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

OPERATION ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr) FOR PHASE 1 OF THE AMAKHALA EMOYENI WIND ENERGY FACILITY

Revision 3
December 2017

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PROJECT DETAILS

DEA Reference No. : 12/12/20/1754/1

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

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Report Status : Revision 3: OEMPr

Submission Date: 12 December 2017

When used as a reference this report should be cited as: Savannah Environmental (2017) Environmental Management Plan Revision 3: Phase 1 of 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.

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.

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.

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

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.

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.

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

DEA	National Department of Environmental Affairs
DMR	Department of Mineral Resources
DOT	Department of Transport
DWS	Department of Water and Sanitation
ECO	Environmental Control Officer
ECPHRA	Eastern Cape provincial Heritage Resources Agency
EIA	Environmental Impact Assessment
OEMP	Operation Environmental Management Plan
EO	Environmental officer
km ²	Square kilometres
m ²	Square meters
MW	Mega Watt
NEMA	National Environmental Management Act (Act No 107 of 1998)
NHRA	National Heritage Resources Act (Act No 25 of 1999)
NGOs	Non-Governmental Organisations
NWA	National Water Act (Act No 36 of 1998)
SAHRA	South African Heritage Resources Agency

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INTRODUCTION

CHAPTER 1

This Operation Environmental Management Programme (OEMPr) has been compiled for the Amakhala Emoyeni Wind Energy Facility being operated by Amakhala Emoyeni RE Project 1 RF (Pty) Ltd. The facility comprises of 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 EMPr 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 of the facility has been completed and the project is now moving into the operation phase.

This Operation Environmental Management Programme (OEMPr) is an update of the Final EMPr for Phase 1 of the wind energy facility approved on the 28 May 2014. This EMPr is applicable to all the employees and contractors of Amakhala Emoyeni RE Project 1 RF (Pty) Ltd working on operation and maintenance phases of the facility. The document will be adhered to and updated as relevant throughout the project life cycle as it is seen as a living document that could respond to real-time changes. Any changes to the OEMPr, which are environmentally defensible, will 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 has constructed 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 wind energy facility is 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**, have been constructed over an area of approximately 130km² in extent.

Infrastructure associated with the facility includes:

- » **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 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
- » Social impacts

No absolute no go areas have been identified to be associated with the 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 OEMPr 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 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, rives, 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.

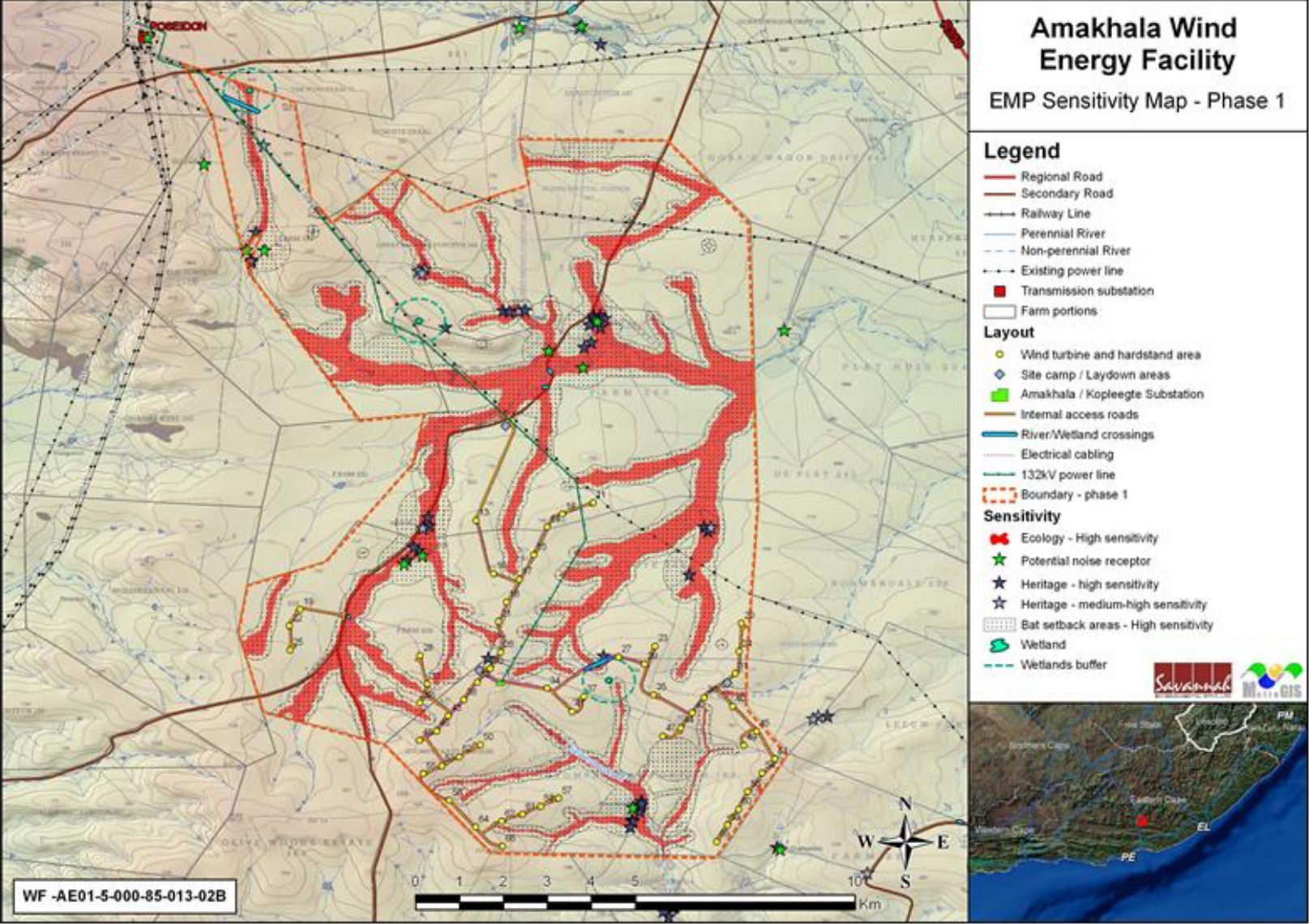


Figure 2.1: Final layout with the areas of potential sensitivity identified through the EIA process for Phase 1

2.3. Activities and Components associated with the Wind Energy Facility

The main operation 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 operation and decommissioning

Main Activity / Project Component	Components of Activity	Details
Operation		
Operation	<ul style="list-style-type: none"> » 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	Maintenance activities include <ul style="list-style-type: none"> » Oil and grease – turbines » Transformer oil – substations » Waste product disposal; and 	<ul style="list-style-type: none"> » 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. » The turbine infrastructure is expected to have a lifespan of approximately 20-30 years, with maintenance.
Decommissioning		
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 	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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) <u>or legislation that will be applicable at the time</u>. If the project requires construction work outside of the designated hours, regulatory authorities

Main Activity / Project Component	Components of Activity	Details
		<p>and affected stakeholders will be consulted and subsequent negotiations will be made to ensure the suitability of the revised activities.</p> <p>» If any blasting is required the public in the area must be notified prior to the activity.</p>

PURPOSE AND OBJECTIVES OF THIS EMP

CHAPTER 3

An 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 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 operation phase of the project, and is intended to manage and mitigate operation activities so that unnecessary or preventable environmental impacts do not result. The EMP also defines monitoring requirements in order to ensure that the specified objectives are met.

This Operational Environmental Management Programme (OEMP) 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 OEMP by the project implementer as well as compliance monitors).

The EMP has the following objectives:

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

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

- » 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 for the operation phase 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 OEMPr 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 as well as those emanating from the walkthrough surveys of the optimised layout, where they are different from those identified in the various specialist studies undertaken during the initial processes.. This will contextualise the OEMPr and enable a thorough understanding of its role and purpose in the integrated environmental management process. This EMP for operation activities has been compiled in accordance with Appendix 4 of the EIA Regulations of 2014, as amended in April 2017.

The OEMPr is a dynamic document, which must be updated when required. It is considered critical that this final OEMPr be updated to include site-specific information and specifications as required throughout the life-cycle of the facility. This will ensure that the project activities are planned and implemented taking sensitive environmental features into account.

STRUCTURE OF THIS EMP

CHAPTER 4

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

- » Operation activities; and
- » 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, 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 OEMPr table has been established for each environmental objective. The information provided within the OEMPr 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.: » 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 OEMPr 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.
- » Additional or unforeseen environmental impacts are identified and additional measures are required to be included in the OEMPr to prevent deterioration or further deterioration of the environment.
- » 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 EMPr was compiled by:

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EMP Compilers:	Lisa Opperman	Savannah Environmental
	Tebogo Mapinga	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:
OPERATION

CHAPTER 5

5.1. 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.

5.2. Objectives

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

OBJECTIVE 1: 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 Operation EMPr.

- » 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 2: 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

Mitigation: Action/control	Responsibility	Timeframe
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 3: 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	» Regular inspections to monitor plant regrowth/performance of

rehabilitation efforts compared to natural/undisturbed areas

OBJECTIVE 4: 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	» 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	» To ensure and encourage site rehabilitation of disturbed areas

Mitigation: Action/control	Responsibility	Timeframe
A botanist <u>or environmental specialist</u> 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	» Successful rehabilitation of disturbed areas
Monitoring	» An on-going alien plant monitoring and eradication programme must be implemented, if/where necessary. This must only areas where the initial clearance and disturbances took place.

OBJECTIVE 5: 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"> » To adhere to the CAA consent issued for the project. » 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	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Erection and maintenance

Mitigation: Action/control	Responsibility	Timeframe
a light to each turbine, but rather place synchronous flashing lights on the turbines representing the outer perimeter of the facility.		
Adhere to the project CAA consent issued for the project and its conditions	Contractor	Operation and maintenance
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 E moyeni RE Project 1 (RF) (Pty) Ltd	Operation and maintenance
Maintain the general appearance of the facility in an aesthetically pleasing way.	Amakhala E moyeni RE Project 1 (RF) (Pty) Ltd	Operation and maintenance
Undertake regular maintenance of light fixtures.	Amakhala E moyeni 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 E moyeni 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 E moyeni 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 » 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 6: 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	Operation
Appoint a suitably qualified specialist to prepare a bird monitoring programme and to undertake bird monitoring during the operational phase.	Specialist Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd Environmental Manager	Operation
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	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 7: 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 / <u>Site Manager</u>	Operation
Storage areas for hazardous substances must be appropriately sealed and banded.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd / <u>Site Manager</u>	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 / <u>Site Manager</u>	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 / <u>Site Manager</u>	Operation and maintenance
Waste handling, collection and disposal operations must be managed and controlled by a waste management contractor.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd / <u>Site Manager</u>	Operation
Used oils and chemicals: <ul style="list-style-type: none"> » 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 / <u>Site Manager</u>	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	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd / <u>Site Manager</u>	Operation

Mitigation: Action/control	Responsibility	Timeframe
to be obtained.		
General waste must be recycled where possible or disposed of at an appropriately licensed landfill.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd / <u>Site Manager</u>	Operation
Hazardous waste (including hydrocarbons) and general waste must be stored and disposed of separately.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd / <u>Site Manager</u>	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 / <u>Site Manager</u>	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 8: Noise control

Projected noise levels during operation of the Wind Energy Facility² 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.

² 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.

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	» 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	» Ensure acceptable noise levels at surrounding stakeholders and potentially sensitive receptors.

Mitigation: Action/control	Responsibility	Timeframe
<u>Noise monitoring should take place if valid noise complaints relating to the operation of the facility are registered. Annual feedback regarding noise levels should be presented to all stakeholders and other interested and affected parties in the area.</u>	Acoustical Consultant	Operation
<u>Noise measurements should be conducted by an acoustic consultant. These measurements should take place over a period of 24 hours in 10 minute bins, with the resulting data co-ordinated with wind speeds as measured (or calculated at a 10 meter height. These measurements should be collected when the wind turbines are operational.</u>	Acoustical Consultant	<u>Operation</u>

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 9: 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
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.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	Operation
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 to be implemented during operation

Performance Indicator	» A training and skills development programme developed and designed before construction phase completed » 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 10: 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	» 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	» 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	» To enhance the potential tourism and renewable energy opportunities associated with the proposed wind energy facility.

Mitigation: Action/control	Responsibility	Timeframe
Establish <u>an exhibition facility within the O&M building on site. The facility should have the necessary information to demonstrate to visitors the operation of the wind farm.</u>	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd	<u>Operation</u>

Performance Indicator	» Establishment of the <u>exhibition facility</u> at the outset of the <u>operation</u> phase.
Monitoring	Independent monitoring to ensure that they have been met for the operation phase.

OBJECTIVE 11: 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	» access roads » substation » wind turbines
Potential Impact	» Bat mortality and destruction of habitat / roosts
Activity/risk source	» Wind turbine placement
Mitigation: Target/Objective	» Reduce impacts on bat species

Mitigation: Action/control	Responsibility	Timeframe
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.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd /Specialist	Operation

Mitigation: Action/control	Responsibility	Timeframe
Implementing adaptive mitigation measures, involving ongoing post – construction monitoring and adjustment of mitigation measures.	Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd /Specialist	<u>Operation</u>

MANAGEMENT PLAN:
 DECOMMISSIONING

CHAPTER 6

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.

6.1. 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.

6.2 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
Retrenchments should Comply with the South African labour legislation of the day	<u>Amakhala Emoyeni RE Project 1 (RF) (Pty) Ltd</u>	<u>At decommissioning.</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.	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 EMP and other related documents at that time.