
PROPOSED GREAT KAROO WIND FARM, NORTHERN CAPE PROVINCE

CONSTRUCTION & OPERATION ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

DFFE REFERENCE: 14/12/16/3/3/2/826

REVISION 2

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Authorisation
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PROJECT DETAILS

| | | |
|--------------------------|---|--|
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DEFINITIONS AND TERMINOLOGY

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

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

Ambient sound level: means the background noise level already present in the environment (in the absence of noise generated by any other proposed development).

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

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

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

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).

Commissioning: Commissioning commences once construction is completed. Commissioning covers all activities including testing after all components of the power station 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.

Department / the competent authority: Refers to the Department of Forestry, Fisheries and the Environmental or any other relevant authority responsible for administering environmental laws.

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. A disturbing noise would be a noise that increase the rating level with more than 7 dBA. Therefore, for this area the rating level is 35 dBA, and if the operation of the wind energy facility results in a noise level higher than 42 dBA, and that change can be attributed to the wind energy facility, that would be a disturbing noise.

'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.

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 an environmental impact assessment process 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 Programme: A plan / programme that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its on-going maintenance after implementation.

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

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).

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

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.

Method statement: method statement is a written submission to the ECO and the Owner's Representative by an appointed 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/>).

Perennial and non-perennial: Perennial systems contain flow or standing water for all or a large proportion of any given year, while non-perennial systems are episodic or ephemeral and thus contains flows for short periods, such as a few hours or days in the case of drainage lines.

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 (e.g. geotechnical surveys) which do not require Environmental Authorisation.

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 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 80 – 150 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. Larger wind turbines are usually mounted on towers ranging from 40 to 150 m tall. 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, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to the Waste Amendment Act (as amended on June 2014); or

any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister.

Watercourse: as per the National Water Act means -

- (a) a river or spring;
- (b) a natural channel in which water flows regularly or intermittently;
- (c) a wetland, lake or dam into which, or from which, water flows; and
- (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

Wetland: Wetlands are defined in the National Water Act as 'land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

- » **Intermittent or seasonal wetlands:** are vleis or larger drainage lines where water tends to accumulate during the rainy season, and may persist for a week or longer, usually several months. In this case there is enough seasonal moisture accumulation to ensure that surface soils remain waterlogged for a longer period, hence also supporting specially adapted flora that will grow in (seasonally) saturated soils.
- » **Perennial¹ wetlands:** are all dams, rivers and other water bodies that carry water permanently, and will only have severely reduced flows or water during periods of prolonged severe droughts.

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.

¹ Perennial: from Latin per, "through", annus, "year", lasting or active through the year or through many years, indefinitely.

ABBREVIATIONS AND ACRONYMS

| | |
|-----------------|--|
| DFFE | National Department of Forestry, Fisheries and the Environment |
| ECO | Environmental Control Officer |
| EIA | Environmental Impact Assessment |
| EMPr | Environmental Management Programme |
| EO | Environmental Officer (employed by the Contractor) |
| GG | Government Gazette |
| GN | Government Notice |
| Ha | Hectare |
| I&AP | Interested and Affected Party |
| km ² | Square kilometres |
| kV | Kilovolt |
| m ² | Square meters |
| m/s | Meters per second |
| MW | Mega Watt |
| NEMA | National Environmental Management Act (Act No 107 of 1998) |
| NHRA | National Heritage Resources Act (Act No 25 of 1999) |
| NIRP | National Integrated Resource Planning |
| NWA | National Water Act (Act No 36 of 1998) |
| PM | Project Manager |
| SHE | Safety, Health and Environment |
| SAHRA | South African Heritage Resources Agency |
| SANRAL | South African National Roads Agency Limited |

TABLE OF CONTENTS

PAGE

| | |
|---|-----------|
| CHAPTER 1: PURPOSE & OBJECTIVES OF THE EMPR | 1 |
| CHAPTER 2: PROJECT DETAILS | 6 |
| 2.1 Activities and Components associated with the Wind Energy Facility | 8 |
| 2.2 Findings of the Environmental Impact Assessment (2014) | 14 |
| 2.2 Findings of the EA Amendment process (2019) | 15 |
| 2.3 Findings of the Walkthrough Assessments (2021) | 17 |
| 2.2 Applicable Legislation | 22 |
| CHAPTER 3: STRUCTURE OF THIS EMPr | 39 |
| 3.1. Project Team | 40 |
| CHAPTER 4: MANAGEMENT PROGRAMME FOR THE WIND ENERGY FACILITY: PLANNING & DESIGN | 41 |
| 4.1. Planning and Design | 41 |
| OBJECTIVE 1 : To ensure that the design of the facility responds to the identified environmental constraints and opportunities | 41 |
| chapter 5: MANAGEMENT PROGRAMME FOR THE WIND ENERGY FACILITY: CONSTRUCTION | 46 |
| 5.1. Overall Goal for Construction | 46 |
| 5.2. Institutional Arrangements: Roles and Responsibilities for the Construction Phase of the Wind Energy Facility | 46 |
| 5.3. Objectives for the Construction EMPr | 49 |
| OBJECTIVE 2 : Securing the site and site establishment | 49 |
| OBJECTIVE 3 : Maximise local employment and business opportunities associated with the construction phase | 50 |
| OBJECTIVE 4 : Avoid the negative social impacts on family structures and social networks due to the presence of construction workers | 51 |
| OBJECTIVE 5 : Noise control | 53 |
| OBJECTIVE 6 : Management of dust and emissions and damage to roads | 54 |
| OBJECTIVE 7 : Soil and rock degradation and erosion control | 55 |
| OBJECTIVE 8 : Limit disturbance and avoid damage to wetland areas and drainage lines | 58 |
| OBJECTIVE 9 : Protection of indigenous vegetation and control of alien invasive plants | 59 |
| OBJECTIVE 10 : Protection of fauna & avifauna | 61 |
| OBJECTIVE 11 : Protection of fossils and sites of heritage and archaeological value | 62 |
| OBJECTIVE 12 : Minimisation of visual impacts associated with construction | 64 |
| OBJECTIVE 13 : Appropriate handling and storage of chemicals, hazardous substances and waste | 64 |
| OBJECTIVE 14 : Ensure disciplined conduct of on-site contractors and workers | 68 |
| OBJECTIVE 15 : To avoid and or minimise the potential risk of increased veld fires during the construction phase. | 69 |
| OBJECTIVE 16 : Traffic management and transportation of equipment and materials to site (Traffic Management Plan) | 70 |
| OBJECTIVE 17 : Effective management of concrete batching plants | 71 |
| 5.4. Detailing Method Statements | 74 |
| OBJECTIVE 18 : Ensure all construction activities are undertaken with the appropriate level of environmental awareness to minimise environmental risk | 74 |
| 5.5. Awareness and Competence: Construction Phase of the Wind Energy Facility | 76 |

OBJECTIVE 19 : To ensure all construction personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm..... 76

5.6. Monitoring Programme: Construction Phase of the Wind Energy Facility 77

OBJECTIVE 20 : To monitor the performance of the control strategies employed against environmental objectives and standards 77

CHAPTER 6: MANAGEMENT PROGRAMME FOR THE WIND ENERGY FACILITY: REHABILITATION OF DISTURBED AREAS..... 78

6.1. Overall Goal for the Rehabilitation of Disturbed Areas 78

OBJECTIVE 21 : To ensure rehabilitation of disturbed areas 78

CHAPTER 7: MANAGEMENT PROGRAMME FOR THE WIND ENERGY FACILITY: OPERATION 80

7.1. Overall Goal for Operation 80

7.2. Objectives 81

OBJECTIVE 22 : Securing the site 81

OBJECTIVE 23 : Protection of indigenous natural vegetation, fauna and maintenance of rehabilitation 81

OBJECTIVE 24 : Protection of avifauna and priority bird species 82

OBJECTIVE 25 : Protection of Bats 83

OBJECTIVE 26 : Minimisation of visual impact – lighting 85

OBJECTIVE 27 : Minimisation of noise impacts from turbines 86

OBJECTIVE 28 : Appropriate handling and management of hazardous substances and waste 87

OBJECTIVE 29 : Maximise local employment and business opportunities during operation 89

OBJECTIVE 30 : Ensure the implementation of an appropriate fire management plan during the operation phase00 90

OBJECTIVE 31 : Minimise the potential negative impact on farming activities and on the surrounding landowners 91

CHAPTER 8: MANAGEMENT PLAN FOR THE WIND ENERGY FACILITY: DECOMMISSIONING 92

8.1. Site Preparation..... 92

8.2 Disassemble Turbines 92

OBJECTIVE 32 OBJECTIVE: To avoid and or minimise the potential environmental and social impacts associated with the decommissioning phase..... 92

List of Figures:

Figure 2.1: Layout Map 7

Figure 2.2: Combined sensitivity Map 21

Appendices:

- Appendix A:** Grievance Mechanism for Public Complaints
- Appendix B:** Alien Invasive and Open Space Management Plan
- Appendix C:** Plant Rescue and Protection Plan
- Appendix D:** Revegetation and Rehabilitation Plan
- Appendix E:** Traffic Management Plan
- Appendix F:** Storm Water Management Plan
- Appendix G:** Emergency Preparedness and Response plan
- Appendix H:** Erosion Management Plan
- Appendix I:** Post construction Avifaunal Plan
- Appendix J:** Environmental Authorisation
- Appendix K:** EA Amendments
- Appendix L:** Updated Layout and Sensitivity Maps
- Appendix M:** Environmental Team CVs

CHAPTER 1: PURPOSE & OBJECTIVES OF THE EMPr

An Environmental Management Programme (EMPr) is defined as “an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented or mitigated, and that the positive benefits of the projects are enhanced”². The objective of this Environmental Management Programme is to provide consistent information and guidance for implementing the management and monitoring measures established in the permitting process and help achieve environmental policy goals. The purpose of an EMPr is to help ensure compliance with recommendations and conditions specified through an EIA process, as well as to ensure continuous improvement of environmental performance, reducing negative impacts and enhancing positive effects during the construction and operation of the facility. An effective EMPr is concerned with both the immediate outcome as well as the long-term impacts of the project.

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

The EMPr has been developed as a set of environmental specifications (i.e. principles of environmental management for the proposed 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 for use of the EMPr by the project implementer as well as compliance monitors).

The EMPr 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.
- » 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 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.

² Provincial Government Western Cape, Department of Environmental Affairs and Development Planning: *Guideline for Environmental Management Plans*, 2005.

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

Great Karoo Wind Farm (Pty) Ltd must ensure that the implementation of the project complies with the requirements of any and all environmental authorisations and permits (once issued), as well as with obligations emanating from all relevant environmental legislation. This obligation is partly met through the development of the EMPr, and the implementation of the EMPr through its integration into the contract documentation for activities associated with both construction and operation. Since this EMPr is part of the EIA process undertaken for the proposed wind energy facility, it is important that this guideline document be read in conjunction with the Final Scoping Report (December 2011), Amended Final EIA Report (April 2014) and the EA Amendment Motivation Report (July 2019)³ as well as any relevant specialist studies conducted in accordance with the EA conditions 13, 15 and 20. This will contextualise the EMPr and enable a thorough understanding of its role and purpose in the integrated environmental process. This EMPr for pre-construction, construction, operational and decommissioning activities has been compiled in accordance with Appendix 4 of the EIA Regulations (2014) as amended and 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 their responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. The Contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The Contractors obligations in this regard include the following:

- » 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 EMPr is readily available on-site, and that all site staff are aware of the location and have access to the document. Employees must be familiar with the requirements of the EMPr 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 appropriate Environmental Awareness Training course. The course must provide the site staff with an appreciation of the project's environmental requirements, the EMPr specifications, and how they are to be implemented.
- » Basic training in the identification of archaeological sites/objects, and protected or Red List flora and fauna that may be encountered on the site.
- » Awareness of any other environmental matters, which are deemed to be necessary by the Environmental Control Officer (ECO).

The EMPr is a dynamic document, which must be updated when required. It is considered critical that this draft EMPr 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.

³ The Environmental authorization was amended in 2019 to increase the turbine specifications and update the site layout. Updated specialist assessments were undertaken as part of this amendment and are included in the July 2019 Amendment Motivation Report.

The Great Karoo Wind Farm (Pty) Ltd received an Environmental Authorisation (EA) for the construction of Great Karoo Wind Energy Facility (WEF) on the 12th of August 2014 (as subsequently amended on 25 July 2016, 5 May 2017 and 20 September 2019). The EA and amendments thereto are contained in **Annexure N**.

In terms of condition 15 of the EA, the EMPr for the project was not approved at the time the EA was granted, and the EMPr was required to be updated in accordance with conditions 13, 15 and 20 of the EA. This EMPr represents the revised EMPr which has been updated in accordance with the conditions of the EA and the findings and recommendations of the specialist walkthroughs undertaken for the final site layout in 2021.

1.1. **EMPr update as required in section 15 and 19.**

This EMPr update is being undertaken in accordance with the requirements of Conditions 13, 15 and 20 of the EA dated, 12 August 2014, as amended.

Table 1.1: Indicates how the conditions of the EA have been addressed in this EMPr update:

| EA Condition Reference | Section of EMPr where Condition has been addressed |
|--|---|
| <u>The EMPr amendment must include the following:</u> | |
| <u>15. The Environmental Management Programme (EMPr) submitted as part of the EIR is not approved and must be amended to include measures as dictated in the final layout map, and micro-siting, and the provisions of this environmental authorisation. The EMPr must be made available for comment by registered interested and affected parties and the holder of this environmental authorisation must consider such comments. Once amended, the final EMPr must be submitted to the department for written approval prior to the commencement of the activity. Once approved the EMPr must be implemented and adhered to.</u> | <u>This is the updated EMPr Rev 2 which has been updated to take into account all measures arising from the final specialist walkthrough and micro-siting exercise and he result final layout. This EMPr will be submitted for comment to the registered interested and affected parties and the public for comment from 19 July 2021 to 19 August 2021. All comments received will be considered and the EMPr amended as such.</u> |
| <u>20.1. The requirements and conditions of this authorisation.</u> | <u>Chapter 1 to Chapter 5 of this EMPr</u> |
| <u>20.2 All mitigation measures arising from compliance with condition 49 of this EA.</u> | <u>All recommendations and mitigation measures of the EIAR and the specialist reports have been included in Chapters 4, 5 and 6 of the EMPr. Where amendments and/or additions have been made, these have been underlined for an ease of reference.</u> |
| <u>20.3 All recommendation and mitigation measures recorded in the EIAR.</u> | <u>All mitigation measures listed in the specialist reports have been included in Chapters 4, 5 and 6 of the EMPr. Where amendments and/or additions have been made, these have been underlined for an ease of reference.</u> |
| <u>20.4. All mitigation measures as listed in the specialist reports must be included in the EMPr and implemented.</u> | <u>All mitigation measures listed in the specialist reports have been included in Chapters 4, 5 and 6 of the EMPr. Where amendments and/or additions have been made, these have been underlined for an ease of reference.</u> |
| <u>20.5 The final Site Layout Map</u> | <u>The final site layout map for the facility is included in</u> |

| EA Condition Reference | Section of EMPr where Condition has been addressed |
|--|--|
| <p><u>20.6. An alien invasive management plan to be implemented during the construction and operation of the facility. The plan must include mitigation measures to reduce the invasion of alien species and ensure that the continuous monitoring and removal of alien species is undertaken.</u></p> | <p>Appendix L of the EMPr and included as Figure 2.1</p> <p><u>An Alien Invasive Management Plan (inclusive of an Open Space Management Plan) has been included as Appendix B of the EMPr. The plan includes mitigation measures to be implemented to reduce the invasion of alien plant species within the project footprint and the surrounding area.</u></p> |
| <p><u>20.7. A plant rescue and protection plan which allows for the maximum transplant of conservation important species from areas to be transformed. This plan must be compiled by a vegetation specialist familiar with the site in consultation with the ECO and be implemented prior to the commencement of the construction phase.</u></p> | <p><u>The Plant and Rescue Protection Plan has been appended to the EMPr as Appendix C of the EMPr.</u></p> |
| <p><u>20.8. A re-vegetation and habitat rehabilitation plan to be implemented during the construction and operation of the facility. Restoration must be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.</u></p> | <p><u>A Re-Vegetation and Rehabilitation Plan has been included in the EMPr as Appendix D.</u></p> |
| <p><u>20.9. A traffic management plan for the site access roads to ensure that no hazards would result from the increase truck traffic flow would not be adversely impacted. This plan must include measures to minimize impacts on local commuters, e.g. limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time and avoid using roads through densely populated built-up areas as not to disturb existing retail and commercial operations.</u></p> | <p><u>A Traffic Management Plan has been included in the EMPr as Appendix E.</u></p> |
| <p><u>20.10. A stormwater management plan to be implemented during the construction and operation of the facility. The plan must ensure compliance with applicable regulations and prevent off-site migration of contaminated stormwater or increased soil erosion. The plan must include the construction of appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of stormwater run-off.</u></p> | <p><u>A Storm Water Management Plan has been included in the EMPr as Appendix F.</u></p> |
| <p><u>20.11. An erosion management plan for monitoring and rehabilitation erosion events associated with the facility. Appropriate erosion mitigation must form part of this plan to prevent and reduce the risk of any potential erosion.</u></p> | <p><u>An Erosion Management Plan has been included in the EMPr as Appendix H.</u></p> |
| <p><u>20.12. An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This must include precautionary measures to limit to the possibility of oil and other toxic liquids from entering the soil or storm</u></p> | <p><u>An Emergency Preparedness and Responses Plan has been included in the EMPr as Appendix G.</u></p> |

| EA Condition Reference | Section of EMPr where Condition has been addressed |
|--|---|
| <u>water systems.</u> | |
| <u>20.13. Measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments, and other environmental sensitive areas from construction impacts including the direct or indirect spillage of pollutants.</u> | The Stormwater Management Plan, including measures to protect hydrological features within the development area of the facility and the surrounding area has been included in Appendix F . |
| <u>20.14. An environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process.</u> | A sensitivity map has been included in Appendix L . |
| <u>20.15. A map combining the final layout map superimposed (overlain) on the environmental sensitivity map. This map must reflect the proposed location of the facility as stated in the EIA and this authorisation.</u> | A map combining the final layout superimposed on the environmental sensitivity is included in Appendix L, and Figure 2.2 of this EMPr . |

CHAPTER 2: PROJECT DETAILS

Great Karoo Wind Farm (Pty) Ltd (**herein referred to as the Project Company**) is proposing to establish a commercial wind energy facility and associated infrastructure on a site located within the Karoo Hoogland Local Municipality (approximately 30 km south of Sutherland in the Northern Cape Province). This project is referred to as the Hidden Valley wind energy facility, which comprises of three development phases. *This EMPr deals with the **Great Karoo Wind Farm** (Phase 3 of the Hidden Valley project).* The facility will be powered by wind. No other fuels will be used as a generating fuel during the operational phase of the project. A layout of the wind energy facility is shown in **Figure 1**.

The grid connection infrastructure required to connect the Great Karoo Wind Farm to the national electricity grid at Hidden Valley substation is authorized in a separate Environmental Authorisation (DEA Ref: 14/12/16/3/3/1/2253 granted 10 June 2021) and is subject to a separate EMPr.

The Great Karoo Wind Farm and associated infrastructure is proposed on Farm Kentucky 206.

The primary components of the Great Karoo Wind Farm will include the following:

- » Up to 42⁴ **wind turbines** (with up to 6.5MW individual wind turbine capacity and with up to 180m rotor diameter and a hub height of up to 150m) and associated infrastructure.
- » Each wind turbine is expected to consist of a concrete foundation (approx. 25m x approx. 25m), a steel or concrete tower, a hub (up to 150m above ground level, depending on the turbine size decided upon) and three blades with a rotor diameter of up to 180m.
- » Hardstands of approximately 100m X 40m associated with each turbine, as well as temporary boom laydown areas (~125m X 20m) and blade laydown areas (~80m X 30m).
- » Medium voltage cabling between the components, laid approximately 1-2 m underground where underground cabling is **practical, or alternately overhead**. In as far as possible, cabling will follow the internal access roads.
- » Internal roads (approximately 8 m in width) linking the wind turbines and other infrastructure on the site. Existing farm roads will be used as far as possible. However, the dispersed distribution pattern of wind turbines and the vast areas of the site which are not currently accessible will necessitate the construction of ~30 km of new access roads in some areas.
- » A new 132 kV **substation**.
- » A high-voltage (HV) yard footprint of approximately 200m x 200 m (40 000m²).
- » **Operations and service building area** for control, maintenance and storage (approximately 2000m²).
- » **Guard house** for access security of approximately 50m².
- » Temporary construction site camp, laydown areas and possible batching area during construction (to be rehabilitated after construction.)

4 Initially 57 wind turbines were proposed but this was reduced to 42 in response to assessments and specialist recommendations in an amendment undertaken in 2019.

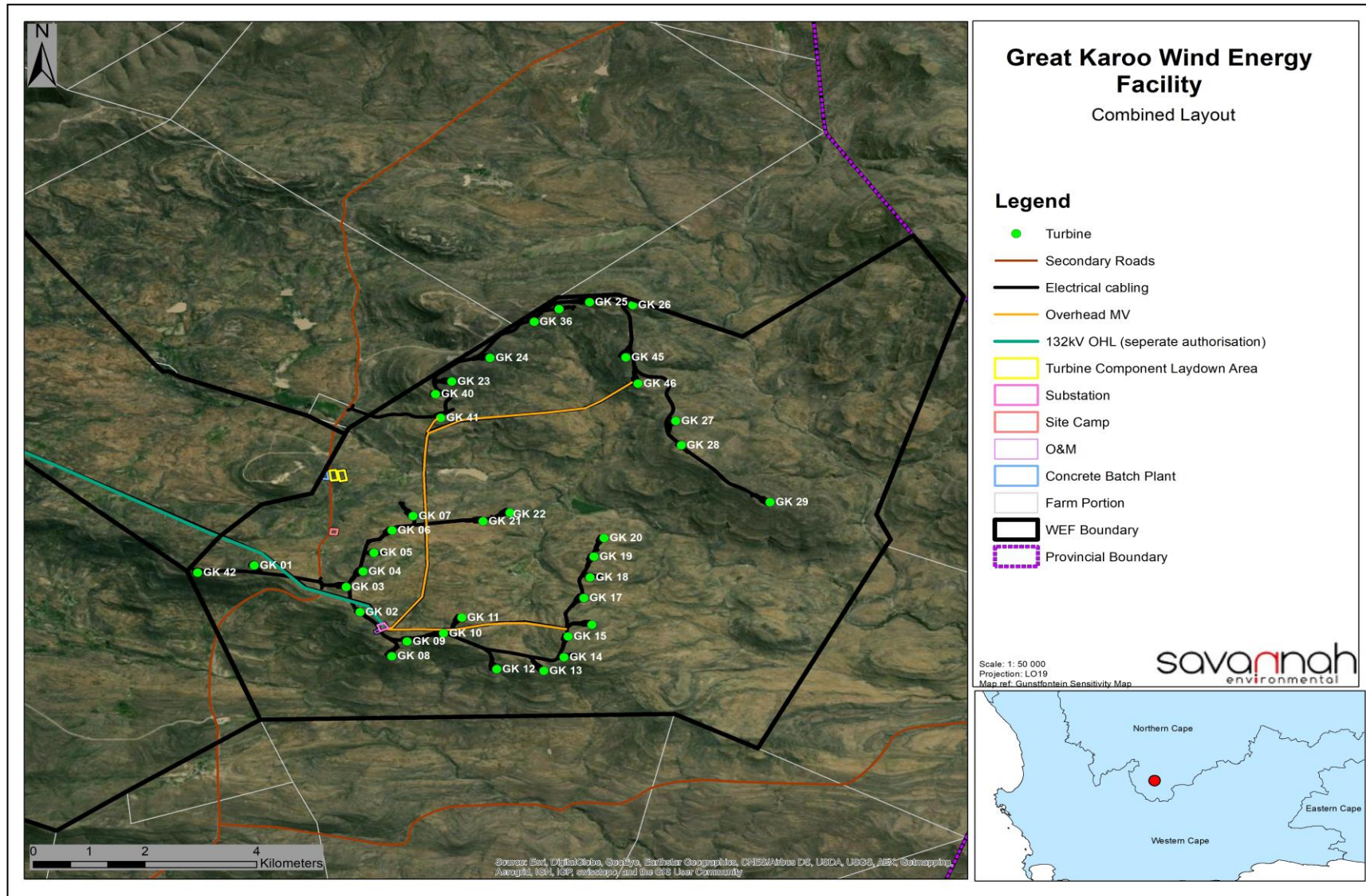


Figure 2.2: Updated Great Karoo Wind farm layout

2.1 Activities and Components associated with the Wind Energy Facility

The main activities/components associated with the Great Karoo Wind Energy Facility comprise the following:

| Main Activity/Project Component | Components of Activity | Details |
|---|---|---|
| Planning | | |
| Conduct surveys | <ul style="list-style-type: none"> » Geotechnical survey by geotechnical engineer » Site survey and confirmation of the turbine micro-siting footprints » Survey of on-site substation (1) and chosen power line routes for HV overhead powerline and MV underground cabling » Survey of internal access routes and water crossings » Environmental walk-through surveys (completed) | <ul style="list-style-type: none"> » Surveys to be undertaken prior to initiating construction. |
| Construction | | |
| Establishment of access roads to the site | <ul style="list-style-type: none"> » Upgrade access/haul roads to the site » Establish internal access roads: 8 m wide permanent roadway within the site between the turbines for use during construction and operation phase. | <ul style="list-style-type: none"> » Access roads will be constructed 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 by surveys undertaken by <u>ecological (including aquatic), heritage, bat and avifaunal specialists</u>). |
| Undertake site preparation | <ul style="list-style-type: none"> » Site establishment of offices/ workshop | <ul style="list-style-type: none"> » These activities will require the stripping of topsoil, which will need to |

| Main Activity/Project Component | Components of Activity | Details |
|---|---|---|
| | <p>with ablutions and stores, contractors yards</p> <ul style="list-style-type: none"> » Establishment of internal access roads (permanent and temporary roads) » Clearance of vegetation at the footprint of each turbine » Excavations for foundations | <p>be stockpiled, backfilled and/or spread on site.</p> |
| Establishment of lay down areas on site | <ul style="list-style-type: none"> » Permanent lay down areas (footprint <u>approx. 65m x approx. 60m</u>) at each turbine position for the storage of wind turbine components and accommodation of construction and crane lifting equipment. » Construction site office. | <ul style="list-style-type: none"> » The lay down area will need to accommodate the cranes required in tower/turbine assembly. » Lay down and storage areas will be required to be established for the normal civil engineering construction equipment which will be required on site. » A large lay down area will be required at each position where the main lifting 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 main crane from all sides. |
| Construct wind turbine foundations | <ul style="list-style-type: none"> » Turbine foundations will be up to approx. <u>25 m x approx. 25m</u>. Foundation holes will be excavated to a depth of approximately 4m-6m, depending on the underlying geotechnical conditions on site | <ul style="list-style-type: none"> » Foundation holes will be mechanically excavated where possible and blasted where required. » Safety barriers will be erected around open excavations. |
| Establishment of onsite batching plants | <ul style="list-style-type: none"> » A batching plant will be required for construction covering approximately 120m X 120m. | <ul style="list-style-type: none"> » Batching plant equipment will need to be installed » A small office may be necessary » A lay down area will need to accommodate aggregate material for batching. |
| Transport of components and equipment to site | <ul style="list-style-type: none"> » Trucks will be used to transport all components to site: * The normal civil engineering construction equipment for the civil | <ul style="list-style-type: none"> » Turbine units consist of a tower comprised of a number of segments, a nacelle, rotor and three blades. » Components of various specialised construction, lifting equipment and counter weights etc. are required on site (e.g. mobile assembly crane |

| Main Activity/Project Component | Components of Activity | Details |
|------------------------------------|--|--|
| | <p>works (e.g. excavators, trucks, graders, compaction equipment, cement mixers, etc.).</p> <ul style="list-style-type: none"> * The components required for the establishment of the substation (including transformers) * Components required for the establishment of the power line (including towers and cabling) | <p>and a main crane) to erect the wind turbines.</p> <ul style="list-style-type: none"> » Other components include components required for the establishment of the substation (including transformers) and those required for the establishment of the power line (including towers and cabling). » 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. It is estimated that 10-14 trucks will be used for the transport of each turbine. |
| 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, assisted by the smaller crane. » 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 by the smaller crane. It will then be lifted to the nacelle by the large crane, and bolted in place. Alternatively the blades may be lifted into position on the nacelle individually by the main crane. » It will take approximately 2-5 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 substation and ancillary | » New up to <u>132 kV on-site substation</u> | » Will require the clearing of vegetation and levelling of the |

| Main Activity/Project Component | Components of Activity | Details |
|---|--|---|
| infrastructure. | <p>complex will connect via a new 132kV power line to Eskom <u>Hidden Valley</u> substation (the 132kV OHL forms part of a separate EA).</p> <ul style="list-style-type: none"> » Substation components » Security fencing around high-voltage (HV) Yard » Workshop » <u>Temporary site offices</u> » Operation and Maintenance Office | <p>development site and the excavation of foundations prior to construction.</p> <ul style="list-style-type: none"> » A lay down area for building materials and equipment associated with these buildings will also be required. » The substation will be constructed within a high-voltage (HV) yard footprint of up to 40 000 m². » The substation 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 sites * Step 3: Construction of terrace and foundations * Step 4: Assembly, erection and installation of equipment * Step 5: Connection of conductors to equipment * Step 6: Rehabilitation of any disturbed areas and protection of erosion sensitive areas. |
| Connection of wind turbines to the on-site substation | <ul style="list-style-type: none"> » Wind turbines » 33 kV electrical <u>underground cabling / overhead lines (where required)</u> connecting each turbine to the substation | <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 underground cables would follow the internal access roads as far as reasonably possible. » Where underground cabling is not practical or environmentally sensible (e.g. in rocky area where blasting would be required), cabling would be above ground, suspended between poles <u>up to 20m high with an average span of 110m between poles.</u> » <u>The route for the MV cabling and power lines will be, surveyed and pegged prior to construction.</u> |
| Commissioning of the facility | <ul style="list-style-type: none"> » Wind energy facility commissioning | <ul style="list-style-type: none"> » 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. » Grid interconnection and unit synchronisation will be undertaken to |

| Main Activity/Project Component | Components of Activity | Details |
|--|--|---|
| | | 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 | <ul style="list-style-type: none"> » On full commissioning of the facility, any access points to the site which are not required during the operation phase will be closed and prepared for rehabilitation. |
| Operation | | |
| Operation | <ul style="list-style-type: none"> » Operation of turbines within the wind energy facility | <ul style="list-style-type: none"> » Once operational, the wind energy facility will be monitored remotely. The operational phase is expected to last 20 years. It is anticipated that there will be full time security, maintenance and control room staff required on site. » 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 – substation » Waste product disposal | <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 20-25 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. This may be longer than the 20 year envisaged 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 remove 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 |

| Main Activity/Project Component | Components of Activity | Details |
|---------------------------------|------------------------|---|
| | | 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 applicable). |

2.2 Findings of the Environmental Impact Assessment (2014)

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

- » Disturbance of ecological environment;
- » Potential impacts on drainage lines and other sensitive habitats, mainly from access roads;
- » Potential impacts on avifauna (birds) although no turbines are in high risk areas;
- » Potential impacts on bats although no turbines are in high risk areas;
- » Potential disturbance to sense of place, visual aesthetics;
- » Noise during construction;
- » Socio-economic impacts;
- » Potential soil erosion and degradation; and
- » Potential impacts on heritage and/ fossil resources (if disturbed).

From the specialist investigations undertaken for the proposed wind energy facility development site, a number of potentially sensitive areas were identified (refer to Figure 2.2):

- » Vegetation of conservation importance: this is based primarily on the location of the site within the Hantam-Roggeveld Centre of Endemism and the Fynbos Biome and which falls within the Namakwa District Biodiversity Sector Plan (NDBSP), Critical Biodiversity Area (CBA) T2 (for this site - important terrestrial habitats that are **south-facing slopes** larger than 25 ha in size, kloofs and habitat for riverine rabbit, therefore with high biodiversity) (medium sensitivity). Areas classified as mountains, ridges or **steep slopes**: some of the steeper scarp slopes of the study area are steep enough to be sensitive to erosion and downslope impacts from disturbance and have been identified as important biodiversity habitats (essential T2 areas from the NDBSP) (high sensitivity).
- » Potential areas for the occurrence of populations of Red List fauna and flora that have been evaluated as having a probability of occurring in **natural habitats** within the study area.
- » Perennial and non-perennial rivers, streams and **watercourses**. These support the ecosystems in the areas and may provide habitat for priority avifauna species.
- » Noise sensitive receptors (farmsteads on / around the site, albeit limited).
- » Heritage artefacts (graves, stone walls and old buildings/ruins present on the site). (Note that no infrastructure is proposed on the identified heritage sites).

The table below summarises which wind turbines have been moved out of sensitive areas, and which turbines have been removed from the layout.

| Turbine Number - EIA-assessed layout for Phase 3 | Reason for repositioning of turbine |
|--|--|
| 75, 76, 149, 154, | Avifaunal risk – 4 wind turbines placed within a high risk area. Action: 4 turbines removed from the layout |
| 125 | Bat risk – One wind turbine occurred in a moderate bat sensitivity buffer area (movement not required but developer adhering to best practice) Action – one wind turbine was removed from the layout |
| 151, 154, 157, 162 | Bat risk – 4 wind turbines placed immediately outside of moderate bat sensitivity buffer (movement not required but developer |

| | |
|--|---|
| | adhering to best practice) Action: four wind turbines removed from the layout |
|--|---|

The refined layout presented in the final EIA report (2014) thus contained a reduced number of wind turbines for the Great Karoo Wind Farm site. The turbines have been reduced from 77 (as assessed) to 57 (final EIA report). (i.e. 20 less turbines are proposed for construction within the Great Karoo Wind Farm than what was originally assessed).

2.2 Findings of the EA Amendment process (2019)

An Environmental Authorisation (EA) for the Great Karoo Wind Energy Facility and associated infrastructure, in the Northern Cape Province (DEA ref: 12/12/20/2370/3) was obtained by Great Karoo Wind Farm (Pty) Ltd on 12 August 2014. The project is intended to be bid into future rounds of the Department of Energy's (DoE) Renewable Energy Independent Power Producers Procurement (REIPPP) Programme. There have been advancements to wind turbine technology since the issuing of the EA, and the turbines authorised in the EA are therefore no longer considered to be the most suitable in terms of production and economic considerations.

In this regard, Great Karoo Wind Farm (Pty) Ltd considered an updated turbine model for the project and is proposed the following:

- » A reduction in the number of wind turbines from the authorised 52, to up to 42;
- » An increase to the rotor diameter for each wind turbine from the authorised diameter of up to 140m, to up to 180m;
- » An increase in hub height from up to 120m, to a range of up to 150m;
- » Turbine capacity from 3,6 MW, to up to 6,5 MW per turbine;
- » Update the layout as required based on the revised turbine numbers and turbine specifications; and
- » Extend the validity period by an additional 5 years.

Amendment of Condition 13.2 of the EA:

from:

"A 150m and 100m buffer respectively between watercourses; ridge edge and the turbine/construction activities"

To:

"Turbine and infrastructure positions as approved by an avifaunal specialist"

Amendment of Condition 49 of the EA

from:

Condition 49, from:

"A 150m between watercourses and 100m buffer between the ridge edge and the turbine/construction activities must be implemented."

To:

"The layout must be approved by the avifaunal specialist."

The increase in the rotor diameter, hub height, wind turbine generation capacity and reduction in the number of turbines will result in the optimisation of the facility layout which was submitted to the Department of Environmental Affairs (DEA) in the EIA process, and subsequent amendments thereto. These amendments to the project are proposed in order to increase the efficiency of the facility and consequently the economic competitiveness thereof, as well as to avoid environmental sensitivities on the site.

The proposed amendments in themselves are not listed activities, and do not trigger any new listed activity as the proposed amendments are within the original authorised development footprint, and do not change the scope of the EA.

In terms of Condition 5 of the Environmental Authorisation and Chapter 5 of the EIA Regulations of December 2014 (as amended on 07 April 2017 and 13 July 2018), it is possible for an applicant to apply, in writing, to the competent authority for a change or deviation from the project description to be approved.

Based on the specialist findings, it is concluded that the proposed amendments to the turbine specifications, wind farm layout and Conditions of the EA are not expected to result in an increase to the significance ratings for the identified potential impacts. In some cases (avifauna and bats), the quantitative value has changed in terms of the magnitude of impacts, but this has not resulted in a change to the qualitative category (i.e. Low, Medium, High) of the significance rating after mitigation measures. There is a reduction in significance in some impacts as a result of the reduced number of turbines and the location of these outside of identified high sensitivity areas.

In addition, the amended wind turbine positions considered avoids all identified avifaunal exclusion zones and areas of high sensitivity. One turbine, turbine 39, remains in the avifaunal exclusion zone. The avifaunal specialist concluded that this is unlikely to result in a significant increase in the overall collision impact rating of the site and that the location of this turbine is acceptable. It was recommended that fieldwork be done in the eagle breeding season to determine the activity status and species utilising the three nests recorded on site. These results must inform possible additional mitigation measures and the final micro-siting of the layout, which will be submitted to the DEA for approval in terms of the requirements of Condition 13 of the EA dated August 2014. Operational phase bird monitoring programme was also recommended by the avifaunal specialist (in line with the guidelines applicable at the start of the operational phase).

The bats specialist report concluded that the amendments to the turbine dimensions proposed at the Great Karoo Wind Farm would slightly increase mortality impacts to bats, but that the overall impact significance would remain unchanged. Based on bat activity levels as assessed from pre-construction monitoring data, impacts to bats are likely to be of a medium significance before mitigation and low after mitigation. It was recommended that ground clearance be maximised and the tip height (i.e. the distance between the ground and the blade tip at its height point) be minimised as far as possible in the final turbine selection. Cumulative impacts on bats after mitigation would also increase due to the increased

number of third-party projects now proposed within 50km of the site. Cumulative impacts are likely to be of a high significance before mitigation and medium after mitigation.

In terms of aspects relating to heritage, visual and noise, the proposed changes to the EA and site layout plan will not increase the significance of impacts originally identified in the EIA report or lead to any additional impacts.

2.3 Findings of the Walkthrough Assessments (2021)

Ecology

Several protected species throughout the development site were identified. However, most of the species are easy to relocate and with a degree of success can be re-established outside of the footprint areas, noting that all of the species are still well represented in areas that won't be disturbed. A very high number of plants that are protected under Provincial legislation, with some of the species encountered (Aizoaceae) numbering in the thousands are abundant within the region. Table 2 in the Ecological Walkthrough Report thus lists the number of plants that should be relocated as a percentage of those observed within the affected properties or sites (5-10%). Noting that the majority of these species are adapted to disturbance, while the topsoil will contain a large seed bank. It is therefore important to conserve as much of the stripped topsoil within the sandy area as and when construction commences, as this will aid in rehabilitation in the later construction phases of the project. Similarly, it is anticipated that rock spoil post construction maybe an issue, thus the contractor must allow for time and cost to adequately break down large boulders to create smaller micro habitats for both plants and animals.

The following recommendations are reiterated:

- » Vegetation clearing should occur in a phased manner in accordance with the construction programme to minimise erosion and/or run-off.
- » All construction materials including fuels and oil should be stored in demarcated areas that are contained within berms / bunds to avoid spread of any contamination. Washing and cleaning of equipment should also be done in berms or bunds, in order to trap any cement and prevent excessive soil erosion. Mechanical plant and bowsers must not be refuelled or serviced within or directly adjacent to any channel. It is therefore suggested that all construction camps, lay down areas, batching plants or areas and any stores should be more than 34m from any demarcated water courses.
- » All cleared areas must be re-vegetated after construction has been completed.
- » All alien plant re-growth (mostly forbs) must be monitored, and should it occur, these plants should be eradicated. The scale of the operation does however not warrant the use of a Landscape Architect and / or Landscape Contractor.

During this assessment, it was also indicated that the presence of termites and primates at other sites have resulted in either damage to underground cables or work stoppages when vervet monkeys or baboons climb into the turbine towers.

With regard primates (vervets & baboons) the following recommendations are made:

- » All turbine towers, plant / vehicles and or buildings inclusive of windows must be closed when not being occupied.
- » Solid waste and in particular any food waste must be disposed of into the appropriate bins. These bins must be located in waste areas that can be located using primate proof cages. This especially on Sundays or R&R periods when there are limited numbers of staff thus movement and disturbance on site. This will discourage the animals from entering the construction camps in search of food, if the waste is not accessible.
- » Confronting the animals is not recommended, as this usually escalates fear within the primates, which typically become defensive, attack and or bite. Particularly if large males or females with young individuals are present.

In a short review of termite distribution of South Africa, it is evident that the following species are found within the project site with those in bold being observed in the previous surveys:

Harvester termites (Hodotermitidae)

- » Hodotermes mossambicus = Northern Harvester Termite / Rysmier
- » **Microhodotermes viator = Southern Harvester Termite**

Subterranean termites / damp wood termites (Rhinotermitidae)

- » Psammotermes allocerus = Desert Termite

Fungus-growing termites (Termitidae)

- » **Trinervitermes = Snouted Harvest Termites**
- » Amitermes hastatus = Black-mound Termites

It is not evident if any of the species have the ability or the need to damage the underground cables, but several options are available to deter the termites from tasting. They don't feed on the cables, but test to see if outer casing is edible, which then leads to damage of the insulation and water ingress. The first option is to include a physical barrier, while the second is the use of a chemical barrier. The latter option is used successfully on small sites such as homes, but the potential of soil contamination and secondary poisoning on a larger scale may pose a significant risk, when considering the length of the cables within a wind farm.

The only recommendation that can be made presently based on the information at hand is to install monitoring stations within the site, typically the very sandy areas where the termites are found. Using these small bait stations will allow for correct identification of the species present, but also allow for the opportunity to place small sections of the proposed cable inside the monitoring system to see if the termites are causing significant damage to the cable outers. These can be placed throughout the site, to assist if required which portions of the underground cables will require physical barriers.

Avifauna

The following nests were recorded during the nest searches and pre-construction surveys:

- » N1: Verreaux's Eagle
- » N2: Jackal Buzzard
- » N3: Jackal Buzzard

- » N4: Suspected Jackal Buzzard
- » N5: Hamerkop
- » N6: Rufous-breasted Sparrowhawk
- » N7: Suspected Jackal Buzzard

The results of the nest searches and general surveys were submitted to the developer who revised the authorised lay-out by removing all turbine positions within a 3km buffer around the recorded Verreaux's Eagle nest, according to the current Verreaux's Eagle guidelines (Ralston-Patton 2017). In addition, 750m no turbine buffers were implemented around all the other confirmed and suspected raptor nests.

The nest search and general avifaunal survey conducted was sufficient to update the avifaunal baseline for the site and inform the final site layout and EMP as required by Condition 49 of the EA, and that no further pre-construction monitoring is required.

Bats

Based on the current turbines with a hub height of 150 and a rotor diameter of 180m, the bat sensitivity buffers are 571m and 117m to turbine base respectively. The observation made on site confirmed that the buffers are sufficient, and no turbine blades are located within bat high sensitivity buffers and adheres to the updated sensitivity map. Even though the current dimensions are acceptable, if the dimensions were to change in future, a bat specialist should be consulted to make sure that no turbine blades are within any bat sensitive buffers. These buffers are not applicable to the construction of powerlines, Access Roads and buildings.

The updated layouts adhere to the current delineated site-specific bat sensitivity areas. Based on the proposed turbine dimensions of up to 150m hub height and up to 180m rotor diameter, the bat specialist has recommended that the turbine base be set back 571m and 117m from specific bat sensitive features identified during the original assessment and updated 2021 walkthrough. The delineated site-specific bat sensitivity areas are more accurate and more appropriate for the site compared to generic 150m/100m buffers. It is the specialist's opinion that potential impacts to bats would be best managed and mitigated by adhering to the site-specific bat sensitive areas, and therefore condition 13.2 and 49 are now replaced by these updated buffers.

All mitigation measures and findings proposed by Animalia (2014) and in the addendum report (Arcus 2019) remain valid and the impact of turbines on bats remain low after mitigation. The current turbine positions as assessed in the site walk-through and presented in the walkthrough report are acceptable and approved from a bat perspective.

Heritage

Based on the outcome of the required walkdown, it is not anticipated that the proposed development of turbines, cables, MV lines and associated infrastructure including access roads associated with the proposed wind farm will negatively impact on significant archaeological heritage and as such, there is no Heritage objection to the Final alignment proposed for the wind farm development. The identified built

environment and graves do not fall within the development footprint and will not be directly impacted. No further heritage work is recommended for the development of the Great Karoo Wind Energy Facility.

Palaeontology

In a subsequent letter from SAHRA dated 21 October 2016, SAHRA indicated that "There will be no need for a further palaeontological field assessment, as a desktop study is sufficient. A map of the identified palaeontological resources relative to the layout of the proposed development must be emailed to the case officer and ECO must monitor all excavations in the Great Karoo Wind Energy Facility". This was reiterated in a subsequent comment from SAHRA for the Great Karoo Wind Energy Facility dated 31 May 2019.

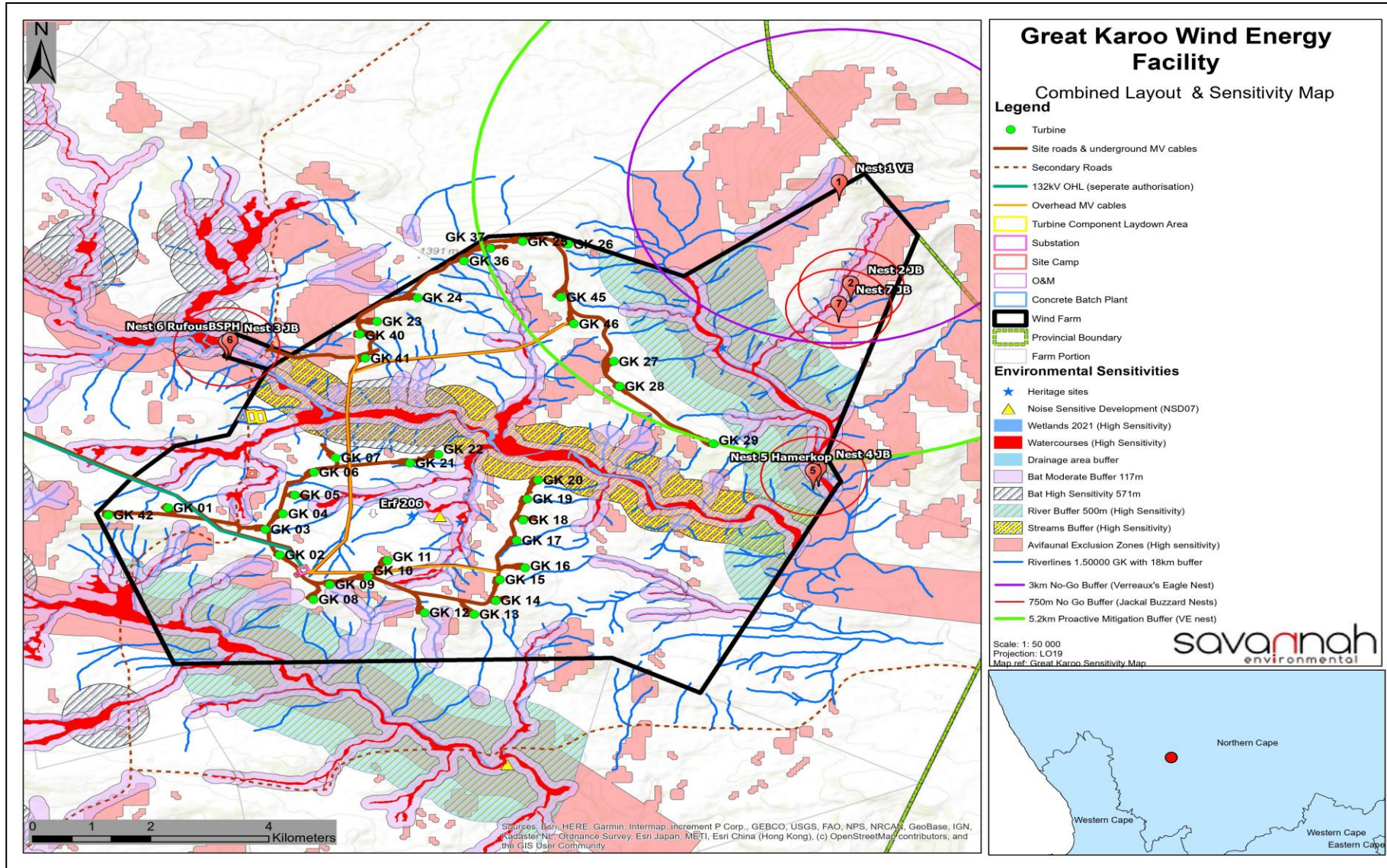


Figure 2-3: Combined Sensitivity Map for the Great Karoo Wind Energy Facility

2.2 Applicable Legislation

The following legislation and guidelines have informed the scope and content of this EMPr:

- » National Environmental Management Act (Act No 107 of 1998);
- » EIA Regulations, published under Chapter 5 of the NEMA (GN R543, GN R544 and GN R546 in Government Gazette 33306 of 18 June 2010)
- » Guidelines published in terms of the NEMA EIA Regulations, in particular:
 - * Guideline 3: General Guide to Environmental Impact Assessment Regulations, 2006 (DEAT, June 2006)
 - * Guideline 4: Public Participation in support of the Environmental Impact Assessment Regulations, 2006 (DEAT, May 2006);
 - * Guideline 5: Assessment of alternatives and impacts in support of the Environmental Impact Assessment Regulations, 2006 (DEAT, June 2006);
 - * Public Participation in the EIA Process (DEA, 2010);
 - * Integrated Environmental Management Information Series (published by DEA); and
- » International guidelines – the Equator Principles and the International Finance Corporation and World Bank Environmental, Health, and Safety Guidelines for Wind Energy (2007).

Several other Acts, standards, or guidelines have also informed the project process and the scope of issues addressed and assessed in the EIA Report. A review of legislative requirements applicable to the proposed project is provided in the table in Table 2.1.

Table 2.1: Relevant legislative permitting requirements applicable to the Wind Energy Facility Project EIA

| Legislation / Policy / Guideline | Applicable Requirements | Relevant Authority | Compliance requirements |
|--|--|---|---|
| National Legislation | | | |
| National Environmental Management Act (Act No 107 of 1998) | <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> | <ul style="list-style-type: none"> » DFFE » Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARD&LR) | <p><u>An EIA report was submitted to the DEA and Provincial Environmental Department in support of the application for authorisation. An EA was issued for the project.</u></p> |
| National Environmental Management Act (Act No 107 of 1998) | <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 project holistically, and to consider the</p> | DFFE (as regulator of NEMA). | <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>National Environmental Management: Waste Act (Act No 59 of 2008)</p> | <p>cumulative effect of a variety of impacts.</p> <p>The Minister may by notice in the Gazette 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. » Making other changes to the particulars on the list. <p>In terms of the Regulations published in terms of this Act (GN 912), a Basic Assessment or Environmental Impact Assessment is required to be undertaken for identified listed activities.</p> <p>Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that:</p> <ul style="list-style-type: none"> » The containers in which any waste is stored, are intact and not corroded or in any other way rendered unfit for the safe storage of waste. » Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away. » Nuisances such as odour, visual impacts | <p>DFFE (hazardous waste)</p> <p>Provincial Department of Environmental Affairs (general waste)</p> | <p><u>No waste disposal site is to be associated with the project. In terms of GNR921, no waste management license is required for this project.</u></p> <p><u>Waste handling, storage and disposal during construction and operation is required to be undertaken in accordance with the requirements of the Act, as detailed in this EMPr.</u></p> |

| Legislation / Policy / Guideline | Applicable Requirements | Relevant Authority | Compliance requirements |
|---|---|--|--|
| | <p>and breeding of vectors do not arise; and</p> <ul style="list-style-type: none"> » Pollution of the environment and harm to health are prevented. | | |
| <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 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 Northern 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><u>DFFE</u> <u>DAEARD&LR</u> Local Municipality</p> | <p>There is no requirement for a noise permit in terms of the legislation. A Noise Impact Assessment is required to be undertaken in accordance with SANS 10328 – this has been undertaken as part of the EIA process (refer to Appendix M of the EIA report). There are noise level limits which must be adhered to.</p> |
| <p>National Water Act (Act No 36 of 1998)</p> | <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> <p>In terms of Section 19, the project proponent must ensure that reasonable measures are</p> | <p>Department of Human Settlements, Water and Sanitation (DHSWS)</p> | <p><u>A Water Use Licence (WUL) or General Authorisation (GA) is required as some drainage lines on the site will be impacted upon by road crossings. Application for a WUL or GA (whichever is deemed to be applicable) will be made with the DWS in terms of Section 21 of the Act.</u></p> |

| Legislation / Policy / Guideline | Applicable Requirements | Relevant Authority | Compliance requirements |
|--|--|---|--|
| | taken throughout the life cycle of this project to prevent and remedy the effects of pollution to water resources from occurring, continuing or recurring. | | |
| National Water Act (Act No 36 of 1998) | 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. | Department of Water Affairs (as regulator of NWA) | 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. |
| Minerals and Petroleum Resources Development Act (Act No 28 of 2002) | 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 accordance with the provisions of the Act. Requirements for Environmental Management Programmes and Environmental Management Plans are set out in Section 39 of the Act. | Department of Mineral Resources | If borrow pits are required for the construction of the facility, a mining permit or right is required to be obtained. |
| National Environmental Management: Air Quality Act (Act No 39 of 2004) | Sections 18, 19 and 20 of the Act allow certain areas to be declared and managed as "priority areas" in terms of air quality. Declaration of controlled emitters (Part 3 of Act) and controlled fuels (Part 4 of Act) with relevant emission standards. Section 34 makes provision for: (1) the Minister to prescribe essential national noise standards - (a) for the control of noise, either in general or by specified machinery or activities or in | <u>DFFE</u> <u>Karoo Hoogland Local Municipality</u> | No permitting or licensing requirements applicable for air quality aspects. The section of the Act regarding noise control is in force, but no standards have yet been promulgated. Draft regulations have however, been promulgated for adoption by Local Authorities. An atmospheric emission licence issued in terms of section 22 may contain conditions in respect of noise. This will however, not be relevant to the facility, as no atmospheric emissions will take place. The Act provides that an air quality officer may require any |

| Legislation / Policy / Guideline | Applicable Requirements | Relevant Authority | Compliance requirements |
|--|---|--|---|
| | <p>specified places or areas; or (b) for determining – (i) a definition of noise (ii) the maximum levels of noise (2) When controlling noise the provincial and local spheres of government are bound by any prescribed national standards. » The Draft National Dust Control Regulations prescribe measures for the control of dust in all areas including residential and light commercial areas.</p> | | <p>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 » 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> <p>The relevant Heritage Resources Authority must be notified of developments such as linear developments (such as roads and power lines), 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</p> | <p>South African Heritage Resources Agency (SAHRA) Northern Cape Heritage Resources Authority</p> | <p><u>A Heritage and Paleontological Impact Assessment (HIA) was undertaken as part of the EIA Process to identify heritage sites. The heritage walkthrough survey and related report was completed and included in the EMPr. The overall area is considered as having a low archaeological significance. The relevant mitigation measures are included in this EMPr.</u></p> |

| Legislation / Policy / Guideline | Applicable Requirements | Relevant Authority | Compliance requirements |
|--|--|---|---|
| | <p>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>National Environmental Management: Biodiversity Act (Act No 10 of 2004)</p> | <ul style="list-style-type: none"> » Provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process (S53) » A list of threatened & protected species has been published in terms of S 56(1) - Government Gazette 29657. » Three government notices have been published, i.e. GN R 150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R 151 (Lists of critically endangered, vulnerable and protected species) and GN R 152 (Threatened or Protected Species Regulations). » 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 | <p><u>DFFE</u> <u>DAEARD&LR</u></p> | <p>As the applicant will not carry on any restricted activity, as is defined in Section 1 of the Act, no permit is required to be obtained in this regard.</p> <p>Specialist ecological studies are required to be undertaken as part of the EIA process. These studies have been undertaken as part of the previously EIAs undertaken for the site. A specialist ecological assessment has been undertaken for the proposed project (refer to Appendix F of the EIA report).</p> <p>A permit may be required should any protected plant species on site be disturbed or destroyed as a result of the proposed development.</p> |

| Legislation / Policy / Guideline | Applicable Requirements | Relevant Authority | Compliance requirements |
|----------------------------------|--|--------------------|-------------------------|
| | <p>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 Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GoN 1002), 9 December 2011).</p> <ul style="list-style-type: none"> » This Act also regulates alien and invader species. » Under this Act, a permit would be required for any activity which is of a nature that may negatively impact on the survival of a listed protected species. <p>The developer has a responsibility for:</p> <ul style="list-style-type: none"> » The conservation of endangered ecosystems and restriction of activities according to the categorisation of the area (not just by listed activity as specified in the EIA regulations). » Promote the application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all development within the | | |

| Legislation / Policy / Guideline | Applicable Requirements | Relevant Authority | Compliance requirements |
|---|---|---|---|
| | <p>area are in line with ecological sustainable development and protection of biodiversity.</p> <ul style="list-style-type: none"> » Limit further loss of biodiversity and conserve endangered ecosystems. | | |
| <p>Conservation of Agricultural Resources Act (Act No 43 of 1983)</p> | <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"> » <u>Category 1 plants</u>: are prohibited and must be controlled. » <u>Category 2 plants</u>: (commercially used plants) may be grown in demarcated areas providing that there is a permit and that steps are taken to prevent their spread. » <u>Category 3 plants</u>: (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> | <p>Department of Agriculture, Forestry and Fisheries <u>DFFE</u></p> | <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> |
| <p>National Veld and Forest</p> | <p>In terms of Section 12 the applicant would be</p> | | <p>While no permitting or licensing requirements arise from this</p> |

| 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 13 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> | | <p>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> | <p><u>Department of Agriculture, Forestry and Fisheries (DAFF)</u> <u>DFFE</u></p> | <p><u>A very high number of plants that are protected under Provincial legislation, with some of the species encountered (Aizoaceae) numbering in the thousands are abundant within the region. A permit will be required.</u></p> |
| Aviation Act (Act No 74 of 1962) 13 th amendment of the Civil Aviation Regulations (CARS) 1997 | <p>Any structure exceeding 45m above ground level or structures where the top of the structure exceeds 150m above the mean ground level, the mean ground level considered to be the lowest point in a 3km</p> | <p>Civil Aviation Authority (CAA)</p> | <p>While no permitting or licence requirements arise from the 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> |

| Legislation / Policy / Guideline | Applicable Requirements | Relevant Authority | Compliance requirements |
|---|---|--|---|
| | <p>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>Hazardous Substances Act (Act No 15 of 1973)</p> | <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, modification, disposal or dumping of such substances and products.</p> <p>» Group I and II: Any substance or mixture of a substance that might by reason of its</p> | <p><u>Department of Health</u> <u>Karoo Hoogland Local Municipality</u></p> | <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>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;</p> <ul style="list-style-type: none"> » 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> | | |
| <p>National Road Traffic Act (Act No 93 of 1996)</p> | <p>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.</p> <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</p> | <p>Provincial Department of Transport (provincial roads) South African National Roads Agency Limited (national roads)</p> | <p>An abnormal load/vehicle permit may be required to transport the various components to site for construction. These include:</p> <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. » Depending on the trailer configuration and height when loaded, some of the power station components may not meet specified dimensional limitations (height and width). |

| Legislation / Policy / Guideline | Applicable Requirements | Relevant Authority | Compliance requirements |
|--|---|---|---|
| | 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. | | |
| Development Facilitation Act (Act No 67 of 1995) | Provides for the overall framework and administrative structures for planning throughout the Republic. Sections 2- 4 provide general principles for land development and conflict resolution. | Karoo Hoogland Local Municipality | <u>The land development application was submitted and approved/granted by the Karoo Hoogland Local Municipality on the 20 January 2021. .</u> |
| Promotion of Access to Information Act (Act No 2 of 2000) | » All requests for access to information held by state or private body are provided for in the Act under S11. | National Department of Environmental Affairs (DEA) | No permitting or licensing requirements. This act may find application during through the project EIA. |
| Promotion of Administrative Justice Act (Act No 3 of 2000) | » In terms of Section 3 the government is required to act lawfully and take procedurally fair, reasonable and rational decisions » Interested & affected parties have right to be heard | National Department of Environmental Affairs (DEA) | No permitting or licensing requirements. This act will find application during through the project EIA. |
| Provincial Legislation/ Policies / Plans | | | |
| Northern Cape Nature Conservation Act, 2009 | To provide for the sustainable utilisation of wild animals, aquatic biota and plants; to provide for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; to provide for offences and penalties for contravention of the Act; to | Northern Cape Department of Environmental Affairs and Nature Conservation | The owner of land upon which an invasive species is found, must take the necessary steps to eradicate or destroy such species. |

| Legislation / Policy / Guideline | Applicable Requirements | Relevant Authority | Compliance requirements |
|--|--|---|---|
| | <p>provide for the appointment of nature conservators to implement the provisions of the Act; to provide for the issuing of permits and other authorisations; and to provide for matters connected therewith.</p> | | |
| <p>Astronomy Geographic Advantage Act (Act 21 of 2007)</p> | <ul style="list-style-type: none"> » Preservation and protection of areas within South Africa that are uniquely suited for optical and radio astronomy. » Regulations promulgated in terms of AGA in 2009 require all developments in the Sutherland area that entail external night lighting, to be fully cut-off, with no light emitted in the upward direction. This is aimed at protecting the observational integrity of SALT (Southern African Large Telescope), the largest telescope in the Southern Hemisphere, located approximately 20 km east of Sutherland. » In terms of section 7(1) and 7(2) of this Act, the Minister declared core astronomy advantage areas on 20 August 2010 under Regulation No. 723 of Government Notice No. 33462. In this regard, all land within a 3 kilometres radius of the centre of the Southern African large Telescope dome falls under the Sutherland Core Astronomy Advantage Area. The declaration also applies to the core astronomy advantage area containing | <p>Department of Science and Technology</p> | <p><u>The study area falls within the Sutherland Central Astronomy Advantage Area (SCAAA). Gazetted Regulations in this regard are required to be adhered to.</u></p> |

| Legislation / Policy / Guideline | Applicable Requirements | Relevant Authority | Compliance requirements |
|---|--|-----------------------------------|--|
| | <p>the MeerKAT radio telescope and the core of the planned Square Kilometre Array (SKA) radio telescope. The study area does not fall within the 3 km radius of SALT or within an area which could affect the MeerKAT and SKA developments.</p> <p>» Under Section 22(1) of the Act the Minister has the authority to protect the radio frequency spectrum for astronomy observations within a core or central astronomy advantage area. As such, the Minister may still under section 23(1) of the Act, declare that no person may undertake certain activities within a core or central astronomy advantage area. These activities include the construction, expansion or operation of any fixed radio frequency interference source, facilities for the generation, transmission or distribution of electricity, or any activity capable of causing radio frequency interference or which may detrimentally influence the astronomy and scientific endeavour.</p> | | |
| Local Legislation / Policies / Plans | | | |
| Karoo Hoogland Local Municipality Integrated Development Plan (IDP) | » The IDP notes that the Karoo Hoogland is primarily an agricultural community. Conservation of the environment and sustainable development are identified as primary points of departure in policy. | Karoo Hoogland Local Municipality | » New developments in the municipality to be in line with the IDP. <u>The land development application was submitted and approved/granted by the Karoo Hoogland Local Municipality on the 20 January 2021.</u> |

| Legislation / Policy / Guideline | Applicable Requirements | Relevant Authority | Compliance requirements |
|----------------------------------|---|--------------------|---|
| | <p>» The main socio-economic developmental issues are identified as widespread poverty, the lack of employment opportunities, low adult literacy levels, and general the lack of diversified skills amongst the bulk of the population. School dropout rates are pronounced. The IDP describes general living conditions in the LM as "some of the worst in the country".</p> | | |
| Standards | | | |
| Noise Standards | <p>Four South African Bureau of Standards (SABS) scientific standards are considered relevant to noise from a Wind Energy Facility. They are:</p> <ul style="list-style-type: none"> » SANS 10103:2008. 'The measurement and rating of environmental noise with respect to annoyance and to speech communication'. » SANS 10210:2004. 'Calculating and predicting road traffic noise'. » SANS 10328:2008. 'Methods for environmental noise impact assessments'. » SANS 10357:2004. 'The calculation of sound propagation by the Concave method'. <p>The relevant standards use the equivalent continuous rating level as a basis for determining what is acceptable. The levels may take single event noise into account, but</p> | Local Municipality | The recommendations that the standards make are likely to inform decisions by authorities, but non-compliance with the standards will not necessarily render an activity unlawful per se. |

| Legislation / Policy / Guideline | Applicable Requirements | Relevant Authority | Compliance requirements |
|----------------------------------|--|--------------------|-------------------------|
| | single event noise by itself does not determine whether noise levels are acceptable for land use purposes. | | |

CHAPTER 3: STRUCTURE OF THIS EMPR

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

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

These chapters set out the procedures necessary for the wind energy facility to achieve environmental compliance. For each of the phases 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 plan 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 EMPr 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; » Substation; » MV lines; » Associated Infrastructure. |
| Potential Impact | Brief description of potential environmental impact if objective is not met. |
| Activity/risk source | Description of activities which could impact on achieving objective. |
| Mitigation: Target/Objective | Description of the target; include quantitative measures and/or dates of completion. |

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

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

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

- » Planned activities change (i.e. in terms of the components of the facility).
- » Modification to or addition to environmental objectives and targets.
- » Additional or unforeseen environmental impacts are identified.
- » 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.

3.1. Project Team

This EMPr was compiled by:

| EMP Compilers | |
|-------------------------------|--|
| Ravisha Ajodhapersadh (2014) | Savannah Environmental |
| Hermien Slabbert (2019) | Savannah Environmental |
| Gideon Raath (2019) | Savannah Environmental |
| Tebogo Mapinga | Savannah Environmental |
| Jo-Anne Thomas (2019) | Savannah Environmental |
| Karen Jodas (2014) | Savannah Environmental |
| Input from Specialists | |
| Ecology | David Hoare Consulting cc (2014), 3 Foxes Biodiversity Solutions (2019) and EnviroSci (2021) |
| Avifauna | Endangered Wildlife Trust (EWT) (2014), Arcus Consulting (2019) and Chris van Rooyen Consulting (2021) |
| Soils and Land-Use | TerraSoil Science (2014) |
| Visual | MetroGIS (2014) and LOGIS (2019) |
| Heritage | Albany Museum (2014) and CTS Heritage (2019 & 2021) |
| Palaeontology | Lloyd Rossouw (2014) |
| Noise | MENCO (2014) and Enviro Acoustic Research (2019) |
| Social Impact | Tony Barbour (Environmental Consultant and Researcher) (2014 & 2019) |
| Bats | Animalia cc (2014) and Arcus Consulting (2019 & 2021) |

The Savannah Environmental team have extensive knowledge and experience in environmental impact assessment and environmental management, and have managed and drafted Environmental Management Programmes for other wind energy facility projects throughout South Africa. In addition, they have been involved in compliance monitoring of major construction projects in South Africa.

CHAPTER 4: MANAGEMENT PROGRAMME FOR THE WIND ENERGY FACILITY: PLANNING & DESIGN

4.1. Planning and Design

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

Subject to final turbine micro-siting and subsequent acceptance from DEA, the layout and preferred grid connection option must be implemented.

| | |
|-------------------------------------|--|
| Project component/s | Project components affecting the objective: » Wind turbines; » Access roads and crane hard standings; » Service building; » Substation; » <u>MV line; and</u> » <u>Associated infrastructures.</u> |
| Potential Impact | » Design fails to respond optimally to the environmental consideration. |
| Activities/risk sources | » Positioning of turbines and access roads » Positioning of substation » Alignment of MV lines |
| Mitigation: Target/Objective | » To ensure that the design of the facility responds to the identified environmental constraints and opportunities. » To ensure that the design of the facility responds to the identified constraints identified through pre-construction bird and bat monitoring. |

| Mitigation: Action/control | Responsibility | Timeframe |
|--|------------------------------------|---|
| The developer to finalise layout of all components, and submit to DFFE for approval. | Project Company, Contractor | Prior to construction |
| <u>Turbines must be positioned in such a way that shadow flicker does not affect any farm buildings.</u> | <u>Project Company, Contractor</u> | <u>Design phase</u> |
| <u>Exclusion of sensitive ecological, Heritage and Paleontological areas from construction activities must inform micro siting of all development activities.</u> | <u>Project Company, Contractor</u> | <u>Design phase</u> |
| <u>Existing road infrastructure must be used as far as possible for providing access to the proposed turbine positions. Where no road infrastructure existing, new roads should be placed within existing disturbed areas or environmental conditions must be taken into account to ensure the minimum amount of damage is caused to natural habitats.</u> | <u>Project Company, Contractor</u> | <u>Prior to construction and construction</u> |
| <u>Signs must be placed along construction roads to identify speed limits, travel restrictions, and other standard traffic control information</u> | <u>Project Company, Contractor</u> | <u>Prior to construction and construction</u> |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|-----------------------------|--|
| <u>Internal access roads must be located to minimize stream crossings. All structures crossing streams (where water use authorisation has been obtained) must be located and constructed so that they do not decrease channel stability or increase water velocity.</u> | Project Company, Contractor | Prior to construction and construction |
| Signage must be erected at appropriate points warning of turning traffic and the construction site | Project Company, Contractor | Prior to construction and construction |
| Construction vehicles carrying materials to the site should avoid using roads through densely populated built-up areas so as not to disturb existing retail and commercial. | Project Company, Contractor | Prior to construction and construction |
| A designated access to the site must be created and clearly marked to ensure safe entry and exit. | Project Company, Contractor | Prior to construction and construction |
| Roads must be designed so that changes to surface water runoff are avoided and erosion is not initiated. | Project Company, Contractor | Prior to construction and construction |
| Additional avifaunal pre-construction monitoring must be conducted. This monitoring can be refined, and focussed on the Great Karoo WEF, and it is not necessary to repeat the full protocol conducted by EWT (2014). The monitoring data collected will update the avifaunal baseline for the site, to allow for meaningful comparison with operational monitoring data, and it must also be used to inform the final micro-siting of the WEF where applicable. | Project Company | Prior to construction |
| The nests sites, N1-N3, must be revisited by an avifaunal specialist during the eagle breeding season (e.g. approximately June-September) to confirm the activity of these sites and the species utilising these sites (if active). Once the above has been completed, the specialist must advise any additional recommendations and/or mitigations, which may result in a need to update the EMP for the project and/or refine the final layout of the turbines. If any active nest sites of eagles are confirmed, these nests sites must be re-visited and regularly surveyed to determine the breeding success of eagles. Monitoring of any such active eagle nest sites should continue into the construction phase of the project, and throughout the operational lifespan of the project, in accordance with the applicable guidelines in effect at the time. | Project Company | Prior to construction |
| Consider design level mitigation measures recommended by the specialists, especially with respect to ecology, visual aesthetics, drainage lines and avifauna as detailed within the EIA report and relevant appendices. | Project Company, Contractor | Tender Design & Design Review Stage |
| Access roads to be carefully planned to minimise the impacted area and prevent unnecessary over compaction of soil. That is, keep grazing and natural units as intact as possible. | Project Company, Contractor | Design phase |

| Mitigation: Action/control | Responsibility | Timeframe |
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| Any further changes to the road or turbine positions should be checked by an ecological specialist to ensure that any high ecological sensitivity areas and features at the site are not affected. | Project Company | Prior to construction |
| Turbines which maximise the ground clearance as much as possible, and minimise the tip height (i.e. the distance between the ground and the blade tip at its highest point) should be used. | Project Company | Prior to construction |
| <u>Based on the current turbines dimensions with a hub height of 150m and a rotor diameter of 180m, the bat sensitivity buffers are 571m and 117m to turbine base respectively</u> | <u>Project Company</u> | <u>Prior to construction</u> |
| <u>The observation made on site confirmed that the bat buffers are sufficient, and no turbines blades are located within bat high sensitivity buffers and adheres to the updated sensitivity map. Even though the current dimensions are acceptable, if the dimensions were to change in future, a bat specialists should be consulted to make sure that no turbine blades are within any bat sensitive buffers.</u> | <u>Project Company</u> | <u>Prior to construction</u> |
| <ul style="list-style-type: none"> <u>It is recommended that suitable pro-active mitigation be implemented at all turbines within a 5.2 km radius around all Verreaux's Eagle nests during daylight hours, once the wind farm commences with operations, to reduce the risk of collisions of Verreaux's Eagles with the turbines. Suitable pro-active mitigation measures should be selected prior to commencement of construction, informed by best-available information at the time of implementation.</u> | <u>Project Company</u> | <u>Prior to construction</u> |
| <u>It is recommended that all internal 33kV medium voltage cables should be placed underground except those sections where, due to ecological, geological or topographical reasons, trenching will not be a practical option, confirmed by appropriate independent specialists.</u> | <u>Project Company</u> | <u>Prior to construction</u> |
| <u>It is recommended that the proposed 33kV pole designs must be approved by the avifaunal specialist, for those sections where the medium voltage cables have to run above-ground, preferably with input from the Endangered Wildlife Trust, to ensure that the designs are raptor-friendly.</u> | <u>Project Company</u> | <u>Prior to construction</u> |
| <u>It is recommended that bird flight diverters are fitted to all 33kV medium voltage overhead lines.</u> | <u>Project Company</u> | <u>Prior to construction</u> |
| The EMPr should form part of the contract with the Contractors appointed to construct and maintain the proposed wind energy facility, and will be used to ensure compliance with environmental specifications and management measures. The implementation of this EMP for all life cycle phases of the proposed project | Project Company, Contractor | Tender Design & Design Review Stage |

| Mitigation: Action/control | Responsibility | Timeframe |
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| is considered to be key in achieving the appropriate environmental management standards as detailed for this project. | | |
| The final location of the wind turbines and associated infrastructure (including access roads, the substation location and power line alignments) must be informed by a survey undertaken by an ecological specialist to identify any of the Red List plant species that have a geographic distribution in the areas, this includes: <ul style="list-style-type: none"> » <i>Vulnerable species (Romulea eburnea, Lotononis venosa and Geissorhiza karoocica); and</i> » <i>Rare species (Cleretum lyratifolium and Strumarica karoocica).</i> The findings of this survey must have been included in this updated EMPr.. Prior to construction, the footprint of each turbine and power line tower must be searched for the relevant populations of plant species of concern. If any populations are found in these areas, infrastructure should be moved to avoid impacts. If not possible to avoid the impact, a permit is required in terms of Chapter 7 of the National Environmental Management: Biodiversity Act to carry out a restricted activity involving a specimen of a listed threatened or protected species. | Project Company, Contractor | Design phase |
| A walk-through survey by an ecologist and avifaunal specialist to be undertaken for the final power line route, and sections of the power line which cross sensitive habitats should be demarcated. | Project Company, Contractor, ecologist, avifaunal specialist | Design phase |
| The Ecological preconstruction walk-through will need to locate and identify species of conservation concern that are within the development footprint. | Project Company and Contractor | Project Company |
| Prior to construction, a walk-down of the amended layout must be conducted by a qualified archaeologist to ensure that no heritage resources are to be impacted by the new locations of the turbines. If heritage resources are identified at or near any proposed infrastructure, an assessment of the significance of the heritage resources and the impact to the identified heritage resource must be completed. A report detailing the results of the survey must be submitted to SAHRA before construction commences. Permits must be obtained to impact on any heritage sites of significance <u>(only if required)</u> . | Project Company | Pre-construction |
| <u>The locations identified as sensitive such as grave sites, should also be protected by buffers. A buffer of 30m from heritage features must be implemented throughout the development footprint.</u> | <u>Project Company, Contractor</u> | <u>Design phase</u> |
| Water use license to be obtained for any impacts on wetlands / drainage lines (if applicable). | Project Company, Contractor | Design phase |

| Mitigation: Action/control | Responsibility | Timeframe |
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| Water use license (or General Authorisation) to be obtained for abstraction of water from on-site borehole/s for construction and operation purposes. | Project Company, Contractor | Design phase |
| Mining permit/license to be obtained for any borrow pits to be established for the project (if applicable). | Contractor | Design phase |
| A ridge survey is undertaken for the identification of nesting sites before construction. | Project Company, , ecologist, avifaunal specialist | Design phase |
| Obtain required abnormal load permits for transportation of project components to site. | Contractor | Design phase |
| Determine an appropriate location for onsite batching | Contractor | Design phase |
| A detailed geotechnical investigation is required for the design phase. | Contractor | Design phase |
| Develop and implement a storm water management plan for the construction and operational phase and append it to the EMPR. | Project Company | Design phase |

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| 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 and Reporting | <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. |

CHAPTER 5: MANAGEMENT PROGRAMME FOR THE WIND ENERGY FACILITY: CONSTRUCTION

5.1. Overall Goal for Construction

The construction phase of the wind energy facility should be undertaken in such a way that ensures the construction activities are properly managed in respect of environmental aspects and impacts and enables the wind energy facility construction activities to be undertaken without significant disruption to other land uses in the area, in particular with regard to noise impacts, traffic and road use, and effects on local residents. The construction phase of the facility should also be undertaken in such a way as to minimise the impact on the vegetation, fauna and avifauna on the site as well as on any archaeological and historical value the site may have, as determined by the EIA and applicable amendments.

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

The proponent must ensure that the implementation of the Power Station 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 EMPr, and the implementation of the EMPr through its integration into the contract documentation. These are outlined below. The developer will retain various key roles and responsibilities during the construction of the wind energy facility.

Specific responsibilities of the Owner's Representatives; Environmental Control Officer and EPC 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 its Contractors are made aware of all stipulations within the EMPr.
- » Ensure that the EMPr 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 EMPr, the conditions of the Environmental Authorisation, and all relevant environmental legislation.

The **Site Manager** (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 EMPr.
- » 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 EMPr and its implementation.
- » Conduct audits to ensure compliance to the EMPr.

- » Ensure there is communication with the Project Manager, the Environmental Control Officer/s 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 EMPr and the conditions of the Environmental Authorisation. The ECO must:

- » Be fully knowledgeable of the contents with the Environmental Impact Assessment.
- » Be fully knowledgeable of the contents with the conditions of the Environmental Authorisation (once issued).
- » Be fully knowledgeable of the contents with the EMPr.
- » Be fully knowledgeable of 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.
- » 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 EMPr is monitored through regular and comprehensive inspection of the site and surrounding areas.
- » Ensure that the Site Manager has input into the review and acceptance of construction methods and method statements.
- » Visit the site sufficiently regularly so as to 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 EMPr in consultation with the Site Manager.
- » 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.
- » Independently report to DFFE in terms of compliance with the specifications of the EMPr and conditions of the Environmental Authorisation (once issued).
- » Ensure that the compilation of progress reports for submission to the Proponent, with input from the Site Manager, takes place on a regular basis, weekly, Monthly compliance monitoring reports, including Final Post-Construction and Final Environmental Rehabilitation Audit Reports as per the EA.
- » Ensure that there is regular 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 and recorded.
- » Independently report to the Department of Environment (National & Provincial) in terms of compliance with the specifications of the EMPr and conditions of the EA (once issued) if and when requested.
- » Submit independent reports to the DEA and other regulating authorities regarding compliance with the requirements of the EMPr, EA and other environmental permits.
- » Keep record of all reports submitted to DFFE.

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.

Contractor(s) and their Service Providers/ Sub-Contractors: The Contractor(s) is responsible for the overall execution of the activities envisioned in the construction phase including the implementation and compliance with recommendations and conditions of the EMPr. It is important that the Contractor(s) is fully aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. The Contractor(s) 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)'s obligations in this regard include the following:

- » Ensure implementation and compliance with the EMPr at all times during construction activities.
- » Responsible for the implementation of corrective actions enforced by the ECO/ EO for non-conformances recorded within a reasonable period of time. The Method Statement / Corrective Action Plan must indicate the turn-around time for closing out the non-conformances.
- » 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.
- » Employees must be provided with a basic understanding of the key environmental features of the construction site and the surrounding environment by the Contractor's Environmental Officer.
- » A copy of the EMPr must be easily accessible to all on-site staff members.
- » Employees must be familiar with the requirements of this EMPr and the environmental specifications as they apply to the construction of the proposed facility.
- » Prior to commencing any site works, all employees and sub-contractors must have attended an environmental awareness training course which must provide staff with an appreciation of the project's environmental requirements, and how they are to be implemented. The training is to be conducted by the Environmental Officer.
- » Staff will be informed of environmental issues as deemed necessary by the ECO / EO.

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

- » Ensuring adherence to the Environmental management programme.
- » Ensuring that Method Statements are submitted to the Site Manager and ECO for approval/acceptance before any work is undertaken.
- » Any lack of adherence to the above will be considered as non-compliance to the specifications of the EMPr.
- » Ensuring that any instructions issued by the Site Manager on the advice of the ECO are adhered to.
- » Ensuring that a register is kept in the site office, which lists all transgressions issued by the ECO / EO.
- » Ensuring that a register of all public complaints is maintained.
- » Ensuring that all employees, including those of sub-contractors receive training before the commencement of construction in order that they can constructively contribute towards the successful implementation of the EMPr (i.e. ensure their staff are appropriately trained as to the environmental obligations).

Proponent's EO / Contractor's EO and/or Environment Representative⁵: The EO will be responsible for implementation of this EMPr and should be appointed prior to any commencement of the activities.

⁵ This refers to the Contractor's designated environmental site representative. The person might have a different title, e.g. Safety, Health and Environmental officer, but their core mandate will be as is described in this EMPr.

The Proponent's EO / Contractor's EO / Environmental Representative should:

- » Be well versed with all the project documentation and general environmental matters.
- » Understand the relevant environmental legislation and processes and the implementation thereof.
- » Understand the hierarchy of Environmental Compliance Reporting, and the implications of Non-Compliance.
- » Know the background of the project and understand the implementation programme.
- » Be able to resolve conflicts and make recommendations on site in terms of the requirements of this Specification.
- » Keep accurate and detailed records of all EMPr-related activities on site. The EO shall keep a daily diary for monitoring the site specific activities as per project schedule.
- » As a general mitigation strategy, the EO should supervise any flora relocation and faunal rescue activities that may need to take place during the site clearing (i.e. during site establishment, and excavation of foundations) and therefore needs the relevant training/ experience. The EO will have overall responsibility for environmental management and implementation of mitigations in absence of the ECO.
- » The EO is responsible for managing the day-to-day on-site implementation of this EMPr and other Project Permits/Authorisations.
- » Ensure or otherwise train and induct all contractor's employees prior to commencement of any works;
- » Compilation of Weekly Monitoring Reports to be submitted to the ECO and Site Manager.
- » In addition, the EO / Environmental Representative must act as project 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, ECO and Contractor (s).

5.3. Objectives for the Construction EMPr

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

OBJECTIVE 2 : Securing the site and site establishment

The Contractor must take all reasonable measures to ensure the safety of the public in the surrounding area. Where the public could be exposed to danger by any of the works or site activities, the Contractor must, as appropriate, provide suitable flagmen, barriers and/or warning signs in English and any other relevant indigenous languages, all to the approval of the Site Manager. All unattended open excavations shall be adequately demarcated and/or fenced (fencing shall consist of a minimum of three strands of wire wrapped with danger tape). Adequate protective measures must be implemented to prevent unauthorised access to the working area and the internal access/haul routes.

Project component/s

Project components affecting the objective:

- » Wind turbines;
- » Access roads;
- » Substation;
- » MV lines;
- » Operation and maintenance buildings; and
- » Laydown areas and hardstands

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| Potential Impact | <ul style="list-style-type: none"> » Hazards to landowners and public » Security of materials » Substantially increased damage to adjacent 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. | Contractor | During site establishment Maintenance: for duration of Contract. |
| Where necessary to control access, fence and secure access to the site and entrances to the site. | Contractor | During site establishment Maintenance: for duration of Contract. |
| Fence and secure Contractor's equipment camp. | Contractor | Erection: during site establishment Maintenance: for duration of Contract. |
| Location of concrete batching plant/s <u>as per approved Final Layout</u> or where not included in the Final Layout it is to be approved by ECO, prior to its establishment. | ECO | During site establishment |

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| 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 EMPr. » Public complaints register must be developed and maintained on site. » ECO / EO to monitor all construction areas on a continuous basis until all construction is completed; immediate report backs to site manager. » ECO / EO to address any infringements with responsible contractors as soon as these are recorded. |

OBJECTIVE 3 : Maximise local employment and business opportunities associated with the construction phase

It is acknowledged that skilled personnel are required for the construction of the wind turbines and associated infrastructure. However, where semi-skilled and unskilled labour is required, opportunities for local employment should be maximised as far as possible.

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| Project component/s | <ul style="list-style-type: none"> » Wind turbines; » Access roads; » Substation; » MV line; » <u>Operation and maintenance buildings; and</u> » <u>Laydown areas and hardstands.</u> |
| Potential Impact | » The opportunities and benefits associated with the creation of local employment and |

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| | business should be maximised. However, due to the relatively small size of the facility the number of employment and business opportunities for locals will be limited. |
| Activities/risk sources | » The employment of outside contractors to undertake the work and who make use of their own labour will reduce the employment and business opportunities for locals. Employment of local labour will maximise local employment opportunities. |
| Mitigation: Target/Objective | » Developer, in discussions with the local municipality, should aim to employ as many workers (skilled, semi-skilled / low-skilled) from the local areas/ towns, as possible. » Developer should develop a database of local BEE service providers |

| Mitigation: Action/control | Responsibility | Timeframe |
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| Employ as many workers (skilled, semi-skilled / low-skilled) from the local area/ nearby towns. | Contractors | Construction |
| Implement appropriate training and skills development programmes prior to the initiation of the construction phase to ensure that local employment target is met. | Contractors | Where required, training and skills development programmes to be initiated prior to the initiation of the construction phase. |
| Develop a database of local BEE service providers and ensure that they are informed of relevant tenders and job opportunities. | Contractors | Database of potential local BEE services providers to be completed before construction phase commences. |
| Identify potential opportunities for local businesses. | Contractors | Tender Design and Review stage |

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| Performance Indicator | » Source as many local labourers as possible. » Database of potential local BEE services providers in place before construction phase commences. |
| Monitoring and Reporting | » Contractors and appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase. » An incident reporting system must be used to record non-conformances to the EMPr. » Public complaints register must be developed and maintained on site. |

OBJECTIVE 4 : Avoid the negative social impacts on family structures and social networks due to the presence of construction workers

While the presence of construction workers does not in itself constitute a social impact, the manner in which construction workers conduct themselves can impact on the local community. In this regard the most significant negative impact is associated with the disruption of existing family structures and social networks. This risk is linked to the potential behaviour of male construction workers, including an increase in alcohol and drug use, an increase in crime levels, the loss of girlfriends and or wives to construction workers, an increase in teenage and unwanted pregnancies, an increase in prostitution and an increase in sexually transmitted diseases.

The potential risk to local family structures and social networks is, however, likely to be low. The low and semi-skilled workers are likely to be local residents and will therefore form part of the local family and social network.

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| Project component/s | <ul style="list-style-type: none"> » Construction of wind turbines » Construction work force |
| Potential Impact | <ul style="list-style-type: none"> » The presence of construction workers who live outside the area and who are housed in local towns can impact on family structures and social networks. » Presence of construction workers on site may result in loss of livestock due to stock theft and damage to farm infrastructure, such as gates and fences. Poaching of wild animals may also occur. » Due the relatively small number of workers associated with the construction of the proposed facility, the risk of impacts is likely to be low. |
| Activities/risk sources | <ul style="list-style-type: none"> » The presence of construction workers can impact negatively on family structures and social networks, especially in small, rural communities. » The presence of construction workers on the site can result in stock thefts and damage to farm infrastructure. |
| Mitigation: Target/Objective | <ul style="list-style-type: none"> » Avoid and or minimise the potential impact of construction workers on the local community and livelihoods. |

| Mitigation: Action/control | Responsibility | Timeframe |
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| <p>Establish contact with the adjacent farmers and develop a Code of Conduct for construction workers.</p> <p>Ensure that construction workers attend a brief session before they commence activities. The aim of the briefing session is to inform them of the rules and regulations governing activities on the site as set out in the Code of Conduct.</p> <p>Ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct.</p> | Contractors | Briefing session for construction workers held before they commence work on site. |
| Ensure that construction workers who are found guilty of breaching the Code of Conduct are dealt with appropriately. Dismissals must be in accordance with South African labour legislation. | Contractors | Construction |
| No housing of construction workers on the site to be permitted, apart from security personnel. | Contractors | Construction |
| Compensate farmers / community members for any proven cost for any losses, such as livestock, damage to infrastructure etc. | Contractors | Compensate Farmers / community after a claim has been verified by the Developer or Contractors. |

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| Performance Indicator | <ul style="list-style-type: none"> » Employment policy and tender documents that set out requirement for local employment and targets completed before construction phase commences. » Code of Conduct developed and approved prior to commencement of construction phase. » Labour locally sourced, where possible. » Tender documents for contractors include recommendations for construction camp. » All construction workers made aware of Code of Conduct within first week of being employed. » Briefing session with construction workers held at outset of construction phase. |
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| Monitoring and Reporting | <ul style="list-style-type: none"> » The Developer and appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase. » An incident reporting system must be used to record non-conformances to the EMPr. » Public complaints register must be developed and maintained on site. |
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OBJECTIVE 5 : Noise control

Various construction activities would be taking place during the development of the facility and may pose a noise risk to sensitive receptors. While the study undertaken in the EIA investigated likely and significant noisy activities, it did not evaluate all potential activities that could result in a noise impact, as these were not defined at the time of the study. Other construction activities not evaluated could include temporary or short-term activities where small equipment is used (such as the digging of trenches to lay underground power-cables).

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| Project component/s | List of project components affecting the objective: <ul style="list-style-type: none"> » Construction of turbine system (foundation, tower, nacelle and rotor); » Substation; » Access roads; » <u>MV lines; and</u> » <u>Associated infrastructure.</u> |
| Potential Impact | » Nuisance noise from construction activities affecting the surrounding community. |
| Activity/risk source | » Any construction activities taking place within 500 m 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 as far as possible that maximum noise levels at potentially sensitive receptors be less than 65 dBA. » Prevent the generation of a disturbing or nuisance noises. » Ensure acceptable noise levels at surrounding stakeholders and potentially sensitive receptors. » Ensuring compliance with the Noise Control Regulations. |

| Mitigation: Action/control | Responsibility | Timeframe |
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| The construction crew must abide by the national standards and local by-laws regarding noise (<u>National Noise Control Regulations and SANS10103:2008</u>). | Contractor | Construction |
| <u>The holder of the authorisation must ensure that the construction staff working in areas where the 8-hour ambient noise levels exceed 75dBA must wear ear protection equipment.</u> | <u>Contractor</u> | <u>Construction</u> |
| All construction equipment, including vehicles, must be properly and appropriately maintained in order to minimise noise generation. | Contractor | Construction |
| Establish a line of communication and notify all stakeholders and sensitive receptors of the means of registering any issues, complaints or comments. | Environmental Control Officer | All phases of project. |

| Mitigation: Action/control | Responsibility | Timeframe |
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| All wind turbines should be located at a setback of 500m from any homestead and a day/night noise criteria level at the nearest residents of 45dB(A) should be used to locate the turbine, the 500m, setback distance can be relaxed if local factors, such as high ground between the noise source and the receiver, indicates that a noise disturbance will not occur. | Contractor | Construction |
| Notify potentially sensitive receptors about work to take place at least 2 days before the activity in the vicinity (within 500 m) of the PSR 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; and » Contact details of responsible party. | Contractor, Environmental Control Officer | At least 2 days, but not more than 5 days before activity is to commence. |

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| Performance Indicator | <ul style="list-style-type: none"> » No complaints received concerning noise. » Equivalent A-weighted noise levels below 45 dBA at potentially sensitive receptors. » Ensure that maximum noise levels at potentially sensitive receptors are less than 65 dBA as far as possible. |
| Monitoring and Reporting | <ul style="list-style-type: none"> » Should a complaint about noise be reported, the developer to look into the matter and determine steps to deal with the complaint. An incident reporting system must be used to record non-conformances to the EMPr. » Public complaints register must be developed and maintained on site. |

OBJECTIVE 6 : Management of dust and emissions and damage to roads

During the construction phase, limited gaseous or particulate emissions (and dust) 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 internal access roads.

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| Project component/s | Project components affecting the objective: <ul style="list-style-type: none"> » Wind turbines; » Access roads; » Substation; and » <u>MV</u> lines. |
| Potential Impact | » Heavy vehicles can generate noise and dust impacts. Movement of heavy vehicles can also damage roads. |
| Activities/risk sources | » The movement of heavy vehicles and their activities on the site can result in noise and dust impacts and damage roads. |
| Mitigation: Target/Objective | » To avoid and or minimise the potential noise and dust impacts associated with heavy vehicles, and also minimise damage to roads. |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|----------------|--------------|
| Implement appropriate dust suppression measures on site | Contractor | Construction |

| Mitigation: Action/control | Responsibility | Timeframe |
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| such as wetting roads on a regular basis. | | |
| Haul vehicles moving outside the construction site carrying material that can be wind-blown should be covered with tarpaulins. | Contractor | Duration of contract |
| Ensure vehicles adhere to speed limits on public roads and speed limits set within the site by the ECO. Vehicles should be fitted with recorders to record when vehicles exceed the speed limit. | Contractor/ transportation contractor | Duration of contract |
| Disturbed areas must be re-vegetated as soon as practicable after construction is complete in an area. | Contractor | At completion of the construction phase. |
| Vehicles and equipment must be maintained in a road-worthy condition at all times. | Contractor | Prior to construction phase. |
| Ensure that damage to gravel public roads and access roads attributable to construction vehicles is repaired before completion of construction phase. | Contractor | Before completion of construction phase. |
| Regular dust control of materials (sand, soil, cement) must be used at concrete batching plants on site. | Contractor | Construction |

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

OBJECTIVE 7 : Soil and rock degradation and erosion control

The natural soil on the site needs to be preserved as far as possible to minimise impacts on the environment. Soil degradation including erosion (by wind and water) and subsequent deposition elsewhere is of a concern in areas underlain by fine grained soil which can be mobilised when disturbed, even on relatively low slope gradients (accelerated erosion). Uncontrolled run-off relating to construction activity (excessive wetting, etc.) will also lead to accelerated erosion. Degradation of the natural soil profile due to excavation, stockpiling, compaction, pollution and other construction activities will affect soil forming processes and associated ecosystems. Steep slope are prone to soil erosion and good soil management must be undertaken during construction.

A set of strictly adhered to mitigation measures are required to be implemented in order 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. Management of erosion will be required during the construction phase of the facility. An erosion management plan is required to ensure compliance with applicable regulations and to prevent increased soil erosion and sedimentation of the downstream environment. The section below provides a guideline for the management of erosion on site and will need to be supplemented with the principles for erosion management contained in the Erosion Management Plan included in **Appendix H**.

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| Project component/s | Project components affecting the objective: <ul style="list-style-type: none"> » Wind turbines; » Access roads; » Substation; » <u>MV</u> lines; » Sealed surfaces (e.g. roofs, concrete surfaces, compacted road surfaces, paved roads / areas); and » <u>Associated infrastructure</u>. |
| Potential Impact | <ul style="list-style-type: none"> » Erosion and soil loss; » Negative impacts on wetlands; » Disturbance to or loss of wetland/pan habitat; » Sedimentation of watercourses/wetland areas; » A loss of indigenous vegetation cover; and » Increased runoff into drainage lines can potentially be associated with accelerated erosion. |
| Activities/risk sources | <ul style="list-style-type: none"> » Rainfall and wind erosion of disturbed areas; » Excavation, stockpiling and compaction of soil; » Concentrated discharge of water from construction activity; » Stormwater run-off from sealed surfaces; » Mobile construction equipment movement on site; » MV line construction activities; » River/stream/drainage line road crossings; » Roadside drainage ditches; and » Project related infrastructure, such as buildings, turbines and fences. |
| Mitigation: Target/Objective | <ul style="list-style-type: none"> » To minimise erosion of soil from site during construction; » To minimise deposition of soil into drainage lines; » To minimise damage to vegetation by erosion or deposition; » To minimise damage to rock, soil and vegetation by construction activity; » No accelerated overland flow related surface erosion as a result of a loss of vegetation cover; » No reduction in the surface area of wetlands (drainage lines and other wetland areas) as a result of the establishment of infrastructure; » Minimal loss of vegetation cover due to construction related activities; » No or insignificant loss of wetland area in the specialist study area; » No increase in runoff into drainage lines as a result of construction of project related infrastructure; and » No increase in runoff into drainage lines as a result of road construction. |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|-----------------------|-------------------------------|
| Stockpile topsoil for re-use in rehabilitation phase. | Contractor | During site establishment and |

| Mitigation: Action/control | Responsibility | Timeframe |
|--|--|---|
| Maintain stockpile shape and protect from erosion. All stockpiles must be positioned at least 50 m away from drainage lines and wetlands. Limit the height of stockpiles as far as possible to reduce compaction. | | any activity related to earthworks as well as the duration of construction. |
| New access roads to be carefully planned and constructed to minimise the impacted area and prevent unnecessary excavation, placement and compaction of soil. | Engineer / ECO / Contractor | Before and during construction |
| Identify and demarcate construction areas for general construction work and restrict construction activity to these areas. | Contractor | Construction |
| Rehabilitate disturbance areas as soon as construction in an area is completed. | Contractor | During and after construction |
| Stockpiles not used in three (3) months after stripping must be seeded or appropriately covered to prevent dust and erosion - only if natural seeding does not occur. | Contractor | During and after construction |
| Erosion control measures: Implement run-off attenuation on slopes (sand bags, logs), silt fences, stormwater catch-pits, shade nets or temporary mulching over denuded areas. | Contractor | Erection: Before construction Maintenance: Duration of contract. |
| Particular care should be taken in the design of road drainage line and wetland crossings in order to ensure there is no step in the channel bed, substrate continuity is maintained and no undue constriction of flow takes place. | Contractor | Erection: during site establishment Maintenance: for duration of contract. |
| Where access roads <u>are authorised (including for environmental authorisation and water use authorisation)</u> to cross natural drainage lines or wetlands, culverts (or other appropriate measures <u>as authorised</u>) must be designed to allow free flow. Regular maintenance of the culverts must be carried out. | Engineer / ECO / Contractor | Before and during construction |
| Control depth of all excavations and stability of cut faces/sidewalls. | Engineer / ECO / Contractor | Maintenance over duration of contract |
| <u>Foundations and trenches must be backfilled with originally excavated material as much as possible. Excess excavation materials must be disposed of only in approved areas or, if suitable, stockpiled for use in reclamation activities.</u> | <u>Engineer / ECO / Contractor</u> | <u>Construction</u> |
| Compile a comprehensive stormwater management plan (<u>refer to Appendix F</u>) as part of the final design of the project and implement during construction and operation. | Construction team, management, environmental control officer | Compile during design; implement during construction & operation |
| Cement batching to take place in designated areas only, as approved by the ECO (if applicable). | Contractor | Construction. |
| Spillages of cement to be cleaned up immediately and disposed or re-used in the construction process. | Contractor | Construction |
| Spill kits to be kept on active parts of the construction site & at site offices. | Contractor | Construction |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|----------------|--------------|
| Soil erosion control measures (such as hessian mats and gabions) be used for in erosion prone areas such as steep slopes. | Contractor | Construction |

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| Performance Indicator | <ul style="list-style-type: none"> » Acceptable level of activity within disturbance areas, as determined by ECO; » Acceptable level of soil erosion around site, as determined by ECO; » Acceptable level of increased siltation in drainage lines, as determined by ECO; » Acceptable level of soil degradation, as determined by ECO; and » Acceptable state of excavations, as determined by ER & ECO. |
| Monitoring and Reporting | <ul style="list-style-type: none"> » Continual inspections of the site by ECO; » Fortnightly inspections of sediment control devices by ECO; » On-going inspections of surroundings, including drainage lines and wetlands by ECO; » Reporting of ineffective sediment control systems and rectification as soon as possible; » An incident reporting system must record non-conformances to the EMP; and » Public complaints register must be developed and maintained on site. |

OBJECTIVE 8 : Limit disturbance and avoid damage to wetland areas and drainage lines

The layout for the wind energy facility avoids the placement of turbines within wetland areas. However, there are still some instances where roads and cables may cross identified wetland or watercourse areas. Mitigation measures are required to minimise impacts on those systems affected in this regard.

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| Project component/s | List of project components affecting the objective: <ul style="list-style-type: none"> » Access roads; » Cabling; » <u>MV</u> lines; » Site Camps; and » Laydown areas. |
| 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 of <u>laydown areas, site camps,</u> access roads, cabling and power lines. |
| Mitigation: Target/Objective | » No damage to wetlands and drainage lines within project area. |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|----------------------------------|--------------|
| Align underground cables and internal access roads as far as possible along existing infrastructure and disturbances. | Project Company, Contractor, ECO | Construction |
| Ensure overhead power lines are constructed to span watercourse crossings <u>as far as possible</u> so as to reduce impacts on riparian vegetation. | Project Company, Contractor, | Construction |
| For any new construction where direct impacts on wetlands are unavoidable, cross watercourses | Project Company, Contractor, | Construction |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|------------------------------|------------------|
| perpendicularly to minimise disturbance footprints. | | |
| Rehabilitate any disturbed areas as soon as possible once construction is completed in an area. | Project Company, Contractor, | Construction |
| Obtain required water use license <u>or</u> <u>General Authorisation (whichever is applicable)</u> for impacting on <u>or nearby to wetlands and / or watercourses</u> (if applicable). | Project Company | Pre-construction |
| Construction must not result in the width of the watercourse being narrowed. | Contractor | Construction |
| Control stormwater and runoff water. | Contractor | Construction |
| Where identified by the ECO, utilise erosion control measures on access roads, wetland areas and drainage lines. | Contractor | Construction |
| Concrete batching plants and stockpiles to be located more than 500m away from wetlands. | Contractor | Construction |

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| Performance Indicator | » Limited impacts on water quality, water quantity, riparian or wetland vegetation, natural status of riparian or wetland areas. |
| Monitoring and Reporting | <ul style="list-style-type: none"> » Habitat loss in watercourses should be monitored before and after construction. » The ECO should be responsible for driving this process and reporting. » An incident reporting system must be used to record non-conformances to the EMPr. » Public complaints register must be developed and maintained on site. |

OBJECTIVE 9 : Protection of indigenous vegetation and control of alien invasive plants

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. Due to disturbance of vegetation, there is a higher risk of alien species dominating disturbed areas. Therefore, control of alien invasive plants is required. An Alien Invasive Plant Management Plan is attached to **Appendix B**. Method for Plant Rescue and Habitat Rehabilitation (a Plant Rescue and Re-Vegetation Management Plan) is attached to **Appendix D**.

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| Project component/s | List of project components affecting the objective: <ul style="list-style-type: none"> » Wind turbines and associated laydown areas; » Access roads and cabling; » Substation; » Workshop area; » Batching plants; » Temporary laydown areas; and » MV lines and associated access road. |
| Potential Impact | » Proliferation of alien plants |
| Activity/risk source | <ul style="list-style-type: none"> » Site preparation and earthworks; » Construction-related traffic; |

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| | <ul style="list-style-type: none"> » Foundations; » Mobile construction equipment; » <u>MV</u> line construction activities; and » 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 of the site; » To minimise footprints of disturbance of vegetation/habitats on-site; » No alien plants within project control area; and » No loss of species of conservation concern. |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|--------------------------------------|--------------------------|
| Unnecessary impacts on surrounding natural vegetation must be avoided, e.g. driving around in the veld. The construction impacts must be contained to the footprint of the infrastructure. | Contractor and ECO, management (ECO) | Construction |
| Internal access roads and cables should be aligned as far as possible along existing linear disturbances, e.g. roads on site and away from steep slopes and drainage lines as much as possible. Where new roads are to be constructed, these should follow existing tracks or disturbed areas or the edges of disturbed areas as far as possible. | Contractor and ECO | Construction / design |
| Identify and demarcate areas within which activities are to be undertaken. Ensure that activities are restricted to these areas to ensure unnecessary impacts on surrounding natural vegetation are avoided. | Contractor and ECO | Construction |
| Establish an on-going monitoring programme to detect, quantify and remove any alien species that may become established and identify the problem species (as per Conservation of Agricultural Resources Act, Act 43 of 1983 and NEM: Biodiversity Act). | Contractor and ECO | Construction & Operation |
| Control any alien plants that become established using registered control methods. | Contractor and ECO | Construction & Operation |

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| Performance Indicator | <ul style="list-style-type: none"> » Limited disturbance outside of designated work areas. » Minimised clearing of existing/natural vegetation. » Limited loss of natural vegetation within "no-go" areas. Loss of other natural vegetation only within designated footprint of infrastructure. » Limited fragmentation of untransformed areas of natural vegetation. » Limited alien infestation within project control area. |
| Monitoring and Reporting | <ul style="list-style-type: none"> » Observation of vegetation clearing activities by ECO throughout construction phase. » Supervision of all clearing and earthworks. » Monitoring of alien plant establishment within the project control area on an on-going basis. » An incident reporting system must be used to record non-conformances to the EMPr. » Public complaints register must be developed and maintained on site. |



OBJECTIVE 10 : Protection of fauna & avifauna

Infrastructure associated with the facility often impacts on birds and animals. Furthermore, the construction and maintenance of the power line linking the facility to the electricity grid will result in some disturbance and habitat destruction. New roads constructed will also have a disturbance and habitat destruction impact.

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| Project component/s | List of project components affecting the objective: » Wind turbines and associated laydown areas; » Access roads and cabling; » Substation; » Workshop area; » Batching plants; » Temporary laydown areas; and » MV lines and associated access road. |
| Potential Impact | » Vegetation clearance and associated impacts on faunal habitats; and » Disturbance of birds |
| Activity/risk source | » Site preparation and earthworks; » Construction-related traffic; » Foundations or plant equipment installation; » Mobile construction equipment; and » Power line construction activities. |
| Mitigation: Target/Objective | » To minimise footprints of habitat destruction; and » To minimise disturbance to resident and visitor faunal and avifaunal species. |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|--------------------------------|---|
| <u>Bird flight diverters are fitted to all 33kV medium voltage overhead lines</u> | Project Company and Contractor | During construction |
| The extent of clearing and disturbance to the native vegetation must be kept to a minimum so that impact on fauna and their habitats is restricted. | Contractor | Site establishment & duration of contract. |
| <u>Should any animals be found these should be relocated prior to construction</u> | <u>Contractor</u> | <u>Site establishment & duration of contract.</u> |
| Should any bird nests be found these should be relocated | Contractor | Site establishment & duration of contract. |
| No poaching or hunting of wildlife on site during construction | Contractor | Site establishment & duration of contract. |

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| Performance Indicator | » Minimum disturbance outside of designated work areas. » Minimised clearing of existing/natural vegetation and habitats for fauna and avifauna. » Limited impacts on faunal species (i.e. noted/recorded fatalities), especially those of conservation concern. |
| Monitoring and Reporting | » Observation of vegetation clearing activities by ECO throughout construction phase. » Supervision of all clearing and earthworks by ECO. » An incident reporting system must be used to record non-conformances to the EMPr. » Public complaints register must be developed and maintained on site. |

OBJECTIVE 11 : Protection of fossils and sites of heritage and archaeological value

The construction phase of the wind energy facility will entail excavations into the superficial sediment cover (soils etc.) and perhaps also into the underlying bedrock. Areas of potentially fossiliferous bedrock may be sealed-in or sterilised by infrastructure such as hard standing areas for each wind turbine, lay down areas and internal access roads. These activities may adversely affect potential fossil heritage within the study area by potentially damaging, destroying, disturbing or permanently sealing-in fossils that are then no longer available for scientific research or other public good.

The main cause of impacts to archaeological sites 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.

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| Project component/s | List of project components affecting the objective: <ul style="list-style-type: none"> » Wind turbines; » Access roads and cabling; » Operations and service building area; » Substation; and » MV lines and associated access roads. |
| Potential Impact | <ul style="list-style-type: none"> » Heritage objects or artefacts found on site are inappropriately managed or destroyed; and » Loss of 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; » Power line construction activities; » Access road construction activities; and » Substation construction facilities. |
| 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 |
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| Construction managers/foremen should be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites. | Project Company | Pre-construction |
| 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. | Project Company / Contractor in consultation with Specialist | Duration of contract |
| If at any stage during the construction phase any semblance of a fossil were to be observed, it would be | Contractor | Duration of contract |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|-----------------------------|---------------------|
| vital to recover the fossil and report the occurrence to the geological staff at the closest repository in the Northern Cape and/or the South African Heritage Resources Agency (SAHRA) (021 642 4502) so that systematic and professional investigation/excavation can be undertaken. | | |
| If concentrations of archaeological materials are exposed during construction, then all work must stop for an archaeologist to investigate. | Contractor | Construction |
| If any human remains (or any other concentrations of archaeological heritage material) are exposed during construction, all work must cease and it must be reported immediately to the nearest museum/archaeologist or to the South African Heritage Resources Agency, so that a systematic and professional investigation can be undertaken. Sufficient time should be allowed to investigate and to remove/collect such material. | Contractor | Construction |
| If concentrations of archaeological heritage material and human remains are uncovered during construction, all work must cease immediately and be reported to the Albany Museum (046 622 2312) and/or the South African Heritage Resources Agency (SAHRA) (021 642 4502) so that systematic and professional investigation/excavation can be undertaken. | <u>Contractor</u> | <u>Construction</u> |
| Construction managers/foremen should be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites. | <u>Contractor</u> | <u>Construction</u> |
| Monitoring of all substantial bedrock excavations for fossil remains by EO, with reporting of new finds to SAHRA and / or a professional palaeontologist for possible specialist mitigation (i.e. recording, judicious sampling of fossil material). | EO Developer | Construction |
| <u>In a subsequent letter from SAHRA dated 21 October 2016, SAHRA indicated that "There will be no need for a further palaeontological field assessment, as a desktop study is sufficient. A map of the identified palaeontological resources relative to the layout of the proposed development must be emailed to the case officer and ECO must monitor all excavations I the Great Karoo Wind Energy Facility".</u> | <u>Contractor & ECO</u> | <u>Construction</u> |

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| Performance Indicator | <ul style="list-style-type: none"> » Minimum disturbance outside of designated work areas. » All heritage items located are dealt with as per the legislative guidelines. |
| Monitoring and Reporting | <ul style="list-style-type: none"> » Observation of excavation activities by ECO throughout construction phase. » Supervision of all clearing and earthworks. » An incident reporting system will be used to record non-conformances to the EMPr. » Public complaints register must be developed and maintained on site. |

OBJECTIVE 12 : Minimisation of visual impacts associated with construction

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

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| Project component/s | List of project components affecting the objective: » Construction site; » access roads; and » turbines. |
| Potential Impact | » The potential scarring of the landscape due to the creation of new access roads/tracks or the unnecessary removal of vegetation; and » Construction traffic. |
| Activity/risk source | » The viewing of visual scarring by observers in the vicinity of the facility or from the roads traversing the site. |
| Mitigation: Target/Objective | » Minimal disturbance to vegetation cover in close vicinity to the proposed facility and its related infrastructure; and » Minimised construction traffic, where possible. |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|-----------------------|--------------------------|
| The general appearance of construction activities, construction equipment camps and lay-down areas must be maintained and kept neat and tidy by means of the timely removal of rubble and disused construction materials. | Contractor | Construction |
| The turbines must be painted a pale, non-reflective colour (i.e., as specified by CAA) before erection of the turbines. | Contractor | Erection of turbines |
| Limit access to the construction sites (during both construction and operational phases) along existing access roads as far as possible. | Contractor | Duration of contract |
| Ensure all disturbed areas are appropriately rehabilitated once construction in an area is complete. | Contractor | Duration of construction |

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| Performance Indicator | » Construction site maintained in a neat and tidy condition. » Vegetation cover that remains intact with no erosion scarring in close proximity of the facility. » Site appropriately rehabilitated after construction is complete. |
| Monitoring | » Monitoring of vegetation clearing during the construction phase. » Monitoring of rehabilitation activities to ensure appropriate rehabilitation of the site. » An incident reporting system will be used to record non-conformances to the EMP. » Public complaints register must be developed and maintained on site. |

OBJECTIVE 13 : 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 although in very small amounts.

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| Project component/s | List of project components affecting the objective: » Wind turbines; » Substation; » MV lines; and » Concrete batching plant. |
| Potential Impact | » 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; and » Litter or contamination of the site or water through poor waste management practices. |
| Activity/risk source | » Vehicles associated with site preparation and earthworks; » MV line construction activities; » Substation construction activities; » Packaging and other construction wastes; » Hydrocarbon use and storage ; and » Spoil material from excavation, earthworks and site preparation. |
| Mitigation: Target/Objective | » To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons; » To ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons; » To comply with waste management legislation; » To minimise production of waste; » To ensure appropriate waste storage and disposal; and » 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 |
| The storage of flammable and combustible liquids such as oils must be in designated areas which are appropriately bunded, and stored in compliance with Material Safety Data Sheets (MSDS) files, as defined by the ECO. | Contractor | Duration of contract |
| Any spills will receive the necessary clean-up action. Bioremediation kits are to be kept on-site and used to remediate any spills that may occur. Appropriate arrangements to be made for appropriate collection and disposal of all cleaning materials, absorbents and contaminated soils (in accordance with a waste management plan). | 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 complied with. | Contractor | Duration of contract |

| Mitigation: Action/control | Responsibility | Timeframe |
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| Routine servicing and maintenance of vehicles is not to take place on-site (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 |
| Transport of all hazardous substances must be in accordance with the relevant legislation and regulations. | Contractor | Duration of contract |
| Waste disposal records must be available for ECO review at all times. | Contractor | Duration of contract |
| Construction contractors must provide specific detailed waste management plans to deal with all waste streams. | 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 and licensed waste disposal sites. | 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 hazardous waste. | Contractor | Duration of contract |
| An incident/complaints register must be established and maintained on-site. | Contractor | Duration of contract |
| Hazardous and non-hazardous waste must be separated at source. Separate waste collection bins must be provided for this purpose. These bins must be clearly marked and appropriately covered. | Contractors | Erection: during site establishment Maintenance: for duration of Contract within a particular area. |
| All solid waste collected must be disposed of at a registered waste disposal site. A certificate of disposal must be obtained and kept on file. The disposal of waste must be in accordance with all relevant legislation. Under no circumstances may solid waste be burnt or buried on site. | Contractors | Erection: during site establishment Maintenance: for duration of Contract within a particular area. |
| Supply waste collection bins at construction equipment and construction crew camps. | Contractors | Erection: during site establishment Maintenance: for duration of Contract within |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|-------------------|-----------------------------|
| | | a particular area. |
| Construction equipment must be refuelled within designated refuelling locations, or where remote refuelling is required, appropriate drip trays must be utilised. | Contractor | Duration of contract |
| All stored fuels to be maintained within a bund and on a sealed surface <u>as per the requirements of SABS 089:1999 Part 1.</u> | Contractor | Duration of contract |
| Fuel storage areas must be inspected regularly to ensure bund stability, integrity and function. | Contractor | Duration of contract |
| Construction machinery must be stored in an appropriately sealed area. | Contractor | Duration of contract |
| <u>Hazardous waste such as bitumen, oils, oily rags, paint tints etc. Must be disposed of at an approved waste landfill site licensed to accept such waste.</u> | <u>Contractor</u> | <u>Duration of contract</u> |
| <u>No dumping or temporary storage of any materials may take place outside designated and demarcated laydown areas, and these must all be located within areas of low environmental sensitivity.</u> | <u>Contractor</u> | <u>Duration of contract</u> |
| <u>Hazardous substances must not be stored where there could be accidental leakage into surface or subterranean water</u> | <u>Contractor</u> | <u>Duration of contract</u> |
| Oily water from bunds at the substation must be removed from site by licensed contractors. | Contractor | Duration of contract |
| Spilled cement must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site. | Contractor | Duration of contract |
| Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures. | Contractor | Duration of contract |
| In the event of a major spill or leak of contaminants, the relevant administering authority must be immediately notified as per the notification of emergencies/incidents. Spill kits to be kept on-site. | Contractor | Duration of contract |
| Any contaminated/polluted soil removed from the site must be disposed of at a licensed hazardous waste disposal facility. | Contractor | Duration of contract |
| <u>Hazardous and flammable substances must be stored and used in compliance to the applicable regulations and safety instructions. Furthermore. No chemicals must be stored nor may any vehicle maintenance occur within 350m of the temporal zone of wetland, a drainage line with or without an extensive floodplain or hillside wetlands</u> | <u>Contractor</u> | <u>Duration of contract</u> |
| An integrated waste management approach must be implemented that is based on waste minimisation and must incorporate reduction, recycling and re-use options where appropriate. Where solid waste is disposed of, such | <u>Contractor</u> | <u>Duration of contract</u> |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|----------------|----------------------------|
| disposal shall only occur at a landfill licensed in terms of section 20(b) of the National Environmental Management Waste Act, 2008 (Act 59 of 2008). | | |
| Upon the completion of construction, the area will be cleared of potentially polluting materials. | Contractor | Completion of construction |

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| Performance Indicator | <ul style="list-style-type: none"> » No chemical spills outside of designated storage areas; » No water or soil contamination by chemical spills; » No complaints received regarding waste on site or indiscriminate dumping; » Internal site audits ensuring that waste segregation, recycling and reuse is occurring appropriately; and » Provision of all appropriate waste manifests for all waste streams. |
| Monitoring and Reporting | <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 must 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. » An incident reporting system must be used to record non-conformances to the EMPr. » Developer and appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase. |

OBJECTIVE 14 : 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 EMPr, as well as the requirements of all relevant environmental legislation.

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| Project component/s | <ul style="list-style-type: none"> » Wind energy facility; and » Associated infrastructure. |
| Potential Impact | <ul style="list-style-type: none"> » Pollution/contamination of the environment; and » Disturbance to the environment and surrounding communities. |
| Activity/risk source | <ul style="list-style-type: none"> » Contractors are not aware of the requirements of the EMPr, leading to unnecessary impacts on the surrounding environment. |
| Mitigation: Target/Objective | <ul style="list-style-type: none"> » To ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment. |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|----------------|----------------|
| This EMPr and the Environmental Authorisation must be included in all tender documentation and Contractors contracts. | Developer | Tender process |

| Mitigation: Action/control | Responsibility | Timeframe |
|--|-----------------------------------|----------------------|
| Contractors must use chemical toilets/ablution facilities situated at designated areas of the site; no abluting must be permitted outside the designated area. These facilities must be regularly serviced by appropriate contractors. Ablution facilities must not be placed within 50m from any river, wetland or drainage line. | Contractor (and sub-contractor/s) | Duration of contract |
| Cooking 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, will disturb flora or fauna outside of the demarcated construction area/s. | Contractor (and sub-contractor/s) | Duration of contract |

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

OBJECTIVE 15 : To avoid and or minimise the potential risk of increased veld fires during the construction phase.

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| Project component/s | <ul style="list-style-type: none"> » Wind turbines » Construction camp |
| Potential Impact | » 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. |
| Activity/risk source | » Contractors are not aware of the requirements of the EMPr, 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 |
|---|----------------|--------------|
| Ensure that open fires on the site for cooking or heating are not allowed except in designated areas. | Contractor | Construction |
| Provide adequate fire fighting equipment on-site. | Contractor | Construction |
| Provide fire-fighting training to selected construction | Contractor | Construction |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|----------------|--------------|
| staff. | | |
| Compensate farmers / community members at full market related replacement cost for any losses due to the wind energy facility project, such as livestock, damage to infrastructure etc. | Contractor | Construction |

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| 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 after claim verified by independent party. |
| Monitoring | <ul style="list-style-type: none"> » A complaints register must be maintained, in which any complaints from the community are to be logged. Complaints must be investigated and, if appropriate, acted upon. » An incident reporting system must be used to record non-conformances to the EMPr. |

OBJECTIVE 16 : Traffic management and transportation of equipment and materials to site (Traffic Management Plan)

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.

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| Project component/s | <ul style="list-style-type: none"> » Wind turbines; » Substations; and » Power lines. |
| 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; and » Deterioration of road pavement conditions (i.e. both surfaced and gravel road) due to abnormal loads. |
| Activity/risk source | » 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; and » To minimise potential for negative interaction between pedestrians or sensitive users and traffic associated with the facility construction. |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|---|----------------------|
| Develop and implement a transportation/traffic management Plan (refer to Appendix E). | Contractor, (Transportation sub-contractor) | Duration of contract |
| All relevant permits for abnormal loads must be applied for from the relevant authority. | Contractor, (Transportation sub-contractor) | Duration of contract |

| Mitigation: Action/control | Responsibility | Timeframe |
|--|--|----------------------|
| A designated access (or accesses) to the proposed site must be created to ensure safe entry and exit. | Contractor | Duration of contract |
| 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, (Transportation sub-contractor) | Duration of contract |
| Any traffic delays because 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). | Contractor | Duration of contract |
| Appropriate maintenance of all vehicles must be ensured. | Contractor | Duration of contract |
| All vehicles travelling on public roads must adhere to the specified speed limits and 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 |

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| Performance Indicator | <ul style="list-style-type: none"> » No traffic incidents involving Project personnel or appointed contractors; » Appropriate signage in place; and » 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; and » An incident reporting system will be used to record non-conformances to the EMP. |

OBJECTIVE 17 : Effective management of concrete batching plants

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

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

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|---------------------|-----------------------------|
| Project component/s | » Concrete batching plant/s |
| Potential Impact | » Dust emissions |

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

| Mitigation: Action/control | Responsibility | Timeframe |
|---|----------------|--------------------|
| Where possible concrete batching plants should be sited such that impacts on the environment or the amenity of the local community from noise, odour or polluting emissions are minimised | Contractor | Construction phase |
| The provision of natural or artificial wind barriers such as trees, fences and landforms may help control the emission of dust from the plant. | Contractor | Construction phase |
| Where there is a regular movement of vehicles. Access and exit routes for heavy transport vehicles should be planned to minimise noise and dust impacts on the environment | Contractor | Construction phase |
| The concrete batching plant site should demonstrate good maintenance practices, including regular sweeping to prevent dust build-up | Contractor | Construction phase |
| The prevailing wind direction should be considered to ensure that bunkers and conveyors are sited in a sheltered position to minimise the effects of the wind. | Contractor | Construction phase |
| Aggregate material should be delivered in a damp condition, and water sprays or a dust suppression agent should be correctly applied to reduce dust emissions and reduce water usage | Contractor | Construction phase |
| Conveyors must be designed and constructed to prevent fugitive dust emissions. This may include covering the conveyor with a roof, installing side protection barriers and equipping the conveyor with spill trays, which direct material to a collection point. Belt cleaning devices at the conveyor head may also assist to reduce spillage. | Contractor | Construction phase |
| The site should be designed and constructed such that clean stormwater, including roof runoff, is diverted away from contaminated areas and directed to the stormwater discharge system. | Contractor | Construction phase |
| Any liquids stored on site, including admixtures, fuels and lubricants, should be stored in accordance with applicable legislation | Contractor | Construction phase |
| Contaminated stormwater and process wastewater should be captured and recycled where possible. A | Contractor | Construction phase |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|----------------|--------------------|
| wastewater collection and recycling system should be designed to collect contaminated water. | | |
| Process wastewater and contaminated stormwater collected from the entire site should be diverted to a settling pond, or series of ponds, such that the water can be reused in the concrete batching process. The settling pond or series of ponds should be lined with an impervious liner capable of containing all contaminants found within the water they are designed to collect | Contractor | Construction phase |
| Areas where spills of oils and chemicals may occur should be equipped with easily accessible spill control kits to assist in prompt and effective spill control | Contractor | Construction phase |
| Ensure that all practicable steps are taken to minimise the adverse effect that noise emissions. This responsibility includes not only the noise emitted from the plant and equipment but also associated noise sources, such as radios, loudspeakers and alarms | Contractor | Construction phase |
| Where possible, waste concrete should be used for construction purposes at the batching plant or project site. | Contractor | Construction phase |
| The batching plant should be monitored by the ECO to ensure that the plant is operating according to its environmental objectives and within legislative requirements. | ECO | Construction phase |

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| Performance Indicator | <ul style="list-style-type: none"> » No complaints on dust » No water or soil contamination by chemical spills » No complaints received regarding waste on site or indiscriminate dumping |
| 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 will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon » 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 » Developer or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase |

5.4. Detailing Method Statements

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

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

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

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

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

- » 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.
- » Batching procedures
- » 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.
 - * 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 bunded with a suitable collection point for accidental spills must be implemented and drip trays underneath dispensing mechanisms including leaking engines/machinery).
- » Fire prevention and management measures on site.
- » Fauna and flora protection process on and off site (i.e. removal to reintroduction or replanting, if necessary).
 - * Rehabilitation 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 must monitor the construction activities to ensure that these are undertaken in accordance with the approved Method Statement.

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

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

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

- » 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 EMPr 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 EMPr and the environmental specifications as they apply to the construction of the facility.
- » Employees must undergo training for the operation and maintenance activities associated with a wind energy facility and have a basic knowledge of the potential environmental impacts that could occur and how they can be minimised and mitigated.
- » Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended an Environmental Awareness Training course which can be done by the contractors environmental representative or the ECO.
- » The course should be sufficient to provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- » Awareness of any other environmental matters, which are deemed to be necessary by the ECO.
- » Ensuring that employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) are erected at prominent locations throughout the site.
- » Ensure that construction workers have received basic training in environmental management, including the storage and handling of hazardous substances, minimisation of disturbance to sensitive areas, management of waste, and prevention of water pollution.
- » Records must be kept of those that have completed the relevant training.
- » Training should be done either in a written or verbal format but must be in an appropriate format for the receiving audience.
- » Refresher sessions must be held to ensure the contractor staff are aware of their environmental obligations as practically possible.

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

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

An environmental monitoring programme should be developed and implemented not only to ensure conformance with the EMPr, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are, or could result in significant environmental impacts for which corrective action is required. The period and frequency of environmental monitoring will most likely be stipulated by the Environmental Authorisation.

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; and
- » Aid communication and feedback to authorities and stakeholders.

The Environmental Control Officer (ECO) will ensure compliance with the EMPr during construction, and will conduct monitoring activities on a regular basis. An independent ECO must be appointed, and 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.

CHAPTER 6: MANAGEMENT PROGRAMME FOR THE WIND ENERGY FACILITY: REHABILITATION OF DISTURBED AREAS

6.1. 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.

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

OBJECTIVE 21 : To ensure rehabilitation of disturbed areas

Areas requiring rehabilitation will include all areas disturbed during the construction phase and that are not required for regular maintenance operations.

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| Project component/s | List of project components affecting the objective: <ul style="list-style-type: none"> » Wind energy facility (including temporary access roads and laydown areas); » MV line servitude and service road servitude; » Substation; and » Temporary laydown areas. |
| 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"> » Temporary laydown areas; » Temporary access roads/tracks; and » Other disturbed areas/footprints. |
| Mitigation: Target/Objective | <ul style="list-style-type: none"> » To ensure and encourage site rehabilitation of disturbed areas; and » To ensure that the site is appropriately rehabilitated following the execution of the works, such that residual environmental impacts (including erosion) are remediated or curtailed. |

| Mitigation: Action/control | Responsibility | Timeframe |
|--|--|---|
| A site rehabilitation programme must be compiled and implemented. | Contractor in consultation with Specialist | Duration of contract |
| All temporary facilities, equipment and waste materials must be removed from site and appropriately disposed of. | Contractor | Following execution of the works. |
| All temporary fencing and danger tape should 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. |

| Mitigation: Action/control | Responsibility | Timeframe |
|--|---|---|
| Disturbed areas must be rehabilitated/re-vegetated with appropriate natural vegetation and/or local seed mix. Re-use native/indigenous plant species 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. | Developer in consultation with rehabilitation specialist | Post-rehabilitation |
| On-going alien plant monitoring and removal should be undertaken on all areas of natural vegetation on an annual basis. | Developer in consultation with rehabilitation specialist | Post-rehabilitation |

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| Performance Indicator | <ul style="list-style-type: none"> » All portions of site, including construction camp and working areas, cleared of equipment and temporary facilities; » Topsoil replaced on all areas and stabilised; » Disturbed areas rehabilitated and at least 50% plant cover achieved on rehabilitated sites; and » Closed site free of erosion and alien invasive plants. |
| Monitoring and Reporting | <ul style="list-style-type: none"> » On-going inspection of rehabilitated areas in order to determine effectiveness of rehabilitation measures implemented. » On-going alien plant monitoring and removal should be undertaken on an annual basis. » An incident reporting system must be used to record non-conformances to the EMPr. |

CHAPTER 7: MANAGEMENT PROGRAMME FOR THE WIND ENERGY FACILITY: OPERATION

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of wind energy facility's Operations Manager, and Environmental Manager for the operation phase of this project are detailed below.

The **Power Station Manager** must:

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

The **Environmental Manager** must:

- » 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.

7.1. 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 and 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 as well as minimising impacts on birds and other fauna using the site.

7.2. Objectives

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

OBJECTIVE 22 : Securing the site

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

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|---|---|
| Project component/s | Project components affecting the objective: » Wind energy facility development footprint; » Access roads; » Substation; » MV lines; and » Operations and service building. |
| Potential Impact | » Hazards to landowners and public |
| Activities/risk sources | » Uncontrolled access to the wind energy facility and associated infrastructure. |
| Mitigation: Target/Objective | » To secure the site against unauthorised entry; and » 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. | Contractor | Operation |
| Post information boards about public safety hazards and emergency contact information. | Contractor | Operation |

| | |
|---------------------------------|---|
| Performance Indicator | » Site is secure and there is no unauthorised entry; and » No members of the public/ landowners injured. |
| Monitoring and Reporting | » Regular visual inspection of fence for signs of deterioration/forced access » An incident reporting system must be used to record non-conformances to the EMP. » Public complaints register must be developed and maintained on site. |

OBJECTIVE 23 : Protection of indigenous natural vegetation, fauna and maintenance of rehabilitation

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

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| Project component/s | » Route of the security team. » Areas disturbed during the construction phase and subsequently rehabilitated at its |
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| | completion. |
| Potential Impact | <ul style="list-style-type: none"> » Disturbance to or loss of vegetation and/or habitat. » Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention. |
| Activity/Risk Source | » Movement of employee vehicles within and around site. |
| Mitigation: Target/Objective | <ul style="list-style-type: none"> » Maintain minimised footprints of disturbance of vegetation/habitats on-site. » Ensure and encourage plant regrowth in non-operational areas of post-construction rehabilitation. |

| Mitigation: Action/Control | Responsibility | Timeframe |
|---|-----------------------|--|
| Vehicle movements must be restricted to designated roadways. | Contractor | Operation |
| Existing roads must be maintained to ensure limited erosion and impact on areas adjacent to roadways. | Contractor | Operation |
| An on-going alien plant monitoring and eradication programme must be implemented, where necessary. | Contractor | Operation |
| A botanist familiar with the vegetation of the area should monitor the rehabilitation success and alien plant removal on an annual basis. | Contractor/Specialist | Annual monitoring until successful re-establishment of vegetation in an area |

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| Performance Indicator | <ul style="list-style-type: none"> » No further disturbance to vegetation or terrestrial faunal habitats. » Continued improvement of rehabilitation efforts. |
| Monitoring | <ul style="list-style-type: none"> » Observation of vegetation on-site by environmental manager. » Regular inspections to monitor plant regrowth/performance of rehabilitation efforts and weed infestation compared to natural/undisturbed areas. |

OBJECTIVE 24 : Protection of avifauna and priority bird species

During operation of the facility, the threat of collision of birds with the turbine blades and overhead power lines is considered to be of moderate to low significance for this facility. Four seasons of bird monitoring has been conducted and turbines have been removed from high risk areas. However, the real extent of this threat is not currently well understood within the South African context due to the limited numbers of wind turbines in South Africa with which bird interactions have been monitored. Bird monitoring must be undertaken during the operation of the facility. A proposed bird monitoring programme for the operational phase is attached to **Appendix J**.

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| Project component/s | List of project components affecting the objective: <ul style="list-style-type: none"> » Wind energy facility (turbines); » mv lines ; and » Substation. |
| Potential Impact | <ul style="list-style-type: none"> » Disturbance to or loss of birds as a result of collision with the turbine blades; » Electrocutation and collision with the power lines; |
| Activity/risk source | » Spinning turbine blades; |

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| | <ul style="list-style-type: none"> » Unmarked overhead power lines; and » Substation. |
| Mitigation: Target/Objective | <ul style="list-style-type: none"> » More accurately determine the impact of the operating wind energy facility on priority bird species; and » Minimise impacts associated with the turbines, power lines and substation. |

| Mitigation: Action/control | Responsibility | Timeframe |
|--|--|--------------------------|
| Some mitigation options that can be employed if monitoring reveals significant numbers of collisions. Mitigation measures should be considered in detail at that time, if needs be. | Project Company Environmental Manager Suitably qualified specialist | Operation |
| <u>Suitable pro-active mitigation be implemented at all turbines within a 5.2 km radius around all Verreaux's Eagle nests during daylight hours, once the wind farm commences with operations, to reduce the risk of collisions of Verreaux's Eagles with the turbines. Suitable pro-active mitigation measures should be selected prior to commencement of operation, informed by best-available information at the time of implementation.</u> | <u>Project Company Environmental Manager Suitably qualified specialist</u> | <u>Operation</u> |
| An operational phase monitoring programme must be implemented to survey bird movements in relation to the wind energy facility and fully document collision and electrocution casualties with the turbines and associated power lines. | Project Company Environmental Manager Suitably qualified specialist | Operation |
| Review bird monitoring report on the full year of operational bird monitoring, and integrate findings into operational EMP and broader mitigation scheme. | Suitably qualified person/ advising specialist/ in consultation with Developer | 1 year post-construction |

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| Performance Indicator | <ul style="list-style-type: none"> » Limit additional disturbance to bird populations on the wind energy facility site. » Continued improvement of bird protection devices, if any. » 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 and Reporting | <ul style="list-style-type: none"> » Observation of avifaunal populations and incidence of injuries/death from collisions from turbine blades. » Environmental manager to monitor turbine field for fatalities. » Review of bird monitoring report on the full year of post-construction monitoring |

OBJECTIVE 25 : Protection of Bats

Bats have been found to be particularly vulnerable to being killed by wind turbines. Pre-construction bat monitoring has been completed for all 4 seasons for the project development site. A proposed bat monitoring programme for the operational phase is attached to **Appendix K**.

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| Project component/s | List of project components affecting the objective » Access roads; » Substation; and » 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 |
|---|---|-------------------|
| Implement a bat monitoring programme during the operational phase of the wind energy facility. | Project Company | Operational Phase |
| Implement any feasible mitigation measures for bats based on the operational phase bat monitoring if required. Further mitigation options that may be utilized include curtailment, blade feathering, blade lock, acoustic deterrents or light lures. | Project Company and Contractor and specialist | Operational Phase |
| <p>Currently the most effective method of mitigation, after correct turbine placement, is alteration of blade speeds and cut-in speeds under environmental conditions favourable to bats.</p> <p>A basic "4 levels of mitigation" (by blade manipulation or curtailment), from light to aggressive mitigation:</p> <ol style="list-style-type: none"> 1. No curtailment (free-wheeling is unhindered below manufacturers cut in speed so all momentum is retained, thus normal operation). 2. 90 Degree feathering of blades below manufacturers cut-in speed so it is exactly parallel to the wind direction as to minimize free-wheeling blade rotation as much as possible without locking the blades. 3. 90 Degree feathering of blades below mitigation cut in conditions. 4. 90 Degree feathering throughout the entire night. <p>Preliminarily, it is recommended that curtailment mitigation initiates at Level 1 then depending on the results of the post construction mortality monitoring, which must be initiated when the first turbine is turning, the mitigation can be intensified up to a maximum intensity of Level 4 should it be necessary based on post construction monitoring. This is an adaptive mitigation management approach that will</p> | Project Company and Contractor and specialist | Operational Phase |

| Mitigation: Action/control | Responsibility | Timeframe |
|--|--|-----------|
| require changes in the mitigation plan to be implemented immediately and in real time during the post construction monitoring. | | |
| Performance Indicator | <ul style="list-style-type: none"> » No additional disturbance to bat populations on the wind energy facility site. » Continued improvement of bat protection devices, if any. » Regular provision of clearly worded, logical and objective information on the interface between the bat populations and the proposed/ operating wind energy facility. » Clear and logical recommendations on why, how and when to institute mitigation measures to reduce bat impacts of the development, from pre-construction to operational phase. | |
| Monitoring and Reporting | <ul style="list-style-type: none"> » Environmental manager to monitor turbine field for fatalities. | |

OBJECTIVE 26 : Minimisation of visual impact – lighting

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 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.

Another source of glare light, albeit not as intense as flood lighting, is the aircraft warning lights mounted on top of the hub of the wind turbines. These lights are less aggravating due to the toned-down red colour, but have the potential to be visible from a great distance. The Civil Aviation Authority (CAA) prescribes these warning lights and the potential to mitigate their visual impacts is low. 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. In this manner less warning lights can be utilised to delineate the facility as one large obstruction, thereby lessening the potential visual impact. 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.

The mitigation of secondary visual impacts, such as security and functional lighting, construction activities, etc. may be possible and should be implemented and maintained on an on-going basis. The operational, security and safety lighting fixtures of the proposed wind energy facility will have some impact on telescopic observations from the Southern African Large Telescope (SALT), located 35km to the north east of the site, on the plateau. The SALT relies on keeping ambient lighting levels to a minimum in order to maximise its operational potential.

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| Project component/s | List of project components affecting the objective: » Wind energy facility (including access roads); and » Substation. |
| Potential Impact | » Risk to aircraft in terms of the potential for collision; and » Enhanced visual intrusion. |
| Activity/risk source | » Substation and associated lighting; and » Wind turbines and other infrastructure. |
| Mitigation: Target/Objective | » 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; and » 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. | Contractor and Turbine supplier, instructed by Project Company | Duration of contract |
| Maintain the general appearance of the facility in an aesthetically pleasing way. | Contractor | Operation and maintenance |
| Ensure that proper planning is undertaken regarding the placement of lighting structures for the substation and that light fixtures only illuminate areas inside the substation site. | Contractor | Operation and maintenance |
| Undertake regular maintenance of light fixtures. | Contractor | Operation and maintenance |

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| Performance Indicator | » Appropriate visibility of infrastructure to aircraft. » The effective containment of the light to the substation sites. |
| Monitoring and Reporting | » Ensure that aviation warning lights or other measures are installed before construction is completed and are fully functional at all times. » The monitoring of the condition and functioning of the light fixtures during the operational phase of the project. |

OBJECTIVE 27 : Minimisation of noise impacts from turbines

From the results of the EIA studies undertaken, noise impacts associated with the wind energy facility are expected to be of low significance. However, mitigation measures are proposed in order to further reduce any potential for noise impact. The rating level in the area for the wind energy facility is likely to be 35 dBA at night. That would also be the "lower limit". Due to the limited noise receptors in and around the site (as identified in the noise impact assessment report), noise from the turbine is unlikely to negatively affect any residents in the broader study area.

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| Project component/s | List of project components affecting the objective: » Wind energy facility (including access roads). |
| Potential Impact | » Increased noise levels at potentially sensitive receptors; » Changing ambient sound levels could change the acceptable land use capability; and » Disturbing character of sound. |
| Activity/risk source | » Wind turbines |
| Mitigation: Target/Objective | » Ensure that the change in ambient sound levels (measured in L_{Aeq}) as experienced by Potentially Sensitive Receptors is less than 5 dBA; (change from the measured and calculated ambient sound levels for the corresponding wind speed); » Prevent the generation of disturbing noise from the wind turbines; and » Ensure acceptable noise levels at surrounding stakeholders and potentially sensitive receptors |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|---|--|
| Design and implement a noise monitoring programme for the operational phase if required. Define the ambient sound levels in 10 minute bins over a period of at least 7 days before the operational phase starts inside. 10 minute sampling bins should be co-ordinated with 10 m wind speed. | Project Company / Acoustical Consultant / Approved Noise Inspection Authority | To be determined by Project Company |
| If required, additional noise monitoring points at a complainant that registered a valid and reasonable noise complaint relating to the operation of the facility | Project Company / Acoustical Consultant / Approved Noise Inspection Authority | To be determined on a case-by-case basis |
| A Noise Monitoring Programme should be designed by an acoustic consultant after discussions with the project developer and considering the comments from surrounding stakeholders if required. This may involve routine or response measurements. Measurements is to take place over a period of 24 hours in 10 minute bins, with the resulting data co-ordinated with wind speeds as measured at a 10 meter height. These samples should be collected when the Wind Turbines are operational. Monitoring is recommended for the first year, as well as any other NSDs that have complained to the developer regarding noise originating from the facility during it operation. | Acoustical Consultant / Approved Noise Inspection Authority | To be determined by Project Company |

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| Performance Indicator | » Ensure that the change in ambient sound levels (L_{Aeq}) as experienced by Potentially Sensitive Receptors is less than 7 dBA. |
| Monitoring and Reporting | » Noise monitoring programme to be developed and implemented at the start of operation. |

OBJECTIVE 28 : 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 and hazardous waste.

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| Project component/s | List of project components affecting the objective: » Wind turbines; » mv line; and » Substation. |
| Potential Impact | » Inefficient use of resources resulting in excessive waste generation; and » Litter or contamination of the site or water through poor waste management practices. |
| Activity/risk source | » Generators and gearbox – turbines; » Transformers and switchgear – substation; and » Fuel and oil storage. |
| Mitigation: Target/Objective | » To comply with waste management legislation; » To minimise production of waste; » To ensure appropriate waste disposal; and » 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. | Contractor | Operation |
| Storage areas for hazardous substances must be appropriately sealed and bunded. | Contractor | 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. | Contractor | 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 bunded area. Should any accidental spillage take place, it must be cleaned up according to specified standards regarding bioremediation. | Contractor | Operation and maintenance |
| Waste handling, collection and disposal operations must be managed and controlled by a waste management contractor. | Contractor / waste management contractor | Operation |
| Used oils and chemicals: » Where these cannot be recycled, appropriate disposal must be arranged with a licensed facility in consultation with the administering authority. » Waste must be stored and handled according to the relevant legislation and regulations. | Contractor | Operation |
| General waste must be recycled where possible or disposed of at an appropriately licensed landfill. | Contractor | Operation |
| Hazardous waste (including hydrocarbons) and general waste must be stored and disposed of separately. | Contractor | Operation |

| Mitigation: Action/control | Responsibility | Timeframe |
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| Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors. | Contractor | Operation |
| No waste may be burned or buried on site. | Contractor | Operation |

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| Performance Indicator | <ul style="list-style-type: none"> » No complaints received regarding waste on site or dumping; » Internal site audits identifying that waste segregation, recycling and reuse is occurring appropriately; » Provision of all appropriate waste manifests; and » No contamination of soil or water. |
| Monitoring and Reporting | <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; and » Regular reports on exact quantities of all waste streams exiting the site must be compiled by the waste management contractor and monitored by the environmental manager. All appropriate waste disposal certificates must accompany the monthly reports. |

OBJECTIVE 29 : Maximise local employment and business opportunities during operation

A limited number of permanent employment opportunities will be created during the operational phase of the project. The operational phase is expected to last for 20 years.

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| Project component/s | List of project components affecting the objective: <ul style="list-style-type: none"> » Wind energy facility; and » Day to day operational activities associated with the wind energy facility including maintenance etc. |
| Potential Impact | <ul style="list-style-type: none"> » The opportunities and benefits associated with the creation of local employment and business should be maximised. |
| Activity/risk source | <ul style="list-style-type: none"> » The operational phase of the wind energy facility will create permanent employment opportunities. » 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"> » Create medium- to long-term full time employment for locals. |

| Mitigation: Action/control | Responsibility | Timeframe |
|--|----------------|--------------------------------------|
| Identify local members of the community who are suitably qualified or who have the potential to be employed full time. | Contractor | Identify members during construction |
| Develop a training and skills transfer programme for the operational phase for local personnel. | Contractor | Operations |

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| Performance Indicator | » Public exposure to the project. » Meeting with Local Municipality. |
| Monitoring and Reporting | » Indicators listed above must be met for the operational phase. |

OBJECTIVE 30 : Ensure the implementation of an appropriate fire management plan during the operation phase

The vegetation in the study area may 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.

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

| Mitigation: Action/Control | Responsibility | Timeframe |
|--|-----------------------|------------------|
| Provide adequate fire fighting equipment on site. | Contractor | Operation |
| Provide fire-fighting training to selected operation and maintenance staff. | Contractor | |
| Ensure that appropriate communication channels are established to be implemented in the event of a fire. | Contractor | Operation |
| Fire breaks should be established where and when required. Cognisance must be taken of the relevant legislation when planning and burning firebreaks (in terms of timing, etc.). Access roads may also act as fire breaks. | Contractor | Operation |
| Upon completion of the construction phase, an emergency evacuation plan must be drawn up to ensure the safety of the staff and surrounding land users in the case of an emergency. | Contractor | Operation |
| Contact details of emergency services should be prominently displayed on site. | Contractor | Operation |

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

OBJECTIVE 31 : Minimise the potential negative impact on farming activities and on the surrounding landowners

Once operational, the negative impact on the daily living and movement patterns of neighbouring residents is expected to be minimal and intermittent (i.e. the increase in traffic to and from site, possible dust creation of vehicle movement on gravel roads on site and possible increase in criminal activities). The number of workers on site on a daily basis is anticipated to have minimal negative social impacts in this regard.

Some positive impacts will be experienced with farmers gaining more access to land through the high quality site roads. Farmers involved with the project will also receive income which can be invested into farming activities. Once construction is completed, negative impacts on farming activities on the site must be limited as far as possible.

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| Project Component/s | <ul style="list-style-type: none"> » Possible negative impacts of activities undertaken on site on the activities of surrounding property owners; and » Impact on farming activities on site. |
| Potential Impact | <ul style="list-style-type: none"> » Limited intrusion impact on surrounding land owners; and » Interference with farming activities on site. |
| Activities/Risk Sources | <ul style="list-style-type: none"> » Increase in traffic to and from site could affect daily living and movement patterns of surrounding residents, and » Operational activities on site could interfere with farming activities of landowner. |
| Mitigation: Target/Objective | <ul style="list-style-type: none"> » Effective management of the facility; » Mitigation of intrusion impacts on property owners; and » Mitigation of impact on farming activities. |

| Mitigation: Action/Control | Responsibility | Timeframe |
|---|--------------------------------|------------------|
| Effective management of the facility and accommodation facility to avoid any environmental pollution focusing on water, waste and sanitation infrastructure and services. | Contractor | Operation |
| Vehicle movement to and from the site should be minimised as far as possible. | Contractor & Employees | Operation |
| Local roads should be maintained to keep the road surface up to a reasonable standard. | Contractor | Operation |
| Limit the development of new access roads on site. | Contractor | Operation |
| Ensure on-going communication with the landowners of the site in order to ensure minimal impact on farming activities. | Project Company and Contractor | Operation |

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| Performance Indicator | <ul style="list-style-type: none"> » No environmental pollution occurs (i.e. waste, water and sanitation); » No intrusion on private properties and on the activities undertaken on the surrounding properties; and » Continuation of farming activities on site. |
| Monitoring and reporting | <ul style="list-style-type: none"> » Developer should be able to demonstrate that facility is well managed without environmental pollution and that the above requirements have been met. |

CHAPTER 8: MANAGEMENT PLAN FOR THE WIND ENERGY FACILITY: DECOMMISSIONING

The turbine infrastructures which will be utilised for the proposed wind energy facility are expected to have a lifespan of 20 years (with maintenance). Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life. 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.

8.1. 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.

8.2 Disassemble Turbines

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 (NEMA / NEM:WA). All parts of the turbine would be considered reusable or recyclable except for the blades.

OBJECTIVE 32 OBJECTIVE: To avoid and or minimise the potential environmental and social impacts associated with the decommissioning phase

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| Project component/s | » Wind turbines » Substation » MV lines |
| Potential Impact | » Impacts on people, flora, fauna, soils etc. |
| 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. |

| Mitigation: Action/control | Responsibility | Timeframe |
|--|-----------------|------------------|
| Retrenchments should comply with South African Labour legislation of the day. | Contractor | Decommissioning. |
| Project Company must ensure that all relevant regulations, national and local legislation are adhered to and that the relevant authorities are informed and involved in the process as much as possible. | Project Company | Decommissioning |
| Rehabilitation should start immediately after decommissioning is completed. | Contractor | Decommissioning |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|--------------------------------|-----------------|
| Re-vegetation specifications to be developed. | Contractor | Decommissioning |
| All excavations must be rehabilitated with soil and topsoil, which should not contain invasive plant species (in compliance with the CARA, as amended), to the satisfaction of the ECO. | Contractor | Decommissioning |
| All building materials must be removed from the site. All compacted surfaces must be ripped and re-vegetated as per the re-vegetation specifications. | Contractor | Decommissioning |
| The most suitable seed mix for disturbed areas to be used in rehabilitation would include indigenous species. | Contractor | Decommissioning |
| Rehabilitation to be conducted in a progressive manner (i.e. once decommissioning in an area has been completed the area will be rehabilitated). The rehabilitation of the area with indigenous vegetation must coincide with the rainfall events and all alien invasive vegetation shall be removed. | Contractor | Decommissioning |
| <p>Rehabilitation measures for the site are to include the following:</p> <ul style="list-style-type: none"> » Re-contouring <p>Subsoil stockpiles should be used to re-contour construction affected areas. The Contractor shall restore the profile, soil condition and landform to as close as possible state to the pre-construction state.</p> <ul style="list-style-type: none"> » Scarification and ripping <p>All areas where rehabilitation interventions are required shall be cross-ripped before topsoil placement. Topsoil and fertile soil shall be uniformly scarified to allow for vegetation growth</p> <ul style="list-style-type: none"> » Fertilising <p>The Contractor shall be required to perform soil analysis tests on the top 75mm of prepared surface prior to re-vegetation/seeding to determine the required fertiliser levels for permanent cover.</p> <ul style="list-style-type: none"> » Seed acquisition <p>The Contractor shall purchase seed from a South African National Seed Organisation (SANSOR) accredited dealer. Seed used for rehabilitation shall not be older than one season. Purchased seed must be of the correct species and of known origin, dried and packed, conforming to all legal requirements for seed. Proof of compliance must be provided to Developer prior decommissioning of works.</p> | Project Company and Contractor | Decommissioning |
| The Contractor shall schedule works for placing of topsoil once all infrastructure has been successfully decommissioned. Seeding can then take place after the first rains of the season and should be concluded by one month before the end of the growing season. | Contractor | Decommissioning |
| The seed mix for use in rehabilitation must be an approved mix of indigenous grass species common to the area. | Contractor | Decommissioning |
| The Contractor shall maintain rehabilitated areas free of weeds and invader plants until the end of the Defects Notification Period | Contractor | Decommissioning |

| Mitigation: Action/control | Responsibility | Timeframe |
|--|----------------|-----------------|
| applicable to rehabilitation. Control of weeds and invader plants must be done in accordance with the specifications stipulated in the CARA. | | |
| The Contractor shall be responsible for the prevention of erosion in areas impacted upon by their activities. All erosion repairs must be implemented at the first signs thereof and no erosion shall be allowed to develop on a large scale. | Contractor | Decommissioning |
| <p>All recyclable rubble and solid waste (e.g. scrap metal, cables, bottles, cans, and plastic residues) shall be collected and disposed of through a registered recycling company. Waste manifests will be kept by the Contractor and shown to the ECO on request.</p> <p>All non-recyclable rubble and solid waste shall be collected and disposed of at an approved waste disposal site. Waste manifests will be shown to the ECO on request.</p> | Contractor | Decommissioning |

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|------------------------------|---|
| Performance Indicator | <ul style="list-style-type: none"> » South African Labour legislation at the relevant time; and » Successful re-vegetation and rehabilitation of the site |
| Monitoring | Monitoring of Rehabilitation by ECO b& Rehabilitation Close-Out Report. |