Project Manager & EAP
WULA for the Great Karoo Wind Farm, Northern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP

CONVENTIONAL POWER GENERATION PROJECTS (COAL)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Mutsho Power Station near Makhado, Limpopo	Mutsho Consortium	Project Manager & EAP
Coal-fired Power Station near Ogies, Mpumalanga	Ruukki SA	Project Manager & EAP
Thabametsi IPP Coal-fired Power Station, near Lephalale, Limpopo	Axia	Project Manager & EAP
Transalloys Coal-fired Power Station, Mpumalanga	Transalloys	Project Manager & EAP
Tshivasho IPP Coal-fired Power Station (with WML), near Lephalale, Limpopo	Cennergi	Project Manager & EAP
Umbani Coal-fired Power Station, near Kriel, Mpumalanga	ISS Global Mining	Project Manager & EAP

Project Name & Location	Client Name	Role
Waterberg IPP Coal-Fired Power Station near Lephalale, Limpopo	Exxaro Resources	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Coal Stockyard on Medupi Ash Dump Site, Limpopo	Eskom Holdings	Project Manager & EAP
Biomass Co-Firing Demonstration Facility at Arnot Power Station East of Middleburg, Mpumlanaga	Eskom Holdings	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Baseload Power Station near Lephalale, Limpopo	Cennergi	Project Manager & EAP
Coal-Fired Power Plant near Delmas, Mpumalanga	Exxaro Resources	Project Manager & EAP
Makhado Power Station, Limpopo	Mutsho Consortium, Limpopo	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the Camden Power Station, Mpumalanga	Eskom Holdings	Project Manager

Compliance Advice

Project Name & Location	Client Name	Role
Thabametsi IPP Coal-fired Power Station, near Lephalale, Limpopo	Axia	Environmental Advisor

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Permit application for the Thabametsi Bulk Water Pipeline, near Lephalale, Limpopo	Axia	Project Manager & EAP
S53 & WULA for the Waterberg IPP Coal-Fired Power Station near Lephalale, Limpopo	Exxaro Resources	Project Manager & EAP
S53 Application for the Tshivasho Coal-fired Power Station near Lephalale, Limpopo	Cennergi	Project Manager & EAP

CONVENTIONAL POWER GENERATION PROJECTS (GAS)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Ankerlig OCGT to CCGT Conversion project &400 kV transmission power line between Ankerlig and the Omega Substation, Western Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Gourikwa OCGT to CCGT Conversion project & 400kV transmission power line between Gourikwa & Proteus Substation, Western Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Richards Bay Gas to Power Combined Cycle Power Station, KwaZulu-Natal	Eskom Holdings SoC Limited	Project Manager & EAP
Richards Bay Gas to Power Plant, KwaZulu-Natal	Richards Bay Gas Power 2	Project Manager & EAP
Decommissioning & Recommissioning of 3 Gas Turbine Units at Acacia Power Station & 1 Gas Turbine Unit at Port Rex Power Station to the existing	Eskom Holdings	Project Manager & EAP

Project Name & Location	Client Name	Role
Ankerlig Power Station in Atlantis Industria, Western Cape		
320MW gas-to-power station in Richards Bay, KwaZulu-Natal	Phinda Power Projects	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Fatal Flaw Analysis for 3 area identified for the establishment of a 500MW CCGT Power Station	Globeleq Advisors Limited	Project Manager & EAP
Richards Bay Gas to Power Combined Cycle Power Station, KwaZulu-Natal	Eskom Holdings SoC Limited	Project Manager & EAP

GRID INFRASTRUCTURE PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Aggeneis-Oranjemond Transmission Line & Substation Upgrade, Northern Cape	Eskom Transmission	Project Manager & EAP
Ankerlig-Omega Transmission Power Lines, Western Cape	Eskom Transmission	Project Manager & EAP
Karoshoek Grid Integration project as part of the Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Koeberg-Omega Transmission Power Lines,, Western Cape	Eskom Transmission	Project Manager & EAP
Koeberg-Stikland Transmission Power Lines, Western Cape	Eskom Transmission	Project Manager & EAP
Kyalami Strengthening Project, Gauteng	Eskom Transmission	Project Manager & EAP
Mokopane Integration Project, Limpopo	Eskom Transmission	Project Manager & EAP
Saldanha Bay Strengthening Project, Western Cape	Eskom Transmission	Project Manager & EAP
Steelpoort Integration Project, Limpopo	Eskom Transmission	Project Manager & EAP
Transmission Lines from the Koeberg-2 Nuclear Power Station site, Western Cape	Eskom Transmission	Project Manager & EAP
Tshwane Strengthening Project, Phase 1, Gauteng	Eskom Transmission	Project Manager & EAP
Main Transmission Substation (MTS) associated with the Choje Wind Farm cluster, Eastern Cape	Wind Relic	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Dassenberg-Koeberg Power Line Deviation from the Koeberg to the Ankerlig Power Station, Western Cape	Eskom Holdings	Project Manager & EAP
Golden Valley II WEF Power Line & Substation near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Golden Valley WEF Power Line near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Karoshoek Grid Integration project as part of the Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP

Project Name & Location	Client Name	Role
Konkoonsies II PV SEF Power Line to the Paulputs Substation near Pofadder, Northern Cape	BioTherm Energy	Project Manager & EAP
Perdekraal West WEF Powerline to the Eskom Kappa Substation, Westnern Cape	BioTherm Energy	Project Manager & EAP
Rheboksfontein WEF Powerline to the Aurora Substation, Western Cape	Moyeng Energy	Project Manager & EAP
Soetwater Switching Station near Sutherland, Northern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP
Solis Power I Power Line & Switchyard Station near Upington, Northern Cape	Brightsource	Project Manager & EAP
Stormwater Canal System for the Ilanga CSP near Upington, Northern Cape	Karoshoek Solar One	Project Manager & EAP
Tsitsikamma Community WEF Powerline to the Diep River Substation, Eastern Cape	Eskom Holdings	Project Manager & EAP
Two 132kV Chickadee Lines to the new Zonnebloem Switching Station, Mpumalanga	Eskom Holdings	Project Manager & EAP
Electrical Grid Infrastructure for the Kolkies and Sadawa PV clusters, Western Cape	Mainstream Renewable Energy Developments	Project Manager & EAP
Sadawa Collector substation, Western Cape	Mainstream Renewable Energy Developments	Project Manager & EAP
Electrical Grid Infrastructure for the Vrede and Rondavel PV facilities, Free State	Mainstream Renewable Energy Developments	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the Ferrum-Mookodi Transmission Line, Northern Cape and North West	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Gamma-Kappa Section A Transmission Line, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Gamma-Kappa Section B Transmission Line, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Hydra IPP Integration project, Northern Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Kappa-Sterrekus Section C Transmission Line, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Namaqualand Strengthening project in Port Nolloth, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
ECO for the construction of the Neptune Substation Soil Erosion Mitigation Project, Eastern Cape	Eskom	Project Manager
ECO for the construction of the Ilanga-Gordonia 132kV power line, Northern Cape	Karoshoek Solar One	Project Manager

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Environmental Permitting and WULA for the Rockdale B Substation & Loop in Power Lines,	Eskom Holdings	Project Manager & EAP
Environmental Permitting and WULA for the Steelpoort Integration project, Limpopo	Eskom Holdings	Project Manager & EAP
Environmental Permitting for Solis CSP near Upington, Northern Cape	Brightsource	Project Manager & EAP

MINING SECTOR PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Elitheni Coal Mine near Indwe, Eastern Cape	Elitheni Coal	Project Manager & EAP
Groot Letaba River Development Project Borrow Pits	Iiso	Project Manager & EAP
Grootegeluk Coal Mine for coal transportation infrastructure between the mine and Medupi Power Station (EMPr amendment) , Limpopo	Eskom Holdings	Project Manager & EAP
Waterberg Coal Mine (EMPr amendment), Limpopo	Seskoko Resources	Project Manager & EAP
Aluminium Plant WML & AEL, Gauteng	GfE-MIR Alloys & Minerals	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Rare Earth Separation Plant in Vredendal, Western Cape	Rareco	Project Manager & EAP
Decommissioning and Demolition of Kilns 5 & 6 at the Slurry Plant, Kwa-Zulu Natal	PPC	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the Duhva Mine Water Recovery Project, Mpumalanga	Eskom Holdings SoC Limited	Project Manager
External compliance audit of Palesa Coal Mine's Integrated Water Use License (IWUL), near KwaMhlanga, Mpumalanga	HCI Coal	Project Manager
External compliance audit of Palesa Coal Mine's Waste Management License (WML) and EMP, near KwaMhlanga, Mpumalanga	HCI Coal	Project Manager
External compliance audit of Mbali Coal Mine's Integrated Water Use License (IWUL), near Ogies, Mpumalanga	HCI Coal	Project Manager
Independent External Compliance Audit of Water Use License (WUL) for the Tronox Namakwa Sands (TNS) Mining Operations (Brand se Baai), Western Cape	Tronox Namakwa Sands	Project Manager
Independent External Compliance Audit of Water Use License (WUL) for the Tronox Namakwa Sands (TNS) Mineral Separation Plant (MSP), Western Cape	Tronox Namakwa Sands	Project Manager
Independent External Compliance Audit of Water Use License (WUL) for the Tronox Namakwa Sands (TNS) Smelter Operations (Saldanha), Western Cape	Tronox Namakwa Sands	Project Manager
Compliance Auditing of the Waste Management Licence for the PetroSA Landfill Site at the GTL Refinery, Western Cape	PetroSA	Project Manager

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Waste Licence Application for the Rare Earth Separation Plant in Vredendal, Western Cape	Rareco	Project Manager & EAP

WULA for the Expansion of the Landfill site at Exxaro's Namakwa Sands Mineral Separation Plant, Western Cape	Exxaro Resources	Project Manager & EAP
S24G & WML for an Aluminium Plant, Gauteng	GfE-MIR Alloys & Minerals	Project Manager & EAP

INFRASTRUCTURE DEVELOPMENT PROJECTS (BRIDGES, PIPELINES, ROADS, WATER RESOURCES, STORAGE, ETC)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Bridge across the Ngotwane River, on the border of South Africa and Botswana	Eskom Holdings	Project Manager & EAP
Chemical Storage Tanks, Metallurgical Plant Upgrade & Backfill Plant upgrade at South Deep Gold Mine, near Westornaria, Gauteng	Goldfields	Project Manager & EAP
Expansion of the existing Welgedacht Water Care Works, Gauteng	ERWAT	Project Manager & EAP
Golden Valley WEF Access Road near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Great Fish River Wind Farm Access Roads and Watercourse Crossings near Cookhouse, Eastern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP
Ilanga CSP Facility Watercourse Crossings near Upington, Northern Cape	Karoshoek Solar one	Project Manager & EAP
Modification of the existing Hartebeestfontein Water Care Works, Gautng	ERWAT	Project Manager & EAP
N10 Road Realignment for the Ilanga CSP Facility, East of Upington, Northern Cape	SANRAL	Project Manager & EAP
Nxuba (Bedford) Wind Farm Watercourse Crossings near Cookhouse, Eastern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP
Pollution Control Dams at the Medupi Power Station Ash Dump & Coal Stockyard, Limpopo	Eskom	Project Manager & EAP
Qoboshane borrow pits (EMPr only), Eastern Cape	Emalahleni Local Municipality	Project Manager & EAP
Tsitsikamma Community WEF Watercourse Crossings, Eastern Cape	Cennergi	Project Manager & EAP
Clayville Central Steam Plant, Gauteng	Bellmall Energy	Project Manager & EAP
Msenge Emoyeni Wind Farm Watercourse Crossings and Roads, Eastern Cape	Windlab	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Harmony Gold WWTW at Doornkop Mine, Gauteng	Harmony Doornkop Plant	Project Manager & EAP
Ofir-ZX Watercourse Crossing for the Solar PV Facility, near Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP
Qoboshane bridge & access roads, Eastern Cape	Emalahleni Local Municipality	Project Manager & EAP
Relocation of the Assay Laboratory near Carletonville, Gauteng	Sibanye Gold	Project Manager & EAP
Richards Bay Harbour Staging Area, KwaZulu-Natal	Eskom Holdings	Project Manager & EAP
S-Kol Watercourse Crossing for the Solar PV Facility, East of Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP
Sonnenberg Watercourse Crossing for the Solar PV Facility, West Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP

Project Name & Location	Client Name	Role
Kruisvallei Hydroelectric Power Generation Scheme, Free State	Building Energy	Project Manager & EAP
Masetjaba Water Reservoir, Pump Station and Bulk Supply Pipeline near Nigel, Gauteng	Naidu Consulting Engineers	Project Manager & EAP
Access Road for the Dwarsug Wind Farm, Northern Cape Province	South Africa Mainsteam Renewable Power	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Roodepoort Open Space Optimisation Programme (OSOP) Precinct, Gauteng	TIMAC Engineering Projects	Project Manager & EAP
Vegetable Oil Plant and Associated Pipeline, Kwa-Zulu Natal	Wilmar Oils and Fats Africa	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO and bi-monthly auditing for the construction of the Olifants River Water Resources Development Project (ORWRDP) Phase 2A: De Hoop Dam, R555 realignment and housing infrastructure	Department of Water and Sanitation	Project Manager Auditor
ECO for the Rehabilitation of the Blaaupan & Storm Water Channel, Gauteng	Airports Company of South Africa (ACSA)	Project Manager
Due Diligence reporting for the Better Fuel Pyrolysis Facility, Gauteng	Better Fuels	Project Manager
ECO for the Construction of the Water Pipeline from Kendal Power Station to Kendal Pump Station, Mpumalanga	Transnet	Project Manager
ECO for the Replacement of Low-Level Bridge, Demolition and Removal of Artificial Pong, and Reinforcement the Banks of the Crocodile River at the Construction at Walter Sisulu National Botanical Gardens, Gauteng Province	South African National Biodiversity Institute (SANBI)	Project Manager
External Compliance Audit of the Air Emission Licence (AEL) for a depot in Bloemfontein, Free State Province and in Tzaneen, Mpumalanga Province	PetroSA	Project Manager

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
WULA for the Izubulo Private Nature Reserve, Limpopo	Kjell Bismeyer, Jann Bader, Laurence Saad	Project Manager & EAP
WULA for the Masodini Private Game Lode, Limpopo	Masodini Private Game Lodge	Environmental Advisor
WULA for the Ezulwini Private Nature Reserve, Limpopo	Ezulwini Investments	Project Manager & EAP
WULA for the Masodini Private Game Lode, Limpopo	Masodini Private Game Lodge	Project Manager & EAP
WULA for the N10 Realignment at the Ilanga SEF, Northern Cape	Karoshoek Solar One	Project Manager & EAP
WULA for the Kruisvallei Hydroelectric Power Generation Scheme, Free State	Building Energy	Project Manager & EAP

Project Name & Location	Client Name	Role
S24G and WULA for the Ilegal construction of structures within a watercourse on EFF 24 Ruimsig Agricultural Holdings, Gauteng	Sorror Language Services	Project Manager & EAP

HOUSING AND URBAN PROJECTS

Basic Assessments

Project Name & Location	Client Name	Role
Postmasburg Housing Development, Northern Cape	Transnet	Project Manager & EAP

Compliance Advice and reporting

Project Name & Location	Client Name	Role
Kampi ya Thude at the Olifants West Game Reserve, Limpopo	Nick Elliot	Environmental Advisor
External Compliance Audit of WUL for the Johannesburg Country Club, Gauteng	Johannesburg Country Club	Project Manager

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
Due Diligence Audit for the Due Diligence Audit Report, Gauteng	Delta BEC (on behalf of Johannesburg Development Agency (JDA))	Project Manager

ENVIRONMENTAL MANAGEMENT TOOLS

Project Name & Location	Client Name	Role
Development of the 3rd Edition Environmental Implementation Plan (EIP)	Gauteng Department of Agriculture and Rural Development (GDARD)	Project Manager & EAP
Development of Provincial Guidelines on 4x4 routes, Western Cape	Western Cape Department of Environmental Affairs and Development Planning	EAP
Compilation of Construction and Operation EMP for the Braamhoek Transmission Integration Project, Kwazulu-Natal	Eskom Holdings	Project Manager & EAP
Compilation of EMP for the Wholesale Trade of Petroleum Products, Gauteng	Munaca Technologies	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for Medupi Power Station, Limpopo	Eskom Holdings	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for the Dube TradePort Site Wide Precinct	Dube TradePort Corporation	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for the Kusile Power Station, Mpumalanga	Eskom Holdings	Project Manager & EAP
Review of Basic Assessment Process for the Wittekleibosch Wind Monitoring Mast, Eastern Cape	Exxaro Resources	Project Manager & EAP
Revision of the EMPr for the Sirius Solar PV	Aurora Power Solutions	Project Manager & EAP

Project Name & Location	Client Name	Role
State of the Environment (SoE) for Emalahleni Local Municipality, Mpumalanga	Simo Consulting on behalf of Emalahleni Local Municipality	Project Manager & EAP
Aspects and Impacts Register for Salberg Concrete Products operations	Salberg Concrete Products	EAP
First State of Waste Report for South Africa	Golder on behalf of the Department of Environmental Affairs	Project Manager & EAP
Responsibilities Matrix and Gap Analysis for the Kruisvallei Hydroelectric Power Generation Scheme, Free State Province	Building Energy	Project Manager
Responsibilities Matrix and Gap Analysis for the Roggeveld Wind Farm, Northern & Western Cape Provinces	Building Energy	Project Manager

PROJECTS OUTSIDE OF SOUTH AFRICA

Project Name & Location	Client Name	Role
Advisory Services for the Zizabona Transmission Project, Zambia, Zimbabwe, Botswana & Namibia	PHD Capital	Advisor
EIA for the Semonkong WEF, Lesotho	MOSCET	Project Manager & EAP
EMP for the Kuvaninga Energia Gas Fired Power Project, Mozambique	ADC (Pty) Ltd	Project Manager & EAP
Environmental Screening Report for the SEF near Thabana Morena, Lesotho	Building Energy	EAP
EPBs for the Kawambwa, Mansa, Mwense and Nchelenge SEFs in Luapula Province, Zambia	Building Energy	Project Manager & EAP
ESG Due Diligence for the Hilton Garden Inn Development in Windhoek, Namibia	Vatange Capital	Project Manager
Mandahill Mall Rooftop PV SEF EPB, Lusaka, Zambia	Building Energy	Project Manager & EAP
Monthly ECO for the PV Power Plant for the Mocuba Power Station	Scatec	Project Manager

savannah environmental

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CURRICULUM VITAE OF CHANTELLE GEYER

Comprehensive CV

Profession : Junior Environmental Consultant

Specialisation: Environmental Management; Project-related GIS mapping; Public Participation Administration; General Geology and Geochemistry.

Work Experience: Six (6) months in the environmental field.

VOCATIONAL EXPERIENCE

Chantelle is a conscientious and ambitious junior Environmental Consultant who holds a BSc(Hons) degree in Environmental Geology. She recently graduated from the North-West University where she consistently stayed in the top 3 of her class. She joined a group of passionate academic peers in her third year to create the first North-West University Geoscience Society to teach young earth scientists about the environment and introduce them to professional mentors, thus bridging the gap between university and a professional career. She was appointed as project manager for this society for two consecutive terms and organized career talks, academic game shows, alumni talks, clean-up initiatives, and numerous team-building events.

She has special interests in geological formations, geochemistry, minerals, contamination studies, rehabilitation and restoration of disturbed areas, as well as hydrology. However, she found her passion for Environmental Management during an environmental internship where she gained experience in:

- Environmental Impact Assessments
- Project-related GIS mapping
- Water use licences
- Public participation processes

Chantelle is a loyal and enthusiastic individual who is dedicated to further her studies in Environmental Management, Environmental Legislation, GIS-mapping, and studies on the renewable energy sector of South Africa. Her goal is to gain knowledge in the processes of Basic Assessments, EIAs, Environmental Compliance, public participation, screening assessments, and environmental authorisation applications. She aims to use this knowledge to strategically consult clients and undertaking projects efficiently and to the highest standard.

SKILLS BASE AND CORE COMPETENCIES

- Great organisational skills
- Good at time management
- Passionate about the environment
- Compilation of Basic Assessment Reports in compliance with environmental legislation.
- Project management for environmental-related events and projects.
- Water Use Licences
- Aiding with public participation processes.
- Experience with South African environmental legislation.

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- BSc Environmental Sciences, North-West University, Potchefstroom (2021)
- BSc Honours Environmental Geology, North-West University, Potchefstroom (2022)

Short Courses:

- Advanced Microsoft Excel Qualification, Lead Academy (2020)

Professional Society Affiliations:

- Registered with the International Association for Impact Assessment South Africa (IAIAsa)

EMPLOYMENT

Date	Company	Roles and Responsibilities
July 2022 - Current:	Savannah Environmental (Pty) Ltd	*Junior Environmental Consultant* Tasks include: *Environmental Assessment Practitioner (EAP); Specialising in project-related GIS mapping.* *Performing Basic Assessment Reports and Environmental Impact Assessments,* *Assisting on administrative public participation documents.*
September 2021 – November 2021	Prescali Environmental (Pty)	*Environmental Intern* Tasks included: Liaising with senior management on environmental concerns, Preparing Water Use Licence (WUL) audits, Taking minutes during meetings, Public Participation tasks.

PROJECT EXPERIENCE

Project experience includes renewable energy projects, grid connection infrastructure, and access roads.

RENEWABLE POWER GENERATION PROJECTS: SOLAR ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Mutsho Solar PV (4x100MW projects, Limpopo)	*Cri-Eagle*	*Junior EAP & GIS Specialist*
Harmony One Plant Solar PV Facility (30MW), Free State	*ENGP*	*Junior EAP & GIS Specialist*
Harmony Target Solar PV Facility (30MW), Free State	*ENGP*	*Junior EAP & GIS Specialist*
Harmony Joel Solar PV Facility (18MW), Free State	*ENGP*	*Junior EAP & GIS Specialist*
Ummbila Emoyeni SEF (150MW), Mpumalanga	*Windlab Developments South Africa (Pty) Ltd*	*Junior EAP & GIS Specialist*

Basic Assessments

Project Name & Location	***Client Name***	***Role***
Harmony Central Plant Solar PV Facility (14MW), Free State	*ENGP*	*Junior EAP & GIS Specialist*
Harmony Moab Khotsong Solar PV Facility (100MW), Free State	*ENGP*	*Junior EAP & GIS Specialist*
Highveld Solar PV Facility (240MW), North West	*WKN Windcurrent*	*Junior EAP & GIS Specialist*
Komsberg Solar PV Facility (200MW), Western and Northern Cape	*Salika SA*	*Junior EAP & GIS Specialist*
Klipfontein Solar PV Facility (500MW), Western and Northern Cape	*Salika SA*	*Junior EAP & GIS Specialist*

RENEWABLE POWER GENERATION PROJECTS: WIND ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Ummbila Emoyeni WEF (666MW), Mpumalanga	*Windlab Developments South Africa (Pty) Ltd*	*Junior EAP & GIS Specialist*

GRID INFRASTRUCTURE PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Ummbila Emoyeni EGI, Mpumalanga	*Windlab Developments South Africa (Pty) Ltd*	*Junior EAP & GIS Specialist*

Basic Assessments

Project Name & Location	***Client Name***	***Role***
Mutsho Solar Grid Connection, Limpopo	*Cri-Eagle*	*Junior EAP & GIS Specialist*
Highveld Grid Connection, North West	*WKN Windcurrent*	*Junior EAP & GIS Specialist*
Komsberg Grid Connection, Western and Northern Cape	*Salika SA*	*Junior EAP & GIS Specialist*
Klipfontein Grid Connection, Western and Northern Cape	*Salika SA*	*Junior EAP & GIS Specialist*

INFRASTRUCTURE DEVELOPMENT PROJECTS (BRIDGES, PIPELINES, ROADS, WATER RESOURCES, STORAGE, ETC)

Basic Assessments

Project Name & Location	***Client Name***	***Role***
Witberg WEF Access Road, Western Cape	*Red Rocket South Africa (Pty) Ltd*	*Junior EAP and GIS Specialist*

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CURRICULUM VITAE OF NICOLENE VENTER

Profession : Public Participation and Social Consultant

Specialisation: Public participation process; stakeholder engagement; facilitation (workshops, focus group and public meetings; public open days; steering committees); monitoring and evaluation of public participation and stakeholder engagement processes

Work Experience: 23 years' experience as a Public Participation Practitioner and Stakeholder Consultant

VOCATIONAL EXPERIENCE

Over the past 23 years Nicolene established herself as an experienced and well recognised public participation practitioner, facilitator and strategic reviewer of public participation processes. She has experience in managing public participation and stakeholder engagement projects and awareness creation programmes. Her experience includes designing and managing countrywide public participation and stakeholder engagement projects and awareness creation projects, managing multi-project schedules, budgets and achieving project goals. She has successfully undertaken several public participation processes for EIA, BA and WULA projects. The EIA and BA process include linear projects such as the NMPP, Eskom Transmission and Distribution power lines as well as site specific developments such as renewable energy projects i.e. solar, photo voltaic and wind farms. She also successfully managed stakeholder engagement projects which were required to be in line with the Equator Principles, locally and in neighbouring countries.

SKILLS BASE AND CORE COMPETENCIES

- Project Management
- Public Participation, Stakeholder Engagement and Awareness Creation
- Public Speaking and Presentation Skills
- Facilitation (workshops, focus group meetings, public meetings, public open days, working groups and committees)
- Social Assessments (Stakeholder Analysis / Stakeholder Mapping)
- Monitoring and Evaluation of Public Participation and Stakeholder Engagement Processes
- Community Liaison
- IFC Performance Standards
- Equator Principles
- Minute taking, issues mapping, report writing and quality control

EDUCATION AND PROFESSIONAL STATUS

Degrees / Diplomas / Certificates:

- Higher Secretarial Certificate, Pretoria Technicon (1970)

Short Courses:

- Techniques for Effective Public Participation, International Association for Public Participation, IAP2 (2008)
- Foundations of Public Participation (Planning and Communication for Effective Public Participation), IAP2 (2009)
- Certificate in Public Participation – IAP2SA Modules 1, 2 and 3 (2013)

Certificate in Public Relations, Public Relation Institute of South Africa, Damelin Management School (1989)

Professional Society Affiliations:

- Member of International Association for Public Participation (IAP2): Southern Africa

EMPLOYMENT

Date	Company	Roles and Responsibilities
November 2018 – current	Savannah Environmental (Pty) Ltd	Public Participation and Social Consultant <u>*Tasks include:*</u> *Tasks include: Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document, Letters to Stakeholders and Interested and/or Affected Parties (I&APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, Tribal Chiefs, affected landowners, etc.* *Managing interaction between Stakeholders and Team Members, liaising with National, Provincial and Local Authorities, managing community consultation and communications in project affected areas, attend to the level of technical information communicated to and consultation with all level of stakeholders involved.*

Date	Company	Roles and Responsibilities
2016 – October 2018	Imaginative Africa (Pty) Ltd *(Director of Imaginative Africa)*	Independent Consultant *Consulting to various Environmental Assessment Practitioners for Public Participation and Stakeholder Engagements:* *<u>Tasks include:</u>* *Tasks include: Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document, Letters to Stakeholders and Interested and/or Affected Parties (I&APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, Tribal Chiefs, affected landowners, etc.* *Managing interaction between Stakeholders and Team Members, liaising with National, Provincial and Local Authorities, managing community consultation and communications in project affected areas, attend to the level of technical information communicated to and consultation with all level of stakeholders involved* *<u>Clients</u>:* *SiVEST Environmental* *Savannah Environmental* *Baagi Environmental* *Royal Haskoning DHV (previously SSI)*
2013 - 2016	Zitholele Consulting *Contact person: Dr Mathys Vosloo* *Contact number: 011 207 2060*	Senior Public Participation Practitioner and Project Manager <u>Tasks included:</u> *Project managed public participation process for EIA/BA/WULA/EAL projects. Manages two Public Participation Administrators. Public Participation tasks as outlined as above and including financial management of public participation processes.*
2011 - 2013	Imaginative Africa (Pty) Ltd *(company owned by Nicolene Venter)*	Independent Consultant Consulting to various Environmental Assessment Practitioners for Public Participation and Stakeholder Engagements <u>Tasks included:</u> *Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document,*

		Letters to Stakeholders and Interested and/or Affected Parties (I&APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, Tribal Chiefs, affected landowners, etc. *Managing interaction between Stakeholders and Team Members, liaising with National, Provincial and Local Authorities, managing community consultation and communications in project affected areas, attend to the level of technical information communicated to and consultation with all level of stakeholders involved* *<u>Clients</u>:* *Bohlweki Environmental* *Bembani Sustainability (Pty) Ltd* *Naledzi Environmental*
2007 – 2011	SiVEST SA (Pty) Ltd *Contact person: Andrea Gibb* *Contact number: 011 798 0600*	Unit Manager: Public Participation Practitioner *<u>Tasks included:</u>* *Project managed public participation process for EIA/BA projects. Manages two Junior Public Participation Practitioners. Public Participation tasks as outlined as above and including financial management of public participation processes.*
2005 – 2006	Imaginative Africa (Pty) Ltd *(company owned by Nicolene Venter)*	Independent Consultant Public Participation and Stakeholder Engagement Practitioner *<u>Tasks included:</u>* *Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document, Letters to Stakeholders and Interested and/or Affected Parties (I&APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, Tribal Chiefs, affected landowners, etc.* *Managing interaction between Stakeholders and Team Members, liaising with National, Provincial and Local Authorities, managing community consultation and communications in project affected areas, attend to the level of technical*

		information communicated to and consultation with all level of stakeholders involved. *<u>Clients</u>:* *Manyaka-Greyling-Meiring (previously Greyling Liaison and currently Golder Associates)*
1997 - 2004	Imaginative Africa (Pty) Ltd *(company owned by Nicolene Venter)*	Independent Consultant: Public Participation Practitioner. *<u>Tasks included:</u>* *Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document, Letters to Stakeholders and Interested and/or Affected Parties (I&APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, affected landowners, etc.* *Managing interaction between Stakeholders and Team Members, liaising with National, Provincial Local Authorities, managing community consultation and communications in project affected areas, attend to the level of technical information communicated to and consultation with all level of stakeholders involved.* *<u>Clients</u>:* *Greyling Liaison (currently Golder Associates); Bembani Sustainability (Pty) Ltd; Lidwala Environmental; Naledzi Environmental*

PROJECT EXPERIENCE

RENEWABLE POWER GENERATION PROJECTS

PHOTOVOLTAIC SOLAR ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Lichtenburg PVs (3 PVs) & Power Lines (grid connection), Lichtenburg, North West Province	*Atlantic Energy Partners* *EAP: Savannah Environmental*	*Project Manage the Public Participation Process* *Facilitate all meetings* *Consultation with Government Officials, Key Stakeholders, Landowners & Community Leaders*
Allepad PVs 4 PVs) & Power Lines (grid connection), Upington, Northern Cape Province	*IL Energy* *EAP: Savannah Environmental*	
Hyperion Solar PV Developments (4 PVs) and Associated Infrastructures, Kathu, Northern Cape Province	*Building Energy* *EAP: Savannah Environmental*	
Aggeneys Solar PV Developments (2 PVs) and Associated Infrastructures, Aggeneys, Northern Cape Province	*Atlantic Energy Partners and ABO Wind* *EAP: Savannah Environmental*	
Upilanga Solar Park, Northern Cape (350MW CSP Tower)	*Emvelo Capital Projects (Pty) Ltd*	
Khunab Solar Development, consisting of Klip Punt PV1, McTaggarts PV1, McTaggarts PV2, McTaggarts PV3 and the Khunab solar Grid Connection near Upington, Northern Cape Province	*Atlantic Energy Partners and Abengoa*	
Sirius Solar PV3 and PV4, near Upington, Northern Cape Province	*Solal*	
Geelstert PV 1 and PV2 solar energy facilities, near Aggeneys, Northern Cape	*ABO Wind*	
Naledi PV and Ngwedi PV solar energy facilities, near Upington, Northern Cape	*Atlantic Energy Partners and Abengoa*	
Kotulo Tsatsi PV1, Kotulo Tsatsi PV3 and Kotulo Tsatsi PV4 solar energy facilities, near Kenhardt, Northern Cape	*Kotulo Tsatsi Energy*	
Tlisitseng PV, including Substations & Power Lines, Lichtenburg, North West Province	*BioTherm Energy* *EAP: SiVEST*	*Public Participation, Landowner and Community Consultation*
Sendawo PVs, including Substations & Power Lines, Vryburg, North West Province		
Helena Solar 1, 2 and 3 PVs, Copperton, Northern Cape Province		
Farm Spes Bona 23552 Solar PV Plants, Bloemfontein, Free State Province	*Surya Power* *EAP: SiVEST*	*Public Participation, Landowner and Community Consultation*
De Aar Solar Energy Facility, De Aar, Northern Cape Province	*South Africa Mainstream Renewable Power Developments* *EAP: SiVEST*	*Public Participation, Landowner and Community Consultation*
Droogfontein Solar Energy Facility, Kimberley, Northern Cape Province		
Kaalspruit Solar Energy Facility, Loeriesfontein, Northern Cape Province		

Platsjambok East PV, Prieska, Northern Cape Province		
Renosterburg PV, De Aar, Northern Cape Province	*Renosterberg Wind Energy Company* *EAP: SiVEST*	*Public Participation, Landowner and Community Consultation*
19MW Solar Power Plant on Farm 198 (Slypklip), Danielskuil, Northern Cape Province	*Solar Reserve South Africa* *EAP: SiVEST*	*Public Participation, Landowner and Community Consultation*

Basic Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Upilanga Solar Park, Northern Cape (x6 100MW PV's and x3 350MW PV Basic Assessments)	*Emvelo Capital Projects (Pty) Ltd*	*Project Manage the Public Participation Process* *Facilitate all meetings* *Consultation with Government Officials, Key Stakeholders, Landowners & Community Leaders*
Sirius Solar PV Solar Energy Facility, Upington, Northern Cape Province	*SOLA Future Energy*	
Khunab Solar Development, consisting of Klip Punt PV1, McTaggarts PV1, McTaggarts PV2, McTaggarts PV3 and the Khunab solar Grid Connection near Upington, Northern Cape Province	*Atlantic Energy Partners and Abengoa*	

WIND ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Aletta Wind Farm, Copperton, Northern Cape Province	*BioTherm Energy* *EAP: SiVEST*	*Public Participation*
Eureka Wind Farm, Copperton, Northern Cape Province		
Loeriesfontein Wind Farm, Loeriesfontein, Northern Cape Province	*South Africa Mainstream Renewable Power Developments* *EAP: SiVEST*	*Public Participation*
Droogfontein Wind Farm, Loeriesfontein, Northern Cape Province		
Four Leeuwberg Wind Farms, Loeriesfontein, Northern Cape Province		
Noupoort Wind Farm, Noupoort, Northern Cape Province		
Mierdam PV & Wind Farm, Prieska, Northern Cape Province		
Platsjambok West Wind Farm & PV, Prieska, Northern Cape Province		

Basic Assessments and Environmental Management Programmes

Project Name & Location	**Client Name**	**Role**
Cluster of Renewable Energy Developments, Eastern Cape Province	*Wind Relic*	

Nama Wind Energy Facility, Northern Cape Province	*Genesis ECO* *EAP: Savannah Environmental*	*Project Manage the Public Participation Process* *Facilitate all meetings* *Consultation with Government Officials, Key Stakeholders, Landowners & Community Leaders*
Zonnequa Wind Energy Facility, Northern Cape Province		

CONCENTRATED SOLAR FACILITIES (CSP)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Upington Concentrating Solar Plant and associated Infrastructures, Northern Cape Province	*Eskom Holdings* *EAP: Bohlweki Environmental*	*Project Manage the Public Participation Process* *Facilitate all meetings* *Consultation with Government Officials, Key Stakeholders, Landowners & Community Leaders*

CONVENTIONAL POWER GENERATION PROJECTS (GAS)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	**Client Name**	**Role**
450MW gas to power project and associated 132kV power line, Richards bay, KwaZulu-Natal	Phinda Power Producers	*Project Manage the Public Participation Process* *Facilitate all meetings* *Consultation with Government Officials, Key Stakeholders & Landowners*
4000MW gas to power project and associated 400kV power lines, Richards bay, KwaZulu-Natal	Phinda Power Producers	
Richards Bay Gas to Power Combined Cycle Power Station, KwaZulu-Natal	Eskom Holdings SoC Limited	

GRID INFRASTRUCTURE PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
132/11kV Olifantshoek Substation and Power Line, Northern Cape	*Eskom*	*Project Manage the Public Participation Process* *Facilitate all meetings* *Consultation with Government Officials, Key Stakeholders, Landowners & Community Leaders*
Grid connection infrastructure for the Namas Wind Farm, Northern Cape Province	*Genesis Namas Wind (Pty) Ltd*	
Grid connection infrastructure for the Zonnequa Wind Farm, Northern Cape Province	*Genesis Zonnequa Wind (Pty) Ltd*	
Khunab Solar Grid Connection, near Upington, Northern Cape Province	*Atlantic Energy Partners and Abengoa*	
Pluto-Mahikeng Main Transmission Substation and 400kV Power Line (Carletonville to Mahikeng), Gauteng and North West Provinces	*Eskom Holdings* *EAP: Baagi Environmental*	
Thyspunt Transmission Lines Integration Project, Eastern Cape Province	*Eskom Holdings* *EAP: SiVEST*	*Public Participation, Landowner and Community Consultation*
Westrand Strengthening Project, Gauteng Province		*Public Participation,*

Mookodi Integration Project, North-West Province		
Transnet Coallink, Mpumalanga and KwaZulu-Natal Provinces		
Delarey-Kopela-Phahameng Distribution power line and newly proposed Substations, North-West Province		*Public Participation, Landowner and Community Consultation*
Invubu-Theta 400kV Eskom Transmission Power Line, KwaZulu-Natal Province	*Eskom Holding* *EAP: Bembani Environmental*	
Melkhout-Kudu-Grassridge 132kV Power Line Project (project not submitted to DEA), Eastern Cape Province	*Eskom Holdings* *EAP: SiVEST*	*Public Participation, Landowner and Community Consultation*
Tweespruit-Welroux-Driedorp-Wepener 132Kv Power Line, Free State Province		
Kuruman 132Kv Power Line Upgrade, Northern Cape Province	*Eskom Holdings* *EAP: Zitholele*	
Vaalbank 132Kv Power Line, Free State Province		
Pongola-Candover-Golela 132kV Power Line (Impact Phase), KwaZulu-Natal Province		

PART 2 AMENDMENTs

Project Name & Location	***Client Name***	***Role***
Transalloys Coal-Fired Power Station near Emalahleni, Mpumalanga Province	*Transalloys (Pty) Ltd*	*Project Manage the Public Participation Process*
Zen Wind Energy Facility, Western Cape	*Energy Team (Pty) Ltd*	
Hartebeest Wind Energy Facility, Western Cape	*juwi Renewable Energies (Pty) Ltd*	
Khai-Ma and Korana Wind Energy Facilities	*Mainstream Renewable Power (Pty) Ltd*	

FACILITATION

Project Name & Location	***Client Name***	***Meeting Type***
Bloemfontein Strengthening Project, Free State Province	Eskom Holdings EAP: Baagi Environmental	Public Meetings
Mooidraai-Smitkloof 132kV Power Line and Substation, Northern Cape Province	Eskom Holdings EAP: SSI	Focus Group Meetings
Aggeneis-Oranjemond 400kV Eskom Transmission Power Line, Northern Cape Province	Eskom Holdings EAP: Savannah Environmental	Focus Group Meetings & Public Meetings
Ariadne-Eros 400kV/132kV Multi-Circuit Transmission Power Line (Public Meetings)	Eskom Holdings EAP: ACER Africa	Public Meetings
Majuba-Venus 765kV Transmission Power Lines, Mpumlanaga Province		
Thabametsi IPP Power Station, Limpopo Province	Thabametsi Power Company EAP: Savannah Environmental	Focus Group Meeting & Public Meeting
Aggeneis-Oranjemond Transmission Line & Substation Upgrade, Northern Cape	Eskom Transmission	Focus Group Meetings & Public Meetings

SCREENING STUDIES

Project Name & Location	***Client Name***	***Role***
Potential Power Line Alternatives from Humansdorp to Port Elizabeth, Eastern Cape Province	*Nelson Mandela Bay Municipality* *EAP: SiVEST*	*Social Assessment*

ASH DISPOSAL FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Medupi Flue Gas Desulphurisation Project (up to completion of Scoping Phase), Limpopo Province	*Eskom Holdings SOC Ltd* *EAP: Zitholele Consulting*	*Public Participation, Landowner and Community Consultation*
Kendal 30-year Ash Disposal Facility, Mpumalanga Province		
Kusile 60-year Ash Disposal Facility, Mpumalanga Province		
Camden Power Station Ash Disposal Facility, Mpumalanga Province		
Tutuka Fabric Filter Retrofit and Dust Handling Plant Projects, Mpumalanga Province	*Eskom Holdings SOC Ltd* *EAP: Lidwala Environmental*	
Eskom's Majuba and Tutuka Ash Dump Expansion, Mpumalanga Province		
Hendrina Ash Dam Expansion, Mpumalanga Province		

INFRASTRUCTURE DEVELOPMENT PROJECTS (BRIDGES, PIPELINES, ROADS, WATER RESOURCES, STORAGE, ETC)

Basic Assessments

Project Name & Location	***Client Name***	***Role***
Expansion of LOX and Diesel Storage at the Air Products Facility in Coega, Eastern Cape	*Air Products South Africa (Pty) Ltd*	*Project Manage the Public Participation Process* *Facilitate all meetings* *Consultation with Government Officials, Key Stakeholders & Landowners*
Transnet's New Multi-Products Pipeline traversing Kwa-Zulu Natal, Free State and Gauteng Provinces	*Transnet* *EAP: Bohlweki Environmental*	
Realignment of the Bulshoek Dam Weir near Klawer and the Doring River Weir near Clanwilliam, Western Cape Province	*Dept of Water and Sanitation* *EAP: Zitholele*	*Public Participation*

STAKEHOLDER ENGAGEMENT

Project Name & Location	***Client Name***	***Role***
Socio-Economic Impact Study for the shutdown and repurposing of Eskom Power Stations: Komati Power Station, Hendrina Power Station & Grootvlei Power Station	*Urban-Econ*	*Project Management for the stakeholder engagement with Community*

		Representatives in the primary data capture area
First State of Waste Report for South Africa	*Golder Associates on behalf of the Department of Environmental Affairs*	*Secretarial Services*
Determination, Review and Implementation of the Reserve in the Olifants/Letaba System	*Golder Associates on behalf of the Department of Water and Sanitation*	
Orange River Bulk Water Supply System		
Levuvu-Letaba Resources Quality Objectives		

FACILITATION

Project Name & Location	***Client Name***	***Meeting Type***
Determination, Review and Implementation of the Reserve in the Olifants/Letaba System	*Department of Water and Sanitation* *Golder Associates*	*Secretarial Services*
Orange River Bulk Water Supply System		*Secretarial Services*
Levuvu-Letaba Resources Quality Objectives		*Secretarial Services*
SmancorCR Chemical Plant (Public Meeting), Gauteng Province	*Samancor Chrome (Pty) Ltd* *EAP: Environment al Science Associates*	*Public Meeting*
SANRAL N4 Toll Highway Project (2nd Phase), Gauteng & North West Provinces	*Department of Transport* *EAP: Bohlweki Environmental*	*Public Meetings*

MINING SECTOR

Environmental Impact Assessment and Environmental Management Programme

Project Name & Location	**Client Name**	**Role**
Zero Waste Recovery Plant at highveld Steel, Mpumalanga Province	*Anglo African Metals* *EAP: Savannah Environmental*	*Public Participation*
Koffiefontein Slimes Dam, Free State Province	*Petra Diamond Mines* *EAP: Zitholele*	*Public Participation*
Baobab Project: Ethenol Plant, Chimbanje, Middle Sabie, Zimbabwe	*Applicant: Green Fuel* *EAP: SiVEST*	*Public Participation & Community Consultation*
BHP Billiton Energy Coal SA's Middelburg Water Treatment Plant, Mpumalanga	*BHP Billiton Group* *EAP: Jones & Wagener*	*Public Participation*

ENVIRONMENTAL AUTHORISATION AMENDMENTS

Project Name & Location	***Client Name***	***Role***
Transalloys Coal-Fired Power Station near Emalahleni, Mpumalanga Province	*Transalloys (Pty) Ltd*	*Public Participation*
Zen Wind Energy Facility, Western Cape	*Energy Team (Pty) Ltd*	
Hartebeest Wind Energy Facility, Western Cape	*juwi Renewable Energies (Pty) Ltd*	
Khai-Ma and Korana Wind Energy Facilities	*Mainstream Renewable Power (Pty) Ltd*	
Beaufort West 280MW Wind Farm into two 140MW Trakas and Beaufort West Wind Farms, Western Cape	*South Africa Mainstream Renewable Power Developments* *EAP: SiVEST*	

SECTION 54 AUDITS

Project Name & Location	***Client Name***	***Role***
Mulilo 20MW PV Facility, Prieska, Northern Cape	*Mulilo (Pty) Ltd*	*Public Participation: I&AP Notification process*
Mulilo 10MW PV Facility, De Aar, Northern Cape	*Mulilo (Pty) Ltd*	
Karoshoek CSP 1 Facility/ Solar One, Upington, Northern Cape	*Karoshoek Solar One (Pty) Ltd*	

APPENDIX N:
ENVIRONMENTAL AUTHORISATIONS

forestry, fisheries
& the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Private Bag X 447· PRETORIA ·0001· Environment House ·473 Steve Biko Road, Arcadia· PRETORIA

DFFE Reference: 14/12/16/3/3/2/2160
Enquiries: Dr Danie Smit
Telephone: (012) 399 9493**E-mail:** DSmit@dffe.gov.za

Mr Peter Carl Venn
Emoyeni Renewable Energy Farm (Pty) Ltd
Postnet Suite 216
Private Bag X26
Tokai
CAPE TOWN
6001

Telephone Number: (083) 689 3063
Email Address: . . . Peter.venn@windlab.com

PER EMAIL / MAIL

Dear Mr Venn

APPLICATION FOR ENVIRONMENTAL AUTHORISATION IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, ACT NO. 107 OF 1998, AS AMENDED: FOR THE PROPOSED DEVELOPMENT OF UMMBILA EMOYENI WIND ENERGY FACILITY, MPUMALANGA PROVINCE.

With reference to the above application, please be advised that the Department has decided to grant authorisation. The Environmental Authorisation (EA) and reasons for the decision are attached herewith.

In terms of Regulation 4(2) of the Environmental Impact Assessment Regulations, 2014, as amended (the EIA Regulations), you are instructed to notify all registered interested and affected parties, in writing and within 14 (fourteen) days of the date of the decision as well as the provisions regarding the submission of appeals that are contained in the Regulations.

In terms of the Promotion of Administrative Justice Act, Act No. 3 of 2000, you are entitled to the right to fair, lawful and reasonable administrative action; and to written reasons for administrative action that affects you negatively. Further your attention is drawn to the provisions of the Protection of Personal Information Act, Act No. 4 of 2013 which stipulate that the Department should conduct itself in a responsible manner when collecting, processing, storing and sharing an individual or another entity's personal information by holding the Department accountable should the Department abuse or compromise your personal information in any way.

Your attention is drawn to Chapter 2 of National Environmental Management Act, Act No. 107 of 1998 National Appeal Regulations published under Government Notice R993 in Government Gazette No. 38303 dated 08 December 2014 (National Appeal Regulations, 2014), which prescribes the appeal procedure to be followed. Kindly include a copy of this document (National Appeal Regulations, 2014) with the letter of notification to interested and affected parties in this matter.

Should any person wish to lodge an appeal against this decision, he/she must submit the appeal to the appeal administrator, and a copy of the appeal to the applicant, any registered interested and affected party, and any

organ of state with interest in the matter within 20 days from the date that the notification of the decision was sent to the registered interested and affected parties by the applicant; or the date that the notification of the decision was sent to the applicant by the Department, whichever is applicable.

Appeals must be submitted in writing in the prescribed form to:

The Director: Appeals and Legal Review of this Department at the below mentioned addresses.

By email: appeals@dffe.gov.za;

By hand: Environment House
473 Steve Biko
Arcadia
Pretoria
0083; or

By post: Private Bag X447
Pretoria
0001

Please note that in terms of Section 43(7) of the National Environmental Management Act, Act No. 107 of 1998, as amended, the lodging of an appeal will suspend the environmental authorisation or any provision or condition attached thereto. In the instance where an appeal is lodged, you may not commence with the activity until such time that the appeal is finalised.

To obtain the prescribed appeal form and for guidance on the submission of appeals, please visit the Department's website at https://www.environment.gov.za/documents/forms#legal_authorisations or request a copy of the documents at appeals@dffe.gov.za.

Yours faithfully

Mr Vusi Skosana
Acting Chief Director: Integrated Environmental Authorisations
Department of Forestry, Fisheries and the Environment
Date: 26 January 2023

cc:	Jo-Anne Thomas	Savannah Environmental (Pty) Ltd	Email: joanne@savannahsa.com

forestry, fisheries & the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Environmental Authorisation

In terms of Regulation 25 of the Environmental Impact Assessment Regulations, 2014, as amended.

Development of Ummbila Emoyeni Wind Energy Facility, Mpumalanga Province

Gert Sibande District Municipality

Authorisation register number:	*14/12/16/3/3/2/2160*
Last amended:	*First issue*
Holder of authorisation:	*Emoyeni Renewable Energy Farm (Pty) Ltd*
Location of activity:	*Farm 261 – Naudesfontein, Farm 264 – Geluksplaats, Farm 268 – Brak Fontein Settlement, Farm 420 – Rietfontein, Farm 421 – Sukkelaar, Farm 422 – Klipfontein, Farm 423 – Bekkerust, Farm 454 – Oshoek, Farm 455 – Ebenhaezer, Farm 456 – Vaalbank, Farm 457 – Roodekrans, Farm 458 – Goedgedacht, Farm 467 – Twee Fontein, Farm 469 – Klipkraal, Farm 548 – Durabel, Farm 470 – Dorpsplaats, Farm 451 – Drinkwater, Farm 452 – Brakfontein* *WITHIN Ward 15 of Govan Mbeki Local Municipality, Ward 12 of Lekwa Local Municipality and Ward 8 and 10 of Msukaligwa Local Municipality, Gert Sibande District Municipality, Mpumalanga Province.*

This authorisation does not negate the holder of the authorisation's responsibility to comply with any other statutory requirements that may be applicable to the undertaking of the activity.

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Decision

The Department is satisfied, on the basis of information available to it and subject to compliance with the conditions of this Environmental Authorisation, that the applicant should be authorised to undertake the activities specified below.

Non-compliance with a condition of this Environmental Authorisation may result in criminal prosecution or other actions provided for in the National Environmental Management Act, Act No. 107 of 1998, as amended and the EIA Regulations, 2014, as amended.

Details regarding the basis on which the Department reached this decision are set out in Annexure 1.

Activities authorised.

By virtue of the powers conferred on it by the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment Regulations, 2014, as amended, the Department hereby authorises –

EMOYENI RENEWABLE ENERGY FARM (PTY) LTD

(Hereafter referred to as the **holder of the authorisation**)

with the following contact details –

Mr Peter Carl Venn
Emoyeni Renewable Energy Farm (Pty) Ltd
POSTNET Suite 216
Private Bag X26
Tokai
CAPE TOWN
6001

Telephone Number: (083) 689 3063

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Email Address: Peter.venn@windlab.com

to undertake the following activities (hereafter referred to as "the activity") indicated in Listing Notice 1, Listing Notice 2 and Listing Notice 3 of the EIA Regulations, 2014 as amended:

Activity number	Activity description
Listing Notice 1 Item 11 (i): *"The development of facilities or infrastructure for the transmission and distribution of electricity –* *(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275kV.*	Internal electrical infrastructure required to connect the Ummbila Emoyeni Wind Energy Facility to the grid connection infrastructure will consist of 33kV cabling (buried or overhead), and 3 x 33/132kV onsite collector substations (IPP Portion).
Listing Notice 1, Item 12(ii)(a)(c): *The development of –* *(ii) Infrastructure or structures with a physical footprint of 100 square metres or more Where such development occurs-* *(a) within a watercourse; or* *(c) within 32 metres of a watercourse.*	The construction and operation of the Ummbila Emoyeni Wind Energy Facility and associated infrastructure will occur within freshwater/ drainage features, as well as within 32m of these features. The infrastructure will have a physical footprint of more than 100 square metres.
Listing Notice 1, Item 14: *The development and related operation of facilities and infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres*	The development of the Ummbila Emoyeni Wind Energy Facility will require the construction and operation of facilities and infrastructure for the storage and handling of dangerous goods (combustible and flammable liquids, such as oils, lubricants, solvents) associated with the onsite collector substations, where such storage will occur inside containers with a combined capacity exceeding 80 cubic meters but not exceeding 500 cubic meters
Listing Notice 1, Item 19(i) *The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells,*	The site for the Ummbila Emoyeni Wind Energy Facility is associated with the presence of freshwater/drainage features. Therefore, during the construction phase, 10 cubic metres of rock will be

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shell grit, pebbles or rock of more than 10 cubic metres from a *(i) Watercourse*	removed from the watercourses for the development of the Ummbila Emoyeni Wind Energy Facility and associated infrastructure
Listing Notice 1, Item 24(ii) *The development of a road –* *(ii) with a reserve wider than 13.5m, or where no reserve exists where the road is wider than 8m.*	The construction of the Ummbila Emoyeni Wind Energy Facility will require the construction of new access roads of 12 -13m wide, with 12m at turning circles, in areas where no road reserve exists to provide access to the facility.
Listing Notice 1, Item 28(ii) *Residential, mixed, retail, commercial, industrial, or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:* *(ii) will occur outside an urban area, where the total land to be developed is bigger than 1ha.*	The total area to be developed (i.e., the development footprint) for the Ummbila Emoyeni Wind Energy Facility is greater than 1ha and occurs outside an urban area in an area currently zoned for agriculture
Listing Notice 1, Item 56(ii) *The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre* *(ii) where no reserve exists, where the existing road is wider than 8 metres.*	Existing farm roads within the project site may require widening, and access roads will be widened by more than 6 metres.
Listing Notice 2, Item 1 *The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20MW or more.*	The project comprises a renewable energy generation facility, which will utilise wind power technology and will have a generation capacity of up to 900MW
Listing Notice 2, Item 15 *The clearance of an area of 20ha or more of indigenous vegetation.*	The facility is located on agricultural land where the predominant land use is farming. The project will require the clearance of indigenous vegetation within

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	an area in excess of 20ha for the development of infrastructure
Listing Notice 3, Item 4(f)(i)(ee): *The development of a road wider than 4 metres with a reserve less than 13.5 metres.* *f. Mpumalanga* *i. Outside urban areas:* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.*	The development of the Ummbila Emoyeni Wind Energy Facility will require the development of access roads of 12 – 13m wide, with 12m at turning circles, in the Mpumalanga Province and outside urban areas. The project site is associated with the presence of a CBA1: Optimal (Terrestrial) and a CBA1: Irreplaceable (Freshwater).
Listing Notice 3, Item 12(f)(ii) *The clearance of an area of 300m2 or more of indigenous vegetation within:* *b. Mpumalanga* *ii. Within critical biodiversity areas identified in bioregional plans.*	The Ummbila Emoyeni Wind Energy Facility development will require clearance in excess of 300m2 within areas classified as CBA1: Optimal (Terrestrial) and CBA1: Irreplaceable (Freshwater) in the Mpumalanga Province
Listing Notice 3, Item 10(f)(i)(cc)(ee)(h h) *The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres* *f. Mpumalanga* *i. Outside urban areas* *(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.* *(hh) Areas within a watercourse or wetland, or within 100 metres of a watercourse or wetland.*	The development of the Ummbila Emoyeni Wind Energy Facility will require the construction and operation of facilities for the storage and handling of a dangerous goods (combustible and flammable liquids, such as oils, lubricants, solvents) associated with the onsite collector substations, where such storage will include containers with a capacity of 80 cubic meters. The site is associated with the presence of freshwater/drainage features, a CBA1: Optimal (Terrestrial) and a CBA1: Irreplaceable (Freshwater) and is located within the Mpumalanga Province and outside urban areas. Further, parts of the site are located in areas which could be considered sensitive in terms of the Gert Sibande District Environmental Management Framework (EMF).

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Listing Notice 3, Item 14(ii)(a)(c)(f)(i)(d d)(ff) *The development of—* *(ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs—* *(a) within a watercourse; or* *(c) within 32 metres of a watercourse, measured from the edge of a watercourse.* *Mpumalanga* *ii. Outside urban areas:* *(dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority* *(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. Mpumalanga*	The development of Ummbila Emoyeni Wind Energy Facility will require the establishment of infrastructure with a physical footprint exceeding 10m2. The site is associated with the presence of freshwater/drainage features, a CBA1: Optimal (Terrestrial) and a CBA1: Irreplaceable (Freshwater), and is located within the Mpumalanga Province, and outside urban areas. Further, parts of the site are located in areas which could be considered sensitive in terms of the Gert Sibande District Environmental Management Framework (EMF).
Listing Notice 3, Item 18(f)(i)(ee) *The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.* *f. Mpumalanga* *i. Outside urban areas:* *(ee) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans*	The development of the Ummbila Emoyeni Wind Energy Facility will require the widening of roads by more than 4m, outside urban areas, and within areas classified as CBA1: Optimal (Terrestrial) and CBA1: Irreplaceable (Freshwater) in the Mpumalanga Province.

as described in the Environmental Impact Assessment Report (EIAr) dated October 2022 at:

- for the development of Ummbila Emoyeni Wind Energy Facility, Mpumalanga Province, hereafter referred to as "the property". SG 21-digit codes and coordinates attached as Appendix 2 and 3.

The infrastructure associated with the development of Ummbila Emoyeni Wind Energy Facility will include will comprise the following:

- Up to 111 wind turbines with a maximum hub height of up to 200m. The tip height of the turbines will be up to 300m.
- 33kV cabling to connect the wind turbines to the onsite collector substations, to be laid underground where practical.
- 3 x 33kV/132kV onsite collector substation (IPP Portion), each being 5ha.
- Battery Energy Storage System (BESS).
- Cabling between turbines, to be laid underground where practical.
- Construction compounds including site office (approximately 300m x 300m in total but split into 3ha each of 150m x 200m):
  - Batching plant of up to 4ha to 7ha.
  - 3 x O&M office of approximately 1.5ha each adjacent to each collector SS
  - 3 x construction compound / laydown area, including site office of 3ha each (150m x 200m each).
- Laydown and crane hardstand areas (approximately 75m x 120m).
- Access roads of 12 -13m wide, with 12m at turning circles.

Technical details of the WEF:

Infrastructure	**Description/ Dimensions**
Number of turbines	Up to 111 turbines
Hub Height	Up to 200m
Tip Height	Up to 300m
Rotor Diameter	Up to 200m
Contracted Capacity	Up to 900MW (individual turbines between 6MW and 15MW in 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)	3 x on-site collector substations (IPP Portion) of 5ha each. 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.
Laydown and Operations and Maintenance (O&M) hub	• 3 x Batching plant of up to 4ha to 7ha. • 3 x O&M office of approximately 1.5ha each adjacent to each collector SS. • 3 x construction compound / laydown area, including site office of 3ha each (150m x 200m each). • Laydown and crane hardstand areas (approximately 75m x 120m).
Access and internal roads	• Wherever possible, existing access roads will be utilised to access the project site and development footprint. • It is unlikely that access roads will need to be upgraded as part of the proposed development. • Internal roads of up to 12-13m in width will be required to access each turbine and the on-site substation. • Access roads will be12m at turning circles
Laydown and crane hardstand areas (at each turbine position)	~75m x 120m
Turbine foundation	Diameter of up to 40m per turbine
Battery Energy Storage System (BESS)	• Export Capacity of up to 800MWh • Total storage capacity 200MW • Storage capacity of up to 6-8 hours • The BESS will be housed in containers covering a total approximate footprint of up to 5ha.

	• Battery types to be considered: Solid State Batteries as the preferred (Lithium Ion) and Redox Flow Batteries as the alternative (Vanadium Redox).
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 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. The grid connection infrastructure has been assessed as part of a separate S&EIA process in support of an application for EA (DFFE Reference number: 14/12/16/3/3/2/2162).
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.

Conditions of this Environmental Authorisation

Scope of authorisation

1. The development of Ummbila Emoyeni Wind Energy Facility including all associated infrastructure located within Ward 15 of Govan Mbeki Local Municipality, Ward 12 of Lekwa Local Municipality and Ward 8 and 10 of Msukaligwa Local Municipality within the jurisdiction of Gert Sibande District Municipality in Mpumalanga Province is approved as per the geographic coordinates cited in Annexure 3.
2. Authorisation of the activity is subject to the conditions contained in this Environmental Authorisation, which form part of the Environmental Authorisation and are binding on the holder of the authorisation.

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3. The holder of the authorisation is responsible for ensuring compliance with the conditions contained in this Environmental Authorisation. This includes any person acting on the holder's behalf, including but not limited to, an agent, servant, contractor, sub-contractor, employee, consultant or person rendering a service to the holder of the authorisation.
4. The activities authorised may only be carried out at the property as described above.
5. Any changes to, or deviations from, the project description set out in this Environmental Authorisation must be approved, in writing, by the Department before such changes or deviations may be effected. In assessing whether to grant such approval or not, the Department may request such information as it deems necessary to evaluate the significance and impacts of such changes or deviations and it may be necessary for the holder of the authorisation to apply for further Environmental Authorisation in terms of the regulations.
6. The holder of an Environmental Authorisation must apply for an amendment of the Environmental Authorisation with the Competent Authority for any alienation, transfer or change of ownership rights in the property on which the activity is to take place.
7. This activity must commence within a period of ten (10) years from the date of issue of this Environmental Authorisation. If commencement of the activity does not occur within that period, the authorisation lapses and a new application for Environmental Authorisation must be made in order for the activity to be undertaken.
8. Construction must be completed within five (05) years of the commencement of the activity on site.

Notification of authorisation and right to appeal.

9. The holder of the authorisation must notify every registered interested and affected party, in writing and within 14 (fourteen) calendar days of the date of this Environmental Authorisation, of the decision to authorise the activity.
10. The notification referred to must –
    10.1. specify the date on which the authorisation was issued;
    10.2. inform the interested and affected party of the appeal procedure provided for in the National Appeal Regulations, 2014;
    10.3. advise the interested and affected party that a copy of the authorisation will be furnished on request; and
    10.4. give the reasons of the Competent Authority for the decision.

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Commencement of the activity

11. The authorised activity shall not commence until the period for the submission of appeals has lapsed as per the National Appeal Regulations, 2014, and no appeal has been lodged against the decision. In terms of Section 43(7), an appeal under Section 43 of the National Environmental Management Act, Act No. 107 of 1998, as amended will suspend the Environmental Authorisation or any provision or condition attached thereto. In the instance where an appeal is lodged you may not commence with the activity until such time that the appeal has been finalised.

Management of the activity

12. A copy of the final site layout map must be made available for comments by registered Interested and Affected Parties and the holder of this environmental authorisation must consider such comments. Once amended, the final development layout map must be submitted to the Department for written approval prior to commencement of the activity. All available biodiversity information must be used in the finalisation of the layout map. Existing infrastructure must be used as far as possible e.g., roads. The layout map must indicate the following:
    12.1. The position of wind turbines and associated infrastructure;
    12.2. Internal roads indicating width;
    12.3. Wetlands, drainage lines, rivers, stream and water crossing of roads and cables;
    12.4. All sensitive features e.g., Important Bird Areas, Critical Biodiversity Areas, Ecological Support Areas, heritage sites, wetlands, pans and drainage channels that will be affected by the facility and associated infrastructure;
    12.5. The BESS, substation(s) inverters and/or transformer(s) sites including their entire footprint;
    12.6. Connection routes (including pylon positions) to the distribution/transmission network;
    12.7. All existing infrastructure on the site, such as roads;
    12.8. Soil heaps (temporary for topsoil and subsoil and permanently for excess material);
    12.9. Buildings, including accommodation; and,
    12.10. All "no-go" and buffer areas.
13. The Environmental Management Programme (EMPr) for the facility submitted as part of the EIAr is not approved and must be amended to include measures as dictated by the final site lay-out map and micro-siting, and the provisions of this environmental authorisation. The EMPr must be made available for comments by registered Interested and Affected Parties and the holder of this environmental authorisation must consider such comments. Once amended, the final EMPr must be submitted to the Department for

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written approval prior to commencement of the activity. Once approved the EMPr must be implemented and adhered to.

14. The EMPr amendment must include the following:
    14.1. All recommendations and mitigation measures recorded in the EIAr and the specialist reports as included in the EIAr dated October 2022.
    14.2. The requirements and conditions of this authorisation.
    14.3. An effective monitoring system to detect any leakage or spillage of any 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.
    14.4. A transportation plan for the transport of turbine components, main assembly cranes and other large equipment.
    14.5. An environmental sensitivity map indicating environmentally sensitive areas and features identified during the EIA process.
    14.6. Measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments, and other environmentally sensitive areas from construction impacts including the direct or indirect spillage of pollutants.
15. The site layout plans as attached as Appendix P (Site maps) of the EIAr dated October 2022 is not approved.
16. The Generic Environmental Management Programme (EMPr) for substation submitted as part of the EIAr dated October 2022 is not approved and Part C must be amended to include measures as dictated by the final site lay-out map and micro-siting, and the provisions of this Environmental Authorisation. Part C of the generic EMPr must be made available for comments to registered Interested and Affected Parties and the holder of this Environmental Authorisation must consider such comments. Once amended, the generic EMPr must be submitted to the Department for written approval of Part C prior to commencement of the activity. Part C of the generic EMPr must be amended to include the following.
    16.1. The requirements and conditions of this Environmental Authorisation;
    16.2. Measures as dictated by the final site lay-out map and micro-siting;
    16.3. All recommendations and mitigation measures recorded in the EIAr and the specialist reports as included in the EIAr dated October 2022;
    16.4. An effective monitoring system to detect any leakage or spillage of any hazardous substances during their transportation, handling, use or storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems;
    16.5. A fire management plan to be implemented during the construction and operation of the facility;

16.6. A re-vegetation and habitat rehabilitation plan. The plan must provide for restoration to be undertaken as soon as possible after completion of construction activities, to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.

16.7. An aquatic Rehabilitation and Monitoring plan, particularly for watercourse features that will be infilled and / or excavated;

16.8. A stormwater management plan; and

16.9. The final site layout map.

17. The EMPr must be implemented and strictly enforced during all phases of the project. It shall be seen as a dynamic document and shall be included in all contract documentation for all phases of the development when approved.

18. Changes to the approved EMPr must be submitted in accordance to the EIA Regulations applicable at the time.

19. The Department reserves the right to amend the approved EMPr should any impacts that were not anticipated or covered in the EIAr be discovered.

Frequency and process of updating the EMPr

20. The EMPr must be updated where the findings of the environmental audit reports, contemplated in Condition 27 below, indicate insufficient mitigation of environmental impacts associated with the undertaking of the activity, or insufficient levels of compliance with the environmental authorisation or EMPr.

21. The updated EMPr must contain recommendations to rectify the shortcomings identified in the environmental audit report.

22. The updated EMPr must be submitted to the Department for approval together with the environmental audit report, as per Regulation 34 of the EIA Regulations, 2014 as amended. The updated EMPr must have been subjected to a public participation process, which process has been agreed to by the Department, prior to submission of the updated EMPr to the Department for approval.

23. In assessing whether to grant approval of an EMPr which has been updated as a result of an audit, the Department will consider the processes prescribed in Regulation 35 of the EIA Regulations, 2014 as amended. Prior to approving an amended EMPr, the Department may request such amendments to the EMPr as it deems appropriate to ensure that the EMPr sufficiently provides for avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity.

24. The holder of the authorisation must apply for an amendment of an EMPr, if such amendment is required before an audit is required. The amendment process is prescribed in Regulation 37 of the EIA Regulations,

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2014, as amended. The holder of the authorisation must request comments on the proposed amendments to the impact management outcomes of the EMPr or amendments to the closure objectives of the closure plan from potentially interested and affected parties, including the competent authority, by using any of the methods provided for in the Act for a period of at least 30 days.

Monitoring

25. The holder of the authorisation must appoint an experienced Environmental Control Officer (ECO) for the construction phase of the development that will have the responsibility to ensure that the mitigation/rehabilitation measures and recommendations referred to in this environmental authorisation are implemented and to ensure compliance with the provisions of the approved EMPr.
    25.1. The ECO must be appointed before commencement of any authorised activities.
    25.2. Once appointed, the name and contact details of the ECO must be submitted to the *Director: Compliance Monitoring* of the Department.
    25.3. The ECO must keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.
    25.4. The ECO must remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site is ready for operation.

Recording and reporting to the Department

26. All documentation e.g. audit/monitoring/compliance reports and notifications, required to be submitted to the Department in terms of this environmental authorisation, must be submitted to the *Director: Compliance Monitoring* of the Department.
27. The holder of the environmental authorisation must, for the period during which the environmental authorisation and EMPr remain valid, ensure that project compliance with the conditions of the environmental authorisation and the EMPr are audited, and that the audit reports are submitted to the *Director: Compliance Monitoring* of the Department.
28. The frequency of auditing and of submission of the environmental audit reports must be as per the frequency indicated in the EMPr, taking into account the processes for such auditing as prescribed in Regulation 34 of the EIA Regulations, 2014 as amended.
29. The holder of the authorisation must, in addition, submit environmental audit reports to the Department within 30 days of completion of the construction phase (i.e. within 30 days of site handover) and a final environmental audit report within 30 days of completion of rehabilitation activities.

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30. The environmental audit reports must be compiled in accordance with Appendix 7 of the EIA Regulations, 2014 as amended and 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 as well as the requirements of the approved EMPr.
31. 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.

Notification to authorities

32. A written notification of commencement must be given to the Department no later than fourteen (14) days prior to the commencement of the activity. The notice must include a date on which it is anticipated that the activity will commence, as well as a reference number.

Operation of the activity

33. A written notification of operation must be given to the Department no later than fourteen (14) days prior to the commencement of the activity operational phase.

Site closure and decommissioning

34. Should the activity ever cease or become redundant, the holder of the authorisation must undertake the required actions as prescribed by legislation at the time and comply with all relevant legal requirements administered by any relevant and Competent Authority at that time.

Specific conditions

35. No activities will be allowed to encroach into a water resource without a water use authorisation being in place from the Department of Water and Sanitation.

Avifauna and bats

36. The facility must be designed in a manner that, infrastructure components that could be used as perching or roosting substrates by birds and bats must be prohibited.
37. The holder of this Environmental Authorisation must restrict the construction activities to the footprint area. No access to the remainder of the property is allowed.

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38. Anti-collision devices such as bird flappers must be installed where power lines cross avifaunal corridors (e.g., grasslands, rivers, wetlands, and dams). The input of an avifaunal specialist must be obtained for the fitting of the anti-collision devices onto specific sections of the line once the exact positions of the towers have been surveyed and pegged. Additional areas of high sensitivity along the preferred alignment must also be identified by the avifaunal specialist for the fitment of anti-collision devices. These devices must be according to Eskom's Transmission and EWT's Guidelines.
39. A pre-construction walk through of the approved power line alignment and turbine positions by a bat specialist, avifaunal specialist and ecologist, must be conducted to ensure that the micro-siting of the turbines, pylons and powerline alignment have the least possible impact, there are no nests sites of priority species on or close to the construction corridor, and all protected plant species impacted are identified.
40. All bird monitoring must be conducted in accordance with the latest BirdLife South Africa/Endangered Wildlife Trust: Best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in Southern Africa.

Vegetation, wetlands and water resources

41. 50m buffers from the outer edge of the freshwater resource features on all small endorheic seepages and depressions with a High Ecological Importance must be implimented
42. 100m buffers from the outer edge of the freshwater resource features on all larger interconnected wetland features with very Ecological importance must be implimented..
43. The 'no-go' areas of the development property must be clearly demarcated and must be excluded from the final layout plan.
44. All watercourses and associated wetlands are regarded as sensitive. All developments within 500m of watercourses must comply with National Water Act.
45. No transmission line towers, substations and construction camps will be placed within the delineated water courses as well as their respective buffers without obtaining the required approvals.
46. A pre-construction survey of the final development footprint must be conducted by qualified floral specialist to identity protected species affected by the proposed development. Prior to the commencement of construction, a rescue and rehabilitation operation for these species which could survive translocation must be conducted.
47. A mole specialist must be appointed to undertake a detailed survey to confirm the presence/absence of Golden moles and assist with micro-siting of the WEF and associated infrastructure and developing a plan to mitigate impacts if detected or favourable habitat is identified (such as relocation).
48. Construction activities must be restricted to demarcated areas to restrict the impact on sensitive environmental features.

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49. All areas of disturbed soil must be reclaimed using only indigenous grass and shrubs. Reclamation activities shall be undertaken according to the rehabilitation plan to be included in the final EMPrs.
50. Topsoil from all excavations and construction activities must be salvaged and reapplied during reclamation.
51. No exotic plants may be used for rehabilitation purposes; only indigenous plants of the area may be utilised.
52. Cleared alien vegetation must not be dumped on adjacent intact vegetation during clearing but must be temporarily stored in a demarcated area.
53. Removal of alien invasive species or other vegetation and follow-up procedures must be in accordance with the Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983).
54. Contractors and construction workers must be clearly informed of the no-go areas.
55. Where roads pass right next to major water bodies, provision shall be made for fauna such as toads to pass under the roads by using culverts or similar structures.
56. Bridge design must be such that it minimise impact to riparian areas with minimal alterations to water flow and must allow the movement of fauna and flora.
57. The final development area should be surveyed for species suitable for search and rescue, which should be trans-located prior to the commencement of construction.
58. Electric fencing should not have any strands within 30cm of the ground, which should be sufficient to allow smaller mammals, reptiles and tortoises to pass through, but still remain effective as a security barrier.
59. Disturbed areas must be rehabilitated as soon as possible after construction with locally indigenous plants to enhance the conservation of existing natural vegetation on site.
60. Wetlands, rivers and river riparian areas must be treated as "no-go" areas and appropriately demarcated as such. No vehicles, machinery, personnel, construction material, fuel, oil, bitumen or waste must be allowed into these areas without the express permission of and supervision by the ECO, except for rehabilitation work in these areas.
61. Workers must be made aware of the importance of not destroying or damaging the vegetation along rivers and in wetland areas and this awareness must be promoted throughout the construction phase.
62. Freshwater ecosystems located in close proximity to the construction areas must be inspected on a regular basis by the ECO for signs of disturbance from construction activities. If signs of disturbance are noted, immediate action must be taken to remedy the situation and, if necessary, a freshwater ecologist must be consulted for advice on the most suitable remediation measures.
63. No discharge of effluents or polluted water must be allowed into any rivers or wetland areas.
64. If construction areas are to be pumped of water (e.g. after rains), this water must be pumped into an appropriate settlement area, and not allowed to flow into any rivers or wetland areas.

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65. Workers must be made aware of the importance of not polluting rivers or wetlands and of not undertaking activities that could result in such pollution, and this awareness must be promoted throughout the construction phase.

66. Freshwater ecosystems located in close proximity to the site must be inspected on a regular basis (but especially after rainfall) by the ECO for signs of sedimentation and pollution. If signs of sedimentation or pollution are noted, immediate action must be taken to remedy the situation and, if necessary, a freshwater ecologist must be consulted for advice on the most suitable remediation measures.

Roads and transportation

67. Signs must be placed along construction roads to identify speed limits, travel restrictions, and other standard traffic control information. To minimize impacts on local commuters, consideration should be given to limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time.

68. All structures crossing streams must be located and constructed so that they do not decrease channel stability or increase water velocity.

69. A designated access to the site must be created and clearly marked to ensure safe entry and exit.

70. Signage must be erected at appropriate points warning of turning traffic and the construction site.

71. Construction vehicles carrying materials to the site should avoid using roads through densely populated built-up areas so as not to disturb existing retail and commercial operations.

72. Road borders should be regularly maintained to ensure that vegetation remains short and that they therefore serve as an effective firebreak.

73. Roads must be designed so that changes to surface water runoff are avoided, and erosion is not initiated.

74. All construction vehicles should adhere to a low-speed limit to avoid collisions with susceptible species such as snakes and tortoises.

Noise

75. If the structures located at NSR47 are used for residential purposes, the resident(s) must be relocated, or the WTG located within 1 000m from these NSR must be moved further than 1 000m from these NSR.

76. 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.

77. 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. Once-off

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noise measurements must be conducted at the location of the person that registered a valid and reasonable noise complaint. The measurement location must consider the direct surroundings to ensure that other sound sources cannot influence the reading. These measurement locations can be reduced accordingly if the NSR are relocated, or the dwelling are no longer used for residential purposes

78. 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:

79.1the resident(s) could be relocated, or;

79.2the 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.

79. The holder of this authorisation must ensure that the construction staff working in areas where the 8-hour ambient noise levels exceed 75dBA must wear ear protection equipment.

80. The holder of this authorisation must ensure that all equipment and machinery are well maintained and equipped with silencers.

81. The holder of this authorisation must provide a prior warning to the community when a noisy activity e.g., blasting is to take place.

82. Positions of turbines jeopardizing compliance with accepted noise levels should be revised during the micro-siting of the units in question and predicted noise levels re-modelled by the noise specialist, in order to ensure that the predicted noise levels are less than 45dB(A).

83. Construction staff must be trained in actions to minimise noise impacts.

Visual resources

84. A 1 000m buffer is proposed within areas immediately surrounding settlement and homesteads development of which is likely to significantly change the character of views for residents which should be sufficient to ensure that development does not totally dominate views.

85. A 500m corridor must be to ensure that development does not totally dominate views along the main roads that could be affected including the N17, the R35, and the R39.

86. The holder of this authorisation must reduce visual impacts during construction by minimising areas of surface disturbance, controlling erosion, using dust suppression techniques and restoring exposed soil as closely as possible to their original contour and vegetation.

87. A lighting engineer must be consulted to assist in the planning and placement of light fixtures in order to reduce visual impacts associated with glare and light trespass.

88. Lighting of main structures (turbines) and ancillary buildings should be designed to minimise light pollution without compromising safety, and turbines must be lit according to Civil Aviation Regulations.

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89. Signage on or near wind turbines must be avoided unless they serve to inform the public about wind turbines and their function.

90. Commercial messages and graffiti on turbines are prohibited.

Human health and safety

91. A health and safety programme must be developed to protect both workers and the general public during construction, operation and decommissioning of the energy facility. The programme must establish a safety zone for wind turbines from residences and occupied buildings, roads, right-of-ways and other public access areas that is sufficient to prevent accidents resulting from the operation of the wind turbines.

92. Potentials interference with public safety communication systems (e.g. radio traffic related to emergency activities) must be avoided.

93. The holder of this authorisation must obtain approval from the South Africa Civil Aviation Authority that the wind facility will not interfere with the performance of aerodrome radio Communication, Navigation and Surveillance (CNS) equipment, especially the radar, prior to commencement of the activity. A copy of the approval must be kept on site by the ECO.

94. The holder of this authorisation must obtain approval from the South Africa Weather Services (WeatherSA) that the energy facility will not interfere with the performance of their equipment, especially radar, prior to commencement of the activity. A copy of the approval must be kept on site by the ECO.

95. The holder of this authorisation must train safety representatives, managers and workers in workplace safety. The construction process must be compliant with all safety and health measures as prescribed by the relevant act.

96. Liaison with land owners/farm managers must be done prior to construction in order to provide sufficient time for them to plan agricultural activities.

97. No unsupervised open fires for cooking or heating must be allowed on site.

Hazardous materials and waste management

98. Areas around fuel tanks must be bunded or contained in an appropriate manner as per the requirements of SABS 089:1999 Part 1.

99. Leakage of fuel must be avoided at all times and if spillage occurs, it must be remedied immediately.

100. Hazardous waste such as bitumen, oils, oily rags, paint tins etc. must be disposed of at an approved waste landfill site licensed to accept such waste.

101. No dumping or temporary storage of any materials may take place outside designated and demarcated laydown areas, and these must all be located within areas of low environmental sensitivity.

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102. Hazardous substances must not be stored where there could be accidental leakage into surface or subterranean water.
103. Hazardous and flammable substances must be stored and used in compliance to the applicable regulations and safety instructions. Furthermore, no chemicals must be stored, nor may any vehicle maintenance occur within 350m of the temporal zone of wetlands, a drainage line with or without an extensive floodplain or hillside wetlands.
104. Temporary bunds must be constructed around chemical storage to contain possible spills.
105. Spill kits must be made available on-site for the clean-up of spills.
106. An integrated waste management approach must be implemented that is based on waste minimisation and must incorporate reduction, recycling and re-use options where appropriate. Where solid waste is disposed of, such disposal shall only occur at a landfill licensed in terms of section 20(b) of the National Environment Management Waste Act, 2008 (Act 59 of 2008).
107. The holder of this authorisation must provide sanitation facilities within the construction camps and along the road so that workers do not pollute the surrounding environment. These facilities must be removed from the site when the construction phase is completed as well as associated waste to be disposed of at a registered waste disposal site.
108. The holder of this authorisation must take note that no temporary site camps will be allowed outside the footprint of the development area as the establishment of such structures might trigger a listed activity as defined in the Environmental Impact Assessment Regulations, 2014.
109. Excavation and blasting activities.
110. Underground cables and internal access roads must be aligned as much as possible along existing infrastructure to limit damage to vegetation and watercourses.
111. Foundations and trenches must be backfilled with originally excavated materials as much as possible. Excess excavation materials must be disposed of only in approved areas or, if suitable, stockpiled for use in reclamation activities.
112. Borrow materials must be obtained only from authorised and permitted sites. Permits must be kept on site by the ECO.
113. Anti-erosion measures such as silt fences must be installed in disturbed areas.

Air emissions

114. Dust abatement techniques must be used before and during surface clearing, excavation, or blasting activities.

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115. Appropriate dust suppression techniques must be implemented on all exposed surfaces during periods of high wind. Such measures may include wet suppression, chemical stabilisation, the use of a wind fence, covering surfaces with straw chippings and re-vegetation of open areas.

Historical / cultural / paleontological resources

116. Should any archaeological sites, artefacts, paleontological fossils or graves be exposed during construction work, work in the immediate vicinity of the find must be stopped, SAHRA must be informed, and the services of an accredited heritage professional obtained for an assessment of the heritage resources to be made.
117. Construction managers/foremen must be informed before construction starts on the possible types of heritage sites and cultural material they may be encountered and the procedures to follow when they find sites.
118. All buffers and no-go areas stipulated in EIAr must be adhered to for both the facilities and all roads and power lines.
119. Should any human remains be uncovered during development they must be immediately protected in situ and reported to the heritage authorities or to an archaeologist. The remains will need to be exhumed at the cost of the developer.
120. All construction and maintenance crew and vehicles (except small vehicles which may use existing farm tracks) should be kept out of the buffer zones.
121. The final layout should be shown to the appointed archaeologist before implementation to confirm that all significant heritage resources have been adequately protected.

Turbine's position

122. The approved turbines must be placed in a manner to avoid all designated, "no-go" areas as well as its buffers.
123. The final placement of turbines must follow a micro siting procedure involving a walk-through and identification of any sensitive areas by botanical and avifaunal specialists.
124. Exclusion of sensitive ecological, heritage and paleontological areas from construction activities must inform micro siting of all development activities.

General

125. A copy of this Environmental Authorisation, the audit and compliance monitoring reports, and the approved EMPr, must be made available for inspection and copying-

125.1. at the site of the authorised activity;

125.2. to anyone on request; and

125.3. where the holder of the Environmental Authorisation has a website, on such publicly accessible website.

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

Date of Environmental Authorisation: 26 January 2023

Mr Vusi Skosana
Acting Chief Director: Integrated Environmental Authorisations
Department of Forestry, Fisheries and the Environment

Annexure 1: Reasons for Decision

1. Information considered in making the decision.

In reaching its decision, the Department took, *inter alia*, the following into consideration -

a) The listed activities as applied for in the application form received on 13 May 2022 and amended application form received on 21 October 2022.

b) The information contained in the EIAr dated October 2022.

c) The comments received from SAHRA, Eskom, Town and Regional Planning Govan Mbeki Local Municipality, Department of Water and Sanitation, and interested and affected parties as included in the EIAr dated October 2022.

d) Mitigation measures as proposed in the EIAr and the EMPr.

e) The information contained in the specialist studies contained within the appendices of the EIAr dated October 2022 and as appears below:

Title	Prepared by	Date
Terrestrial Ecology	Nkurenkuru Ecology and Biodiversity	September 2022
Freshwater Ecology	Nkurenkuru Ecology and Biodiversity	September 2022
Avifauna	Arcus Consultancy Services South Africa (Pty) Limited	September 2022
Bat Impact Assessment	Camissa Sustainability Consulting	June 2022
Soils and Agricultural Potential	The Biodiversity Company	June 2022
Heritage (including archaeology, palaeontology and sense of place)	CTS Heritage	August 2022
Noise Impact Assessment	Enviro-Acoustic Research cc	
Visual	Environmental Planning and Design	August 2022
Socio-Economic Impact Assessment	Urban-Econ Development Economists	August 2022
Traffic Impact Assessment	JG Afrika (Pty) Ltd	September 2022
EMPrs	Savannah Environmental (Pty) Ltd	October 2022

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2. Key factors considered in making the decision.

All information presented to the Department was taken into account in the Department's consideration of the application. A summary of the issues which, in the Department's view, were of the most significance is set out below.

a) The findings of all the specialist studies conducted and their recommended mitigation measures.

b) The need for the proposed project stems from the provision of electricity to the national grid.

c) The EIAr dated October 2022 identified all legislation and guidelines that have been considered in the preparation of the EIAr.

d) The location of the proposed wind energy facility.

e) The methodology used in assessing the potential impacts identified in the EIAr dated October 2022 and the specialist studies have been adequately indicated.

f) A sufficient public participation process was undertaken, and the applicant has satisfied the minimum requirements as prescribed in the EIA Regulations, 2014 as amended for public involvement.

3. Findings

After consideration of the information and factors listed above, the Department made the following findings -

a) The identification and assessment of impacts are detailed in the EIAr dated October 2022 and sufficient assessment of the key identified issues and impacts have been completed.

b) The procedure followed for impact assessment is adequate for the decision-making process.

c) The information contained in the EIAr dated October 2022 is deemed to be accurate and credible.

d) The proposed mitigation of impacts identified and assessed adequately curtails the identified impacts.

e) EMPr measures for the pre-construction, construction and rehabilitation phases of the development were proposed and included in the EIAr and will be implemented to manage the identified environmental impacts during the construction phase.

In view of the above, the Department is satisfied that, subject to compliance with the conditions contained in the environmental authorisation, the authorised activities will not conflict with the general objectives of integrated environmental management laid down in Chapter 5 of the National Environmental Management Act, 1998 and that any potentially detrimental environmental impacts resulting from the authorised activities can be mitigated to acceptable levels. The environmental authorisation is accordingly granted.

Annexure 2: Ummbila Emoyeni_Land Portions & SG codes

Land Portion ID	Farm Name	Portion Number
T0IS00000000026100015	NAUDESFONTEIN,261	15 (REMAINING EXTENT)
T0IS00000000026100021	NAUDESFONTEIN,261	21
T0IS00000000026400000	GELUKSPLAATS,264	0
T0IS00000000026400001	GELUKSPLAATS,264	1
T0IS00000000026400003	GELUKSPLAATS,264	3
T0IS00000000026400004	GELUKSPLAATS,264	4
T0IS00000000026400005	GELUKSPLAATS,264	5
T0IS00000000026400006	GELUKSPLAATS,264	6 (REMAINING EXTENT)
T0IS00000000026400008	GELUKSPLAATS,264	8 (REMAINING EXTENT)
T0IS00000000026400009	GELUKSPLAATS,264	9 (REMAINING EXTENT)
T0IS00000000026400010	GELUKSPLAATS,264	10
T0IS00000000026400011	GELUKSPLAATS,264	11
T0IS00000000026400012	GELUKSPLAATS,264	12
T0IS00000000026800006	THE BRAKFONTEIN SETTLEMENT,268	6
T0IS00000000026800007	THE BRAKFONTEIN SETTLEMENT,268	7
T0IS00000000026800010	THE BRAKFONTEIN SETTLEMENT,268	10
T0IS00000000026800011	THE BRAKFONTEIN SETTLEMENT,268	11
T0IS00000000026800012	THE BRAKFONTEIN SETTLEMENT,268	12
T0IS00000000042000008	RIETFONTEIN,420	8
T0IS00000000042000009	RIETFONTEIN,420	9
T0IS00000000042000010	RIETFONTEIN,420	10
T0IS00000000042000011	RIETFONTEIN,420	11
T0IS00000000042000012	RIETFONTEIN,420	12
T0IS00000000042000015	RIETFONTEIN,420	15 (REMAINING EXTENT)
T0IS00000000042000016	RIETFONTEIN,420	16

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T0IS00000000042000018	RIETFONTEIN,420	18
T0IS00000000042000019	RIETFONTEIN,420	19
T0IS00000000042000022	RIETFONTEIN,420	22
T0IS00000000042000032	RIETFONTEIN,420	32
T0IS00000000042100002	SUKKELAAR,421	2
T0IS00000000042100002	SUKKELAAR,421	2
T0IS00000000042100007	SUKKELAAR,421	7
T0IS00000000042100009	SUKKELAAR,421	9
T0IS00000000042100009	SUKKELAAR,421	9
T0IS00000000042100010	SUKKELAAR,421	10
T0IS00000000042100010	SUKKELAAR,421	10
T0IS00000000042100011	SUKKELAAR,421	11
T0IS00000000042100011	SUKKELAAR,421	11
T0IS00000000042100012	SUKKELAAR,421	12
T0IS00000000042100012	SUKKELAAR,421	12
T0IS00000000042100022	SUKKELAAR,421	22
T0IS00000000042100025	SUKKELAAR,421	25 (REMAINING EXTENT)
T0IS00000000042100034	SUKKELAAR,421	34
T0IS00000000042100035	SUKKELAAR,421	35
T0IS00000000042100036	SUKKELAAR,421	36
T0IS00000000042100037	SUKKELAAR,421	37
T0IS00000000042100037	SUKKELAAR,421	37
T0IS00000000042100038	SUKKELAAR,421	38
T0IS00000000042100039	SUKKELAAR,421	39
T0IS00000000042100040	SUKKELAAR,421	40
T0IS00000000042100042	SUKKELAAR,421	42
T0IS00000000042100042	SUKKELAAR,421	42
T0IS00000000042200000	KLIPFONTEIN,422	0
T0IS00000000042200002	KLIPFONTEIN,422	2 (REMAINING EXTENT)
T0IS00000000042200003	KLIPFONTEIN,422	3 (REMAINING EXTENT)
T0IS00000000042200004	KLIPFONTEIN,422	4
T0IS00000000042200005	KLIPFONTEIN,422	5
T0IS00000000042200006	KLIPFONTEIN,422	6
T0IS00000000042200007	KLIPFONTEIN,422	7

VS

T0IS00000000042200008	KLIPFONTEIN,422	8 (REMAINING EXTENT)
T0IS00000000042200009	KLIPFONTEIN,422	9
T0IS00000000042200010	KLIPFONTEIN,422	10
T0IS00000000042200012	KLIPFONTEIN,422	12
T0IS00000000042200013	KLIPFONTEIN,422	13 (REMAINING EXTENT)
T0IS00000000042200014	KLIPFONTEIN,422	14 (REMAINING EXTENT)
T0IS00000000042200016	KLIPFONTEIN,422	16
T0IS00000000042200017	KLIPFONTEIN,422	17
T0IS00000000042200018	KLIPFONTEIN,422	18
T0IS00000000042200019	KLIPFONTEIN,422	19
T0IS00000000042200020	KLIPFONTEIN,422	20
T0IS00000000042200021	KLIPFONTEIN,422	21
T0IS00000000042200022	KLIPFONTEIN,422	22
T0IS00000000042200023	KLIPFONTEIN,422	23
T0IS00000000042300000	BEKKERSRUST,423	0 (REMAINING EXTENT)
T0IS00000000042300001	BEKKERSRUST,423	1
T0IS00000000042300002	BEKKERSRUST,423	2 (REMAINING EXTENT)
T0IS00000000042300004	BEKKERSRUST,423	4
T0IS00000000042300005	BEKKERSRUST,423	5 (REMAINING EXTENT)
T0IS00000000042300006	BEKKERSRUST,423	6
T0IS00000000042300010	BEKKERSRUST,423	10
T0IS00000000042300011	BEKKERSRUST,423	11
T0IS00000000042300012	BEKKERSRUST,423	12
T0IS00000000042300013	BEKKERSRUST,423	13
T0IS00000000042300014	BEKKERSRUST,423	14
T0IS00000000042300015	BEKKERSRUST,423	15
T0IS00000000042300017	BEKKERSRUST,423	17
T0IS00000000042300019	BEKKERSRUST,423	19 (REMAINING EXTENT)
T0IS00000000042300020	BEKKERSRUST,423	20
T0IS00000000042300022	BEKKERSRUST,423	22
T0IS00000000042300023	BEKKERSRUST,423	23
T0IS00000000042300024	BEKKERSRUST,423	24
T0IS00000000042300025	BEKKERSRUST,423	25
T0IS00000000045100004	DRINKWATER,451	4

VS

T0IS00000000045100022	DRINKWATER,451	22
T0IS00000000045200005	BRAKFONTEIN,452	5
T0IS00000000045400004	OSHOEK,454	4 (REMAINING EXTENT)
T0IS00000000045400013	OSHOEK,454	13
T0IS00000000045400018	OSHOEK,454	18
T0IS00000000045500000	EBENHAEZER,455	0
T0IS00000000045500001	EBENHAEZER,455	1
T0IS00000000045500002	EBENHAEZER,455	2
T0IS00000000045500003	EBENHAEZER,455	3
T0IS00000000045600001	VAALBANK,456	1
T0IS00000000045600002	VAALBANK,456	2
T0IS00000000045600003	VAALBANK,456	3
T0IS00000000045600004	VAALBANK,456	4
T0IS00000000045600007	VAALBANK,456	7
T0IS00000000045600008	VAALBANK,456	8
T0IS00000000045600013	VAALBANK,456	13
T0IS00000000045600015	VAALBANK,456	15
T0IS00000000045600016	VAALBANK,456	16
T0IS00000000045600017	VAALBANK,456	17
T0IS00000000045600018	VAALBANK,456	18
T0IS00000000045600019	VAALBANK,456	19
T0IS00000000045700000	ROODEKRANS,457	0
T0IS00000000045700001	ROODEKRANS,457	1
T0IS00000000045700004	ROODEKRANS,457	4
T0IS00000000045700005	ROODEKRANS,457	5
T0IS00000000045700007	ROODEKRANS,457	7
T0IS00000000045700022	ROODEKRANS,457	22
T0IS00000000045700023	ROODEKRANS,457	23
T0IS00000000045700023	ROODEKRANS,457	23
T0IS00000000045800000	GOEDGEDACHT,458	0
T0IS00000000045800002	GOEDGEDACHT,458	2
T0IS00000000045800003	GOEDGEDACHT,458	3
T0IS00000000045800004	GOEDGEDACHT,458	4
T0IS00000000045800004	GOEDGEDACHT,458	4

VS

T0IS00000000045800005	GOEDGEDACHT,458	5
T0IS00000000045800008	GOEDGEDACHT,458	8
T0IS00000000045800009	GOEDGEDACHT,458	9
T0IS00000000045800010	GOEDGEDACHT,458	10
T0IS00000000045800011	GOEDGEDACHT,458	11
T0IS00000000045800012	GOEDGEDACHT,458	12
T0IS00000000045800013	GOEDGEDACHT,458	13
T0IS00000000045800014	GOEDGEDACHT,458	14
T0IS00000000045800015	GOEDGEDACHT,458	15
T0IS00000000045800016	GOEDGEDACHT,458	16
T0IS00000000045800017	GOEDGEDACHT,458	17
T0IS00000000045800018	GOEDGEDACHT,458	18
T0IS00000000045800019	GOEDGEDACHT,458	19
T0IS00000000045800021	GOEDGEDACHT,458	21
T0IS00000000045800021	GOEDGEDACHT,458	21
T0IS00000000045800022	GOEDGEDACHT,458	22
T0IS00000000045800023	GOEDGEDACHT,458	23
T0IS00000000045800025	GOEDGEDACHT,458	25
T0IS00000000045800026	GOEDGEDACHT,458	26 (REMAINING EXTENT)
T0IS00000000045800027	GOEDGEDACHT,458	27
T0IS00000000045800028	GOEDGEDACHT,458	28
T0IS00000000045800029	GOEDGEDACHT,458	29
T0IS00000000045800031	GOEDGEDACHT,458	31
T0IS00000000045800032	GOEDGEDACHT,458	32
T0IS00000000045800033	GOEDGEDACHT,458	33
T0IS00000000045800034	GOEDGEDACHT,458	34
T0IS00000000045800035	GOEDGEDACHT,458	35
T0IS00000000045800036	GOEDGEDACHT,458	36
T0IS00000000045800037	GOEDGEDACHT,458	37
T0IS00000000045800039	GOEDGEDACHT,458	39
T0IS00000000045800041	GOEDGEDACHT,458	41
T0IS00000000045800042	GOEDGEDACHT,458	42
T0IS00000000045800043	GOEDGEDACHT,458	43
T0IS00000000046700000	TWEEFONTEIN,467	0 (REMAINING EXTENT)

VS

T0IS00000000046700001	TWEEFONTEIN,467	1 (REMAINING EXTENT)
T0IS00000000046700004	TWEEFONTEIN,467	4 (REMAINING EXTENT)
T0IS00000000046700005	TWEEFONTEIN,467	5
T0IS00000000046700006	TWEEFONTEIN,467	6
T0IS00000000046700007	TWEEFONTEIN,467	7 (REMAINING EXTENT)
T0IS00000000046700008	TWEEFONTEIN,467	8
T0IS00000000046700010	TWEEFONTEIN,467	10
T0IS00000000046900005	KLIPKRAAL,469	5 (REMAINING EXTENT)
T0IS00000000046900006	KLIPKRAAL,469	6
T0IS00000000046900007	KLIPKRAAL,469	7
T0IS00000000046900008	KLIPKRAAL,469	8
T0IS00000000047000085	DORPSPLAATS,470	85
T0IS00000000054800000	DURABEL,548	0

Annexure 3: Coordinates

WIND FARM

	Latitude	Longitude
Site Coordinates (centre of project site)	26°36'25.92" S	29°36'26.38" E

Corner coordinates of project site	Latitude	Longitude
	26°30'1" S	29°37'30" E
	26°30'20" S	29°38'34" E
	26°30'56"S	29°38'32" E
	26°30'58"S	29°38'21" E
	26°31'22" S	29°38'15" E
	26°31'31" S	29°38'56" E
	26°32'2" S	29°39'8" E
	26°31'57" S	29°38'30" E
	26°33'14" S	29°38'21" E
	26°33'9" S	29°36'31" E
	26°33'49" S	29°36'27" E
	26°33'39" S	29°37'16" E
	26°34'1" S	29°37'16" E
	26°34'12" S	29°37'38" E
	26°34'24" S	29°38'3" E
	26°34'7" S	29°38'15" E
	26°34'7" S	29°38'31" E
	26°34'51" S	29°38'29" E
	26°35'19" S	29°39'41" E
	26°35'57" S	29°39'41" E
	26°35'59" S	29°38'58" E
	26°35'31" S	29°38'32" E
	26°36'25" S	29°38'28" E
	26°36'30" S	29°37'12" E
	26°37'4" S	29°37'22" E
	26°37'18" S	29°37'39" E
	26°37'18" S	29°38'29" E
	26°37'39" S	29°38'23" E
	26°38'28" S	29°40'46" E
	26°37'42" S	29°40'59" E
	26°37'47" S	29°41'27" E
	26°38'3" S	29°41'21" E
	26°38'8" S	29°41'41" E
	26°38'38" S	29°41'9" E
	26°39'1" S	29°42'16" E
	26°38'50" S	29°40'54" E
	26°42'0" S	29°41'15" E
	26°41'56" S	29°42'0" E
	26°42'40" S	29°41'54" E

	26°42'51" S	29°41'1" E
	26°45'44" S	29°41'9" E
	26°45'57" S	29°40'32" E
	26°44'32" S	29°40'1" E
	26°44'41" S	29°38'38" E
	26°44'15" S	29°38'40" E
	26°44'8" S	29°37'31" E
	26°43'0" S	29°37'35" E
	26°43'0" S	29°36'34" E
	26°42'18" S	29°36'40" E
	26°42'12" S	29°36'17" E
	26°41'30" S	29°36'17" E
	26°41'16" S	29°35'14" E
	26°41'22" S	29°35'0" E
	26°41'23" S	29°34'25" E
	26°40'31" S	29°34'39"E
	26°40'52" S	29°35'26" E
	26°39'47" S	29°35'28" E
	26°39'27" S	29°34'21" E
	26°38'26" S	29°34'43" E
	26°38'28" S	29°35'18" E
	26°37'58" S	29°35'14" E
	26°37'54" S	29°34'39" E
	26°38'14" S	29°34'17" E
	26°38'24" S	29°33'56" E
	26°38'8" S	29°33'50" E
	26°38'14" S	29°33'30" E
	26°37'11" S	29°32'25" E
	26°35'15" S	29°31'40" E
	26°35'4" S	29°31'54" E
	26°35'9" S	29°31'5" E
	26°34'50" S	29°31'5" E
	26°34'50" S	29°30'30" E
	26°34'26" S	29°30'26" E
	26°34'33" S	29°31'3" E
	26°34'47" S	29°31'50" E
	26°33'26" S	29°31'38" E
	26°33'24" S	29°32'21" E
	26°33'10" S	29°32'39" E
	26°32'32" S	29°32'39" E
	26°32'25" S	29°32'14" E
	26°32'32" S	29°31'50" E
	26°32'0" S	29°31'40" E
	26°31'53" S	29°31'9" E
	26°31'27" S	29°31'9" E
	26°31'28" S	29°31'33" E
	26°31'4" S	29°31'21" E
	26°30'46" S	29°31'5" E
	26°30'32" S	29°31'23" E
	26°30'17" S	29°31'23" E

VS

	26°30'22" S	29°32'14" E
	26°28'33" S	29°32'41" E
	26°28'30" S	29°33'5" E
	26°29'0" S	29°33'3" E
	26°29'3" S	29°33'29" E
	26°28'26" S	29°33'28" E
	26°28'21" S	29°33'58" E
	26°28'56" S	29°34'2" E
	26°28'55" S	29°35'17" E
	26°28'12" S	29°35'1" E
	26°27'47" S	29°37'34" E
	26°28'53" S	29°37'45" E
	26°30'1" S	29°37'30" E

GRID CONNECTION INFRASTRUCTURE

Site Coordinates (centre of project site)	26°37'3.04"S; 29°36'9.18"E		
Co-ordinates of the MTS	26°38'38.66"S, 29°35'21.91"E		
Co-ordinates of the collector Stations	26°37'6.51"S, 29°35'48.70"E 26°31'24.23"S, 29°35'11.06"E 26°43'46.50"S, 29°40'49.03"E		
Co-ordinates of onsite switching stations	**Switching Station**	**Latitude**	**Longitude**
	WEF 1	26°30'37.40"S	29°35'16.67"E
	WEF 2	26°35'19.49"S	29°37'37.71"E
	WEF 3	26°36'54.24"S	29°36'16.13"E
Start and End coordinates of project site	**Start Point**		
	Latitude	**Longitude**	
	26°30'39.96"S	29°35'16.01"E	
	End Point		
	Latitude	**Longitude**	
	26°43'41.59"S	29°40'39.88"E	

VS

forestry, fisheries
& the environment
Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Private Bag X447 PRETORIA 0001 Environment House · 473 Steve Biko Road, Arcadia· PRETORIA
Tel(+ 27 12) 399 9000
Enquiries: Devinagie Bendeman Telephone: 012 399 9337 E-mail: vbendeman@dffe.gov.za

Mr. Vusi Skosana
Director: IEA: National Integrated Authorisations

Dear Mr. Skosana

APPOINTMENT AS ACTING CHIEF DIRECTOR: INTEGRATED ENVIRONMENTAL AUTHORISATIONS FOR THE PERIOD 19 DECEMBER 2022 – 31 JANUARY 2023

I hereby inform you that I have decided to appoint you as Acting Chief Director: Integrated Environmental Authorizations, for the period of 19 December 2022 - 31 January 2023 whilst Mr Sabelo Malaza is fulfilling his temporary reassignment function at the Forestry Branch.

All the correspondence and other documents that are usually signed by the Chief Director: Integrated Environmental Authorizations must be signed under Acting Chief Director: Integrated Environmental Authorisations during the above-mentioned period.

Your appointment in the above acting position remains subject to the provisions of the Public Service Act, 1994 (Proclamation No. 103 of 1994), as amended, the Government Employees Pension Fund Act, 1996 (Proclamation No. 21 of 1996), the regulations promulgated under these Acts and relevant circulars.

In the execution of your duties and the exercising of the powers delegated to you, you will furthermore be subjected to the provisions of the Public Finance Management Act, compliance with the Promotion of Access to Information Act, Promotion of Administrative Justice Act, the Minimum Information Security Standard, Departmental Policies and other applicable legislations with the Republic of South Africa. You are therefore advised to make yourself familiar with the provisions of these legislations and policies and the amendments thereof. (Copies of Departmental policies can be obtained from the Human Resource Office).

Please accept my heartfelt gratitude for all your assistance on behalf of the department.

Yours sincerely

Ms Devinagie Bendeman
Deputy Director-General: RCSM (Regulatory Compliance and Sector Monitoring)
Date: 1 December 2022

ACKNOWLEDGEMENT
I ACCEPT / ~~DO NOT ACCEPT~~ appointment as Acting Chief Director: Integrated Environmental Authorisations
Signed:
Date: 05 December 2022

forestry, fisheries
& the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Private Bag X 447· PRETORIA 0001· Environment House 473 Steve Biko Road, Arcadia· PRETORIA

DFFE Reference: 14/12/16/3/3/2/2160/AM1
Enquiries: Ms Nyiko Nkosi
Telephone: (012) 399 9392 **E-mail:** nnkosi@dffe.gov.za

Mr Peter Carl Venn
Ummbila Emoyeni (Pty) Ltd
PO BOX 639
Northlands
JOHANNESBURG
2196

Telephone Number: 083 689 3063
Email Address: Peter.venn@seritigreen.com

PER EMAIL / MAIL

Dear Mr Venn

AMENDMENT OF THE ENVIRONMENTAL AUTHORISATION ISSUED ON 26 JANUARY 2023 FOR THE DEVELOPMENT OF UMMBILA EMOYENI WIND ENERGY FACILITY, MPUMALANGA PROVINCE

The Environmental Authorisation (EA) issued for the abovementioned application by this Department on 26 January 2023, your application for amendment of the EA received by the Department on 19 April 2023 and the acknowledgement letter dated 24 April 2023 refer.

Based on a review of the reason for requesting an amendment to the above EA, this Department, in terms of Chapter 5 of the Environmental Impact Assessment Regulations, 2014 as amended, has decided to amend the EA dated 26 January 2023 as follows:

Amendment 1: Amendment f the Applicant details of the EA

From:

Emoyeni Renewable Energy Farm (Pty) Ltd

With following postal address:

POSTNET Suite 216
Private Bag X26
Tokai
CAPE TOWN
6001

To:

Ummbila Emoyeni (Pty) Ltd

With following postal address:

PO BOX 639
Northlands
JOHANNESBURG
2196

Reason for amendment:
The current holder, Emoyeni Renewable Energy Farm (Pty) Ltd wishes to transfer the EA to Ummbila Emoyeni (Pty) Ltd, a Special Purpose Vehicle (SPV) constituted for the project. Ummbila Emoyeni (Pty) Ltd accepts full responsibility for the EA. This SPV is fully owned by Seriti Green Developments, who also own Emoyeni Renewable Energy Farm (Pty) Ltd.

Amendment 2: Amendment of conditions 12 and 13 on page 11 of the EA

From:

12. *A copy of the final site layout map must be made available for comments by registered Interested and Affected Parties and the holder of this environmental authorisation must consider such comments. Once amended, the final development layout map must be submitted to the Department for written approval prior to commencement of the activity. All available biodiversity information must be used in the finalisation of the layout map. Existing infrastructure must be used as far as possible e.g., roads. The layout map must indicate the following:*
    12.1 The position of wind turbines and associated infrastructure;
    12.2 Internal roads indicating width;
    12.3 Wetlands, drainage lines, rivers, stream and water crossing of roads and cables;
    12.4 All sensitive features e.g., Important Bird Areas, Critical Biodiversity Areas, Ecological Support Areas, heritage sites, wetlands, pans and drainage channels that will be affected by the facility and associated infrastructure;
    12.5 The BESS, substation(s) inverters and/or transformer(s) sites including their entire footprint;
    12.6 Connection routes (including pylon positions) to the distribution/transmission network;
    12.7 All existing infrastructure on the site, such as roads;
    12.8 Soil heaps (temporary for topsoil and subsoil and permanently for excess material);
    12.9 Buildings, including accommodation; and,
    12.10 All "no-go" and buffer areas.

13 *The Environmental Management Programme (EMPr) for the facility submitted as part of the EIAr is not approved and must be amended to include measures as dictated by the final site lay-out map and micro-siting, and the provisions of this environmental authorisation. The EMPr must be made available for comments by registered Interested and Affected Parties and the holder of this environmental authorisation must consider such comments. Once amended, the final EMPr must be submitted to the Department for written approval prior to commencement of the activity. Once approved the EMPr must be implemented and adhered to."*

MS

To:

12. ***The project will be developed in phases.*** *A copy of the final site layout map,* ***per phase,*** *must be made available for comments by registered Interested and Affected Parties,* ***as applicable per phase,*** *and the holder of this environmental authorisation must consider such comments. Once amended, the final development layout map* ***per phase*** *must be submitted to the Department for written approval prior to commencement of the activity. All available biodiversity information* ***applicable for the relevant phase*** *must be used in the finalisation of the layout map. Existing infrastructure must be used as far as possible e.g., roads. The layout map must indicate the following:*
    12.1. *The position of wind turbines and associated infrastructure;*
    12.2. *Internal roads indicating width;*
    12.3. *Wetlands, drainage lines, rivers, stream and water crossing of roads and cables;*
    12.4. *All sensitive features e.g., Important Bird Areas, Critical Biodiversity Areas, Ecological Support Areas, heritage sites, wetlands, pans and drainage channels that will be affected by the facility and associated infrastructure;*
    12.5. *The BESS, substation(s) inverters and/or transformer(s) sites including their entire footprint;*
    12.6. *Connection routes (including pylon positions) to the distribution/transmission network;*
    12.7. *All existing infrastructure on the site, such as roads;*
    12.8. *Soil heaps (temporary for topsoil and subsoil and permanently for excess material);*
    12.9. *Buildings, including accommodation; and*
    12.10. *All "no-go" and buffer areas.*

13 *The Environmental Management Programme (EMPr) for the facility submitted as part of the EIAr is not approved and must be amended to include measures as dictated by the final site lay-out map and micro-siting,* ***per phase,*** *and the provisions of this environmental authorisation. The EMPr must be made available for comments by registered Interested and Affected Parties,* ***as applicable per phase,*** *and the holder of this environmental authorisation must consider such comments. Once amended, the final EMPr must be submitted to the Department for written approval prior to commencement of the activity. Once approved the EMPr must be implemented and adhered to.*

Amendment 3: Inclusion of a Condition to the EA:

The following condition is herewith added into the EA:

13A. The layout plan and EMPr to be submitted per applicable phase must include the linkage and details of the previous phase (if applicable) as well as indicating the remaining extent/phases yet to be submitted for approval.

Reason for amendment:
The motivation for applying for the full development remains unchanged, i.e., it is the intention of the applicant to develop the WEF in commercially viable phases which can either feed into the national grid via the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) or provide power to third-party off-takers (wheeling). In this instance, an off-taker will not procure 900MW in once instance, it is likely that buyers of the power will seek to purchase between 100MW and 150MW of renewable energy.

Both conditions 12 and 13 of the EA do not provide for the implementation of the project in phases. Emoyeni Renewable Energy Farm (Pty) Ltd is therefore requesting a change in the wording of these conditions to clearly indicate that the finalisation of the layout and the EMPr will be completed within phases, as stated in the Final EIA report. This amendment will not change the scope of the assessment or the EA as the total capacity of the facility and the extent of authorised infrastructure will not be exceeded. It will only allow the project to be constructed in an appropriate and responsible manner.

This proposed amendment letter must be read in conjunction with the EA dated 26 January 2023.

In terms of the Promotion of Administrative Justice Act, 2000 (Act No 3 of 2000), you are entitled to the right to fair, lawful and reasonable administrative action; and to written reasons for administrative action that affects you negatively. Further your attention is drawn to the provisions of the Protection of Personal Information Act, 2013 (Act no. 4 of 2013) which stipulate that the Department should conduct itself in a responsible manner when collecting, processing, storing and sharing an individual or another entity's personal information by holding the Department accountable should the Department abuse or compromise your personal information in any way.

In terms of Regulation 4(2) of the Environmental Impact Assessment Regulations, 2014, as amended (the EIA Regulations), you are instructed to notify all registered interested and affected parties, in writing and within 14 (fourteen) days of the date of the EA, of the Department's as well as the provisions regarding the submission of appeals that are contained in the Regulations.

Your attention is drawn to Chapter 2 of National Environmental Management Act, 1998 (Act No. 107 of 1998) National Appeal Regulations published under Government Notice R993 in Government Gazette No. 38303 dated 08 December 2014 (National Appeal Regulations, 2014), which prescribes the appeal procedure to be followed. Kindly include a copy of this document (National Appeal Regulations, 2014) with the letter of notification to interested and affected parties in this matter.

Should any person wish to lodge an appeal against this decision, he/she must submit the appeal to the appeal administrator, and a copy of the appeal to the applicant, any registered interested and affected party, and any organ of state with interest in the matter within 20 days from the date that the notification of the decision was sent to the registered interested and affected parties by the applicant; or the date that the notification of the decision was sent to the applicant by the Department, whichever is applicable.

Appeals must be submitted in writing in the prescribed form to:

The Director: Appeals and Legal Review of this Department at the below mentioned addresses.

By email: appeals@dffe.gov.za

By hand: Environment House
473 Steve Biko,
Arcadia,
Pretoria,
0083

or

By post: Private Bag X447,
Pretoria,
0001

Please note that in terms of Section 43(7) of the National Environmental Management Act, Act No. 107 of 1998, as amended, the lodging of an appeal will suspend the environmental authorisation, or any provision or condition attached thereto. In the instance where an appeal is lodged, you may not commence with the activity until such time that the appeal is finalised.

M.S

To obtain the prescribed appeal form and for guidance on the submission of appeals, please visit the Department's website at https://www.environment.gov.za/documents/forms#legal_authorisations or request a copy of the documents at appeals@dffe.gov.za

Yours faithfully

Mr Sabelo Malaza
Chief Director: Integrated Environmental Authorisations
Department of Forestry, Fisheries and the Environment
Date: 15/05/2023

cc:	Ms Jo-Anne Thomas	Savannah Environmental (Pty) Ltd	E-mail: joanne@savannahsa.com