
PHASE 1 AMAKHALA EMOYENI WIND ENERGY FACILITY & ASSOCIATED INFRASTRUCTURE, EASTERN CAPE PROVINCE

CONSTRUCTION & OPERATION ENVIRONMENTAL MANAGEMENT PLAN (EMP) FOR PHASE 1 OF THE AMAKHALA EMOYENI WIND ENERGY FACILITY

Revision 2

Revised in terms of the Conditions of the Environmental Authorisation

April 2014

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PROJECT DETAILS

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Environmental Management Plan: Phase 1 of Proposed
Amakhala Emoyeni Wind Energy Facility & Associated
Infrastructure, Eastern Cape

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DEFINITIONS AND TERMINOLOGY

Archaeology: Remains resulting from human activities which are in state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.

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

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

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

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

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

Commercial Operation date: The date after which all testing and commissioning has been completed and is the initiation date to which the seller can start producing electricity for sale (i.e. when the project has been substantially completed).

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.

Commissioning: Commissioning commences once construction is completed. Commissioning covers all activities including testing after all components of the wind turbine are installed.

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. 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 of time 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.

Emergency: An undesired event that does result in a significant environmental impact and requires the notification of the relevant statutory body, such as a local authority

Endangered species: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals

have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

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

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

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

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

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

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

Generator: The generator is what converts the turning motion of a wind turbine's 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 (Van der Linde and Feris, 2010; pg 185).

Heritage: That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act of 2000).

Incident: An undesired event which may result in a significant environmental impact but can be managed through internal response

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

Indigenous species: A species that occurs, or has historically occurred, naturally in a free state in nature within the borders of the Republic, but excludes a species that has been introduced in the Republic as a result of human activity.

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

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

Invasive species: Any species whose establishment and spread outside of its natural distribution range.

Method statement: a written submission to the ECO and the site manager (or engineer) by the EPC Contractor in collaboration with his/her EO.

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

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

No-go areas: Areas of environmental sensitivity that should not be impacted on or utilised during the development of a project as identified in any environmental reports.

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).

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

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

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

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 rotor, is constructed from tubular steel. It is approximately 90 m 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 wind turbine and to sustain vibration, wind loading and the overall weather elements for the lifetime of the wind turbine.

Waste: Any substance, whether or not that substance can be reduced re-used, recycled and recovered; that is surplus, unwanted, rejected, discarded, abandoned or disposed of which the generator has no further use for the purposes of production. Any product which must be treated and disposed of, that is identified as waste by the minister of Environmental affairs (by notice in the Gazette) and includes waste generated by the mining, medical or other sectors, but: A by-product is not considered waste, and portion of waste, once re-used, recycled and recovered, ceases to be waste (Van der Linde and Feris, 2010; pg 186).

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

<u>DEA</u>	<u>National Department of Environmental Affairs</u>
<u>DMR</u>	<u>Department of Mineral Resources</u>
<u>DOT</u>	<u>Department of Transport</u>
<u>DWA</u>	<u>Department of Water Affairs</u>
<u>ECO</u>	<u>Environmental Control Officer</u>
<u>ECPHRA</u>	<u>Eastern Cape provincial Heritage Resources Agency</u>
<u>EIA</u>	<u>Environmental Impact Assessment</u>
<u>EMP</u>	<u>Environmental Management Plan</u>
<u>EO</u>	<u>Environmental officer</u>
<u>km²</u>	<u>Square kilometres</u>
<u>m²</u>	<u>Square meters</u>
<u>MW</u>	<u>Mega Watt</u>
<u>NEMA</u>	<u>National Environmental Management Act (Act No 107 of 1998)</u>
<u>NHRA</u>	<u>National Heritage Resources Act (Act No 25 of 1999)</u>
<u>NGOs</u>	<u>Non-Governmental Organisations</u>
<u>NWA</u>	<u>National Water Act (Act No 36 of 1998)</u>
<u>SAHRA</u>	<u>South African Heritage Resources Agency</u>

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INTRODUCTION

CHAPTER 1

This Environmental Management Plan has been compiled for the Amakhala Emoyeni Wind Energy Facility being planned by Amakhala Emoyeni RE Project 1 RF (Pty) Ltd. The facility is proposed to comprise up to 56 wind turbines with a generating capacity of up to 134.4MW. This project received authorisation in September 2011. An amended Authorisation for the four phases of the project was issued on 28 August 2012 (refer to Appendix A). This EMP is for the Amakhala Emoyeni Phase 1 Wind Energy Facility.

Following a competitive bidding process under the Independent Power Producer (IPP) Procurement Programme being conducted by the Department of Energy, the Amakhala Emoyeni Wind Energy Facility was awarded preferred bidder status in May 2012. Construction is due to commence in June 2014.

This Environmental Management Plan (EMP) is an update of the draft EMP for Phase 1 of the wind energy facility submitted with the Environmental Impact Assessment (EIA) for the project (in accordance with the requirement of Condition 3.1 of the Environmental Authorisation), and includes the conditions of the Environmental Authorisation of September 2011 and the amended Authorisation of August 2012.

This EMP is applicable to all the employees and contractors of Amakhala Emoyeni RE Project 1 RF (Pty) Ltd working on the pre-construction, construction, and operation and maintenance phases of the facility. The document will be adhered to, updated as relevant throughout the project life cycle. Any changes to the EMP, which are environmentally defensible, shall be submitted to the Department of Environmental Affairs (DEA) for acceptance before such changes are effected.

PROJECT DETAILS

CHAPTER 2

Amakhala Emoyeni RE Project 1 RF (Pty) Ltd is proposing to establish the Amakhala Emoyeni Phase 1 Wind Energy Facility and associated infrastructure on a site between Cookhouse and Bedford in the Eastern Cape Province. The facility development footprint is authorised for the farms:

- » Remainder of Portion 1 of Farm Kleine Knoffel Fonteyn 187
- » Portion 5 of Farm Great Knoffel Fonteyn 149
- » Farm 242
- » Farm 260
- » Farm 259
- » Farm Kop Leegte 205
- » Portion 1 of Farm 222
- » Remainder of Farm 222
- » Farm Stompstaart Fontein 168

The proposed wind energy facility will be known as the **Amakhala Emoyeni Phase 1 Wind Energy Facility**. Wind turbines with a capacity of up to **134.4 MW**, collectively referred to as a **wind energy facility**, are planned to be constructed over an area of approximately 130km² in extent.

Infrastructure associated with the facility will include:

- » **56 wind turbines** (with a hub height of up to 100 m).
- » **Foundations** (of up to 25 x 25 x 2 m) to support the turbine towers
- » **Underground cables** (where practical) between the turbines.
- » **One substation** occupying an area of 250m x 250m to facilitate the connection between the wind energy facility and the Poseidon Substation.
- » Internal **access roads** to each turbine (4 - 8 m wide).
- » **New overhead power line** feeding into the Poseidon substation.
- » On-site **maintenance facility, visitor centre and laydown areas**.
- » **Crane pads and hard standings**.

2.1. Findings of the EIA

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

- » Disturbance of ecological environment (flora fauna, and habitats (including wetlands and watercourses))

- » Impacts on avifauna (birds)
- » Disturbance to sense of place, visual aesthetics
- » Noise pollution
- » Soil disturbance and erosion
- » Impacts on heritage and fossil resources
- » Social impacts

No absolute no go areas have been identified to be associated with the proposed wind energy facility. Potentially sensitive areas in the project area identified through the EIA include:

- » Areas of high ecological sensitivity
- » Heritage sites
- » Potentially sensitive noise receptors

These areas of sensitivity are indicated on the project sensitivity map included within Figure 2.1. Figure 2.1 indicates an area of high ecological sensitivity. However, this area is not considered an exclusion area. The reasons for this are that the footprint occupied by the infrastructure is limited, thereby limiting the impact. Should mitigation measures be adhered to, impacts can be adequately managed. The primary reason for the high significance score is the fact that the impact will definitely occur. If the mitigation measures proposed in the ecological EIA study are implemented, impacts in these areas will be reduced to an acceptable medium significance.

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

2.2. Final Layout

The final layout overlaid on the sensitivity map (Wetlands, drainage lines, rivers, stream and water crossing of roads, no-go areas, and the location of heritage sites), as per Condition 6.4 of the Environmental Authorisation, is displayed in Figures 2.1. This layout includes:

- » 56 Turbine positions and associated infrastructure (including hardstand areas and crane pads) considered as a single area of disturbance - indicated by a yellow dot on the layout plan
- » Access roads including vehicle turning circles– indicated as on the layout plan
- » Substation and/or transformer site - indicated by a green square on the layout plan
- » Power line route to connect the facility substation to Poseidon Substation - indicated as a grey power line on the layout plan

- » Cable routes (these follow the access roads, and also include those which are not along internal roads) – indicated as purple dashed line on the layout plan.
- » Maintenance and site office – indicated as a grey diamond on the layout plan.

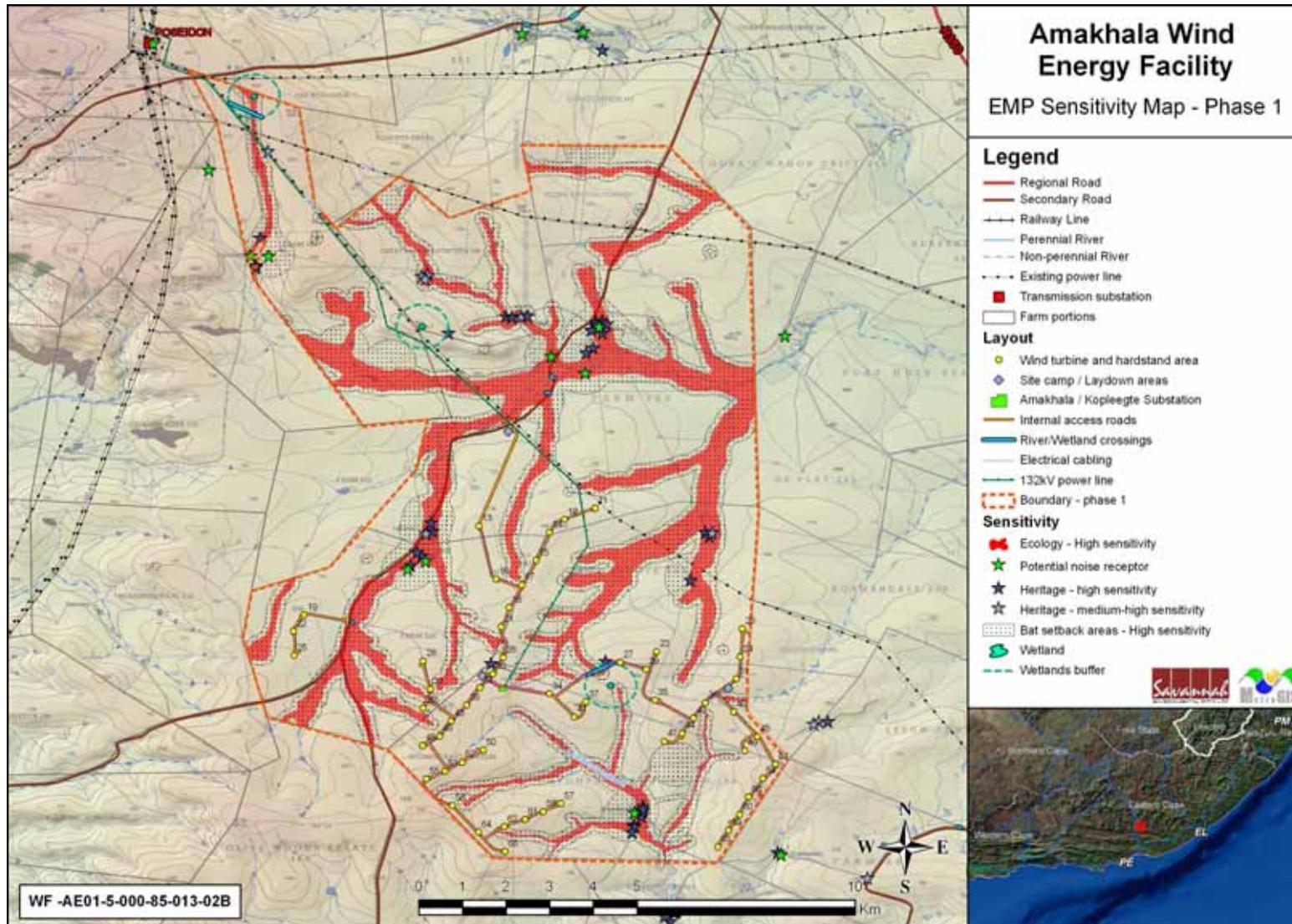


Figure 2.1: Final layout with the areas of potential sensitivity identified through the EIA process for Phase 1 (to be changed)

2.3. Activities and Components associated with the Wind Energy Facility

The main activities/components associated with Phase 1 of the Amakhala Emoyeni Wind Energy Facility are detailed in Table 2.1.

Table 2.1: Activities Associated with Planning, Construction, Operation and Decommissioning

Main Activity/Project Component	Components of Activity	Details
Planning		
Conduct technical surveys	Geotechnical survey by geotechnical engineer: » Site survey and confirmation of the turbine micro-siting footprint » Survey of substation sites	» All surveys are to be undertaken prior to initiating construction.
Construction		
Establishment of access roads to the site	» Upgrade access/haul roads to the site, as required (this only refers to the main access roads leading directly to site itself). <u>Amakhala Emoyeni RE Project 1 RF (Pty) Ltd</u> would not be responsible for upgrading / maintaining any national or regional roads. » Establish internal access roads: 4- 8 m wide permanent roadway within the site between the turbines for use during construction and operation phase. » Temporary track (adjacent to and utilising part of the permanent road) for use by the crane during construction phase only.	» Access roads will be constructed/upgraded in advance of any components being delivered to site, and will remain in place after completion for future access and possibly access for replacement of parts if necessary. » Existing access roads to the site will be utilised, and upgraded where required. Special haul roads may need to be constructed to and within the site to accommodate abnormally loaded vehicle access and circulation. » The internal service road alignment is informed by the final micro-siting/positioning of the wind turbines (as well as specialist surveys).
Undertake site preparation	» Site establishment of offices / workshop with ablutions and stores, contractors yards and batching plant. » Establishment of internal access roads (permanent and temporary roads)	» These activities will require the stripping of topsoil, which will need to be appropriately stockpiled for use in rehabilitation.

Main Activity/Project Component	Components of Activity	Details
	<ul style="list-style-type: none"> » Clearance of vegetation at the footprint of each turbine » Excavations for foundations 	
Establishment of lay down areas on site	<ul style="list-style-type: none"> » Lay down areas (temporary footprint 60m x 60m) at each turbine position for the storage of wind turbine components and accommodation of construction and crane lifting equipment. » Temporary lay down area for crane assembly. 	<ul style="list-style-type: none"> » Each turbine needs a flat and hardened lay down area of up to 60 m x 60 m during the construction process. » This area can be rehabilitated after construction. » The lay down area will need to accommodate the cranes required in tower/turbine assembly. A large lay down area will be required at each position where the main lifting crawler crane may be required to be erected and/or disassembled. This area would be required to be compacted and levelled to accommodate the assembly crane, which would need to access the crawler crane from all sides. » Lay down and storage areas will be required to be established for the normal civil engineering construction equipment which will be required on site. » Such areas to make use of already compacted areas as far as possible, such as roadways or other laydown areas.
Construct wind turbine foundations	<ul style="list-style-type: none"> » Concrete foundations of approximately of up to 25 x 25m x 2m depth at each turbine location (final dimensions to be defined by geotechnical survey of the site) 	<ul style="list-style-type: none"> » Foundation holes will be mechanically excavated (blasting may be needed). » Any blasting activity must be conducted in the manner suggested by the applicable legislation. » Shoring and safety barriers will be erected. » Aggregate and cement to be transported from the closest centre to the development, with the establishment of a small concrete batching plant.
Transport of components and equipment to site	<ul style="list-style-type: none"> » Flatbed trucks will be used to transport all components to site: <ul style="list-style-type: none"> * Turbine units consist of a tower comprised of 4 segments, a nacelle, and three rotor blades 	<ul style="list-style-type: none"> » The Port of Coega has been identified as the as most suitable port for ease of access and storage facilities for wind turbine components. The route identified as most favourable is as follows: <ul style="list-style-type: none"> o Coega to N2 National Road o N2 to Cookhouse Via N10

Main Activity/Project Component	Components of Activity	Details
	<p>(each of up to 50 m in length).</p> <ul style="list-style-type: none"> * Components of various specialised construction, lifting equipment and counter weights etc. are required on site (e.g. mobile assembly crane and main lift crawler crane) to erect the wind turbines. * The normal civil engineering construction equipment for the civil works (e.g. excavators, trucks, graders, compaction equipment, cement mixers, gravel delivery, etc.). * The components required for the establishment of the substations (including transformers) * Ready-mix cement trucks for turbine, substation and visitors centre foundations 	<ul style="list-style-type: none"> o Cookhouse to Bedford (Via R63) o Bedford to site o Use existing roads where possible » Turbine units consist of a tower comprised of 4 segments, a nacelle, and three rotor blades. Components of various specialised construction, lifting equipment and counter weights etc. are required on site (e.g. 200 ton mobile assembly crane and a 750 ton main lift crawler crane) to erect the wind turbines. Other components include components required for the establishment of the substations (including transformers) » The wind turbine, including tower, will be brought to site by the supplier in sections. The individual components are defined as abnormal loads in terms of the Road Traffic Act (Act No 29 of 1989) by virtue of the dimensional limitations (abnormal length of the blades) and load limitations (i.e. the nacelle). The dimensional requirements of the load during the construction phase (length/height) may require alterations to the existing road infrastructure (widening on corners, removal of traffic islands), accommodation of street furniture (electricity, street lighting, traffic signals, telephone lines etc.) and protection of road-related structures (bridges, culverts, portal culverts, retaining walls etc) as a result of abnormal loading. The equipment will be transported to the site using appropriate National and Provincial routes, and the dedicated access/haul road to the site itself.
Erect turbines	<ul style="list-style-type: none"> » Large lifting crane used for lifting of large, heavy components » A small crane for the assembly of the rotor. 	<ul style="list-style-type: none"> » The large lifting crane will lift the tower sections into place. » The nacelle, which contains the gearbox, generator and yawing mechanism, will then be placed onto the top of the assembled tower. » The rotor (i.e. the blades of the turbine) will then be assembled or partially assembled on the ground. It will then be lifted to the

Main Activity/Project Component	Components of Activity	Details
		<p>nacelle and bolted in place.</p> <ul style="list-style-type: none"> » It will take approximately 2 days to erect each turbine, although this will depend on the climatic conditions as a relatively wind-free day will be required for the installation of the rotor.
Construct substations and ancillary infrastructure.	<ul style="list-style-type: none"> » Substations » Other substation components » Security fencing around high-voltage (HV) Yard » Workshop 	<ul style="list-style-type: none"> » A temporary construction area is needed for containers, toilets and equipment. » Permanent operational buildings are as follows: <ul style="list-style-type: none"> * Operations and workshop: ~150m² » Will require the clearing of vegetation and levelling of the development site and the excavation of foundations prior to construction. » A lay down area for building materials and equipment associated with these buildings will also be required. » The on-site substations will be constructed with a high-voltage (HV) yard footprint of up to 250m x 200m. » The substations would be constructed in the following simplified sequence: <ul style="list-style-type: none"> * Step 1: Survey of the site * Step 2: Site clearing and levelling and construction of access road to substation site * Step 3: Construction of terrace and foundations * Step 4: Assembly, erection and installation of equipment (including transformers) * Step 5: Connection of conductors to equipment * Step 6: Rehabilitation of any disturbed areas and protection of erosion sensitive areas using indigenous vegetation and not exotics.
Connection of wind turbines to the on-site substations	<ul style="list-style-type: none"> » Wind Turbines » 33 kV underground (where practical) electrical cabling connecting each 	<ul style="list-style-type: none"> » The installation of these cables will require the excavation of trenches, approximately 1m in depth within which these cables can then be laid. The trenches will be backfilled with the original

Main Activity/Project Component	Components of Activity	Details
	turbine to the substations	excavated material. The underground cables would follow the internal access roads as far as reasonably possible.
Commissioning of Phase 1 of the facility	» Wind energy facility commissioning	<ul style="list-style-type: none"> » Commissioning begins once all components of the wind turbine are installed. » Prior to the start up of a wind turbine, a series of checks and tests will be carried out, including both static and dynamic tests to make sure the turbine is working within appropriate limits. Commissioning tests will usually involve standard electrical tests for the electrical infrastructure as well as the turbine, and inspection of routine civil engineering quality records. » Grid interconnection and unit synchronisation will be undertaken to confirm the turbine and unit performance. Physical adjustments may be needed such as changing the pitch of the blades.
Undertake site remediation	<ul style="list-style-type: none"> » Remove all construction equipment from the site » Rehabilitation of temporarily disturbed areas where practical and reasonable 	» On full commissioning of the facility (or a phase thereof), any access points to the site which are not required during the operation phase will be closed and prepared for rehabilitation.
Operation		
Operation	» Operation of turbines within the wind energy facility	<ul style="list-style-type: none"> » After commissioning, the wind energy facility will be handed over to the operations and maintenance crew. » Once operational, the wind energy facility will be monitored remotely. » Each turbine in the facility will be operational, except under circumstances of mechanical breakdown, extreme weather conditions or maintenance activities.
Maintenance	<ul style="list-style-type: none"> » Oil and grease – turbines » Transformer oil – substations » Waste product disposal 	» The wind turbines will be subject to periodic maintenance and inspection. Periodic oil changes will be required and any waste products (e.g. oil) will be disposed of in accordance with relevant waste management legislation.

Main Activity/Project Component	Components of Activity	Details
		» The turbine infrastructure is expected to have a lifespan of approximately 20-30 years, with maintenance.
<i>Decommissioning</i>		
Site preparation	<ul style="list-style-type: none"> » Confirming the integrity of the access to the site to accommodate required equipment and lifting cranes. » Preparation of the site (e.g. lay down areas, construction platform) » Mobilisation of construction equipment 	» Equipment associated with this facility 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 facility would comprise the disassembly and replacement of the turbines with more appropriate technology/infrastructure available at that time.
Disassemble and replace existing turbines	» A large crane will be used to disassemble the turbine and tower sections.	<ul style="list-style-type: none"> » Turbine components would be reused, recycled or disposed of in accordance with regulatory requirements. » The hours of operation for noisy construction activities are guided by the Environment Conservation Act (noise control regulations). If the project requires construction work outside of the designated hours, regulatory authorities and affected stakeholders will be consulted and subsequent negotiations will be made to ensure the suitability of the revised activities. » If any blasting is required the public in the area must be notified prior to the activity.

LEGISLATIVE REQUIREMENTS

CHAPTER 3

Table 3.1 provides an outline of the relevant environmental legislation and permitting requirements associated with the proposed project. This list of legislation is applicable at this time and should be updated on a continuous basis as the environmental legislation within South Africa changes.

Table 3.1: Relevant legislative permitting requirements applicable to the Wind Energy Facility Project

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
National Legislation			
<p>National Environmental Management Act (Act No 107 of 1998)</p>	<p>EIA Regulations have been promulgated in terms of Chapter 5. Activities which may not commence without an environmental authorisation are identified within these Regulations.</p> <p>In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed and reported on to the competent authority (the decision-maker) charged by NEMA with granting of the relevant environmental authorisation.</p> <p>In terms of GNR 387 of 21 April 2006, a scoping and EIA process is required to be undertaken for the proposed project</p>	<p>National Department of Environmental Affairs – lead authority.</p> <p>Provincial Environmental Department - commenting authority.</p>	<p>An Environmental authorisation has been issues for the project.</p>
<p>National Environmental Management Act (Act No 107 of 1998)</p>	<p>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, stopped or minimised.</p> <p>In terms of NEMA, it has become the legal duty of a project proponent to consider a</p>	<p>Department of Environmental Affairs (as regulator of NEMA).</p>	<p>While no permitting or licensing requirements arise directly by virtue of the proposed project, this section will find application during the EIA phase and will continue to apply throughout the life cycle of the project.</p>

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>project holistically, and to consider the cumulative effect of a variety of impacts.</p>		
<p>National Environmental Management: Waste Act (Act No 59) of 2008</p>	<p>The Act serves to regulate waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation.</p> <p>The Minister may by notice in the <i>Gazette</i> publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment.</p> <p>The Minister may amend the list by:</p> <ul style="list-style-type: none"> » Adding other waste management activities to the list; » Removing waste management activities from the list; or » Making other changes to the particulars on the list. 	<p>National Department of Environmental Affairs.</p>	<p>A waste licence could be required in the event that more than 100m³ of general waste or more than 80m³ of hazardous waste is to be stored on site at any one time. The volumes of waste generated during construction and operation of the facility are not expected to be large enough to require a waste license.</p>
<p>Environment Conservation Act (Act No 73 of 1989)</p>	<p>In terms of section 25 of the ECA, the national noise-control regulations (GN R154 in Government Gazette No. 13717 dated 10 January 1992) were promulgated. The NCRs were revised under Government Notice Number R. 55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations.</p> <p>Subsequently, in terms of Schedule 5 of the</p>	<p>National Department of Environmental Affairs Provincial Environmental Department - commenting authority. Local authorities Local Municipality</p>	<p>There is no requirement for a noise permit in terms of the legislation.</p> <p>There are noise level limits which must be adhered to, as detailed in SANS 10103. It provides the maximum average background ambient sound levels, $L_{Req,d}$ and $L_{Req,n}$, during the day and night respectively to which different types of</p>

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>Constitution of South Africa of 1996, legislative responsibility for administering the noise control regulations was devolved to provincial and local authorities. Provincial Noise Control Regulations exist in the Free State, Western Cape and Gauteng provinces, but the Eastern Cape province have not yet adopted provincial regulations in this regard.</p> <p>Allows the Minister of Environmental Affairs to make regulations regarding noise, among other concerns</p>		<p>developments may be exposed.</p>
National Water Act (Act No 36 of 1998)	<p>Water uses must be licensed unless such water use falls into one of the categories listed in S22 of the Act or falls under general authorisation in terms of S39 and GN 1191 of GG 20526 October 1999.</p>	Department of Water Affairs	<p>A water use license is required to be obtained for any activities as defined in terms of S21 of the NWA. It is, however, unlikely that a water use license will be required for this project.</p>
National Water Act (Act No 36 of 1998)	<p>In terms of Section 19, the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to prevent and remedy the effects of pollution to water resources from occurring, continuing or recurring.</p>	Department of Water Affairs (as regulator of NWA)	<p>While no permitting or licensing requirements arise directly by virtue of the proposed project, this section will find application during the EIA phase and will continue to apply throughout the life cycle of the project.</p>
Minerals and Petroleum Resources Development Act (Act No 28 of 2002)	<p>A mining permit or mining right may be required where a mineral in question is to be mined (e.g. materials from a borrow pit) in</p>	Department of Mineral Resources	<p>If borrow pits are required for the construction of the facility, a mining permit or right is required to be obtained.</p>

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>accordance with the provisions of the Act.</p> <p>Requirements for Environmental Management Programmes and Environmental Management Plans are set out in Section 39 of the Act.</p>		
<p>National Environmental Management: Air Quality Act (Act No 39 of 2004)</p>	<p>Sections 18, 19 and 20 of the Act allow certain areas to be declared and managed as "priority areas"</p> <p>Declaration of controlled emitters (Part 3 of Act) and controlled fuels (Part 4 of Act) with relevant emission standards.</p>	<p>National Department of Environmental Affairs – air quality</p> <p>Provincial Department of Environment</p> <p>Local Municipality</p>	<p>While no permitting or licensing requirements arise from this legislation, this Act will find application during the operational phase of the project.</p> <p>The Act provides that an air quality officer may require any person to submit an atmospheric impact report if there is reasonable suspicion that the person has failed to comply with the Act.</p>
<p>National Heritage Resources Act (Act No 25 of 1999)</p>	<p>Section 38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including</p> <ul style="list-style-type: none"> » the construction of a road, power line, pipeline, canal or other similar linear development or barrier exceeding 300 m in length; » any development or other activity which will change the character of a site exceeding 5 000 m² in extent. <p>The relevant Heritage Resources Authority must be notified of developments such as</p>	<p>South African Heritage Resources Agency (SAHRA) – National heritage sites (grade 1 sites) as well as all historic graves and human remains.</p> <p>Heritage Western Cape</p>	<p>A permit may be required should identified cultural/heritage sites on site be required to be disturbed or destroyed as a result of the proposed development.</p>

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>linear developments (such as roads), bridges exceeding 50 m, or any development or other activity which will change the character of a site exceeding 5 000 m²; or the re-zoning of a site exceeding 10 000 m² in extent. This notification must be provided in the early stages of initiating that development, and details regarding the location, nature and extent of the proposed development must be provided.</p> <p>Standalone HIAs are not required where an EIA is carried out as long as the EIA contains an adequate HIA component that fulfils the provisions of Section 38. In such cases only those components not addressed by the EIA should be covered by the heritage component.</p>		
<p>Nature and Environmental Conservation Ordinance (Act 19 of 1974)</p>	<p>Article 63 prohibits the picking of certain fauna (including cutting, chopping, taking, gathering, uprooting, damaging or destroying). Schedule 3 lists endangered flora and Schedule 4 lists protected flora.</p> <p>An article 26 to 47 regulates the use of wild animals.</p>	<p>National Department of Environmental Affairs Eastern Cape Department of Environment</p>	<p>Permits are required to impact on plants and animals listed as threatened or protected. The habitat on site is potentially suitable for a number of species that are protected according to this legislation and it is therefore possible that species on this list occur on site.</p>
<p>National Environmental Management: Biodiversity Act (Act No 10 of 2004)</p>	<p>In terms of S57, the Minister of Environmental Affairs has published a list of critically endangered, endangered, vulnerable, and protected species in GNR 151 in Government</p>	<p>Department of Environmental Affairs</p>	<p>As the applicant will not carry out any restricted activity, as is defined in S1 of the Act, no permit is required to be obtained in this regard.</p>

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>Gazette 29657 of 23 February 2007 and the regulations associated therewith in GNR 152 in GG29657 of 23 February 2007, which came into effect on 1 June 2007.</p> <p>In terms of GNR 152 of 23 February 2007: Regulations relating to listed threatened and protected species, the relevant specialists must be employed during the EIA Phase of the project to incorporate the legal provisions as well as the regulations associated with listed threatened and protected species (GNR 152) into specialist reports in order to identify permitting requirements at an early stage of the EIA Phase.</p> <p>The Act provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (National Environmental</p>		<p>No threatened plant species are likely to be impacted by the proposed development. However, should any species be impacted, the relevant permit/s should be obtained.</p>

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GoN 1002), 9 December 2011).		
Conservation of Agricultural Resources Act (Act No 43 of 1983)	<p>Regulation 15 of GNR1048 provides for the declaration of weeds and invader plants, and these are set out in Table 3 of GNR1048. Declared Weeds and Invaders in South Africa are categorised according to one of the following categories:</p> <ul style="list-style-type: none"> » Category 1 plants: are prohibited and must be controlled. » Category 2 plants: (commercially used plants) may be grown in demarcated areas providing that there is a permit and that steps are taken to prevent their spread. » Category 3 plants: (ornamentally used plants) may no longer be planted; existing plants may remain, as long as all reasonable steps are taken to prevent the spreading thereof, except within the floodline of watercourses and wetlands. <p>These regulations provide that Category 1, 2 and 3 plants must not occur on land and that such plants must be controlled by the methods set out in Regulation 15E.</p>	Department of Agriculture	<p>While no permitting or licensing requirements arise from this legislation, this Act will find application during the EIA phase and will continue to apply throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies must be developed and implemented. In addition, a weed control and management plan must be implemented.</p> <p>The permission of agricultural authorities will be required if the Project requires the draining of vleis, marshes or water sponges on land outside urban areas.</p>
National Veld and Forest	In terms of Section 21 the applicant would be	Department of Water Affairs and	While no permitting or licensing

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
Fire Act (Act 101 of 1998)	<p>obliged to burn firebreaks to ensure that should a veld fire occur on the property, that it does not spread to adjoining land.</p> <p>In terms of section 12 the applicant must ensure that the firebreak is wide and long enough to have a reasonable chance of preventing the fire from spreading, not causing erosion, and is reasonably free of inflammable material.</p> <p>In terms of section 17, the applicant must have such equipment, protective clothing and trained personnel for extinguishing fires.</p>	Forestry	<p>requirements arise from this legislation, this act will find application during the operational phase of the project. Due to the fire prone nature of the area, it must be ensured that the landowner and developer are part of the local Fire Protection Agency.</p>
National Forests Act (Act No 84 of 1998)	<p>Protected trees: According to this act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that ' no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister'.</p> <p>Forests: Prohibits the destruction of indigenous trees in any natural forest without a licence.</p>	Department of Agriculture, Forestry and Fisheries	<p>If any protected indigenous trees are found on site a permit or license is required for the destruction of protected tree species and/or indigenous tree species within a natural forest.</p>
Aviation Act (Act No 74 of 1962) 13 th amendment of	Any structure exceeding 45m above ground level or structures where the top of the	Civil Aviation Authority (CAA)	While no permitting or licence requirements arise from the

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
the Civil Aviation Regulations (CARS) 1997	<p>structure exceeds 150m above the mean ground level, the mean ground level considered to be the lowest point in a 3km radius around such structure.</p> <p>Structures lower than 45m, which are considered as a danger to aviation shall be marked as such when specified.</p> <p>Overhead wires, cables etc., crossing a river, valley or major roads shall be marked and in addition their supporting towers marked and lighted if an aeronautical study indicates it could constitute a hazard to aircraft.</p> <p>Section 14 of Obstacle limitations and marking outside aerodrome or heliport – CAR Part 139.01.33 relates specifically to appropriate marking of wind energy facilities.</p>		<p>legislation, this act will find application during the operational phase of the project. Appropriate marking is required to meet the specifications as detailed in the CAR Part 139.01.33.</p>
Hazardous Substances Act (Act No 15 of 1973)	<p>This Act regulates the control of substances that may cause injury, or ill health, or death by reason of their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation,</p>	Department of Health	<p>It is necessary to identify and list all the Group I, II, III and IV hazardous substances that may be on the site and in what operational context they are used, stored or handled. If applicable, a license is required to be obtained from the Department of Health.</p>

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>modification, disposal or dumping of such substances and products.</p> <ul style="list-style-type: none"> » Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared to be Group I or Group II hazardous substance; » Group IV: any electronic product; » Group V: any radioactive material. <p>The use, conveyance or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.</p>		
National Road Traffic Act (Act No 93 of 1996)	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" outline the rules and conditions which 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.	Provincial Department of Transport (provincial roads) South African National Roads Agency Limited (national roads)	An abnormal load/vehicle permit may be required to transport the various components to site for construction. These include: <ul style="list-style-type: none"> » Route clearances and permits will be required for vehicles carrying abnormally heavy or abnormally dimensioned loads. » Transport vehicles exceeding the dimensional limitations (length) of 22m.

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>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.</p> <p>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 National Road Traffic Act and the relevant Regulations.</p>		<p>» Depending on the trailer configuration and height when loaded, some of the power station components may not meet specified dimensional limitations (height and width).</p>
<p>Development Facilitation Act (Act No 67 of 1995)</p>	<p>Provides for the overall framework and administrative structures for planning throughout the Republic.</p> <p>Sections 2- 4 provide general principles for land development and conflict resolution.</p>	<p>Provincial Environmental Department - commenting authority. Local Municipality.</p>	<p>If necessary, the applicant must submit a land development application in the prescribed manner and form as provided for in the Act. A land development applicant who wishes to establish a land development area must comply with procedures set out in the DFA.</p>
<p>Subdivision of Agricultural Land Act (Act No 70 of 1970)</p>	<p>Details land subdivision requirements and procedures. Applies for subdivision of all agricultural land. Or for the registration of a lease for longer than 10 years over a portion of agricultural land.</p>	<p>Consent of Minister of Agriculture to subdivide, or register long lease or servitude, in respect of a portion of agricultural land.</p>	<p>Subdivision is not required for the Amakhala Emoyeni site as the long leases for the project are over entire properties (not portions).</p>

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
Fencing Act 31 of 1963	To consolidate the laws relating to fences and the fencing of farms and other holdings and matters incidental thereto. Procedures with regards to the fencing erected and new fencing.	Consent of Minister of Agriculture to subdivide, or register long lease or servitude, in respect of a portion of agricultural land.	Existing fences and new fences erected must follow the requirements of the Fencing legislation.
<i>Provincial Legislation/ Policies / Plans</i>			
Cape Land Use Planning Ordinance (No 15 of 1985)	Details land subdivision and rezoning requirements and procedures	Local authority, i.e. Blue Crane Route Local Municipality	Given that the wind energy development is proposed on land that is zoned for agricultural use, a rezoning application in terms of Section 17 of LUPO to an alternative appropriate zone will be required. Rezoning has been undertaken following the issuing of an environmental Authorisation for the proposed project.
<u>Nature Conservation Ordinance (Act No. 19 of 1974)</u>	<ul style="list-style-type: none"> » <u>Article 63 prohibits the picking of certain fauna (including cutting, chopping, taking, and gathering, uprooting, damaging, or destroying).</u> » <u>Schedule 3 lists endangered flora and Schedule 4 lists protected flora.</u> <p><u>Articles 26 to 47 regulate the use of wild animals.</u></p>	<u>Eastern Cape DEDEAT</u>	<u>Permitting or licensing requirements may arise from this legislation for the proposed activities to be undertaken for the proposed project.</u>

PURPOSE AND OBJECTIVES OF THIS EMP

CHAPTER 4

An Environmental Management Plan (EMP) is defined as “an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented or mitigated, and that the positive benefits of the projects are enhanced”¹. The objective of this EMP 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 EMP 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 EMP is concerned with both the immediate outcome as well as the long-term impacts of the project.

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

The EMP has been developed as a set of environmental specifications (i.e. principles of environmental management for the proposed Amakhala Emoyeni Phase 1 Wind Energy Facility), which are appropriately contextualised to provide clear guidance in terms of the on-site implementation of these specifications (i.e. on-site contextualisation is provided through the inclusion of various monitoring and implementation tools for assisted use of the EMP by the project implementer as well as compliance monitors). During its lifecycle, projects journey through four distinctive phases, i.e. planning and design, construction, operation and decommissioning. The EMP is accordingly separated into measures dealing with the various project phases.

The EMP has the following objectives:

- » To outline mitigation measures and environmental specifications which are required to be implemented for the planning, construction, rehabilitation and operation phases of the project in order to minimise the extent of environmental impacts, and to manage environmental impacts associated with the wind energy facility.

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

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

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

Amakhala Emoyeni RE Project 1 RF (Pty) Ltd must ensure that the implementation of the project complies with the requirements of any and all environmental authorisations and permits, and obligations emanating from other relevant environmental legislation. This obligation is partly met through the development and the implementation of the EMP through its integration into the contract documentation. Since this EMP is part of the EIA process undertaken for the proposed Amakhala Emoyeni Phase 1 Wind Energy Facility, it is important that this document be read in conjunction with the Scoping Report dated June 2010 and Split EIA Report dated May 2012, as well as the Environmental Authorisation issued on 28 August 2012. This will contextualise the EMP and enable a thorough understanding of its role and purpose in the integrated environmental management process. This EMP for construction and operation activities has been compiled in accordance with Section 34 of the EIA Regulations of 2006 and will be further developed in terms of specific requirements listed in any authorisations issued for the proposed project.

To achieve effective environmental management, it is important that Contractors are aware of the responsibilities in terms of the relevant environmental legislation (Chapter 3) and the contents of this EMP. The Contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The Contractor's obligations in this regard include the following:

- » Ensuring that employees have a basic understanding of the key environmental features of the construction site and the surrounding environment.
- » Ensuring that a copy of the EMP is readily available on-site, and that all site staff are aware of the location and have access to the document. Employees will be familiar with the requirements of the EMP and the environmental specifications as they apply to the construction of the facility.

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

STRUCTURE OF THIS EMP

CHAPTER 5

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

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

These chapters set out the procedures necessary for Amakhala Emoyeni RE Project 1 RF (Pty) Ltd to achieve environmental compliance. For each of the phases of implementation for the wind energy facility project, an over-arching environmental **goal** is stated. In order to meet this goal, a number of **objectives** are listed. The management programme has been structured in table format in order to show the links between the goals for each phase and their associated objectives, activities/risk sources, mitigation actions monitoring requirements and performance indicators. A specific environmental management programme table has been established for each environmental objective. The information provided within the EMP table for each objective is illustrated below:

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

Project component/s	List of project components affecting the objective, i.e.: <ul style="list-style-type: none"> » wind turbines » access roads » substations
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 EMP tables are required to be reviewed and possibly modified whenever changes, such as the following, occur:

- » Planned activities change (i.e. in terms of the components and/or layout of the facility).
- » Modification to or addition to environmental objectives and targets.
- » Relevant legal or other requirements are changed or introduced.
- » Significant progress has been made on achieving an objective or target such that it should be re-examined to determine if it is still relevant, should be modified, etc.

5.1. Project Team

This EMP was compiled by:

	Name	Company
EMP Compilers:	Karen Jodas	Savannah Environmental
	Jo-Anne Thomas	Savannah Environmental
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	Johan Binneman – heritage	Eastern Cape heritage Consultants
	Andrew Jenkins - ornithologist	Avisense Consulting
	Iain Paton - soils and erosion potential	Outeniqua Geotechnical Services cc
	Lourens du Plessis - visual	MetroGIS
	Morne de Jager – noise	MENCO
	Tony Barbour - social	Tony Barbour Consultants

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

**MANAGEMENT PLAN:
 PLANNING & DESIGN**

CHAPTER 6

6.1. Goal for Planning and Design

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

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

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

6.2. Objectives

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

From the specialist investigations undertaken for the proposed wind energy facility development site, no absolute 'no go' areas were identified. However, a number of potentially sensitive areas were identified to be associated with the proposed project. These areas are illustrated in Figure 2.1.

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

Mitigation: Action/control	Responsibility	Timeframe
<p>Undertake pre-construction surveys for the following:</p> <ul style="list-style-type: none"> » Ecology » Avifauna » Heritage <p>Inspection of all proposed road alignments, substation sites and turbine sites through site inspections to determine if any adjustments are necessary to mitigate impacts.</p>	<p>Specialists/ Amakhala Emoyeni RE Project 1 RF (Pty) Ltd</p>	<p>Design stage</p>
<p>Consider design level mitigation measures recommended by the specialists, especially with respect to visual aesthetics, noise, flora, ecology (Appendix B), avifauna, and heritage sites (Appendix C), as detailed within the EIA report and relevant appendices. These recommendations are to be supplemented by information collected during the pre-construction surveys.</p>	<p>Engineering Design Consultant / turbine supplier/ Amakhala Emoyeni RE Project 1 RF (Pty) Ltd</p>	<p>Tender Design & Design Review Stage</p>
<p>All hard infrastructure should be located within areas of low sensitivity, as far as possible.</p>	<p>Amakhala Emoyeni RE Project 1 RF (Pty) Ltd</p>	<p>Design phase</p>
<p>All turbines must be located at least 100m from the edge of any highly sensitivity areas as identified in the EIA (refer to Figure 2.1).</p>	<p>Amakhala Emoyeni RE Project 1 RF (Pty) Ltd</p>	<p>Design phase</p>
<p>Siting of turbines should adhere to the >500m setbacks from large water bodies, riparian vegetation and rocky crevices, if and where bat occurrence is found after monitoring.</p>	<p>Amakhala Emoyeni RE Project 1 RF (Pty) Ltd</p>	<p>Design phase</p>
<p>Access roads to be carefully planned to minimise the impacted area and prevent unnecessary over compaction and erosion of soil.</p>	<p>Amakhala Emoyeni RE Project 1 RF (Pty) Ltd</p>	<p>Design phase</p>
<p>All roads must be designed so that changes to surface water runoff are avoided and erosion is not initiated.</p>	<p>Amakhala Emoyeni RE Project 1 RF (Pty) Ltd</p>	<p>Design phase</p>
<p>Internal access roads must be located away from drainage/stream bottoms and avoid wetlands if possible, if access roads must be located on stream crossings, ensure the crossings are kept to a minimum, do not decrease channel stability, or increase water velocity.</p>	<p>Amakhala Emoyeni RE Project 1 RF (Pty) Ltd</p>	<p>Design phase</p>
<p>Existing drainage must not be altered if possible, especially in sensitive areas.</p>	<p>Amakhala Emoyeni RE Project 1 RF (Pty) Ltd/Contractor</p>	<p>Design phase</p>
<p>All construction must be done in a way as to ensure that surface and subsurface movement of water along drainage lines is possible and to ensure that drainage measures promote the dissipation of storm water</p>	<p>Amakhala Emoyeni RE Project 1 RF (Pty) Ltd/Contractor</p>	<p>Design phase</p>

Mitigation: Action/control	Responsibility	Timeframe
runoff in a manner suggested by the storm water management plan (refer to Appendix D).		
The noise emission specifications of wind turbine generators should be considered when selecting the equipment.	Amakhala Emoyeni RE Project 1 RF (Pty) Ltd	Design phase
Noise modelling should play a role in the design of the layout of the facility. An appropriate buffer zone should be developed around all potentially sensitive receptors (proposed to be 1000m), if turbines are within this buffer, noise modelling would need to be redone to determine if the impact is acceptable or not (refer to Appendix E).	Amakhala Emoyeni RE Project 1 RF (Pty) Ltd	Design phase
A monitoring programme should be implemented to document the effect of the wind turbines on birds and bats. This should take place before construction (to provide a benchmark), and continue during construction and during operation.	Amakhala Emoyeni RE Project 1 RF (Pty) Ltd in consultation with specialist	Pre-construction, Construction and Operation
A detailed geotechnical investigation is required for the design phase.	Amakhala Emoyeni RE Project 1 RF (Pty) Ltd	Design phase
Compile a comprehensive stormwater management plan for hard surfaces (e.g. substation footprints) as part of the final design of the project.	Amakhala Emoyeni RE Project 1 RF (Pty) Ltd/Contractor	Design phase
Identify construction areas and plan activities such that construction activity is restricted to these areas	Amakhala Emoyeni RE Project 1 RF (Pty) Ltd/Contractor	Pre-construction and Construction
Access roads to be carefully planned constructed and marked to minimise the impacted area and prevent unnecessary excavation, placement and compaction of soil. Roads should be laid out along the contour wherever possible, and should never traverse steep slopes at 90 degrees. Road drainage is essential. All drains diverting water off the road must be designed in such a way as to ensure erosion is not created.	Amakhala Emoyeni RE Project 1 RF (Pty) Ltd/Contractor	Design
Obtain a Water Use License (or General Authorisation, as applicable) from the DWA prior to the commencement of the project should the project impact on any wetland or water resource.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Pre-construction
Obtain all necessary biodiversity permits prior to the commencement of construction.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Pre-construction
To protect a large concentration of Middle Stone Age stone tools between turbine 42 and 49, the construction of the underground cables and roads	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd/Contractor	Design phase

Mitigation: Action/control	Responsibility	Timeframe
must be moved 50 metres northeast.		
To protect a dry packed stone walled gate between turbine <u>36</u> and 40, the construction of the underground cables and roads must be moved 50 metres north.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd/Contractor	Design phase
<u>The full time ECO should regularly visit the construction site to inspect the construction areas and activities to verify if there any archaeological finds.</u>	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Design phase/ Construction and Operation
Ensure that the heritage sites are avoided when placing infrastructure (refer to Appendix C for list of heritage sites recorded in the development area). These sites should be marked before the commencement of construction.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd Specialist	Design phase Pre-construction
Compile plan of action if graves of any nature are disturbed and compile plan of action to safeguard fittings and materials in heritage buildings on the site. Compile final listing of heritage sites that will potentially be affected by developments. There is a standard procedure which should be followed for graves. This plan of action must be in accordance with the legal requirements in this regard.	Heritage Specialists	Pre-construction
The facility must be designed to discourage use as perching or roosting substrates by birds and bats.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Design phase
Amakhala Emoyeni RE Project 1, in consultation with the Blue Crane Development Agency and other stakeholders, should investigate the opportunities for establishing a Community Trust.		Pre-construction, Construction and Operation
Develop a health and safety plan to protect both workers and the general public during construction, operation and decommissioning of the wind energy facility.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd/Contractor	Pre- construction

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

Performance Indicator	<ul style="list-style-type: none"> » Selected alignments, substation sites and turbine layout minimises any negative environmental impacts and maximises any benefits.
Monitoring	<ul style="list-style-type: none"> » Ensure that the design implemented meets the objectives and mitigation measures in the EIA report through review of the design by

the Project Manager, and the ECO prior to the commencement of construction.

OBJECTIVE 2: Initiate Bird and Bat Monitoring Program

A pre-construction monitoring programme to document the impact of the wind energy facility on birds and bats has been completed on the site, and extended over a period of 12 months. This should continue during the operation phase. This is seen as critical to furthering the understanding of avifaunal and bat impacts and wind energy facilities on the site and in South Africa.

Project component/s	» wind turbines
Potential Impact	» Mortality of birds due to collision with turbines
Activity/risk source	» Turbines
Mitigation: Target/Objective	» The delivery of an effective impact mitigation scheme for the facility, refined by post-construction monitoring of actual impacts, and resulting adjustments in management practices and mitigation measures applied.

Mitigation: Action/control	Responsibility	Timeframe
Appoint advising scientist and agency to conduct pre-construction bird and bat monitoring.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Pre-construction
Implement monitoring programme.	Monitoring agency	Pre-construction, operation
Refine monitoring protocol and determine the extent of radar deployment if required. Periodically collate and analyse pre-construction monitoring data. Review report on the full year of pre-construction monitoring, and integrate findings into construction EMP and broader mitigation scheme.	Advising scientist	Pre-construction, operation
Possibly exclude development from certain high-lying areas where Cape Vultures and other soaring species might be most likely to fly.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Pre-construction
All bird and bat monitoring reports and baseline data collected from the pre- and post-construction monitoring program must be	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Pre-construction, and post construction

Mitigation: Action/control	Responsibility	Timeframe
submitted to Birdlife South Africa, EWT and the relevant authorities on a quarterly basis.		
All valuable bird and bat habitats must be protected. Impacts on these areas must be minimised as far as possible.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Pre-construction and during construction

Performance Indicator	» Clear and logical recommendations on why, how and when to institute mitigation measures to reduce avian impacts of the development, from pre-construction to operational phase.
Monitoring	» An incident reporting system should be used to record non-conformances to the EMP.

OBJECTIVE 3: To ensure effective communication mechanisms

On-going communication with affected and surrounding landowners is important to maintain during the construction and operational phases of the 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
Potential Impact	» Impacts on affected and surrounding landowners and land uses
Activity/risk source	» Activities associated with wind energy facility construction » Activities associated with wind energy facility operation
Mitigation: Target/Objective	» Effective communication with affected and surrounding landowners » Addressing of 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 (as outlined in Appendix E) to be implemented during both the construction and operational phases of the facility. This procedure should include 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.	Amakhala Emoyeni RE Project 1	Pre-construction (construction procedure) Pre-operation (operation procedure)
Develop and implement a grievance mechanism for the construction, operational and closure phases of the project for all	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd /	Pre-construction (construction procedure) Pre-operation (operation

Mitigation: Action/control	Responsibility	Timeframe
employees, contractors, subcontractors and site personnel. This procedure should be in line with the South African Labour Law.	Contractor	procedure)
Liaison with landowners is to be undertaken prior to the commencement of construction in order to provide sufficient time for them to plan agricultural activities.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd / Contractor	Pre-construction

Performance Indicator	» Effective communication procedures in place.
Monitoring	» An incident reporting system should be used to record non-conformances to the EMP.

MANAGEMENT PLAN: CONSTRUCTION

CHAPTER 7

7.1. Overall Goal for Construction

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

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

7.2. Institutional Arrangements: Roles and Responsibilities for the Construction Phase of the Wind Energy Facility

As the Proponent, Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd must ensure that the implementation of the wind energy facility complies with the requirements of any and all environmental authorisations and permits, and obligations emanating from other relevant environmental legislation. This obligation is partly met through the development of the EMP, and the implementation of the EMP through its integration into the contract documentation. Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd will retain various key roles and responsibilities during the construction of the wind energy facility. These are outlined below.

OBJECTIVE 4: To establish clear reporting, communication and responsibilities in relation to environmental incident

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

The **Project Manager** will:

- » Ensure all specifications and legal constraints specifically with regards to the environment are highlighted to the Contractor(s) so that they are aware of these.
- » Ensure that Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd and its Contractor(s) are made aware of all stipulations within the EMP.
- » Ensure that the EMP is correctly implemented throughout the project cycle by means of site inspections and meetings. This will be documented as part of the site meeting minutes.
- » Be fully conversant with the Environmental Impact Assessment for the project, the EMP, the conditions of the Environmental Authorisation, and all relevant environmental legislation.

The **Site Manager** (Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd's On-site Representative) will:

- » Be fully knowledgeable with the contents of the Environmental Impact Assessment.
- » Be fully knowledgeable with the contents and conditions of the Environmental Authorisation.
- » Be fully knowledgeable with the contents of the Environmental Management Plan.
- » Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with these.
- » Be fully knowledgeable with the contents of all relevant licences and permits.
- » Have overall responsibility of the EMP and its implementation.
- » Conduct audits to ensure compliance to the EMP.
- » Ensure there is communication with the Project Manager, the Environmental Control Officer and relevant discipline Engineers on matters concerning the environment.
- » Ensure that no actions are taken which will harm or may indirectly cause harm to the environment, and take steps to prevent pollution on the site.
- » Confine activities to the demarcated construction site.

An independent **Environmental Control Officer (ECO)** must be appointed by the project proponent prior to the commencement of any authorised activities. The ECO will be responsible for monitoring, reviewing and verifying compliance by the Contractor with the environmental specifications of the EMP and the conditions of the Environmental Authorisation. The ECO will:

- » Be fully knowledgeable with the contents with the Environmental Impact Assessment.
- » Be fully knowledgeable with the contents with the conditions of the Environmental Authorisation (once issued).
- » Be fully knowledgeable with the contents with the Environmental Management Plan.
- » Be fully knowledgeable with the contents with all relevant environmental legislation, and ensure compliance with them.
- » Be fully knowledgeable of all the licences and permits issued to the site.
- » Be fully knowledgeable of the content of the water use licence and the authorisation granted from the department of forestry and fisheries.
- » Ensure that the contents of this document are communicated to the Contractor site staff and that the Site Manager and Contractor are constantly made aware of the contents through discussion.
- » Ensure that the compliance of the EMP is monitored through regular and comprehensive inspection of the site and surrounding areas.
- » Ensure that if the EMP conditions or specifications are not followed then appropriate measures are undertaken to address this.
- » Monitoring and verification must be implemented to ensure that environmental impacts are kept to a minimum, as far as possible.
- » Ensure that the Site Manager has input into the review and acceptance of construction methods and method statements.
- » Ensure that activities on site comply with all relevant environmental legislation.
- » Ensure that a removal is ordered of any person(s) and/or equipment responsible for any contravention of the specifications of the EMP.
- » Ensure that the compilation of progress reports for submission to the Project Manager, with input from the Site Manager, takes place on a regular basis, including a final post-construction audit.
- » Ensure that there is communication with the Site Manager regarding the monitoring of the site.
- » Ensure that any non-compliance or remedial measures that need to be applied are reported.
- » Keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.
- » Keep a daily site diary.
- » Keep record of all reports submitted to DEA.
- » Independently report to DEA in terms of compliance with the specifications of the EMP and conditions of the Environmental Authorisation (once issued).

As a general mitigation strategy, the Environmental Control Officer (ECO) should be present full-time on site for:

- » Facilitation of environmental induction with construction staff, and
- » Site preparation and initial clearing activities to ensure the correct demarcation of no-go areas,

- » Supervision of 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).
- » Excavation, levelling and terracing for all infrastructure footprints,
- » Monitoring of linear infrastructure construction activities (access road),

Thereafter, monthly or bi-weekly site compliance inspections would probably be sufficient, reducing as construction proceeds, provided compliance is maintained. However, in the absence of the ECO there should be a designated environmental officer present to deal with any environmental issues that may arise such as fuel or oil spills.

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.

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

- » Ensuring adherence to the environmental management specifications.
- » Ensuring that Method Statements are submitted to the Site Manager for approval before any work is undertaken. Any lack of adherence to this will be considered as non-compliance to the specifications of the EMP.
- » 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 EMP (i.e. ensure their staff are appropriately trained as to the environmental obligations).

Contractor's Environmental Representative: The Contractor's Environmental Representative (CER), employed by the Contractor, is responsible for managing the day-to-day on-site implementation of this EMP, and for the compilation of regular (usually weekly) Monitoring Reports. In addition, the CER 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 Environmental Representative 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 EMP-related activities on site.

7.3. Objectives

In order to meet the goals for construction, the following objectives have been identified, together with necessary actions and monitoring requirements.

OBJECTIVE 5: Site establishment and securing the site

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

Project component/s	<ul style="list-style-type: none"> » wind turbines » access roads » substations
Potential Impact	<ul style="list-style-type: none"> » Hazards to landowners and public » Security of materials » Substantially increased damage to sensitive vegetation
Activities/risk sources	<ul style="list-style-type: none"> » Open excavations (foundations and cable trenches) » Movement of construction vehicles in the area and on-site
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To secure the site against unauthorised entry » To protect members of the public/landowners/residents

Mitigation: Action/control	Responsibility	Timeframe
Secure site, working areas and excavations in an appropriate manner, as agreed with the ECO.	Contractor	Erection: during site establishment Maintenance: for duration of Contract
Where necessary to control access, fence and secure area.	Contractor	Erection: during site establishment Maintenance: for duration of Contract

Mitigation: Action/control	Responsibility	Timeframe
Fence and secure Contractor's equipment camp.	Contractor	Erection: during site establishment Maintenance: for duration of Contract
Create a designated access points to the site. This access must be clearly marked to ensure safe entry and exit. Signage must be erected at appropriate points warning of turning traffic and the construction site.	Contractor	Erection: during site establishment Maintenance: for duration of Contract
Where the public could be exposed to danger by any of the works or site activities, the Contractor must, as appropriate, provide suitable flagmen, barriers and/or warning signs in English, Afrikaans and any other relevant local languages, all to the approval of the Project Manager.	Contractor	Erection: during site establishment Maintenance: for duration of Contract
Signs must be placed along construction roads to identify speed limits, travel restrictions, and other standard traffic control information.	Contractor	Erection: during site establishment Maintenance: for duration of Contract
Minimise vegetation clearance associated with site establishment activities	Contractor	Site establishment
All development footprints for roads, buildings, underground cables, laydown areas and turbine footings should be appropriately fenced off and clearly indicated with flags and/or danger tape strips. There is to be no disturbance outside these demarcated areas.	Contractor	Erection: during site establishment Maintenance: for duration of Contract
Establish the necessary ablution facilities with chemical toilets. Provide adequate sanitary facilities and ablutions for construction workers (1 toilet per every 15 workers) at appropriate locations on site.	Contractor	Erection: during site establishment Maintenance: for duration of Contract
Ablution or sanitary facilities should not be located within 100 m from a 1:100 year flood line including water courses, wetlands or within a horizontal distance of less than 100 m, whichever is applicable	Contractor	During site establishment, construction and maintenance
Supply adequate waste collection bins at site where construction is being undertaken.	Contractor	Erection: during site establishment Maintenance: for duration of

Mitigation: Action/control	Responsibility	Timeframe
		Contract within a particular area

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

OBJECTIVE 6: To avoid and or minimise the potential impact on current and future farming activities during the construction phase

The final footprint of disturbance associated with the facility is a small percentage of the farmland where turbines will be located and is linked to the foundation of the individual wind turbines, services roads and substations. The impact on farmland associated with the construction phase can be mitigated by minimising the footprint of the construction related activities and ensuring that disturbed areas are fully rehabilitated on completion of the construction phase.

Project component/s	<ul style="list-style-type: none"> » wind turbines » access roads » substations
Potential Impact	The footprint of the wind energy facility and associated infrastructure will result in a loss of land that will impact on farming activities on the site.
Activities/risk sources	The footprint taken up by the wind energy facility and associated infrastructure.
Mitigation: Target/Objective	To minimise the loss of land taken up by the wind energy facility and associated infrastructure and to enable farming activities to continue where possible, specifically grazing.

Mitigation: Action/control	Responsibility	Timeframe
Minimise the footprint of the wind energy facility and the associated infrastructure.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd and contractor	Duration of construction

Mitigation: Action/control	Responsibility	Timeframe
Investigate the possibility of allowing farmers in the area to continue to use the site for their agricultural activities	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Duration of construction
Compile and implement a rehabilitation plan to ensure rehabilitation of disturbed areas on completion of the construction phase.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Construction and post-construction

Performance Indicator	» No complaints regarding impacts on farming activities.
Monitoring	» ECO to monitor indicators listed above to ensure that they have been met for the construction phase.

OBJECTIVE 7: Noise control

Projected noise levels during construction of the full Wind Energy Facility² were modelled using the methodology as proposed by SANS 10357:2004. The resulting future noise projections indicated that the construction activities as modelled for the worst case scenario would not comply with both the Noise Control Regulations (GN R154) as well as the SANS 10103:2004 guidelines (projected noise levels higher than the acceptable night rating level).

Various construction activities would be taking place during the development of the facility and there exists a risk that some of these activities could have a noise impact on surrounding residents. The significance of this noise impact was defined to be of a medium significance. However, mitigation measures were proposed that would reduce the significance to a more acceptable low level.

Project component/s	<ul style="list-style-type: none"> » turbine system (foundation, tower, nacelle and rotor) » substation(s) » access roads » electrical power cabling
Potential Impact	<ul style="list-style-type: none"> » Increased noise levels at potentially sensitive receptors » Potentially changing the acceptable land use capability
Activity/risk source	Any construction activities taking place within 500 meters from potentially sensitive receptors (PSR)
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Ensure equivalent A-weighted noise levels below 45 dBA at potentially sensitive receptors. » Ensure that maximum noise levels at potentially sensitive receptors be less than 65 dBA.

² The analysis was based the originally assessed 350 turbine layout as opposed to the approved 216 turbine Final Layout. Impacts are likely to be lower for the approved final layout than as assessed in the EIA.

	<ul style="list-style-type: none"> » Ensure acceptable noise levels at surrounding stakeholders and potentially sensitive receptors. » Ensuring compliance with the Noise Control Regulations
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Mitigation: Action/control	Responsibility	Timeframe
Establish a line of communication and notify all stakeholders and potentially sensitive receptors of the means of registering any issues, complaints or comments.	Environmental Control Officer or Community Liaison Officer	All phases of project
Notify potentially sensitive receptors about work to take place at least 2 days before the activity in the vicinity (within 500) of the potentially sensitive receptors is to start. The following information to be presented in writing: <ul style="list-style-type: none"> » Description of Activity to take place » Estimated duration of activity » Working hours » Contact details of responsible party 	Contractor Environmental Control Officer	Duration of construction At least 2 days, but not more than 5 days before activity is to commence
Ensure that all construction equipment is maintained and fitted with the required noise abatement equipment.	Environmental Control Officer	Weekly inspection
The construction crew must abide by the local by-laws regarding noise.	Contractor Environmental Control Officer	Duration of construction phase
Where possible construction work should be undertaken during normal working hours (06H00 – 18H00), from Monday to Saturday. If agreements can be reached (in writing) with the surrounding (within a 500 m distance) potentially sensitive receptors, these working hours can be extended.	Contractor	Duration of construction phase
Construction staff must be given training in actions to minimise noise.	Contractor	Pre-construction
Ensure that construction staff working in areas where the 8-hour ambient noise levels exceed 75 dBA must wear ear protection equipment.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » Equivalent A-weighted noise levels below 45 dBA at potentially sensitive receptors (8 hours). » Ensure that maximum noise levels at potentially sensitive receptors are less than 65 dBA. » No noise complaints are registered.
Monitoring	<ul style="list-style-type: none"> » Quarterly noise monitoring by an Approved Noise Inspection Authority. Noise monitoring to be conducted 500 meters downwind from all noisy activities, or at potentially sensitive receptors when work is taking place within 500 meters from a potentially sensitive receptor. Monitoring to take place every time that a noise complaint is registered.

OBJECTIVE 8: Management of dust and emissions to air

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

Project component/s	<ul style="list-style-type: none"> » wind turbines » access roads » substations » concrete batching plant
Potential Impact	<ul style="list-style-type: none"> » Dust and particulates from vehicle movement to and on-site, foundation excavation, road construction activities, road maintenance activities, temporary stockpiles, and vegetation clearing affecting the surrounding residents and visibility. » Release of minor amounts of air pollutants (for example NO₂, CO and SO₂) from vehicles and construction equipment.
Activities/risk sources	<ul style="list-style-type: none"> » Clearing of vegetation and topsoil » Excavation, grading, scraping » Transport of materials, equipment and components on internal access roads » Re-entrainment of deposited dust by vehicle movements » Wind erosion from topsoil and spoil stockpiles and unsealed roads and surfaces » Fuel burning vehicle engines
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure emissions from all vehicles are minimised, where possible, for the duration of the construction phase » To minimise nuisance to the community from dust emissions and to comply with workplace health and safety requirements for the duration of the construction phase

Mitigation: Action/control	Responsibility	Timeframe
Roads must be maintained to a manner that will ensure that dust from road or vehicle sources is not visibly excessive. Ensure that damage to roads is repaired on completion of construction phase.	Contractor	Site establishment; Duration of construction
Appropriate dust suppressant must be applied on all exposed areas and stockpiles as required to minimise/control airborne dust.	Contractor	Duration of contract
Haul vehicles moving outside the construction site carrying material that can be wind-blown must be covered with tarpaulins.	Contractor	Duration of contract
<u>Speed of construction vehicles must be restricted to low speeds.</u>	Contractor/ developers/ ECO	Duration of contract
Disturbed areas must be re-vegetated with indigenous vegetation as soon as practicable once construction is	Contractor	At completion of the construction

Mitigation: Action/control	Responsibility	Timeframe
completed in an area.		phase
Construction vehicles and equipment must be maintained in a road-worthy condition at all times.	Contractor	Duration of contract
<u>Construction vehicles that have 4 wheel drive must engage 4 x 4 and or diff lock when required to ensure dust is kept to a minimum.</u>	Contractor/ developers/ ECO	Pre-Construction
If monitoring results or complaints indicate inadequate performance against the criteria indicated, then the source of the problem must be identified, and existing procedures or equipment modified to ensure the problem is rectified.	Contractor	Duration of contract

Performance Indicator	<ul style="list-style-type: none"> » No complaints from affected residents or community regarding dust or vehicle emissions. » Dust suppression measures on roads implemented for all heavy vehicles that require such measures during the construction phase commences. » Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed. » Road worthy certificates in place for all heavy vehicles at outset of construction phase and up-dated on a monthly basis.
Monitoring	<p>Monitoring must be undertaken to ensure emissions are not exceeding the prescribed levels via the following methods:</p> <ul style="list-style-type: none"> » Visual daily inspections of dust generation by construction activities throughout the construction phase. » Immediate reporting by personnel of any potential or actual issues with nuisance dust or emissions to the Project Manager. » A complaints register must be maintained, in which any complaints from residents/the community will be logged. Complaints will be investigated and, where appropriate, acted upon. » An incident reporting system must be used to record non-conformances to the EMP.

OBJECTIVE 9: Protection of flora and fauna / Minimisation of disturbance in development footprint

Impacts on vegetation at the construction stage are expected to be mainly as a result of direct permanent loss of vegetation in development footprint areas. Impacts on fauna during construction are expected to be as a result of disturbance and habitat destruction. Although some areas of high ecological sensitivity have been identified on site, the development footprints will not impact on any ecological “no go” habitats or areas.

There is a single animal species of conservation concern that may occur in habitats within the study area, the near threatened Giant Bullfrog. Likely breeding sites are the edges of small farm dams in watercourses on site. They may forage in surrounding vegetation.

Project component/s	<ul style="list-style-type: none"> » wind turbines » access roads » substations
Potential Impact	<ul style="list-style-type: none"> » Impacts on or loss of indigenous natural vegetation due to construction activities » Impacts on soil » Loss of topsoil » Loss of habitat suitable for the Giant Bullfrog
Activity/risk source	<ul style="list-style-type: none"> » Site preparation and earthworks » Construction-related traffic » Foundations or plant equipment installation » Mobile construction equipment » Dumping or damage by construction equipment outside of demarcated construction areas.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To retain natural vegetation in the highly sensitive areas the site » To minimise footprints of disturbance of vegetation/habitats on-site » To minimise loss of indigenous vegetation » No alien plants within project control area » No loss of species of conservation concern

Mitigation: Action/control	Responsibility	Timeframe
Areas to be cleared must be clearly marked on-site to eliminate the potential for unnecessary clearing. Disturbance of indigenous vegetation must be kept to a minimum. Where disturbance is unavoidable, disturbed areas should be rehabilitated as quickly as possible.	Contractor in consultation with Specialist	Pre-construction
All protected vegetation located in the zone of impact	ECO	Pre-construction

Mitigation: Action/control	Responsibility	Timeframe
must be clearly marked by the ECO to ensure that plants are protected. Appropriate permits must be obtained if any protected species are to be impacted upon.		
Avoid impacts on dams and wetland habitat identified as being suitable for the Giant Bullfrog.	Contractor ECO	Site establishment & duration of contract
All trenches and holes excavated on site must be monitored to ensure no fauna is trapped within them. If fauna get trapped in any holes/trenches, the ECO or the relevant conservation organisation must assist in removing the animals from the pit and relocate it to a suitable habitat.	Contractor / ECO	Pre-construction and during construction
No personnel on site may cause harm to any individual Giant Bullfrog. Environmental orientation of personnel must include information on identifying this species.	Amakhala E moyeni RE Project 1 (RF) (Pty) Ltd/ ECO	Site establishment & duration of contract
<u>Should giant bull frogs be found on the site, consult an ecologist/ suitably qualified person to map extent of suitable habitat for Giant Bullfrog before construction. Identify project components that infringe on giant Bullfrog habitat. After construction, record any disturbance to habitat in terms of extent and potential effects on remaining habitat.</u>	Amakhala E moyeni RE Project 1 (RF) (Pty) Ltd in consultation with Specialist	Pre-construction /post-construction
Where possible, locate any crossings at sites where there are existing road crossings.	Amakhala E moyeni RE Project 1 (RF) (Pty) Ltd ECO	Site establishment & duration of contract
For any new river crossings, apply the following measures: » use adequate bridge or culvert structures that result in minimal impacts on water or sediment flow through the river bed. » ensure bridge structures do not cause canalization or erosion. » implement adequate erosion control measures below river crossings as per the erosion management plan and the Storm water management plan (refer to Appendix <u>D and G</u>). » Obtain a permit from DWA for any infrastructure to be located within a watercourse, or within 500m of a wetland.	Amakhala E moyeni RE Project 1 (RF) (Pty) Ltd CO	Site establishment & duration of contract
The extent of clearing and disturbance to the native vegetation must be kept to a minimum so that impact on flora and fauna is restricted.	Contractor	Site establishment & duration of contract

Mitigation: Action/control	Responsibility	Timeframe
Construction activities must be restricted to demarcated areas so that impact on flora and fauna is restricted.	Contractor	Site establishment & duration of contract
Unnecessary impacts on surrounding natural vegetation must be avoided, e.g. driving around in the veld. Use access roads only. Off road driving may be permitted under the supervision of the ECO.	Contractor	Site establishment & duration of contract
Roads must be aligned away from steep slopes and drainage lines as far as possible.	Contractor	Design; Duration of construction
Avoid creating conditions in which alien plants may become established: » Keep disturbance of indigenous vegetation to a minimum » Rehabilitate disturbed areas as quickly as possible once construction in an area is complete » Do not import soil from areas with alien plants	Construction team, management (environmental officer)	Construction & Operation
Establish a weekly on-going monitoring programme to detect and quantify any alien species that may become established and identify the problem species (as per Conservation of Agricultural Resources Act)	Construction team, management (environmental officer)	Construction & Operation
If any alien invasive species are detected then the distribution of these should be mapped (GPS coordinates of plants or concentrations of plants), number of individuals (whole site or per unit area), age and/or size classes of plants and aerial cover of plants. The results should be interpreted in terms of the risk posed to sensitive habitats within and surrounding the project area.	Developer/ Ecologist and the ECO	Pre-construction/ during operation
Immediately control any new alien plants that become established using registered control methods.	Construction team, management (EO)	Construction & Operation
Implement an Alien Plants management Program to address all existing alien plants and emerging alien plants on the site (refer to Appendix H).	Construction team, management (EO) and the ECO	Pre construction, Construction & Operation
In the event where vegetation needs to be removed, vegetation must be rescue and stored before a site is to be cleared, with the guidance of principles detailed in the Plant Rescue & protection and Rehabilitation Plan (refer to <u>Appendix I</u>). Plants must be removed in a manner to preserve the plant which can then be stored in a suitable constructed nursery. All plants in the nursery must be replanted and re-used in the rehabilitation phase of project development.	Construction team and ECO	Construction & operation and rehabilitation
A site rehabilitation programme must be developed and implemented by a specialist ecologist.	Contractor in consultation with Specialist	Duration of contract

Performance Indicator	<ul style="list-style-type: none"> » Zero disturbance outside of designated work areas » Minimised clearing of existing/natural vegetation » Loss of natural vegetation equivalent to the exact footprint of the proposed project » Number of plants and aerial cover of plants within project area and immediate surroundings » No loss of habitat suitable for or individuals of the protected Giant Bullfrog
Monitoring	<ul style="list-style-type: none"> » Observation of vegetation clearing and soil management activities by ECO throughout construction phase » The environmental manager should be responsible for driving alien monitoring process. » Before construction, determine required number of hectares to accommodate footprint of proposed infrastructure and demarcate construction areas. » Annual audit during construction of project area and immediate surroundings by qualified ecologist. An incident reporting system will be used to record non-conformances to the EMP.

OBJECTIVE 10: Protection of avifauna

The proposed facility is likely to have a moderate, long-term impact on the avifauna of the area, and may negatively affect key rare, red-listed and/or endemic species. The most important negative impacts are likely to be on Cape Vulture, Denham's Bustard and Blue Crane. These birds (and other priority species) may be disturbed by construction of the facility or lose foraging habitat to the construction footprint.

Project component/s	<ul style="list-style-type: none"> » wind turbines » substations
Potential Impact	<ul style="list-style-type: none"> » Disturbance to or loss of birds as a result of collision with the turbine blades » Electrocutation on substations
Activity/risk source	<ul style="list-style-type: none"> » Spinning turbine blades » substations
Mitigation: Target/Objective	<ul style="list-style-type: none"> » More accurately determine the impact of the operating wind energy facility on priority bird species » Minimise impacts associated with collisions and electrocutions

Mitigation: Action/control	Responsibility	Timeframe
Carefully monitor the local avifauna pre- and post-construction, and implement appropriate additional mitigation as and when significant changes are recorded in the number, distribution or breeding behaviour of any of the priority species, or when	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Pre-construction, continuing to operation

Mitigation: Action/control	Responsibility	Timeframe
collision or electrocution mortalities are recorded for any of the priority species.		
Refine post-construction monitoring protocol in terms of results pre-construction. Periodically collate and analyse post-construction monitoring data. Review report on the full year of post-construction monitoring, and integrate findings into operational EMP and broader mitigation scheme.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd / specialist	Construction and post construction
Minimise habitat destruction caused by the construction of the facility by keeping the lay-down areas as small as possible, building as few temporary roads as possible, and reducing the final extent of developed area to a minimum.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd Environmental Manager	Construction
Minimising the disturbance impacts associated with the construction of the facility, by abbreviating construction time, scheduling activities around avian breeding and/or movement schedules, and lowering levels of associated noise.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd Environmental Manager	Construction
<u>Removal of all dead livestock as soon as possible from the site and keeping detailed information on fatalities</u>	<u>Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd / specialist</u>	<u>Construction and post construction</u>
<u>Should a situation arise that is detrimental to regional avifauna, the specialist may request that construction or maintenance be rescheduled</u>	<u>Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd / specialist</u>	<u>Construction and post construction</u>

Performance Indicator	<ul style="list-style-type: none"> » Minimal disturbance to avifaunal populations on the wind energy facility site » Regular provision of clearly worded, logical and objective information on the interface between the local avifauna and the proposed/operating wind energy facility » Clear and logical recommendations on why, how and when to institute mitigation measures to reduce avian impacts of the development, from pre-construction to operational phase
Monitoring	<ul style="list-style-type: none"> » Observation of avifaunal populations and incidence of injuries/death from collisions from turbine blades.

OBJECTIVE 11: Limit Damage to Watercourses

A number of watercourses have been identified on the site and those to be impacted have been authorised in terms of Section 39 of the National Water Act (No. 36 of 1998) by the Department of Water Affairs (DWA) in the General Authorisation (GA) dated 27 March 2013. These areas provide habitat to many of the identified sensitive plant and animal species identified to be associated with the site. Therefore, avoidance of these areas as far as possible is recommended. If it is necessary to remove species of special concern, every effort must be made to rescue and protect them (using the guidelines in the Plant Rescue & Protection and Rehabilitation Plan, Appendix I).

Project component/s	<ul style="list-style-type: none"> » Wind turbines » Access roads » Substations
Potential Impact	» Damage to wetland areas by any means that will result in hydrological changes (includes erosion, siltation, dust, direct removal of soil of vegetation, dumping of material within wetlands). The focus should be on the functioning of the wetland as a natural system.
Activity/risk source	» Construction & operation of facility
Mitigation: Target/Objective	» No damage to watercourse areas within project area

Mitigation: Action/control	Responsibility	Timeframe
Align underground cables and internal access roads along existing infrastructure as far as possible.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd Contractor	Design; Construction
For any new construction, cross watercourses perpendicularly to minimise disturbance footprints.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd Contractor	Design; Construction
Rehabilitate any disturbed areas as quickly as possible once construction is completed in an area (using the Plant Rescue & protection and Rehabilitation Plan, <u>Appendix I</u>).	Contractor	Construction
<u>Compile a site specific stormwater management plan to control stormwater and runoff water for areas such as the workshop / maintenance area.</u>	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd, ECO	Construction
<u>Monitoring</u> to take place on a regular basis where infrastructure is to be located close to watercourses.	Contractor ECO	Construction
<u>Obtain a Water Use Licence from DWA to impact on any wetland or water resource not authorised in the General Authorisation dated 27 March 2013</u>		

Performance Indicator	» Impacts on water quality, water quantity, wetland vegetation, natural status of wetland within acceptable norms and standards
Monitoring	<ul style="list-style-type: none"> » <u>Monitoring of water courses</u> to take place on a regular basis. This should include the water <u>courses</u> and quantity leaving the project area through the watercourses (should be monitored within main drainage systems that exit site). » Habitat loss in watercourses should be monitored before and after construction. » The ECO should be responsible for driving this process. » Reporting frequency depends on legal compliance framework.

OBJECTIVE 12: Control runoff and soil erosion & degradation

The soil resource on the site needs to be conserved as far as possible to minimise the cumulative impact on the local environment.

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

Project component/s	<ul style="list-style-type: none"> » Wind turbines » Access roads » Substations » Sealed surfaces (e.g. roofs, concrete surfaces, compacted road surfaces, paved roads / areas). » All other infrastructure
Potential Impact	<ul style="list-style-type: none"> » Degradation of soil » Degradation of local geology » Soil erosion » Siltation of drainage lines
Activities/risk sources	<ul style="list-style-type: none"> » Water and wind erosion of cleared and excavated areas » Excavation, mixing, dumping, stockpiling and compaction of soil » Concentrated discharge of water from construction activity » Site preparation and earthworks » Foundations or plant equipment installation » Mobile construction equipment movement on site » River/stream/drainage line road crossings.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise degradation of rock and soil by construction activity » To conserve topsoil by stockpiling and re-using in disturbance areas » To minimise erosion of soil from site during construction » To minimise deposition of soil into drainage lines

Mitigation: Action/control	Responsibility	Timeframe
Identify construction areas and restrict construction	ECO/Contractor	Pre-construction

Mitigation: Action/control	Responsibility	Timeframe
activities to these areas.		and Construction
Dust control on construction site: implementation of appropriate dust control measures.	Contractor	Construction
Erosion features must be immediately stabilised with appropriate erosion control measures, according to the erosion management Plan (Appendix G).	Contractor	Construction
Where access roads cross natural drainage lines, culverts must be designed to allow free flow. Regular maintenance must be carried out.	EPC Contractor	Design Pre-construction and Construction
Stockpile topsoil for re-use in rehabilitation phase. Maintain stockpile shape and protect from erosion. Store topsoil stockpiles to a maximum height of 30 / 40cm. Limit the height of stockpiles as far as possible to reduce compaction.	Contractor	During site establishment and any activity related to earthworks as well as the duration of construction
All areas of disturbed soil must be reclaimed using only indigenous grass and shrubs as per the recommendations in the Plant Rescue & protection and Rehabilitation Plan (Appendix I).	Contractor and soil specialist	During design, pre-construction, construction and in rehabilitation phases.
Rehabilitate any disturbed areas immediately after construction in that area is complete in order to stabilise landscapes.	Contractor	Post-construction
Any stockpiles must be protected against wind erosion (e.g. surrounded by shade cloth fences or damped down on a regular basis).	Contractor	Duration of contract
Erosion control measures: Run-off attenuation on slopes (sand bags, logs), silt fences, stormwater catch-pits, shade nets or temporary mulching over denuded areas.	Contractor/ECO	Erection: Before construction Maintenance: Duration of contract
Minimise vegetation clearance or removal associated with site establishment activities, trim trees under supervision, where possible (refer to the Plant Rescue & protection and Rehabilitation Plan - Appendix I).	Contractor	Duration of contract
Movement of vehicles on-site is to be on approved and formalised access roads only, which shall be adequately maintained throughout construction. Where temporary tracks are required (e.g. for use by crawler crane) these are to be ripped and rehabilitated as soon use of the track in an area is no longer required.	Contractor	Duration of contract
Control depth of excavations and stability of cut faces/sidewalls.	Engineer/ECO/ Contractor	During construction and over duration of contract

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

OBJECTIVE 13: To avoid and or minimise the potential risk of increased veld fires during the construction phase

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

Project component/s	<ul style="list-style-type: none"> » wind turbines » access roads » substations
Potential Impact	Veld fires can pose a personal safety risk to local farmers and communities, and their homes, crops, livestock and farm infrastructure, such as gates and fences.
Activities/risk sources	The presence of construction workers and their activities on the site can increase the risk of veld fires.
Mitigation: Target/Objective	To avoid and or minimise the potential risk of veld fires on local communities and their livelihoods.

Mitigation: Action/control	Responsibility	Timeframe
Ensure that open fires on the site for cooking or heating are not allowed except in designated areas.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd, ECO & Contractor	Duration of construction
Provide adequate fire fighting equipment onsite.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd & Contractor	Duration of construction
Provide fire-fighting training to selected construction staff.	Contractor	Duration of construction
Compensate farmers / community members at full	Contractor	As required

Mitigation: Action/control	Responsibility	Timeframe
market related replacement cost for any losses, such as livestock, damage to infrastructure etc for losses associated with fires resulting from negligence or non-compliance.		
Road borders must be regularly maintained to ensure that vegetation remains short to serve as an effective firebreak.	Contractor	Duration of construction

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

OBJECTIVE 14: Protection of sites of heritage value / fossil resources

The main cause of impacts to archaeological sites during construction activities is physical disturbance of the material itself and its context. The heritage and scientific potential of an archaeological site is highly dependent on its geological and spatial context. This means that even though, for example a deep excavation may expose archaeological artefacts, the artefacts are relatively meaningless once removed from the area in which they were found. Large-scale excavations for foundations will damage archaeological sites, as will road construction activities. Mitigation is proposed as the heritage resources are of high significance. Mitigation should take the form of implementing no-go buffer zones around all cemeteries and graves. If unmarked burials are discovered during construction, a plan of action must be in place to deal with the situation.

If at any stage during the construction phase any semblance of a fossil is observed, it would be vital to stop the work immediately and report this occurrence to ECPHRA, SAHRA and / or a professional palaeontologist (for example the geological staff at either the Albany Museum or Rhodes University in Grahamstown) as soon as possible so that appropriate mitigation measures can be implemented. Generally fossils can be removed quickly and would therefore not delay or hinder construction operations.

Findings from the walk-through heritage survey undertaken, as well as a list of heritage sites, their significance and location is included in Appendix C of this EMP.

Project component/s	<ul style="list-style-type: none"> » Wind turbines » Access roads » Substations
Potential Impact	<ul style="list-style-type: none"> » Heritage objects or artefacts found on site are inappropriately managed or destroyed » Disturbance to fossil resources
Activity/risk source	<ul style="list-style-type: none"> » Site preparation and earthworks » Foundations or plant equipment installation » Mobile construction equipment movement on site
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure that any heritage objects found on site are treated appropriately and in accordance with the relevant legislation

Mitigation: Action/control	Responsibility	Timeframe
Areas required to be cleared during construction must be clearly marked in the field to avoid unnecessary disturbance of adjacent areas (which will not be surveyed in detail by a heritage specialist).	Contractor in consultation with Specialist	Pre-construction
<u>The full time ECO</u> must undertake periodic inspection during construction and operational phases to determine compliance.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd in consultation with specialist	Construction (visits to be determined based on scheduling of activities)
If a heritage object is found, work in that area must be stopped immediately, and appropriate specialists brought in to assess to site, notify the administering authority of the item/site, and undertake due/required processes.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd /Contractor in consultation with Specialist	Duration of contract
If any concentrations of archaeological material are uncovered during development, work must immediately cease and be reported to the nearest archaeologist <u>the Eastern Cape Provincial Heritage Resources Agency</u> and/or the South African Heritage Resources Agency.	Contractor ECO	Duration of construction
Construction managers/foremen should be informed before construction starts on the possible types of heritage sites and cultural material they may encounter. It is suggested that a person be trained to be on site to report to the site manager if sites are found.	ECO	Pre-Construction
The upright stone fence posts (which will be removed in the construction of underground cables), must be conserved.	Contractor ECO	Construction

Performance Indicator	<ul style="list-style-type: none"> » Zero disturbance outside of designated work areas » All heritage items located are dealt with as per the legislative guidelines
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	» A record is kept of all instances of accidental disturbance of heritage material, as well as post construction review of impacts on landscape context.
Monitoring	» Supervision of all clearing and earthworks by ECO throughout construction phase

OBJECTIVE 15: Minimisation of visual impacts associated with construction

The construction phase of the facility should be sensitive to potential observers in the vicinity of the construction site. The placement of lay-down areas and temporary construction camps should be carefully considered in order to not negatively influence the future perception of the facility.

Secondary visual impacts associated with the construction phase, such as the sight of construction vehicles, dust and construction litter must be managed to reduce visual impacts. The use of dust-suppression techniques on the access roads (where required), timely removal of rubble and litter, and the erection of temporary screening will assist in doing this.

Project component/s	» Wind turbines » Substations » Access roads
Potential Impact	» Temporary visual intrusion
Activity/risk source	» Transportation of wind energy facility and substation components to the site » Construction activities on-site, and at substation sites » The potential scarring of the landscape due to the creation of new access roads/tracks or the unnecessary removal of vegetation
Mitigation: Target/Objective	» Minimise contrast with surrounding environment and visibility of the construction activities to people in the area

Mitigation: Action/control	Responsibility	Timeframe
Signage near wind turbines should be avoided unless they serve to inform the public about the wind turbines and their function, graffiti and commercial messaging must be avoided.	EPC Contractor Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Pre-construction, throughout construction and during operation.
Adopt responsible construction practices aimed at containing the construction activities to specifically demarcated areas thereby limiting the removal of natural vegetation to the minimum.	Contractor	Duration of contract
The activities and movement of construction workers and construction site vehicles will be restricted to the immediate construction site.	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
Laydown areas and stockyards should be located in low visibility areas as far as possible. Areas close to main roads, buildings and developments must be avoided, the low lying areas will be beneficial for these areas.	Contractor	Construction
Limit access to the construction sites along existing access roads.	Contractor	Construction
The general appearance of construction activities, construction equipment camps and lay-down areas will be maintained by means of the timely removal of rubble and disused construction materials.	Contractor	Construction
Implement an environmentally responsive planning approach to roads and infrastructure to limit cut and fill requirements.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd Contractor	Pre-construction Construction
Rehabilitate all disturbed areas, including cut and fill slopes to acceptable visual standards.	Contractor	Post-construction

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

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

The construction phase of the project will be the most significant in terms of generating traffic impacts; resulting from the transport of equipment (including turbine components) and materials and construction crews to the site and the return of the vehicles after delivery of materials. Potential impacts associated with transportation and access relate to works within the site boundary (i.e. the wind energy facility and ancillary infrastructure) and external works outside the site boundary.

Project component/s	<ul style="list-style-type: none"> » Wind turbines » Substations
Potential Impact	<ul style="list-style-type: none"> » Traffic congestion, particularly on narrow roads or on road passes where overtaking is not permitted » Risk of accidents » Deterioration of road pavement conditions (both surfaced and gravel road) due to abnormal loads
Activity/risk source	<ul style="list-style-type: none"> » Transportation of project components to site
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise impact of traffic associated with the construction of the facility on local traffic » To minimise potential for negative interaction between pedestrians or sensitive users and traffic associated with the facility construction

Mitigation: Action/control	Responsibility	Timeframe
All relevant permits for abnormal loads must be applied for from the relevant authority.	Contractor (or appointed transportation contractor)	Pre-construction
A designated access (or accesses) to the proposed site must be created to ensure safe entry and exit.	Contractor	Pre-construction
Appropriate road management strategies must be implemented on external and internal roads with all employees and contractors required to abide by standard road and safety procedures.	Contractor (or appointed transportation contractor)	Pre-construction
Any traffic delays as a result of construction traffic must be co-ordinated with the appropriate authorities.	Contractor	Duration of contract
Signage must be established at appropriate points warning of turning traffic and the construction site (all signage to be in accordance with prescribed standards) with accordance to the Transport and Traffic Management Plan(Appendix J).	Contractor	Duration of contract
Appropriate maintenance of all vehicles must be ensured, in accordance to the Transport and Traffic management Plan (Appendix J).	Contractor	Duration of contract
<u>All other mitigation measures as per the site specific Transport Management Plans and or Logistic Study must also developed for the project must be taken into consideration.</u>	<u>Contractor</u>	<u>Duration of the contract</u>
All vehicles travelling on public roads must adhere to the specified speed limits and relevant legislation. All drivers must be in possession of an appropriate valid driver's license.	Contractor	Duration of contract
Keep hard road surfaces as narrow as possible.	Contractor	Duration of contract

Performance Indicator	<ul style="list-style-type: none"> » No traffic incidents involving Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd personnel or appointed contractors » Appropriate signage in place » No complaints resulting from traffic congestion, delays or driver negligence associated with construction of the wind energy facility
Monitoring	<ul style="list-style-type: none"> » Visual monitoring of dust produced by traffic movement » Visual monitoring of traffic control measures to ensure they are effective » A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon » An incident reporting system will be used to record non-conformances to the EMP

OBJECTIVE 17: Appropriate handling and storage of chemicals, hazardous substances and waste

The construction phase of the wind energy facility will involve the storage and handling of a variety of chemicals including adhesives, abrasives, oils and lubricants, paints and solvents. The main wastes expected to be generated by the construction of the facility will include general solid waste, hazardous waste and liquid waste. A guideline for integrated management of construction waste is included as Appendix K of this EMP.

Project component/s	<ul style="list-style-type: none"> » Storage and handling of chemicals, hazardous substances and waste » Concrete batching plant
Potential Impact	<ul style="list-style-type: none"> » Release of contaminated water from contact with spilled chemicals » Generation of contaminated wastes from used chemical containers » Inefficient use of resources resulting in excessive waste generation » Pollution of the surrounding environment through inappropriate waste management practices » Litter or contamination of the site or water through poor waste management practices » Pollution of water and soil resources
Activity/risk source	<ul style="list-style-type: none"> » Wind turbine construction activities » Substation construction activities » Packaging and other construction wastes » Hydrocarbon use and storage » Spoil material from excavation, earthworks and site preparation
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons » To ensure that the storage and maintenance of machinery on-site does not cause <u>contamination</u>/pollution of the environment or harm to persons » To comply with waste management guidelines developed by contractor

- » To minimise production of waste
- » To ensure appropriate waste handling, storage and disposal
- » To avoid environmental harm from waste disposal

Mitigation: Action/control	Responsibility	Timeframe
An effective monitoring system must be implemented during the construction phase to detect any leakage or spillage of hazardous substances during their transportation, handling, use and storage.	Contractor	Duration of contract
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	Contractor	Duration of contract
Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting/toxic substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures.	Contractor	Duration of contract
In the event of a major spill or leak of contaminants, the area must be demarcated/ <u>isolated and</u> the relevant administering authority must be immediately notified as per the notification of emergencies/incidents.	Contractor	Duration of contract
All concrete mixing on site must be conducted in a designated area on an appropriately sealed surface.	Contractor	During construction
Spilled cement must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site.	Contractor	Duration of contract
Soil contaminated/ polluted as a result of a major spill must be removed from the site and disposed of at a licensed hazardous waste disposal facility. Soils contaminated/ polluted through minor spills can be treated on site provided they are contained and have not penetrated the soil surface.	Contractor	Duration of contract
Routine servicing and maintenance of vehicles must not take place on-site outside of designated areas (except for emergency situations or large cranes which cannot be moved off-site). If repairs of vehicles must take place on site, an appropriate drip tray must be used to contain any fuel or oils.	Contractor	Duration of contract
All hazardous material and chemicals on site must be stored in a clearly marked, secure area. The secure area must be designed in a way to ensure that the hazardous material and chemicals will not leak or spill and harm the environment.	Contractor	Duration of the contract
All stored fuels to be maintained within a bunded area and on a sealed surface, or contained in an appropriate manner as per the requirements of SABS 089: 1999 Part 1.	Contractor	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
Fuel storage areas must be inspected regularly to ensure bund stability, integrity and function.	Contractor ECO	Duration of contract
Hazardous substances must not be stored where there could be accidental leakage into surface or subterranean water.	Contractor	Duration of contract
No chemicals may be stored, nor may any vehicle maintenance take place within 350m of the temporal zone of wetlands, a drainage line with or without an extensive floodplain or hillside wetland.	Contractor	Duration of contract
Construction machinery must be stored in an appropriately demarcated, secure and sealed area.	Contractor	Duration of contract
Oily water from bunds at the substations must be removed from site by licensed contractors and in secure containers to avoid spills.	Contractor	Duration of contract
The storage of flammable and combustible liquids such as oils will be in designated areas which are appropriately bunded, and stored in compliance with MSDS files.	Contractor	Duration of contract
Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals will be compiled with.	Contractor	Duration of contract
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations.	Contractor	Duration of contract
Construction contractors must provide specific detailed waste management method statements to deal with all waste streams.	Contractor	Pre-construction
An integrated waste management approach that is based on waste minimisation must be implemented. This approach must include reduction, recycling, re-use and disposal where appropriate (refer to Appendix K).	Contractor	Duration of contract
Specific areas must be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste (wood and metal scrap) and contaminated waste. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage and vermin control.	Contractor	Duration of contract
Where possible, construction and general wastes on-site must be reused or recycled. Bins and skips must be available on-site for collection, separation and storage of waste streams (such as wood, metals, general refuse etc.).	Contractor	Duration of contract
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Contractor	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
Waste bins must be available and located in the area where the contract staff are working.	Contractor	Duration of contract
All general waste must be kept sealable storage containers that are animal proof, i.e. bins or skips.	Contractor	Duration of the contract
All general waste on site must be collected weekly (or more regularly if required) by an approved contractor (holder of a certificate indicating where the waste will be disposed of)	Contractor	Duration of the contract
No waste may be buried or burnt on site	Contractor	Duration of contract
Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area.	Contractor	Duration of contract
Waste and surplus dangerous goods must be kept to a minimum and must be transported by approved waste transporters to sites designated for their disposal.	Contractor	Duration of contract
Documentation (waste manifest) must be maintained detailing the quantity, nature and fate of any regulated waste. Waste disposal records must be available for review at any time.	Contractor	Duration of contract
Dispose of all solid waste collected at an appropriately registered waste disposal site. The disposal of waste shall be in accordance with all relevant legislation. Under no circumstances may waste be burnt on site.	Contractor	Duration of Contract
Where a registered waste site is not available close to the construction site, provide a method statement with regard to waste management.	Contractor	Pre-construction
Upon the completion of construction, the area must be cleared of potentially polluting materials.	Contractor	Completion of construction

Performance Indicator	<ul style="list-style-type: none"> » No chemical spills outside of designated storage areas » No water or soil contamination by spills » No complaints received regarding waste on site or indiscriminate dumping » Internal site audits ensuring that waste segregation, recycling and reuse is occurring appropriately » Provision of all appropriate waste manifests for all waste streams
Monitoring	<ul style="list-style-type: none"> » Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase. » A complaints register must be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon. » Observation and supervision of waste management practices throughout construction phase. » Waste collection to be monitored on a regular basis. » Waste documentation completed. » A complaints register 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 EMP.
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OBJECTIVE 18: Ensure disciplined conduct of on-site contractors and workers

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

Project component/s	» Wind turbines » Access roads » Substations
Potential Impact	» Pollution/contamination of the environment » Disturbance to the environment
Activity/risk source	» Contractors are not aware of the requirements of the EMP, leading to unnecessary impacts on the surrounding environment
Mitigation: Target/Objective	» To ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment

Mitigation: Action/control	Responsibility	Timeframe
The terms of this EMP and the Environmental Authorisation will be included in all tender documentation and Contractors contracts.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Tender process
An ECO must be permanently on site throughout the road construction, cable laying, and turbine foundation excavation periods, and at other times should visit the site at least once a week.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Duration of construction
Contractors must use chemical toilets/ablution facilities situated at designated areas of the site (1 toilet per 15 people); no ablution will be permitted outside the designated area and within 100m of a water course, wetland or drainage line. These facilities must be regularly serviced by appropriate contractors. Sewage from these toilets must be collected by a registered contractor weekly and disposed of at a suitably licensed treatment facility. Proof of appropriate disposal must be provided.	Contractor (and sub-contractor/s)	Duration of contract
In the event of a sewage spill from the chemical	Contractor (and sub-	Duration of

Mitigation: Action/control	Responsibility	Timeframe
toilets, mitigation action must be implemented according to the waste management standards.	contractor/s)	contract
Cooking/meals must take place in a designated area; no firewood or kindling may be gathered from the site or surrounds.	Contractor (and sub-contractor/s)	Duration of contract
All litter must be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area; particular attention needs to be paid to food waste.	Contractor (and sub-contractor/s)	Duration of contract
No one other than the ECO or personnel authorised by the ECO must disturb flora or fauna outside of the demarcated construction area/s.	Contractor (and sub-contractor/s)	Duration of contract
Contractors appointed by Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the <u>EMP and Code of Conduct documentation, specifically consequences of stock theft, gate management/access and trespassing on adjacent farms.</u>	Contractor (and sub-contractor/s)	Construction

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

OBJECTIVE 19: To avoid and or minimise the potential impact of construction on the safety of local communities and the potential loss of stock and damage to farm infrastructure.

<u>Project component/s</u>	<ul style="list-style-type: none"> » <u>wind turbines</u> » <u>access roads</u> » <u>substations</u>
<u>Potential Impact</u>	<u>Impact on safety of farmers and communities (increased crime etc) and potential loss of livestock due to stock theft by construction workers and also damage to farm infrastructure, such as gates and fences.</u>
<u>Activity/risk source</u>	<u>The presence of construction workers on the site can pose a potential safety risk to local farmers and communities and may also result in stock thefts. The activities of construction workers may also result in damage to farm infrastructure.</u>
<u>Mitigation: Target/Objective</u>	<u>To avoid and or minimise the potential impact on local communities and their livelihoods.</u>

<u>Mitigation: Action/control</u>	<u>Responsibility</u>	<u>Timeframe</u>
<ul style="list-style-type: none"> » <u>Housing of workers on site limited to the use of existing and available serviced facilities/infrastructure;</u> » <u>Establish a Monitoring Forum (MF) with the adjacent farmers and develop a site Code of Conduct for construction workers.</u> » <u>Inform all workers of the conditions contained in the site Code of Conduct and the consequences of non-compliance</u> » <u>All non-compliances and disputes/misconduct issues will be dealt with as per Code of Conduct agreed to by the developer and the community and or landowners.</u> » 	<p><u>Contractor</u></p>	<ul style="list-style-type: none"> » <u>Establish MF before construction phase commences.</u> » <u>Develop site Code of Conduct prior to commencement of construction phase. The Code of Conduct should be signed by the Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd and the contractors before the contractors move onto site;</u> » <u>Inform all construction workers of Code of Conduct requirements before construction phase commences and the consequences thereof.</u> » <u>Compensate Farmers / community members as verified by the developer and or Contractor/s. the compensation must be as contained in the Code of conduct agreement.</u>

<u>Performance Indicator</u>	<ul style="list-style-type: none"> • <u>Community MF in place before construction phase commences.</u> • <u>Code of Conduct developed and approved prior to commencement of construction phase.</u> • <u>All construction workers made aware of Code of Conduct within first week of being employed.</u> • <u>Compensation claims settled within 1 month of claim being verified by Community MF.</u>
<u>Monitoring</u>	<ul style="list-style-type: none"> • <u>Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.</u>

7.4. Detailing Method Statements

OBJECTIVE 20: To ensure all construction activities/practices/procedures are undertaken with the appropriate level of environmental awareness to minimise environmental risk, in line with the specifications of the EMP.

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

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

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

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 storm water management procedures recommended in the storm water 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 waste process.
 - * Recycle, re-use and removal process and procedure.
- » Liquid waste management:
 - * The 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 an existing facilities where possible. Where no facilities are available, grey water runoff must be controlled to ensure there is no seepage into wetlands or natural watercourses.
- » Dust and noise pollution
 - * Describe necessary measures to ensure that noise from construction activities is maintained within lawfully acceptable levels (construction activities generating output levels of 85 dB(A) near human settlement, are to be confined to working hours (06h00 - 18h00) Mondays to Saturdays).
 - * 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 storage and handling areas.

- * All storage areas, (i.e: for harmful substances appropriately banded with a suitable collection point for accidental spills must be implemented and drip trays underneath dispensing mechanisms including leaking engines/machinery).
- » Fire prevention and management measures on site.
- » Fauna and flora protection process on and off site (ie removal to reintroduction or replanting, if necessary).
 - * Rehabilitation and re-vegetation process.
- » Incident and accident reporting protocol.
- » General administration
- » Designate access road and the protocol on while roads are in use.
- » Requirements on gate control protocols.

The Contractor may not commence the activity covered by the Method Statement until it has been approved 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. The ECO should monitor the construction activities to ensure that these are undertaken in accordance with the approved Method Statement.

7.5. Awareness and Competence: Construction Phase of the Wind Energy Facility

OBJECTIVE 21: 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 EMP. The Contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The Contractors obligations in this regard include the following:

- » Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment.
- » Ensuring that a copy of the EMP is readily available on-site, and that all site staff are aware of the location and have access to the document. Employees will be familiar with the requirements of the EMP and the environmental specifications as they apply to the construction of the facility.

- » Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended an Environmental Awareness Training course. The course must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- » Basic training in the identification of archaeological sites/objects, paleontological sites, and protected flora and fauna that may be encountered on the site.
- » Awareness of any other environmental matters, which are deemed to be necessary by the ECO.
- » Ensuring that appropriate communication tools are used to outline the environmental "do's" and "don'ts" (as per the environmental awareness training course) to employees.
- » Records must be kept of those that have completed the relevant training.
- » Refresher sessions must be held to ensure the contractor's staff are aware of their environmental obligations.

7.5.1 Environmental Awareness Training

Environmental Awareness Training must take the form of an on-site talk and demonstration by the ECO 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 ECO on site.

7.5.2 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 include discussing the developer's environmental policy and values, the function of the EMP and Contract Specifications and the importance and reasons for compliance to these. The induction training must highlight 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.

7.5.3 Toolbox Talks

Toolbox talks should be held on a scheduled and regular basis (at least twice a month) 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 reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

7.6. Monitoring Programme: Construction Phase of the Wind Energy Facility

OBJECTIVE 22: 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 EMP, but also to monitor any environmental issues and impacts which have not been accounted for in the EMP that are, or could result in significant environmental impacts for which corrective action is required. The period and frequency of monitoring will be stipulated by the Environmental Authorisation (once issued). Where this is not clearly dictated, Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd will determine and stipulate the period and frequency of monitoring required in consultation with relevant stakeholders and authorities. The Project Manager will ensure that the monitoring is conducted and reported.

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

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

The Environmental Control Officer will ensure compliance with the EMP, and to conduct monitoring activities. The Environmental Control Officer must have the appropriate experience and qualifications to undertake the necessary tasks. The Environmental Control Officer will report any non-compliance or where corrective action is necessary to the Site Manager and/or any other monitoring body stipulated by the regulating authorities.

The Environmental Control Officer (ECO) will ensure compliance with the environmental authorisation (EA), EMP, relevant permits and licences and the environmental legislation during construction, and will conduct monitoring activities on a regular basis. An independent ECO must be appointed, and must have the appropriate experience and qualifications to undertake the necessary tasks. The ECO will report any non-

compliance or where corrective action is necessary to the Site Manager, DEA and/or any other monitoring body stipulated by the regulating authorities.

7.6.1. Non-Conformance Reports

All supervisory staff including Foremen, Resident Engineers, and the ECO must be provided 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.

7.6.2. Monitoring Reports

A monitoring report will be compiled by the ECO on a monthly basis and must be submitted to 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. Records relating to monitoring must be kept on site and made available for inspection to any relevant and competent authority in respect of this development.

7.6.3. Final Audit Report

A final environmental audit report must be compiled by an independent auditor and be submitted to DEA upon completion of the construction and rehabilitation activities (within 30 days of completion of the construction phase (i.e.: within 30 days of site handover) and within 30 days of completion of rehabilitation activities. 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 EMP. Further details of the audit report are contained in Clause 5 of the Environmental Authorisation dated 28 August 2012. Records relating to audits must be kept on site and made available for inspection to any relevant and competent authority in respect of this development.

**MANAGEMENT PLAN:
 REHABILITATION OF DISTURBED AREAS**

CHAPTER 8

8.1. Overall Goal for the Rehabilitation of Disturbed Areas

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

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

8.2. Objectives

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

OBJECTIVE 23: To ensure appropriate rehabilitation of disturbed areas following the execution of the works, such that residual environmental impacts are remediated or curtailed

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

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

Project component/s	<ul style="list-style-type: none"> » Wind energy facility (including and laydown areas) » Substation site and associated access road » Access roads not required for operation and maintenance
Potential Impact	<ul style="list-style-type: none"> » Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention
Activity/risk source	<ul style="list-style-type: none"> » Temporary laydown areas » Temporary access roads/tracks » Other disturbed areas/footprints
Mitigation:	<ul style="list-style-type: none"> » To ensure and encourage site rehabilitation of disturbed areas

Target/Objective	» 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
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Mitigation: Action/control	Responsibility	Timeframe
All temporary facilities, equipment and waste materials must be removed from site as soon as practically possible after construction is complete.	Contractor	Following execution of the works
All temporary fencing and danger tape must be removed once the construction phase has been completed.	Contractor	Following completion of construction activities in an area
Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion.	Contractor	Following completion of construction activities in an area
Disturbed areas must be rehabilitated/re-vegetated with appropriate natural vegetation and/or local seed mix <u>(as per the Plant Rescue and Protection and Rehabilitation Plan re</u> contained in Appendix J). Re-use of native/indigenous plant species that were removed from disturbance areas in the rehabilitation phase.	Contractor in consultation with rehabilitation specialist	Following completion of construction activities in an area
Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd in consultation with rehabilitation specialist	Post-rehabilitation
All open spaces created through the construction process must be re-vegetated and rehabilitated in a manner recommended by the Plant Rescue & Protection and Rehabilitation Plan included Appendix I.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd in consultation with rehabilitation specialist	Pre and Post-rehabilitation
On-going alien plant monitoring and removal <u>within the disturbed project footprint (where the initial clearing for construction took place)</u> must be undertaken on all areas of natural vegetation on an annual basis.	Amakhala Emoyeni RE Project 1 Amakhala Emoyeni RE Project 1 RF Pty Ltd in consultation with rehabilitation specialist	Post-rehabilitation

Performance Indicator	<ul style="list-style-type: none"> » All portions of site, including construction equipment camp and working areas, cleared of equipment and temporary facilities » Topsoil replaced on all areas and stabilised » Disturbed areas rehabilitated and acceptable plant cover achieved on rehabilitated sites
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	» Completed site free of erosion and alien invasive plants
Monitoring	» <u>On-going inspection of rehabilitated areas (originally affected areas) in order to determine effectiveness of rehabilitation measures implemented (included alien invasive plants)</u>
	»

MANAGEMENT PLAN: OPERATION

CHAPTER 9

9.1. Overall Goal for Operation

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

- » Ensures that operation activities are properly managed in respect of environmental aspects and impacts.
- » Enables the wind energy facility operation activities to be undertaken without significant disruption to other land uses in the area, in particular with regard to noise impacts, farming practices, traffic and road use, and effects on local residents.
- » Minimises impacts on birds and other fauna using the site.
- » Monitors and evaluates the impacts of the wind energy facility on birds that frequent the area, in particular monitoring of bird strikes, bird nesting activities and water bird uses of the wetlands/ephemeral pans on the site.
- » Monitors the actual noise impacts of the wind energy facility.
- » Establishes an environmental baseline for wind energy facility sites in South Africa, particularly with regard to priority bird species using the site.

9.2. Objectives

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

OBJECTIVE 24: To establish clear reporting, communication and responsibilities in relation to environmental incident

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Wind Farm Site Manager, and Environmental Manager for the operation phase of this project are detailed below.

The Wind Farm Site **Manager** will:

- » Ensure that adequate resources (human, financial, technology) are made available and appropriately managed for the successful implementation of the operational EMP.

- » Conduct annual basis reviews of the EMP 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.

The **Environmental Manager** will:

- » Develop and Implement an Environmental Management System (EMS) for the wind energy facility and associated infrastructure.
- » Manage and report on the facility'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 (DEA) on environmental performance and other issues.
- » Conduct environmental training and awareness for the employees who operate and maintain the wind energy facility.
- » 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.

OBJECTIVE 25: Securing the site

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

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

Mitigation: Action/control	Responsibility	Timeframe
Where necessary to control access, fence and secure access to the site and entrances to the site.	Amakhala Emoyeni RE Project 1	Operation
Post information boards about public safety hazards and emergency contact information	Amakhala Emoyeni RE Project 1	Operation

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

OBJECTIVE 26: Protection of vegetation

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

Project component/s	<ul style="list-style-type: none"> » Wind energy facility (including access roads) » Substations and access to substations
Potential Impact	» Disturbance to or loss of vegetation and/or habitat
Activity/risk source	» Movement of employee vehicles within and around site
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To maintain minimised footprints of disturbance of vegetation/habitats on-site » To ensure and encourage plant regrowth in areas of post-construction rehabilitation

Mitigation: Action/control	Responsibility	Timeframe
Vehicle movements must be restricted to designated roadways.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Operation
Existing roads must be maintained to ensure limited erosion and impact on areas adjacent to roadways.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Operation
An on-going alien plant monitoring and eradication programme must be implemented, if/where necessary.	Amakhala Emoyeni RE Project 1 RF Pty Ltd	Operation

Performance Indicator	<ul style="list-style-type: none"> » No further disturbance to vegetation » Continued improvement of rehabilitation efforts (including alien invasive plants) on the initially cleared areas. »
Monitoring	<ul style="list-style-type: none"> » Regular inspections to monitor plant regrowth/performance of rehabilitation efforts compared to natural/undisturbed areas

OBJECTIVE 27: Maintenance of rehabilitated areas

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

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

Mitigation: Action/control	Responsibility	Timeframe
A botanist familiar with the vegetation of the area should monitor the rehabilitation success	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd / Specialist	Annual monitoring until successful re-establishment of vegetation in an area
Fire breaks should be established, where appropriate.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Duration of contract
Road borders must be regularly maintained to ensure that vegetation remains short to serve as an effective firebreak.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Operation

Performance Indicator	<ul style="list-style-type: none"> » Successful rehabilitation of disturbed areas
Monitoring	<ul style="list-style-type: none"> » <u>An on-going alien plant monitoring and eradication programme must</u>

be implemented, if/where necessary. This must **only** areas where the initial clearance and disturbances took place.

OBJECTIVE 28: Minimisation of visual impacts

The primary visual impact, namely the appearance and dimensions of the wind energy facility (mainly the wind turbines) is not possible to mitigate to any significant extent within this landscape. The functional design of the structures and the dimensions of the facility cannot be changed in order to reduce visual impacts. Alternative colour schemes (i.e. painting the turbines sky-blue, grey or darker shades of white) are not permissible as the CAA's Marking of Obstacles expressly states, "Wind turbines shall be painted bright white to provide the maximum daytime conspicuousness". Failure to adhere to the prescribed colour specifications will result in the fitting of supplementary daytime lighting to the wind turbines, once again aggravating the visual impact. The potential for mitigation is therefore low or non-existent. Due to the nature of the area within which the facility is planned, there are only a few potentially sensitive receptors.

Other impacts include impacts associated with lighting of substations, and the aircraft warning lights mounted on top of the hub of the wind turbines. The regulations for the CAA's *Marking of Obstacles* should be strictly adhered to, as the failure of complying with these guidelines may result in the developer being required to fit additional light fixtures at closer intervals thereby aggravating the visual impact.

Project component/s	<ul style="list-style-type: none"> » Wind energy facility (including access roads) » Substations
Potential Impact	<ul style="list-style-type: none"> » Risk to aircraft in terms of the potential for collision » Enhanced visual intrusion » Impact on ambient lighting conditions
Activity/risk source	<ul style="list-style-type: none"> » Size/scale of turbines » Substation and associated lighting » Aviation lighting » Access roads » » Other associated infrastructure
Mitigation: Target/Objective	<ul style="list-style-type: none"> » <u>To adhere to the CAA consent issued for the project</u> » To minimise potential for visual impact » To ensure that the facility complies with Civil Aviation Authority requirements for turbine visibility to aircraft » Minimise contrast with surrounding environment and visibility of the turbines to humans » The containment of light emitted from the substation in order to eliminate the risk of additional night-time visual impacts.

Mitigation: Action/control	Responsibility	Timeframe
Aviation warning lights must be mounted on turbine hub or such measures required by the Civil Aviation Authority. Indications are that the facility may not be required to fit a light to each turbine, but rather place synchronous flashing lights on the turbines representing the outer perimeter of the facility.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Erection and maintenance
<u>Adhere to the project CAA consent issued for the project and its conditions</u>	<u>Contractor</u>	<u>Construction, Operation and maintenance</u>
The turbines will be painted a pale, matt, non-reflective colour (i.e. off white, as specified) and it will be ensured that the specified paint colour is complied with before erection of the turbines.	Contractor	Erection of turbines
Ensure that proper planning is undertaken regarding the placement of lighting structures for the substations and that light fixtures only illuminate areas inside the substation site.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Construction, Operation and maintenance
Maintain the general appearance of the facility in an aesthetically pleasing way.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Operation and maintenance
Undertake regular maintenance of light fixtures.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Operation and maintenance
Limit access to the wind energy facility site and substation to along existing access roads.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Operation and maintenance
» Mitigation of lighting impacts includes the pro-active design, planning and specification lighting for the facility by a lighting engineer. The correct specification and placement of lighting and light fixtures for both the turbines and the ancillary infrastructure will go far to contain rather than spread the light.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd / lighting engineer	Operation and maintenance

Performance Indicator	<ul style="list-style-type: none"> » Minimised visual intrusion on surrounding areas » Appropriate visibility of infrastructure to aircraft » The effective containment of the light to the substation site.
Monitoring	<ul style="list-style-type: none"> » Ensure that aviation warning lights or other measures are installed before construction is completed » Ensure that Aviation warning lights or other measures are functional at all times » The monitoring of the condition and functioning of the light fixtures during the operational phase of the project.

OBJECTIVE 29: Protection of avifauna

During operation of the facility, the threat of collision of avifauna with the turbine blades is the most concerning issue. However, the real extent of this threat is not currently well understood within the South African context due to the limited numbers of turbines in South Africa with which bird interactions have been monitored. Lighting of turbines and other infrastructure has the potential to attract birds, thereby increasing the risk of collisions with turbines. Infrastructure associated with the facility often also impacts on birds.

Project component/s	» wind energy facility (turbines) » substations
Potential Impact	» Disturbance to or loss of birds as a result of collision with the turbine blades
Activity/risk source	» Spinning turbine blades » substations
Mitigation: Target/Objective	» Minimise impacts associated with collisions and electrocutions

Mitigation: Action/control	Responsibility	Timeframe
Ensure that all dead stock are removed from the land as soon as possible (and perhaps relocated to safe 'restaurant' area for vultures at least 20 km from the site, and that all landowners within a wide radius (>10 km) of the facility are asked to do the same. This should reduce the numbers of vultures attracted to the area and lower collision risk.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd Environmental Manager	Construction - Operation
<u>Appoint a suitably qualified specialist to prepare a bird monitoring programme and to undertake bird monitoring during the operational phase.</u>	<u>Specialist</u> Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd <u>Environmental Manager</u>	<u>Operation</u>
Ensure that lighting on turbines is kept to a minimum and is coloured (red or green) and intermittent, rather than permanent and white, to reduce confusion effects for nocturnal migrants.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd Environmental Manager	Construction - Operation

Performance Indicator	» Reduced impacts on avifauna from operation of the facility
Monitoring	» Observation of avifaunal populations and incidence of injuries/death from collisions from turbine blades.

OBJECTIVE 30: Appropriate handling and management of hazardous substances and waste

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

Project component/s	<ul style="list-style-type: none"> » Wind turbines » Substations
Potential Impact	<ul style="list-style-type: none"> » Inefficient use of resources resulting in excessive waste generation » Litter or contamination of the site or water through poor waste management practices
Activity/risk source	<ul style="list-style-type: none"> » Generators and gearbox - turbines » Transformers and switchgear - substation » Water storage tank » Fuel and oil storage » Maintenance building
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To comply with waste management guidelines » To minimise production of waste » To ensure appropriate waste disposal » To avoid environmental harm from waste disposal

Mitigation: Action/control	Responsibility	Timeframe
Hazardous substances must be stored in sealed containers within a clearly demarcated designated area.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Operation
Storage areas for hazardous substances must be appropriately sealed and banded.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Operation
All structures and/or components replaced during maintenance activities must be appropriately disposed of at an appropriately licensed waste disposal site or sold to a recycling merchant for recycling.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Operation
Care must be taken to ensure that spillage of oils and other hazardous substances are limited during maintenance. Handling of these materials should take place within an appropriately sealed and banded area. Should any accidental spillage take place, it will be cleaned up according to specified standards regarding bioremediation.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Operation and maintenance
Waste handling, collection and disposal operations must be managed and controlled by a waste	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Operation

Mitigation: Action/control	Responsibility	Timeframe
management contractor.	/waste management contractor	
Used oils and chemicals: » 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.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Operation
It must be ensured that volumes of any hazardous waste stored on site do not exceed 30m ³ . Should this volume be exceeded, a waste license will be required to be obtained.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Operation
General waste must be recycled where possible or disposed of at an appropriately licensed landfill.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Operation
Hazardous waste (including hydrocarbons) and general waste must be stored and disposed of separately.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Operation
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Operation

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

OBJECTIVE 31: Noise control

Projected noise levels during operation of the Wind Energy Facility³ were modelled using the methodology as proposed by SANS 10357:2004. The resulting future noise projections indicated that the operation of the facility would comply with the Noise Control Regulations (GN R154), yet would not comply with the guidelines as proposed by SANS 10103:2004. The significance of this noise impact was determined to be medium. Mitigation measures were proposed that would reduce the significance to a more acceptable low.

When considering the potential cumulative effects when the proposed Cookhouse Wind Energy Facility is added indicates non-compliance with both the Noise Control Regulations as well as the SANS 10103:2004 guidelines. It becomes critical that both developers implement appropriate mitigation measures, especially for the boundary area between the two facilities.

The following measures are recommended to define the performance of the developer in mitigating the projected impacts and reducing the significance of the noise impact.

Project component/s	» wind turbines
Potential Impact	<ul style="list-style-type: none"> » Increased noise levels at potentially sensitive receptors » Changing ambient sound levels could change the acceptable land use capability » Disturbing character of sound
Activity/risk source	» Simultaneous operation of a number of wind turbines close to a sensitive receptor
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Ensure that the change in ambient sound levels as experienced by Potentially Sensitive Receptors is less than 65 dBA through appropriate placement of turbines during the final design phase. » Ensure acceptable noise levels at surrounding stakeholders and potentially sensitive receptors.

Mitigation: Action/control	Responsibility	Timeframe
Define the ambient sound levels over a 24-hour period before the operational phase begins inside and outside of the dwellings of at least 3 Potentially Sensitive Receptors.	Acoustical Consultant / Approved Noise Inspection Authority	Before operational phase commences
Design and implement a noise monitoring programme.	Acoustical Consultant / Approved Noise	Before operational

³ The analysis was based the originally assessed 350 turbine layout as opposed to the approved 56 turbine Final Layout. Impacts are likely to be lower for the approved final layout than as assessed in the EIA.

Mitigation: Action/control	Responsibility	Timeframe
	Inspection Authority	phase commences
Add additional noise monitoring points at any complainants that registered a noise complaint relating to the operation of the wind energy facility.	Acoustical Consultant / Suitable qualified person/s	With quarterly monitoring
All relevant staff to be given training in actions to minimise noise impacts.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Operation
All staff must ensure that all the equipment and machinery are well maintained and equipped with silencers.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Operation

Performance Indicator	Ensure that the change in ambient sound levels as experienced by Potentially Sensitive Receptors is less than 65 dBA.
Monitoring	Quarterly noise monitoring by an Acoustic Consultant or Approved Noise Inspection Authority. Noise monitoring programme to be developed and implemented at the start of operation and continue for 1 year.

OBJECTIVE 32: Maximise local employment and business opportunities associated with the operational phase.

Project component/s	Day to day operational activities associated with the wind energy facility including maintenance etc.
Potential Impact	» The opportunities and benefits associated with the creation of local employment and business should be maximised
Activity/risk source	» The operational phase of the wind energy facility will create adequate full time employment opportunities.
Mitigation: Target/Objective	» In the medium to long term employ adequate locals as possible to fill employment opportunities.

Mitigation: Action/control	Responsibility	Timeframe
<u>As far as practical, the entire workforce of permanent staff should be based in local towns of Cookhouse, Bedford and or Somerset East. Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd as far as practical, will implement a training and skills development and training programme, taking the local content into consideration.</u>	<u>Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd</u>	<u>Develop programme during the construction/operation phase</u>
Identify local members of the community who are suitably qualified or who have the potential to be employed full time.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Identify members during the construction phase

Performance Indicator	<ul style="list-style-type: none"> » <u>A training and skills development programme developed and designed before construction phase completed</u> » Potential local community members identified before construction phase completed.
Monitoring	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd must monitor indicators listed above to ensure that they have been met for the operational phase.

OBJECTIVE 33: Maximise the potential tourism opportunities during the operational phase. Highlight the benefits of renewable energy projects.

Project component/s	Operational phase of the project.
Potential Impact	<ul style="list-style-type: none"> » The proposed wind energy facility has the potential to provide Blue Crane Route Municipality with an attraction that would improve its attraction to tourists. The development also has the potential to promote the benefits of renewable energy projects.
Activity/risk source	<ul style="list-style-type: none"> » The establishment of a wind energy facility has the potential to create and attraction for visitors to the area. The development also has the potential to promote the benefits of renewable energy projects.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To enhance the potential tourism and renewable energy opportunities associated with the proposed wind energy facility.

Mitigation: Action/control	Responsibility	Timeframe
Liaise with representatives from the Blue Crane Route Municipality and tourism organisations to raise awareness of the proposed wind energy facility	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	During the construction phase
Establish a renewable energy interpretation centre at the site. The centre should be equipped with information boards that provide visitors with information on the project and other relevant information.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Establish centre at the outset of the construction phase. This will create an opportunity to provide tourists with information on both the construction and operational phases of the project.

Performance Indicator	<ul style="list-style-type: none"> » Meeting with Blue Crane Route Municipality and local tourism organisations during the construction phase. » Establishment of interpretation centre at the outset of the construction phase.
Monitoring	Independent monitoring to ensure that they have been met for the operational phase.

OBJECTIVE 34: Protection of Bats

Bird and bat deaths are one of the most controversial biological issues related to wind turbines. The deaths of birds and bats at wind farm sites have raised concerns by conservation agencies internationally. Bats have been found to be particularly vulnerable to being killed by wind turbines. Pre-construction bat monitoring has been initiated on the site, and has been completed for all 4 seasons.

Project component/s	<ul style="list-style-type: none"> » <u>access roads</u> » <u>substation</u> » <u>wind turbines</u>
Potential Impact	» <u>Bat mortality and destruction of habitat / roosts</u>
Activity/risk source	» <u>Wind turbine placement</u>
Mitigation: Target/Objective	» <u>Reduce impacts on bat species</u>

Mitigation: Action/control	Responsibility	Timeframe
<u>A preconstruction survey for bats must be continued to confirm whether bat species of concern occur on site or not and whether roosting habitats or known important maternity roosts occur within close proximity to the site.</u>	<u>Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd/Specialist</u>	<u>Planning & design</u>
<u>If the preconstruction survey finds that the presence of bats or roosting habitats of concern occur, then the monitoring programme should be continued operation to document the effect of wind turbines on bat species of concern.</u>	<u>Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd /Specialist</u>	<u>Construction & operation</u>
<u>Implementing adaptive mitigation measures, involving ongoing post – construction monitoring and adjustment of mitigation measures .</u>	<u>Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd /Specialist</u>	<u>Construction & operation</u>

**MANAGEMENT PLAN:
 DECOMMISSIONING**

CHAPTER 10

The turbine infrastructure which will be utilised for the proposed wind energy facility is expected to have a lifespan of 20 to 30 years (with maintenance). Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life. The decommissioning activities would need to comply with the legislation relevant at the time.

Should the activity ever cease or become redundant, the applicant shall undertake the required actions as prescribed by legislation at the time and comply with all relevant legal requirements administered at any relevant and competent authority at that time.

10.1. Site Preparation

Site preparation activities will include confirming the integrity of the access to the site to accommodate required abnormal load equipment and lifting cranes, preparation of the site (e.g. lay down areas, construction platform) and the mobilisation of construction equipment.

10.2 Disassemble Existing Turbine

A large crane will be brought on site. It will be used to disassemble the turbine and tower sections. These components will 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.

OBJECTIVE 34: To avoid and or minimise the potential impacts associated with the decommissioning phase.

Project component/s	» Decommissioning phase of the wind energy facility.
Potential Impact	» Decommissioning will result in job losses, which in turn can result in a number of social impacts, such as reduced quality of life, stress, depression etc. However, the number of people affected (~90) is relatively small. Decommissioning is also similar to the construction phase in that it will also create temporary employment opportunities.
Activity/risk source	» Decommissioning of the wind energy facility.

Mitigation: Target/Objective	» To avoid and or minimise the potential social impacts associated with decommissioning phase of the wind energy facility.
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Mitigation: Action/control	Responsibility	Timeframe
<u>Retrenchments should Comply with the South African labour legislation of the day</u>		
<u>Rehabilitation to be undertaken in terms of specifications outlined in the Rehabilitation Section of this EMP (Chapter 8) as well as in terms of any specific requirements applicable at the time.</u>	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	At decommissioning.

Performance Indicator	South African Labour legislation at the relevant time
Monitoring	Rehabilitation undertaken in accordance with the <u>EMP and other related documents at that time.</u>