
GUNSTFONTEIN WIND ENERGY FACILITY, NEAR SUTHERLAND, NORTHERN CAPE PROVINCE

CONSTRUCTION & OPERATION ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

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

REVISION 2

**Submitted in order to comply with per EA conditions 16, 18 and 19 of the Environmental
Authorisation
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Prepared for

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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.

Commencement: The start of any physical activity, including site preparation and any other activity on site resulting in the 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 a 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 Environmental Affairs 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.

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

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

Endemic: An "endemic" is a species that grows 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 the 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 inspector: A person designated as an environmental management inspector in terms of Section 31B or 31C on the National Environmental Management Act 107 of 1998.

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.

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

Hazardous waste: Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment (Van der Linde and Feris, 2010; pg 185).

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

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: A method statement is a written submission to the ECO and the Proponent's Representative by an appointed Contractor(s) 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.

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 and/or concrete. 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

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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, operational and decommissioning phases of a project, and is intended to manage and mitigate construction and operational 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, operational and decommissioning 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 EIA process are systematically addressed in the EMPr, ensuring the minimisation of adverse environmental impacts to an acceptable level.

Gunstfontein Wind Energy Facility (Pty) Ltd must ensure that the implementation of the project complies with the requirements of any and all Environmental Authorisations (**Appendix K**) and permits, 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 (October 2015) and EIA Report (April 2016), as well as any relevant specialist studies conducted in accordance with the EA conditions 18 and 19. 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 Gunstfontein Wind Farm (Pty) Ltd received an Environmental Authorisation (EA) for the construction of Gunstfontein Wind Energy Facility (WEF) on 25 July 2016. In terms of this EA, the EMPr for the project is amendable (Conditions 18-22), and must be implemented and strictly enforced. This revised EMPr includes additional mitigation measures as required by the specialist team specifically in accordance with conditions 18 and 19 of the issued EA, and is being submitted for authority approval. EMPr revision 1 (dated July 2019) was submitted as part of an amendment application (amendments to turbine specifications amongst others) in 2019, but was not approved in terms of Condition 18 & 19 of the EA.

The 2019 amendment application entailed an updated turbine model for the project and amendments to various conditions. This amendment is included in **Appendix L**.

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

1.1. EMPr update as required in section 18 and 19.

This EMPr update is being undertaken in accordance with the requirements of Condition 18 and 19 of the EA dated, 25 July 2016.

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
The EMPr amendment must include the following:	
<u>18. 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 the result final layout. This EMPr will be submitted for comment to the registered interested and affected parties and the public for comment from 12 July 2021 to 12 August 2021. All comments received will be considered and the EMPr amended as such.</u>
<u>19.1. The requirements and conditions of this authorisation.</u>	<u>. Chapters 4 and 85 of this EMPr</u>
<u>19.2 All recommendations and mitigation measures recorded in the EIAR.</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>19.3 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>19.4 The final Site Layout Map</u>	<u>The final site layout map for the facility is included in Appendix M of the EMPr and included as Figure 2.1</u>
<u>19.5. The South African Astronomical Observatory, South Africa's largest telescope and the South African Civil Aviation Authority must be provided an opportunity to review and provide comment on the use of lighting on the development footprint. The comments must be incorporated into the EMPr</u>	<u>This updated EMPr (version 2) is made available to SAAO as interested and affected party and a copy thereof distributed for review during the 30-day public review period from 12 August 2021 to 12 August 2021. All comments received will be addressed and incorporated into the Comments and Response Report and included with the final EMPr submitted for authority decision making.</u>
<u>19.6. An alien invasive management plan to be implemented during the construction and operation of the facility. The plan must include mitigation measures to</u>	<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</u>

EA Condition Reference	Section of EMPr where Condition has been addressed
reduce the invasion of alien species and ensure that the continuous monitoring and removal of alien species is undertaken.	measures to be implemented to reduce the invasion of alien plant species within the project footprint and the surrounding area.
19.7. 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.	The Plant and Rescue Protection Plan has been appended to the EMPr as Appendix C of the EMPr.
19.8. 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.	A Re-Vegetation and Rehabilitation Plan has been included in the EMPr as Appendix D .
19.9. 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.	A Traffic Management Plan has been included in the EMPr as Appendix E .
19.10 The post construction Avifaunal monitoring plan that must adhere to Birdlife's most recent Avifaunal guideline.	A post construction Avifaunal monitoring plan has been included as Appendix J .
19.12. 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.	A Storm Water Management Plan has been included in the EMPr as Appendix F .
19.13. 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.	An Erosion Management Plan has been included in the EMPr as Appendix H .
19.14. 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 water systems.	An Emergency Preparedness and Responses Plan has been included in the EMPr as Appendix G .

<u>EA Condition Reference</u>	<u>Section of EMPr where Condition has been addressed</u>
<u>19.15. A fire management plan to be implemented during the construction and operational phase.</u>	<u>An Emergency Preparedness and Responses Plan has been included in the EMPr as Appendix G. The Plan includes mitigation measures to mitigate against possible fires during the construction and operation phases of the facility.</u>
<u>19.16. 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>	<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>
<u>19.17. An environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process.</u>	<u>A sensitivity map has been included in Appendix M.</u>
<u>19.18. 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 EIAR and this authorisation.</u>	<u>A map combining the final layout superimposed on the environmental sensitivity is included in Appendix M, and Figure 2.2 of this EMPr.</u>

CHAPTER 2: PROJECT DETAILS

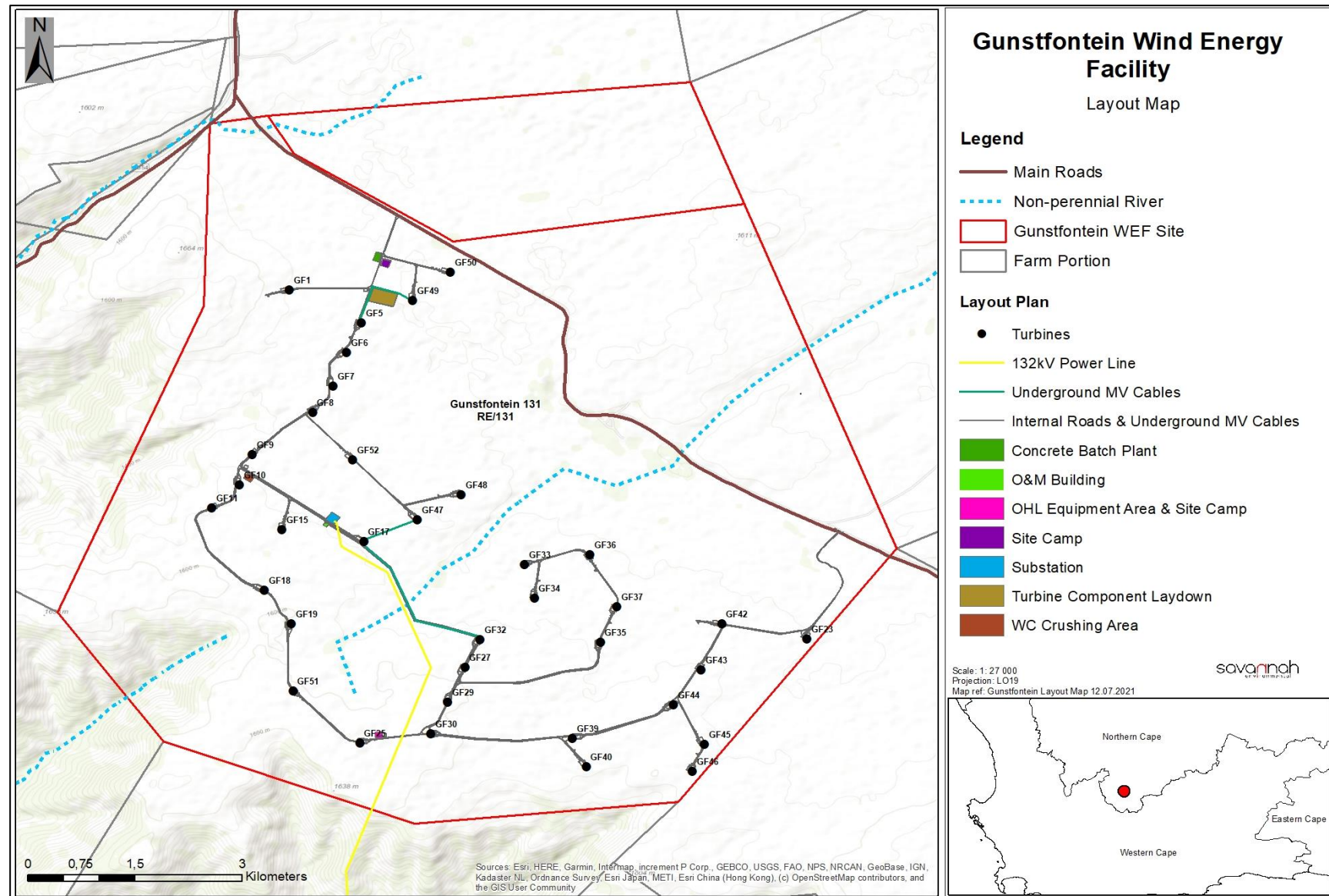
Gunstfontein Wind Energy Facility (Pty) Ltd (**herein referred to as the Proponent**) is proposing to establish a commercial wind energy facility and associated infrastructure on a site located within the Karoo Hoogland Local Municipality (approximately 20 km south of Sutherland in the Northern Cape Province). This project is referred to as the Gunstfontein Wind Energy Facility. The facility will be powered by wind. No other fuels will be used as a generating fuel during the operational phase of the project.

The potentially sensitive areas already identified through the scoping study and the results from the bird and bat pre-construction monitoring provided No-Go areas (i.e. avoidance of identified avifaunal, bat and ecologically sensitive areas). These areas were excluded from the developable area. In addition, all sensitive areas identified during the EIA process and through the final walk-through surveys were considered in compiling the final facility layout. The proposed area for the development of the Gunstfontein Wind Energy Facility (~12 000 ha in extent) includes the farm portion: The Remainder of the farm Gunstfontein 131.

The project will include the following infrastructure³:

- » Up to 36 wind turbines, each up to 6.5MW in capacity, subject to a 200MW cap on contracted capacity. The hub height of each turbine will be up to 150 metres, and the rotor diameter up to 180 metres.
- » Permanent concrete foundations (approx. 25mx approx. 25 m) to support the turbines, and crane pad/laydown areas (approx. 50 m x approx. 25 m).
- » Cabling between the turbines, to be laid underground where practical and generally alongside the internal access roads, to connect to an on-site substation.
- » An on-site substation (120 m x 120 m) to facilitate the connection between the wind energy facility and the electricity grid.
- » Internal access roads (approx. 35 km in extent and 8 m wide) to each turbine linking the wind turbines and other infrastructure on the site.
- » Buildings and dedicated areas for administration, workshops, control systems, maintenance and storage with parking areas where required.
- » Temporary construction compound and temporary site offices.

The final layout is provided in Figure 2.1, Figure 2.2 and **Appendix M**.



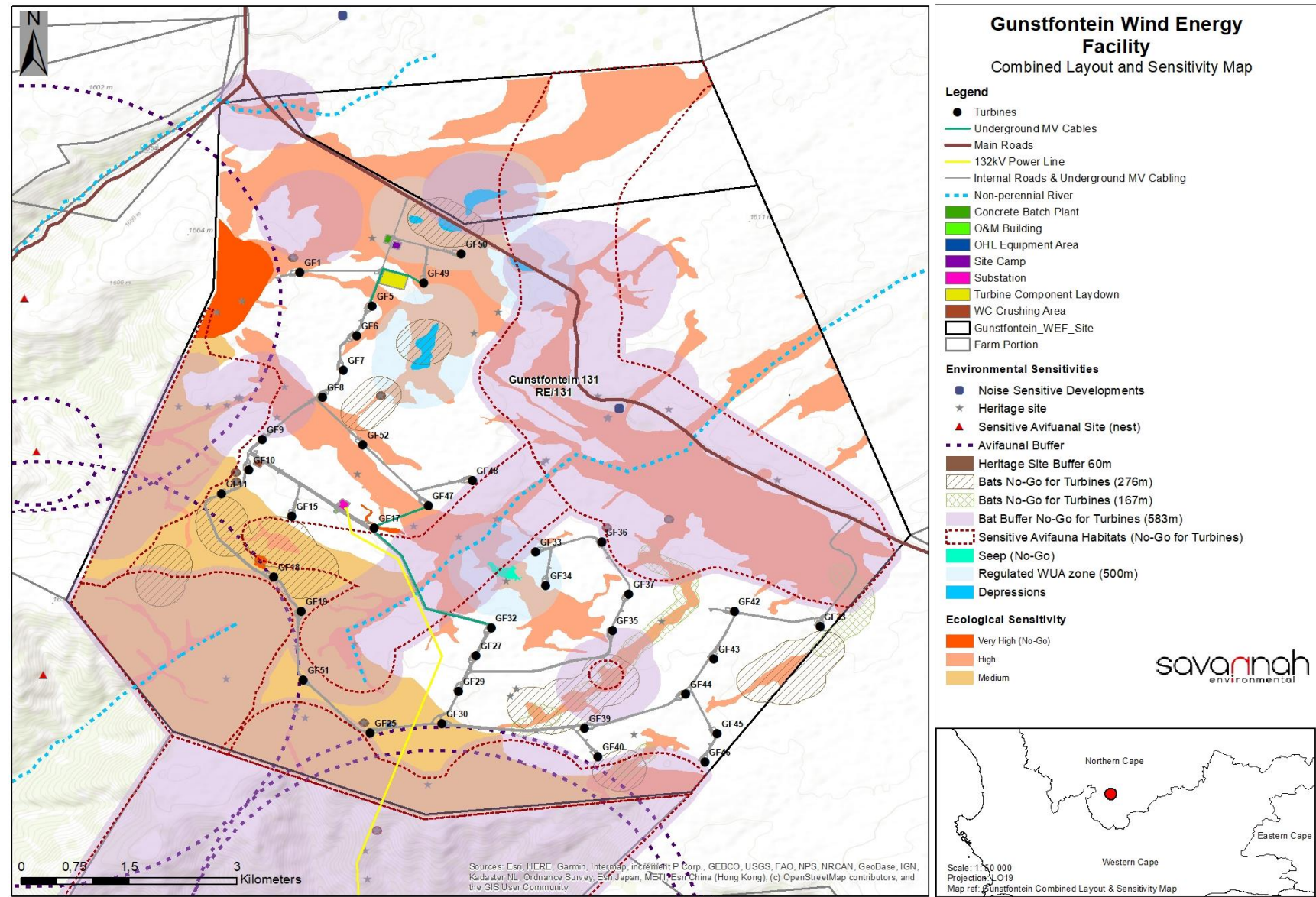


Figure 2.2: Updated combined Layout and Sensitivity Map

2.1 Activities and Components associated with the Wind Energy Facility

The main anticipated activities/components associated with the Gunstfontein Wind Energy Facility comprise the following:

Table 2.1: Activities anticipated Associated with Planning, Construction, Operation and Decommissioning of the Facility

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 selected MV underground power line routes between the turbines » Survey of internal access routes and watercourse 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 and within the site	<ul style="list-style-type: none"> » Upgrade access/haul roads to the site. Establish internal access roads: up to 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 large scale components being delivered to site, and will remain in place after completion for future access and possibly access for replacement of parts if necessary, i.e. maintenance activities. » Existing access roads to the site will be utilised, and upgraded where required. Special haul roads may need to be constructed 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 ecological <u>(including aquatic)</u>, heritage <u>(including palaeontology)</u>, bat and avifaunal specialists).
Undertake site preparation	<ul style="list-style-type: none"> » Site establishment of offices/ workshop with ablutions and stores, contractors yards 	<ul style="list-style-type: none"> » These activities will require the stripping of topsoil, which will need to be stockpiled, backfilled, where necessary, and/or spread on site and where necessary used latter for rehabilitation.

Main Activity/Project Component	Components of Activity	Details
	<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 	
Establishment of lay down areas on site	<ul style="list-style-type: none"> » at each turbine position for the storage and assembly of wind turbine components and accommodation of construction and crane lifting equipment. » Construction site office 	<ul style="list-style-type: none"> » The permanent lay down area will need to accommodate the cranes required in tower/turbine assembly during construction and for maintenance if and when required. » Temporary storage areas will be required to be established for the normal civil engineering construction equipment which will be required on site. » A large permanent 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 levelled, compacted, with foundations in part, to accommodate the assembly crane and tower segments, 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 ~ <u>25m</u> x ~ <u>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 and might use explosives where necessary, e.g. where the subsurface conditions don't allow for mechanical excavation (permits would be required for the latter – to be obtained by the Contractor(s)). » Safety barriers will be erected around open excavations where necessary.
Establishment of onsite batching plants	<ul style="list-style-type: none"> » A batching plant will be required for construction covering ~ <u>100m x 100m</u> 	<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: * Components of various specialised construction equipment, lifting equipment and counter weights etc. are required on site (e.g. mobile assembly crane and main lift crawler crane) to erect the wind turbines. * The normal civil engineering construction equipment for the civil works (e.g. 	<ul style="list-style-type: none"> » Turbine units consist of a tower comprised of a number of segments, a nacelle, rotor and three blades. » The wind turbine, including tower, will be brought to site by the supplier in sections/segments. 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

Main Activity/Project Component	Components of Activity	Details
	<p>excavators, trucks, graders, compaction equipment, cement/concrete mixers, etc.).</p> <ul style="list-style-type: none"> * Components required for the establishment of the MV overhead power line (including towers and cabling). * Ready-mix concrete trucks for, <i>inter alia</i>, turbine and building foundations. 	<p>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.</p> <ul style="list-style-type: none"> » It is estimated that approximately 10-14 trucks will be used for the transport of each turbine.
Construct Substation and ancillary infrastructure.	<ul style="list-style-type: none"> » A 132 kV substation complex (120m x 120m) will be required to facilitate grid connection to the Soetwater Switching Substation » Substation components » Security fencing around high-voltage (HV) Yard » Workshop » Temporary site offices » Operation and Maintenance building(s) 	<ul style="list-style-type: none"> » Will require the clearing of vegetation and levelling of the development site and the excavation of foundations prior to construction. » A lay down area for building materials and equipment associated with these buildings will also be required. » The substation will be constructed within a high-voltage (HV) yard footprint of up to 14 400 m². A further up to 12 000m² may be needed for associated buildings and parking. » 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.
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.

Main Activity/Project Component	Components of Activity	Details
		<ul style="list-style-type: none"> » It may take 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.
Medium voltage cabling between the turbines to the on-site substation	<ul style="list-style-type: none"> » Wind turbines » Medium Voltage (MV) underground power lines connecting each turbine to the substation 	<ul style="list-style-type: none"> » The installation of underground cables will require the excavation of trenches, approximately 1m – 2m in depth within which these cables can then be laid. » The underground cables would follow the internal access roads as far as reasonably possible. <u>Few underground cables will require to follow their own route however.</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 confirm the turbine and unit performance. Physical adjustments may be needed such as changing the pitch of the blades.
Undertake site rehabilitation	<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, access roads and laydown areas within 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		

Main Activity/Project Component	Components of Activity	Details
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 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

In terms of the findings of the EIA Report, various potential planning, construction and operation-related potential environmental impacts were identified all within acceptable limits, as having to be managed, including:

- » Disturbance of the 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):

The following 'no go' areas and sensitive areas have been identified on the site:

- » **Ecological sensitivities:** The greater project development site for the Gunstfontein wind farm project comprises three distinctive and ecologically different areas: the high-lying plateau, the low-lying plains and the intervening rugged or steep escarpment. The facility itself is restricted to the plateau and the margin of the escarpment, with no wind turbine closer than 500m from the edge of the escarpment. The majority of the site is considered of moderate sensitivity with some areas of high sensitivity located along the edge of the plateau along the escarpment deemed to be high sensitivity on account of the high confirmed abundance of species of concern within the area. The lowlands and associated wetlands and drainage systems are considered very high sensitivity on account of their ecological function as well as high abundance of species of conservation concern. There is also a high elevation hill along the western margin of the site, which is above 1 600m in elevation and is considered very high sensitivity as a result of the very limited extent of habitat at this elevation.

The drainage systems and associated seasonally wet lowlands are identified as sensitive features of the site that should be avoided to the extent possible, both due to their ecological role as well as the presence of numerous geophytes of concern associated with these habitats. Under the assessed layout there are 9 turbines (turbines 2, 4, 11, 28, 39, 40, 41, 42 and 49)⁴ within these more sensitive lowland areas. It was recommended that these turbines are relocated to less sensitive areas, as it is not likely that the impacts associated with development in these areas can be effectively mitigated. Four (4) turbines (turbines 4, 5, 6 and 7) were to be located within the western hill which is considered a very high sensitivity area (no-go area) which impact on plant species and habitats of concern and hence also needed to be relocated. Provided that these turbines were relocated and access roads through the very high sensitivity areas minimised, then the impacts of the development were assessed as reduced to an acceptable level.

⁴ Note that these turbine numbers refer to the turbine numbering used in the original EIA, and do not correlate with the updated final layout map contained in this EMPr.

In terms of recommended mitigation and avoidance measures associated with each sensitivity level and feature present, the following recommendations are proposed:

- * No turbines should be located within the very high sensitivity lowlands and wetlands of the site. However, as many of these are linear features, it will not be possible to avoid some impact from access roads. This is considered acceptable, provided that existing access is used where possible and the final locations of drainage crossings are inspected by a freshwater ecologist before construction and adjusted where necessary.
- * The four turbines located on the very high sensitivity hill along the western margin of the site should be relocated off the hill.
- * The turbines along the front edge of the plateau, within the area considered to be high sensitivity are considered acceptable, but require specific mitigation and avoidance. Some impact to this area is considered acceptable firstly because current levels of habitat loss are low and so the habitat itself is not under threat and secondly because the area is not homogeneously sensitive, but contains localised areas of high sensitivity that can be avoided. The final layout of the development should be checked in the field during the wet season and adjusted where necessary to avoid sensitive areas and minimise impact of species of concern.
- * Even within the medium sensitivity plains of the site where the majority of the turbines would be located, there may be some localised habitats or features of concern present. These should be located during a preconstruction walk-through of the final development footprint and the layout adjusted accordingly.

As part of the mitigation strategy, turbines and associated infrastructures (substation and operation and management buildings, access roads and MV powerlines) have been relocated out of the very high sensitive (no-go areas) in accordance with these recommendations.

» **Avifaunal sensitivities:** The no-go areas already identified for the bird community should be excluded from development. The following sensitive areas should be noted:

- * The renosterveld area on the northern farm portion of the proposed development site which has a double importance due to its utilization by Falcons and Bustards, as well as an entryway to the study area used by Waterbirds and "Ciconids". This area is considered the higher routes flux observed in the area and is intended to safeguard these movements;
- * The area of the main waterbodies and main valley are associated to the activity of Waterbirds (particularly the main waterbodies), "Ciconids" (in the main valley especially) and Bustards. These include the Waterbirds highlighted which presented the highest activity of the general waterbird community, as well as the occurrence of sensitive species (to which a buffer of 500m was considered) or high activity levels though not of sensitive species (where a buffer of 200 m was considered). Additionally, the analysis of the Waterbirds and "Ciconids" activity showed an increased movement frequency between the main valley and a waterbody located east which led to the selection of this particular section as sensitive due to collision risk during such movements. These corridors were selected based on the routes flux observed and are intended to safeguard any collision risk regarding such movements;
- * The escarpment area was especially important for Raptor and Falcon species. For that reason, a 500m buffer was selected around the escarpment edges. Rock Hyrax colonies were abundantly observed in the escarpment area, especially in the rocky outcrops. These are prey of several raptor species, including Verreauxs' Eagle for which Rock Hyrax is considered its main prey. Additionally, a potential Verreauxs' Eagle nest was discovered in the escarpment area. Though breeding of the

species was not confirmed, pairs were regularly observed in the surrounding areas which indicate that it may be a possibility in the next breeding seasons. Therefore a 2000 m buffer was highlighted around this potential breeding location;

- * The valley thickets south of the central escarpment area which were important for "Ciconids", some Raptors and passerine species. A 200 m buffer was considered around this feature;
- * Additionally, a buffer area was considered around the potential breeding locations of Secretary bird (1500 m buffer area) and Martial Eagle (2000 m buffer area). However due to their large distance from the proposed WEF farm boundaries (approximately 3 km) these buffers do not affect any farm portions proposed for development; and
- * The main routes of arrival and utilization of the central waterbodies present on the site were also highlighted and are considered no-go areas for turbine placement due to habitat loss and disturbance impacts.

The buffers defined are indicative boundaries of areas/environmental features considered to pose higher collision risk for the avifaunal community with confirmed and potential occurrence within the proposed development area. These buffers are proposed to be respected in terms of the placement of wind turbines construction footprint.

- » **Heritage sensitivities:** Eight heritage features were recorded. The heritage features that were recorded consisted of Anglo Boer War (South African War) fortifications, rock art, stone cairns and farm labourer ruins). The rock art site (Feature 1), the stone cairn (Feature 4), the ruin (Feature 6) and four fortifications (Feature 2, 3, 7 & 8) are all located well away from any development footprint and will not be impacted on by the proposed wind farm development. However, the third fortification (Feature 5) would have been indirectly impacted on by tower 14 located 48 m to the north and the proposed access road that is located 20 m to the North West (Layout Alternative 1). It was accordingly recommended that the tower and access roads are micro adjusted to have a no development buffer zone of at least 60 m from feature 5 which was done. The site must also be demarcated during construction to prevent accidental damage to the site during the construction phase.
- » **Paleontological Heritage sensitivities:** Due to the potential economic as well as geoscientific interest (including possible association with fossil plants), the five uranium anomalies identified on the Remainder of the Farm Gunstfontein 131 should be protected by buffer zones of 30 m radius. The GPS locations of these five anomalies are as follows:
 - * Anomaly 169 (Gunstfontein 131): 32° 33' 20" S, 20° 38' 20" E
 - * Anomaly 170 (Gunstfontein 131): 32° 35' 09" S, 20° 37' 29" E
 - * Anomaly 171 (Gunstfontein 131): 32° 36' 07" S, 20° 38' 08" E
 - * Anomaly 172 (Gunstfontein 131): 32° 34' 02" S, 20° 41' 40" E
 - * Anomaly 173 (Gunstfontein 131): 32° 34' 56" S, 20° 42' 21" E

A similar 30m radius buffer zone be established to safeguard the association of abundant fossilised plant material with a sizeable body of koffiekliip (rusty-brown ferruginised sandstone) recorded at Loc. 114 (32°33'16.97"S, 20°38'0.73"E) on the western margins of Gunstfontein 131. Please note that the identified anomalies and fossilised plant material are all located well away from any wind farm infrastructure and will not be impacted on by the proposed wind farm development.

As a result of SAHRA feedback, it was decided to increase all paleontological heritage buffer zones to 60m, and this has been adopted as part of the mitigation strategy.

- » **Bat sensitivities:** Areas of high bat sensitivity areas defined by a 200 m buffer around temporary water bodies. It was recommended that Turbine 11 (Layout Alternative 1) should be relocated as it was located in a no-go zone – this was done. The following no-go areas must be considered:
- * The 500 m buffer surrounding all confirmed bat roosts;
 - * A 200 m buffer surrounding potential roosting sites;
 - * A 500 m buffer surrounding permanent water bodies and lines where high activity levels have been recorded; a 200 m buffer surrounding other permanent water bodies and lines;
 - * A 200 m buffer surrounding linear features with potential to be used by bats as navigation corridors and commuting pathways within or across the site (mountain gorges and water lines/ waterbodies that are arranged in a linear way and that may form a corridor); and
 - * Habitats where high bat activity of sensitive species have been recorded during the surveys: all escarpment area where many rock crevices hold high roosting potential and an additional 500m buffer around the upper ridge line, as this may be an approaching route of bat roosting in the escarpment that may travel to the area above the escarpment to forage.

As part of the mitigation strategy, turbine 11 has been relocated out of high sensitive and no-go areas.

The buffers defined are indicative boundaries of areas/environmental features considered to pose higher collision risk for the bat community with confirmed and potential occurrence within the proposed development area. These buffers are proposed to be respected in terms of the placement of wind turbines construction footprint.

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

2.3 Findings of the EA Amendment Process (2019)

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. An 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 Gunstfontein 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. The bat specialist also recommended that a minimum buffer to blade tip for all bat buffer zones is required. The amended wind turbine positions considered avoids all identified bat exclusion zones and areas of high sensitivity. 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 relating to bats 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.

2.4 Findings of the Walkthrough Studies (2020-2021)

Ecological Walk Through

Flora

Only one red data species was identified in the approved layout and for this reason the position of Turbine tower 11 (inclusive of hardstand area) was adjusted to avoid the portion of a rocky out crop area (No-Go area). This was due to the presence of *Antimima ivori* now listed as Rare, as this would be the fourth known locality, with the global population estimated at 100 plants (5 on Gunstfontein). One other species listed as Rare was also observed, but fell outside of the proposed project layout (v June 2021), namely *Lachenalia congesta*.

The disturbance, destruction and/or relocation, whichever is more relevant, of these species would require the relevant permits from the provincial authority, noting that the majority of the species listed below were found outside of the June 2021 project layout.

A very high number of plants that are protected under Provincial legislation, with some of the species encountered (Mesembryanthemaceae) numbering in the thousands are abundant within the region. The walkthrough report (refer to the supporting documentation) 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 may be 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.

Fauna

In terms of fauna, the following, inter alia, are protected and may not be hunted, captured or harmed without a permit:

- » All tortoises [3 species observed which include Angulate tortoise (*Chersina angulate*), Karoo Padloper (*Homopus femoralis*) & Southern Tent Tortoise (*Psammobates tentorius tentorius*)];
- » All lizards;
- » All frogs;
- » Most snakes [4 species were observed in November 2020, namely Cape cobra (*Naja nivea*), Mole snake (*Pseudoaspis cana*), Karoo sand snake (*Psammophylax rhombeatus rhombeatus*), and Puff adder (*Bitis arietans arietans*)]. The June 2021 period was mainly a cold windy period so no reptiles other than a few of the tortoises listed above were observed;
- » All indigenous antelope;
- » Aardvark;

- » Most small carnivores such as Honey Badger, Cape Fox, Bat-eared Fox;
- » Large Grey Mongoose etc.; and
- » Most birds except pest species.

With the exception of the tortoises and snakes, the species listed above typically leave the area once construction commences, thus permits for the relocation of snakes and tortoises must be obtained.

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 vervets or baboons climb into the turbine towers.

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.

Avifaunal

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

- » N1: Verreaux's Eagle
- » N2: Verreaux's Eagle
- » N3: Verreaux's Eagle
- » N4: Booted Eagle
- » N5: Jackal Buzzard
- » N6: Verreaux's Eagle

The results of the nest searches 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 nests, according to the requirements of the current Verreaux's Eagle guidelines (Ralston-Patton 2017). In addition, a 1.5km no turbine buffer was implemented around a large dam at the site, based on the recommendations from the avifaunal specialists. The implementation of these additional no-go buffers resulted in a reduction in the number of turbines on site from 46 (as authorised) to 36.

Bats

The original bat No-go buffers suggest by the pre-construction monitoring report were 500m. An additional 200m and 100m buffer were suggested in the addendum report and site walk-through. These buffers are to

blade tip. The bat sensitivity buffers were updated according to the exact turbine dimensions being applied for which is a hub height of up to 150 and rotor diameter of up to 180m, which resulted in buffers of 583m, 276m and 167m to turbine base respectively. The observations made on site confirmed that the buffers are sufficient, and no turbine blades are located within bat No-Go buffers and adheres to the updated sensitivity map. The only no-go buffers that are applicable for the construction MV lines and access roads are the potential roost buffer of 200m, with the aim to limit roost disturbance during construction. No infrastructure is located within this buffer.

Heritage and Paleontology

Heritage resources identified within the proposed development area include archaeological and built environment features. Only a few lithics comprising patinated silcrete and hornfels were identified. Almost all built environment features were found along valley bottom or on the steep scree slopes. Several stone ruins were the only significant findings in the region assigned for the development of the Gunstfontein Wind Farm. A rectangular, dry stocked stone-built kraal (likely historic in age) and a disused stone and mudbrick-built farm dwelling with associated stone outbuildings were identified during the over-head powerline survey. The lack of natural shelters, in addition to the extreme climate conditions and a lack of water throughout the areas of the proposed development most likely made the area unattractive for prehistoric occupation.

Based on the outcome of the walkthrough, it is not anticipated that the proposed development of turbines, cables and roads associated with the proposed Wind Energy Facility including the associated infrastructures will negatively impact on significant archaeological heritage and as such, there is no heritage objection to the final alignment of the of the wind farm development. The identified built environment and graves do not fall within the development footprint and will not be directly impacted.

A palaeontological walkthrough was conducted to comply with the requirements of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Act, 1999 (Act No. 25 of 1999) (NHRA). The whole development is underlain by Abrahamskraal Formation of the Adelaide Subgroup, in the Beauport Group of the Karoo Supergroup. This Formation is rated as highly sensitive for impacts of Palaeosensitivity Map available on SHARIS. As far as the palaeontology is concerned the project may proceed.

Visual

Due to the fact that a fewer number of turbines are proposed in the final layout when compared with the originally assessed layout (-10), the proposed WEF is likely to be visible over a smaller area and to a lower number of receptors. Turbines Gf33 and Gf34 are closer to the Komsberg Road than turbines in the originally assessed layout, it is likely that they could make the proposed WEF more visually imposing over a short section of the road. However, the original 46 turbine layout is likely to be more visually imposing over the majority of the affected section of the road. From the R354 as a viewer approaches the top of the Verlatenkloof Pass, the additional proposed turbines and particularly turbines Gf33 and Gf34 could marginally increase the apparent extent of the landscape that the proposed project affects, however, the proximity of the closest turbines associated with the original 46 turbine layout will still make this layout more imposing. Whilst the final 36 turbine layout will include turbines that are closer to the Gunstfontein homestead, it is unlikely that the proposed layout will be visually imposing when viewed from the homestead. The final 36 turbine layout will not increase the risk of shadow flicker affecting the Gunstfontein homestead.

2.5 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 982, GNR 983, GNR 984 and GNR 985 in Government Gazette 38282 of 4 December 2014).
- » Guidelines published in terms of the NEMA EIA Regulations, in particular:
 - * Companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2010 (Draft Guideline; DEA, 2010).
 - * Public Participation in the EIA Process (DEA, 2010).
 - * Integrated Environmental Management Information Series (published by DEA).
- » 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 for the project. A review of legislative requirements applicable to the proposed project is provided in **Table 2.2**.

Table 2.2: 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 GN R543, R544, R545 and R546 of June 2010, a scoping and EIA process was required to be undertaken for the proposed project.</p>	<p>» DFFE</p> <p>» <u>Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARD&LR)</u></p>	<p>The listed activities triggered by the proposed Project has been identified and assessed in the EIA process.</p> <p>The EIA Report was submitted to the competent and commenting authority in support of the application for authorisation. Authorisation was issued on 25 July 2016.</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</p>	<u>DFFE</u> (as regulator of NEMA).	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.

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	holistically, and to consider the cumulative effect of a variety of impacts.		
National Environmental Management: Waste Act (Act No 59 of 2008)	<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 of November 2013), 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. 	<p><u>DFFE</u> (hazardous waste)</p> <p>Provincial Department of Environmental Affairs (general waste)</p>	<p>No waste disposal site is to be associated with the project. In terms of GNR921, no waste management license is required for this project.</p> <p>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 EMP.</p>

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<ul style="list-style-type: none"> » The waste cannot be blown away. » Nuisances such as odour, visual impacts and breeding of vectors do not arise; and » Pollution of the environment and harm to health are prevented. 		
Environment Conservation Act (Act No 73 of 1989)	<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>	Noise impacts are expected to be associated with the project and are not likely to present a significant intrusion to the local community. There is no requirement for a noise permit in terms of the legislation.
National Water Act (Act No 36 of 1998)	Water uses under S21 of the Act 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.	<u>Department of Human Settlements, Water and Sanitation (DHSWS)</u>	A Water Use Authorisation is required as some drainage lines on the site will be impacted upon by road crossings. Application for a WUL or GA <u>(whichever is deemed to be applicable)</u> will be made with the DWS in terms of Section 21 of the Act.

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	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.		Water will be extracted from groundwater (borehole on site) for use within the facility and during construction.
Minerals and Petroleum Resources Development Act (Act No 28 of 2002)	<p>A mining permit or mining right may be required where a mineral in question is to be mined (e.g. materials from a borrow pit) in accordance with the provisions of the Act.</p> <p>Requirements for Environmental Management Programmes and Environmental Management Plans are set out in S39 of the Act.</p>	Department of Mineral Resources and Energy (DMRE)	Should material not be sourced from a commercial source and a borrow pit(s) be considered necessary, the Contractor shall source and apply for the relevant permit from the DMRE.
National Environmental Management: Air Quality Act (Act No 39 of 2004)	<p>Measures in respect of dust control (S32) and National Dust Control Regulations of November 2013.</p> <p>Measures to control noise (S34) - no regulations promulgated yet.</p>	DFFE Karoo Hoogland Local Municipality	<p>No permitting or licensing requirements arise from this legislation.</p> <p>The Act provides that an air quality officer may require any person to submit an atmospheric impact report if there is reasonable suspicion that the person has failed to comply with the Act. The air quality officer may require a dust monitoring programme as per the Regulations for dust control. This EMPr however makes provision for managing and mitigating potential dust impacts.</p>
National Heritage Resources Act (Act No 25 of 1999)	<p>Section 38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including</p> <p>» the construction of a road, power line, pipeline, canal or other similar linear</p>	South African Heritage Resources Agency (SAHRA) Northern Cape Heritage Resources Authority	A Heritage and Paleontological Impact Assessment (HIA) was undertaken as part of the EIA Process to identify heritage sites. <u>The heritage and Palaeontological walkthrough surveys and related reports were completed and included in the EMPr. The Heritage and Palaeontological walkthrough was completed and the</u>

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>development or barrier exceeding 300 m in length;</p> <p>» 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 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><u>conservation management plan was completed and included in the EMPr as Appendix I.</u> The overall area is considered as having a low archaeological significance. The relevant mitigation measures are included in this EMPr,</p>
National Environmental Management: Biodiversity Act (Act No 10 of 2004)	<p>» Provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process (S53)</p>	<p>National Department of Environmental Affairs</p> <p><u>DAEARD&LR</u></p>	<p>As the applicant will not carry out any restricted activity, as is defined in Section 1 of the Act, no permit is required to be obtained in this regard.</p>

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<ul style="list-style-type: none"> » 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 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, GN 1002), 9 December 2011). » This Act also regulates alien and invader species. 		<p>A Specialist Ecological Assessment was undertaken as part of the Environmental Impact Assessment process (refer to Appendix D of the EIA Report). As such the potential occurrence of critically endangered, endangered, vulnerable, and protected species, as well as critically endangered (CR), endangered (EN), vulnerable (VU) or protected ecosystems and species and the potential for them to be affected has been considered.</p>

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>» 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> <p>The Proponent has a responsibility for:</p> <p>» 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).</p> <p>» Promote the application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all development within the area are in line with ecological sustainable development and protection of biodiversity.</p> <p>» Limit further loss of biodiversity and conserve endangered ecosystems.</p>		
National Environmental Management: Biodiversity Act 10 of 2004	GNR 598: The Alien and Invasive Species (AIS) Regulations provides for the declaration of weeds and invader plants.	Department of Agriculture, Forestry and Fisheries (DAFF) <u>DFFE</u>	This Act will find application throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies are included in this EMPr. In addition, weed control and management has also been included in this EMPr.
National Veld and Forest Fire Act (Act 101 of 1998)	In terms of S13 the landowner would be required to burn firebreaks to ensure that should a veldfire occur on the property, that it does not spread to adjoining land.	DAFF <u>DFFE</u>	While no permitting or licensing requirements arise from this legislation, this Act will find application during the construction and operational phase of the project The relevant management and mitigation measures has been included in this EMPr.

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>In terms of S13 the landowner 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 S17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires.</p>		
Conservation of Agricultural Resources Act (CARA) (Act No 43 of 1983)	<p>» Prohibition of the spreading of weeds (S5).</p> <p>» Classification of categories of weeds & invader plants (Regulation 15 of GN R1048) & restrictions in terms of where these species may occur.</p> <p>» Requirement & methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R1048).</p>	<p>DAFF</p> <p><u>DFFE</u></p>	An Ecology study was undertaken (refer to Appendix D of the EIA Report). The relevant mitigations measures were identified and are included in this EMPr.
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>» DAFF</p> <p>» <u>DAEARD&LR</u></p>	<p>A permit or license is required for the destruction of protected tree species and/or indigenous tree species within a natural forest.</p> <p>No Protected tree species or indigenous tree species were identified on site, <u>requiring a permit under the National Forest Act.</u></p>

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
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 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>	Civil Aviation Authority (CAA)	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.
Hazardous Substances Act (Act No 15 of 1973)	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.	Department of Health Karoo Hoogland Municipality	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.

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<ul style="list-style-type: none"> » Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared to be Group I or Group II hazardous substance; » Group IV: any electronic product; » Group V: any radioactive material. <p>The use, conveyance or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.</p>		
National Road Traffic Act (Act No 93 of 1996)	<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>	Provincial Department of Transport (provincial roads) South African National Roads Agency Limited (national roads)	<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
	The general conditions, limitations and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.		
Astronomy Geographic Advantage Act (Act 21 of 2007)	<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 	Department of Science and Technology	The study area falls within the Sutherland Central Astronomy Advantage Area (SCAAA). <u>Gazetted Regulations in this regard are required to be adhered to. .</u>

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>dome falls under the Sutherland Core Astronomy Advantage Area. The declaration also applies to the core astronomy advantage area containing 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>		
<u>GNR 805 of 29 May 2019 under the Astronomy</u>	<u>These regulations apply to specified activities within the Sutherland Central Astronomy</u>	<u>Department of Science and Innovation</u>	<u>Requirements in terms of the Regulations for the SCAAA, the following is applicable for the project:</u>

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
<u>Geographic Advantage Act, No. 21 of 2007</u>	<p><u>Advantage Area declared for optical astronomy purposes and related scientific endeavours.</u></p> <p><u>The restriction of the specified activities within the Sutherland Central Astronomy Advantage Area is intended to protect the optical astronomy observations carried out within the Sutherland Core Astronomy Advantage Area from a detrimental impact.</u></p> <p><u>The regulation sets out maximum lighting levels for specified activities within the Sutherland Central Astronomy Advantage Area, including establishing a minimum acceptable night time brightness levels, as well as prescribed conditions for lighting activities and the nature of lighting used. In addition, dust and wind turbine conditions are provided within the Sutherland Central Astronomy Advantage Area. The regulation state that:</u></p> <p><u>(1) Unless authorised by the management authority, no person may allow any general area lighting and outdoor recreational lighting activities within the Sutherland Central Astronomy Advantage Area to cause the average night sky brightness stated in sub -</u></p>		<p>» <u>Any person who intends to conduct any activity within the Sutherland Central Astronomy Advantage Area that may involve any earth works creating dust, must submit an application on the prescribed form.</u></p> <p>» <u>Lighting for the wind farm (including obstacle lighting) must be planned and managed as per the requirements of the Regulations.</u></p> <p><u>All construction activities must be in accordance with these regulations by obtaining earthwork approval from the DSI prior to construction commencing and adhering to lighting types and levels on site as specified in the minimum standards of these regulations.</u></p>

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<p><u>regulation 3(2) to be exceeded within the Sutherland Core Astronomy Advantage Area.</u></p> <p><u>In addition to:</u></p> <p><u>5. Activities creating air pollution</u> <u>(1) Any person who intends to conduct any activity within the Sutherland Central Astronomy Advantage Area that may involve any earth works creating dust, must submit an application on the prescribed form (Annexure B), a copy of which can be obtained from the management authority, for approval by the management authority prior to commencing such activities.</u></p> <p><u>Fines of up to R 200 000.00 are determined for any intentional contravention of the regulations</u></p>		
Provincial Legislation/ Policies / Plans			
Northern Cape Nature Conservation Act, 2009	This Act provides for the sustainable utilisation of wild animals, aquatic biota and plants; provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; and	<u>DAEARD&LR</u>	<p>A permit is required for any activities which involve species listed under schedule 1 or 2. The NC DENC permit office provides an integrated permit which can be used for all provincial and Threatened or Protected Species (TOPS)-related permit requirements.</p> <p>Provincially protected plant species were found within the study area. <u>All protected plant species, (protected in terms of the Northern Cape Nature Conservation Act (No.</u></p>

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>provides for the issuing of permits and other authorisations. Amongst other regulations, the following may apply to the current project:</p> <ul style="list-style-type: none"> » Boundary fences may not be altered in such a way as to prevent wild animals from freely moving onto or off of a property; » Aquatic habitats may not be destroyed or damaged; » The owner of land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species. <p>The Act provides lists of protected species for the Province.</p>		<p>9 of 2009) legislation) identified on the site are listed in the <u>specialist report (Dec 2020), the Ecological Walkthrough Report dated June 2012</u> and disturbance of the listed vegetation will require the need for a permit application.</p>
Local Legislation / Policies / Plans			
Karoo Hoogland Local Municipality Integrated Development Plan (IDP)	<ul style="list-style-type: none"> » 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. » 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". 	Karoo Hoogland Local Municipality	New developments in the municipality to be in line with the IDP.

Table 2.3: Standards applicable to the Gunstfontein Wind Energy Facility

Theme	Standard	Summary
Air	South African National Standard (SANS) 69	Framework for setting and implementing national ambient air quality standards
	SANS 1929: Ambient Air Quality	Sets limits for common pollutants
Noise	SANS 10328:2003: Methods for Environmental Noise Impact Assessments	General procedure used to determine the noise impact
	SANS 10103:2008: The Measurement and Rating of Environmental Noise with Respect to Land Use, Health, Annoyance and Speech Communication	Provides noise impact criteria
	National Noise Control Regulations	Provides noise impact criteria
	SANS 10210: Calculating and Predicting Road Traffic Noise	Provides guidelines for traffic noise levels
Waste	DWAF (1998) Waste Management Series. Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste	DWAF Minimum Requirements
	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) – National norms and standard for the storage of waste.	<ul style="list-style-type: none"> » Provides uniform national approach relating the management of waste facilities » Ensure best practice in management of waste storage » Provides minimum standards for the design and operation of new and existing waste storage
Water	Best Practise Guideline (G1) Storm Water Management DWA 2006	Provides guidelines to the management of storm water
	South African Water Quality Guidelines	Provides water quality guidelines
Economical, Environmental and Social	Equator Principles, July 2020	<u>The Equator Principles are intended to serve as a common baseline and framework for financial institutions to identify, assess and manage environmental and social risks when financing Projects.</u>

CHAPTER 3: STRUCTURE OF THIS EMPR

The first three 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 Gunstfontein Wind Energy Facility (Pty) Ltd, as the Proponent 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, e.g.: <ul style="list-style-type: none"> » Wind turbines; » Substation » Access roads; and » Associated infrastructures.
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, e.g. 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 and additional measures are required to be included in the EMP to prevent deterioration or further deterioration of the environment.
- » Relevant legal or other requirements are changed or introduced.
- » Significant progress has been made on achieving an objective or target such that it should be re-examined to determine if it is still relevant, should be modified, etc.

3.1 Project Team

This EMP was compiled by:

EMP Compilers	
<u>EMPr Revision 2:</u>	
<u>Gideon Raath</u>	<u>Savannah Environmental</u>
<u>Jo-Anne Thomas</u>	<u>Savannah Environmental</u>
<u>Tebogo Mapinga</u>	<u>Savannah Environmental</u>
<u>EMPr Revision 1:</u>	
Hermien Slabbert	Savannah Environmental
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<u>Draft EMPr as part of the EIA Report</u>	
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Input from Specialists	
Ecology	Simon Todd Consulting <u>and EnviroSci</u>
Avifauna	Bioinsight South Africa, Arcus consulting <u>& Chris Van Rooyen Consulting</u>
Bats	Bioinsight South Africa and Arcus consulting
Soils and Land-Use, Land Capacity and Agricultural Potential	Garry Paterson of Arc-Institute for soil, climate and water
Visual	Jon Marshall of Afzelia Environmental Planning and Design
Heritage	Jaco van der Walt of Heritage Contracts and Jenna Lavin of CTS Heritage
Palaeontology	John Almond of Natura Viva
Noise	Morne de Jager of EAR- Enviro Acoustic Research
Social Impact	Tony Barbour and Schalk van der Merwe (Environmental Consultant and Researcher)

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 Goal for Pre-Construction

Overall Goal for Pre-Construction (Planning and Design): Undertake the pre-construction (planning and design) phase of the wind farm in a way that:

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

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

4.2 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 DFFE, the final layout must be implemented.

Project component/s	<ul style="list-style-type: none">» Wind turbines;» Cabling between turbines;» Substation;» Access roads and crane hard standings;» Service building(s); and» Associated infrastructure.
Potential Impact	<ul style="list-style-type: none">» Design fails to respond optimally to the environmental considerations.
Activities/risk sources	<ul style="list-style-type: none">» Positioning of turbines and alignment of access roads and underground cabling» Positioning of substation» Positioning of buildings» Construction and design of watercourse crossings» Pre-construction activities, e.g. geotechnical investigations
Mitigation: Target/Objective	<ul style="list-style-type: none">» To ensure that the design of the facility responds to the identified environmental constraints and opportunities.» To ensure that pre-construction activities are undertaken in an environmentally friendly manner by e.g. avoiding identified sensitive areas.» 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 as might be required by the EA.	Proponent / Contractor(s)	Prior to construction
<u>The "no-go" areas of the development property must be demarcated and must be excluded from the Final Layout.</u>	<u>Proponent / Contractor(s)</u>	<u>Prior to construction</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>Proponent / Contractor(s)</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>Proponent / Contractor(s)</u>	<u>Prior to construction and construction</u>
<u>Internal access roads must be located to minimize stream crossings. All structures crossing streams must be located and constructed so that they do not decrease channel stability or increase water velocity.</u>	<u>Proponent / Contractor(s)</u>	<u>Prior to construction</u>
<u>Signage must be erected at appropriate points warning of turning traffic and the construction site.</u>	<u>Proponent / Contractor(s)</u>	<u>Prior to construction and construction</u>
<u>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.</u>	<u>Proponent / Contractor(s)</u>	<u>Prior to construction and construction</u>
<u>A designated access to the site must be created and clearly marked to ensure safe entry and exit.</u>	<u>Proponent / Contractor(s)</u>	<u>Prior to construction and construction</u>
<u>Roads must be designed so that changes to surface water runoff are avoided and erosion is not initiated.</u>	<u>Proponent / Contractor(s)</u>	<u>Prior to construction</u>
<u>All construction vehicles should adhere to low speed limit to avoid collisions with susceptible species such as snakes and tortoises.</u>	<u>Proponent / Contractor(s)</u>	<u>Prior to construction and construction</u>
<u>Positions of turbines jeopardizing compliance with accepted Noise levels should be revised during the micro-siting of the units in question and predicted noise levels re-modelled by the noise specialist, to ensure that the predicted noise levels are less than 45dB(A).</u>	<u>Proponent / Contractor(s) / Specialist</u>	<u>Prior to construction</u>
High traffic areas and buildings such as offices, batching plants, storage areas etc. should, where possible, be situated in areas that are already disturbed and existing roads and farm tracks should be used where possible.	Proponent / Contractor(s)	Prior to construction and construction

Mitigation: Action/control	Responsibility	Timeframe
The minimum footprint areas of infrastructure should be used wherever possible, including road widths and lengths.	Proponent / Contractor(s)	Prior to construction and construction
Bridge design must be such that it minimises impact to riparian areas with minimal alterations to water flow and must allow the movement of fauna and flora.	Contractor(s)	Design phase
All buffers and no-go areas stipulated in the Avifaunal and Bat Reports <u>conducted during the EIA and in the walkthrough reports</u> must be adhered to for the facility	Contractor(s)	Design phase
A uniform 500m buffer applies to all identified avifaunal "no-go" areas	<u>Contractor(s)</u>	<u>Design phase</u>
<u>All turbines, the substation and construction camp/laydown area positions must be relocated outside the 500m uniform avifaunal buffer.</u>	<u>Contractor(s)</u>	<u>Design phase</u>
<u>A 500m buffer must be applied for all potential and confirmed bat roosting sites. Additional 200m and 100m buffers.</u>	<u>Contractor(s)</u>	<u>Design phase</u>
A comprehensive stormwater management plan must be compiled and detail how stormwater will be managed to reduce velocities and volumes of water that could lead to erosion of surfaces (refer to Appendix E).	Contractor(s)	Design phase
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 EMPr for all life cycle phases of the proposed project is considered to be key in achieving the appropriate environmental management standards as detailed for this project.	Proponent / Contractor(s)	Tender Design & Design Review Stage
Preconstruction ecological and heritage walk-through of the final approved layout and suitable micro-siting of the turbines and access roads must be conducted prior to construction activities.	Proponent	Design phase
The ecological preconstruction walk-through would serve to locate and identify species of conservation concern that are within the development footprint. Some search and rescue of plant species of conservation concern may be required.	Proponent	Design phase
Prior to construction, an avifaunal specialist should conduct a site walkthrough, covering the final road and power line routes as well as the final turbine positions, to identify any nests/breeding activity of sensitive species, as well as any additional sensitive	Proponent	Design phase

Mitigation: Action/control	Responsibility	Timeframe
habitats within which construction activities may need to be excluded.		
Should priority species nests be located, a protective buffer may be applied, within which construction activities may need to be restricted during the breeding season for that species.	Proponent	Design phase
The impacts on bats can be mitigated by using turbines which maximise the ground clearance as much as possible, and by minimising the tip height (i.e. the distance between the ground and the blade tip at its highest point).	Proponent	Design phase
A buffer zone of 60 m must be maintained from all identified heritage and palaeontological resources. Micro adjustment of all relevant proposed infrastructure must occur in order to achieve this.	Proponent	Design phase
No turbines may be located within the no-go areas, including the 3 km Verreaux's Eagle nest buffers. These no-go areas do not apply to associated infrastructure.	<u>Proponent</u>	<u>Design phase</u>
Place MV power lines underground where possible, unless it is practically impossible to do so due to ecological, geological or topographical considerations, and confirmed by appropriate independent specialists, as part of the walkthrough and micro-siting process;	<u>Proponent</u>	<u>Design phase</u>
Water use license/ General Authorisation to be obtained for any impacts on wetlands / drainage lines (if applicable).	Proponent/Contractor(s)	Design phase
Water use license or General Authorisation to be obtained for abstraction of water from on-site borehole/s for construction or operation purposes.	Proponent/Contractor(s)	Design phase
Mining permit/license to be obtained for any borrow pits to be established for the project (if applicable).	Contractor(s)	Design phase
<u>Relevant permits must be obtained from relevant authorities for any removal or destruction of Threatened or Protected Species (TOPs).</u>	<u>Proponent</u>	<u>Design phase</u>
Obtain required abnormal load permits for transportation of project components to site.	Contractor(s)/ Transport Contractor	Design phase
Determine an appropriate location for onsite batching outside of identified sensitive areas.	Contractor(s)	Design phase
A detailed geotechnical investigation is required for the design phase.	Contractor(s)	Design phase

Performance Indicator	<ul style="list-style-type: none"> » Design meets objectives and does not unnecessarily degrade the environment. » Design and layouts etc. respond to the mitigation measures and recommendations in the EIA.
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**Monitoring
Reporting**

and

- » Ensure that the design implemented meets the objectives and mitigation measures in the EIA Report through review of the design by the Project Manager, ECO, Contractor and the Environmental Officer (EO) prior to the commencement of construction.

OBJECTIVE 2: To ensure effective communication mechanisms

On-going communication with affected and surrounding landowners is important to maintain during the construction and operational phases of the wind farm. Any issues and concerns raised should be addressed as far as possible in as short a timeframe as possible.

Project component/s	<ul style="list-style-type: none"> » Wind turbines; » Cabling between turbines; » Substation; » Access roads; » Watercourse crossing, i.e. access roads and culverts; » Buildings; and » All other infrastructure.
Potential Impact	» Impacts on affected and surrounding landowners and land uses
Activity/risk source	<ul style="list-style-type: none"> » Activities associated with pre-construction activities » Activities associated with construction of the wind farm » Activities associated with construction of watercourse crossings » Activities associated with operation
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Effective communication with affected and surrounding landowners » Addressing of any issues and concerns raised as far as possible in as short a timeframe as possible

Mitigation: Action/control	Responsibility	Timeframe
Compile and implement a grievance mechanism procedure for the public (using Appendix B) to be implemented during both the construction and operational phases of the facility and if applicable during decommissioning. This procedure should include details of the contact person who will be receiving issues raised by interested and affected parties, and the process that will be followed to address issues. A Project Specific Grievance Mechanism will be developed and implemented for construction.	Proponent and/or Contractor(s)	Pre-construction (construction procedure) Pre-operation (operation procedure)
Develop and implement a grievance mechanism for the construction, operational and closure phases of the project for all employees, contractors, subcontractors and site personnel. This procedure should be in line with the South African Labour Law.	Proponent and/or Contractor(s)	Pre-construction (construction procedure) Pre-operation (operation procedure)
Liaison with landowners is to be undertaken prior to the commencement of construction in order to agree on landowner-specific conditions during construction and maintenance.	Proponent and/or Contractor(s)	Pre-construction
An incident reporting system must be developed and used to record non-conformances to the EMPr.	Contractor(s)/ ECO	Pre-construction Duration of construction

Mitigation: Action/control	Responsibility	Timeframe
Public complaints register must be developed and maintained on site in line with the Grievance mechanism (Appendix A).	Contractor(s)	Pre-construction Duration of construction

Performance Indicator	» Effective communication procedures in place for all phases as required.
Monitoring	» An incident reporting system should be used to record non-conformances to the EMPr. Grievance mechanism procedures should be implemented. » Public complaints register must be developed and maintained.

OBJECTIVE 3: Protection of Heritage and Palaeontological Resources

Project component/s	» Wind turbines; » Cabling between turbines; » Substation; » Access roads; » Buildings; and » All other infrastructure.
Potential Impact	» Destruction of potential heritage and fossil/palaeontological resources
Activity/risk source	» Activities associated with construction of the wind farm » Activities associated with construction of watercourse crossings » Activities associated with operation
Mitigation: Target/Objective	» Protection of identified heritage sites and fossils » Protection of potential heritage artefacts uncovered during construction

Mitigation: Action/control	Responsibility	Timeframe
All palaeontological specialist work should conform to international best practice for palaeontological fieldwork and (e.g. data recording fossil collection and curation) should adhere as far as possible to the minimum standards for Phase 2 palaeontological studies recently developed by SAHRA (2013).	Proponent and Specialist	Pre-Construction
On-site investigation to identify and cordon off sensitive heritage sites/areas must be undertaken prior to commencement of construction.	Contractor(s) in conjunction with the ECO/ EO	Pre-construction
A realistic, collaborative monitoring programme and protocol should be drawn up by the palaeontologist in conjunction with the proponent.	Proponent and Specialist	Pre-construction
A 30m radius buffer zone must be established to safeguard the association of abundant fossilised plant material with a sizeable body of koffieklip (rusty-brown ferruginised	Proponent and Specialist	Pre-construction

Mitigation: Action/control	Responsibility	Timeframe
sandstone) recorded at Loc. 114 (32°33'16.97"S, 20°38'0.73"E) on the western margins of Remainder of the Farm Gunstfontein 131.		
A Conservation Management Plan must be developed to ensure the on-going conservation of identified heritage resources during the life of the development. The report must include a map of all identified heritage and palaeontological resources with buffer zones of 60 m in relation to the proposed development. This report must be submitted to SAHRA if the EA has been approved.	Proponent and Specialist	Pre-construction
<u>Should important new fossil remains - such as insects, vertebrate bones and teeth, petrified wood, plant-rich fossil lenses or dense fossil burrow assemblages - be exposed during construction, the responsible Environmental Control Officer should alert SAHRA (i.e. The South African Heritage Resources Agency. Contact details: Ms Ragna Redelstorff, 021 202 8651, 111 Harrington Street, Cape Town, rredelstorff@sahra.org.za) as soon as possible. This is so that appropriate action can be taken in good time by a professional palaeontologist at the developer's expense.</u>	<u>ECO</u>	<u>Construction</u>
The five uranium anomalies identified on the Remainder of the Farm Gunstfontein 131 must be protected by buffer zones of 30 m radius. The GPS locations of these five anomalies are as follows: » Anomaly 169 (Gunstfontein 131): 32° 33' 20" S, 20° 38' 20" E » Anomaly 170 (Gunstfontein 131): 32° 35' 09" S, 20° 37' 29" E » Anomaly 171 (Gunstfontein 131): 32° 36' 07" S, 20° 38' 08" E » Anomaly 172 (Gunstfontein 131): 32° 34' 02" S, 20° 41' 40" E » Anomaly 173 (Gunstfontein 131): 32° 34' 56" S, 20° 42' 21" E	Proponent and Specialist	Pre-Construction
<u>The stone vaim/possible graves (Feature 4 SAHRIS ID 129288, should be demarcated and fenced off with a perimeter buffer zone of 60m</u>	<u>Proponent and Specialist</u>	<u>Pre-Construction</u>

Performance Indicator	» No impacts on valuable fossil heritage. » No impacts on valuable heritage resources.
Monitoring	» Contractor to cordon off sensitive sites

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 watercourses, 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 facility complies with the requirements of any and all environmental authorisations and permits, and obligations emanating from other relevant environmental legislation. This obligation is partly met through the development of the EMP, and the implementation of the EMP through its integration into the contract documentation. These are outlined below. The Proponent will retain various key and facilitation roles and responsibilities during the construction of the wind energy facility, however, the Contractor(s) will be responsible for implementing the conditions of the EMP.

a) OBJECTIVE 1: Establish clear reporting, communication, and responsibilities in relation to overall implementation of the EMP

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Project Manager, Site Manager, Contractor's Environmental Officer (EO), ECO and Contractor for the construction phase of this project are as detailed below. Formal responsibilities are necessary to ensure that key procedures are executed.

Project Manager/ Coordinator 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 the project Contractor(s) are made aware of all stipulations within the EMP.
- » Coordinate the correct implementation of the EMP throughout the project by means of site inspections and meetings. This will be documented as part of the site meeting minutes.
- » Be fully knowledgeable with the EIA Report (including amendments) for the project, the EMP, the conditions of the Environmental Authorisation, and all relevant licences and permits.
- » Be fully knowledgeable with the contents of all relevant licences and permits.

Site Manager (Contractor(s)'s on-site Representative) will:

- » Be fully knowledgeable with the contents of the EIA Report and risk management.

- » Be fully knowledgeable with the contents and conditions of the Environmental Authorisation and related amendments.
- » Be fully knowledgeable with the contents of the EMPr.
- » Have overall responsibility of the EMPr and its implementation.
- » Ensure that audits are conducted to ensure compliance to the EMPr.
- » Ensure there is communication with the Project Manager, the ECO, the EO, and relevant discipline engineers on matters concerning the environmental compliance.
- » Be fully knowledgeable with the contents of all project licences and permits.
- » 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 and will be responsible for monitoring, reviewing and verifying compliance by the Contractor(s) with the environmental specifications of the EMP and the conditions of the Environmental Authorisation. Accordingly, the ECO will:

- » Be fully knowledgeable with the contents of the EIA Report.
- » Be fully knowledgeable with the contents and with the conditions of the Environmental Authorisation including all subsequent amendments.
- » Be fully knowledgeable with the contents of the EMPr.
- » Be fully knowledgeable of all the project licences and permits issued to the site and ensure communication to the relevant personnel on the conditions contained therein.
- » Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with them.
- » Ensure that the contents of this document are communicated to the Contractor(s) site staff and that the Site Manager and Contractors are constantly made aware of the contents through regular discussion.
- » Ensure that the compliance of the EMPr, EA and legislative is monitored through regular and comprehensive inspection of the site and surrounding areas.
- » Ensure that if the EMPr, EA and/or the legislation conditions, regulations or specifications are not followed then appropriate measures are undertaken to address any non-compliances (for example an ECO may cease an activity to prevent a non-compliance from continuing, if reasonable (i.e. if all other options have been exhausted)).
- » Monitoring and verification must be implemented to ensure that environmental impacts are kept to a minimum, as far as possible.
- » Ensure that the Site Manager has input into the review and acceptance of construction methods and method statements.
- » Visit the site sufficiently regularly so as to ensure that activities on site comply with all relevant environmental legislation.
- » Ensure that appropriate measures are undertaken to address any non-compliances recorded. The Method Statements must include the timelines to close out the identified non-conformances.
- » Ensure that a removal is ordered of any person(s) and/or equipment responsible for any contravention of the specifications of the EMPr and/or project permits.
- » Keep record of all environmental activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.

- » 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.

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.

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(s) 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(s) 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

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.

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	<ul style="list-style-type: none"> » Wind energy turbines » Cabling between turbines » Substation » Access roads » Buildings » Operation and maintenance buildings » Laydown areas and hardstands
Potential Impact	<ul style="list-style-type: none"> » Hazards to landowners and public » Security of materials » Substantially increased damage to natural vegetation and sensitive environmental areas, due largely to unawareness of where such areas are located. » Potential impact on fauna and avifauna
Activities/risk sources	<ul style="list-style-type: none"> » Open excavations (foundations and cable trenches) » Movement of construction employees, vehicles and plant 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(s)/ EO	During site establishment Maintenance: for duration of Contract.
Where necessary to control access, fence and secure area using appropriate means, and implement access control procedures – fencing should take cognisance of farming activities, e.g. not limiting game and/or sheep and other animals from accessing water/ food (fencing should be discussed and planned in conjunction with the landowners prior to construction).	Contractor(s)	During site establishment Maintenance: for duration of Contract.
Fence and secure Contractor's equipment camp.	Contractor(s)	Erection: during site establishment Maintenance: for duration of Contract.
Develop and implement an efficient access control system which allows for the identification of all people on site.	Contractor(s)	During site establishment Implement for duration of contract
Concrete batching plant/s to be located in <u>the lowest applicable sensitivity areas</u> within the approved development area or an area approved by the ECO.	Contractor(s)	During site establishment
High traffic areas and buildings such as offices, batching plants, storage areas etc. should where possible be situated in areas that are already disturbed and existing roads and farm tracks should be used where possible.	Contractor(s)	During site establishment Implement for duration of contract
The minimum footprint areas of infrastructure should be used wherever possible, including road widths and lengths.	Contractor(s)	During site establishment Implement for duration of contract

Mitigation: Action/control	Responsibility	Timeframe
All unattended open excavations must be adequately demarcated and/or fenced (fencing shall consist of a minimum of three strands of wire wrapped with danger tape).	Contractor(s)	During site establishment
Establish appropriately bunded areas for storage of hazardous materials (i.e. fuel to be required during construction). Bunds must be constructed in order to accommodate 110% of the volume of the substance stored.	Contractor(s)	During site establishment and during construction
Establish the necessary ablution facilities with chemical toilets and provide adequate sanitation facilities and ablutions for construction workers (1 toilet per every 15 workers) at appropriate locations on site.	Contractor(s)	During site establishment and during construction
Ablution or sanitation facilities should not be located within 100 m from a 1:100 year flood line or within 32m of a watercourse if the 1:100 year flood line is unknown/uncertain.	Contractor(s)	Site establishment, and duration of construction

Performance Indicator	<ul style="list-style-type: none"> » Site is secure and there is no unauthorised entry. » No members of the public/ landowners injured as a result of construction activities. » Fauna and flora is protected as far as practically possible » Appropriate and adequate waste management and sanitation facilities provided at construction site.
Monitoring and Reporting	<ul style="list-style-type: none"> » Regular visual inspection of fence for signs of deterioration/forced access. » An incident reporting system used to record non-conformances to the EMPr. » Public complaints register used to record complaints received. » 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. Employment of locals and the involvement of local Small, Micro and Medium Enterprises (SMMs) would enhance the social benefits associated with the project, even if the opportunities are only temporary. The procurement of local goods could furthermore result in positive economic spin-offs. It is acknowledged that socio-economic development forms a major part of the REIPPPP and the Project therefore has various targets to meet.

Project component/s	<ul style="list-style-type: none"> » Construction activities associated with the establishment of the wind farm, including associated infrastructure.
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Potential Impact	» The opportunities and benefits associated with the creation of local employment and 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	<ul style="list-style-type: none"> » The Proponent, in discussions with the local municipality, should aim to employ as many workers (skilled, semi-skilled / low-skilled) from the local areas/ towns, as possible. » The proponent should also develop a database of local BBBEE service providers

Mitigation: Action/control	Responsibility	Timeframe
Employ as many workers (skilled, semi-skilled / low-skilled) from the local area/ nearby towns as possible.	Contractor(s)	Project duration
Where required, implement appropriate training and skills development programmes prior to the initiation of the construction phase to ensure that local employment target is met.	Proponent/ Contractor(s)	Project duration
Develop a database of local Broad Based Black Economic Empowerment (BBBEE) service providers and ensure that they are informed of relevant tenders and job opportunities.	Contractor(s)	Project duration
Skills audit to be undertaken as per the Renewable Energy Independent Power Producer Procurement Process (REIPPPP) Enterprise Development (ED) and Socio-Economic Development (SED) Requirements to determine training and skills development requirements.	Contractor(s)	Project duration
Identify potential opportunities for local businesses.	Proponent/ Contractor(s)	Project duration

Performance Indicator	<ul style="list-style-type: none"> » Source as many local labourers as possible. » Database of potential local BBBEE services providers in place before construction phase commences. » Skills audit to determine need for training and skills development programme undertaken within 1 month of commencement of construction phase.
Monitoring and Reporting	<ul style="list-style-type: none"> » 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 EMP. » Public complaints register used to record complaints received. » A Site Specific Grievance Mechanism must be communicated and implemented prior to construction.

OBJECTIVE 4 : Avoid the negative social impacts on family structures and social networks due to the presence of construction workers from outside the area, including potential loss of livestock, game, other fauna and damage to farm infrastructure

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 (including stock theft), 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.

Project component/s	<ul style="list-style-type: none"> » Construction and establishment activities associated with the establishment of the wind farm, including associated infrastructure. » 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. » Impacts on the surrounding environment due to inadequate sanitation and waste removal facilities. » Impact on safety of farmers and communities (increased crime etc.) by construction workers and also damage to farm infrastructure such as gates and fences.
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 or illegal hunting/trapping of fauna and or game 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. » To minimise impacts on the social and biophysical environment.

Mitigation: Action/control	Responsibility	Timeframe
<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>	Proponent/ Contractor(s)	Pre-construction/ construction
Ensure that construction workers who are found guilty of breaching the Code of Conduct are disciplined accordingly. All disciplinary hearings and/or dismissals must be in accordance with South African labour legislation.	Proponent/ Contractor(s)	Pre-construction/ construction
The housing of construction workers on the site should be limited to security personnel, if required.	Contractor(s)	Pre-construction/ construction

Mitigation: Action/control	Responsibility	Timeframe
Compensate farmers / community members for any proven cost for any losses, such as livestock, damage to infrastructure etc.	Proponent/ Contractor(s)	Construction
Inform the landowner of activity on their land as per agreed landowner construction requirements or at least two (2) days in advance of planned activities	Contractor(s)	Duration of contract
Procedures and measures to prevent, and in worst cases, attend to fires should be developed in consultation with the surrounding property owners.	Contractor(s)	Pre- construction and when required
Contact details of emergency and police services should be prominently displayed on site.	Contractor(s)	Construction
Appropriate fire-fighting equipment must be present on site and members of the workforce should be appropriately trained in using this equipment in the fighting of veld fires.	Contractor(s)	Construction
Employees, visitors and/or subcontractors should be made well aware of the consequences of any damage to private property and/or loss of livestock, game and/or other fauna.	Proponent/ Contractor(s)	Duration of contract
Should there be any damage to private property and/or loss of livestock, game and/or other fauna that can be linked to the Contractor, or any subcontractor, the landowner shall be compensated accordingly upon sufficient proof thereof.	Proponent/ Contractor(s)	Duration of contract
Reasonable site access control should be implemented.	Contractor(s)	Duration of contract

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. » Documentation of Landowner Requirements to be agreed with the contractor prior to commencement of construction. » Appropriate waste and wastewater management. » Community Monitoring Forum in place before construction phase commences. » No criminal activities and theft of livestock, illegal hunting or trapping of game and/or other fauna attributable to the construction workers are reported. » No complaints received from landowners or the general public. » No fires or on-site accidents occur.
Monitoring and Reporting	<ul style="list-style-type: none"> » The Proponent, Contractor(s) and/or the 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 used to record complaints received.

OBJECTIVE 5 : Noise control

Construction noise as well as traffic movement to and from the wind energy facility site (particularly the use of heavy-duty vehicles), could potentially result in a noise impact on the residents near the proposed facility during construction.

Project component/s	<ul style="list-style-type: none"> » Wind Energy turbines » Cabling between turbines » Substation » Access roads » Buildings » Watercourse crossing, i.e. access roads and culverts
Potential Impact	» Nuisance noise from construction activities affecting the surrounding community.
Activity/risk source	<ul style="list-style-type: none"> » Any construction activities taking place within 500 m from potentially sensitive receptors (PSR). » Site preparation and earthworks » Construction-related transport » Foundations or plant equipment installation » Building activities » Power line construction activities
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
On-site construction activities should be limited to daylight hours as far as possible. No construction activities after 13:00 on Saturdays, Sundays and public holidays. Should construction activities need to be undertaken outside of these times, landowners need to be consulted. Where work takes place outside of normal working hours, the relevant legislation should be adhered to.	Contractor(s)	Construction
<u>The potential noise impact must be re-evaluated should the layout be changed such that any wind turbines area located closer than 1000m from a confirmed noise sensitive area.</u>	<u>Contractor(s)</u>	<u>Construction</u>
Construction staff working in areas where the 8-hour ambient noise levels exceed 75dBA must wear ear protection equipment.	Contractor(s)	Construction
Construction noise must be managed according to the Noise Control Regulations and SANS 10103	Contractor(s)	Construction
The construction crew must abide by the national standards and local by-laws, if any, regarding noise.	Contractor(s)	Construction

Mitigation: Action/control	Responsibility	Timeframe
All construction equipment, including vehicles, must be properly and appropriately maintained in order to minimise noise generation.	Contractor(s)	Construction
Establish a line of communication and notify all stakeholders and sensitive receptors of the means of registering any issues, complaints or comments.	Contractor(s)	All phases of project.
Notify potentially noise sensitive receptors about work to take place at least 2 days before the activity in the vicinity (within 500 m) of the Potentially Sensitive Receptors (PSR) is to start. The following information to be presented in writing: » Description of activity to take place; » Estimated duration of activity; » Working hours; and » Contact details of responsible party.	Contractor(s)	At least 2 days, but not more than 5 days before activity is to commence.

Performance Indicator	» 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	» Should a complaint about noise be reported, the Proponent and/or Contractor(s) is 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 used to record complaints received.

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.

Project component/s	» Wind Energy turbines » Cabling between turbines » Substation » Access roads » Buildings » Watercourse crossing, i.e. access roads and culverts » Batching Plant
Potential Impact	» Heavy vehicles can generate noise and dust impacts. Movement of heavy vehicles can also damage roads. » Dust and particulates from vehicle movement to and on-site, foundation excavation, road construction activities, road maintenance activities, temporary stockpiles, and vegetation clearing affecting the surrounding residents (dust nuisance) and visibility. » Release of minor amounts of air pollutants (for example NO ₂ , CO and SO ₂) from vehicles and construction equipment
Activities/risk sources	» The movement of heavy vehicles and their activities on the site can result in noise and dust impacts and damage roads.

	<ul style="list-style-type: none"> » Clearing of vegetation and topsoil. » Excavation, grading and scraping. » Transport of materials, equipment and components on internal access roads. » Re-entrainment of deposited dust by vehicle movements. » Wind erosion from topsoil and spoil stockpiles and unsealed roads and surfaces. » Fuel burning from construction vehicles with combustion engines.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To avoid and or minimise the potential noise and dust impacts associated with heavy vehicles, and also minimise damage to roads. » To ensure emissions from all vehicles are minimised, where possible, for the duration of the construction phase. » To minimise nuisance to the community and adjacent landowners from dust emissions and to comply with workplace health and safety requirements for the duration of the construction phase.

Mitigation: Action/control	Responsibility	Timeframe
Implement appropriate dust suppression measures on site such as wetting roads on a regular basis including during site clearing and periods of high winds (by using non-potable water as far as practically possible).	Contractor(s)	Construction
Haul vehicles moving outside the construction site carrying material that can be wind-blown should be covered with tarpaulins.	Contractor(s)	Duration of contract
Ensure vehicles adhere to speed limits on public roads and speed limits set within the site.	Contractor(s) / transportation contractor	Duration of contract
Disturbed areas must be re-vegetated as soon as practicable after construction is complete in an area.	Contractor(s)	At completion of the construction phase.
Vehicles and equipment must be maintained in a road-worthy condition at all times.	Contractor(s)	Prior to construction phase.
Ensure that damage to gravel public roads and access roads attributable to construction vehicles use for the construction of the Project is repaired before completion of construction phase.	Contractor(s)	Before completion of construction phase.
Regular dust control of materials (sand, soil, concrete) must be used at concrete batching plants on site.	Contractor(s)	Construction
Strictly control vibration pollution from compaction plant or excavation plant as far as practically possible	Contractor(s)	Construction
Disturbed areas must be re-vegetated as soon as practicable.	Contractor(s)	At completion of the construction phase.
If monitoring results or complaints indicate inadequate performance against the criteria indicated, then the source of the problem will be identified, and existing procedures or equipment modified to ensure the problem is rectified.	Contractor(s)	Duration of contract

Performance Indicator	<ul style="list-style-type: none"> » Appropriate dust suppression measures implemented on site during the construction phase. » Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed or before entering the site.
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	<ul style="list-style-type: none"> » 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"> » The Proponent 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 EMP. » Public complaints register used to record complaints received.

OBJECTIVE 7 : Soil 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.) could 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 slopes are prone to soil erosion and good soil management must be undertaken during construction on these slopes.

A set of strictly adhered to mitigation measures are required to be implemented in order to effectively limit/ manage the potential 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. 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**.

Project component/s	<ul style="list-style-type: none"> » Wind turbines; » Substation; » Access roads; » Sealed surfaces (e.g. roofs, concrete surfaces, compacted road surfaces, paved roads / areas); » Watercourse crossing, i.e. access roads and culverts; and » All other infrastructure (site camp, batching plant etc).
Potential Impact	<ul style="list-style-type: none"> » Erosion and soil loss; » Sedimentation of watercourses; » 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; » 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 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 drainage lines 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 separately from subsoil for re-use in rehabilitation phase. Maintain stockpile shape and protect from erosion. All stockpiles must be positioned at least 50 m away from drainage lines if practically possible. Limit the height of stockpiles as far as possible to reduce compaction.	Contractor(s)	During site establishment and any activity related to earthworks as well as the duration of construction.
<u>All disturbed soil must be reclaimed using only indigenous grass and shrubs. Reclamation activities shall be undertaken according to the rehabilitation plan (refer to Appendix D.</u>	<u>Contractor(s)</u>	<u>Construction and rehabilitation</u>
Phased development and vegetation clearing must be implemented where possible so that cleared areas are not left un-vegetated and vulnerable to erosion for extended periods of time before construction commences.	Contractor(s)	During site establishment and 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 (Allowance has been made for micro-siting of internal access roads).	Contractor(s)	Before and during construction
Identify and demarcate construction areas for general construction work and restrict construction activity to these areas.	Contractor(s)	Construction
Rehabilitate disturbance areas as soon as construction in an area is completed, if practically and logistically possible.	Contractor(s)	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(s)	During and after construction
<u>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.</u>	<u>Contractor(s)</u>	<u>Construction</u>
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(s)	Erection: Before construction Maintenance: Duration of contract.

Mitigation: Action/control	Responsibility	Timeframe
Particular care should be taken in the design of road drainage line 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(s)	Erection: during site establishment Maintenance: for duration of contract.
Where access roads cross natural drainage lines, culverts (or other appropriate measures) must be designed to allow free flow. Regular maintenance of the culverts must be carried out.	Engineer / Contractor(s)	Before and during construction
Control depth of all excavations and stability of cut faces/sidewalls – this will also be covered by health and safety requirements.	Engineer / Contractor(s)	Maintenance over duration of contract
Implement the comprehensive stormwater management plan as part of the final design of the project and implement during construction and operation (refer to Appendix E).	Contractor(s)	Compile during design; implement during construction & operation
Cement/Concrete batching to take place in designated areas only, as detailed on the approved facility layout map (if applicable).	Contractor(s)	Construction.
Spillages of cement/concrete to be cleaned up immediately and disposed of.	Contractor(s)	Construction
Spill kits to be kept on active parts of the construction site & at site offices.	Contractor(s)	Construction
Soil erosion control measures (such as hessian mats and gabions) be used for in erosion prone areas such as steep slopes.	Contractor(s)	Construction

Performance Indicator	<ul style="list-style-type: none"> » Acceptable level of activity within disturbance areas; » No activity outside of designated areas » Minimal level of soil erosion around site as a result of construction activities » No siltation in drainage lines as a result of construction activities » Minimal level of soil degradation as a result of construction activities » No accelerated erosion at drainage line road crossings (typical signs of accelerated erosion would be headcut development, channel incision or scour adjacent to the structure). » Limited soil erosion around site as a result of construction activities; » No increased siltation in drainage lines as a result of construction activities; » Impacts on drainage lines are minimised. » Only limited localised scour adjacent to culverts. » Acceptable state of excavations, as determined by ECO.
Monitoring and Reporting	<ul style="list-style-type: none"> » Continual inspections of the site by ECO/ EO; » Daily monitoring for the water crossing construction period. » Fortnightly inspections of sediment control devices by ECO/ EO; » On-going inspections of surroundings, including drainage lines by ECO/ EO; » 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 used to record complaints received.

OBJECTIVE 8 : Limit disturbance and avoid damage to drainage lines/ watercourses

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

Project component/s	<ul style="list-style-type: none"> » Access roads » Cabling between turbines » Watercourse crossing, i.e. access roads and culverts » Wind turbines » Workshop area/ laydown areas
Potential Impact	<ul style="list-style-type: none"> » Damage to drainage line areas by any means that will result in hydrological changes (includes erosion, siltation, dust, and direct removal of soil or vegetation, contamination, dumping of material). The focus should be on the functioning of the drainage line as a natural system. » Increased runoff into drainage lines can potentially be associated with accelerated erosion.
Activity/risk source	<ul style="list-style-type: none"> » Construction of access roads and cabling.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Minimise damage to watercourse areas where crossing will be built. » No increase in runoff into drainage lines as a result of construction of project related infrastructure. » No increase in runoff into drainage lines as a result of road construction

Mitigation: Action/control	Responsibility	Timeframe
Align underground cables and internal access roads as far as possible along existing infrastructure and disturbances, e.g. within the internal access road construction corridor.	Proponent, Contractor(s)	Construction
For any new construction where direct impacts on drainage lines are unavoidable, cross watercourses perpendicularly as far as practically possible to minimise disturbance footprints.	Contractor(s)	Construction
Rehabilitate any disturbed areas as soon as possible once construction is completed in an area.	Contractor(s)	Construction
Bridge design must be such that it minimises impact to riparian areas with minimal alterations to water flow and must allow the movement of fauna and flora	Contractor(s)	Construction
Obtain required water use license/ GA for impacting on drainage lines (if applicable).	Proponent	Pre-construction
Construction must not result in the width of the watercourse being narrowed.	Contractor(s)	Construction
Control storm water and runoff water through the implementation of a storm water management plan for the site (refer to Appendix F).	Contractor(s), ECO/ EO	Construction
Contaminated runoff from the construction site(s) should be prevented from entering the rivers/streams. <u>Working protocols incorporating pollution control measures (including approved method statements by the contractor) should be clearly set out in the EMPr and strictly enforced</u>	<u>Contractor(s)</u>	<u>Construction</u>
Ablution facilities at the construction sites, i.e. outside the construction camp must be located at least 100m away from drainage lines and must be regularly serviced.	Contractor(s)	Construction
Concrete batching plants and stockpiles to be located more than 50m away from drainage lines wherever practically possible. If not possible, the ECO/ EO must be consulted to ensure the relevant mitigation measures are implemented.	Contractor(s)/ ECO/ EO	Construction
<u>Based then on the Macfarlane & Bredin (2016) buffer model, a buffer of 59m is proposed for these areas, which is considerably less than the buffer distance used in the EIA specialist assessment (i.e. 100m) Thus, all of the wetland areas have been excluded from the development footprint, with the closest system being approximately 100m from an access road.</u>	<u>Contractor(s)</u>	<u>Construction</u>

Performance Indicator	<ul style="list-style-type: none"> » Limited impacts on water quality, water quantity, riparian or wetland vegetation, natural status of riparian or wetland areas. » No increase in runoff into drainage lines as a result of construction of project related infrastructure.
Monitoring and Reporting	<ul style="list-style-type: none"> » Habitat loss in watercourses should be monitored before and after construction by the ECO/ EO. » The ECO in conjunction with the EO, should be responsible for monitoring and reporting. » An incident reporting system must be used to record non-conformances to the EMPr.

- » Weekly monitoring by the ECO/ EO during the construction phase to ensure mitre drains or similar runoff management structures are properly constructed.
- » Public complaints register must be used to record complaints received.

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

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 Protection Plan and Re-Vegetation Management Plan and Rehabilitation Plan) is attached to **Appendix C and D**.

Project component/s	<ul style="list-style-type: none"> » Wind turbines and associated laydown areas; » Access roads and cabling; » Substation; » Workshop area; » Site camp » Batching plants; and » Temporary laydown areas.
Potential Impact	» Proliferation of alien plants
Activity/risk source	<ul style="list-style-type: none"> » Site preparation and earthworks » Trenching activities for cable laying » Excavation for tower base foundations » Construction of site access road » Site preparation for lay-down area(s) and site office/visitor's centre (e.g. compaction) » Foundations or plant equipment installation » Stockpiling of topsoil, subsoil and spoil material
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; » Remove and store all topsoil on areas that are to be excavated wherever practically possible; and use this topsoil in subsequent rehabilitation of disturbed areas; and » Limited 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 where there are no existing roads or where there aren't new roads planned. The construction impacts must be contained to the footprint of the infrastructure.	Contractor(s)	Construction
Keep disturbance of indigenous vegetation to a minimum and rehabilitate disturbed areas as quickly as possible	Contractor(s)	Construction

Mitigation: Action/control	Responsibility	Timeframe
<u>All cleared areas must be re-vegetated after construction has been completed.</u>	<u>Contractor(s)</u>	<u>Construction</u>
<u>Any search and rescue operations should be conducted before the end of February for the summer flowering species, and a follow -up should be conducted early June for the winter flowering species.</u>	Contractor(s)	Construction
<u>Employees must be prohibited from harvesting wild plants for any purpose</u>	<u>Contractor(s)</u>	<u>Construction</u>
No importing of soil from areas with alien plants	Contractor(s)	Construction
Internal access roads and cables should be aligned as far as possible along existing linear disturbances, e.g. access road corridors 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(s)	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(s)	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(s)	Construction & Operation
Control any alien plants that become established using registered control methods.	Contractor(s)	Construction & Operation
<u>Cleared alien vegetation must not be dumped on adjacent intact vegetation during clearance but must be temporarily stored in a demarcated area.</u>	<u>Contractor (s)</u>	<u>Construction</u>
<u>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.</u>	<u>Contractor (s)</u>	<u>Construction & Operation</u>
<u>Vegetation clearing should occur in a phased manner in accordance with the construction programme to minimise erosion and/or run-off.</u>	<u>Contractor (s)</u>	<u>Construction</u>
<u>Specific demarcation fences of the Antimima ivori populations are erected prior to construction commencing, as several activities due various constraints, which also includes bird movement require that portions of the no-go area around WTG 17 and the associated underground cable be used.</u>		
<u>Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces shall be re-vegetated or stabilised as soon as is practically possible</u>	<u>Contractor (s)</u>	<u>Construction</u>
Salvaging topsoil:	Contractor(s)	Before and during construction

Mitigation: Action/control	Responsibility	Timeframe
<ul style="list-style-type: none"> » Topsoil must always be salvaged and stored separately from subsoil and lower-lying parent rock or other spoil material. <ul style="list-style-type: none"> ○ Topsoil stripping removed up to 30 cm or less of the upper soils. ○ In cultivated areas, depth of topsoil may increase and needs to be confirmed with the land owner » Prior to salvaging topsoil the depth, quality and characteristics of topsoil should be known for every management area. <ul style="list-style-type: none"> * This will give an indication of total volumes of topsoil that need to be stored to enable the proper planning and placement of topsoil storage. * Different types of topsoil – rocky soils and sands or loams must be stored separately <p>Topsoil should be removed (and stored) under dry conditions to avoid excessive compaction whenever topsoil will have to be stored for longer than one year.</p>		
<p>Storing topsoil:</p> <ul style="list-style-type: none"> » Viability of stored topsoil depends on moisture, temperature, oxygen, nutrients and time stored. » Rapid decomposition of organic material in warm, moist topsoil rapidly decreases microbial activity necessary for nutrient cycling, and reduces the amount of beneficial micro-organisms in the soil. » Stockpile location, if not adjacent to a linear development: <ul style="list-style-type: none"> * At least 50 m from any watering point * Ideally a disturbed but weed-free area » <i>Topsoil is typically stored in berms with a width of 150 – 200 cm, and a maximum height of 2m:</i> <ul style="list-style-type: none"> * Place berms along contours or perpendicular to the prevailing wind direction * Adhere to the following general rule: the larger the pile of topsoil storage needs to be, the shorter should be the time it is stored » Topsoil handling should be reduced to stripping, piling (once), and re-application. Between the stockpiling and reapplication, stored topsoil should not undergo any further handling except control of erosion and (alien) invasive vegetation » Where topsoil can be reapplied within six months to one year after excavation, it will be useful to store the topsoil as close as possible to the area of excavation and re-application, e.g. next to cabling trenches <ul style="list-style-type: none"> * In such case, use one side of the linear development for machinery and access only 	Contractor(s)	Before and during construction

Mitigation: Action/control	Responsibility	Timeframe
<ul style="list-style-type: none"> * Place topsoil on the other/far side of this development, followed by the subsoil (e.g. on geotextile) » In cases where topsoil has to be stored longer than 6 months or during the rainy season, soils should be kept as dry as possible and protected from erosion and degradation by: <ul style="list-style-type: none"> * Preventing puddling on or between heaps of topsoil * Or covering topsoil berms * Preventing all forms of contamination or pollution * Preventing any form of compaction * Monitoring establishment of all invasive vegetation and removing such if it appears * Keeping slopes of topsoil at a maximal 2:1 ratio * Monitoring and mitigating erosion where it appears * Where topsoil needs to be stored in excess of more than 6 months, it is recommended to either cover the topsoil or allow an indigenous grass cover to grow on it – if this does not happen spontaneously, other measures as advised by a specialist should be considered. This must be implemented only after consultation with the ECO. 		
<p>Reapplying topsoil:</p> <ul style="list-style-type: none"> » Spoil materials and subsoil must be back-filled first, then covered with topsoil » Generally, topsoil should be re-applied to a depth equal to slightly greater than the topsoil horizon of a pre-selected undisturbed reference site » The minimum depth of topsoil needed for revegetation to be successful is approximately 20 cm » If the amount of topsoil available is limited, a strategy must be worked out to optimise revegetation efforts with the topsoil available » Reapplied topsoil should be landscaped in a way that creates a variable microtopography of small ridges and valleys that run parallel to existing contours of the landscape. The valleys become catch-basins for seeds and act as run-on zones for rainfall, increasing moisture levels where the seeds are likely to be more concentrated. This greatly improves the success rate of revegetation efforts. » To stabilise reapplied topsoils and minimise raindrop impact and erosion: <ul style="list-style-type: none"> o Use organic material from cleared and shredded woody vegetation where possible o Alternatively, suitable geotextiles or organic erosion mats can be used as necessary <p>Continued monitoring will be necessary to detect any sign of erosion early enough to allow timeous mitigation</p>	Contractor(s)	Before and during construction

Mitigation: Action/control	Responsibility	Timeframe
Re-applied topsoil needs to be re-vegetated as soon as possible, following the specifications of the revegetation and rehabilitation plan (refer to Appendix D)	Contractor(s)	Before and during construction, monitored during operational phase
<u>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 bowzers 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.</u>	Contractor(s)	<u>During construction and rehabilitation</u>
<u>No Exotic plants may be used for rehabilitation purposes; only indigenous plants of the area may be utilised.</u>	Contractor(s)	<u>During construction and rehabilitation</u>

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/ EO 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 used to record complaints received.

OBJECTIVE 10 : Protection of fauna & avifauna

Infrastructure associated with the facility often impacts on birds and animals. New roads constructed will also have a disturbance and habitat destruction impact.

Project component/s	<ul style="list-style-type: none"> » wind turbines and associated laydown areas; » access roads and cabling; » substation; » Overhead power lines; » workshop area; » batching plants; and » temporary laydown areas.
Potential Impact	<ul style="list-style-type: none"> » Vegetation clearance and associated impacts on faunal habitats; and » Disturbance of birds (e.g. destruction of habitat,)
Activity/risk source	<ul style="list-style-type: none"> » Site preparation and earthworks; » Construction-related traffic;

	<ul style="list-style-type: none"> » Foundations or plant equipment installation; and » Mobile construction equipment.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise footprints of habitat destruction; and » To minimise disturbance to resident and visitor faunal and avifaunal species.

Mitigation: Action/control	Responsibility	Timeframe
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(s)	Site establishment & duration of contract.
High traffic areas and buildings such as offices, batching plants, storage areas etc. should where possible be situated in areas that are already disturbed and existing roads and farm tracks should be used where possible.	Contractor(s)	Site establishment & duration of contract.
The minimum footprint areas of infrastructure should be used wherever possible, including road widths and lengths.	Contractor(s)	Site establishment & duration of contract.
Should any animals be found these should be relocated prior to construction, the ECO/ EO should first be consulted to ensure that no permits are required for relocation. If permits are required these must first be obtained.	Contractor(s)	Site establishment & duration of contract.
No poaching or illegal hunting of wildlife on site during construction	<u>Contractor(s)</u>	Site establishment & duration of contract.
<u>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.</u>	<u>Contractor(s)</u>	<u>During construction</u>
<u>All turbine towers, plant / vehicles and or buildings inclusive of windows must be closed when not being occupied</u>	<u>Contractor(s)</u>	<u>During construction</u>
No animals are to be harmed or killed by the Proponent or Contractor(s). Employees should be trained (e.g. during toolbox talks) that poisonous animals should not be killed and if encountered the ECO/ EO should be informed.	Contractor(s)/ ECO/ EO/	Duration of contract
<u>Regarding termites, it was recommended that the applicant 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.</u>	<u>Contractor(s)/ ECO/ EO/</u>	<u>During construction</u>
The ECO/ EO must have the required Competency Certificates, received from the attendance of a Reptile Husbandry and Handling Course as there may be many poisonous snakes to be moved. Alternatively, if any poisonous animals are encountered on site, they should either be allowed sufficient space and time to relocate, or a relevantly qualified person must be contacted to remove/relocate the animal.	Contractor(s)/ ECO/ EO/	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
Active breeding in the immediate surroundings must be monitored during construction by the ECO/EO. Should any bird nests be found that are likely to be disturbed by construction activities, these will not be relocated without first consulting an avifaunal specialist. If nests cannot be relocated, other mitigation measures will be investigated.	Contractor(s)/ ECO/ EO	Site establishment & duration on contract
The construction Phase EO, and the on-site Environmental Manager (or Environmental Site Officer as the case may be) should have sufficient experience and knowledge of local avifauna to identify red data and priority bird species, as well as their nests. The EO and Environmental Manager must then, during audits/site visits, make a concerted effort to look out for such breeding activities of red data species, and such efforts may include the training of construction staff (e.g. in Toolbox talks) to identify red data species, followed by regular questioning of staff as to the regular whereabouts on site of these species. If any nests or breeding locations for these species are located, the avifaunal specialist is to be contacted for further instruction.	Contractor(s)/ EO	Site establishment & duration on contract
Construction phase bird monitoring, in line with applicable guidelines, must be implemented and must include monitoring of all raptor nest sites for breeding success. The main implications of this are that they recommend that VPs be monitored for 18 hours per season (i.e. 72 hours per year) and that a second year of monitoring is recommended should the site pose a significant risk to Verreaux's Eagle and should turbines be proposed in potentially sensitive areas. The results of this fieldwork must also inform whether any additional long-term pre-construction monitoring is warranted to update the avifaunal baseline for operational comparison, and must inform the scope and duration of the monitoring (if required). Updated data sets will allow for more meaningful comparison with operational monitoring data, and the additional monitoring (if required) must also be used to advise the final micro-siting of the layout of the WEF where applicable, prior to any construction taking place.	Contractor(s)/ EO/ Specialist	Site establishment & duration on contract
Following construction, rehabilitation of all areas disturbed (e.g. temporary access tracks and laydown areas) must be undertaken and to this end a habitat restoration plan is to be developed by a specialist and included within the EMPr. (refer to Appendix D for the <u>Revegetation and Rehabilitation Plan</u>).	Contractor(s)/ EO	Site establishment & duration on contract
Attach appropriate (i.e. as advised by an avifaunal specialist) marking devices (BFDs), which may include the need for nocturnal LED ⁶ marking devices, on all spans of any new overhead power lines to increase visibility. The	Contractor(s)/ EO	Site establishment & duration on contract

⁶ LED must be narrow band as per SALT Regulations GN 805.

Mitigation: Action/control	Responsibility	Timeframe
placement, number and model of the BFDs is to be advised by an avifaunal specialist prior to construction, and may include the need for some sections to be marked with solar powered LED devices, suitable to mitigate for collision prone species that regularly in the dark (e.g. flamingos, ducks, geese and cranes).		
Any new overhead power lines must be of a design that minimises electrocution risk by using adequately insulated 'bird friendly' structures, with clearances between live components of 1.8 m or greater and which provides a safe bird perch. A replica or 'mock up' of the exact pole structures (including bend point structures), or at least a 3D model simulation that specifically shows how the jumpers will be placed and insulated, must be examined and approved by the bird specialist in consultation with EWT.	Contractor(s)/ EO	Site establishment & duration on contract
Place power lines underground where possible, unless it is practically impossible to do so due to ecological, geological or topographical considerations, and confirmed by appropriate independent specialists.	Contractor(s)/ EO	Site establishment & duration on contract
Place any new overhead power lines adjacent to existing power line or linear infrastructure (e.g. roads and fence lines) where possible.	Contractor(s)/ EO	Site establishment & duration on contract
Any new overhead lines must avoid avifaunal no-go areas. Where this is practically impossible or ecologically undesirable, the valid reasons thereof must be discussed with the specialist, and the specialist must approve the section of line within any no-go area, as part of the walkthrough and micro-siting process. Should any overhead lines be located in avifaunal no-go areas, appropriate Bird Flight Diverters (BFD) marking devices must be used as referred to below.	Contractor(s)/ EO	Site establishment & duration on contract
Develop and implement a carcass search programme for birds during the first two years of operation, in line with or exceeding the applicable monitoring guidelines. This program must include monitoring of overhead power lines.	Contractor(s)/ EO	Site establishment & duration on contract
<u>Suitable pro-active mitigation be implemented at all turbines within a 5.2 km radius around all Verreux's Eagle nests during daylight hours, once the wind farm commences with operations, to reduce the risk of collisions of Verreux'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>Contractors/ Specialist/ operations manager</u>	Design, Construction and Operations
<u>All internal 33kV cables are placed underground except those sections where, due to ecological, geological or topographical reasons, trenching will not be a practical option, confirmed by appropriate independent specialist.</u>	<u>Contractor(s)/ EO</u>	<u>Design, Construction</u>
<u>The proposed pole designs must be approved by the avifaunal specialist, for those sections where the 33kV cables have to run above-ground, preferably with input</u>	<u>Contractor(s)/ EO</u>	<u>Design, Construction</u>

Mitigation: Action/control	Responsibility	Timeframe
from the Endangered Wildlife Trust, to ensure that the designs are raptor-friendly.		
Bird flight diverters are fitted to all the 33kV overhead lines.	Contractor(s)/ EO	Design, Construction
With regards to 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.	Contractor(s)/ EO/ operations manager	Construction and Operations

Performance Indicator	» No disturbance outside of designated work areas. » Minimised clearing of existing/natural vegetation and habitats for fauna and avifauna. » Limited impacts on faunal species (including avifauna) (i.e. noted/recorded fatalities), especially those of conservation concern.
Monitoring and Reporting	» Observation of vegetation clearing activities by EO throughout construction phase. » Supervision of all clearing and earthworks by EO. » An incident reporting system must be used to record non-conformances to the EMPr. » Public complaints register must be used to record complaints received. » Construction phase monitoring implemented.

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.

- » **Heritage sensitivities:** Eight heritage features were recorded. The heritage features that were recorded consisted of Anglo Boer War (South African War) fortifications, rock art, stone cairns and farm labourer ruins). The rock art site (Feature 1), the stone cairn (Feature 4), the ruin (Feature 6) and four fortifications (Feature 2, 3,5,7 & 8) are all located well away from any development footprint and will not be impacted

on by the proposed wind farm development. It is recommended that the tower and access roads are micro adjusted to have a no development buffer zone of at least 60 m from the heritage features identified. The site must also be demarcated during construction to prevent accidental damage to the site during the construction phase.

- » **Paleontological Heritage sensitivities:** Due to the potential economic as well as geoscientific interest (including possible association with fossil plants), the five uranium anomalies identified on the Remainder of the Farm Gunstfontein 131 should be protected by buffer zones of 60 m radius. The GPS locations of these five anomalies are as follows:

- * Anomaly 169 (Gunstfontein 131): 32° 33' 20" S, 20° 38' 20" E
- * Anomaly 170 (Gunstfontein 131): 32° 35' 09" S, 20° 37' 29" E
- * Anomaly 171 (Gunstfontein 131): 32° 36' 07" S, 20° 38' 08" E
- * Anomaly 172 (Gunstfontein 131): 32° 34' 02" S, 20° 41' 40" E
- * Anomaly 173 (Gunstfontein 131): 32° 34' 56" S, 20° 42' 21" E

A similar 60m radius buffer zone be established to safeguard the association of abundant fossilised plant material with a sizeable body of koffiekliip (rusty-brown ferruginised sandstone) recorded at Loc. 114 (32°33'16.97"S, 20°38'0.73"E) on the western margins of Gunstfontein 131. Please note that the identified anomalies and fossilised plant material are all located well away from any wind farm infrastructure and will not be impacted on by the proposed wind farm development.

Project component/s	<ul style="list-style-type: none"> » Wind turbines; » Access roads and cabling; » Substation; and » Operations and service building area.
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; and » Access road construction activities.
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
The ECO/ EO for the project should be well versed before construction starts on the possible types of heritage sites/materials they may encounter and the procedures to follow when they find sites. They should be trained by the Heritage Specialist to identify, follow the relevant procedure and report to the site manager if sites are found.	Contractor(s) and ECO/ EO	Pre-construction
If a heritage object is found, work in that area (the immediate area affecting the find) must be stopped immediately, and appropriate specialists brought in to assess the site, notify the administering authority of the item/site, and undertake due/required processes.	Proponent / Contractor(s) in consultation with Specialist	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
Turbines, towers and access roads must have a no development buffer zone of at least 60 m from the heritage features identified. The sites must also be demarcated during construction to prevent accidental damage to the site during the construction phase. The stone cairn/possible grave (Feature 4), must be demarcated and fenced off with a perimeter buffer zone of 60m	Contractor(s) in consultation with Specialist	Duration of contract
If concentrations of archaeological materials are exposed during construction then all work must stop for an archaeologist to investigate.	Contractor(s)	Construction
If any human remains (or any other concentrations of archaeological heritage material) are exposed during construction, all work in the immediate area affecting the find, must cease and it must be reported immediately to the <u>Archaeologist and/or the South African Heritage Resources Agency (021 462 4502)</u> , so that a systematic and professional investigation can be undertaken. Sufficient time should be allowed to investigate and to remove/collect such material.	Contractor(s)	Construction
<u>A conservation Management Plan must be implemented to ensure ongoing conservation of identified heritage resources during the life of the development. This report must be submitted to SAHRA and must form part of this EMPr. Refer to Appendix I.</u>	<u>Contractor(s)</u>	<u>Construction</u>
On-site monitoring of excavations deeper than 1m of any infrastructure located within the Abrahamskraal formation must be conducted.	ECO	Construction
The ECO/ EO for the project should be alerted to the potential for, and scientific significance of, new fossil finds during the construction phase of the development. They should familiarise themselves with the sort of fossils concerned through museum displays and accessible, well-illustrated literature.	Contractor(s) and ECO/ EO	Pre-construction/ Construction
<u>Palaeontological Monitoring of the construction phase must be conducted by a suitable qualified Environmental Control Officer, punctuated by regular site visits by a qualified palaeontologist. Proof of training must be presented to SAHRA and regular monitoring reports must be submitted to SAHRA.</u>	<u>Contractor(s) and ECO/ EO</u>	<u>Construction</u>

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/ EO throughout construction phase. » Supervision of all clearing and earthworks. » An incident reporting system must be used to record non-conformances to the EMPr. » Public complaints register must be used to record complaints received.

OBJECTIVE 12 : Minimisation of visual impacts associated with construction

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

Project component/s	<ul style="list-style-type: none"> » Construction site » Transportation of staff and equipment » Wind turbines
Potential Impact	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » The viewing of visual scarring by observers in the vicinity of the facility or from the roads traversing the site.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » 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(s)	Construction
Reduce visual disturbances by minimising areas of surface disturbance, controlling erosion, using dust suppression techniques and restoring exposed soil as close as possible to their original contour and vegetation	Contractor(s)	Construction
Limit access to the construction sites (during both construction and operational phases) along existing access roads as far as possible.	Contractor(s)	Duration of contract
Vehicle movements on local roads must be limited to standard construction operating hours wherever possible to limit noise impacts and dust nuisance.	Contractor(s)	Duration of contract
Times for arrival and departure of heavy vehicles must be co-ordinated as far as possible in order to minimise congestion.	Contractor(s)	Duration of contract
The movement of all vehicles within the site must be on designated roadways.	Contractor(s)	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 and must be managed on an ongoing basis).	Contractor(s)	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(s)	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
Ensure all disturbed areas are appropriately rehabilitated once construction in an area is complete.	Contractor(s)	Duration of construction

Performance Indicator	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » Ensure that mitigation measures are implemented during construction to minimise visual impacts on surrounding communities. » Ensure that aviation warning lights or other measures are installed before construction is completed according to CAA requirements. » Ensure that aviation warning lights or other measures are functional at all times. » Monitoring of rehabilitation activities to ensure appropriate rehabilitation of the site. » An incident reporting system will be used to record non-conformances to the EMPr. » Public complaints register must be used to record complaints received.

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.

Project component/s	<ul style="list-style-type: none"> » Wind turbines; » Concrete batching plant; » Construction camp/ laydown areas; and » Associated infrastructure.
Potential Impact	<ul style="list-style-type: none"> » Release of contaminated water from contact with spilled chemicals; » Generation of contaminated wastes from used chemical containers; » 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	<ul style="list-style-type: none"> » Vehicles associated with site preparation and earthworks; » Power line construction activities; » Packaging and other construction wastes; » Hydrocarbon use and storage ; and » Spoil material from excavation, earthworks and site preparation.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons; » To ensure that the storage and maintenance of machinery on-site does not cause 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
Areas around fuel tanks must be bounded or contained in an appropriate manner as per the requirements of SABS 089:1999 Part 1.	Contractor(s)	Duration of contract
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(s)	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.	Contractor(s)	Duration of contract
Any spills must receive the necessary clean-up action. Bioremediation kits must 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.	Contractor(s)	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(s)	Duration of contract
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, e.g. during emergencies, an appropriate drip tray must be used to contain any fuel or oils.	Contractor(s)	Duration of contract
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations.	Contractor(s)	Duration of contract
Waste disposal records must be available for ECO review at all times.	Contractor(s)	Duration of contract
Construction contractors must provide specific detailed waste management plans/method statements to deal with all waste streams.	Contractor(s)	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(s)	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(s)	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(s)	Duration of contract
Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area.	Contractor(s)	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
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(s)	Duration of contract
Documentation (waste manifest) must be maintained detailing the quantity, nature and fate of any hazardous waste.	Contractor(s)	Duration of contract
An incident/complaints register must be established and maintained on-site.	Contractor(s)	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.	Contractor(s)	Erection: during site establishment Maintenance: for duration of Contract within a particular area.
<u>No dumping or temporary storage of any materials may take place outside designated and demarcated laydown areas, and this must all be located within areas of low environmental sensitivity.</u>	<u>Contractor(s)</u>	<u>Duration of contract</u>
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.	Contractor(s)	Erection: during site establishment Maintenance: for duration of Contract within a particular area.
<u>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.</u>	<u>Contractor(s)</u>	<u>Construction</u>
<u>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 bowzers 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.</u>	<u>Contractor(s)</u>	<u>Construction</u>
Supply waste collection bins at construction equipment and construction crew camps.	Contractor(s)	Erection: during site establishment Maintenance: for duration of Contract within 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(s)	Duration of contract
All stored fuels to be maintained within a bund and on a sealed surface.	Contractor(s)	Duration of contract
Fuel storage areas must be inspected regularly to ensure bund stability, integrity and function.	Contractor(s)	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
Construction machinery must be stored in an appropriately sealed area.	Contractor(s)	Duration of contract
Spilled cement/concrete must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site.	Contractor(s)	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(s)	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(s)	Duration of contract
Any contaminated/polluted soil removed from the site must be disposed of at a licensed hazardous waste disposal facility.	Contractor(s)	Duration of contract
Upon the completion of construction, the area will be cleared of potentially polluting materials.	Contractor(s)	Completion of construction
Supply adequate weather and vermin proof waste collection bins and skips (covered at minimum with secured netting or shade cloth) at site where construction is being undertaken. Separate labelled bins should be provided for general and hazardous waste. As far as possible, provision should be made for separation of waste for recycling.	Contractor(s)	Site establishment, and duration of construction
All work sites must be kept free of waste. No solid waste may be burned or buried on site or disposed of by any other method on site or within quarries or borrows pits. Solid waste (general waste) to be disposed of at the nearest municipal landfill site. Slips of disposal to be retained as proof of responsible disposal	Contractor(s)	Site establishment, and duration of construction
<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 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).</u>	<u>Contractor(s)</u>	<u>Duration of the contract</u>
Liquid waste: No liquid waste, including grey water, may be discharged into any water body or drainage line. All sewage disposal to take place at a registered and operational wastewater treatment works. Slips of disposal to be retained as proof of responsible disposal Hazardous substances and hazardous waste: Ensure compliance with all national, regional and local legislation with regard to the storage, handling and disposal of hydrocarbons, chemicals, solvents and any	Contractor(s) O&M Contractor	During and post construction.

Mitigation: Action/control	Responsibility	Timeframe
other harmful and hazardous substances and materials. The onus is on the Contractor to identify and interpret the applicable legislation. Hazardous waste to be disposed of at a registered h:H or H:H landfill site. Depending on the classification of the waste, a registered service provider with the necessary permits is to collect, transport and dispose of hazardous waste. Proof of appropriate disposal to be provided to the ECO.		
Keep a record of all hazardous substances stored on site for submission to the ECO. Clearly label all the containers storing hazardous waste.	Contractor(s)	Construction
An effective monitoring system must be put in place to detect any leakage or spillage of all hazardous substances during their transportation, handling, installation and storage.	Contractor(s)	Duration of contract
Precautions must be in place to limit the possibility of oil and other toxic liquids from entering the soil or clean stormwater system.	Contractor(s)	Duration of contract
Implement an integrated waste management approach that is based on waste minimisation and incorporates reduction, recycling, re-use and disposal where appropriate.	Contractor(s)	Duration of contract
Upon the completion of construction, the area must be cleared of potentially polluting materials. Spoil stockpiles must also be removed and appropriately disposed of or the material re-used for an appropriate purpose.	Contractor(s)	Completion of construction

Performance Indicator	<ul style="list-style-type: none"> » No chemical spills outside of designated storage areas; » No water or soil contamination by 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. » Spills are sufficiently cleaned and dealt with.
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 must 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 EMP. » Proponent 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, the EIA Report and this EMPr, as well as the requirements of all relevant environmental legislation.

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 Contractor(s) contracts.	Proponent	Tender process
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 or drainage line.	Contractor(s) (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(s) (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(s) (and sub-contractor/s)	Duration of contract
No one must disturb flora or fauna outside of the demarcated construction area/s.	Contractor(s) (and sub-contractor/s)	Duration of contract

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.

The increased presence of people on the site could increase the risk of veld fires, particularly in the dry season.

Project component/s	<ul style="list-style-type: none"> » Wind turbines » 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
No open fires for cooking or heating must be allowed on site.	Contractor(s)	Construction
Provide adequate fire-fighting equipment on-site.	Contractor(s)	Construction
Provide fire-fighting training to selected construction staff.	Contractor(s)	Construction
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. as a result of fires that can be directly attributed to construction activities.	Contractor(s)	Construction

Performance Indicator	<ul style="list-style-type: none"> » Designated areas for fires identified on site at the outset of the construction phase. » Fire-fighting equipment and training provided before the construction phase commences. » Compensation claims settled 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 mostly to works within the site boundary (i.e. the Wind Energy Facility and ancillary infrastructure) and external works outside the site boundary. This section should be read in conjunction with the Traffic Management Plan attached as **Appendix E**.

Project component/s	<ul style="list-style-type: none"> » Wind turbines; » Substation; » Access roads; » Associated infrastructure; and » Construction vehicles
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; » To minimise potential for negative interaction between pedestrians or sensitive users and traffic associated with the facility construction; and » To ensure all vehicles are roadworthy and all materials/equipment are carried appropriately and within any imposed permit/licence conditions.

Mitigation: Action/control	Responsibility	Timeframe
Develop and implement a traffic management plan (Refer to Appendix E).	Contractor(s), (Transportation sub-contractor)	Duration of contract
Existing road infrastructure must be used as far as possible for providing access to the proposed turbine positions. Where no road infrastructure exists, 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.	Contractor(s), (Transportation sub-contractor)	Duration of contract
Internal roads must be located to minimize stream crossings. All structures crossing streams must be located and constructed so that they do not decrease channel stability or increase water velocity.	Contractor(s), (Transportation sub-contractor)	Duration of contract
All relevant permits for abnormal loads must be applied for from the relevant authority.	Contractor(s), (Transportation sub-contractor)	Duration of contract
A designated access (or accesses) to the proposed site must be created to ensure safe entry and exit.	Contractor(s)	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(s), (Transportation sub-contractor)	Duration of contract
Any traffic delays because of construction traffic must be co-ordinated with the appropriate authorities.	Contractor(s)	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). Signage must be maintained on an on-going basis.	Contractor(s)	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
Appropriate maintenance of all vehicles must be ensured.	Contractor(s)	Duration of contract
Signs must be placed along construction roads to identify speed limits, travel restrictions, and other standard traffic control information. 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(s)	Duration of contract
Keep hard road surfaces as narrow as possible.	Contractor(s)	Duration of contract
Construction vehicles carrying material to the site should avoid using roads through densely populated built-up areas.	Contractor(s), (Transportation sub-contractor)	Duration of contract
The movement of all vehicles within the site must be on designated roadways.	Contractor(s)	Duration of contract
All hazardous substances must be transported in accordance with the relevant legislation and regulations.	Contractor(s)	Duration of contract
Road borders should be regularly maintained to ensure that vegetation remains short and that they therefore serve as an effective firebreak (where required).	Contractor(s) in consultation with the ECO	Duration of contract
Roads must be designed so that changes to surface water runoff are avoided and erosion is not initiated.	Contractor(s)	Duration of contract

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 EMPr.

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.

Project component/s	» Concrete batching plant/s
Potential Impact	<ul style="list-style-type: none"> » Dust emissions » Release of contaminated water » Generation of contaminated wastes from used chemical containers » Inefficient use of resources resulting in excessive waste generation
Activity/risk source	<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	» 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(s)	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(s)	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(s)	Construction phase
The concrete batching plant site should demonstrate good maintenance practices, including regular sweeping to prevent dust build-up	Contractor(s)	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(s)	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(s)	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(s)	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(s)	Construction phase
Any liquids stored on site, including admixtures, fuels and lubricants, should be stored in accordance with applicable legislation	Contractor(s)	Construction phase

Mitigation: Action/control	Responsibility	Timeframe
Contaminated stormwater and process wastewater should be captured and recycled where possible. A wastewater collection and recycling system should be designed to collect contaminated water.	Contractor(s)	Construction phase
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(s)	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(s)	Construction phase
Ensure that all practicable steps are taken to minimise the adverse effect of noise emissions. This responsibility includes not only the noise emitted from the plant and equipment but also associated noise sources, such as radios, loudspeakers and alarms	Contractor(s)	Construction phase
Where possible, waste concrete should be used for construction purposes at the batching plant or project site.	Contractor(s)	Construction phase
The batching plant should be monitored by the ECO/EO to ensure that the plant is operating according to its environmental objectives and within legislative requirements.	ECO/EO	Construction phase

Performance Indicator	<ul style="list-style-type: none"> » No complaints regarding dust » No water or soil contamination by chemical spills » No complaints received regarding waste on site or indiscriminate dumping
Monitoring	<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 must be logged. Complaints will be investigated and, if appropriate, acted upon » An incident reporting system must be used to record non-conformances to the EMPr » Proponent or appointed ECO/EO 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 be practically mitigated and managed for the duration of the contract, or for the time period in which that risk will exist 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 and ECO, setting out the plant, materials, labour and method the Contractor(s) proposes using to conduct an activity, in such detail that the Site Manager and ECO is able to assess whether the Contractor(s)'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 and/or ECO.

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, *inter alia*:

- » Site establishment (which explains all activities from induction training to offloading, construction sequence for site establishment and the different amenities 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 (in accordance with the Storm Water Management Plan – Attached as **Appendix E**).
- » 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 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, concrete, 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(s) may not commence the activity covered by the Method Statement until it has been provided to, reviewed and accepted by the Site Manager /Project Manager and/or ECO, except in the case of emergency activities and then only with the consent of the Site Manager. Review and accepted (or approval where required) of the Method Statement will not absolve the Contractor(s) 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 accepted/approved.

The ECO and the EO must monitor the construction activities to ensure that these are undertaken in accordance with the approved Method Statement(s).

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:

- » All employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment. This includes the discussion/explanation of site environmental matters during regular toolbox talks.
- » The content and requirements of Method Statements are to be clearly explained to all plant operators and general workers. All staff acting in a supervisory capacity is to have copies of the relevant Method Statements and be aware of the content thereof.
- » Ensuring that a copy of the EMPr is readily available on-site, and that all site staff are aware of the location and have access to the document.
- » Senior site staff will be familiar with the requirements of the EMPr and the environmental specifications as they apply to the construction of the 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 contractor's 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.
- » All sub-contractors must have a copy of the EMPr and sign a declaration/acknowledgement that they are aware and familiar with the contents and requirements of the EMPr and that they will conduct work in such a manner as to ensure compliance with the requirements of the EMPr. All subcontractors

performing the works should appoint a qualified Environmental Officer for the implementation of this EMPr and other project permits and authorisations.

- » Contractors and main sub-contractors should have a basic training in the identification of archaeological sites/objects, and protected flora and fauna that may be encountered on the site.

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

5.5.1 Environmental Awareness Training

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

5.5.2 Induction Training

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

This induction training should include discussing the Proponent's environmental policy and values, the EA and function of the EMPr, Contract Specifications and the importance and reasons for compliance to these. The induction training must highlight overall do's and don'ts on site and clarify the contractual and legal repercussions of non-compliance (penalty fees will be outlined in the service level agreement between the proponent and the contractor). The non-conformance reporting system must be explained during the induction as well. Opportunity for questions and clarifications must form part of this training. A record of attendance of this training must be maintained by the EO / Environmental Representative on site.

5.5.3 Toolbox Talks

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

5.6. Monitoring Schedule: 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 schedule should be developed and implemented not only to ensure conformance with the condition of 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 independent ECO will be responsible for monitoring (on a monthly basis) although will include others on a needs basis (also refer to section 5.6.1 below). The Site Manager and Proponent's Environmental Manager will ensure that the monitoring is conducted and reported.

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

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

The EO for the Contractor/s performing different aspects of activities on site must be appointed prior to site mobilisation and will be responsible for the day to day implementation of the EMPr and other project permits and authorisations. The Contractor and Proponent's EO will be responsible for weekly reporting to the ECO, Site Manager and Proponent's Environmental Manager.

The 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, DFFE and/or any other monitoring body stipulated by the regulating authorities.

5.6.1 Non-Conformance Reports

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

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

5.6.2 Monitoring Reports

A monitoring report will be compiled by the ECO on a monthly basis and must be submitted to DFFE for their records (Director: Compliance Monitoring). This report should include details of the activities undertaken in the reporting period, any non-conformances or incidents recorded, corrective action required, and details of those non-conformances or incidents which have been closed out. The EO will be responsible for the

weekly reports which will be submitted internally to the Site Manager and Proponent's Environmental Manager which, in addition, will aid the ECO in compiling the monthly monitoring report. The monitoring report must be submitted to the DFFE timeously upon completion thereof.

5.6.3 Audit Reports

The Proponent must ensure that project compliance with the conditions of the Environmental Authorisation (once issued) is audited, and that the audit reports re submitted to the Director: Compliance Monitoring at the DFFE. The environmental audit reports must be compiled in accordance with Appendix 7 of the EIA Regulations, 2014 (as amended) and must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the environmental authorisation conditions as well as the requirements of the approved EMPr. Record relating to monitoring and auditing must be kept on site and made available for inspection to any relevant and competent authority in respect of this development.

5.6.4 Final Audit Report

A final external audit should be conducted following the completion of rehabilitation after The environmental audit reports must be compiled in accordance with Appendix 7 of the EIA Regulations, 2014 (as amended). construction is completed. The audit report must be submitted to the DFFE within 30 days of completion of the audit (i.e. within 30 days of site handover) and within 30 days of completion of rehabilitation activities.

The final environmental audit report must:

- » Be compiled by an independent environmental auditor;
- » Indicate the date of the audit, the name of the auditor and the outcome of the audit;
- » Evaluate compliance with the requirements of the approved EMPr and the EA;
- » Include measures to be implemented to attend to any non-compliances or degradation noted;
- » Include copies of any approvals granted by other authorities relevant to the development for the reporting period;
- » Highlight any outstanding environmental issues that must be addressed, along with recommendations for ensuring these issues are appropriately addressed;
- » Include a copy of the EA and the approved EMPr;
- » Include all documentation such as waste disposal certificates, hazardous waste landfill site licenses etc. pertaining to the EA; and
- » Include evidence of adherence to the conditions of this authorisation and the EMPr where relevant such as training records and attendance registers.

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 (Refer to **Appendix D: Revegetation and Rehabilitation Plan**).

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

OBJECTIVE 1 : 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.

Project component/s	List of project components affecting the objective: <ul style="list-style-type: none"> » Wind energy facility (including substation, temporary access roads, crushing and batch plant areas); » Temporary laydown areas; and » Watercourse crossing, i.e. access roads and culverts.
Potential Impact	<ul style="list-style-type: none"> » Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention.
Activity/risk source	<ul style="list-style-type: none"> » Site preparation and earthworks » Excavation of foundations and trenches » Temporary laydown areas » Temporary access roads/tracks » Other disturbed areas/footprints
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure and encourage site rehabilitation of disturbed areas; 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
Following construction, rehabilitation of all areas disturbed (e.g. temporary access tracks and laydown areas) must be undertaken and to this end a habitat restoration plan is to be developed by a specialist and included within the EMPr (refer to Appendix D).	Contractor(s) and Proponent	Construction & operation
The site rehabilitation programme must be implemented (refer to Appendix D).	Contractor(s) and ECO/EO in consultation with Specialist	Duration of contract
All temporary facilities, equipment and waste materials must be removed from site and appropriately disposed of.	Contractor(s)	Following execution of the works.

Mitigation: Action/control	Responsibility	Timeframe
Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion.	Contractor(s)	Following completion of construction activities in an area.
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 as far as practically possible.	Contractor(s) in consultation with rehabilitation specialist and the landowners.	Following completion of construction activities in an area.
No exotic plants may be used for rehabilitation purposes. Only indigenous plants of the area may be utilised.	Contractor(s)	Construction/ operation
Newly rehabilitated areas must be adequately demarcated and access restricted (specifically vehicular access) until vegetation is established. Appropriate signage must be established and maintained to ensure personnel are aware of these areas.	Contractor(s)	Construction/ operation
Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.	Contractor(s) in consultation with rehabilitation specialist	Post-rehabilitation
On-going alien plant monitoring (as per the Alien invasive Management Plan - refer to Appendix B) and removal should be undertaken on all areas of natural vegetation on an annual basis.	Contractor(s) in consultation with rehabilitation specialist	Post-rehabilitation
All disturbed soil areas (including road and hard stand verges) should be compacted sufficiently to avoid increased burrowing of rodents (which in turn could attract raptors and result in turbine collisions). Disturbed areas should effectively rehabilitated with indigenous grass species as soon as possible.	Contractor(s) in consultation with the ECO/ EO	Following completion of construction activities in an area.

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

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 potential 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. Roles and Responsibilities

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 **O&M Operator** 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 if and when required.
- » Liaise with statutory bodies such as the National and Provincial Department of Forestry, Fisheries and the Environment (DFFE) 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 where required.
- » Liaise with interested and affected parties on environmental issues of common concern.
- » Track and control the lodging of any complaints regarding environmental matters.

7.3. Objectives

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

OBJECTIVE 1 : Securing the site

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

Project component/s	<ul style="list-style-type: none"> » Wind energy facility development footprint; » Access roads; and » Operations and service building.
Potential Impact	<ul style="list-style-type: none"> » Hazards to landowners and public
Activities/risk sources	<ul style="list-style-type: none"> » Uncontrolled access to the wind energy facility and associated infrastructure.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To secure the site against unauthorised entry; 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.	Proponent / O&M Operator	Operation
Post information boards about public safety hazards and emergency contact information.	Proponent / O&M Operator	Operation

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

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

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

Project component/s	<ul style="list-style-type: none"> » Areas requiring regular maintenance; » Route of the security team (if required); » Wind Energy Facility including access roads and laydown areas; » Areas disturbed during the construction phase and subsequently rehabilitated at its completion; and
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	» Watercourse crossings.
Potential Impact	<ul style="list-style-type: none"> » Disturbance to or loss of vegetation and/or habitat. » Alien plant invasion. » Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention.
Activity/Risk Source	» 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 as far as practically possible.	Proponent / O&M Operator	Operation
Existing roads must be maintained to ensure limited erosion and impact on areas adjacent to roadways.	O&M Operator	Operation
An on-going alien plant monitoring and eradication programme must be implemented, where necessary.	Proponent	Operation
A botanist familiar with the vegetation of the area should monitor the rehabilitation success and alien plant removal on an annual basis.	O&M Operator / Specialist	Annual monitoring until successful re-establishment of vegetation in an area
Fire breaks should be established, where appropriate and as discussed with the landowners. Access roads could also act as fire breaks.	Proponent O&M Operator / Specialist	Duration of contract
Vegetation control within the facility should be by manual clearing and herbicides should not be used except to control alien plants in the prescribed manner if necessary.	Proponent O&M Operator / Specialist	Operation
An environmental manager / consultant should be appointed during operation whose duty it will be to minimise impacts on surrounding sensitive habitats	Contractor(s) and Proponent O&M Operator	Operation

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 / consultant. » Regular inspections to monitor plant regrowth/performance of rehabilitation efforts and weed infestation compared to natural/undisturbed areas. » Annual monitoring with records of alien species presence and clearing actions. » Annual monitoring with records of erosion problems and mitigation actions taken with photographs. » If necessary, an on-going alien plant monitoring and removal should be undertaken on an annual basis or as deemed necessary by the Proponent Environmental Manager. This must be determined especially for the first 5 years of the operational phase where re-infestation is the highest, or until deemed unnecessary by a suitably qualified botanist/Proponent Environmental Management.

OBJECTIVE 3 : Protection of avifauna and priority bird species

During operation of the facility, the threat of collision of birds and bats 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, addition nest surveys and pre-construction 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 construction and operation phases of the facility.

Project component/s	<ul style="list-style-type: none"> » Wind energy facility (turbines); and » Associated infrastructure, i.e. overhead power lines
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	<ul style="list-style-type: none"> » Spinning turbine blades; » Unmarked overhead power lines;
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

Mitigation: Action/control	Responsibility	Timeframe
Operation phase bird monitoring, in line with applicable guidelines, must be implemented and must include monitoring of all raptor nest sites for breeding success. The main implications of this are that they recommend that VPs be monitored for 18 hours per season (i.e. 72 hours per year) and that a second year of monitoring is recommended should the site pose a significant risk to Verreaux's Eagle and should turbines be located in potentially sensitive areas.	Specialist	Site establishment & duration on contract
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.	Proponent O&M Operator / Suitably qualified specialist	Operation
A systematic bird monitoring programme should be implemented at this facility once operational, as per the current best practice guidelines.	Proponent O&M Operator in consultation with Specialist	Construction & operation
Review post-construction bird monitoring report on the full year of operational bird monitoring, and integrate findings into operational EMPr and broader mitigation scheme if and where considered necessary.	Advising scientist/biologist/ monitoring agency/avifauna specialist	1 year post-construction
For Avifaunal: Lighting on turbines to be of an intermittent and coloured nature rather than constant white light to reduce the possible impact on the movement patterns of nocturnal migratory species. <u>It should also be noted that</u>	Contractor(s) and Proponent O&M Operator	Construction & operation

Mitigation: Action/control	Responsibility	Timeframe
<u>this will primarily also be guided by CAA requirements for aviation safety.</u>		
Attach appropriate (i.e. as advised by an avifaunal specialist) marking devices (BFDs), which may include the need for nocturnal LED ⁷ marking devices, on all spans of any new overhead power lines to increase visibility. The placement, number and model of the BFDs is to be advised by an avifaunal specialist prior to construction, and may include the need for some sections to be marked with solar powered LED devices, suitable to mitigate for collision prone species that regularly in the dark (e.g. flamingos, ducks, geese and cranes).	Contractor(s) and Proponent O&M Operator	Construction & operation
Any new overhead power lines must be of a design that minimises electrocution risk by using adequately insulated 'bird friendly' structures, with clearances between live components of 1.8 m or greater and which provides a safe bird perch. A replica or 'mock up' of the exact pole structures (including bend point structures), or at least a 3D model simulation that specifically shows how the jumpers will be placed and insulated, must be examined and approved by the bird specialist in consultation with EWT.	Contractor(s) and Proponent O&M Operator	Construction & operation
Develop and implement a carcass search programme for birds as a minimum during the first two years of operation followed by year 5, 10, 15, 20 and 25, in line with or exceeding the applicable South African monitoring guidelines of the time.	Contractor(s) and Proponent O&M Operator	Operation
Construction and operation phase bird monitoring, in line with applicable guidelines, must be implemented and must include monitoring of all raptor nest sites for breeding success.	Contractor(s) and Proponent O&M Operator	Operation
Operational monitoring data (including that from the recommended operational programme for the Gunstfontein WEF) should be made available to appropriate agencies such as Bird Life SA and the Endangered Wildlife Trust, as well as avifaunal specialists through the BARESG, to promote more accurate and detailed cumulative assessments in the future.	Contractor(s) and Proponent O&M Operator	Operation
If unacceptable impacts are observed (in the opinion of the bird specialist after consultation with BLSA, relevant stakeholders and an independent review if required), the specialist should conduct a literature review specific to the impact (e.g. collision and/or electrocution) and provide updated and relevant mitigation options to be implemented. Possible mitigations that may need to be implemented (and should be considered in the project's financial planning) include:	Contractor(s) and Proponent O&M Operator	Operation

⁷ LED lighting (and only if required) must also comply with GN 805 SCAAA regulations to be narrow band or LPS/HPS lighting.

Mitigation: Action/control	Responsibility	Timeframe
<p>Onsite and off-site habitat management. A habitat management plan which aims to prevent an influx/increase in preferred prey items in the turbine area due to the construction and operation activities, while improving raptor habitat and promoting prey availability away from the site.</p> <ul style="list-style-type: none"> - Using deterrent devices (e.g. visual and noise deterrents), deterrent and/or shutdown systems e.g. Automatic bird detectors (e.g. automated camera-based monitoring systems – McClure et al. 2018) if commercially available; or Radar Assisted Shutdown on Demand (RASOD) to reduce collision risk. - Painting a turbine blade to make it more visible (subject to the requisite approvals being obtained from the applicable authorities e.g. CAA and DFFE). Some success has been observed in reducing raptor mortalities in Norway using this method. - Identify options to modify turbine operation (e.g. temporary curtailment or shut-down on demand) to reduce collision risk if absolutely necessary and if other methods have not had the desired results. - Any other acceptable options available at the time. 		
Develop and implement a carcass search programme for birds during the first two years of operation, in line with or exceeding the applicable monitoring guidelines. This program must include monitoring of overhead power lines.	Contractor(s) and Proponent O&M Operator	Operation phase

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 monitor/specialist to monitor turbine field for fatalities. » Operational phase monitoring implemented » Review of bird monitoring report on the full year of post-construction monitoring

OBJECTIVE 4 : 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.

Project component/s	<ul style="list-style-type: none"> » access roads; » substation; » wind turbines; and » associated infrastructure
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
A post-construction bat monitoring by an independent monitor should take place for at least two years after operation has commenced.	Proponent	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.	Proponent O&M Operator and specialist	Operational Phase

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	» Environmental monitor/specialist to monitor turbine field for fatalities.

OBJECTIVE 5 : 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", unless a deviation is issued. 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. The Gunstfontein Wind Energy Facility will have synchronous flashing lights on the turbines representing the outer perimeter of the facility and Pilot Activated Lighting (PAL) is being investigated to further reduce impact in line with CAA requirements. In this manner less warning lights will be utilised to delineate the facility as one large obstruction and will only light up for a restricted amount of time as advised by CAA, thereby lessening the potential visual impact. The regulations for the CAA's *Marking of Obstacles* should be strictly adhered too, as the failure of complying with these guidelines may result in the Proponent 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 25km from the closest Gunstfontein turbine. The SALT relies on keeping ambient lighting levels to a minimum in order to maximise its operational potential. SALT are being engaged with to ensure compliance with the Regulation GN 805 of May 2021.

Project component/s	List of project components affecting the objective: » Wind energy facility (including access roads and turbines); and » Associated infrastructure
Potential Impact	» Risk to aircraft in terms of the potential for collision; and » Enhanced visual intrusion.
Activity/risk source	» Size/scale of turbines » Associated lighting » Wind turbines and other infrastructure » Access roads » Other associated 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 <u>and complies with the SALT Regulation GN 805 of May 2019;</u> and » Minimise contrast with surrounding environment and visibility of the turbines to humans.

Mitigation: Action/control	Responsibility	Timeframe
Aviation warning lights must be mounted on turbine hub or such measures specified by the Civil Aviation Authority consent.	Proponent / O&M Operator	Operation and maintenance
Ensure that proper planning is undertaken regarding the placement of lighting structures for the turbines and ancillary buildings.	Proponent / O&M Operator	Design
Maintain the general appearance of the facility in an aesthetically pleasing way.	Proponent / O&M Operator	Operation and maintenance
Undertake regular maintenance of light fixtures.	Proponent /	Operation and maintenance

Mitigation: Action/control	Responsibility	Timeframe
	O&M Operator	

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

OBJECTIVE 6 : 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.

Project component/s	» Wind energy facility (including access roads).
Potential Impact	<ul style="list-style-type: none"> » Increased noise levels at potentially sensitive receptors; » Changing ambient sound levels could change the acceptable land use capability; and » Disturbing character of sound.
Activity/risk source	» Operation of wind turbines.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » 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
If required, additional noise monitoring points at a complainant that registered a valid and reasonable noise complaint relating to the operation of the facility	Proponent/ O&M Operator / Acoustical Consultant / Approved Noise Inspection Authority	Operation

Performance Indicator	» Ensure that the change in ambient sound levels (L_{Aeq}) as experienced by Potentially Sensitive Receptors is less than 75dBA.
Monitoring and Reporting	» 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.

OBJECTIVE 7 : Appropriate handling and management of hazardous substances and waste

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

Project component/s	List of project components affecting the objective: » Wind turbines; and » Associated infrastructure.
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; 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.	Proponent	Operation
Storage areas for hazardous substances must be appropriately sealed and bunded.	Proponent / O&M Operator	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.	Proponent	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.	O&M Operator	Operation and maintenance
Waste handling, collection and disposal operations must be managed and controlled by a waste management contractor.	Proponent / O&M Operator / 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 or a licensed contractor should be appointed to collect and dispose of used oil. » Waste must be stored and handled according to the relevant legislation and regulations.	Proponent / O&M Operator	Operation

Mitigation: Action/control	Responsibility	Timeframe
General waste must be recycled where possible or disposed of at an appropriately licensed landfill.	Proponent / O&M Operator	Operation
Hazardous waste (including hydrocarbons) and general waste must be stored and disposed of separately.	Proponent / O&M Operator	Operation
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	O&M Operator/ waste management contractor	Operation
No waste may be burned or buried on site.	Proponent / O&M Operator	Operation

Performance Indicator	<ul style="list-style-type: none"> » No complaints received regarding waste on site or dumping; » Internal site audits identifying that waste segregation, recycling and reuse is occurring appropriately; » Provision of all appropriate waste manifests; and » No contamination of soil or water.
Monitoring and Reporting	<ul style="list-style-type: none"> » Waste collection must be monitored internally on a regular basis . » Waste documentation must be completed and 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 8 : 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 - 25 years.

Project component/s	<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 as far as possible.
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.	Proponent / O&M Operator	Identify members during construction
Develop a training and skills transfer programme for the operational phase for local personnel.	Proponent / O&M Operator	Operations

Performance Indicator	<ul style="list-style-type: none"> » Public exposure to the project. » Meeting with Local Municipality; and » Training and skills development programme developed and designed before construction phase completed.
Monitoring and Reporting	<ul style="list-style-type: none"> » Indicators listed above must be met for the operational phase.

OBJECTIVE 9 : 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.

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.	Proponent / O&M Operator	Operation
Join local Fire Protection Association, should there be one in existence.	Proponent / O&M Operator	Operation
Provide fire-fighting training to selected operation and maintenance staff.	Proponent / O&M Operator	Operation
Ensure that appropriate communication channels are established to be implemented in the event of a fire.	Proponent / O&M Operator	Operation
Fire breaks should be established where and when required in consultation with the landowners. 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.	Proponent / O&M Operator	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.	Proponent / O&M Operator	Operation

Mitigation: Action/Control	Responsibility	Timeframe
Contact details of emergency services should be prominently displayed on site.	Proponent / O&M Operator	Operation
Performance Indicator	<ul style="list-style-type: none"> » Fire-fighting equipment and training provided before the construction phase commences. » Appropriate fire breaks in place. 	
Monitoring and Reporting	<ul style="list-style-type: none"> » Proponent must monitor indicators listed above to ensure that they have been met. 	

OBJECTIVE 10: 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.

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.	Proponent / O&M Operator	Operation
Vehicle movement to and from the site should be minimised as far as possible.	Proponent / O&M Operator	Operation
Local roads should be maintained to keep the road surface up to a reasonable standard.	O&M Operator	Operation
Limit the development of new access roads on site.	O&M Operator	Operation
Ensure on-going communication with the landowners of the site in order to ensure minimal impact on farming activities.	Proponent / O&M Operator	Operation

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"> » Proponent 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 - 25 years (with maintenance). Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life. It is most likely that decommissioning activities of the infrastructure of the facility would comprise the disassembly and replacement of the turbines with more appropriate technology/infrastructure available at that time. The relevant mitigation measures contained under the construction section should be applied during decommissioning and therefore is not repeated in this section. It must be noted that decommissioning activities will need to be undertaken in accordance with the relevant legislation applicable at that time, which may require this section of the EMP to be revisited and amended.

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

The wind (turbine and tower sections) of the proposed facility will be disassembled once it reaches the end of its economic lifespan. A large crane would be required for disassembling the turbine and tower sections. Once disassembled, the components will be reused, recycled, or disposed of in accordance with regulatory requirements at the time (such as NEMA / NEM:WA currently). All parts of the turbine would be considered reusable or recyclable except for the blades.

8.3 Rehabilitation of the Site

In order to minimise the extent of rehabilitation activities required during the decommissioning phase, the project Proponent must ensure that constant effort is applied to rehabilitation activities throughout the construction, operation and maintenance phases of the project.

In decommissioning of the facility the Proponent must ensure that:

- » All sites, not already vegetated, are to be vegetated as soon as possible after operation ceases with species appropriate to the area.
- » Any fauna encountered during decommission should be removed to safety by a suitably qualified person.
- » All structures, foundations (to at least 750mm below ground level) and sealed areas are demolished, removed and waste material disposed of at an appropriately licensed waste disposal site.
- » All access/service roads not required to be retained by landowners are closed and fully rehabilitated.
- » All vehicles to adhere to low speed limits (40km/h max) on the site, to reduce risk of faunal collisions as well as reduce dust.
- » All disturbed areas are compacted, sloped and contoured to ensure drainage and runoff and to minimise the risk of erosion.
- » All rehabilitated areas are monitored for erosion.

- » Components of the facility are removed from the site and disposed of appropriately.
- » Retrenchments should comply with South African Labour legislation of the day.

The section on Rehabilitation (Chapter 6) is also relevant to the decommissioning of sections of the proposed Project and must be adhered to.

OBJECTIVE 1 : To avoid and or minimise the potential environmental and social impacts associated with the decommissioning phase

Project component/s	<ul style="list-style-type: none"> » Wind turbines; » Substation; and » Associated infrastructure.
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.	O&M Operator	Decommissioning.
Proponent 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.	Proponent	Decommissioning
Rehabilitation should start immediately after decommissioning is completed.	Proponent / O&M Operator / Contractor	Decommissioning
Re-vegetation specifications to be developed.	Proponent / O&M Operator / 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.	O&M Operator / 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.	O&M Operator / Contractor	Decommissioning
The most suitable seed mix for disturbed areas to be used in rehabilitation would include indigenous species.	O&M Operator / 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.	O&M Operator / Contractor	Decommissioning
Rehabilitation measures for the site are to include the following: » Re-contouring Subsoil stockpiles should be used to re-contour construction affected areas. The Contractor shall restore the profile, soil	Proponent and O&M Operator / Contractor	Decommissioning

Mitigation: Action/control	Responsibility	Timeframe
<p>condition and landform to as close as possible state to the pre-construction state.</p> <p>» Scarification and ripping</p> <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> <p>» <u>The specialist should be consulted regarding specialist with particularly reference to seeding and fertilization.</u></p> <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> <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 Proponent prior decommissioning of works. Refer to the Appendix D.</p>		
The Contractor shall maintain rehabilitated areas free of weeds and invader plants until the end of the Defects Notification Period applicable to rehabilitation. Control of weeds and invader plants must be done in accordance with the specifications stipulated in the CARA.	O&M Operator / Contractor	Decommissioning
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.	O&M Operator / 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>	O&M Operator / Contractor	Decommissioning

Performance Indicator	<p>» South African Labour legislation at the relevant time; and</p> <p>» Successful re-vegetation and rehabilitation of the site</p>
Monitoring	Monitoring of Rehabilitation by Project Proponent & Rehabilitation Close-Out Report.

