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# **GUNSTFONTEIN WIND ENERGY FACILITY, NEAR SUTHERLAND, NORTHERN CAPE PROVINCE**

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## **CONSTRUCTION & OPERATION ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)**

**DEA REFERENCE: 14/12/16/3/3/2/826**

**REVISION 1**

**Submitted as part of the EA Amendment Motivation Report  
July 2019**

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## PROJECT DETAILS

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<b>DEA Reference No.</b>	: 14/12/16/3/3/2/826
<b>Title</b>	: Environmental Management Programme: Gunstfontein Wind Energy Facility, Northern Cape Province – Revision 1
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<b>Client</b>	: Gunstfontein Wind Farm (Pty) Ltd
<b>Report Status</b>	: EMPr submitted as part of the Environmental Impact Assessment Report
<b>Revision</b>	: 1

**When used as a reference this report should be cited as:** Savannah Environmental (2019) Environmental Management Programme: Gunstfontein Wind Energy Facility near Sutherland, Northern Cape Province

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## DEFINITIONS AND TERMINOLOGY

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**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 environmental management plan or any other appropriate environmental instruments introduced by legislation.

**Environmental Impact:** An action or series of actions that have an effect on the environment.

**Environmental impact assessment:** Environmental Impact Assessment (EIA), as defined in the NEMA EIA Regulations and in relation to an application to which scoping must be applied, means the process of



collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.

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

**Environmental management 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 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 the 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 – 120 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 120 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.
- » **Perennial<sup>1</sup> 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.

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

## **ABBREVIATIONS AND ACRONYMS**

DEA	National Department of Environmental Affairs
DWS	Department of Water and Sanitation
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 <sup>2</sup>	Square kilometres
kV	Kilovolt
m <sup>2</sup>	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

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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”<sup>2</sup>. 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.

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<sup>2</sup> 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 and permits (once issued), as well as with obligations emanating from all relevant environmental legislation. This obligation is partly met through the development of the EMPr, and the implementation of the EMPr through its integration into the contract documentation for activities associated with both construction and operation. Since this EMPr is part of the EIA process undertaken for the proposed wind energy facility, it is important that this guideline document be read in conjunction with the Final Scoping Report (October 2015) and EIA Report (April 2016). 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) 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 (Condition 18), and must be implemented and strictly enforced. This revised EMPr forms part of an EA amendment application for the project and includes additional mitigation measures as required by the specialist team (as detailed in the Amendment Motivation Report compiled in May 2019).

This amendment entails an updated turbine model for the project and is proposing the following:

1. An increase to the rotor diameter for each wind turbine from the authorised diameter of up to 140m, to up to 180m;
2. An increase in hub height from up to 120m, to a range of up to 150m;

3. Update the layout as required based on the revised turbine numbers and turbine specifications;
4. Amendment to site access co-ordinates:

It is requested that the site access co-ordinates (as specified on page 6 of the EA) is to be amended:

From:

Access to site: 32°32'12.91" S, 20°39'06.97" E

To:

Site access point 1: 32°32'32.67" S, 20°39'40.95" E

Site access point 2: 32°34'56.62" S, 20°42'59.77" E

And it is requested that the description of the technical details of the facility on page 7 of the EA be amended

From:

Site access: Site access will be via a gravel road which branches off of the R354. The access point is located approximately 2.0-2.5km from the R354 turn-off to Klein Roggeveld.

To:

Site access will be via a gravel road which branches off of the R354. Two access points are proposed approximately 2.0-2.5km and approximately 10.5-11.0km from the R354 turn-off to Klein Roggeveld.

5. It is requested that the following conditions be removed from the Environmental Authorisation, since the numbering of turbines has been updated in the amended layout and the following conditions are no longer relevant:
  - Condition 2: The following turbine positions are hereby approved, i.e. 1-13, 19-22, 25-29, 38-43, 48-54, 57-67
  - Condition 3: The following turbine positions is not approved; i.e. 14-18, 23, 24, 30-37, 44-47, 55, 56 and 68 and does not form part of the development
  - Condition 41: The underground MV line route linking turbine 40 to turbine 49 is not approved
  - Condition 130: The following turbine positions are hereby approved, i.e. 1-13, 19-22, 25-29, 38-43, 48-54, 57-67
  - Condition 131: The following turbine positions are excluded from this environmental authorisation: turbine positions 14-18, 23, 24, 30-37, 44-47, 55, 56 and 68.

6. Amendment of Condition 42 of the EA:

from:

"The underground MV line and overhead MV line linking turbine 08 to turbine 11 is not approved"

To:

"The underground MV line and overhead MV line linking turbine 08 to turbine 11 (as shown on the layout plan submitted with the final EIR report, dated April 2016) is not approved".

7. Amendment of Condition 51 of the EA:

from:

"Condition 51: The area identified as "high sensitive escarpment" by the Environmental Sensitivity and Final Optimised Layout Map (Mitigation Strategy) received by the Department on 29 June 2016 is regarded as a "no-go" area."

To:

Areas identified as high and very high ecological sensitivity in the Environmental Sensitivity Map (Refer to Figure 9.1 in the Motivation report) be regarded as no-go areas for turbines.

It is important to note that the high sensitivity areas are no-go for turbines only, not for associated infrastructure such as roads.

8. Amendment of Condition 27 of the EA (in order to align the Environmental Authorisation with the current EIA Regulations):

From:

Condition 27: The holder of the authorisation may apply for an amendment of an EMPr, if such amendment is required before an audit is required. The holder must notify the Department of its intention to amend the EMPr at least 60 days prior to submitting such amendments to the EMPr to the Department for approval. In assessing whether to grant such approval or not, the Department will consider the processes and requirements prescribed in Regulation 37 of GNR 982.

To:

The holder of the authorisation may apply for an amendment of an EMPr, if such amendment is required before an audit is required. In assessing whether to grant such approval or not, the Department will consider the processes and requirements prescribed in Regulation 37 of GNR 982

9. Amendment of Condition 123 of the EA:

From:

Pre-construction archaeological monitoring is required. The appointed archaeologist must keep a list documenting all identified farm infrastructure.

To:

Pre-construction archaeological walkthrough is required of the final layout. A report detailing the results of the walk-down must be submitted to SAHRA for comment. The holder must keep a list documenting all features of archaeological significance, identified by the archaeologist, which may be impacted by the development and which must be demarcated as no-go areas.

As required in terms of Regulation 32(1)(a)(iii), consideration was given to the requirement for additional measures to ensure avoidance, management and mitigation of impacts associated with the proposed change in the project details. From the specialist inputs provided into the amendment motivation, additional mitigation measures have been recommended. These additional mitigation measures have been shown in underlined text in this EMPr, to illustrate which measures are novel inclusions and relate to the 2019 amendment only.

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.

## CHAPTER 2: PROJECT DETAILS

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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 optimised final layout of the wind turbines and associated infrastructure (i.e. after implementing suggested mitigation) are shown on **Figure 2.1** (also refer to **Appendix A**).

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. The proposed area for the development of the Gunstfontein Wind Energy Facility (~12 000 ha in extent) included four farm portions: Portion 1 and the Remainder of the farm Gunstfontein 131.

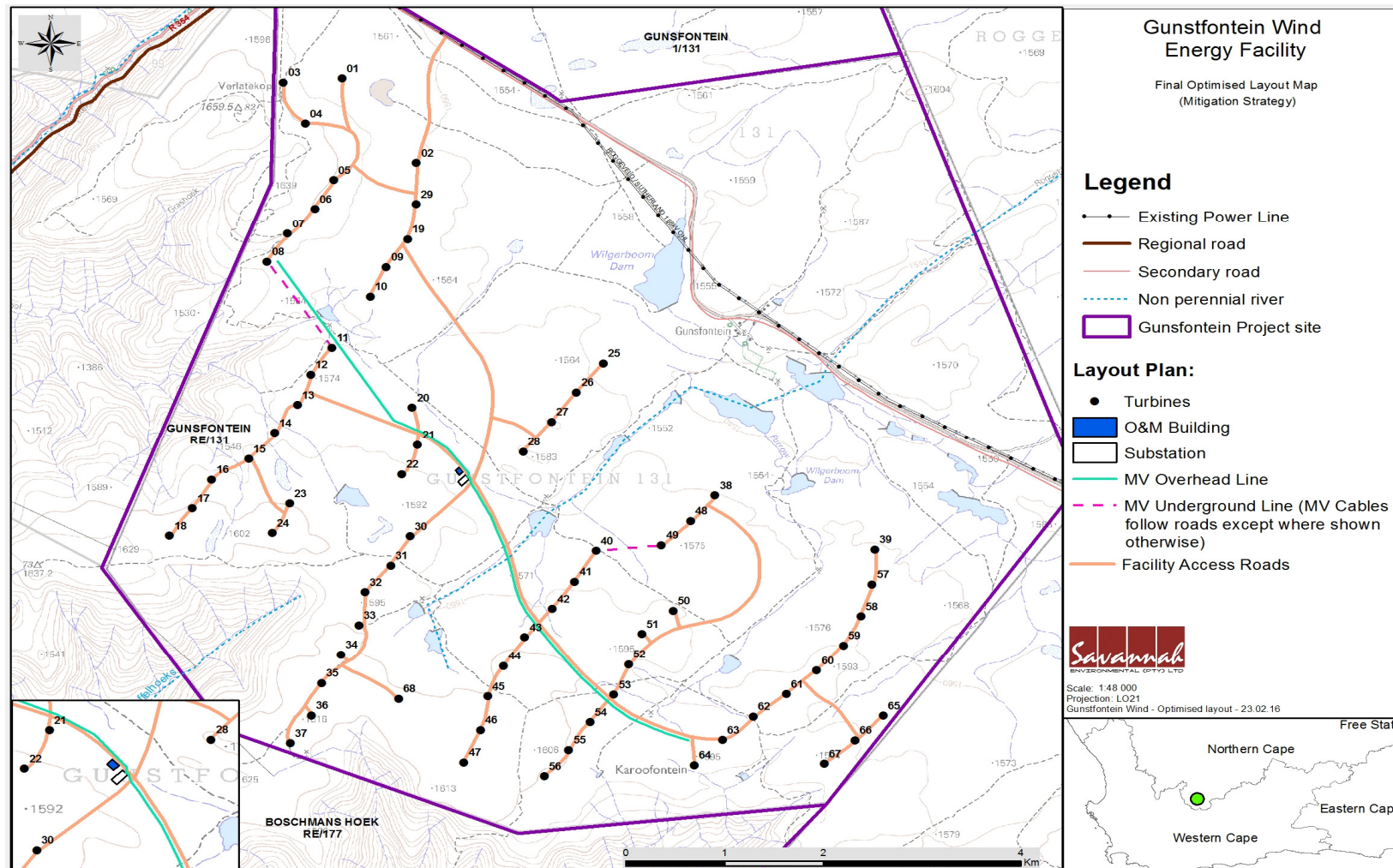
In order to assess the impacts associated with the proposed Gunstfontein Wind Energy Facility, it is necessary to understand the extent of the affected area. The development footprint area for the Gunstfontein Wind Farm site to be occupied by turbines and associated infrastructure considered in the EIA is Portion 1 and the Remainder of the Farm Gunstfontein 131.

The project will include the following infrastructure<sup>3</sup>:

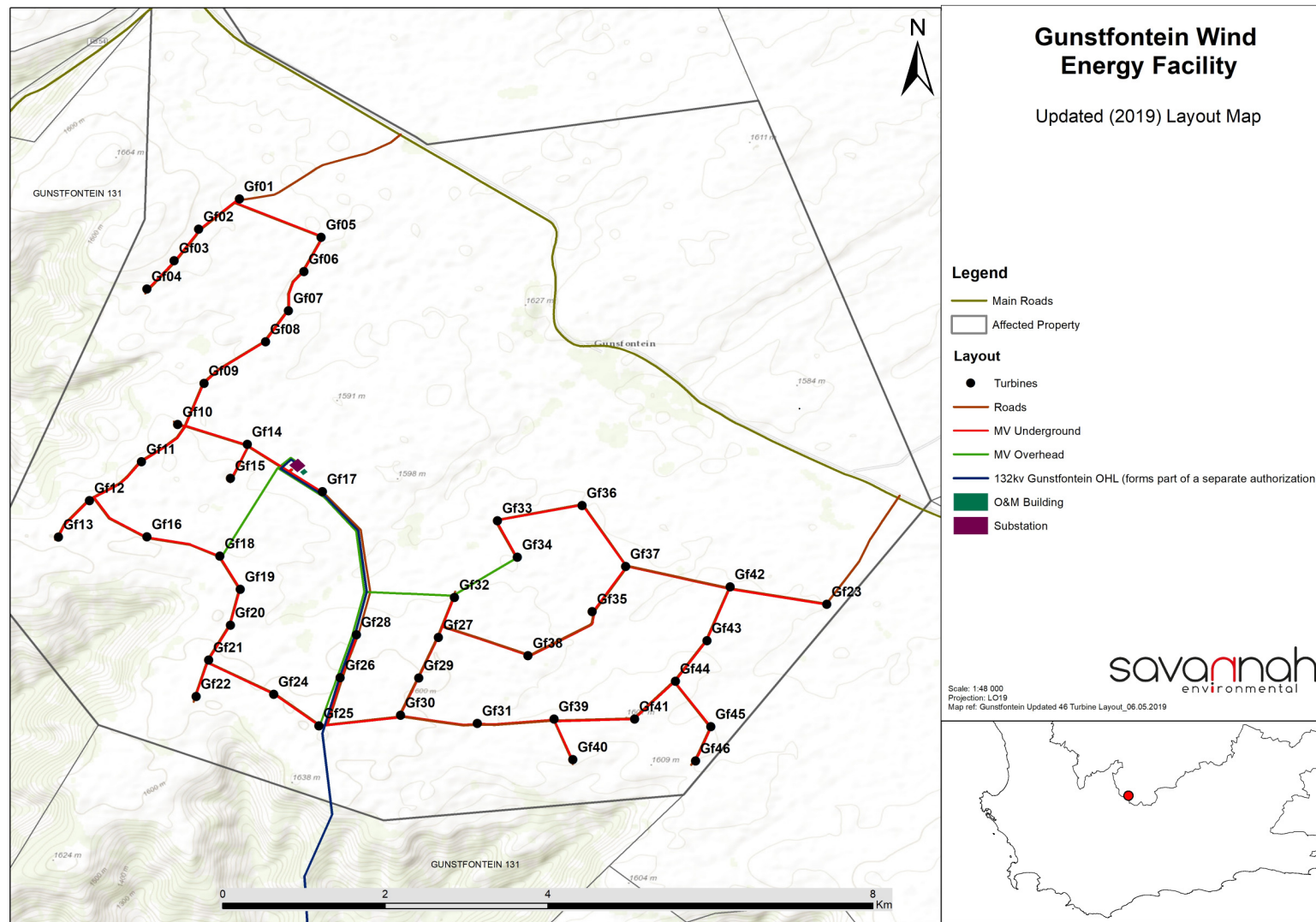
- » Up to 46 wind turbines, each up to 6.5 in capacity, subject to a 200MW cap on contracted capacity. The hub height of each turbine will be up to 150 metres, and the rotor diameter up to 180 metres.
- » Permanent concrete foundations (22 m x 22 m x 25 m) to support the turbines, and crane pad/laydown areas (50 m x 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 (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; and
- » Temporary construction compound and temporary site offices.

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<sup>3</sup> This project description has been updated to reflect the proposed amendments applied for



**Figure 2.1:** Optimised Layout for the Wind Energy Facility, as assessed within the EIA



**Figure 2.1:** Updated wind farm layout (2019)



## 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
<b>Planning</b>		
Conduct surveys	<ul style="list-style-type: none"> <li>» Geotechnical survey by geotechnical engineer</li> <li>» Site survey and confirmation of the turbine micro-siting footprints</li> <li>» Survey of selected MV underground and overhead power line routes between the turbines</li> <li>» Survey of internal access routes and watercourse crossings</li> <li>» Environmental walk-through surveys</li> </ul>	<ul style="list-style-type: none"> <li>» Surveys to be undertaken prior to initiating construction.</li> </ul>
<b>Construction</b>		
Establishment of access roads to and within the site	<ul style="list-style-type: none"> <li>» Upgrade access/haul roads to the site</li> <li>Establish internal access roads: up to 8 m wide permanent roadway within the site between the turbines for use during construction and operation phase.</li> </ul>	<ul style="list-style-type: none"> <li>» 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.</li> <li>» 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.</li> <li>» 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, heritage and avifaunal specialists).</li> </ul>
Undertake site preparation	<ul style="list-style-type: none"> <li>» Site establishment of offices/ workshop with ablutions and stores, contractors yards</li> <li>» Establishment of internal access roads (permanent and temporary roads)</li> </ul>	<ul style="list-style-type: none"> <li>» 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.</li> </ul>



Main Activity/Project Component	Components of Activity	Details
	<ul style="list-style-type: none"> <li>» Clearance of vegetation at the footprint of each turbine</li> <li>» Excavations for foundations</li> </ul>	
Establishment of lay down areas on site	<ul style="list-style-type: none"> <li>» Permanent lay down areas (footprint 50m x 25m) at each turbine position for the storage and assembly of wind turbine components and accommodation of construction and crane lifting equipment.</li> <li>» Construction site office</li> </ul>	<ul style="list-style-type: none"> <li>» 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.</li> <li>» Temporary storage areas will be required to be established for the normal civil engineering construction equipment which will be required on site.</li> <li>» 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.</li> </ul>
Construct wind turbine foundations	<ul style="list-style-type: none"> <li>» Turbine foundations will be up to 22m x 22m. Foundation holes will be excavated to a depth of approximately 4m-6m, depending on the underlying geotechnical conditions on site</li> </ul>	<ul style="list-style-type: none"> <li>» 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)).</li> <li>» Safety barriers will be erected around open excavations where necessary.</li> </ul>
Establishment of onsite batching plants	<ul style="list-style-type: none"> <li>» A batching plant will be required for construction covering approximately 50m x 50m</li> </ul>	<ul style="list-style-type: none"> <li>» Batching plant equipment will need to be installed</li> <li>» A small office may be necessary</li> <li>» A lay down area will need to accommodate aggregate material for batching.</li> </ul>
Transport of components and equipment to site	<ul style="list-style-type: none"> <li>» Trucks will be used to transport all components to site:</li> <li>* 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.</li> <li>* The normal civil engineering construction equipment for the civil</li> </ul>	<ul style="list-style-type: none"> <li>» Turbine units consist of a tower comprised of a number of segments, a nacelle, rotor and three blades.</li> <li>» 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,</li> </ul>

Main Activity/Project Component	Components of Activity	Details
	<p>works (e.g. excavators, trucks, graders, compaction equipment, cement/concrete mixers, etc.).</p> <ul style="list-style-type: none"> <li>* Components required for the establishment of the MV overhead power line (including towers and cabling).</li> <li>* Ready-mix concrete trucks for, <i>inter alia</i>, turbine and building foundations.</li> </ul>	<p>telephone lines etc.) and protection of road-related structures (bridges, culverts, portal culverts, retaining walls etc.) as a result of abnormal loading. The equipment will be transported to the site using appropriate National and Provincial routes, and the dedicated access/haul road to the site itself.</p> <ul style="list-style-type: none"> <li>» It is estimated that approximately 10-14 trucks will be used for the transport of each turbine.</li> </ul>
Construct Substation and ancillary infrastructure.	<ul style="list-style-type: none"> <li>» A 132 kV substation complex (120m x 120m) will be required to facilitate grid connection to the Soetwater Switching Substation</li> <li>» Substation components</li> <li>» Security fencing around high-voltage (HV) Yard</li> <li>» Workshop</li> <li>» Temporary site offices</li> <li>» Operation and Maintenance building(s)</li> </ul>	<ul style="list-style-type: none"> <li>» Will require the clearing of vegetation and levelling of the development site and the excavation of foundations prior to construction.</li> <li>» A lay down area for building materials and equipment associated with these buildings will also be required.</li> <li>» The substation will be constructed within a high-voltage (HV) yard footprint of up to 14 400 m<sup>2</sup>. A further up to 12 000m<sup>2</sup> may be needed for associated buildings and parking.</li> <li>» The substation would be constructed in the following simplified sequence: <ul style="list-style-type: none"> <li>* Step 1: Survey of the site</li> <li>* Step 2: Site clearing and levelling and construction of access road to substation sites</li> <li>* Step 3: Construction of terrace and foundations</li> <li>* Step 4: Assembly, erection and installation of equipment</li> <li>* Step 5: Connection of conductors to equipment</li> <li>* Step 6: Rehabilitation of any disturbed areas and protection of erosion sensitive areas.</li> </ul> </li> </ul>
Erect turbines	<ul style="list-style-type: none"> <li>» Large lifting crane used for lifting of large, heavy components</li> <li>» A small crane for the assembly of the rotor.</li> </ul>	<ul style="list-style-type: none"> <li>» The large lifting crane will lift the tower sections into place, assisted by the smaller crane.</li> <li>» The nacelle, which contains the gearbox, generator and yawing mechanism, will then be placed onto the top of the assembled tower.</li> <li>» 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.</li> </ul>

Main Activity/Project Component	Components of Activity	Details
		<ul style="list-style-type: none"> <li>» 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.</li> </ul>
Medium voltage cabling between the turbines to the on-site substation	<ul style="list-style-type: none"> <li>» Wind turbines</li> <li>» Medium Voltage (MV) underground and overhead power lines connecting each turbine to the substation</li> </ul>	<ul style="list-style-type: none"> <li>» The installation of underground cables will require the excavation of trenches, approximately 1m – 2m in depth within which these cables can then be laid.</li> <li>» The underground cables would follow the internal access roads as far as reasonably possible.</li> <li>» The MV overhead power lines will be constructed by placing pylons in more disturbed areas and avoiding any sensitive areas identified in the EIA Process.</li> <li>» Where underground cabling is not practical or environmentally sensible (e.g. in rocky area where blasting would be required), cabling would be above ground, suspended between ~8m high pylons at ~60m centres.</li> </ul>
Commissioning of the facility	<ul style="list-style-type: none"> <li>» Wind energy facility commissioning</li> </ul>	<ul style="list-style-type: none"> <li>» 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.</li> <li>» 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.</li> </ul>
Undertake site rehabilitation	<ul style="list-style-type: none"> <li>» Remove all construction equipment from the site</li> <li>» Rehabilitation of temporarily disturbed areas where practical and reasonable</li> </ul>	<ul style="list-style-type: none"> <li>» 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.</li> </ul>
<b>Operation</b>		
Operation	<ul style="list-style-type: none"> <li>» Operation of turbines within the wind energy facility</li> </ul>	<ul style="list-style-type: none"> <li>» Once operational, the wind energy facility will be monitored remotely. Based on information provided by the Proponent, the project will employ between 12 and 17 permanent employment opportunities as well as provide for further shorter term contract work. 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.</li> <li>» Each turbine in the facility will be operational, except under circumstances of mechanical breakdown, extreme weather conditions or maintenance</li> </ul>

Main Activity/Project Component	Components of Activity	Details
		activities.
Maintenance	<ul style="list-style-type: none"> <li>» Oil and grease – turbines</li> <li>» Transformer oil – substation</li> <li>» Waste product disposal</li> </ul>	<ul style="list-style-type: none"> <li>» 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.</li> <li>» The turbine infrastructure is expected to have a lifespan of approximately 20 - 25 years, with maintenance.</li> </ul>
<b>Decommissioning</b>		
Site preparation	<ul style="list-style-type: none"> <li>» Confirming the integrity of the access to the site to accommodate required equipment and lifting cranes.</li> <li>» Preparation of the site (e.g. lay down areas, construction platform)</li> <li>» Mobilisation of construction equipment</li> </ul>	<ul style="list-style-type: none"> <li>» 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.</li> </ul>
Disassemble and remove existing turbines	<ul style="list-style-type: none"> <li>» A large crane will be used to disassemble the turbine and tower sections.</li> </ul>	<ul style="list-style-type: none"> <li>» Turbine components would be reused, recycled or disposed of in accordance with regulatory requirements.</li> <li>» 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).</li> </ul>

## 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 1600m 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) 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.

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 homogenously 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 Verreaux's Eagle for which Rock Hyrax is considered its main prey. Additionally a potential Verreaux's 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

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.

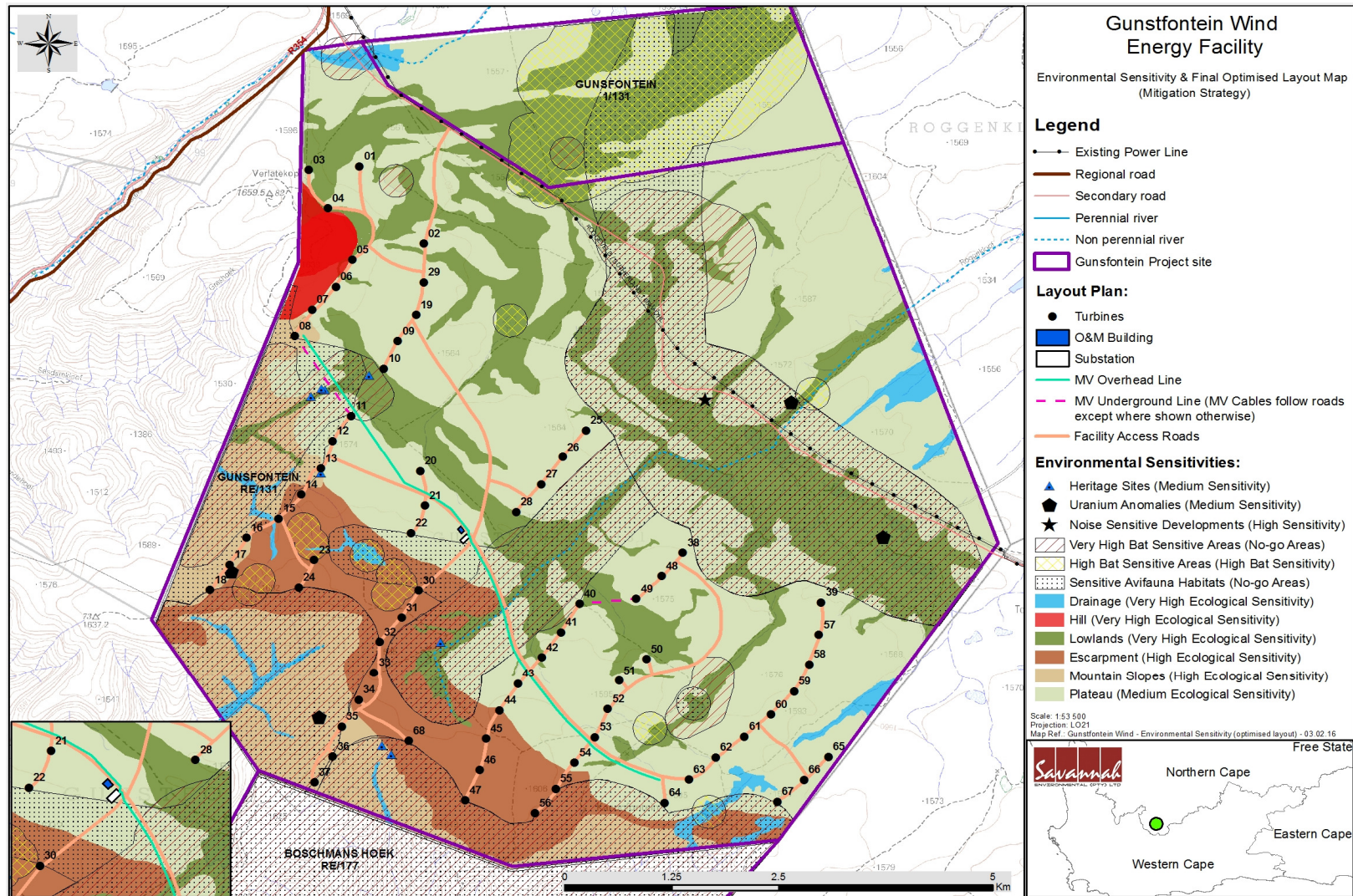
In addition, the amended wind turbine positions considered avoids all identified avifaunal exclusion zones and areas of high sensitivity. An operational-phase bird monitoring programme was also recommended by the avifaunal specialist (in line with the guidelines applicable at the start of the operational 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



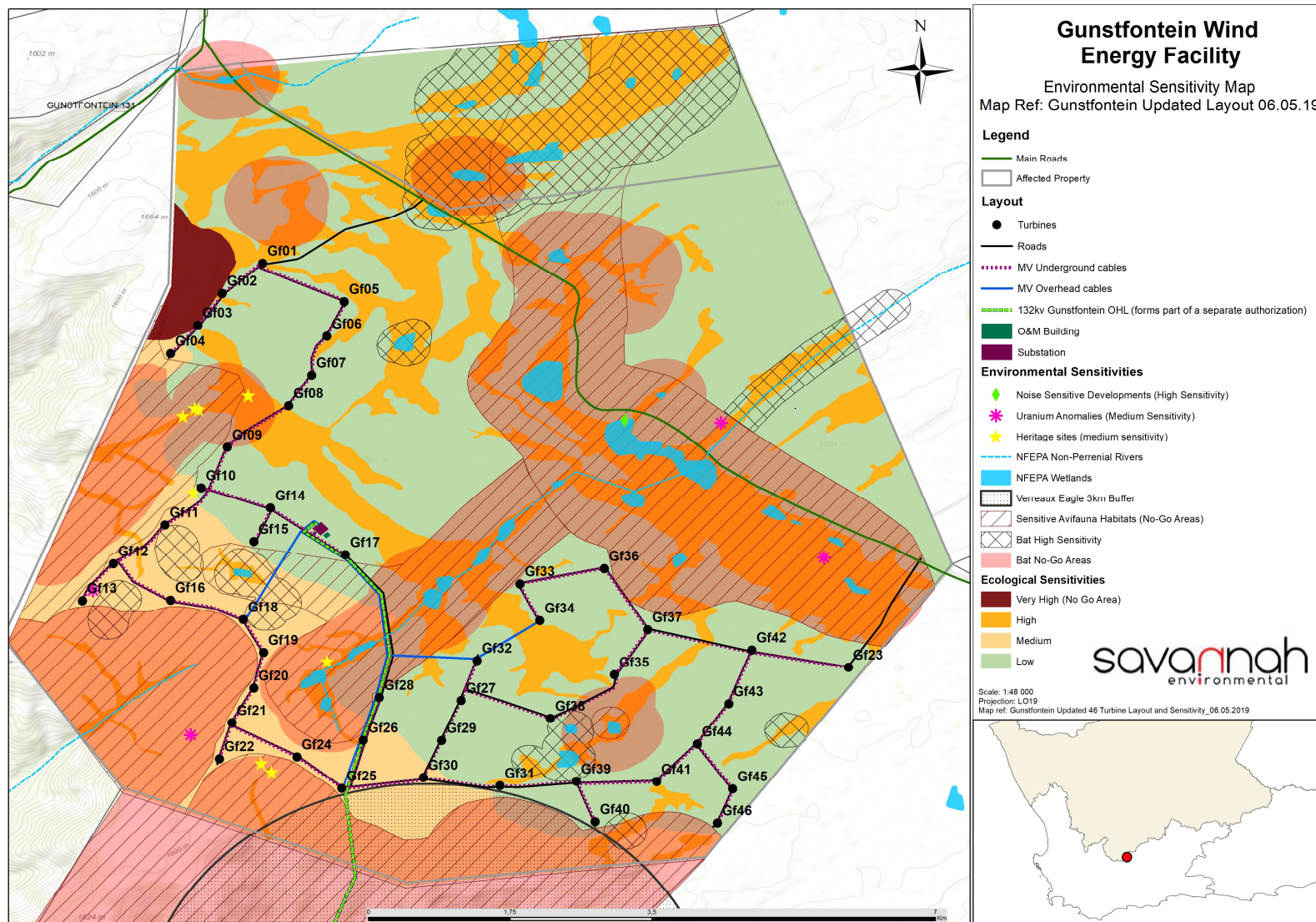
turbine selection. The bat specialist also recommended that a minimum buffer to blade tip for all bat buffer zones is required. The amended wind turbine positions considered avoids all identified bat exclusion zones and areas of high sensitivity. Cumulative impacts on bats after mitigation would also 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.



**Figure 2.2:** Environmental sensitivity map for the project study area illustrating sensitive areas in relation to the Optimised Final layout assessed within the EIA.





**Figure 2.2:** Environmental sensitivity map for the updated layout (2019)

## 2.3 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
<b>National Legislation</b>			
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>» National Department of Environmental Affairs</p> <p>» Department of Environmental and Nature Conservation (DENC) – commenting authority</p>	<p>The listed activities triggered by the proposed Project has been identified and assessed in the EIA process.</p> <p>This EIA Report was submitted to the competent and commenting authority in support of the application for authorisation. Partial 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</p>	Department of Environmental Affairs (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
	duty of a project proponent to consider a project 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"> <li>» Adding other waste management activities to the list.</li> <li>» Removing waste management activities from the list.</li> <li>» Making other changes to the particulars on the list.</li> </ul> <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"> <li>» 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.</li> <li>» Adequate measures are taken to prevent</li> </ul>	<p>DEA (hazardous waste)</p> <p>Provincial Department of Environmental Affairs (general waste)</p>	<p>As no waste disposal site is to be associated with the project. In terms of GNR921, no permit 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 EMPr.</p>

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>accidental spillage or leaking.</p> <ul style="list-style-type: none"> <li>» The waste cannot be blown away.</li> <li>» Nuisances such as odour, visual impacts and breeding of vectors do not arise; and</li> <li>» Pollution of the environment and harm to health are prevented.</li> </ul>		
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. Allows the Minister of Environmental Affairs to make regulations regarding noise, among other concerns</p>	DEA NC DENC Local Municipality	Noise impacts are expected to be associated with the construction phase of 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	Department of Water and Sanitation (DWS)	A Water Use Licence (WUL) or General Authorisation (GA) is required as some drainage lines on the site will be impacted upon by road crossings. Application for a WUL or GA will be made with the DWS in terms of Section 21 of

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>and GN 1191 of GG 20526 October 1999.</p> <p>In terms of Section 19, the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to prevent and remedy the effects of pollution to water resources from occurring, continuing or recurring.</p>		<p>the Act.</p> <p>Water will be extracted from groundwater (borehole on site) for use within the facility and during construction.</p>
Minerals and Petroleum Resources Development Act (Act No 28 of 2002)	<p>A mining permit or mining right may be required where a mineral in question is to be mined (e.g. materials from a borrow pit) in 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 (DMR)	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 DMR.
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>	DEA 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,</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. The overall area is considered as having a low archaeological significance. The relevant mitigation



Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>pipeline, canal or other similar linear 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 m<sup>2</sup> 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 m<sup>2</sup>; or the re-zoning of a site exceeding 10 000 m<sup>2</sup> 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>		measures are included in this EMPr.
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>» A list of threatened &amp; protected species</p>	National Department of Environmental Affairs  DENC	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.

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>has been published in terms of S 56(1) - Government Gazette 29657.</p> <p>» 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).</p> <p>» 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).</p> <p>» This Act also regulates alien and invader species.</p> <p>» Under this Act, a permit would be</p>		<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>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> <ul style="list-style-type: none"> <li>» 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).</li> <li>» 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.</li> <li>» Limit further loss of biodiversity and conserve endangered ecosystems.</li> </ul>		
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)	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.	Department of Agriculture, Forestry and Fisheries (DAFF)	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 &amp; invader plants (Regulation 15 of GN R1048) &amp; restrictions in terms of where these species may occur.</p> <p>Requirement &amp; methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R1048).</p>	Department of Agriculture, Forestry and Fisheries (DAFF)	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>» Department of Agriculture, Forestry and Fisheries (DAFF)</p> <p>» NC DENC</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.</p>
Aviation Act (Act No 74 of 1997)	Any structure exceeding 45m above ground	Civil Aviation Authority (CAA)	While no permitting or licence requirements arise from the

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
1962) 13 <sup>th</sup> amendment of the Civil Aviation Regulations (CARS) 1997	<p>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>		<p>legislation, this act will find application during the operational phase of the project. Appropriate marking is required to meet the specifications as detailed in the CAR Part 139.01.33.</p>
Hazardous Substances Act (Act No 15 of 1973)	<p>This Act regulates the control of substances that may cause injury, or ill health, or death by reason of their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products.</p>	<p>Department of Health Karoo Hoogland Municipality</p> <p>Local</p>	<p>It is necessary to identify and list all the Group I, II, III and IV hazardous substances that may be on the site and in what operational context they are used, stored or handled. If applicable, a license is required to be obtained from the Department of Health.</p>

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<ul style="list-style-type: none"> <li>» 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;</li> <li>» Group IV: any electronic product;</li> <li>» Group V: any radioactive material.</li> </ul> <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"> <li>» Route clearances and permits will be required for vehicles carrying abnormally heavy or abnormally dimensioned loads.</li> <li>» Transport vehicles exceeding the dimensional limitations (length) of 22m.</li> <li>» Depending on the trailer configuration and height when loaded, some of the power station components may not meet specified dimensional limitations (height and width).</li> </ul>

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>The general conditions, limitations and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.</p>		
<p>Astronomy Geographic Advantage Act (Act 21 of 2007)</p>	<ul style="list-style-type: none"> <li>» Preservation and protection of areas within South Africa that are uniquely suited for optical and radio astronomy.</li> <li>» 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.</li> <li>» In terms of section 7(1) and 7(2) of this Act, the Minister declared core astronomy advantage areas on 20 August 2010 under Regulation No. 723 of Government Notice No. 33462. In this regard, all land within a 3 kilometres radius of the centre of the Southern African large Telescope dome falls under the Sutherland Core</li> </ul>	<p>Department of Science and Technology</p>	<p>The study area falls within the Sutherland Central Astronomy Advantage Area gazetted in GN R140 of 28 February 2015, the 75km circular buffer centred on the SALT. While no regulations (draft or final) have yet been gazetted for this area, SAAO should be consulted as a key stakeholder. It should be noted that the entire project falls outside of the Karoo Central Astronomy Advantage Areas which were gazetted for the protection of the SKA.</p>

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>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>		
<b>Provincial Legislation/ Policies / Plans</b>			
Northern Cape Nature Conservation Act, 2009	This Act provides for the sustainable utilisation of wild animals, aquatic biota and plants;	NC DENC	A permit is required for any activities which involve species listed under schedule 1 or 2. The NC DENC permit office



Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>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 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"> <li>» Boundary fences may not be altered in such a way as to prevent wild animals from freely moving onto or off of a property;</li> <li>» Aquatic habitats may not be destroyed or damaged;</li> <li>» 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.</li> </ul> <p>The Act provides lists of protected species for the Province.</p>		<p>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. Therefore, a permit could be required for removal of such species. A permit could be required NC DENC to relocate protected plants and to clear natural vegetation within the development area.</p>
<b>Local Legislation / Policies / Plans</b>			
Karoo Hoogland Local Municipality Integrated Development Plan (IDP)	<ul style="list-style-type: none"> <li>» 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.</li> <li>» The main socio-economic developmental</li> </ul>	Karoo Hoogland Local Municipality	New developments in the municipality to be in line with the IDP.

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>issues are identified as widespread poverty, the lack of employment opportunities, low adult literacy levels, and general the lack of diversified skills amongst the bulk of the population. School dropout rates are pronounced. The IDP describes general living conditions in the LM as "some of the worst in the country".</p>		

**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"> <li>» Provides uniform national approach relating the management of waste facilities</li> <li>» Ensure best practice in management of waste storage</li> <li>» Provides minimum standards for the design and operation of new and existing waste storage</li> </ul>
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 2013	Determines, assesses and manages environmental and social risk in projects

## 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**

<b>Project component/s</b>	List of project components affecting the objective, e.g.: <ul style="list-style-type: none"> <li>» wind turbines;</li> <li>» Substation</li> <li>» access roads; and</li> <li>» Associated infrastructures.</li> </ul>
<b>Potential Impact</b>	Brief description of potential environmental impact if objective is not met.
<b>Activity/risk source</b>	Description of activities which could impact on achieving objective.
<b>Mitigation: Target/Objective</b>	Description of the target; include quantitative measures and/or dates of completion.

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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.

<b>Performance Indicator</b>	Description of key indicator(s) that track progress/indicate the effectiveness of the management plan.
<b>Monitoring and Reporting</b>	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:

<b>EMP Compilers</b>	
<b>EMPr Revision 1:</b>	
Hermien Slabbert	Savannah Environmental
Gideon Raath	Savannah Environmental
Jo-Anne Thomas	Savannah Environmental
<b>Draft EMPr as part of the EIA Report</b>	
Tebogo Mapinga	Savannah Environmental
Karen Jodas	Savannah Environmental
<b>Input from Specialists</b>	
Ecology	Simon Todd Consulting
Avifauna	Bioinsight South Africa and Arcus consulting
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
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 DEA, the layout and preferred grid connection option must be implemented.

<b>Project component/s</b>	<ul style="list-style-type: none"><li>» wind turbines;</li><li>» cabling between turbines;</li><li>» substation;</li><li>» access roads and crane hard standings;</li><li>» service building(s); and</li><li>» associated infrastructure.</li></ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"><li>» Design fails to respond optimally to the environmental considerations.</li></ul>
<b>Activities/risk sources</b>	<ul style="list-style-type: none"><li>» Positioning of turbines and alignment of access roads and underground cabling</li><li>» Positioning of substation</li><li>» Positioning of buildings</li><li>» Construction and design of watercourse crossings</li><li>» Pre-construction activities, e.g. geotechnical investigations</li></ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"><li>» To ensure that the design of the facility responds to the identified environmental constraints and opportunities.</li><li>» To ensure that pre-construction activities are undertaken in an environmentally friendly manner by e.g. avoiding identified sensitive areas.</li><li>» To ensure that the design of the facility responds to the identified constraints identified through pre-construction bird and bat monitoring.</li></ul>

Mitigation: Action/control	Responsibility	Timeframe
The developer to finalise layout of all components, and submit to DEA for approval as might be required by the EA.	Proponent / Contractor(s)	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.</u>	<u>Proponent / Contractor(s)</u>	<u>Prior to construction and construction</u>
<u>The minimum footprint areas of infrastructure should be used wherever possible, including road widths and lengths.</u>	<u>Proponent / Contractor(s)</u>	<u>Prior to construction and construction</u>
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 must be adhered to for the facility	Contractor(s)	Design phase
A comprehensive stormwater management 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 <b>Appendix H</b> ).	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
<u>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.</u>	Proponent	Design phase
<u>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</u>	<u>Proponent</u>	<u>Design phase</u>

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
<u>additional sensitive habitats within which construction activities may need to be excluded.</u>		
<u>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.</u>	<u>Proponent</u>	<u>Design phase</u>
<u>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).</u>	<u>Proponent</u>	<u>Design phase</u>
<u>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.</u>	<u>Proponent</u>	<u>Design phase</u>
<u>No turbines may be located within the no-go areas, including the 3 km Verreaux's Eagle nest buffer. These no-go areas do not apply to associated infrastructure.</u>		
<u>All turbines must be situated at least 70 m back from the no-go boundary. This is based on the assumption that a turbine with the maximum specifications is installed. Should a smaller turbine be utilised, the setback distance to the no-go areas may be reduced slightly, which must be confirmed by the specialist during the pre-construction walkthrough and micro-siting process.</u>		
<u>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, as part of the walkthrough and micro-siting process;</u>		
<u>Place any new overhead power lines adjacent to existing power line or linear infrastructure (e.g. roads and fence lines) where possible;</u>		
<u>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 Dividers (BFD) marking devices must be used as referred to below.</u>		
<u>Attach appropriate (i.e. as advised by an avifaunal specialist) marking devices (BFDs), which</u>		



Mitigation: Action/control	Responsibility	Timeframe
<u>may include the need for nocturnal LED 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).</u>		
<u>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.</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
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
The facility must be designed to discourage the use of infrastructure components as perching or roosting substrates by birds.	Contractor(s)	Design phase
Develop an alien invasive and open space management plan for the site (refer to <b>Appendix C</b> ).	Proponent	Pre-construction
Develop a plant rescue and protection plan for the site (refer to <b>Appendix D</b> ).	Proponent	Pre-construction
Develop a re-vegetation and habitat rehabilitation plan for the site (refer to <b>Appendix E</b> ).	Proponent	Pre-construction
Develop a traffic management plan for the site	Proponent	Pre-construction

Mitigation: Action/control	Responsibility	Timeframe
(refer to <b>Appendix F</b> ).		
Develop a storm water management plan for the site (refer to <b>Appendix H</b> ).	Proponent	Pre-construction
Develop an erosion management plan for the site (refer to <b>Appendix J</b> ).	Proponent	Pre-construction
The alien/ invasive plant management report; plant rescue and protection report; and re-vegetation and habitat rehabilitation report must be made available to the Department and applicable competent authority on request.	Proponent	Pre-construction and construction
Develop an effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems.	Proponent	Pre-construction
Develop a Conservation Management Plan to ensure the on-going conservation of identified heritage resources during the life span of the development.	Proponent	Pre-construction

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

## 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.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>» wind turbines;</li> <li>» cabling between turbines;</li> <li>» substation;</li> <li>» access roads;</li> <li>» watercourse crossing, i.e. access roads and culverts;</li> <li>» buildings; and</li> <li>» all other infrastructure.</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Impacts on affected and surrounding landowners and land uses</li> </ul>

<b>Activity/risk source</b>	<ul style="list-style-type: none"> <li>» Activities associated with pre-construction activities</li> <li>» Activities associated with construction of the wind farm</li> <li>» Activities associated with construction of watercourse crossings</li> <li>» Activities associated with operation</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» Effective communication with affected and surrounding landowners</li> <li>» Addressing of any issues and concerns raised as far as possible in as short a timeframe as possible</li> </ul>

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
<p>Compile and implement a grievance mechanism procedure for the public (using <b>Appendix B</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.</p> <p>A Project Specific Grievance Mechanism will be developed and implemented prior to construction.</p>	Proponent and/or Contractor(s)	<p>Pre-construction (construction procedure)</p> <p>Pre-operation (operation procedure)</p>
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)	<p>Pre-construction (construction procedure)</p> <p>Pre-operation (operation procedure)</p>
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	<p>Pre-construction</p> <p>Duration of construction</p>
Public complaints register must be developed and maintained on site in line with the Grievance mechanism ( <b>Appendix B</b> ).	Contractor(s)	<p>Pre-construction</p> <p>Duration of construction</p>

<b>Performance Indicator</b>	» Effective communication procedures in place for all phases as required.
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» An incident reporting system should be used to record non-conformances to the EMPr. Grievance mechanism procedures should be implemented.</li> <li>» Public complaints register must be developed and maintained.</li> </ul>

### OBJECTIVE 3: Protection of Heritage and Palaeontological Resources

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>» Wind turbines;</li> <li>» Cabling between turbines;</li> <li>» Substation;</li> <li>» Access roads;</li> <li>» Buildings; and</li> <li>» All other infrastructure.</li> </ul>
<b>Potential Impact</b>	» Destruction of potential heritage and fossil/palaeontological resources
<b>Activity/risk source</b>	<ul style="list-style-type: none"> <li>» Activities associated with construction of the wind farm</li> <li>» Activities associated with construction of watercourse crossings</li> <li>» Activities associated with operation</li> </ul>
<b>Mitigation:</b>	» Protection of identified heritage sites and fossils
<b>Target/Objective</b>	» Protection of potential heritage artefacts uncovered during construction

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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 koffiekliip (rusty-brown ferruginised 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.	Proponent and Specialist	Pre-construction
<u>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. These buffer zones have been mapped in Figures 5a and 5b in the areas where impact is likely.</u>	<u>Proponent and Specialist</u>	<u>Pre-construction</u>
<u>A Conservation Management Plan must be developed to ensure the on-going conservation of identified heritage resources during the life of the development. The</u>	<u>Proponent and Specialist</u>	<u>Pre-construction</u>

Mitigation: Action/control	Responsibility	Timeframe
<u>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.</u>		
<p>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:</p> <p>» Anomaly 169 (Gunstfontein 131): 32 33 20 S, 20 38 20 E</p> <p>» Anomaly 170 (Gunstfontein 131): 32 35 09 S, 20 37 29 E</p> <p>» Anomaly 171 (Gunstfontein 131): 32 36 07 S, 20 38 08 E</p> <p>» Anomaly 172 (Gunstfontein 131): 32 34 02 S, 20 41 40 E</p> <p>Anomaly 173 (Gunstfontein 131): 32 34 56 S, 20 42 21 E</p>	Proponent and Specialist	Pre-Construction

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» No impacts on valuable fossil heritage.</li> <li>» No impacts on valuable heritage resources.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Contractor to cordon off sensitive sites</li> </ul>

## **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.

### **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 EMPr, and the implementation of the EMPr 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 EMPr.

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

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 EMPr.
- » Coordinate the correct implementation of the EMPr 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 EMPr, 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 sufficient 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 Reports including Final Post-Construction Audit Reports.
- » 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 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).

**Contractor's EO and Environment Representative<sup>4</sup>:** The EO will be responsible for implementation of this EMPr and should be appointed prior to any commencement of the activities.

The 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 and Monthly 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

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<sup>4</sup> 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.

any other relevant indigenous languages, all to the approval of the Site Manager. All unattended open excavations shall be adequately demarcated and/or fenced (fencing shall consist of a minimum of three strands of wire wrapped with danger tape). Adequate protective measures must be implemented to prevent unauthorised access to the working area and the internal access/haul routes.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>» Wind energy turbines</li> <li>» Cabling between turbines</li> <li>» Substation</li> <li>» Access roads</li> <li>» Buildings</li> <li>» MV Overhead power line(s)</li> <li>» Operation and maintenance buildings</li> <li>» Laydown areas and hardstands</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Hazards to landowners and public</li> <li>» Security of materials</li> <li>» Substantially increased damage to natural vegetation and sensitive environmental areas, due largely to unawareness of where such areas are located.</li> <li>» Potential impact on fauna and avifauna</li> </ul>
<b>Activities/risk sources</b>	<ul style="list-style-type: none"> <li>» Open excavations (foundations and cable trenches)</li> <li>» Movement of construction employees, vehicles and plant in the area and on-site</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» To secure the site against unauthorised entry</li> <li>» To protect members of the public/landowners/residents</li> </ul>

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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 areas of low sensitivity within the approved development area or an area approved by the ECO.	Contractor(s)	During site establishment
<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.</u>	<u>Contractor(s)</u>	<u>During site establishment</u> <u>Implement for duration of contract</u>
<u>The minimum footprint areas of infrastructure should be used wherever possible, including road widths and</u>	<u>Contractor(s)</u>	<u>During site establishment</u> <u>Implement for duration of</u>

Mitigation: Action/control	Responsibility	Timeframe
<u>lengths.</u>		<u>contract</u>
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

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Site is secure and there is no unauthorised entry.</li> <li>» No members of the public/ landowners injured as a result of construction activities.</li> <li>» Fauna and flora is protected as far as practically possible</li> <li>» Appropriate and adequate waste management and sanitation facilities provided at construction site.</li> </ul>
<b>Monitoring and Reporting</b>	<ul style="list-style-type: none"> <li>» Regular visual inspection of fence for signs of deterioration/forced access.</li> <li>» An incident reporting system used to record non-conformances to the EMPr.</li> <li>» Public complaints register used to record complaints received.</li> <li>» ECO/ EO to monitor all construction areas on a continuous basis until all construction is completed; immediate report backs to site manager.</li> <li>» ECO/ EO to address any infringements with responsible contractors as soon as these are recorded.</li> </ul>

### 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 (SMMEs) 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.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>» Construction activities associated with the establishment of the wind farm, including associated infrastructure.</li> </ul>
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<b>Potential Impact</b>	» 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.
<b>Activities/risk sources</b>	» 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.
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» 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.</li> <li>» The proponent should also develop a database of local BBBEE service providers</li> </ul>

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Source as many local labourers as possible.</li> <li>» Database of potential local BBBEE services providers in place before construction phase commences.</li> <li>» Skills audit to determine need for training and skills development programme undertaken within 1 month of commencement of construction phase.</li> </ul>
<b>Monitoring and Reporting</b>	<ul style="list-style-type: none"> <li>» Contractors and appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.</li> <li>» An incident reporting system must be used to record non-conformances to the EMPr.</li> <li>» Public complaints register used to record complaints received.</li> <li>» A Site Specific Grievance Mechanism must be communicated and implemented prior to construction.</li> </ul>

**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.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>» Construction and establishment activities associated with the establishment of the wind farm, including associated infrastructure.</li> <li>» Construction work force</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» 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.</li> <li>» Impacts on the surrounding environment due to inadequate sanitation and waste removal facilities.</li> <li>» Impact on safety of farmers and communities (increased crime etc.) by construction workers and also damage to farm infrastructure such as gates and fences.</li> </ul>
<b>Activities/risk sources</b>	<ul style="list-style-type: none"> <li>» The presence of construction workers can impact negatively on family structures and social networks, especially in small, rural communities.</li> <li>» 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.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» Avoid and or minimise the potential impact of construction workers on the local community and livelihoods.</li> <li>» To minimise impacts on the social and biophysical environment.</li> </ul>

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Establish contact with the adjacent farmers and develop a Code of Conduct for construction workers.	Proponent/ Contractor(s)	Pre-construction/ construction
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.		
Ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct.		
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
Compensate farmers / community members for any proven cost for any losses, such as livestock, damage to	Proponent/ Contractor(s)	Construction

Mitigation: Action/control	Responsibility	Timeframe
infrastructure etc.		
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

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Employment policy and tender documents that set out requirement for local employment and targets completed before construction phase commences.</li> <li>» Code of Conduct developed and approved prior to commencement of construction phase.</li> <li>» Labour locally sourced, where possible.</li> <li>» Tender documents for contractors include recommendations for construction camp.</li> <li>» All construction workers made aware of Code of Conduct within first week of being employed.</li> <li>» Briefing session with construction workers held at outset of construction phase.</li> <li>» Documentation of Landowner Requirements to be agreed with the contractor prior to commencement of construction.</li> <li>» Appropriate waste and wastewater management.</li> <li>» Community Monitoring Forum in place before construction phase commences.</li> <li>» No criminal activities and theft of livestock, illegal hunting or trapping of game and/or other fauna attributable to the construction workers are reported.</li> <li>» No complaints received from landowners or the general public.</li> <li>» No fires or on-site accidents occur.</li> </ul>
<b>Monitoring and Reporting</b>	<ul style="list-style-type: none"> <li>» 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.</li> <li>» An incident reporting system must be used to record non-conformances to the EMPr.</li> <li>» Public complaints register used to record complaints received.</li> </ul>

## 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.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>» Wind Energy turbines</li> <li>» Cabling between turbines</li> <li>» Substation</li> <li>» Access roads</li> <li>» Buildings</li> <li>» Watercourse crossing, i.e. access roads and culverts</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Nuisance noise from construction activities affecting the surrounding community.</li> </ul>
<b>Activity/risk source</b>	<ul style="list-style-type: none"> <li>» Any construction activities taking place within 500 m from potentially sensitive receptors (PSR).</li> <li>» Site preparation and earthworks</li> <li>» Construction-related transport</li> <li>» Foundations or plant equipment installation</li> <li>» Building activities</li> <li>» Power line construction activities</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» Ensure equivalent A-weighted noise levels below 45 dBA at potentially sensitive receptors.</li> <li>» Ensure as far as possible that maximum noise levels at potentially sensitive receptors be less than 65 dBA.</li> <li>» Prevent the generation of a disturbing or nuisance noises.</li> <li>» Ensure acceptable noise levels at surrounding stakeholders and potentially sensitive receptors.</li> <li>» Ensuring compliance with the Noise Control Regulations.</li> </ul>

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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
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
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	Contractor(s)	All phases of project.

Mitigation: Action/control	Responsibility	Timeframe
registering any issues, complaints or comments.		
<p>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:</p> <ul style="list-style-type: none"> <li>» Description of activity to take place;</li> <li>» Estimated duration of activity;</li> <li>» Working hours; and</li> <li>» Contact details of responsible party.</li> </ul>	Contractor(s)	At least 2 days, but not more than 5 days before activity is to commence.

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» No complaints received concerning noise.</li> <li>» Equivalent A-weighted noise levels below 45 dBA at potentially sensitive receptors.</li> <li>» Ensure that maximum noise levels at potentially sensitive receptors are less than 65 dBA as far as possible.</li> </ul>
<b>Monitoring and Reporting</b>	<ul style="list-style-type: none"> <li>» 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.</li> <li>» Public complaints register used to record complaints received.</li> </ul>



## 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.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>» Wind Energy turbines</li> <li>» Cabling between turbines</li> <li>» Substation</li> <li>» Access roads</li> <li>» Buildings</li> <li>» Watercourse crossing, i.e. access roads and culverts</li> <li>» Batching Plant</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Heavy vehicles can generate noise and dust impacts. Movement of heavy vehicles can also damage roads.</li> <li>» 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.</li> <li>» Release of minor amounts of air pollutants (for example NO<sub>2</sub>, CO and SO<sub>2</sub>) from vehicles and construction equipment</li> </ul>
<b>Activities/risk sources</b>	<ul style="list-style-type: none"> <li>» The movement of heavy vehicles and their activities on the site can result in noise and dust impacts and damage roads.</li> <li>» Clearing of vegetation and topsoil.</li> <li>» Excavation, grading and scraping.</li> <li>» Transport of materials, equipment and components on internal access roads.</li> <li>» Re-entrainment of deposited dust by vehicle movements.</li> <li>» Wind erosion from topsoil and spoil stockpiles and unsealed roads and surfaces.</li> <li>» Fuel burning from construction vehicles with combustion engines.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» To avoid and or minimise the potential noise and dust impacts associated with heavy vehicles, and also minimise damage to roads.</li> <li>» To ensure emissions from all vehicles are minimised, where possible, for the duration of the construction phase.</li> <li>» 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.</li> </ul>

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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.

Mitigation: Action/control	Responsibility	Timeframe
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

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

## 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**.

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

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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.
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.

Mitigation: Action/control	Responsibility	Timeframe
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
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.
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
Compile a comprehensive stormwater management plan as part of the final design of the project and implement during construction and operation (refer to <b>Appendix H</b> ).	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
Storm water Management Plan to be updated and implemented as soon as the designs have been finalised.	Contractor(s)	Construction

**Performance Indicator**

- » 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

	<ul style="list-style-type: none"> <li>» No siltation in drainage lines as a result of construction activities</li> <li>» Minimal level of soil degradation as a result of construction activities</li> <li>» 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).</li> <li>» Limited soil erosion around site as a result of construction activities;</li> <li>» No increased siltation in drainage lines as a result of construction activities;</li> <li>» Impacts on drainage lines are minimised.</li> <li>» Only limited localised scour adjacent to culverts.</li> <li>» Acceptable state of excavations, as determined by ECO.</li> </ul>
<b>Monitoring and Reporting</b>	<ul style="list-style-type: none"> <li>» Continual inspections of the site by ECO/ EO;</li> <li>» Daily monitoring for the water crossing construction period.</li> <li>» Fortnightly inspections of sediment control devices by ECO/ EO;</li> <li>» On-going inspections of surroundings, including drainage lines by ECO/ EO;</li> <li>» Reporting of ineffective sediment control systems and rectification as soon as possible;</li> <li>» An incident reporting system must record non-conformances to the EMPr; and</li> <li>» Public complaints register used to record complaints received.</li> </ul>

#### **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.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>» Access roads</li> <li>» Cabling between turbines</li> <li>» Watercourse crossing, i.e. access roads and culverts</li> <li>» Wind turbines</li> <li>» Workshop area/ laydown areas</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» 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.</li> <li>» Increased runoff into drainage lines can potentially be associated with accelerated erosion.</li> </ul>
<b>Activity/risk source</b>	<ul style="list-style-type: none"> <li>» Construction of access roads and cabling.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» Minimise damage to watercourse areas where crossing will be built.</li> <li>» No increase in runoff into drainage lines as a result of construction of project related infrastructure.</li> <li>» No increase in runoff into drainage lines as a result of road construction</li> </ul>

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 H).	Contractor(s), ECO/ EO	Construction
Contaminated runoff from the construction site(s) should be prevented from entering the rivers/streams.	Contractor(s)	Construction
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
Utilise erosion control measures on access roads, wetland areas and drainage lines.	<u>Contractor(s)</u>	Construction

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Limited impacts on water quality, water quantity, riparian or wetland vegetation, natural status of riparian or wetland areas.</li> <li>» No increase in runoff into drainage lines as a result of construction of project related infrastructure.</li> </ul>
<b>Monitoring and Reporting</b>	<ul style="list-style-type: none"> <li>» Habitat loss in watercourses should be monitored before and after construction by the ECO/ EO.</li> <li>» The ECO in conjunction with the EO, should be responsible for monitoring and reporting.</li> <li>» An incident reporting system must be used to record non-conformances to the EMP.</li> <li>» Weekly monitoring by the ECO/ EO during the construction phase to ensure mitre drains or similar runoff management structures are properly constructed.</li> <li>» Public complaints register must be used to record complaints received.</li> </ul>

**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 C**. 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 D** and **E**.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>» wind turbines and associated laydown areas;</li> <li>» access roads and cabling;</li> <li>» substation;</li> <li>» workshop area;</li> <li>» site camp</li> <li>» batching plants; and</li> <li>» temporary laydown areas.</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Proliferation of alien plants</li> </ul>
<b>Activity/risk source</b>	<ul style="list-style-type: none"> <li>» Site preparation and earthworks</li> <li>» Trenching activities for cable laying</li> <li>» Excavation for tower base foundations</li> <li>» Construction of site access road</li> <li>» Site preparation for lay-down area(s) and site office/visitor's centre (e.g. compaction)</li> <li>» Foundations or plant equipment installation</li> <li>» Stockpiling of topsoil, subsoil and spoil material</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» To retain natural vegetation in the highly sensitive areas of the site;</li> <li>» To minimise footprints of disturbance of vegetation/habitats on-site;</li> <li>» No alien plants within project control area;</li> <li>» 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</li> <li>» Limited loss of species of conservation concern.</li> </ul>

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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
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

Mitigation: Action/control	Responsibility	Timeframe
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
<p>Salvaging topsoil:</p> <ul style="list-style-type: none"> <li>» 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"> <li>○ Topsoil stripping removes up to 30 cm or less of the upper soils.</li> <li>○ In cultivated areas, depth of topsoil may increase and needs to be confirmed with the land owner</li> </ul> </li> <li>» Prior to salvaging topsoil the depth, quality and characteristics of topsoil should be known for every management area. <ul style="list-style-type: none"> <li>* 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.</li> <li>* Different types of topsoil – rocky soils and sands or loams must be stored separately</li> </ul> </li> </ul> <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>	Contractor(s)	Before and during construction
<p>Storing topsoil:</p> <ul style="list-style-type: none"> <li>» Viability of stored topsoil depends on moisture, temperature, oxygen, nutrients and time stored.</li> <li>» 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.</li> <li>» Stockpile location, if not adjacent to a linear development: <ul style="list-style-type: none"> <li>* At least 50 m from any watering point</li> <li>* Ideally a disturbed but weed-free area</li> </ul> </li> <li>» Topsoil is typically stored in berms with a width of 150 – 200 cm, and a maximum height of 2m: <ul style="list-style-type: none"> <li>* Place berms along contours or perpendicular to the prevailing wind direction</li> <li>* 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</li> </ul> </li> </ul>	Contractor(s)	Before and during construction



Mitigation: Action/control	Responsibility	Timeframe
<ul style="list-style-type: none"> <li>» 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</li> <li>» 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"> <li>* In such case, use one side of the linear development for machinery and access only</li> <li>* Place topsoil on the other/far side of this development, followed by the subsoil (e.g. on geotextile)</li> </ul> </li> <li>» 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"> <li>* Preventing puddling on or between heaps of topsoil</li> <li>* Or covering topsoil berms</li> <li>* Preventing all forms of contamination or pollution</li> <li>* Preventing any form of compaction</li> <li>* Monitoring establishment of all invasive vegetation and removing such if it appears</li> <li>* Keeping slopes of topsoil at a maximal 2:1 ratio</li> <li>* Monitoring and mitigating erosion where it appears</li> <li>* 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, seeding should be considered. This must be implemented only after consultation with the ECO.</li> </ul> </li> </ul>		
<p>Reapplying topsoil:</p> <ul style="list-style-type: none"> <li>» Spoil materials and subsoil must be back-filled first, then covered with topsoil</li> <li>» Generally, topsoil should be re-applied to a depth equal to slightly greater than the topsoil horizon of a pre-selected undisturbed reference site</li> <li>» The minimum depth of topsoil needed for revegetation to be successful is approximately 20 cm</li> <li>» If the amount of topsoil available is limited, a strategy must be worked out to optimise revegetation efforts with the topsoil available</li> <li>» 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</li> </ul>	Contractor(s)	Before and during construction

Mitigation: Action/control	Responsibility	Timeframe
<p>of revegetation efforts.</p> <p>» To stabilise reapplied topsoils and minimise raindrop impact and erosion:</p> <ul style="list-style-type: none"> <li>o Use organic material from cleared and shredded woody vegetation where possible</li> <li>o Alternatively, suitable geotextiles or organic erosion mats can be used as necessary</li> </ul> <p>Continued monitoring will be necessary to detect any sign of erosion early enough to allow timeous mitigation</p>		
Re-applied topsoil needs to be re-vegetated as soon as possible, following the specifications of the revegetation and rehabilitation plan (refer to Appendix E)	Contractor(s)	Before and during construction, monitored during operational phase

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

## 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.

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

**Target/Objective** » 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.
<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.</u>	<u>Contractor(s)</u>	<u>Site establishment &amp; duration of contract.</u>
<u>The minimum footprint areas of infrastructure should be used wherever possible, including road widths and lengths.</u>	<u>Contractor(s)</u>	<u>Site establishment &amp; duration of contract.</u>
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.
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
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
Employees must be prohibited from harvesting wild plants for any purpose	Contractor(s)	Duration of contract
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
<u>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</u>	<u>Contractor(s)/ EO</u>	<u>Site establishment &amp; duration on contract</u>

Mitigation: Action/control	Responsibility	Timeframe
<u>species. If any nests or breeding locations for these species are located, the avifaunal specialist is to be contacted for further instruction.</u>		
<u>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.</u>	<u>Contractor(s)/ EO/ Specialist</u>	<u>Site establishment &amp; duration on contract</u>
<u>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 EMP.</u>	<u>Contractor(s)/ EO</u>	<u>Site establishment &amp; duration on contract</u>
<u>Attach appropriate (i.e. as advised by an avifaunal specialist) marking devices (BFDs), which may include the need for nocturnal LED 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).</u>	<u>Contractor(s)/ EO</u>	<u>Site establishment &amp; duration on contract</u>
<u>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.</u>	<u>Contractor(s)/ EO</u>	<u>Site establishment &amp; duration on contract</u>
<u>Place power lines underground where possible, unless it is practically impossible to do so due to ecological, geological or topographical considerations, and</u>	<u>Contractor(s)/ EO</u>	<u>Site establishment &amp; duration on contract</u>

Mitigation: Action/control	Responsibility	Timeframe
<u>confirmed by appropriate independent specialists.</u>		
<u>Place any new overhead power lines adjacent to existing power line or linear infrastructure (e.g. roads and fence lines) where possible.</u>	<u>Contractor(s)/ EO</u>	<u>Site establishment &amp; duration on contract</u>
<u>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 Dividers (BFD) marking devices must be used as referred to below.</u>	<u>Contractor(s)/ EO</u>	<u>Site establishment &amp; duration on contract</u>
<u>Attach appropriate (i.e. as advised by an avifaunal specialist) marking devices (BFDs), which may include the need for nocturnal LED 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).</u>	<u>Contractor(s)/ EO</u>	<u>Site establishment &amp; duration on contract</u>
<u>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.</u>	<u>Contractor(s)/ EO</u>	<u>Site establishment &amp; duration on contract</u>

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» No disturbance outside of designated work areas.</li> <li>» Minimised clearing of existing/natural vegetation and habitats for fauna and avifauna.</li> <li>» Limited impacts on faunal species (including avifauna) (i.e. noted/recorded fatalities), especially those of conservation concern.</li> </ul>
<b>Monitoring and Reporting</b>	<ul style="list-style-type: none"> <li>» Observation of vegetation clearing activities by EO throughout construction phase.</li> <li>» Supervision of all clearing and earthworks by EO.</li> <li>» An incident reporting system must be used to record non-conformances to the EMPr.</li> <li>» Public complaints register must be used to record complaints received.</li> <li>» Construction phase monitoring implemented.</li> </ul>

## 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.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>» wind turbines;</li> <li>» access roads and cabling;</li> <li>» Substation; and</li> <li>» Operations and service building area.</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Heritage objects or artefacts found on site are inappropriately managed or destroyed; and</li> <li>» Loss of fossil resources.</li> </ul>
<b>Activity/risk source</b>	<ul style="list-style-type: none"> <li>» Site preparation and earthworks;</li> <li>» Foundations or plant equipment installation;</li> <li>» Mobile construction equipment movement on site; and</li> <li>» Access road construction activities.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» To ensure that any heritage objects found on site are treated appropriately and in accordance with the relevant legislation.</li> </ul>

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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	Contractor(s) and ECO/ EO	Pre-construction

Mitigation: Action/control	Responsibility	Timeframe
the relevant procedure and report to the site manager if sites are found.		
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
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 at any stage during the construction phase any semblance of a fossil were to be observed, it would be vital to recover the fossil and report the occurrence to the geological staff at the closest repository in the Northern Cape and/or the South African Heritage Resources Agency (SAHRA) (021 642 4502) so that systematic and professional investigation/ excavation can be undertaken.	Contractor(s)	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 nearest museum/archaeologist or to the South African Heritage Resources Agency, so that a systematic and professional investigation can be undertaken. Sufficient time should be allowed to investigate and to remove/collect such material.	Contractor(s)	Construction
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

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Minimum disturbance outside of designated work areas.</li> <li>» All heritage items located are dealt with as per the legislative guidelines.</li> </ul>
<b>Monitoring and Reporting</b>	<ul style="list-style-type: none"> <li>» Observation of excavation activities by ECO/ EO throughout construction phase.</li> <li>» Supervision of all clearing and earthworks.</li> </ul>

- » An incident reporting system must be used to record non-conformances to the EMP.
- » 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.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>» Construction site</li> <li>» Transportation of staff and equipment</li> <li>» Wind turbines</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» The potential scarring of the landscape due to the creation of new access roads/tracks or the unnecessary removal of vegetation; and</li> <li>» Construction traffic.</li> </ul>
<b>Activity/risk source</b>	<ul style="list-style-type: none"> <li>» The viewing of visual scarring by observers in the vicinity of the facility or from the roads traversing the site.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» Minimal disturbance to vegetation cover in close vicinity to the proposed facility and its related infrastructure; and</li> <li>» Minimised construction traffic, where possible.</li> </ul>

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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



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

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Construction site maintained in a neat and tidy condition.</li> <li>» Vegetation cover that remains intact with no erosion scarring in close proximity of the facility.</li> <li>» Site appropriately rehabilitated after construction is complete.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Ensure that mitigation measures are implemented during construction to minimise visual impacts on surrounding communities.</li> <li>» Ensure that aviation warning lights or other measures are installed before construction is completed according to CAA requirements.</li> <li>» Ensure that aviation warning lights or other measures are functional at all times.</li> <li>» Monitoring of rehabilitation activities to ensure appropriate rehabilitation of the site.</li> <li>» An incident reporting system will be used to record non-conformances to the EMPr.</li> <li>» Public complaints register must be used to record complaints received.</li> </ul>

### 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.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>» wind turbines;</li> <li>» Concrete batching plant;</li> <li>» Construction camp/ laydown areas; and</li> <li>» Associated infrastructure.</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Release of contaminated water from contact with spilled chemicals;</li> <li>» Generation of contaminated wastes from used chemical containers;</li> <li>» Inefficient use of resources resulting in excessive waste generation; and</li> <li>» Litter or contamination of the site or water through poor waste management practices.</li> </ul>
<b>Activity/risk source</b>	<ul style="list-style-type: none"> <li>» Vehicles associated with site preparation and earthworks;</li> <li>» Power line construction activities;</li> <li>» Packaging and other construction wastes;</li> <li>» Hydrocarbon use and storage ; and</li> <li>» Spoil material from excavation, earthworks and site preparation.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons;</li> <li>» To ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons;</li> <li>» To comply with waste management legislation;</li> <li>» To minimise production of waste;</li> <li>» To ensure appropriate waste storage and disposal; and</li> <li>» To avoid environmental harm from waste disposal.</li> </ul>

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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

Mitigation: Action/control	Responsibility	Timeframe
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
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.
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.
Supply waste collection bins at construction equipment and construction crew camps.	Contractor(s)	Erection: during site establishment Maintenance:

Mitigation: Action/control	Responsibility	Timeframe
		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
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
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:	Contractor(s) O&M Contractor	During and post construction.

Mitigation: Action/control	Responsibility	Timeframe
Ensure compliance with all national, regional and local legislation with regard to the storage, handling and disposal of hydrocarbons, chemicals, solvents and any other harmful and hazardous substances and materials. 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)	Pre-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

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» No chemical spills outside of designated storage areas;</li> <li>» No water or soil contamination by chemical spills;</li> <li>» No complaints received regarding waste on site or indiscriminate dumping;</li> <li>» Internal site audits ensuring that waste segregation, recycling and reuse is occurring appropriately; and</li> <li>» Provision of all appropriate waste manifests for all waste streams.</li> <li>» Spills are sufficiently cleaned and dealt with.</li> </ul>
<b>Monitoring and Reporting</b>	<ul style="list-style-type: none"> <li>» Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase.</li> <li>» 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.</li> <li>» Observation and supervision of waste management practices throughout construction phase.</li> <li>» Waste collection to be monitored on a regular basis.</li> <li>» Waste documentation completed.</li> <li>» An incident reporting system must be used to record non-conformances to the EMPr.</li> <li>» Proponent and appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.</li> </ul>

#### 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.

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

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Compliance with specified conditions of Environmental Authorisation, EIA Report and EMPr;</li> <li>» No complaints regarding contractor behaviour or habits; and</li> <li>» Code of Conduct drafted before commencement of construction phase and briefing session with construction workers held at outset of construction phase.</li> </ul>
<b>Monitoring and Reporting</b>	<ul style="list-style-type: none"> <li>» Observation and supervision of Contractor practices throughout construction phase.</li> <li>» 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.</li> <li>» An incident reporting system must be used to record non-conformances to the EMPr.</li> </ul>

**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.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>» wind turbines</li> <li>» construction camp</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» 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.</li> </ul>
<b>Activity/risk source</b>	<ul style="list-style-type: none"> <li>» Contractors are not aware of the requirements of the EMPr, leading to unnecessary impacts on the surrounding environment.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» To ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment.</li> </ul>

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Designated areas for fires identified on site at the outset of the construction phase.</li> <li>» Fire-fighting equipment and training provided before the construction phase commences.</li> <li>» Compensation claims settled after claim verified by independent party.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» 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.</li> <li>» An incident reporting system must be used to record non-conformances to the EMPr.</li> </ul>

**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 and Transportation Plan attached as Appendix F.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>» wind turbines;</li> <li>» substation;</li> <li>» access roads;</li> <li>» associated infrastructure; and</li> <li>» construction vehicles</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Traffic congestion, particularly on narrow roads or on road passes where overtaking is not permitted;</li> <li>» Risk of accidents;</li> <li>» and</li> <li>» Deterioration of road pavement conditions (i.e. both surfaced and gravel road) due to abnormal loads.</li> </ul>
<b>Activity/risk source</b>	<ul style="list-style-type: none"> <li>» Transportation of project components to site.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» To minimise impact of traffic associated with the construction of the facility on local traffic;</li> <li>» To minimise potential for negative interaction between pedestrians or sensitive users and traffic associated with the facility construction; and</li> <li>» To ensure all vehicles are roadworthy and all materials/equipment are carried appropriately and within any imposed permit/licence conditions.</li> </ul>

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Develop and implement a traffic management plan (Refer to <b>Appendix F</b> ).	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	Contractor(s)	Duration of contract



Mitigation: Action/control	Responsibility	Timeframe
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.		
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

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» No traffic incidents involving Project personnel or appointed contractors;</li> <li>» Appropriate signage in place; and</li> <li>» No complaints resulting from traffic congestion, delays or driver negligence associated with construction of the Wind Energy Facility.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Visual monitoring of dust produced by traffic movement;</li> <li>» Visual monitoring of traffic control measures to ensure they are effective;</li> <li>» 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</li> <li>» An incident reporting system will be used to record non-conformances to the EMPr.</li> </ul>

## 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.

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

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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	Contractor(s)	Construction phase

Mitigation: Action/control	Responsibility	Timeframe
stormwater discharge system.		
Any liquids stored on site, including admixtures, fuels and lubricants, should be stored in accordance with applicable legislation	Contractor(s)	Construction phase
Contaminated stormwater and process wastewater should be captured and recycled where possible. A wastewater collection and recycling system should be designed to collect contaminated water.	Contractor(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"> <li>» No complaints regarding dust</li> <li>» No water or soil contamination by chemical spills</li> <li>» No complaints received regarding waste on site or indiscriminate dumping</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>» Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase</li> <li>» 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</li> <li>» An incident reporting system must be used to record non-conformances to the EMP</li> <li>» Proponent or appointed ECO/EO must monitor indicators listed above to ensure that they have been met for the construction phase</li> </ul>

#### 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 H**).

- » 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 contractors environmental representative or the ECO.
- » The course should be sufficient to provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- » Awareness of any other environmental matters, which are deemed to be necessary by the ECO.
- » Ensuring that employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) are erected at prominent locations throughout the site.
- » Ensure that construction workers have received basic training in environmental management, including the storage and handling of hazardous substances, minimisation of disturbance to sensitive areas, management of waste, and prevention of water pollution.
- » Records must be kept of those that have completed the relevant training.
- » Training should be done either in a written or verbal format but must be in an appropriate format for the receiving audience.
- » Refresher sessions must be held to ensure the contractor staff are aware of their environmental obligations as practically possible.

- » 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 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 function of the EMPr and Contract Specifications and the importance and reasons for compliance to these. The induction training must highlight overall do's and don'ts on site and clarify the 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) for the most part 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 EO will be responsible for weekly and monthly reporting to the ECO and Site 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, DEA 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 DEA 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 ECO/EO will be responsible for the weekly and monthly reports which will be submitted internally which will aid the ECO in compiling the monitoring report. The monitoring report must be submitted to the DEA on the first week of the following month.

### **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 DEA.

### **5.6.4 Final Audit Report**

A final external audit should be conducted following the completion of rehabilitation after construction is completed. The audit report must be submitted to the DEA 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 E:** 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.

<b>Project component/s</b>	List of project components affecting the objective: <ul style="list-style-type: none"> <li>» Wind energy facility (including temporary access roads and laydown areas);</li> <li>» Temporary laydown areas; and</li> <li>» Watercourse crossing, i.e. access roads and culverts.</li> </ul>
<b>Potential Impact</b>	» Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention.
<b>Activity/risk source</b>	<ul style="list-style-type: none"> <li>» Site preparation and earthworks</li> <li>» Excavation of foundations and trenches</li> <li>» Temporary laydown areas</li> <li>» Temporary access roads/tracks</li> <li>» Other disturbed areas/footprints</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» To ensure and encourage site rehabilitation of disturbed areas; and</li> <li>» 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.</li> </ul>

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
<u>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.</u>	<u>Contractor(s) and Proponent</u>	<u>Construction &amp; operation</u>
The site rehabilitation programme must be implemented (refer to <b>Appendix E</b> ).	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 <b>Appendix C</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.

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

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

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### 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 Environmental Affairs (DEA) on environmental performance and other issues.
- » Conduct environmental training and awareness for the employees who operate and maintain the wind energy facility.
- » Compile environmental policies and procedures 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.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>» wind energy facility development footprint;</li> <li>» Access roads; and</li> <li>» Operations and service building.</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Hazards to landowners and public</li> </ul>
<b>Activities/risk sources</b>	<ul style="list-style-type: none"> <li>» Uncontrolled access to the wind energy facility and associated infrastructure.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» To secure the site against unauthorised entry; and</li> <li>» To protect members of the public/landowners/residents.</li> </ul>

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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

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

#### 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.

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

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» No further disturbance to vegetation or terrestrial faunal habitats.</li> <li>» Continued improvement of rehabilitation efforts.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Observation of vegetation on-site by environmental manager / consultant.</li> <li>» Regular inspections to monitor plant regrowth/performance of rehabilitation efforts and weed infestation compared to natural/undisturbed areas.</li> <li>» Annual monitoring with records of alien species presence and clearing actions</li> <li>» Annual monitoring with records of erosion problems and mitigation actions taken with photographs</li> <li>» 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</li> </ul>

### 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 has been conducted and turbines have been removed from high risk areas. However, the real extent of this threat is not currently well understood within the South African context due to the limited numbers of wind turbines in South Africa with which bird interactions have been monitored. Bird monitoring must be undertaken during the operation of the facility.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>» Wind energy facility (turbines); and</li> <li>» Associated infrastructure, i.e. overhead power lines</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Disturbance to or loss of birds as a result of collision with the turbine blades;</li> <li>» Electrocution and collision with the power lines;</li> </ul>
<b>Activity/risk source</b>	<ul style="list-style-type: none"> <li>» Spinning turbine blades;</li> <li>» Unmarked overhead power lines;</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» More accurately determine the impact of the operating wind energy facility on priority bird species; and</li> <li>» Minimise impacts associated with the turbines, power lines</li> </ul>

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
<u>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.</u>	<u>Specialist</u>	<u>Site establishment &amp; duration on contract</u>
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
<u>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>	<u>Contractor(s) and Proponent O&amp;M Operator</u>	<u>Construction &amp; operation</u>
<u>Attach appropriate (i.e. as advised by an avifaunal specialist) marking devices (BFDs), which may include</u>	<u>Contractor(s) and Proponent</u>	<u>Construction &amp; operation</u>

Mitigation: Action/control	Responsibility	Timeframe
<u>the need for nocturnal LED 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).</u>	<u>O&amp;M Operator</u>	
<u>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.</u>	<u>Contractor(s) and Proponent</u> <u>O&amp;M Operator</u>	<u>Construction &amp; operation</u>
<u>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.</u>	<u>Contractor(s) and Proponent</u> <u>O&amp;M Operator</u>	<u>operation</u>
<u>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.</u>	<u>Contractor(s) and Proponent</u> <u>O&amp;M Operator</u>	<u>Operation</u>
<u>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.</u>	<u>Contractor(s) and Proponent</u> <u>O&amp;M Operator</u>	<u>Operation</u>
<u>If unacceptable impacts are observed (in the opinion of the bird specialist after consultation with BLSA, relevant stakeholders and an independent review), 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. Mitigations that may need to be implemented (and should be considered in the project's financial planning) include:</u> <u>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.</u> <u>- Using deterrent devices (e.g. visual and noise</u>	<u>Contractor(s) and Proponent</u> <u>O&amp;M Operator</u>	<u>Operation</u>



Mitigation: Action/control	Responsibility	Timeframe
<p><u>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.</u></p> <ul style="list-style-type: none"> <li>- <u>Painting a turbine to make it more visible (subject to the requisite approvals being obtained from the applicable authorities e.g. CAA and DEA). Some success has been observed in reducing raptor mortalities in Norway using this method.</u></li> <li>- <u>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.</u></li> </ul>		
<p><u>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.</u></p>	<p><u>Contractor(s) and Proponent</u> <u>O&amp;M Operator</u></p>	<p><u>Operation phase</u></p>

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Limit additional disturbance to bird populations on the wind energy facility site.</li> <li>» Continued improvement of bird protection devices, if any.</li> <li>» Regular provision of clearly worded, logical and objective information on the interface between the local avifauna and the proposed/ operating wind energy facility.</li> <li>» 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.</li> </ul>
<b>Monitoring and Reporting</b>	<ul style="list-style-type: none"> <li>» Observation of avifaunal populations and incidence of injuries/death from collisions from turbine blades.</li> <li>» Environmental manager to monitor turbine field for fatalities.</li> <li>» Operational phase monitoring implemented</li> <li>» Review of bird monitoring report on the full year of post-construction monitoring</li> <li>»</li> </ul>

#### 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.

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

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» No additional disturbance to bat populations on the wind energy facility site.</li> <li>» Continued improvement of bat protection devices, if any.</li> <li>» Regular provision of clearly worded, logical and objective information on the interface between the bat populations and the proposed/ operating wind energy facility.</li> <li>» 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.</li> </ul>
<b>Monitoring and Reporting</b>	» Environmental manager 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". 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 this manner less warning lights is utilised to delineate the facility as one large obstruction, thereby lessening the potential visual impact. The regulations for the CAA's *Marking of Obstacles* should be strictly adhered 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.

<b>Project component/s</b>	List of project components affecting the objective: » Wind energy facility (including access roads and turbines); and » Associated infrastructure
<b>Potential Impact</b>	» Risk to aircraft in terms of the potential for collision; and » Enhanced visual intrusion.
<b>Activity/risk source</b>	» Size/scale of turbines » Associated lighting » Wind turbines and other infrastructure » Access roads » Other associated infrastructure
<b>Mitigation: Target/Objective</b>	» To minimise potential for visual impact; » To ensure that the facility complies with Civil Aviation Authority requirements for turbine visibility to aircraft; and » Minimise contrast with surrounding environment and visibility of the turbines to humans.

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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 / O&M Operator	Operation and maintenance

<b>Performance Indicator</b>	» Minimised visual intrusion on surrounding areas. » Appropriate visibility of infrastructure to aircraft.
<b>Monitoring and Reporting</b>	» Ensure that aviation warning lights or other measures are installed before construction is completed and are fully functional at all times. » The monitoring of the condition and functioning of the light fixtures during the operational phase of the project.

## OBJECTIVE 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.

<b>Project component/s</b>	» Wind energy facility (including access roads).
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Increased noise levels at potentially sensitive receptors;</li> <li>» Changing ambient sound levels could change the acceptable land use capability; and</li> <li>» Disturbing character of sound.</li> </ul>
<b>Activity/risk source</b>	» Operation of wind turbines
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» Ensure that the change in ambient sound levels (measured in <math>L_{Aeq}</math>) 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);</li> <li>» Prevent the generation of disturbing noise from the wind turbines; and</li> <li>» Ensure acceptable noise levels at surrounding stakeholders and potentially sensitive receptors</li> </ul>

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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

<b>Performance Indicator</b>	» Ensure that the change in ambient sound levels ( $L_{Aeq}$ ) as experienced by Potentially Sensitive Receptors is less than 7 dBA.
<b>Monitoring and Reporting</b>	» 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.

<b>Project component/s</b>	List of project components affecting the objective: <ul style="list-style-type: none"> <li>» Wind turbines; and</li> <li>» Associated infrastructure.</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Inefficient use of resources resulting in excessive waste generation; and</li> <li>» Litter or contamination of the site or water through poor waste management practices.</li> </ul>

<b>Activity/risk source</b>	<ul style="list-style-type: none"> <li>» Generators and gearbox – turbines; and</li> <li>» Fuel and oil storage.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» To comply with waste management legislation;</li> <li>» To minimise production of waste;</li> <li>» To ensure appropriate waste disposal; and</li> <li>» To avoid environmental harm from waste disposal.</li> </ul>

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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 banded.	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 banded 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: <ul style="list-style-type: none"> <li>» 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.</li> <li>» Waste must be stored and handled according to the relevant legislation and regulations.</li> </ul>	Proponent / O&M Operator	Operation
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

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

## 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.

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

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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

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

## **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.

<b>Project Component/s</b>	» Operation and maintenance of the wind energy facility and associated infrastructure.
<b>Potential Impact</b>	» 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.
<b>Activities/Risk Sources</b>	» The presence of operation and maintenance personnel and their activities on the site can increase the risk of veld fires.
<b>Mitigation: Target/Objective</b>	» To avoid and or minimise the potential risk of veld fires on local communities and their livelihoods.

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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
Contact details of emergency services should be prominently displayed on site.	Proponent / O&M Operator	Operation

<b>Performance Indicator</b>	» Fire-fighting equipment and training provided before the construction phase commences. » Appropriate fire breaks in place.
<b>Monitoring and Reporting</b>	» 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.

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

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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

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



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

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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 (NEMA / NEM:WA). 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 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**

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>» wind turbines;</li> <li>» substation; and</li> <li>» associated infrastructure.</li> </ul>
<b>Potential Impact</b>	» Impacts on people, flora, fauna, soils etc.
<b>Activity/risk source</b>	» Decommissioning of the Wind Energy Facility.
<b>Mitigation: Target/Objective</b>	» To avoid and or minimise the potential social impacts associated with decommissioning phase of the Wind Energy Facility.

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
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>» Fertilising</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>» Seed acquisition</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.</p>		
The Contractor shall schedule works for placing of topsoil once all infrastructure has been successfully decommissioned. Seeding can then take place after the first rains of the season and should be concluded by one month before the end of the growing season.	O&M Operator / Contractor	Decommissioning
The seed mix for use in rehabilitation must be an approved mix of indigenous grass species common to the area.	O&M Operator / Contractor	Decommissioning
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

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

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## **CHAPTER 9: FINALISATION OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME**

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The EMPr is a dynamic document, which must be updated when required. It is considered critical that this draft EMPr be updated to include site-specific information and specifications following the final walk-through surveys (flora, fauna, avifauna, bats, and heritage) and site development footprint, including the access roads and power line routes. This will ensure that the construction and operation activities are planned and implemented taking sensitive environmental features into account.

**APPENDIX A:**  
**GRIEVANCE MECHANISM**

## **GRIEVANCE MECHANISM / PROCESS**

### **PURPOSE**

This Grievance Mechanism has been developed to receive and facilitate resolution of concerns and grievances about the Project's environmental and social performance. The aim of the grievance mechanism is to ensure that grievances or concerns raised by local landowners and or communities are addressed in a manner that:

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

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

### **PROCEDURE FOR RECEIVING AND RESOLVING GRIEVANCES**

- » Local landowners, communities and authorities must be informed in writing by the Proponent of the grievance mechanism and the process by which grievances can be brought to the attention of the Proponent through its designated representative.
- » A company representative must be appointed as the contact person for grievances to be addressed to. The name and contact details of the contact person must be provided to local landowners, communities and authorities.
- » Project related grievances relating to the construction, operational and or decommissioning phase must be addressed in writing to the contact person. The contact person should assist local landowners and or communities who may lack resources to submit/prepare written grievances.
- » The grievance must be registered with the contact person who, within 5 working days of receipt of the grievance, must contact the Complainant to discuss the grievance and agree on suitable date and venue for a meeting in order to discuss the grievances raised. Unless otherwise agreed, the meeting should be held within 3 weeks of receipt of the grievance.
- » The contact person must draft a letter to be sent to the Complainant acknowledging receipt of the grievance, the name and contact details of Complainant, the nature of the grievance, the date that the grievance was raised, and the date and venue for the meeting (once agreed).
- » Prior to the meeting being held the contact person must contact the Complainant to discuss and agree on the parties who should attend the meeting. The people who will be required to attend the meeting will depend on the nature of the grievance. While the Complainant and or proponent are entitled to invite their legal representatives to attend the meeting/s, it should be made clear that to all the parties involved in the process that the grievance mechanism process is not a legal process. It is therefore recommended that the involvement of legal representatives be limited.

- » The meeting should be chaired by the Proponent's representative appointed to address grievances. The Proponent must provide a person to take minutes of and record the meeting/s. Any costs associated with hiring venues must be covered by the Proponent.
- » Draft copies of the minutes must be made available to the Complainant and the Proponent within 4 working days of the meeting being held. Unless otherwise agreed, comments on the Draft Minutes must be forwarded to the company representative appointed to manage the grievance mechanism within 4 working days of receipt of the draft minutes.
- » In the event of the grievance being resolved to the satisfaction of all the parties concerned, the outcome must be recorded and signed off by the relevant parties. The record should provide details of the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
- » In the event of a dispute between the Complainant and the Proponent regarding the grievance, the option of appointing an independent mediator to assist with resolving the issue should be discussed. The record of the meeting/s must note that a dispute has arisen and that the grievance has not been resolved to the satisfaction of all the parties concerned.
- » In the event that the parties agree to appoint a mediator, the Proponent will be required to identify three (3) mediators and forward the names and CVs to the Complainant within 2 weeks of such agreement being reached. The Complainant, in consultation with the Proponent, must identify the preferred mediator and agree on a date for the next meeting. The cost of the mediator must be borne by the Proponent however the mediator may rule that the Complainant must re-imburse the Proponent a proportion of these costs. The Proponent must provide a person to take minutes of and record the meeting/s.
- » In the event of the grievance, with the assistance of the mediator, being resolved to the satisfaction of all the parties concerned, the outcome must be recorded and signed off by the relevant parties, including the mediator. The record should provide details on the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
- » In the event of the dispute not being resolved, the mediator must prepare a draft report that summarises the nature of the grievance and the dispute. The report should include a recommendation by the mediator on the proposed way forward with regard to the addressing the grievance.
- » The draft report must be made available to the Complainant and the Proponent for comment before being finalised and signed by all parties. Unless otherwise agreed, comments on the draft report must be forwarded to the company representative appointed to manage the grievance mechanism within 4 working days. The way forward will be informed by the recommendations of the mediator and the nature of the grievance.

A Complaint is closed out when no further action can be or needs to be taken. Closure status will be classified in the Complaints Register as follows:

- » Resolved. Complaints where a resolution has been agreed and implemented and the Complainant has signed the Confirmation Form.
- » Unresolved. Complaints where it has not been possible to reach an agreed resolution and the case has been authorised for close out by the Appeals Committee.
- » Abandoned. Complaints where the Complainant is not contactable after one month following receipt of a Complaint and efforts to trace his or her whereabouts have been unsuccessful.

The grievance mechanism does not replace the right of an individual, community, group or organization to take legal action should they so wish. In the event of the grievance not being resolved to the satisfaction of Complainant and or the Proponent, either party may be of the opinion that legal action may be the most appropriate option.



**APPENDIX B:**  
**ALIEN INVASIVE AND OPEN SPACE MANAGEMENT PLAN**

## **ALIEN INVASIVE AND OPEN SPACE MANAGEMENT PLAN**

### **1. PURPOSE**

Invasive alien species pose the second largest threat to biodiversity after direct habitat destruction. The purpose of this Alien Invasive and Open Space Management Plan is to provide a framework for the management of alien and invasive plant species and the integrated management of the natural and semi-natural areas within the development area during the construction and operation of the Gunstfontein Wind Energy Facility. The broad objectives of the plan includes the following:

- » Ensure alien plants do not become dominant in parts or throughout the whole site through the control and management of alien and invasive species presence, dispersal and encroachment.
- » Managing and maintaining the ecosystem in a near-natural state and restoring and/or rehabilitating the ecosystems to such a state.
- » Develop and implement a monitoring and eradication programme for alien and invasive species.
- » Promote the natural re-establishment and planting of indigenous species in order to retard erosion and alien plant invasion.

### **2. RELEVANT ASPECTS OF THE SITE**

The disturbance associated with the construction of the facility will encourage the invasion of alien species into areas with very low current levels of invasion. Some alien invasion is inevitable and regular alien clearing activities would be required to limit the extent of this problem. Once the natural vegetation has returned to the disturbed areas, the site will be less vulnerable to alien plant invasion, however, the roadsides and turbine service areas are likely to remain foci of alien plant invasion. This impact is highly likely to occur during the operational phase of the development. The construction phase is considered too short for significant alien plant invasion to occur despite the fact that many alien species are likely to be imported at this point. Species observed to be problematic in the area include:

- » *Bromus spp.*
- » *Avena fatua*
- » *Erodium cicutarium*
- » *Salsola kali*
- » *Malva parviflora*
- » *Prosopis glandulosa*
- » *Atriplex inflata*

Although the presence of these species within the development area are not directly of concern to the development of the wind energy facility, these are the species that are likely to become a problem within the disturbed areas of the site on account of seed input from these adjacent areas.

### **3. LEGISLATIVE CONTEXT**

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

In terms of the amendments to the regulations under the Conservation of Agricultural Resources Act (Act No. 43 of 1983), all declared aliens must be effectively controlled. Landowners are legally responsible for the control of invasive alien plants on their properties. In terms of this Act, 198 alien species were listed as declared weeds and invaders and ascribed to one of the following categories:

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

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

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

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

Plants listed under the categories above are detailed within Notice 1 of the Alien and Invasive Species published in GNR599 of 01 August 2014. The following guide is a useful starting point for the identification of alien species: Bromilow, C. 2010. Problem Plants and Alien Weeds of South Africa. Briza, Pretoria.

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

## **4. ALIEN PLANT MANAGEMENT PRINCIPLES**

### **4.1. Prevention and early eradication**

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

Monitoring plans should be developed which are designed to identify Invasive Alien Plant Species shortly after they establish in the project area. Keeping up to date on which weeds are an immediate threat to the site is important, but efforts should be planned to update this information on a regular basis. When new Invasive Alien Plant Species are recorded on site, an immediate response of identifying the area for future monitoring and either hand-pulling the weeds or an application of a suitable herbicide should be planned. It is, however, better to monitor regularly and act swiftly than to allow invasive alien plants to become established on site.

### **4.2. Containment and control**

If any alien invasive plants are found to become established on site, action plans for their control should be developed, depending on the size of the infestations, budgets, manpower considerations and time. Separate plans and control actions should be developed for each location and/or each species. Appropriate registered chemicals and other possible control agents should be considered in the action plans for each site/species. The key is to ensure that no invasions get out of control. Effective containment and control will ensure that the least energy and resources are required to maintain this status over the long-term. This will also be an indicator that natural systems are impacted to the smallest degree possible.

### **4.3. General Clearing and Guiding Principles**

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

#### **i. Clearing Methods**

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

Fire shall not be used for alien control or vegetation management at the site. The best-practice clearing method for each species identified should be used. The preferred clearing methods for most alien species can be obtained from the DWAF Working for Water

» **Mechanical control**

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

» **Chemical Control**

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

- \* Area contamination must be minimised by careful, accurate application with a minimum amount of herbicide to achieve good control.
- \* All care must be taken to prevent contamination of any water bodies. This includes due care in storage, application, cleaning equipment and disposal of containers, product and spray mixtures.
- \* Equipment should be washed where there is no danger of contaminating water sources and washings carefully disposed of at a suitable site.
- \* To avoid damage to indigenous or other desirable vegetation, products should be selected that will have the least effect on non-target vegetation.
- \* Coarse droplet nozzles should be fitted to avoid drift onto neighbouring vegetation.
- \* The appropriate health and safety procedures should also be followed regarding the storage, handling and disposal of herbicides.

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

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

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

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

» **Biological control**

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

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

#### **4.4. General management practices**

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

- » Establish an ongoing monitoring programme for the construction phase to detect and quantify any alien species that may become established and identify the problem species.
- » Alien vegetation regrowth on areas disturbed by construction must be immediately controlled once recorded - throughout the entire site during construction and operation.
- » Care must be taken to avoid the introduction of alien invasive plant species to the site. Particular attention must be paid to imported material such as building sand or dirty earth-moving equipment. Stockpiles should be checked regularly and any weeds emerging from material stockpiles should be removed.
- » Cleared areas that have become invaded by alien species can be sprayed with appropriate herbicides provided that these are such that they break down on contact with the soil. Residual herbicides should not be used. Mechanical/ manual method should however also be considered as an option.
- » The effectiveness of vegetation control varies seasonally and this is also likely to impact alien species. Control early in the wet season will allow species to re-grow and follow-up control is likely to be required. It is tempting to leave control until late in the wet season to avoid follow-up control. However, this may allow alien species to set seed before control and hence will not contribute towards reducing alien species abundance. Therefore, vegetation control should be aimed at the middle of the wet season, with a follow-up event towards the end of the wet season. There are no exact dates that can be specified here as each season is unique and management must therefore respond according to the state and progression of the vegetation.
- » Alien management is an iterative process and it may require repeated control efforts to significantly reduce the abundance of a species. This is often due to the presence of large and persistent seed

banks. However, repeated control usually results in rapid decline once seed banks become depleted.

- » Some alien species are best individually pulled by hand and removed from the site.
- » Regular vegetation control to reduce plant biomass within the site should be conducted. This should be timed so as to coincide with the critical growth phases of the most important alien species on site. This will significantly reduce the cost of alien management as this should contribute towards the control of the dominant alien species and additional targeted control will be required only for a limited number of species.
- » No alien species should be cultivated on-site. If vegetation is required for aesthetic purposes, then non-invasive, water-wise locally-occurring species should be used.
- » During operation, surveys for alien species should be conducted regularly. It is recommended that this be undertaken every 6 months for the first two years after construction and annually thereafter. All aliens identified should be cleared using appropriate means.

#### **4.5. Monitoring**

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

In general, the following principles apply for monitoring:

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

The following monitoring could be used as a baseline to ensure management of alien invasive plant species.

#### **Construction Phase**

<b>Monitoring Action</b>	<b>Indicator</b>	<b>Timeframe</b>
Document alien species present at the site	List of alien species	Preconstruction & monthly thereafter
Document alien plant distribution	Alien plant distribution map within priority areas	3 Monthly
Document & record alien control measures implemented	Record of clearing activities	3 Monthly

Review & evaluation of control success rate	Decline in documented alien abundance over time	Biannually
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### **Operation Phase**

Monitoring Action	Indicator	Timeframe
Document alien species distribution and abundance over time at the site	Alien plant distribution map	Biannually (first 2 years) / Annually
Document alien plant control measures implemented & success rate achieved	Records of control measures and their success rate. A decline in alien distribution and cover over time at the site	Biannually (first 2 years) / Annually
Document rehabilitation measures implemented and success achieved in problem areas	Decline in vulnerable bare areas over time	Biannually (first 2 years) / Annually

## **5. OPEN SPACE MANAGEMENT PRINCIPLES**

The following elements are considered part of the Open Space Management Plan. The principles contained within the Alien Invasive Management Plan should also be considered to form part of the Open Space Management Plan.

### **Access Control:**

- » Access to the facility should be strictly controlled.
- » All visitors and contractors should be required to sign-in.
- » Signage at the entrance should indicate that disturbance to fauna and flora is strictly prohibited.

### **Prohibited Activities:**

The following activities should not be permitted by anyone except the landowner or his representatives:

- » No fires within the site.
- » No hunting, collecting or disturbance of fauna and flora, except where required for the safe operation of the facility and only by the Environmental Officer on duty and with the appropriate permits and landowner permission.
- » No driving off of demarcated roads.
- » No interfering with livestock.

### **Fire Risk Management:**

Although fires are not a regular occurrence at the site, fires may occasionally occur under the right circumstances. Ignition risk sources in the area include the following:

- » Lightning strikes
- » Personnel within the facility
- » Infrastructure such as transmission lines



The National Veld and Forest Fires Act places responsibility on the landowner to ensure that the appropriate equipment as well as trained personnel are available to combat fires. Therefore, the management of the facility should ensure that they have suitable equipment as well as trained personnel available to assist in the event of fire.

#### Firebreaks

Extensive firebreaks are not recommended as a fire-risk management strategy at the site. The site is very large compared to the extent of the infrastructure and the maintenance of firebreaks would impose a large management burden on the operation of the facility. In addition, the risk of fires is not distributed equally across the site and within many of the lowlands of the site, there is not sufficient biomass to carry fires and the risk of fires within these areas is very low. Rather targeted risk management should be implemented around vulnerable or sensitive elements of the facility such as substations or other high-risk components. Within such areas, the extent over which management action needs to be applied is relatively limited and it is recommended that firebreaks are created by mowing and that burning to create firebreaks is not used as this in itself poses a risk of runaway fires. Where such firebreaks need to be built such as around substation, a strip of vegetation 5-10 m wide can be cleared manually and maintained relatively free of vegetation through manual clearing on an annual basis. However if alien species colonise these areas, more regular clearing should be implemented.

**APPENDIX C:**  
**PLANT RESCUE AND PROTECTION PLAN**

## PLANT RESCUE AND PROTECTION PLAN

### 1. PURPOSE

The purpose of the plant rescue and protection plan is to implement avoidance and mitigation measures, in addition to the mitigation measures included in the Environmental Management Programme (EMPr) to reduce the impact of the development of the Gunstfontein Wind Energy Facility on listed and protected plant species and their habitats, and to provide guidance on search and rescue of species of conservation concern.

### 2. RELEVANT ASPECTS OF THE SITE

According to the SANBI SIBIS database, 692 plant species have been recorded from the quarter degree squares 3220 CB, DA, CD, DC (Table 1). This includes 11 species of high conservation concern and 22 species of moderate conservation concern. Several listed species were observed at the site including *Brunsvigia josephinae*, *Eriocephalus grandiflorus*, *Adromischus phillipsiae*, *Lachenalia congesta*, *Delosperma sphalmanthoides*, *Cliffortia arborea* and *Romulea komsbergensis*. Areas of high listed species density include the low-lying areas on sandy soils along drainage lines, gravel outcrops and rock pavements especially along the escarpment.

**Table 1:** Numbers of the species within the different conservation status categories as indicated below, data derived from the SANBI SIBIS database. Species not evaluated are largely alien species and species no longer recognised as valid.

Status/ IUCN Red List Category	No. Species
<b>Critically Endangered (CR)</b>	<b>2</b>
<b>Endangered (EN)</b>	<b>0</b>
<b>Vulnerable (VU)</b>	<b>9</b>
<b>Near Threatened (NT)</b>	<b>4</b>
<b>Critically Rare</b>	<b>0</b>
<b>Rare</b>	<b>13</b>
<b>Declining</b>	<b>2</b>
<b>Data Deficient - Insufficient Information (DDD)</b>	<b>3</b>
<b>Data Deficient - Taxonomically Problematic (DDT)</b>	<b>8</b>
<b>Least Concern</b>	<b>547</b>
<b>Not Evaluated</b>	<b>104</b>
<b>Total</b>	<b>692</b>

A preliminary walk-through of the final layout should be conducted to assess the presence of listed plant species within the development footprint which will need to be rescued or relocated. Such a walk-through should be conducted at the favourable time of year when the probability of recognizing species of conservation concern is high.

### 3. PRINCIPLES FOR SEARCH AND RESCUE

Successful plant rescue can only be achieved if:

- » Species can be removed from their original habitat with minimal damage to the plant, especially the roots.
- » All plants removed are safely stored and treated according to their specific requirements prior to being transplanted again.
- » They are relocated into a suitable habitat and protected from further damage and all disturbances to aid their re-establishment.
- » Timing of planting activities is planned with the onset of the growing season.
- » Steps are taken where necessary to aid the initial establishment of vegetation, including occasional watering.

The following principles apply in terms of plant rescue and protection:

- » A permit is required from the Northern Cape Department of Economic Development and Nature Conservation (DENC) to translocate or destroy any listed and protected species, even if they do not leave the property. This permit should be obtained prior to any search and rescue operations being undertaken.
- » Where suitable species are identified, a search and rescue operation of these species should be undertaken within the development footprint, where these species would be affected, and prior to the commencement of construction.
- » As far as possible, timing of search and rescue activities should be planned with the onset of the growing season.
- » Affected individuals should be translocated to a similar habitat outside of the development footprint and marked and recorded for monitoring purposes. For each individual plant that is rescued, the plant must be photographed before removal, tagged with a unique number or code and a latitude longitude position recorded using a hand-held GPS device.
- » The rescued plants must be planted into a container to be housed within a temporary nursery on site or immediately planted into the target habitat.
- » Rescued plants, if re-planted back in the wild, should be placed as close as possible to where they were originally removed. Re-planting into the wild must cause as little disturbance as possible to existing natural ecosystems. The position of the rescued individual/s must be recorded to aid in future monitoring of that plant as noted earlier.
- » During construction, the Environmental Control Officer (ECO)/ Environmental Officer (EO) must monitor vegetation clearing at the site. Any deviations from the plans that may be required should first be checked for listed species by the ECO/EO and any listed species present which are able to survive translocation should be translocated to a safe site.
- » Any listed species suitable for translocation observed within the development footprint, and that would be affected, that were not previously observed be translocated to a safe site.
- » The collecting of plants or their parts should be strictly forbidden (as per the mitigations included in the EMPr). Staff should be informed of the legal and conservation aspects of harvesting plants from the wild as part of the environmental induction training as per the mitigations including the EMPr.
- » Sensitive habitats and areas outside of the project development area should be clearly demarcated as no go areas during the construction and operational phase to avoid accidental impacts.



**APPENDIX D:**  
**REVEGETATION AND REHABILITATION PLAN**

## **REVEGETATION AND REHABILITATION PLAN**

### **1. PURPOSE**

The purpose of the rehabilitation plan is to ensure that areas cleared or impacted during construction activities of the Gunstfontein Wind Energy Facility are rehabilitated with a plant cover that reduces the risk of erosion from these areas as well as restores some ecosystem function. The purpose of the rehabilitation plan for the site can be summarised as follows:

- » Achieve long-term stabilisation of all disturbed areas to minimise erosion potential.
- » Re-vegetate all disturbed areas with suitable local plant species.
- » Minimise visual impact of disturbed areas.
- » Ensure that disturbed areas are safe for future uses.

This Revegetation and Rehabilitation Plan should be closely aligned with other site-specific plans, including the Erosion Management Plan, Alien Invasive and Open Space Management Plan, and Plant Rescue and Protection Plan.

### **2. RELEVANT ASPECTS OF THE SITE**

The site occurs within a semi-arid environment and a fundamentally different approach to rehabilitation efforts in such areas is required as compared to traditional rehabilitation approaches within more mesic areas. In addition, rehabilitation techniques which rely on agricultural techniques such as the application of fertilizer and the planting of annual grasses or other alien species are not appropriate. The major implication of the semi-arid nature of the site is that the use of appropriate species and techniques is key in order to achieve long-term success.

### **3. IDENTIFICATION OF TARGET AREAS**

The construction activities required for the development will result in significant disturbance at the site. Rehabilitation is costly and time-consuming and therefore priority areas where rehabilitation should be focused must be identified. Priority areas include areas vulnerable to erosion such as on steep slopes as well as areas near to important ecosystems such as areas near to drainage lines.

#### **4. TOPSOIL MANAGEMENT**

Effective topsoil management is a critical element of rehabilitation, particularly in arid and semi-arid areas where soil properties are a fundamental determinant of vegetation composition and abundance. Although some parts of the site consist of exposed bedrock, most parts of the site have at least some topsoil. Where any excavation or topsoil clearing is required, the topsoil should be stockpiled and later used to cover cleared and disturbed areas once construction activity has ceased.

- » Topsoil is the top-most layer (0-25cm) of the soil in undisturbed areas. This soil layer is important as it contains nutrients, organic matter, seeds, micro-organisms fungi and soil fauna. All these elements are necessary for soil processes such as nutrient cycling and the growth of new plants. The biologically active upper layer of the soil is fundamental in the maintenance of the entire ecosystem;
- » Topsoil should be retained on site in order to be used for site rehabilitation. The correct handling of the topsoil is a key element to rehabilitation success. Firstly it is important that the correct depth of topsoil is excavated. If the excavation is too deep, the topsoil will be mixed with sterile deeper soil, leading to reduction in nutrient levels and a decline in plant performance on the soil;
- » Wherever possible, stripped topsoil should be placed directly onto an area being rehabilitated. This avoids stockpiling and double handling of the soil. Topsoil placed directly onto rehabilitation areas contains viable seed, nutrients and microbes that allow it to revegetate more rapidly than topsoil that has been in stockpile for long periods;
- » If direct transfer is not possible, the topsoil should be stored separately from other soil heaps until construction in an area is complete. The soil should not be stored for a long time and should be used as soon as possible. The longer the topsoil is stored, the more seeds, micro-organisms and soil biota become sterile;
- » Ideally stored topsoil should be used within a month and should not be stored for longer than three months. In addition, topsoil stores should not be too deep, a maximum depth of 1m is recommended to avoid compaction and the development of anaerobic conditions within the soil;
- » If topsoil is stored on a slope then sediment fencing should be used downslope of the stockpile in order to intercept any sediment and runoff should be directed away from the stockpiles upslope.
- » Reduced activity at the site after large rainfall events when the soils are wet is encouraged. No driving off of hardened roads should occur immediately following large rainfall events until soils have dried out and the risk of bogging down has decreased.
- » Any topsoil, waste rock or other material dumps should be protected from erosion with silt traps and other suitable prevention measures.
- » Gabions and other stabilisation features should be used during construction activities on steep slopes in order to prevent erosion.

#### **5. GENERAL PRINCIPLES FOR REHABILITATION**

##### **5.1. Mulching**



Mulching is the covering of the soil with a layer of organic matter of leaves, twigs bark or wood chips, usually chopped quite finely. The main purpose of mulching is to protect and cover the soil surface as well as serve as a source of seed for revegetation purposes.

- » During site clearing the standing vegetation should not be cleared and mixed with the soil, but should be cleared separately, either mechanically or by hand using a brush-cutter. The cleared vegetation should be stockpiled and used whole or shredded by hand or machine to protect the soil in disturbed areas and promote the return of indigenous species;
- » Mulch is to be harvested from areas that are to be denuded of vegetation during construction activities, provided that they are free of seed-bearing alien invasive plants;
- » No harvesting of vegetation may be done outside the area to be disturbed by construction activities; and
- » Brush-cut mulch shall be stored for as short a period as possible, and seed released from stockpiles shall be collected for use in the rehabilitation process.

## **5.2 Seeding**

In some areas the natural regeneration of the vegetation may be poor and the application of seed to enhance vegetation recovery may be required. Seed should be collected from plants present at the site and should be used immediately or stored appropriately and used at the start of the following wet season. Seed can be broadcast onto the soil, but should preferably be applied in conjunction with measures to improve seedling survival such as scarification of the soil surface or simultaneous application of mulch.

- » Indigenous seeds may be harvested for purposes of re-vegetation in areas that are free of alien / invasive vegetation, either at the site prior to clearance or from suitable neighbouring sites;
- » Seed may be harvested by hand and if necessary dried or treated appropriately;
- » Seed gathered by vacuum harvester, or other approved mass collection method, from suitable shrubs or from the plant litter surrounding the shrubs must be kept apart from individually harvested seed; and
- » No seed of alien or foreign species should be used or brought onto the site.

### **5.3 Transplants**

Where succulent plants are available or other species which may survive translocation are present, individual plants can be dug out from areas about to be cleared and planted into areas which require revegetation. This can be an effective means of establishing indigenous species quickly.

- » Plants for transplant should only be removed from areas that are going to be cleared;
- » Perennial grasses, shrubs, succulents and geophytes are all potentially suitable candidates for transplant;
- » Transplants should be nearby and should not be transported around the site to distant areas; and
- » Transplants must remain within the site and may not be transported off the site. Therefore, it is recommended that before construction commences individuals of listed species within the development footprint should be marked and translocated to similar habitat outside the development footprint under the supervision of an ecologist or someone with experience in plant translocation. Permits from the relevant provincial authorities will be required to relocate listed plant species.

### **5.4 Use of soil savers**

On steep slopes and areas where seed and organic matter retention is low, it is recommended that soil savers are used to stabilise the soil surface. Soil savers are man-made materials, usually constructed of organic material such as hemp or jute and are usually applied in areas where traditional rehabilitation techniques are not likely to succeed.

- » In areas where soil saver is used, it should be pegged down to ensure that it captures soil and organic matter flowing over the surface; and
- » Soil saver may be seeded directly once applied as the holes in the material catch seeds and provide suitable microsites for germination.

### **5.6. General**

- » Progressive rehabilitation is an important element of the rehabilitation strategy and should be implemented where feasible;
- » Once revegetated, areas should be protected to prevent trampling and erosion;
- » No construction equipment, vehicles or unauthorised personnel should be allowed onto areas that have been vegetated;
- » Where rehabilitation sites are located within actively grazed areas, they should be fenced;
- » Fencing should be removed once a sound vegetative cover has been achieved; and
- » Any runnels, erosion channels or wash ways developing after revegetation should be backfilled and consolidated and the areas restored to a proper stable condition.

## **6. MONITORING REQUIREMENTS**

As rehabilitation success, particularly in arid areas is unpredictable, monitoring and follow-up actions are important to achieve the desired cover and soil protection.

- » Re-vegetated areas should be monitored every 3 months for the first 12 months and every 6 months thereafter for the next year.
- » Re-vegetated areas showing inadequate surface coverage (less than 30% within 12 months after re-vegetation) should be prepared and re-vegetated.
- » Where transplants have been used the survival rate of the different species used should be monitored every 3 months for the first 12 months and every 6 months thereafter for the next year. The results should be used to inform the choice of species for transplant and other factors which may influence survival.

**APPENDIX E:**  
**TRAFFIC MANAGEMENT PLAN**

## PRINCIPLES FOR TRAFFIC MANAGEMENT

### 1. PURPOSE

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

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

### 2. RELEVANT ASPECTS OF THE PROJECT

The general freight for the wind farm comprise of building material, blades, nacelles, towers, rotors and a transformer. The route for transportation of imported equipment is either from Saldanha, Cape Town or Port Elizabeth, although Saldanha is the preferred port with a route length of 426km.

The northern section of the study area (above the escarpment) can be accessed via a gravel road which branches off of the R354. The internal access roads will need to be established. As far as possible, existing access roads to the site would be utilised, and upgraded where required.

The traffic volumes and movements for the construction, operation and decommissioning phases of the project will have varying patterns:

#### Construction Phase

The anticipated traffic during the construction phase per turbine are as follows:

- » Abnormal vehicles: 10 (turbine components)
- » Heavy vehicles: 60 (reinforcement and concrete)
- » Heavy vehicles: 5 (road layer works)

Therefore 150/10 (heavy/abnormal) vehicles will be required per turbine.

The total trips for the preferred heavy vehicles during the construction phase of the project over an estimated period of alternative layout of 68 turbines will be 680 abnormal and 10200 heavy vehicles during the construction phase of the project over an estimated period of 24 months.

The personnel required during installation is estimated to be 300 persons. The personnel will be transported to and from the site by means of busses. This personnel transportation will contribute the majority of the estimate daily trips between 15 to 20 trips.

The current traffic volume on the N1 near Matjiesfontein (between Laingsburg and Touwsrivier) are estimated from the most recent SANRAL yearbook at 3834 average Daily Traffic, 1497 average daily truck traffic (both directions with a 50/50 split) and a maximum hourly flow of about 800 veh/h for this section of the road.

The current traffic volumes on the R354 (Western Cape Province Road: Truck Road 20/1) is in the order of 140 vehicles per day with a 13% heavy vehicle component.

In the worst case, the number of heavy vehicle trips per day would be in order of 15-25 round trips for the construction of the wind farm. Based on the expected number of construction trips to be generated by the Gunstfontein wind farm development, the existing road network has sufficient capacity to accommodate the additional trips from an operational perspective.

#### Operation Phase

The operation phase of this project is not expected to generate significant traffic volumes as the generated site traffic would be limited to maintenance support, with only a few light vehicles per day. It is estimated that the number of external light trips will vary between 5 and 10 light vehicles per day to transport operational personnel to and from the site. There is also a possibility that certain turbine elements such as blades, gearbox or nacelle hub will need to be replaced over the life of the project, which would require ad hoc abnormal trips and the movement of a crane to the site.

There will be nominal construction equipment necessary for the maintenance of the roads if required. This would be infrequent and negligible.

#### Decommissioning Phase

The anticipated traffic during the decommissioning phase per turbine are as follows:

- » Abnormal vehicles for removal of turbines: 10 (turbine components)
- » Heavy vehicles for transportation debris: 5 (demolished concrete bases)
- » Heavy vehicles for transporting construction equipment: 5 (road works)

Therefore 10/10 (heavy/abnormal) vehicles will be required per turbine.

This traffic is expected over a 12 month period. The personnel required at this stage would be in the order of 100 persons which would generate 5 to 10 trips daily. The traffic volume on the National and Provincial roads would be in the order of 1.5 to 2.0 times the existing traffic depending on the actual growth rates.

It can therefore be stated that the installation traffic, the operational traffic and the decommissioning traffic would be low without out any significant impact on the existing traffic flows on the N1 or Provincial Roads and it will have a negligible impact on pavement structures. Furthermore the traffic impact on the provincial gravel road will also be negligible with respect to service levels.

### **3. TRAFFIC AND TRANSPORTATION MANAGEMENT PRINCIPLES**

- » Prior to the commencement of construction the contractor must develop their own detailed Transport Management Plan (TMP) based on traffic volumes and road carry capacity outlines in this plan
- » The transport contractor must ensure that all required permits for the transportation of abnormal loads are in place prior to the transportation of equipment and project components to the site. Specific abnormal load routes must be developed with environmental factors taken into consideration.
- » Before construction commences, authorised access routes must be clearly marked in the field with signs or flagging. The Construction Contractor must review the location of designated access and will be responsible for ensuring construction travel is limited to designated routes. The entrance of the main access road must not be constructed before a blind rise or on a bend of the public road.
- » All employees must attend an environmental training program (e.g. toolbox talks) by the Environmental Officer (EO). Through this program, employees will be instructed to use only approved access roads, drive within the delineated road limits, and obey jurisdictional and posted speed limits to minimise potential impacts to the environment and other road users.
- » The contractor will be responsible for making sure that their suppliers, vendors, and subcontractors strictly comply with the principles of this TMP and the contractor's TMP.
- » Adjacent landowners must be notified of the construction schedule.
- » Access roads and entrances to the site should be carefully planned to limit any intrusion on the neighbouring property owners and road users.
- » Signs must be posted in the project area to notify landowners and others of the construction activity.
- » Flagging must be provided at access points to the site and must be maintained until construction is completed on the site.
- » Speed limits must be established prior to commencement of construction and enforced over all construction traffic.
- » Speed controls and implementation of appropriate dust suppression measures must be enforced to minimise dust pollution.
- » Throughout construction the contractor will be responsible for monitoring the condition of roads used by project traffic and for ensuring that roads are maintained in a condition that is comparable to the condition they were in before the construction began.
- » Drivers must have an appropriate valid driver's license and other operation licences required by applicable legislation.
- » All vehicles must be maintained in good mechanical, electrical, and electronic condition, including but not limited to the brake systems, steering, tires, windshield wipers, side mirrors and rear view mirror, safety belts, signal indicators, and lenses.
- » Any traffic delays attributable to construction traffic must be co-ordinated with the appropriate authorities.
- » No deviation from approved transportation routes must be allowed, unless roads are closed for reasons outside the control of the contractor.
- » Impacts on local communities must be minimised. Consideration should be given to limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time.

#### **4. MONITORING**

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



**APPENDIX F:**  
**STORM WATER MANAGEMENT PLAN**

## **STORMWATER MANAGEMENT PLAN**

### **1. PURPOSE**

It is understood that activities associated with developments can impact negatively on drainage systems. By taking greater cognisance of natural hydrological patterns and processes it is possible to develop stormwater management systems in a manner that reduces these potentially negative impacts and mimic nature. The main risks associated with inappropriate stormwater management are increased erosion risk and risks associated with flooding. Therefore, this Stormwater Management Plan and the Erosion Management Plan are closely linked to one another and should be managed together.

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

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

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

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

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

### **2. RELEVANT ASPECTS OF THE SITE**

The most prominent hydrological features within the study area, mainly located on top of the plateau, are a number of non-perennial pans and farm dams. Other smaller pans and farm dams occur throughout the study area. There are no major perennial rivers in close proximity to the proposed development site, but a number of non-perennial rivers and streams traverse the study area. The most notable of these is the Tankwa River and its tributaries that have their origin within this region.

The proposed development occurs at the intersection of the following catchments within the Nama Karoo Ecoregion:

- » E23A – Tankwa;
- » E23B - Knoffelhoeks River catchment; and
- » D56C – Unknown tributary of the Riet River catchment

These catchments are characterised by several perennial and non-perennial rivers associated with these mainstem systems, several of which contain the following:

- » Seeps with no wetland habitat only rock outcrops colonised by grasses;
- » Seep wetlands, rock and clay soils colonised by *Juncus* and other sedge species;
- » Channelled valley bottom wetlands (Plate 3), with *Juncus* and other sedge species;
- » Unchannelled valley bottom wetland areas, similar to the above but without a visible channel; and
- » Depressions / endorheic pans, some of which have been converted into dams.

In terms of the National Freshwater Ecosystems Priority Areas (NFEPA) assessment, all of drainage lines within the site have been assigned a condition score of AB (Nel *et al.* 2012), indicating that they largely intact watercourses of biological significance. This is largely due to this catchments falling with the headwaters of large systems such as the Tankwa and Buffels River. This is especially true for those systems flowing in a westerly direction forming part of the Tankwa River catchment, as these are largely natural systems.

It should be noted that there is a potential impact on riparian systems through the possible increase in surface water runoff on downstream riparian form and function, i.e. although no water courses are present, impacts to the hydrological regime such as alteration of surface run-off patterns may be altered.

### **3. STORMWATER MANAGEMENT PRINCIPLES**

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

- » Prevent concentration of stormwater flow at any point where the ground is susceptible to erosion.
- » Reduce stormwater flows as far as possible by the effective use of attenuating devices (such as swales, berms, silt fences). As construction progresses, the stormwater control measures are to be monitored and adjusted to ensure complete erosion and pollution control at all times.
- » Minimise the area of exposure of bare soils to minimise the erosive forces of wind, water and all forms of traffic.
- » Ensure that development does not increase the rate of stormwater flow above that which the natural ground can safely accommodate at any point in the sub-catchments.
- » Ensure that all stormwater control works are constructed in a safe and aesthetic manner in keeping with the overall development.
- » Plan and construct stormwater management systems to remove contaminants before they pollute surface waters or groundwater resources. Implement the principle of separating clean and dirty run-off streams (typically from bunded areas or those areas associated with hydrocarbon storage or the facility substation).
- » Contain soil erosion, whether induced by wind or water forces, by constructing protective works to trap sediment at appropriate locations. This applies particularly during construction.

- » Avoid situations where natural or artificial slopes may become saturated and unstable, both during and after the construction process.
- » Design and construct roads to avoid concentration of flow along and off the road. Where flow concentration is unavoidable, measures to incorporate the road into the pre-development stormwater flow should not exceed the capacity of the culvert. To assist with the stormwater run-off, gravel roads should typically be graded and shaped with a 2-3% crossfall back into the slope, allowing stormwater to be channelled in a controlled manner towards the, natural drainage lines and to assist with any sheet flow on the site.
- » Design culvert inlet structures to ensure that the capacity of the culvert does not exceed the pre-development stormwater flow at that point. Provide detention storage on the road and/or upstream of the stormwater culvert.
- » Design outlet culvert structures to dissipate flow energy. Any unlined downstream channel must be adequately protected against soil erosion.
- » Where the construction of a building causes a change in the vegetative cover of the site that might result in soil erosion, the risk of soil erosion by stormwater must be minimised by the provision of appropriate artificial soil stabilisation mechanisms or revegetation of the area. Any inlet to a piped system should be fitted with a screen, or grating to prevent debris and refuse from entering the stormwater system.
- » Preferably all drainage channels on site and contained within the larger area of the property (i.e. including buffer zone) should remain in the natural state so that the existing hydrology is not disturbed.

### **3.1. Engineering Specifications**

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

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

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

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

**APPENDIX G:**  
**EMERGENCY PREPAREDNESS AND RESPONSE PLAN**

## EMERGENCY PREPAREDNESS AND RESPONSE PLAN

### 1. PURPOSE

The purpose of the Emergency Preparedness and Response Plan is:

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

This plan outlines response actions for potential incidents of any size. It details response procedures that will minimise potential health and safety hazards, environmental damage, and clean-up efforts. The plan has been prepared to ensure quick access to all the information required in responding to an emergency event. The plan will enable an effective, comprehensive response to prevent injury or damage to the construction personnel, public, and environment during the project. Contractors are expected to comply with all procedures described in this document. A Method Statement should be prepared at the commencement of construction detailing how this plan is to be implemented as well as details of relevant responsible parties for the implementation. The method statement must also reflect conditions of the IFC PS1 and include the following:

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

## **2. PROJECT-SPECIFIC DETAILS**

The Gunstfontein Wind Farm (Pty) Ltd proposes to construct and operate a wind energy facility, known as the Gunstfontein Wind Energy Facility, on the Remaining of the Farm Gunstfontein 131, located approximately 20km south of Sutherland in the Northern Cape Province. Due to the scale and nature of this development, it is anticipated that the following risks could potentially arise during the construction and operation phases:

- Fires;
- Leakage of hazardous substances;
- Storage of flammable materials and substances;
- Accidents; and
- Natural disasters.

## **3. EMERGENCY RESPONSE PLAN**

There are three levels of emergency as follows:

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

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

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



### **3.1. Emergency Scenario Contingency Planning**

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

##### **i. Spill Prevention Measures**

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

- » All equipment refuelling, servicing and maintenance activities should only be undertaken within appropriately sealed designated areas.
- » All maintenance materials, oils, grease, lubricants, etc. should be stored in a designated area in an appropriate storage container.
- » No refuelling, storage, servicing, or maintenance of equipment should take place within 50m of drainage lines or sensitive environmental resources in order to reduce the risk of contamination by spills.
- » No refuelling or servicing should be undertaken without absorbent material or drip pans properly placed to contain spilled fuel.
- » Any fluids drained from the machinery during servicing should be collected in leak-proof containers and taken to an appropriate disposal or recycling facility.
- » If these activities result in damage or accumulation of product on the soil, the contaminated soil must be disposed of as hazardous waste. Under no circumstances shall contaminated soil be added to a spoils pile and transported to a regular disposal site.
- » Chemical toilets used during construction must be regularly cleaned. Chemicals used in toilets are also hazardous to the environment and must be controlled. Portable chemical toilets could overflow if not pumped regularly or they could spill if dropped or overturned during moving. Care and due diligence should be taken at all times.
- » Contact details of emergency services and HazMat Response Contractors are to be clearly displayed on the site. All staff are to be made aware of these details and must be familiar with the procedures for notification in the event of an emergency (as well as the possible time delay in emergency services arriving due to the remote location of the site).

##### **ii. Procedures**

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

1. Spill or release identified.
2. Assess person safety, safety of others and environment.
3. Stop the spill if safely possible.
4. Contain spill to limit entering water bodies and surrounding areas.
5. Identify substance spilled.
6. Quantify spill (under or over guideline/threshold levels).

7. Notify Site Manager and emergency response crew and authorities (in event of major spill).
8. Inform users (and downstream users) of potential risk.
9. Clean up of spill using on-site spill kit or by HazMat team (if required).
10. Record of spill incident on company database.

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

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

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

**Containment of Spills on Land**

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

» *Dykes*

Dykes can be created using soil surrounding a spill on land. These dykes are constructed around the perimeter or down slope of the spilled substance. A dyke needs to be built up to a size that will ensure containment of the maximum quantity of contaminant that may reach it. A plastic tarp can be placed on and at the base of the dyke such that the contaminant can pool up and subsequently be removed with sorbent materials or by pump into barrels or bags. If the spill is migrating very slowly, a dyke may not be necessary and sorbents can be used to soak up contaminants before they migrate away from the source of the spill.

» *Trenches*

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

**Containment of Spills on or in Water (including water resource features)**

Spills in water can negatively impact water quality and aquatic life. All measures need to be undertaken to contain spills to drainage lines or open water. The following methods could be used:

» *Temporary weirs*

Temporary weir structures can be used to contain spills in streams and to prevent further migration downstream. Plywood or other materials found on site can be placed into and across the width of the stream, such that water can still flow under the weir. Weirs are however only effective for spilled substances which float on the water surface, and also only for a limited time period.

» *Barriers*

In some situations barriers made of netting or fence material can be installed across a stream, and sorbent materials placed at the base to absorb spilled substance. Sorbents will need to be replaced as soon as they are saturated. Water will be allowed to flow through.

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

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

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

**c) Procedures for restoring affected areas**

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

### **3.1.2. Scenario: Fire (and fire water handling)**

#### **i. Action Plan**

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

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

#### **ii. Procedures**

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

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

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

#### **a) Procedures for initial actions**

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

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

**b) Reporting procedures**

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

## SUMMARY: RESPONSE PROCEDURE

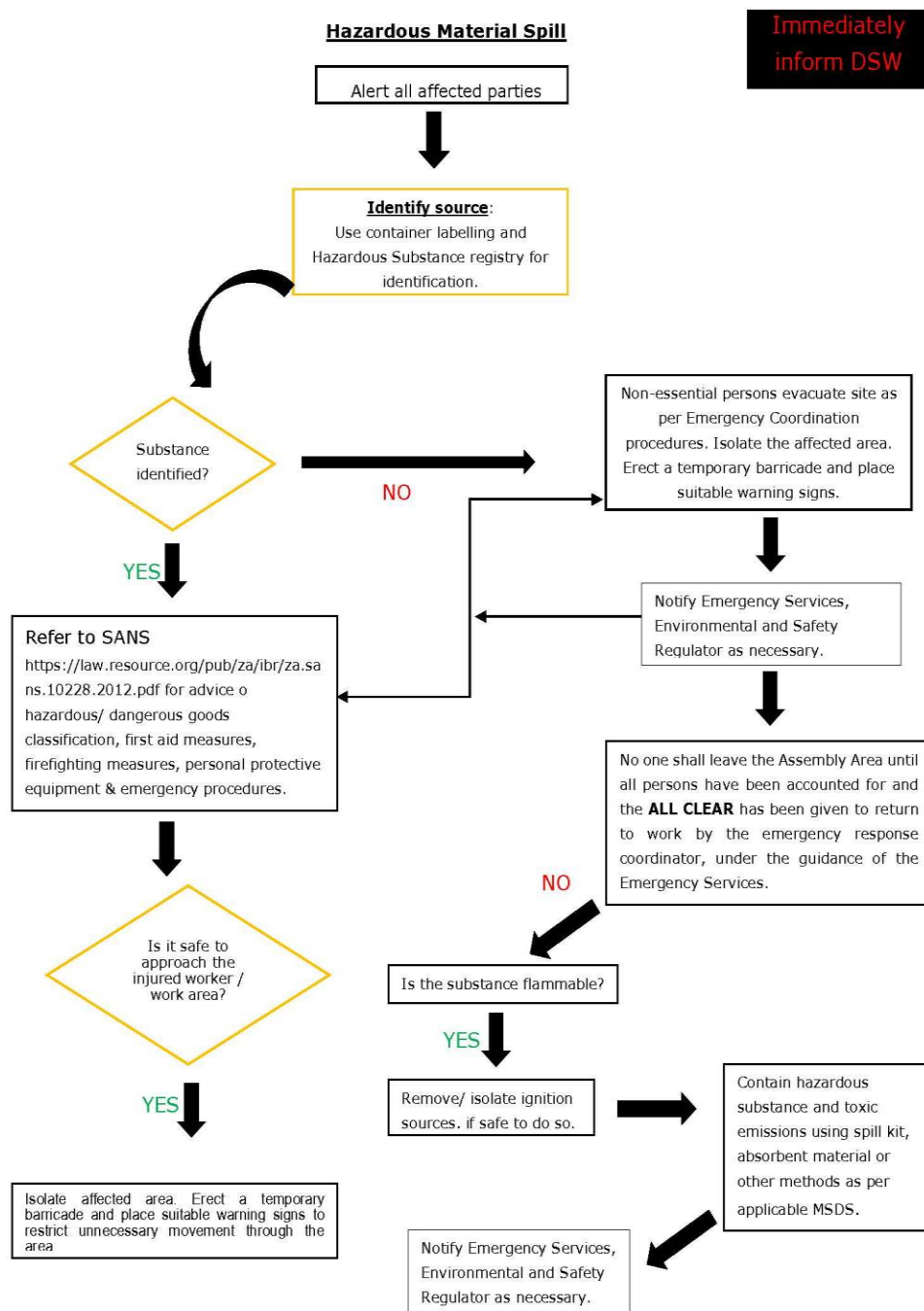
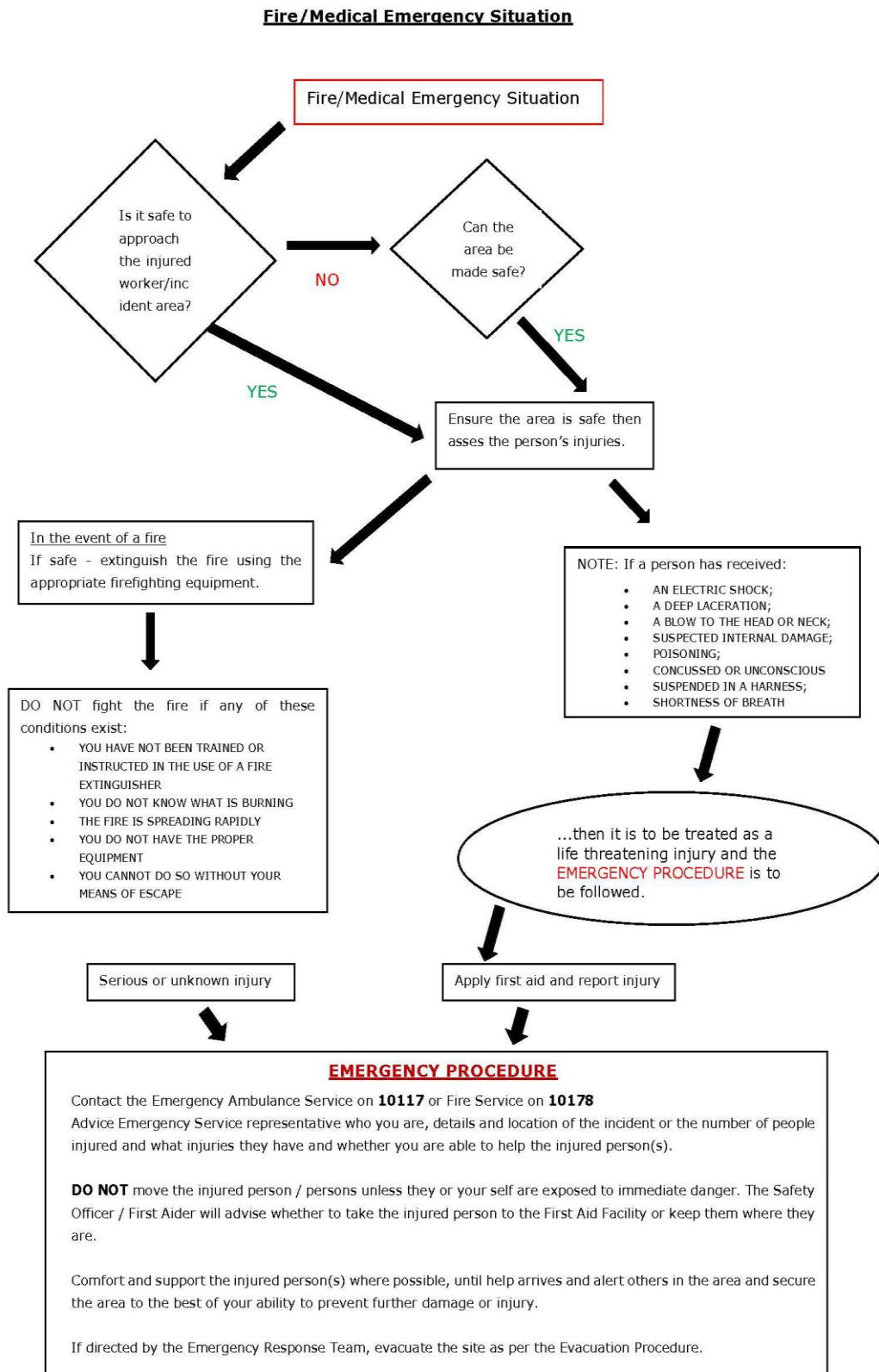


Figure 1: Hazardous Material Spill



**Figure 2:** Emergency Fire/Medical

**APPENDIX H:**  
**EROSION MANAGEMENT PLAN**



## PRINCIPLES FOR EROSION MANAGEMENT

### 1. PURPOSE

Exposed and unprotected soils are the main cause of erosion in most situations. Therefore, this erosion management plan and the revegetation and rehabilitation plan are closely linked to one another and should not operate independently, but should rather be seen as complementary activities within the broader environmental management of the site and should therefore be managed together.

This Erosion Management Plan addresses the management and mitigation of potential impacts relating to soil erosion. The objective of the plan is to provide:

- A general framework for soil erosion and sediment control, which enables the contractor to identify areas where erosion can occur and is likely to be accelerated by construction related activities.
- An outline of general methods to monitor, manage and rehabilitate erosion prone areas, ensuring that all erosion resulting from all phases of the development is addressed.

### 2. RELEVANT ASPECTS OF THE SITE

The soils in most of the Gunstfontein study area are not considered to be highly erodible. This is due to several factors, including the shallow soil depth to underlying rock, as well as the presence of surface rock outcrops. This will lead to a relatively stable soil surface, although in areas with steeper slopes, virtually all soils will erode to some extent if disturbed.

However, in land type **Db6**, there is a significant occurrence (74%) of duplex soils, which are deeper, with a sandy topsoil abruptly overlying a clay subsoil, so that if the topsoil becomes exposed (by such actions as overgrazing, or man-made processes such as construction), it can be washed away, resulting in the subsoil forming a crust, which is very difficult to re-vegetate. Therefore, great care should be taken in this area wherever construction activities are planned.

As the only planned infrastructure that traverses land type Db6 is a single length of access road.

### 3. EROSION AND SEDIMENT CONTROL PRINCIPLES

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

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

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

### 3.1. On-Site Erosion Management

General factors to consider regarding erosion risk at the site includes the following:

- » Soil loss will be greater during wet periods than dry periods. Intense rainfall events outside of the wet season, such as occasional summer thunder storms can also cause significant soil loss. Therefore precautions to prevent erosion should be present throughout the year.
- » Soils loss will be greater along the access road that traverses land type Db6. Therefore precautions to prevent erosion should be present throughout the construction phase.
- Soils loss will be greater on steeper slopes. Ensure that steep slopes are not devegetated unnecessarily and subsequently become hydrophobic (i.e. have increased runoff and a decreased infiltration rate) increasing the erosion potential.
- » Soil loss is related to the length of time that soils are exposed prior to rehabilitation or stabilisation. Therefore the gap between construction activities and rehabilitation should be minimised. Phased construction and progressive rehabilitation, where practically possible, are therefore important elements of the erosion control strategy.
- » The extent of disturbance will influence the risk and consequences of erosion. Therefore site clearing should be restricted to areas required for construction purposes only. As far as possible, large areas should not be cleared all at once, especially in areas where the risk of erosion is higher.
- » Roads should be planned and constructed in a manner which minimises their erosion potential. Roads should therefore follow the natural contour as far as possible. Roads parallel to the slope direction should be avoided as far as possible.
- » Where necessary, new roads constructed should include water diversion structures present with energy dissipation features present to slow and disperse the water into the receiving area.
- » Roads and other disturbed areas should be regularly monitored for erosion. Any erosion problems recorded should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.
- » Compacted areas should have adequate drainage systems to avoid pooling and surface flow. Heavy machinery should not compact those areas which are not intended to be compacted as this will result in compacted hydrophobic, water repellent soils which increase the erosion potential of the area. Where compaction does occur, the areas should be ripped.
- » All bare areas should be revegetated with appropriate locally occurring species, to bind the soil and limit erosion potential.
- » Silt fences should be used where there is a danger of topsoil or material stockpiles eroding and entering streams and other sensitive areas.
- » Gabions and other stabilisation features should be used on steep slopes and other areas vulnerable to erosion to minimise erosion risk as far as possible.
- » Activity at the site after large rainfall events when the soils are wet and erosion risk is increased should be reduced.
- » Topsoil should be removed and stored separately during construction activities (as per the recommendations in the EMPr), and should be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas.

- » Regular monitoring of the site for erosion problems during construction (on-going) and operation (at least twice annually) is recommended, particularly after large summer thunderstorms have been experienced. The ECO will determine the frequency of monitoring based on the severity of the impacts in the erosion prone areas.

### **3.1.1. Erosion control mechanisms**

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

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

### **3.2. Engineering Specifications**

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

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

### **3.3. Monitoring**

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

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

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

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

#### **4. CONCLUSION**

The Erosion Management Plan is a document to assist the Proponent/ Contractor with guidelines on how to manage erosion during all phases of the project. The implementation of management measures is not only good practice to ensure minimisation of degradation, but also necessary to ensure compliance with legislative requirements. This document forms part of the EMPr, and is required to be considered and adhered to during the design, construction, operation and decommissioning phases of the project (if and where applicable).

## **5. REFERENCES**

- Department of Environmental Affairs. (1983). *Conservation of Agricultural Resources Act 43 of 1983*. Pretoria: Department of Environmental Affairs.
- Coetzee, K. (2005). *Caring for Natural Rangelands*. Scottsville: University of KwaZulu-Natal Press.
- Commission, F. R. (2009, March 10). *Forestry Commission*. Retrieved August Tuesday, 2012, from Forestry Commission: Forest Research : [www.forestry.gov.uk](http://www.forestry.gov.uk)
- Tongway, D. J., & Ludwig, J. A. (2004). *Heterogeneity in arid and semi arid lands*. Queensland: Sustainable Ecosystems.
- van der Linde, M., & Feris, L. (2010). *Compendium of South African Legislation*. Pretoria: Pretoria University Press.

**APPENDIX I:**  
**ENVIRONMENTAL TEAM CV'S**



## environmental affairs

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA

### DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

File Reference Number:  
NEAS Reference Number:  
Date Received:

(For official use only)

DEA/EIA/

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

#### PROJECT TITLE

PROPOSED AMENDMENT TO THE GUNSTONTEIN WEF, PTN 1 OF THE FARM  
GUNSTONTEIN 131, NORTHERN CAPE

#### Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
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#### Departmental Details

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Department of Environmental Affairs  
Attention: Chief Director: Integrated Environmental Authorisations  
Private Bag X447  
Pretoria  
0001

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Environment House  
473 Steve Biko Road  
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:  
Email: [EIAAdmin@environment.gov.za](mailto:EIAAdmin@environment.gov.za)

1.


## SPECIALIST INFORMATION

Specialist Company Name:	CTS HERITAGE		
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition
Specialist name:	JENNA LAVIN		
Specialist Qualifications:	MSC. ARCHAEOLOGY		
Professional affiliation/registration:	ASAPA APHP		
Physical address:	16 EDISON WAY, CENTURY CITY		
Postal address:	34 HARRIES ST, PLUMSTEAD		
Postal code:	7800	Cell:	083 617 0854
Telephone:		Fax:	
E-mail:	jenna.lavin@ctsheritage.com		

## 2. DECLARATION BY THE SPECIALIST

I, JENNA LAVIN, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

  
Signature of the Specialist

CTS HERITAGE  
Name of Company:

30 MAY 2019  
Date



3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, JENNA LAVIN, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

[Signature]  
Signature of the Specialist

CTS HERITAGE  
Name of Company

30 MAY 2019  
Date

[Signature]  
Signature of the Commissioner of Oaths

2019-05-30  
Date





## environmental affairs

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA

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NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

#### PROJECT TITLE

Gunstfontein Wind Energy Facility

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Email: [EIAAdmin@environment.gov.za](mailto:EIAAdmin@environment.gov.za)


## 1. SPECIALIST INFORMATION

Specialist Company Name:	Arcus Consultancy Services South Africa (Pty) Ltd		
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition
Specialist name:	Jonathan Aronson		
Specialist Qualifications:	Master of Science (Zoology)		
Professional affiliation/registration:	SACNASP #400238/14 South African Bat Assessment Association		
Physical address:	Office 220 Cube Workspace Cnr Long Street and Hans Strijdom Road Cape Town		
Postal address:	Office 220 Cube Workspace Cnr Long Street and Hans Strijdom Road Cape Town		
Postal code:	8001	Cell:	0790988595
Telephone:	0214121535	Fax:	n/a
E-mail:	JonathanA@arcusconsulting.co.za		

## 2. DECLARATION BY THE SPECIALIST

I, Jonathan Aronson , declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

  
Signature of the Specialist

Arcus Consultancy Services South Africa (Pty) Ltd

Name of Company:

69/07/2019  
Date

Details of Specialist, Declaration and Undertaking Under Oath

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Jonathan Aronson, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.



Signature of the Specialist

Arcus Consultancy Services South Africa (Pty) Ltd

Name of Company

09/07/2019

Date

**Peter Hugh Martyn Cohen**  
Commissioner of Oaths  
Practising Attorney SA  
ENSafrica  
1 North Wharf Square  
Loop Street Cape Town 8001



Signature of the Commissioner of Oaths

09/07/2019

Date



## environmental affairs

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA

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#### PROJECT TITLE

*Gunstfontein Wind Energy Facility*

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Email: [EIAAdmin@environment.gov.za](mailto:EIAAdmin@environment.gov.za)


## 1. SPECIALIST INFORMATION

Specialist Company Name:	Arcus Consultancy Services (Pty) Ltd.		
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition
Specialist name:	Andrew Pearson		
Specialist Qualifications:	BSc. Conservation Ecology		
Professional affiliation/registration:	SACNASP - Professional Natural Scientist (Pr. Sci. Nat)		
Physical address:	Office 220 Cube Workspace, Chr Long and Hans Strijdom		
Postal address:	AS ABOVE		
Postal code:	8001	Cell:	072 558 0080
Telephone:	021 412 1529	Fax:	
E-mail:	andrewp@arcusconsulting.co.za		

## 2. DECLARATION BY THE SPECIALIST

I, Andrew Pearson, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

  
Signature of the Specialist

Arcus Consultancy Services South Africa (Pty) Ltd.  
Name of Company:

12/06/2019  
Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Andrew Pearson, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

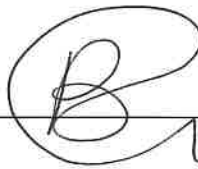
  
\_\_\_\_\_  
Signature of the Specialist

ARCUS CONSULTANCY SERVICES SOUTH AFRICA (PTY) LTD

\_\_\_\_\_  
Name of Company

12/06/2019  
\_\_\_\_\_  
Date

Brittany Muller  
\_\_\_\_\_  
Signature of the Commissioner of Oaths



**Brittany Elizabeth Muller**  
Commissioner of Oaths  
Practising Attorney SA  
ENSafrica  
1 North Wharf Square  
Loop Street Cape Town 8001



12/06/2019  
\_\_\_\_\_  
Date

**APPENDIX 6  
DECLARATION OF THE EAP**

I, Jo-Anne Thomas, declare that –


- I act as the independent environmental assessment practitioner in this application;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I will take into account, to the extent possible, the matters listed in Regulation 14 of the Regulations when preparing the application and any report relating to the application;
- I undertake to disclose to the applicant and the Competent Authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the Competent Authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the Competent Authority, unless access to that information is protected by law, in which case it will be indicated that such information exists and will be provided to the Competent Authority;
- I will perform all obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I am aware of what constitutes an offence in terms of Regulation 48 and that a person convicted of an offence in terms of Regulation 48(1) is liable to the penalties as contemplated in Section 49B of the Act.

**Disclosure of Vested Interest (delete whichever is not applicable)**

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;

~~• I have a vested interest in the proposed activity proceeding, such vested interest being:~~

Not Applicable



Signature of the environmental assessment practitioner

Savannah Environmental (Pty) Ltd

Name of company:

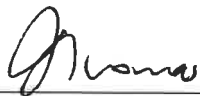
19/07/2019

Date



## UNDERTAKING UNDER OATH/ AFFIRMATION

I, Jo-Anne Thomas, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.



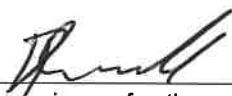
Signature of the environmental assessment practitioner

Savannah Environmental (Pty) Ltd

Name of company

19/07/2019

Date



Signature of the commissioner of oaths

3/6/19

Date

COMMISSIONER OF OATHS EX OFFICIO  
**ROBERTO SMALL**  
PRACTISING ATTORNEY OF SA  
MOTSEKUA INCORPORATED ATTORNEYS  
OFFICE 3, DUNWOODY CENTRE  
CNR WESTERN SERVICE ROAD & WOODLANDS DR  
WOODMEAD, SANDTON  
(T) 011 568 5040 (F) 086 244 3072



## environmental affairs

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA

### DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

#### PROJECT TITLE

**Gunstfontein Wind Energy Facility**

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473 Steve Biko Road  
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:  
Email: [EIAAdmin@environment.gov.za](mailto:EIAAdmin@environment.gov.za)

## 1. SPECIALIST INFORMATION

Specialist Company Name:	Enviro Acoustic Research cc		
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition
Specialist name:	Morné de Jager		
Specialist Qualifications:	B. Ing (Chemical)		
Professional affiliation/registration:	SAAI, ASA		
Physical address:	726 Wiedrigh Street, Moreleta Park, Pretoria		
Postal address:	PO Box 2047, Garsfontein East		
Postal code:	0060	Cell:	082 565 4059
Telephone:	012 004 0362	Fax:	086 621 0292
E-mail:	morne@menco.co.za		

## 2. DECLARATION BY THE SPECIALIST

I, Morne de Jager, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

  
Signature of the Specialist

Enviro Acoustic Research cc

Name of Company:

2019 – 06 - 04

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Morne de Jager, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

MJ  
Signature of the Specialist

**Enviro Acoustic Research cc**

Name of Company

**2019 - 06 - 04**

Date

Millard  
Signature of the Commissioner of Oaths

2019/06/04  
Date

Commissioner of Oaths/Kommissaris van Ede

**MJ MILLARD**

Ex Officio

Professional Accountant (SA)

Professionele Rekenmeester (SA)

Lid No: 8916

PO Box / Posbus 90803, Garsfontein

Pretoria

0040



## environmental affairs

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA

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Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

#### PROJECT TITLE

Proposed amendment of the Gunstfontein Wind Energy Facility within the Karoo Hoogland Local Municipality, Northern Cape Province

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Email: [EIAAdmin@environment.gov.za](mailto:EIAAdmin@environment.gov.za)

## 1. SPECIALIST INFORMATION

Specialist Company Name:	3Foxes Biodiversity Solutions		
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	Level 4	Percentage Procurement recognition
			100%
Specialist name:	Simon Todd		
Specialist Qualifications:	BSc (Zool. & Bot.) BSc Hons (Zool.) MSc (Cons. Biol.)		
Professional affiliation/registration:	SACNASP Pr.Sci.Nat 400425/11		
Physical address:	60 Forrest Way, Glencairn		
Postal address:	60 Forrest Way, Glencairn		
Postal code:	7975	Cell:	0823326502
Telephone:		Fax:	
E-mail:	Simon.Todd@3foxes.co.za		

## 2. DECLARATION BY THE SPECIALIST

I, \_\_\_\_\_ Simon Todd \_\_\_\_\_, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the Specialist

3Foxes Biodiversity Solutions

Name of Company:

10/06/2019

Date

Details of Specialist, Declaration and Undertaking Under Oath



### 3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Simon Todd, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.



Signature of the Specialist

3Foxes Biodiversity Solutions

Name of Company

10/06/2019

Date



Signature of the Commissioner of Oaths



Dominique Gouny

Commissioner of Oaths

2019 06 10  
Vishoeek

Date

main Ed Vishoeek



## environmental affairs

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA

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## 1. SPECIALIST INFORMATION

Specialist Company Name:	Lourens du Plessis t/a LOGIS			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	Exempt	Percentage Procurement recognition	0
Specialist name:	Lourens du Plessis			
Specialist Qualifications:	BA			
Professional affiliation/registration:	Professional Geo-Information Science (GISc) Practitioner registered with the SA Geomatics Council (SAGC) Reg. No. GPr GISc 0147			
Physical address:	531A Witogie Street Die Wilgers Pretoria			
Postal address:	PO Box 384 La Montagne			
Postal code:	0184	Cell:	082 922 9019	
Telephone:		Fax:		
E-mail:	lourens@logis.co.za			

## 2. DECLARATION BY THE SPECIALIST

I, Lourens du Plessis, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the Specialist

t/a LOGIS

Name of Company:

2019/5/31

Date

I, Lourens du Plessis, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

t/a LOGIS

Name of Company

2019/5/31

Date \_\_\_\_\_

Signature of the Commissioner of Oaths

Date \_\_\_\_\_

200-08-04

I solemnly swear and affirm before me  
that I am the declarant herein and that  
the contents of this statement are true and  
correct to the best of my knowledge and belief.  
I have signed and affirmed before me and deponent's  
signature/mark/thumbprint was placed thereon  
in my presence.

to at \_\_\_\_\_ op om \_\_\_\_\_  
at on \_\_\_\_\_

(HANTEERENING) KOMMISSARIS VAN EDE  
(SIGNATURE) COMMISSIONER OF OATHS

VOLLE VOORNAAM EN VAN IN DRUKSKRIJF  
FULL FIRST NAMES AND SURNAME IN BLOCK LETTERS

BESIGHEIDSADERES (STRAATADERES)  
BUSINESS ADDRESS (STREET ADDRESS)

GARET FOR TOWN  
SGREGANT

S.A. POLISIEDIENS  
S.A. POLICE SERVICES

**CURRICULUM VITAE**  
*Jonathan Aronson MSc Pr.Sci.Nat*  
*Ecologist*  
*Email: JonathanA@arcusconsulting.co.za*



**Specialisms**

- Ecological Impact Assessments
- Pre-construction and Operational monitoring at wind energy developments
- Data analysis and statistical assessment of ecological data
- GIS mapping and Analysis

**Summary of Experience**

Jonathan has 12 years of experience studying and researching bats and has presented at the International Bat Research Conference and local bat workshops. He has been at the forefront of bats and wind energy research in South Africa and has worked on more than 40 WEF projects in South Africa, Kenya, Mozambique, Zambia and the UK undertaking pre-construction monitoring, operational monitoring, impact assessments and mitigation strategy design. He is a co-author of the Good Practise Guidelines for Surveying Bats at Wind Energy Facilities in South Africa, is the lead author on the operational monitoring guidelines for bats and is a founding member of the South African Bat Assessment Advisory Panel (SABAAP). He has experience managing wind energy facility projects including developing survey strategies, implementing field surveys, data analysis and report writing. He has provided extensive input to Environmental Impact Assessments (EIA) and post-construction Environmental Management Plans (EMP) for bats.

**Professional History**

2013 to current - Ecology Specialist, Arcus Consultancy Services Ltd, Cape Town  
2011 to 2013 - Director, Gaia Environmental Services Pty (Ltd), Cape Town  
2008 to 2008 - Research Assistant, Percy Fitzpatrick Inst. of African Ornithology, Cape Town

**Qualifications and Professional Interests**

- **University of Cape Town, 2009-2010**  
Msc Zoology
- **University of Cape Town, 2007**  
BSc (Hons) Freshwater Biology
- **University of Cape Town, 2003-2006**  
BSc Zoology
- Member of Society for Conservation Biology (2011 to present)
- South African Bat Assessment Advisory Panel (2013 to present)
- Professional Natural Scientist (Ecological Science) – SACNASP Registration #400238/14

**Project Experience**

**Bat Monitoring and Environmental Impact Assessments**

- Banna Ba Phifu Wind Energy Facility. Bat Monitoring (WKN Windcurrent SA (Pty) Ltd).
- Choje Wind Farm. Pre-construction bat monitoring (Wind Relic (Pty) Ltd).
- Kwagga Wind Energy Facility. Pre-construction bat monitoring (ABO Wind renewable energies (Pty) Ltd).
- Wind Farm in Zambia. Pre-construction bat monitoring (SLR Consulting).
- Namaacha Wind Farm. Pre-construction bat monitoring and EIA services in Mozambique (Consultec).
- West Coast One Wind Energy Facility. Post-construction Monitoring (Aurora Wind Power (RF) (Pty) Ltd).
- Beck Burn Wind Farm. Post-construction Monitoring. (EDF Energy).
- Fazakerly Waste Water Treatment Works. Post-construction Monitoring. (United Utilities).
- Paulputs Wind Energy Facility. 12 months pre-construction bat monitoring study (WKN Windcurrent SA (Pty) Ltd).
- Putsonderwater Wind Energy Facility. 12 months pre-construction bat monitoring study (WKN Windcurrent SA (Pty) Ltd).
- Zingesele Wind Energy Facility. 12 months pre-construction bat monitoring study (juwi Renewable Energies (Pty) Ltd).
- Highlands Wind Energy Facility. 12 months pre-construction bat monitoring study (WKN Windcurrent SA (Pty) Ltd).
- Kap Vley Wind Energy Facility. 12 months pre-construction bat monitoring study (juwi Renewable Energies (Pty) Ltd).
- Universal and Sonop Wind Energy Facilities. Pre-construction bat monitoring (JG Afrika).
- Kolkies and Karee Wind Energy Facility. 12 months pre-construction bat monitoring study (Mainstream Renewable Power South Africa).
- Komsberg East and West Wind Energy Facility. 12 months pre-construction bat monitoring study (African Clean Energy Developments Pty Ltd).

# CURRICULUM VITAE

*Jonathan Aronson MSc Pr.Sci.Nat*

*Ecologist*

*Email: JonathanA@arcusconsulting.co.uk Tel: +27 (0) 790 988 595*



- Gouda Wind Energy Facility. 24 months of operational monitoring for bats including activity and fatality surveys. (Blue Falcon 140 (Rf) Pty Ltd) and fatality surveys.
- Pofadder Wind Energy Facility. 12 months pre-construction bat monitoring study (Mainstream Renewable Power South Africa).
- Elliot Wind Energy Facility. Pre-construction bat monitoring study. (Rainmaker Energy).
- Hopefield Wind Farm. 12 months of operational monitoring for bats including activity (Umoya Energy).
- Spitskop West Wind Energy Facility. 12 months pre-construction bat monitoring study (RES Southern Africa/Gestamp).
- Spitskop East Wind Energy Facility. Analysis of 12 months of pre-construction bat monitoring data (RES Southern Africa).
- Patryshoogte Wind Energy Facility. Pre-construction bat monitoring study (RES Southern Africa).
- Swartberg Wind Energy Facility. 12 months pre-construction monitoring and surveys for the presence of bats roosting in farm buildings (CSIR).
- Clover Valley and Groene Kloof Wind Energy Facility. Arcus staff undertook 12 months of pre-construction bat monitoring which included acoustic surveys and mist-netting to catch bats. (Western Wind Energy).
- Spitskopvlakte Wind Energy Project. Arcus staff assisted with the implementation of a survey of bat activity on this site located near Laingsburg in the Western Cape. This work included acoustic monitoring at several locations including monitoring at height.

## **Ecological Surveys**

- Killean Wind Farm. Bat acoustic surveys including a driven transect and commissioning of bat detectors for this proposed site in Scotland, UK. (Renewable Energy Systems Ltd).
- Maple Road, Tankersely. Bat acoustic surveys including a walked transect for this proposed site near Barnsley, UK (Rula Developments).

## **Due Diligence**

- Due Diligence of Bat Monitoring at the Copperton Wind Energy Facility (SLR Consulting).
- Due Diligence of Bat Monitoring at the Kangas, Excelsior and Golden Valley Wind Farms (ERM).
- Due Diligence of Bat Monitoring at the Roggeveld Wind Farm (IBIS Consulting).

## **Amendment Applications**

- Review and impact assessment for amendment to turbine dimensions for the Great Karoo Wind Energy Facility (Savannah Environmental (Pty) Ltd).
- Review and impact assessment for amendment to turbine dimensions for the Gunstfontein Wind Energy Facility (Savannah Environmental (Pty) Ltd).
- Review and impact assessment for amendment to turbine dimensions for the Komserberg East and West Wind Energy Facilities (Aurecon South Africa (Pty) Ltd).
- Review and impact assessment for amendment to turbine dimensions for the Soetwater Wind Energy Facility (Savannah Environmental (Pty) Ltd).
- Review and impact assessment for amendment to turbine dimensions for the Karusa Wind Energy Facility (Savannah Environmental (Pty) Ltd).
- Review and impact assessment for amendment to turbine dimensions for the Zen Wind Energy Facility (Savannah Environmental (Pty) Ltd).

## **Peer Review**

- Peer Review for Three Bat Monitoring Reports for the Bokpoort II Solar Developments (Golder Associates)
- Peer Review of Operational Monitoring at the Jeffreys Bay Wind Farm, including updating the operational mitigation strategy for bats (Globeleq South Africa Management Services (Pty) Ltd).
- Oyster Bay Wind Energy Facility. Reviewing a pre-construction bat monitoring study and providing input into a stand-alone study (RES Southern Africa).
- Review and design mitigation strategies for bats at the Kinangop Wind Park, Kenya (African Infrastructure Investment Managers).

**Arcus Consultancy Services South Africa (Pty) Limited**

Registered in South Africa No. 2015/416206/07

# CURRICULUM VITAE

*Jonathan Aronson MSc Pr.Sci.Nat*

*Ecologist*

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## Feasibility Studies

- Feasibility assessment for four potential wind farms in the Northern Cape (ABO Wind renewable energies (Pty) Ltd).
- Feasibility assessment for four potential wind farms in Mozambique (Ibis Consulting (Pty) Ltd).
- Assessment of the Feasibility of a Wind Farm in the Northern Cape (juwi Renewable Energies (Pty) Ltd).
- Assessment of the Feasibility of a Wind Farm in the Eastern Cape (WKN Windcurrent SA (Pty) Ltd).

## Research Projects

- Darling National Demonstration Wind Farm Project. Designed and implemented a research project investigating bat fatality in the Western Cape.

## **Publications**

- MacEwan, K., **Aronson, J.**, Richardson, E., Taylor, P., Coverdale, B., Jacobs, D., Leeuwener, L., Marais, W., Richards, L. South African Bat Fatality Threshold Guidelines for Operational Wind Energy Facilities – South African Bat Assessment Association (1<sup>st</sup> Edition).
- **Aronson, J.B.** and Sowler, S. (2016). Mitigation Guidance for Bats at Wind Energy Facilities in South Africa.
- **Aronson, J.B.**, Richardson, E.K., MacEwan, K., Jacobs, D., Marais, W., Aiken, S., Taylor, P., Sowler, S. and Hein, C (2014). South African Good Practise Guidelines for Operational Monitoring for Bats at Wind Energy Facilities (1<sup>st</sup> Edition).
- Sowler, S. and S. Stoffberg (2014). South African Good Practise Guidelines for Surveying Bats in Wind Energy Facility Developments - Pre-Construction (3<sup>rd</sup> Edition). Kath Potgieter, K., MacEwan, K., Lötter, C., Marais, M., **Aronson, J.B.**, Jordaan, S., Jacobs, D.S, Richardson, K., Taylor, P., Avni, J., Diamond, M., Cohen, L., Dippenaar, S., Pierce, M., Power, J. and Ramalho, R (eds).
- **Aronson, J.B.**, Thomas, A. and Jordaan, S. 2013. Bat fatality at a Wind Energy Facility in the Western Cape, South Africa. *African Bat Conservation News* 31: 9-12.

## **Workshops, Seminars and Courses**

- The Ecosystem Approach and Systems Thinking Course, United Nations Environment Programme, Currently undertaking.
- Why Carbon Footprinting Makes Business Sense, African Climate and Development Initiative Seminar, September 2016.
- The Age of Sustainable Development Course, The SDG Academy, 2016.
- Planetary Boundaries and Human Opportunities Course, The SDG Academy, 2015.
- Endangered Wildlife Trust (EWT) Bats and Wind Energy Training Course, October 2013.
- Ecological Networks Course, Kirstenbosch Botanical Gardens, July 2013.
- Social and Economic Network Analysis Course, online via Stanford University, 2013.
- Social Network Analysis Course, online via University of Michigan, 2013.
- Introduction to Complexity Science Course, online via Santa Fe Institute, 2013.
- Introduction to Spatial Analysis using R, Kirstenbosch Botanical Gardens, May 2013.
- Google Geo Tools for Conservation, University of Cape Town, February 2013.
- Endangered Wildlife Trust (EWT) Bats and Wind Energy Training Course, January 2012.
- Statistical Modelling Workshop for Biologists, University of Cape Town, September 2010.
- ESRI Virtual Campus Online GIS Courses, 2010.
- WAYS/ScholarShip IT Workshop: Remote Sensing and GIS Course, March 2009.

# CURRICULUM VITAE

*Andrew Pearson*

*Ecology Specialist (Avifauna)*

Email: AndrewP@arcusconsulting.co.za Tel: +27 (0) 21 412 1529



ARCUS

## Specialisms

- Avifauna Impact Assessment
- Operational Phase Avifaunal Monitoring
- Environmental Management Processes
- Survey Design and Management

## Summary of Experience

Andrew is an Avifauna Specialist with nine years in environmental management experience and over six years as an avifaunal specialist. He has gained a strong level of experience in avifauna assessments across a multitude of industries, including various powerline assessments and walk-downs. To date, Andrew has provided avifaunal specialist services on over 6 solar, 26 power line and 25 wind farm projects in South Africa. Andrew can provide input into the design of projects and environmental management plans, assess environmental due diligence and compliance with international environmental policies (World Bank, IFC, Equator Principles) and peer review avifaunal specialist reports. Andrew is a professional natural scientist registered with SACNASP, and is a selected member of the Birds and Renewable Energy Specialist Group (BARESG). Andrew has been bird watching for 24 years, worked as a birding field guide in 2006 and 2007, and attended bird identification training at the Lawsons Birding Academy in 2007.

## Professional History

### **January 2014 to Present - Avifauna Specialist, Arcus Consultancy Services Ltd**

- Specialist Bird Impact Assessment Studies for energy infrastructure
- Design of high quality bird surveys in line with applicable guidance and legal requirements
- Design and implementation of operational carcass search programme including the training and management of locally based observers.
- Specialist raptor nest surveys

### **March 2011 to December 2013 - Environmental Impact Assessment & Avifaunal Specialist, Endangered Wildlife Trust**

- Specialist Bird Impact Assessment Studies for energy infrastructure
- Extensive work in the Wind Energy Sector to reduce possible impacts on birds and bats
- 12 month Bird Monitoring on WEF sites: compilation of monitoring protocol; recruitment, management and co-ordination of observers; on site Bird observation as part of a 12 month monitoring programme; and compilation of final monitoring reports
- Presentations and Environmental Training

### **January 2008 to March 2011 - Group Environmental Manager, Basil Read (Pty) Ltd**

- Environmental management of Roads and Civil construction projects.
- Implementation and certification of an ISO 14001:2004 Environmental Management System
- Group Internal Environmental Audits
- Compilation of EMP's and Environmental site inspections
- Assistance in ENV authorisations and applications
- Environmental Awareness Training
- Compilation of Group Carbon Footprint

### **February 2006 to January 2008 - Game Ranger and Walking Guide, CC Africa (now &BEYOND), Phinda Private Game Reserve**

- Game drives and walks in a Big 5 reserve
- Hosting guests and sharing environmental and wildlife knowledge
- Environmental management, waste management



# CURRICULUM VITAE

## Qualifications and Professional Interests

- August 2010 - Hazard Identification and Risk Assessment (HIRA) Course, IRCA Global
- April 2010 - SAMTRAC, NOSA, East Rand Office
- April 2009 - Green Star Accredited Professional Exam, (GBCSA), PROMETRIC
- May 2008 - Environmental Auditing: ISO 14001:2004, a Lead Auditors Course (SAACTA approved), Centre for Environmental Management at North West University (NWU), Potchestroom
- February 2008 - Environmental Law for Managers, Centre for Environmental Management at NWU
- February 2008 - Implementing Environmental Management Systems-ISO 14001:2004, Centre for Environmental Management at NWU
- August 2007 - Bird Identification Course, Lawson's Birding Academy, 7 day intensive training in Makuleke, Kruger National Park, SA
- **2001 to 2005 - Bachelor of Science: Conservation Ecology, University of Stellenbosch**

## Recent Conferences and Seminars

- Windaba 2013, 2014 and 2015; Solar Indaba 2013; Africa Utility Week 2014 and 2015
- IAIA SA National Conference 2013
- Endangered Wildlife Trust's Birds of Prey Programme (BoPP), Annual Conference 2012
- Power & Electricity World Africa 2012
- Wind Energy and Birds – Information Week. Endangered Wildlife Trust, 2011
- August 2011 IAIA South Africa, 2011 Conference
- March 2011 Wildlife and Energy Symposium

## Additional Skills

- ArcGIS, Google GEO tools and Google Earth
- Computer Skills: Office 2013 incl. Microsoft Word, Excel, Outlook and PowerPoint
- Field work skills involving various sampling methods, data capturing & analysis
- Excellent knowledge of fauna (especially birds) and flora
- 4x4 driving skills

## Project Experience

- **Due Diligence**  
Due Diligence of Bird Work conducted at the Kangnas WEF (ERM); Due Diligence of Bird Work conducted at the Excelsior WEF (ERM); Due Diligence of Bird Work conducted at the Golden Valley WEF (ERM); Due Diligence of Bird Work at the Roggeveld Wind Farm (IBIS Consulting).
- **Peer Review**  
Peer Review of Operational Monitoring at the Jeffreys Bay Wind Farm (Globeleq South Africa Management Services (Pty) Ltd); Review and design mitigation strategies for birds at the Kinangop Wind Park, Kenya (African Infrastructure Investment Managers).
- **Feasibility Studies**  
Assessment of the Feasibility of a Wind Farm in the Eastern Cape near Somerset East (WKN Windcurrent SA (Pty) Ltd).
- **Pre-Constriction Monitoring and/or Impact Assessment- Wind Energy Facility (WEF) Projects:**  
Kouga WEF; Aberdeen WEF; Hidden Valley WEF; Middleton WEF; Springfontein WEF, Moorreesburg WEF; Grassridge WEF; Ukomeleza WEF; Chaba WEF; Waainek WEF; Vryheid WEF; Kouga Western Cluster WEF; Hopefield WEF; DNA Elliot WEF; Confidential WEF near Elliot; Umsinde Emoyeni WEF; Grassridge II WEF; Komsberg East WEF; Komsberg West WEF; Gouda WEF; Confidential WEF near Touws River; Confidential WEF near Kleinsee.
- **Operational Monitoring -WEF Projects:**

# CURRICULUM VITAE

*Andrew Pearson*

*Ecology Specialist (Avifauna)*

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Hopefield WEF; Gouda WEF

- **Impact Assessment-Power-line Projects:**

St Francis Bay Kouga 66kV; Ncwane Okuku 88kV; Vulcan Ekangala 132kV; Merapi Everest 400kV; Mathibestad Majaneng 132kV; Majaneng Themba Main-Babelegi 132kV; Ngoma Pandamatenga 400kV (ZIZABONA Phase 2); Estancia Thuli 132kV; Estancia Zamokuhle 132kV; Gumeni Bosloop 132kV; Mbumbu Tsakani 132kV; Normandie Heyshope 132kV; Mookodi Integration Project; Wildebees Bethal 132kV; Zaaifontein Mathondwane 88kV; Hlabisa Nongoma 88kV; Mandeni Gingindlovu 132kV; Tabor Nzhelele 400kV; Leksand St James 88kV; Emondlo St James 88kV; Randfontein Mine 132kV; Droogfontein CSP 132kV; Mtubatuba St Lucia 132kV; Ndumo Gezisa 132kV; Ermelo Uitkoms 88kV; TCTA Spring Grove 88kV; Springfontein 132kV.

- **Pre-construction Monitoring and/or Impact Assessment- Concentrated Solar Power (CSP) Plants and Solar Photovoltaic (PV) Plants:**

Humansrus 100MW CSP; Arriesfontein 100MW CSP; Arriesfontein 225MW PV; Eenzaamheid PV; Vaal Dam PV; Mokopole PV; Kalkaar CSP and PV; Droogfontein PV; Bokpoort II CSP; Metsimatala CSP.

- **Other:**

Expansion of Hendrina Power Station Ash Disposal Facilities; Expansion of Majuba Power Station Ash Disposal Facilities; Expansion of Tutuka Power Station Ash Disposal Facilities; Eskom Distribution Cedarville Upgrade; Eskom Limpopo Operating Unit (LOU) Head Office, Polokwane

## Affiliations

- Member of the Birds and Renewable Energy Specialist Group (BARESG), South Africa
- South African Council for Natural Scientific Professions (SACNASP) Registration number 400423/11





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## CURRICULUM VITAE



**Jenna Lavin**

Tel: 083 619 0854 (c); 013 0131 (w)

E-mail address: jenna.lavin@cedartower.co.za

ID number: 8512050014089

### **EDUCATION:**

#### **Tertiary**

- 2014 - M.Phil in Conservation of the Built Environment (University of Cape Town)  
Ongoing - expected to graduate in 2015
- 2011 Continued Professional Development Course in Urban Conservation Management (University of Cape Town) Part I and Part II
- 2010 M.Sc. with Distinction in Archaeology (University of Cape Town)  
Title: *Palaeoecology of the KBS member of the Koobi Fora Formation: Implications for Pleistocene Hominin Behaviour.*
- 2007 B.Sc. Honours in Archaeology (University of Cape Town)  
Title: *The Lost Tribes of the Peninsula: An Investigation into the historical distribution of Chacma baboons (*Papio ursinus*) at the Cape Peninsula, South Africa.*  
Koobi Fora Field School, Rutgers University (U.S.A.)/ National Museums of Kenya
- 2006 B.Sc. Archaeology (University of Cape Town)  
B.Sc. Environmental and Geographic Science (University of Cape Town)

#### **Secondary**

- 1999-2003 Rustenburg High School for Girls  
Firsts in English, Afrikaans, Mathematics HG, Biology HG, History HG, Entrepreneurship.



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## **EMPLOYMENT HISTORY:**

### **PROFESSIONAL DEVELOPMENT**

#### **Environmental and Heritage Management:**

- Head of Heritage Operations for Heritage CTS Consultants and member of OpenHeritage NPC.  
*July 2016 to present*
- Assistant Director for Policy, Research and Planning at Heritage Western Cape.  
*August 2014 to June 2016*

Responsibilities include drafting of new heritage related policy, the grading and declaration of Provincial Heritage Sites, the development of Conservation Management Plans, facilitating the development of inventories of heritage resources through local authorities as well as managing the development of the Western Cape's Heritage Information Management System (HIMS).

Acting Deputy Director from April to December 2015.

- Heritage Officer for Palaeontology and for the Mpumalanga Province at the South African Heritage Resources Agency (SAHRA).  
*January 2013 to June 2014*

Responsibilities include dealing with palaeontological permit applications in terms of Section 35 of the NHRA and development applications in terms of Section 38 of the NHRA. Projects included the development of a National Palaeotechnic Report identifying significant palaeontological deposits throughout SA, as well as developing professional relationships between SAHRA and the Palaeontological Society of South Africa (PSSA) and the Geological Society of South Africa (GSSA). During this time, I was part of the team that developed the digitised National Palaeontological Sensitivity Map (<http://www.sahra.org.za/about/news/nov2013/palaeosensitivitymap>), the first of its kind in the world.

- Heritage Officer for Archaeology, Palaeontology and Meteorites at Heritage Western Cape (HWC).  
*September 2010 to December 2012*

HWC is a Public Entity that forms part of the Heritage Resource Management Component of the Provincial Governments' Department of Cultural Affairs and Sport (DCAS). Projects included the declaration of Pinnacle Point and the West Coast Fossil Park as Provincial Heritage Sites (PHS), the management of the development of the Baboon Point PHS Conservation Management Plan as well as an educational outreach program as part of the DCAS MOD Centre Project.



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- Heritage Officer for the Archaeology, Palaeontology and Meteorites Unit of the South African Heritage Resources Agency (SAHRA) as part of a three month contract.  
*January 2010 to March 2010*
- Environmental Control Officer, Amathemba Environmental Management Consulting  
*Part time: 2007 to 2009*

### **Other**

My private experience as a traveler in South Africa, Tanzania, Kenya, Namibia, Zambia, Malawi and Mozambique has inspired a passion for the conservation of environmental and heritage resources. I am passionate about sustainable living, with my Bachelor of Science in Environmental and Geographical Science providing a framework on which to base my values.

With a friend, I established the fundraising initiative, Chicks4Change, through which we managed to organize a number of successful events and raise R40 000 for Project Rhino to assist with anti-poaching initiatives.

In 2013 I was asked to join the panel of judges for the Ministerial awards for Heritage in the Western Cape. From 2013 to July 2014, I was a member of the Heritage Western Cape Archaeology, Palaeontology and Meteorites Committee. In July 2014, I presented at the Conference for the Palaeontological Society of South Africa on the use of GIS in the management of palaeontological resources in the face of increased development pressures. In April 2015 I participated in a conference on Landscape Archaeology hosted by the Leakey Foundation in San Fransisco, presenting on the management of archaeological landscapes in South Africa. In April 2016, I presented at the ICAHM Conference in Salalah, Oman on the management of archaeological heritage in South Africa.

In November 2013, I was awarded a bursary from the Department of Arts and Culture to complete the Masters in Philosophy in Conservation of the Built Environment through the UCT Faculty of Engineering and the Built Environment in 2014 and 2015.

I am a paid up member of the Association for Southern African Professional Archaeologists (ASAPA), the Association of Professional Heritage Practitioners (APHP), the Palaeontological Society of South Africa (PSSA) and ICOMOS South Africa, for which I am Vice-President of the Board. I am also a member of the International Committee for Archaeological Heritage Management (ICAHM).

## Short CV/Summary of Expertise – Simon Todd

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### *Professional Profile*

Simon Todd has extensive experience in biodiversity management and ecological assessment across South African ecosystems. This includes a variety of broad-scale strategic assessments and best-practice guidelines for a range of industries. In addition, Simon Todd has conducted a large amount of research on the impacts of land-use on biodiversity and has published numerous scientific papers in international peer-reviewed journals on this topic. Simon Todd is a recognised ecological expert and is a past chairman and current executive committee member of the Arid-Zone Ecology Forum and has over 20 years' experience working throughout the country. Simon Todd is registered with the South African Council for Natural Scientific Professions (No. 400425/11).

Recent notable projects include:

- First-author of a book chapter on the ecological impacts of Shale Gas development on the Karroo of South Africa. (2017)
- Co-author on the Biodiversity chapter of the Shale Gas SEA being conducted by CSIR. (2016)
- Co-author on the Eskom Grid Infrastructure SEA, managed by CSIR. (2016)
- Co-author on the Wind and Solar SEA, managed by CSIR. (2015)

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### *Abbreviated CV*

- Profession: Independent Ecological Consultant - Pr.Sci.Nat 400425/11
- Specialisation: Plant & Animal Ecology
- Years of Experience: 20 Years

### *Skills & Primary Competencies*

- Research & description of ecological patterns & processes in Thicket, Savannah Nama Karoo, Succulent Karoo, Arid Grassland and Fynbos Ecosystems.
- Ecological Impacts of land use on biodiversity and provision of associated management advice.

- Vegetation surveys & degradation assessment & mapping
- Long-term vegetation monitoring
- Faunal surveys & assessment.
- GIS & remote sensing

#### *Tertiary Education:*

- 1992-1994 – BSc (Botany & Zoology), University of Cape Town
- 1995 – BSc Hons, Cum Laude (Zoology) University of Natal
- 1996-1997- MSc, Cum Laude (Conservation Biology) University of Cape Town

#### *Employment History*

- 1997 – 1999 – Research Scientist (Contract) – South African National Biodiversity Institute
- 2000-2004 – Specialist Scientist (Contract ) - South African National Biodiversity Institute
- 2004-2007 – Senior Scientist (Contract) – Plant Conservation Unit, Department of Botany, University of Cape Town
- 2007-Present – Senior Scientist (Associate) – Plant Conservation Unit, Department of Botany, University of Cape Town.
- 2010-Present – Self-employed as consultant and sole proprietor of Simon Todd Consulting, which has conducted more than 150 specialist assessments.

#### *General Experience & Expertise*

- Lead ecologist on several SEA chapters, including Eskom Grid Infrastructure, Wind and Solar SEA and Shale Gas SEA.
- Conducted a large number of fauna and flora specialist assessments distributed widely across South Africa. Projects have ranged in extent from <50 ha to more than 50 000 ha.
- Widely-recognized ecology specialist. Published numerous peer-reviewed scientific publications based on various ecological studies across the country. Past chairman of the Arid Zone Ecology Forum and current executive committee member.
- Extensive field and personal experience across a broad range of South African ecosystems, with particular focus on the Western, Northern and Eastern Cape.
- Strong research background which has proved invaluable when working on ecologically sensitive and endangered ecosystems, habitats and species.
- Published numerous research reports as well as two book chapters and a large number of papers in leading scientific journals dealing primarily with human impacts on the vegetation and ecology of South African ecosystems.
- Maintain several long-term vegetation monitoring projects which have led to several publications.
- Guest lecturer at two universities and have also served as an external examiner.
- Reviewed papers for more than 12 international ecological journals.
- SACNASP registered as a Professional Natural Scientist, (Ecology) No. 400425/11.

### *Current Committees*

- SANBI Vegmap Committee – 2015 – present
- CSIR Wind and Solar SEA Phase II advisory committee – 2016-present
- AZEF deputy chair – 2012-present
- SANBI Karoo Biogaps Taxon leads' committee and executive committee member.

### *Recent & Relevant Outputs & Publications*

#### **Strategic Environmental Assessments**

Co-Author. Chapter 7 - Biodiversity & Ecosystems - Shale Gas SEA. CSIR 2016.

Co-Author. Chapter 1 Scenarios and Activities – Shale Gas SEA. CSIR 2016.

Co-Author – Ecological Chapter – Wind and Solar SEA. CSIR 2014.

Co-Author – Ecological Chapter – Eskom Grid Infrastructure SEA. CSIR 2015.

Contributor – Ecological & Conservation components to SKA SEA. CSIR 2017.

#### **Specialist Fauna and Flora Assessments:**

Specialist Ecological studies for many different developments distributed across the country including:

- Over 30 Wind Energy projects
- More than 60 Solar Energy developments
- More than 30 different housing, roads, mining and other infrastructure development projects.
- More than 20 electricity transmission infrastructure projects.

A full list of projects is available on request.

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# Morné de Jager

## Personal Data

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Identity Number	711221 5062 080
Date of Birth	21 December 1971
Sex	Male
Marital Status	Married, three children
Driver's license	Code 08
Nationality	South African
Home Language	Afrikaans (speak, read and write)
Other Languages	English (speak, read and write)
Higher Educational Qualifications	B.Eng (Chemical Engineering) [Pretoria University]
Previous Employment	JCI Wates Meiring and Barnard Department of Water Affairs and Forestry M2 Environmental Connections cc
Current Employment	Enviro-Acoustic Research cc

## Short Resumé

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Morné started his career in the mining industry as a bursar Learner Official (JCI, Randfontein), working in the mining industry, doing various mining related courses (Rock Mechanics, Surveying, Sampling, Safety and Health [Ventilation, noise, illumination etc] and Metallurgy. He did work in both underground (Coal, Gold and Platinum) as well as opencast (Coal) for 4 years. He changed course from Mining Engineering to Chemical Engineering after his second year of his studies at the University of Pretoria.

After graduation he worked as a Water Pollution Control Officer at the Department of Water Affairs and Forestry for two years (first year seconded from Wates, Meiring and Barnard), where duties included the perusal (evaluation, commenting and recommendation) of various regulatory required documents (such as EMPR's, Water Licence Applications and EIA's), auditing of licence conditions as well as the compilation of Technical Documents.

Since leaving the Department of Water Affairs, Morné has been in private consulting for the last 15 years, managing various projects for the mining and industrial sector, private developers, business, other environmental consulting firms as well as the Department of Water Affairs. During that period he has been involved in various projects, either as specialist, consultant, trainer or project manager, successfully completing these projects within budget and timeframe. During that period he gradually moved towards environmental acoustics, focusing on this field exclusively since 2007.

He has been interested in acoustics as from school days, doing projects mainly related to loudspeaker design. Interest in the matter brought him into the field of Environmental Noise Measurement, Prediction and Control. He has been doing work in this field for the past 8 years, and was involved with the following projects in the last few years:

# Project Experience – Acoustics

<b>Wind Energy Facilities</b>	<i>Full Environmental Noise Impact Assessments for - Bannf (Vidigenix), iNca Gouda (Aurecon SA), Kangnas (Aurecon), Plateau East and West (Aurecon), Wolf (Aurecon), Outeniqua (Aurecon), Zen (Savannah Environmental – SE), Goereesoe (SE), Springfontein (SE), Garob (SE), Project Blue (SE), ESKOM Kleinzee (SE), Walker Bay (SE), Oyster Bay (SE), Hidden Valley (SE), Happy Valley (SE), Deep River (SE), Tsitsikamma (SE), AB (SE), West Coast One (SE), Hopefield II (SE), Namakwa Sands (SE), VentuSA Gouda (SE), Dorper (SE), Amakhala Emoyeni (SE), Klipheuwel (SE), Cookhouse (SE), Cookhouse II (SE), Rheboksfontein (SE), Suurplaat (SE), Karoo Renewables (SE), Koningaas (SE), Eskom Aberdene (SE), Spitskop (SE), Castle (SE), Khai Ma (SE), Poortjies (SE), Korana (SE), IE Moorreesburg (SE), Saldanha (Terramanzi), Loeriesfontein (SiVEST), , Rhenosterberg (SiVEST), Noupoot (SiVEST), Prieska (SiVEST), Canyon Springs (Canyon Springs), Msenge Emoyeni (Windlab), Gunstfontein (SE), Komsberg (ARCUS), Umsinde Emoyeni (ARCUS), Dwarsrug (SiVEST)</i>
<b>Mining and Industry</b>	<i>Full Environmental Noise Impact Assessments for - BECSA – Middelburg (Golder Associates), Kromkrans Colliery (Geovicon Environmental), SASOL Borrow Pits Project (JMA Consulting), Lesego Platinum (AGES), Tweefontein Colliery (Cleanstream), Evraz Vametco Mine and Plant (JMA), Goedehoop Colliery (Geovicon), Hakra Project (Prescali Environmental), Der Brochen Platinum Project (J9 Environment), Delft Sand (AGES), Brandbach Sand (AGES), Verkeerdepan Extension (CleanStream), Dwaalboom Limestone (AGES), Jagdlust Chrome (MENCO), WPB Coal (MENCO), Landau Expansion (CleanStream), Otjikoto Gold (AurexGold), Klipfontein Colliery (MENCO), Imbabala Coal (MENCO), ATCOM East Expansion (Jones and Wagner), IPP Waterberg Power Station (SE), Kangra Coal (ERM), Schoongesicht (CleanStream), EastPlats (CleanStream), Chapudi Coal (Jacana Environmental), Generaal Coal (JE), Mopane Coal (JE), Glencore Boshhoek Chrome (JMA), Langpan Chrome (PE), Vlakpoort Chrome (PE), Sekoko Coal (SE), Frankford Power (REMIG), Strahrae Coal (Ferret Mining), Transalloys Power Station (Savannah), Pan Palladum Smelter, Iron and PGM Complex (Prescali), Fumani Gold (AGES), Leiden Coal (EIMS), Colenso Coal and Power Station (SiVEST/EcoPartners), Klippoortjie Coal (Gudani), Rietspruit Crushers (MENCO), Assen Iron (Tshikovha), Transalloys (SE), ESKOM Ankerlig (SE), Pofadder CSP (SE), Nooitgedacht Titano Project (EcoPartners), Algoa Oil Well (EIMS), Spitskop Chrome (EMAssistance), Klippoortjie Coal (Gudani), Vlakfontein South (Gudani), Leandra Coal (Jacana), Grazvalley and Zoetveld (Prescali), Tjate Chrome (Prescali), Langpan Chromite (Prescali), Vereeniging Recycling (Pro Roof), Meyerton Recycling (Pro Roof), Hammanskraal Billeting Plant 1 and 2 (Unica)</i>
<b>Road and Railway</b>	<i>K220 Road Extension (UrbanSmart), Boskop Road (MTO), Sekoko Mining (AGES), Davel-Swaziland-Richards Bay Rail Link (Aurecon), Moloto Transport Corridor Status Quo Report and Pre-Feasibility (SiVEST), Postmasburg Housing Development (SE), Tshwane Rapid Transport Project, Phase 1 and 2 (NRM Consulting/City of Tshwane), Transnet Apies-river Bridge Upgrade (Transnet), Gautrain Due-diligence (SiVest), N2 Piet Retief (SANRAL)</i>
<b>Airport</b>	<i>Oudtshoorn Noise Monitoring (AGES), Sandton Heliport (Alpine Aviation), Tete Airport Scoping</i>
<b>Noise monitoring</b>	<i>Peerboom Colliery (EcoPartners), Thabametsi (Digby Wells), Doxa Deo (Doxa Deo), Harties Dredging (Rand Water), Xstrata Coal – Witbank Regional (Xstrata), Sephaku Delmas (AGES), Amakhala Emoyeni WEF (Windlab Developments), Oyster Bay WEF (Renewable Energy Systems), Tsitsikamma WEF (Cennergi and SE), Hopefield WEF (Umoya), Wesley WEF (Innowind), Ncora WEF (Innowind), Boschmanspoort (Jones and Wagner), Ngamakwe WEF (Innowind), Hopefield WEF Noise Analysis (Umoya), Dassiesfontein WEF Noise Analysis (BioTherm), Transnet Noise Analysis (Aurecon), Jeffries Bay Wind Farm (Globeleq), Sephaku Aganang (Exigo), Sephaku Delmas (Exigo), Beira Audit (BP/GPT), Nacala Audit (BP/GPT), NATREF (Nemai), Rappa Resources (Rayten)</i>
<b>Small Noise Impact Assessments</b>	<i>TCTA AMD Project Baseline (AECOM), NATREF (Nemai Consulting), Christian Life Church (UrbanSmart), Kosmosdale (UrbanSmart), Louwlandia K220 (UrbanSmart), Richards Bay Port Expansion (AECOM), Babalegi Steel Recycling (AGES), Safika Slag Milling Plant (AGES), Arcelor Mittal WEF (Aurecon), RVM Hydroplant (Aurecon), Grootvlei PS Oil Storage (SiVEST), Rhenosterberg WEF, (SiVEST), Concerto Estate (BPTrust), Ekuseni Youth Centre (MENCO), Kranskop Industrial Park (Cape South Developments), Pretoria Central Mosque (Noman Shaikh), Soshanguve Development (Maluleke Investments), Seshego-D Waste Disposal (Enviroxcellence), Zambesi Safari Equipment (Owner), Noise Annoyance Assessment due to the Operation of the Gautrain (Thornhill and Lakeside Residential Estate), Upington Solar (SE), Ilangaletu Solar (SE), Pofadder Solar (SE), Flagging Trees WEF (SE), Uyekraal WEF (SE), Ruuki Power Station (SE), Richards Bay Port Expansion (AECOM), Babalegi Steel Recycling (AGES), Safika Ladium (AGES), Safika Cement Isando (AGES), RareCo (SE), Struisbaai WEF (SE), Perdekraal WEF (ERM), Kotula Tsatsi Energy (SE), Olievenhoutbosch Township (Nali)</i>
<b>Project reviews and amendment reports</b>	<i>Loperberg (Savannah), Dorper (Savannah), Penhoek Pass (Savannah), Oyster Bay (RES), Tsitsikamma (Cennergi), Amakhala Emoyeni (Windlab), Spreeukloof (Savannah), Spinning Head (SE), Kangra Coal (ERM), West Coast One (Moyeng Energy), Rheboksfontein (Moyeng Energy), De Aar WEF (Holland)</i>





## **CURRICULUM VITAE**

### **LOURENS MARTINUS DU PLESSIS**

*MetroGIS (Pty) Ltd*

*Visual Assessment and Geographic Information Systems Specialist*

#### **SKILLS BASE AND CORE COMPETENCIES**

- More than 17 years experience in the application of Geographical Information Systems (GIS) in Environmental Planning and Management.
- Extensive practical knowledge in spatial analysis, environmental modelling and digital mapping.
- Experience in applying GIS in EIAs, State of the Environment Reports and Environmental Management Plans.
- Lourens has been involved in the application of Geographical Information Systems (GIS) in Environmental Planning and Management since 1990. He has extensive practical knowledge in spatial analysis, environmental modeling and digital mapping, and applies this knowledge in various scientific fields and disciplines. His GIS expertise are often utilised in Environmental Impact Assessments, State of the Environment Reports, Environmental Management Plans, tourism development and environmental awareness projects and mining rehabilitation plans.
- Lourens holds a BA degree in Geography and Anthropology from the University of Pretoria and worked at the Geographic Information Systems Laboratory (GisLAB CC, at the Department of Landscape Architecture) from 1990 to 1997. He later became a member of the GisLAB and in 1997, when Q Data Consulting acquired the GisLAB, worked for Geographic Information Systems Business Solutions (GISBS, a division of Q Data Consulting) for two years as project manager and senior consultant. In 1999 he joined MetroGIS (Pty) Ltd and still functions as a director and project manager to this day.
- Lourens has received various awards for his work over the past decade, including EPPIC Awards for ENPAT, a Q Data Consulting Performance Award and two 3<sup>rd</sup> place ESRI (Environmental Systems Research Institute) awards for Most Analytical and Best Cartographic Maps, at Annual International ESRI User Conferences. He is a co-author of the ENPAT book and has had several of his maps published in Jacana Media's educational publications and environmental books.

#### **TERTIARY EDUCATION**

- BA (University of Pretoria) Geography and Anthropology (Majors), 1993

#### **EMPLOYMENT HISTORY**

1999-present: MetroGIS, Director

1997-1999: GISBS, Project Manager

1990-1997: GisLAB, Project Manager / Member

#### **SELECTED RELEVANT PROJECT EXPERIENCE**

##### **Visual Impact Assessments (VIA), viewshed analyses and visual assessments**

- Coal strip mining in Zimbabwe viewshed analyses
- Viewshed analyses and sensitivity mapping for telecommunication masts in the northern provinces (Limpopo, Mpumalanga and North-West)
- Siemens 3<sup>rd</sup> license cellular communications infrastructure EIAs. Viewshed analyses and sensitivity mapping for over 4,000 telecommunication mast sites in all major metropolitan areas of South Africa.
- CSIR high mast viewshed analysis and sensitivity mapping
- Atlantis Open Cycle Gas Turbine power station VIA
- Kynoch Gypsum Tailings dam extension VIA
- N1 Western Bypass Shell service station VIA
- Coega regional hazardous waste processing facility VIA
- Robinson Deep landfill extension VIA
- Hazardous waste blending platform VIA

- Mercury-Ferrum-Garona transmission line integration VIA
- Matimba B (Medupi) coal-fired power station VIA
- Concentrating Solar Power (CSP) plant in Upington VIA
- Zeus to Mercury transmission line (comparative viewshed analyses)
- Mmamabula (Botswana) transmission line and power station viewshed analyses
- Petronet new multi-products pipeline VIA
- Wind energy facility (Sere) in the Western Cape province VIA
- Ankerlig power station conversion and transmission line VIA
- Gourikwa power station conversion and transmission line VIA
- Kyalami strengthening project VIA
- Steelpoort integration project VIA
- Medupi reservoir and telecommunication mast VIA
- VIA's for Basic Assessment Reports (wind monitoring masts)
- Cookhouse, Hopefield, Amakhala, Caledon, Worcester, Tulbach, Overberg, Britannia Bay, Brand-se-Baai, Deep River, Happy Valley, River Bank, Uiekraal, Beaufort West, Laingsburg, Rheboksfontein, Suurplaat and West Coast
- Cookhouse wind energy facility VIA
- Hopefield wind energy facility VIA
- Mokopane Integration Project VIA
- Cradle of Humankind World Heritage Site (WHS) viewshed protection zone, visual character assessment and visual zonation plan
- Indwe wind energy facility VIA
- Amakhala wind energy facility VIA
- Boontjieskraal wind energy facility VIA
- Britannia Bay wind energy facility VIA
- Brand-se-Baai wind energy facility VIA
- Upington and Pofadder solar thermal facilities VIAs
- Dorper wind energy facility VIA
- Flagging Trees wind energy facility VIA
- Rheboksfontein, Suurplaat and West Coast wind energy facilities VIAs
- Riverbank wind energy facility VIA
- Waterberg photovoltaic plant VIA
- Eskom wind intergration projects VIAs
- Welgedacht water care works VIA
- Aberdeen wind energy facility
- Aggeneis-Oranjemund power line intergration
- Project Blue wind energy facility
- Inca De Aar solar energy facility
- Aced De Aar solar energy facility
- Exxaro Lephalale solar energy facility
- Happy Valley wind energy facility
- Hendrina power station ash dam extension
- Hidden Valley wind energy facility
- Kakamas photovoltaic plant
- Karoo renewable energy facility
- Ilanga (Karoskraal) solar thermal power plant
- Keimoes photovoltaic plants (Sonnenberg, Ofir and Geelkop)
- Kimberley photovoltaic solar plant
- Kleinbegin photovoltaic plant
- Kleinzee wind energy facility
- Koinaas wind energy facility
- Oyster Bay wind energy facility
- Ilanga Lethemba (Paardevelei) PV solar energy facility
- Upington photovoltaic solar facility
- Ramphole (Ritchie) PV solar energy facility
- Ruukie (Mpumalanga) coal fired power station
- Saldanha Steel wind energy facility

- Spitskop wind energy facility
- Tsitsikamma community wind energy facility
- Uyekraal wind energy facility
- Veldrift and Saldanha wind energy facilities
- Vredendal photovoltaic solar energy facility
- Wag'nBiekiespan solar energy facility
- Walker Bay wind energy facility

## CURRICULUM VITAE OF JO-ANNE THOMAS

<b>Profession:</b>	Environmental Management and Compliance Consultant; Environmental Assessment Practitioner
<b>Specialisation:</b>	Environmental Management; Strategic environmental advice; Environmental compliance advice & monitoring; Environmental Impact Assessments; Policy, strategy & guideline formulation; Project Management; General Ecology
<b>Work experience:</b>	Twenty one (21) years in the environmental field

### VOCATIONAL EXPERIENCE

Provide technical input for projects in the environmental management field, specialising in Strategic Environmental Advice, Environmental Impact Assessment studies, environmental auditing and monitoring, environmental permitting, public participation, Environmental Management Plans and Programmes, environmental policy, strategy and guideline formulation, and integrated environmental management. Key focus on integration of the specialist environmental studies and findings into larger engineering-based projects, strategic assessment, and providing practical and achievable environmental management solutions and mitigation measures. Responsibilities for environmental studies include project management (including client and authority liaison and management of specialist teams); review and manipulation of data; identification and assessment of potential negative environmental impacts and benefits; review of specialist studies; and the identification of mitigation measures. Compilation of the reports for environmental studies is in accordance with all relevant environmental legislation.

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

### SKILLS BASE AND CORE COMPETENCIES

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

## EDUCATION AND PROFESSIONAL STATUS

### Degrees:

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

### Short Courses:

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

### Professional Society Affiliations:

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

## EMPLOYMENT

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

## PROJECT EXPERIENCE

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

## RENEWABLE POWER GENERATION PROJECTS: PHOTOVOLTAIC SOLAR ENERGY FACILITIES

### Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Christiana PV 2 SEF, North West	Solar Reserve South Africa	Project Manager & EAP
De Aar PV facility, Northern Cape	iNca Energy	Project Manager & EAP
Everest SEF near Hennenman, Free State	FRV Energy South Africa	Project Manager & EAP
Graafwater PV SEF, Western Cape	iNca Energy	Project Manager & EAP
Grootkop SEF near Allanridge, Free State	FRV Energy South Africa	Project Manager & EAP
Hertzogville PV 2 SEF with 2 phases, Free State	SunCorp / Solar Reserve	Project Manager & EAP
Karoshhoek CPV facility on site 2 as part of the larger Karoshhoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP

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

#### Basic Assessments

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

Project Name & Location	Client Name	Role
Sirius Solar PV Project Three and Sirius Solar PV Project Four (BA in terms of REDZ regulations), Northern Cape	SOLA Future Energy	Project Manager & EAP

#### Screening Studies

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

#### Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO and bi-monthly auditing for the construction of the Adams Solar PV Project Two South of Hotazel, Northern Cape	Enel Green Power	Project Manager
ECO for the construction of the Kathu PV Facility, Northern Cape	REISA	Project Manager
ECO and bi-monthly auditing for the construction of the Pulida PV Facility, Free State	Enel Green Power	Project Manager
ECO for the construction of the RustMo1 SEF, North West	Momentous Energy	Project Manager
ECO for the construction of the Sishen SEF, Northern	Windfall 59 Properties	Project Manager



Project Name & Location	Client Name	Role
Cape		
ECO for the construction of the Upington Airport PV Facility, Northern Cape	Sublunary Trading	Project Manager
Quarterly compliance monitoring of compliance with all environmental licenses for the operation activities at the Kathu PV facility, Northern Cape	REISA	Project Manager
ECO for the construction of the Konkoonies II PV SEF and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager
ECO for the construction of the Aggeneys PV SEF and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager

#### Compliance Advice and ESAP Reporting

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

#### Due Diligence Reporting

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

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

Project Name & Location	Client Name	Role
Biodiversity Permit & WULA for the Aggeneys SEF near Aggeneys, Northern Cape	BioTherm Energy	Project Manager & EAP
Biodiversity Permit for the Konkoonies II SEF near Pofadder, Northern Cape	BioTherm Energy	Project Manager & EAP
Biodiversity Permitting for the Lephalale SEF, Limpopo	Exxaro Resources	Project Manager & EAP

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

#### **RENEWABLE POWER GENERATION PROJECTS: CONCENTRATED SOLAR FACILITIES (CSP)**

##### **Environmental Impact Assessments and Environmental Management Programmes**

Project Name & Location	Client Name	Role
Ilanga CSP 2, 3, 4, 5, 7 & 9 Facilities near Upington, Northern Cape	Emvelo Holdings	Project Manager & EAP
Ilanga CSP near Upington, Northern Cape	Ilangethu Energy	Project Manager & EAP
Ilanga Tower 1 Facility near Upington, Northern Cape	Emvelo Holdings	Project Manager & EAP

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

#### Environmental Compliance, Auditing and ECO

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

#### Screening Studies

Project Name & Location	Client Name	Role
Upington CSP (Tower) Plant near Kanoneiland, Northern Cape	iNca Energy and FRV	Project Manager & EAP

#### Compliance Advice and ESAP reporting

Project Name & Location	Client Name	Role
Ilanga CSP Facility near Upington, Northern Cape	Ilangeethu Energy	Environmental Advisor
Ilangelethu CSP 2, Northern Cape	FG Emvelo	Environmental Advisor
Kathu CSP Facility, Northern Cape	GDF Suez	Environmental Advisor
Lephalale SEF, Limpopo	Cennergi	Environmental Advisor
Solis I CSP Facility, Northern Cape	Brightsource	Environmental Advisor

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

Project Name & Location	Client Name	Role
Environmental Permitting for the Ilanga CSP Facility near Upington, Northern Cape	Ilangeethu Energy	Project Manager & EAP
Environmental Permitting for the Kathu CSP, Northern Cape	GDF Suez	Project Manager & EAP
WULA for the Solis I CSP Facility, Northern Cape	Brightsource	Project Manager & EAP

#### RENEWABLE POWER GENERATION PROJECTS: WIND ENERGY FACILITIES

#### Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Sere WEF, Western Cape	Eskom Holdings SoC Limited	EAP

Project Name & Location	Client Name	Role
Aberdeen WEF, Eastern Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Amakhala Emoyeni WEF, Eastern Cape	Windlab Developments	Project Manager & EAP
EXXARO West Coast WEF, Western Cape	EXXARO Resources	Project Manager & EAP
Goereesoe Wind Farm near Swellendam, Western Cape	iNca Energy	Project Manager & EAP
Hartneest WEF, Western Cape	Juwi Renewable Energies	Project Manager & EAP
Hopefield WEF, Western Cape	Umoya Energy	EAP
Kleinsee WEF, Northern Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Klipheuwel/Dassiesfontein WEF within the Overberg area, Western Cape	BioTherm Energy	Project Manager & EAP
Moorreesburg WEF, Western Cape	iNca Energy	Project Manager & EAP
Oyster Bay WEF, Eastern Cape	Renewable Energy Resources Southern Africa	Project Manager & EAP
Project Blue WEF, Northern Cape	Windy World	Project Manager & EAP
Rheboksfontein WEF, Western Cape	Moyeng Energy	Project Manager & EAP
Spitskop East WEF near Riebeeck East, Eastern Cape	Renewable Energy Resources Southern Africa	Project Manager & EAP
Suurplaat WEF, Western Cape	Moyeng Energy	Project Manager & EAP
Swellendam WEF, Western Cape	IE Swellendam	Project Manager & EAP
Tsitsikamma WEF, Eastern Cape	Exxarro	Project Manager & EAP
West Coast One WEF, Western Cape	Moyeng Energy	Project Manager & EAP

#### Basic Assessments

Project Name & Location	Client Name	Role
Amakhala Emoyeni Wind Monitoring Masts, Eastern Cape	Windlab Developments	Project Manager & EAP
Beaufort West Wind Monitoring Masts, Western Cape	Umoya Energy	Project Manager & EAP
Hopefield Community Wind Farm near Hopefield, Western Cape	Umoya Energy	Project Manager & EAP
Koekenaap Wind Monitoring Masts, Western Cape	EXXARO Resources	Project Manager & EAP
Koingnaas WEF, Northern Cape	Just Palm Tree Power	Project Manager & EAP
Laingsburg Area Wind Monitoring Masts, Western Cape	Umoya Energy	Project Manager & EAP
Overberg Area Wind Monitoring Masts, Western Cape	BioTherm Energy	Project Manager & EAP
Oyster Bay Wind Monitoring Masts, Eastern Cape	Renewable Energy Systems Southern Africa (RES)	Project Manager & EAP

#### Screening Studies

Project Name & Location	Client Name	Role
Albertinia WEF, Western Cape	BioTherm Energy	Project Manager & EAP
Koingnaas WEF, Northern Cape	Just Pal Tree Power	Project Manager & EAP
Napier Region WEF Developments, Western Cape	BioTherm Energy	Project Manager & EAP
Tsitsikamma WEF, Eastern Cape	Exxarro Resources	Project Manager & EAP
Various WEFs within an identified area in the Overberg area, Western Cape	BioTherm Energy	Project Manager & EAP
Various WEFs within an identified area on the West Coast, Western Cape	Investec Bank Limited	Project Manager & EAP
Various WEFs within an identified area on the West Coast, Western Cape	Eskom Holdings Limited	Project Manager & EAP

Project Name & Location	Client Name	Role
Various WEFs within the Western Cape	Western Cape Department of Environmental Affairs and Development Planning	Project Manager & EAP
Velddrift WEF, Western Cape	VentuSA Energy	Project Manager & EAP
Wind 1000 Project	Thabo Consulting on behalf of Eskom Holdings	Project Manager & EAP
Wittekleibosch, Snylip & Doriskraal WEFs, Eastern Cape	Exxarro Resources	Project Manager & EAP

#### Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the West Coast One WEF, Western Cape	Aurora Wind Power	Project Manager
ECO for the construction of the Gouda WEF, Western Cape	Blue Falcon	Project Manager
EO for the Dassiesklip Wind Energy Facility, Western Cape	Group 5	Project Manager
Quarterly compliance monitoring of compliance with all environmental licenses for the operation activities at the Gouda Wind Energy facility near Gouda, Western Cape	Blue Falcon	Project Manager
Annual auditing of compliance with all environmental licenses for the operation activities at the West Coast One Wind Energy facility near Vredenburg, Western Cape	Aurora Wind Power	Project Manager
External environmental and social audit for the Amakhala Wind Farm, Eastern Cape	Cennergi	Project Manager
External environmental and social audit for the Tsitsikamma Wind Farm, Eastern Cape	Cennergi	Project Manager
ECO for the construction of the Excelsior Wind Farm and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager
External compliance audit of the Dassiesklip Wind Energy Facility, Western Cape	BioTherm Energy	Project Manager

#### Compliance Advice

Project Name & Location	Client Name	Role
Amakhala Phase 1 WEF, Eastern Cape	Cennergi	Environmental Advisor
Dassiesfontein WEF within the Overberg area, Western Cape	BioTherm Energy	Environmental Advisor
Excelsior Wind Farm, Western Cape	BioTherm Energy	Environmental Advisor
Great Karoo Wind Farm, Northern Cape	African Clean Energy Developments (ACED)	Environmental Advisor
Hopefield Community WEF, Western Cape	African Clean Energy Developments (ACED)	Environmental Advisor
Rheboksfontein WEF, Western Cape	Moyeng Energy	Environmental Advisor
Tiqua WEF, Western Cape	Cennergi	Environmental Advisor
Tsitsikamma WEF, Eastern Cape	Cennergi	Environmental Advisor
West Coast One WEF, Western Cape	Moyeng Energy	Environmental Advisor

#### Due Diligence Reporting

Project Name & Location	Client Name	Role
Witteberg WEF, Western Cape	EDPR Renewables	Environmental Advisor
IPD Vredenburg WEF within the Saldanha Bay area, Western Cape	IL&FS Energy Development Company	Environmental Advisor

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

Project Name & Location	Client Name	Role
Biodiversity Permitting for the Power Line between the Tsitikamma Community WEF & the Diep River Substation, Eastern Cape	Cennergi	Project Manager & EAP
Biodiversity Permitting for the West Coast One WEF, Western Cape	Aurora Wind Power	Project Manager & EAP
Environmental Permitting for the Excelsior WEF, Western Cape	BioTherm Energy	Project Manager & EAP
Plant Permits & WULA for the Tsitsikamma Community WEF, Eastern Cape	Cennergi	Project Manager & EAP
S24G and WULA for the Rectification for the commencement of unlawful activities on Ruimsig AH in Honeydew, Gauteng	Hossam Soror	Project Manager & EAP
S24G Application for the Rheboksfontein WEF, Western Cape	Ormonde - Theo Basson	Project Manager & EAP
S53 Application & WULA for Suurplaat and Gemini WEFs, Northern Cape	Engie	Project Manager & EAP
S53 Application for the Hopefield Community Wind Farm near Hopefield, Western Cape	Umoya Energy	Project Manager & EAP
S53 Application for the Project Blue WEF, Northern Cape	WWK Developments	Project Manager & EAP
S53 for the Oyster Bay WEF, Eastern Cape	RES	Project Manager & EAP
WULA for the Great Karoo Wind Farm, Northern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP

#### **CONVENTIONAL POWER GENERATION PROJECTS (COAL)**

##### **Environmental Impact Assessments and Environmental Management Programmes**

Project Name & Location	Client Name	Role
Mutsho Power Station near Makhado, Limpopo	Mutsho Consortium	Project Manager & EAP
Coal-fired Power Station near Ogies, Mpumalanga	Ruukki SA	Project Manager & EAP
Thabametsi IPP Coal-fired Power Station, near Lephalale, Limpopo	Axia	Project Manager & EAP
Transalloys Coal-fired Power Station, Mpumalanga	Transalloys	Project Manager & EAP
Tshivasho IPP Coal-fired Power Station (with WML), near Lephalale, Limpopo	Cennergi	Project Manager & EAP
Umbani Coal-fired Power Station, near Kriel, Mpumalanga	ISS Global Mining	Project Manager & EAP
Waterberg IPP Coal-Fired Power Station near Lephalale, Limpopo	Exxaro Resources	Project Manager & EAP

##### **Basic Assessments**

Project Name & Location	Client Name	Role
Coal Stockyard on Medupi Ash Dump Site, Limpopo	Eskom Holdings	Project Manager & EAP

Project Name & Location	Client Name	Role
Biomass Co-Firing Demonstration Facility at Arnot Power Station East of Middleburg, Mpumlanaga	Eskom Holdings	Project Manager & EAP

#### Screening Studies

Project Name & Location	Client Name	Role
Baseload Power Station near Lephalale, Limpopo	Cennergi	Project Manager & EAP
Coal-Fired Power Plant near Delmas, Mpumalanga	Exxaro Resources	Project Manager & EAP
Makhado Power Station, Limpopo	Mutsho Consortium, Limpopo	Project Manager & EAP

#### Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the Camden Power Station, Mpumalanga	Eskom Holdings	Project Manager

#### Compliance Advice

Project Name & Location	Client Name	Role
Thabametsi IPP Coal-fired Power Station, near Lephalale, Limpopo	Axia	Environmental Advisor

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

Project Name & Location	Client Name	Role
Permit application for the Thabametsi Bulk Water Pipeline, near Lephalale, Limpopo	Axia	Project Manager & EAP
S53 & WULA for the Waterberg IPP Coal-Fired Power Station near Lephalale, Limpopo	Exxaro Resources	Project Manager & EAP
S53 Application for the Tshivasho Coal-fired Power Station near Lephalale, Limpopo	Cennergi	Project Manager & EAP

### CONVENTIONAL POWER GENERATION PROJECTS (GAS)

#### Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Ankerlig OCGT to CCGT Conversion project & 400 kV transmission power line between Ankerlig and the Omega Substation, Western Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Gourikwa OCGT to CCGT Conversion project & 400 kV transmission power line between Gourikwa & Proteus Substation, Western Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Richards Bay Gas to Power Combined Cycle Power Station, KwaZulu-Natal	Eskom Holdings SoC Limited	Project Manager & EAP
Richards Bay Gas to Power Plant, KwaZulu-Natal	Richards Bay Gas	Project Manager & EAP
Decommissioning & Recommissioning of 3 Gas Turbine Units at Acacia Power Station & 1 Gas Turbine Unit at Port Rex Power Station to the existing Ankerlig Power Station in Atlantis Industria, Western Cape	Eskom Holdings	Project Manager & EAP
Two 132kV Chickadee Lines to the new Zonnebloem Switching Station, Mpumalanga	Eskom Holdings	Project Manager & EAP



### Screening Studies

Project Name & Location	Client Name	Role
Fatal Flaw Analysis for 3 area identified for the establishment of a 500MW CCGT Power Station	Globeleq Advisors Limited	Project Manager & EAP
Richards Bay Gas to Power Combined Cycle Power Station, KwaZulu-Natal	Eskom Holdings SoC Limited	Project Manager & EAP

### GRID INFRASTRUCTURE PROJECTS

#### Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Aggeneis-Oranjemond Transmission Line & Substation Upgrade, Northern Cape	Eskom Transmission	Project Manager & EAP
Ankerlig-Omega Transmission Power Lines, Western Cape	Eskom Transmission	Project Manager & EAP
Karoshhoek Grid Integration project as part of the Karoshhoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Koeberg-Omega Transmission Power Lines,, Western Cape	Eskom Transmission	Project Manager & EAP
Koeberg-Stikland Transmission Power Lines, Western Cape	Eskom Transmission	Project Manager & EAP
Kyalami Strengthening Project, Gauteng	Eskom Transmission	Project Manager & EAP
Mokopane Integration Project, Limpopo	Eskom Transmission	Project Manager & EAP
Saldanha Bay Strengthening Project, Western Cape	Eskom Transmission	Project Manager & EAP
Steelpoort Integration Project, Limpopo	Eskom Transmission	Project Manager & EAP
Transmission Lines from the Koeberg-2 Nuclear Power Station site, Western Cape	Eskom Transmission	Project Manager & EAP
Tshwane Strengthening Project, Phase 1, Gauteng	Eskom Transmission	Project Manager & EAP

### Basic Assessments

Project Name & Location	Client Name	Role
Dassenberg-Koeberg Power Line Deviation from the Koeberg to the Ankerlig Power Station, Western Cape	Eskom Holdings	Project Manager & EAP
Golden Valley II WEF Power Line & Substation near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Golden Valley WEF Power Line near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Karoshhoek Grid Integration project as part of the Karoshhoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Konkoonsies II PV SEF Power Line to the Paulputs Substation near Pofadder, Northern Cape	BioTherm Energy	Project Manager & EAP
Perdekraal West WEF Powerline to the Eskom Kappa Substation, Western Cape	BioTherm Energy	Project Manager & EAP
Rheboksfontein WEF Powerline to the Aurora Substation, Western Cape	Moyeng Energy	Project Manager & EAP
Soetwater Switching Station near Sutherland, Northern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP



Solis Power I Power Line & Switchyard Station near Upington, Northern Cape	Brightsource	Project Manager & EAP
Stormwater Canal System for the Ilanga CSP near Upington, Northern Cape	Karoshok Solar One	Project Manager & EAP
Tsitsikamma Community WEF Powerline to the Diep River Substation, Eastern Cape	Eskom Holdings	Project Manager & EAP

#### Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the Ferrum-Mookodi Transmission Line, Northern Cape and North West	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Gamma-Kappa Section A Transmission Line, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Gamma-Kappa Section B Transmission Line, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Hydra IPP Integration project, Northern Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Kappa-Sterrekus Section C Transmission Line, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Namaqualand Strengthening project in Port Nolloth, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
ECO for the construction of the Neptune Substation Soil Erosion Mitigation Project, Eastern Cape	Eskom	Project Manager
ECO for the construction of the Ilanga-Gordonia 132kV power line, Northern Cape	Karoshok Solar One	Project Manager

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

Project Name & Location	Client Name	Role
Environmental Permitting and WULA for the Rockdale B Substation & Loop in Power Lines,	Eskom Holdings	Project Manager & EAP
Environmental Permitting and WULA for the Steelpoort Integration project, Limpopo	Eskom Holdings	Project Manager & EAP
Environmental Permitting for Solis CSP near Upington, Northern Cape	Brightsource	Project Manager & EAP

#### MINING SECTOR PROJECTS

#### Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Elitheni Coal Mine near Indwe, Eastern Cape	Elitheni Coal	Project Manager & EAP
Groot Letaba River Development Project Borrow Pits	Iiso	Project Manager & EAP
Grootegeluk Coal Mine for coal transportation infrastructure between the mine and Medupi Power Station (EMPr amendment) , Limpopo	Eskom Holdings	Project Manager & EAP
Waterberg Coal Mine (EMPr amendment), Limpopo	Sesoko Resources	Project Manager & EAP
Aluminium Plant WML & AEL, Gauteng	GfE-MIR Alloys & Minerals	Project Manager & EAP
Zero Waste Recovery Plant at Highveld Steel, Mpumalanga	Anglo African Metal	Project Manager & EAP

#### Basic Assessments

Project Name & Location	Client Name	Role
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Rare Earth Separation Plant in Vredendal, Western Cape	Rareco	Project Manager & EAP
Decommissioning and Demolition of Kilns 5 & 6 at the Slurry Plant, Kwa-Zulu Natal	PPC	Project Manager & EAP

#### Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the Duhva Mine Water Recovery Project, Mpumalanga	Eskom Holdings SoC Limited	Project Manager
External compliance audit of Palesa Coal Mine's Integrated Water Use License (IWUL), near KwaMhlanga, Mpumalanga	HCI Coal	Project Manager
External compliance audit of Palesa Coal Mine's Waste Management License (WML) and EMP, near KwaMhlanga, Mpumalanga	HCI Coal	Project Manager
External compliance audit of Mbali Coal Mine's Integrated Water Use License (IWUL), near Ogies, Mpumalanga	HCI Coal	Project Manager
Independent External Compliance Audit of Water Use License (WUL) for the Tronox Namakwa Sands (TNS) Mining Operations (Brand se Baai), Western Cape	Tronox Namakwa Sands	Project Manager
Independent External Compliance Audit of Water Use License (WUL) for the Tronox Namakwa Sands (TNS) Mineral Separation Plant (MSP), Western Cape	Tronox Namakwa Sands	Project Manager
Independent External Compliance Audit of Water Use License (WUL) for the Tronox Namakwa Sands (TNS) Smelter Operations (Saldanha), Western Cape	Tronox Namakwa Sands	Project Manager
Compliance Auditing of the Waste Management Licence for the PetroSA Landfill Site at the GTL Refinery, Western Cape	PetroSA	Project Manager

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

Project Name & Location	Client Name	Role
Waste Licence Application for the Rare Earth Separation Plant in Vredendal, Western Cape	Rareco	Project Manager & EAP
WULA for the Expansion of the Landfill site at Exxaro's Namakwa Sands Mineral Separation Plant, Western Cape	Exxaro Resources	Project Manager & EAP
S24G & WML for an Aluminium Plant, Gauteng	GfE-MIR Alloys & Minerals	Project Manager & EAP

#### INFRASTRUCTURE DEVELOPMENT PROJECTS (BRIDGES, PIPELINES, ROADS, WATER RESOURCES, STORAGE, ETC)

##### Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Bridge across the Ngotwane River, on the border of South Africa and Botswana	Eskom Holdings	Project Manager & EAP
Chemical Storage Tanks, Metallurgical Plant Upgrade & Backfill Plant upgrade at South Deep Gold Mine, near Westonaria, Gauteng	Goldfields	Project Manager & EAP

Project Name & Location	Client Name	Role
Expansion of the existing Welgedacht Water Care Works, Gauteng	ERWAT	Project Manager & EAP
Golden Valley WEF Access Road near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Great Fish River Wind Farm Access Roads and Watercourse Crossings near Cookhouse, Eastern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP
Ilanga CSP Facility Watercourse Crossings near Upington, Northern Cape	Karoshhoek Solar one	Project Manager & EAP
Modification of the existing Hartebeestfontein Water Care Works, Gauteng	ERWAT	Project Manager & EAP
N10 Road Realignment for the Ilanga CSP Facility, East of Upington, Northern Cape	SANRAL	Project Manager & EAP
Nxuba (Bedford) Wind Farm Watercourse Crossings near Cookhouse, Eastern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP
Pollution Control Dams at the Medupi Power Station Ash Dump & Coal Stockyard, Limpopo	Eskom	Project Manager & EAP
Qoboshane borrow pits (EMPr only), Eastern Cape	Emalahleni Local Municipality	Project Manager & EAP
Tsitsikamma Community WEF Watercourse Crossings, Eastern Cape	Cennergi	Project Manager & EAP
Clayville Central Steam Plant, Gauteng	Bellmall Energy	Project Manager & EAP
Msenge Emoyeni Wind Farm Watercourse Crossings and Roads, Eastern Cape	Windlab	Project Manager & EAP

#### Basic Assessments

Project Name & Location	Client Name	Role
Harmony Gold WWTW at Doornkop Mine, Gauteng	Harmony Doornkop Plant	Project Manager & EAP
Ofir-ZX Watercourse Crossing for the Solar PV Facility, near Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP
Qoboshane bridge & access roads, Eastern Cape	Emalahleni Local Municipality	Project Manager & EAP
Relocation of the Assay Laboratory near Carletonville, Gauteng	Sibanye Gold	Project Manager & EAP
Richards Bay Harbour Staging Area, KwaZulu-Natal	Eskom Holdings	Project Manager & EAP
S-Kol Watercourse Crossing for the Solar PV Facility, East of Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP
Sonnenberg Watercourse Crossing for the Solar PV Facility, West Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP
Kruisvallei Hydroelectric Power Generation Scheme, Free State	Building Energy	Project Manager & EAP
Masetjaba Water Reservoir, Pump Station and Bulk Supply Pipeline near Nigel, Gauteng	Naidu Consulting Engineers	Project Manager & EAP
Access Road for the Dwarsug Wind Farm, Northern Cape Province	South Africa Mainsteam Renewable Power	Project Manager & EAP
Upgrade of the Cooling Water Treatment Facility at the Kriel Power Station, Mpumalanga	Eskom	Project Manager & EAP

#### Screening Studies

Project Name & Location	Client Name	Role
Roodepoort Open Space Optimisation Programme (OSOP) Precinct, Gauteng	TIMAC Engineering Projects	Project Manager & EAP

Vegetable Oil Plant and Associated Pipeline, Kwa-Zulu Natal	Wilmar Oils and Fats Africa	Project Manager & EAP
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#### Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO and bi-monthly auditing for the construction of the Olifants River Water Resources Development Project (ORWRDP) Phase 2A: De Hoop Dam, R555 realignment and housing infrastructure	Department of Water and Sanitation	Project Manager Auditor
ECO for the Rehabilitation of the Blaaupan & Storm Water Channel, Gauteng	Airports Company of South Africa (ACSA)	Project Manager
Due Diligence reporting for the Better Fuel Pyrolysis Facility, Gauteng	Better Fuels	Project Manager
ECO for the Construction of the Water Pipeline from Kendal Power Station to Kendal Pump Station, Mpumalanga	Transnet	Project Manager
ECO for the Replacement of Low-Level Bridge, Demolition and Removal of Artificial Pong, and Reinforcement the Banks of the Crocodile River at the Construction at Walter Sisulu National Botanical Gardens, Gauteng Province	South African National Biodiversity Institute (SANBI)	Project Manager
External Compliance Audit of the Air Emission Licence (AEL) for a depot in Bloemfontein, Free State Province and in Tzaneen, Mpumalanga Province	PetroSA	Project Manager

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

Project Name & Location	Client Name	Role
WULA for the Izubulo Private Nature Reserve, Limpopo	Kjell Bismeyer, Jann Bader, Laurence Saad	Project Manager & EAP
WULA for the Masodini Private Game Lodge, Limpopo	Masodini Private Game Lodge	Environmental Advisor
WULA for the Ezulwini Private Nature Reserve, Limpopo	Ezulwini Investments	Project Manager & EAP
WULA for the Masodini Private Game Lodge, Limpopo	Masodini Private Game Lodge	Project Manager & EAP
WULA for the N10 Realignment at the Ilanga SEF, Northern Cape	Karoshhoek Solar One	Project Manager & EAP
WULA for the Kruisvallei Hydroelectric Power Generation Scheme, Free State	Building Energy	Project Manager & EAP
S24G and WULA for the Illegal construction of structures within a watercourse on EFF 24 Ruimsig Agricultural Holdings, Gauteng	Sorrer Language Services	Project Manager & EAP

#### HOUSING AND URBAN PROJECTS

##### Basic Assessments

Project Name & Location	Client Name	Role
Postmasburg Housing Development, Northern Cape	Transnet	Project Manager & EAP

##### Compliance Advice and reporting

Project Name & Location	Client Name	Role
Kampi ya Thude at the Olifants West Game Reserve, Limpopo	Nick Elliot	Environmental Advisor
External Compliance Audit of WUL for the Johannesburg Country Club, Gauteng	Johannesburg Country Club	Project Manager

#### Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
Due Diligence Audit for the Due Diligence Audit Report, Gauteng	Delta BEC (on behalf of Johannesburg Development Agency (JDA))	Project Manager

#### ENVIRONMENTAL MANAGEMENT TOOLS

Project Name & Location	Client Name	Role
Development of the 3rd Edition Environmental Implementation Plan (EIP)	Gauteng Department of Agriculture and Rural Development (GDARD)	Project Manager & EAP
Development of Provincial Guidelines on 4x4 routes, Western Cape	Western Cape Department of Environmental Affairs and Development Planning	EAP
Compilation of Construction and Operation EMP for the Braamhoek Transmission Integration Project, Kwazulu-Natal	Eskom Holdings	Project Manager & EAP
Compilation of EMP for the Wholesale Trade of Petroleum Products, Gauteng	Munaca Technologies	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for Medupi Power Station, Limpopo	Eskom Holdings	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for the Dube TradePort Site Wide Precinct	Dube TradePort Corporation	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for the Kusile Power Station, Mpumalanga	Eskom Holdings	Project Manager & EAP
Review of Basic Assessment Process for the Wittekleibosch Wind Monitoring Mast, Eastern Cape	Exxaro Resources	Project Manager & EAP
Revision of the EMP for the Sirius Solar PV	Aurora Power Solutions	Project Manager & EAP
State of the Environment (SoE) for Emalahleni Local Municipality, Mpumalanga	Simo Consulting on behalf of Emalahleni Local Municipality	Project Manager & EAP
Aspects and Impacts Register for Salberg Concrete Products operations	Salberg Concrete Products	EAP
First State of Waste Report for South Africa	Golder on behalf of the Department of Environmental Affairs	Project Manager & EAP
Responsibilities Matrix and Gap Analysis for the Kruisvallei Hydroelectric Power Generation Scheme, Free State Province	Building Energy	Project Manager
Responsibilities Matrix and Gap Analysis for the Roggeveld Wind Farm, Northern & Western Cape Provinces	Building Energy	Project Manager

## **PROJECTS OUTSIDE OF SOUTH AFRICA**

<b>Project Name &amp; Location</b>	<b>Client Name</b>	<b>Role</b>
Advisory Services for the Zizabona Transmission Project, Zambia, Zimbabwe, Botswana & Namibia	PHD Capital	Advisor
EIA for the Semonkong WEF, Lesotho	MOSCET	Project Manager & EAP
EMP for the Kuvaninga Energia Gas Fired Power Project, Mozambique	ADC (Pty) Ltd	Project Manager & EAP
Environmental Screening Report for the SEF near Thabana Morena, Lesotho	Building Energy	EAP
EPBs for the Kawambwa, Mansa, Mwense and Nchelenge SEFs in Luapula Province, Zambia	Building Energy	Project Manager & EAP
ESG Due Diligence for the Hilton Garden Inn Development in Windhoek, Namibia	Vatange Capital	Project Manager
Mandahill Mall Rooftop PV SEF EPB, Lusaka, Zambia	Building Energy	Project Manager & EAP
Monthly ECO for the PV Power Plant for the Mocuba Power Station	Scatec	Project Manager

## CURRICULUM VITAE OF GIDEON RAATH

<b>Profession :</b>	Environmental and Permitting Consultant
<b>Specialisation:</b>	Environmental Impact Assessments, Water Use Licencing, Waste Licencing, Environmental Compliance Officer, Ecological Specialist, Wetland Specialist, GIS, MPRDA permitting
<b>Work Experience:</b>	4.5 years' experience in environmental management, National Water Act, Mineral and Petroleum Resources Development Act, ECO and compliance auditing, wetland and ecological specialist reporting

### VOCATIONAL EXPERIENCE

Gideon holds an MSc (Geography and Environmental Management; SU), a BSc Honours (Ecology and Environmental Studies - Cum laude; Wits) and a BSc (Geography and Environmental Management; UJ). His MSc thesis focused on the hydrological impact on the spatial distribution of invasive Eucalyptus trees along the Breede River, while his honours thesis evaluated ethnobotanical relationships around the Rio Tinto copper mine in Phalaborwa. Most recently he has worked as an Environmental Consultant at EOH Coastal and Environmental Services (EOH CES), conducting environmental authorisations applications (NWA, NEMA, MPRDA), Public Participation Processes, GIS specialisation as well as Ecological and Wetland specialist studies. Previously, Gideon worked as the Monitoring & Evaluation Project Manager for the City of Cape Town's invasive species unit (Environmental Resources Management Department).

Gideon's GIS background includes the management of the City of Cape Town invasive species GIS database, involving the storage, management, recall and quality control off all sightings, clearance visits and known infestations. Further experience include mapping for various consulting projects, boundary verification through ground-truthing and the spatial mapping and delineation component of this MSc research. Gideon has further attended public participation workshops, and has been involved with IAP identification, translation, public meetings and engagement for a variety of projects, mainly within the Afrikaans speaking Northern Cape. Gideon is interested in invasion ecology, treatment of groundwater pollution through phytoremediation, botanical and wetland specialist studies, GIS application for ecology and environmental management, and the EIA processes in general.

### SKILLS BASE AND CORE COMPETENCIES

- Environmental Management
- GIS data manipulation, storage, management and mapping
- EIA Impact Assessments and Basic Assessment
- Environmental Management Programmes
- Environmental Compliance Monitoring
- Mining Rights, Mining Permits, Prospecting Rights (and renewal) applications (MPRDA & NEMA)
- Public and Stakeholder Engagement (NEMA)
- Ecological/Botanical Specialist Studies



- Wetland Delineation, Functional and Impact Assessment studies
- Water Use Licence Applications (NWA)
- General Authorisations (NWA)

## EDUCATION AND PROFESSIONAL STATUS

### Degrees:

- M.Sc. Geography and Environmental Science (2014), Stellenbosch University (2014)
- B.Sc. (Hons) Ecology, Environment and Conservation (Cum Laude), University of the Witwatersrand (2011)
- B.Sc. Life and Environmental Sciences, University of Johannesburg (2010)

### Short Courses:

- GroundTruth SASS5 competency course, GroundTruth Aquatic Consulting (2017)
- DWS 21C&I GA training workshop, Department of Water and Sanitation (2016)
- IAIAsa Public Participation Process Workshop, IAIAsa South Africa (2016)
- EIA Theory and application, EOH Coastal and Environmental Services (2015)
- Water Safety Training, City of Cape Town Environmental Resources Department (2014)
- Herbicide safety and application for weed control, City of Cape Town Environmental Resources Department (2014)
- Snake awareness training, City of Cape Town Environmental Resources Department (2014)
- Habitable Planet Workshop, Applied Centre for Climate & Earth Systems Science, Cape Town (2011)

### Professional Society Affiliations:

- Golden Key International Honour Society – University of the Witwatersrand Chapter
- South African Council for Scientific Natural Professionals (SACNASP): Certified Natural Scientist – Pr.Sci.Nat. (Membership No.: 117178)
- IAIAsa (Membership No.: 3619)

### Other Relevant Skills:

- GPS use, spatial data capturing and ground truthing

## EMPLOYMENT

Date	Company	Roles and Responsibilities
October 2018 - Current:	Savannah Environmental (Pty) Ltd	<p>Environmental and Permitting Consultant</p> <p><u>Tasks include:</u> Undertaking environmental impact assessments, basic assessments, environmental management programmes (EMPrs), environmental amendments, water use license applications, general authorisations, wetland assessments, botanical/ecological assessments, mining rights and permit applications, prospecting rights applications, environmental compliance officer audits and reporting, Ensuring environmental compliance on permitting processes, client liaison and relationship management.</p>



Date	Company	Roles and Responsibilities
February 2015 – September 2018	EOH Coastal and Environmental Services (Pty) Ltd	<p>Senior Environmental Consultant</p> <p><u>Tasks included:</u> Undertaking environmental impact assessments, basic assessments, environmental management programmes (EMPrs), environmental amendments, water use license applications, general authorisations, wetland assessments, botanical/ecological assessments, mining rights and permit applications, prospecting rights applications, environmental compliance officer audits and reporting, Ensuring environmental compliance on permitting processes, client liaison and relationship management, public participation processes for environmental authorisations.</p>
March 2014 – February 2015	Invasive Species Unit (ISU), Environmental Resources Management Department (ERMD), City of Cape Town	<p>Professional Officer</p> <p><u>Tasks included:</u> Managed the Monitoring &amp; Evaluation project portfolio, entailing the establishment of an invasive species monitoring &amp; evaluation system for the ISU, as well as GIS database management, quality assurance and reporting thereof. Position required managing a small staff compliment (dealing directly with GIS database management), managing time and budgets for the monitoring division, conducting monitoring trials and research, writing species management plans as well as handling the GIS database, quality control, verification and integrity for the ISU.</p>
January 2012 – March 2014	University of Stellenbosch	<p>Departmental Assistant</p> <p><u>Tasks included:</u> Technical editing of academic reports.</p> <p>Formatting of PhD and MSc reports on a weekly basis, with short turnaround time and good quality feedback.</p>
January 2011 – January 2012	University of the Witwatersrand	<p>Departmental Assistant</p> <p><u>Tasks included:</u> Responsible for practical tutorials and marking of 1st year medical students. Included zoology and botany.</p>
January 2006 – November 2010 (part time)	Codeon Networking CC	<p>Co-founder and web developer</p> <p><u>Tasks included:</u> Small business owner, responsible for all facets of the business. Self-taught HTML, CSS, PHP and MySQL. Won and produced two medium enterprise websites serving the gaming community. Websites required user profiles &amp; permissions, CMS system and automated payment options as functionality. Development</p>

Date	Company	Roles and Responsibilities
		and maintenance of a user database and account management system.

## PROJECT EXPERIENCE

Project experience includes project management, EIA, BA and EMPr documentation development, integrated water use license applications, general authorisations, specialist botanical and ecological impact assessments, specialist wetland delineation and impact assessments, GIS applications and mapping, compliance auditing and monitoring, vegetation rehabilitation and monitoring plans, integrated waste management plans and waste licencing, mining right & permits, as well as prospecting rights applications.

Industry experience includes the waste sector (IWMP's and waste licencing), road and rail infrastructure (BAR, S&EIR, WUL/GA, Waste Licence), ports and harbours (management plans), private sector clients across varying industries (various permits), mining sector (BAR, S&EIR, mining permits and rights, prospecting rights), conservation sector (biodiversity plans), renewable energy industry (BAR, S&EIR) as well as the gas and oil industry (biodiversity reports).

## RENEWABLE POWER GENERATION PROJECTS: SOLAR ENERGY FACILITIES

### Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
Enel Paleisheuwel Solar compliance auditing, Paleisheuwel, Northern Cape	Enel Green Power RSA (EGP RSA)	Environmental consultant

## RENEWABLE POWER GENERATION PROJECTS: WIND ENERGY FACILITIES

### Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
G7 Brandvalley S&EIR, Matjiesfontein, Northern Cape	G7 Renewable Energy (Pty) Ltd	Environmental consultant
G7 Rietkloof S&EIR, Matjiesfontein, Northern Cape	G7 Renewable Energy (Pty) Ltd	Environmental consultant

### Basic Assessments

Project Name & Location	Client Name	Role
G7 Renewable Energy 132kV BAR & EMPr, Matjiesfontein, Northern Cape	G7 Renewable Energy (Pty) Ltd	Project Manager, Environmental consultant, Public Participation

### Compliance Advice and ESAP reporting

Project Name & Location	Client Name	Role
Biotherm Energy Golden Valley Wind Energy Facility ESAP, Bedford, Eastern Cape	Biotherm Energy Pty Ltd	Environmental consultant

### Amendments

Project Name & Location	Client Name	Role
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Mosselbay Energy EA Amendment, Mosselbay, Western Cape	Mosselbay Energy IPP (Pty) Ltd	Environmental consultant
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## **GAS PROJECTS**

### **Screening Studies**

<b>Project Name &amp; Location</b>	<b>Client Name</b>	<b>Role</b>
iGas integrated biodiversity screening, Saldanha, Western Cape	Central Energy Fund - iGas (subsidiary)	Environmental consultant, Faunal specialist (assistant)

## **MINING SECTOR PROJECTS**

### **Environmental Impact Assessments and Environmental Management Programmes**

<b>Project Name &amp; Location</b>	<b>Client Name</b>	<b>Role</b>
Triton Minerals Limited Ancuabe and Nicanda Hills EPDA, Ancuabe, Cabo Del Gado Province, Mozambique	Triton Minerals Ltd	Environmental consultant
Ancuabe graphite mine Environmental and Social Impact Assessment (ESIA), Cabo Del Gado Province, Mozambique	Grafex Limitada Mozambique	Environmental consultant

### **Basic Assessments**

<b>Project Name &amp; Location</b>	<b>Client Name</b>	<b>Role</b>
SANRAL material sourcing BAR (DMR), Hendrina, Mpumalanga Province	SANRAL SOC Ltd & Leo consulting engineers	Project Manager, Environmental consultant, Public Participation
SANRAL Bierspruit R510 Borrow Pit authorisation, Thabazimbi, Limpopo Province	SANRAL SOC Ltd & Royal HaskoningDHV South Africa	Project Manager, Environmental consultant, Ecological specialist, Public Participation
Almenar tin prospecting BAR, Carnarvon, Northern Cape	Almenar Property Investments (Pty) Ltd	Environmental consultant

### **Rehabilitation Studies**

<b>Project Name &amp; Location</b>	<b>Client Name</b>	<b>Role</b>
Ancuabe baseline vegetation monitoring assessment and programme, Ancuabe, Cabo Del Gado Province, Mozambique	Grafex Limitada Mozambique	Botanical specialist
Prospecting pit rehabilitation programme, Ancuabe, Cabo Del Gado Province, Mozambique	Grafex Limitada Mozambique	Botanical specialist, Environmental consultant
Mayfield Quarry rehabilitation plan, Grahamstown, Eastern Cape	Mayfield Quarry	Environmental consultant

### **Environmental Compliance, Auditing and ECO**

<b>Project Name &amp; Location</b>	<b>Client Name</b>	<b>Role</b>
Construction monitoring and DMR environmental authorisation, Hendrina, Mpumalanga Province	SANRAL SOC Ltd & Leo consulting engineers	Project Manager, ECO,
SANRAL Caledon N2 Section 3 road upgrade ECO Audits and Reporting, Caledon, Western Cape Province	JG Afrika Engineering	Project Manager, ECO

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

Project Name & Location	Client Name	Role
VMC Mining permit renewal application, Rust De Winter, Gauteng	Vergenoeg Mining Company (Pty) Ltd	Environmental consultant
Zirco Resources Kamiesberg heavy mineral sand mine water use licence, Kamiesberg, Northern Cape	Zirco Roode Heuwel (Pty) Ltd	Environmental consultant

**INFRASTRUCTURE DEVELOPMENT PROJECTS (BRIDGES, PIPELINES, ROADS, WATER RESOURCES, STORAGE, ETC)****Environmental Impact Assessments and Environmental Management Programmes**

Project Name & Location	Client Name	Role
S&EIR authorisation for the SANRAL Zandkraal-Windburg N1 road upgrade, Windburg, Free State Province	SANRAL SOC Ltd & SMEC Consulting Engineers	Project Manager, Environmental consultant, Public Participation
Thabazimbi Local Municipality Integrated Waste Management Plan, Thabazimbi, Limpopo Province	Thabazimbi Local Municipality & Anglo American Plc	Environmental consultant, Public Participation

**Basic Assessments**

Project Name & Location	Client Name	Role
SANRAL Masekwaspoort N1 Road Upgrade BA, Louis Trichardt, Limpopo Province	SANRAL SOC Ltd & Knight Piésold Consulting	Project Manager, Environmental consultant, Public Participation
SANRAL Polokwane N1 Ring Road Upgrade Basic Assessment, Polokwane, Limpopo Province	SANRAL SOC Ltd & KBK Engineers	Environmental consultant
Boshhoek Loop Rail Upgrade BAR, Rustenburg, North-West Province	Transnet SOC Ltd	Project Manager, Environmental consultant, Wetland specialist, Public Participation
Heysterkrand Loop Rail Upgrade BAR, Rustenburg, North-West Province	Transnet SOC Ltd	Project Manager, Environmental consultant, Public Participation
SANRAL Bierspruit R510 road upgrade Basic Assessment, Thabazimbi, Limpopo Province	SANRAL SOC Ltd & Royal HaskoningDHV South Africa	Project Manager, Environmental consultant, Ecological specialist, Public Participation
Barberton IAPS Waste Water Treatment Works development BAR, Barberton, Mpumalanga Province	Umjindi Local Municipality and Rhodes University	Project Manager, Environmental consultant, Public Participation
SANRAL Caledon N2 Section 3 road upgrade project Basic Assessment, Caledon, Western Cape Province	JG Afrika Engineering	Project Manager, Environmental consultant, Ecological specialist, ECO

**Environmental Compliance, Auditing and ECO**

Project Name & Location	Client Name	Role
Construction Monitoring and DMR environmental authorisation, Hendrina, Mpumalanga Province	SANRAL SOC Ltd & Leo consulting engineers	Project Manager, Environmental consultant, ECO

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

Project Name & Location	Client Name	Role
Water use licence for the SANRAL Zandkraal-Windburg N1 road upgrade and quarrying, Windburg, Free State Province	SANRAL SOC Ltd & SMEC Consulting Engineers	Project Manager, Environmental consultant, Public Participation
SANRAL Masekwaspoort N1 road upgrade water use licence application, Louis Trichardt, Limpopo Province	SANRAL SOC Ltd & Knight Piésold Consulting	Project Manager, Environmental consultant, Public Participation
Boshoek Loop Rail Upgrade water use licence application, Rustenburg, North-West Province	Transnet SOC Ltd	Project Manager, Environmental consultant, Wetland specialist, Public Participation
SANRAL Bierspruit R510 road water use licence, Thabazimbi, Limpopo Province	SANRAL SOC Ltd & Royal HaskoningDHV South Africa	Project Manager, Environmental consultant, Ecological specialist, Public Participation
Barberton IAPS Waste Water Treatment Works water use licence and SASS 5 assessment, Barberton, Mpumalanga Province	Umjindi Local Municipality and Rhodes University	Project Manager, Environmental consultant, Aquatic specialist, Public Participation
SANRAL Caledon N2 Section 3 road upgrade water use licence and specialist reports, Caledon, Western Cape Province	JG Afrika Engineering	Project Manager, Environmental consultant, Ecological specialist, Public Participation

## **HOUSING AND URBAN PROJECTS**

### **Environmental Impact Assessments and Environmental Management Programmes**

Project Name & Location	Client Name	Role
Scoping and EIR authorisation, Water Use Licence, for the Ganspan tourism facility development, Jan Kempdorp, Northern Cape	Frances Baard Local Municipality	Project Manager, Environmental consultant, Public Participation

### **Basic Assessments**

Project Name & Location	Client Name	Role
Basic Assessment for the office complex development within the Pretoria National Botanical Gardens, Pretoria, Gauteng	South African National Biodiversity Institute (SANBI)	Project Manager, Environmental consultant, Public Participation, ECO
Corner Berg and Drooge Street township development BAR, Zeerust, North-West Province	Ramotshere Moiloa Local Municipality	Project Manager, Environmental consultant, Public Participation
Corner Kort and Bree Street township development BAR, Zeerust, North-West Province	Ramotshere Moiloa Local Municipality	Project Manager, Environmental consultant, Public Participation
Hope Village township development BAR, Johannesburg, Gauteng	Door of Hope Charity Organisation	Project Manager, Environmental consultant, Public Participation
ACSA Jones Road Filling Station Basic Assessment, Johannesburg, Gauteng	Airports Company South Africa SOC Ltd	Project Manager, Environmental consultant, Public Participation

**Screening Studies**

Project Name & Location	Client Name	Role
Kibler Park Church Development ecological assessment, Johannesburg, Gauteng	Riverside Community Church	Project Manager, Ecological specialist
DEA Quoin Point dune specialist assessments, Gansbaai, Western Cape	Department of Environmental Affairs (national)	Project Manager, Environmental consultant

**Environmental Compliance, Auditing and ECO**

Project Name & Location	Client Name	Role
Transnet Depot and Siding compliance auditing programme, Johannesburg, Gauteng & Rustenburg, North-West Province	Transnet SOC Ltd	ECO
Environmental compliance monitoring for the office complex development within the Pretoria National Botanical Gardens, Pretoria, Gauteng	South African National Biodiversity Institute (SANBI)	Project Manager, Environmental consultant, Public Participation, ECO

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

Project Name & Location	Client Name	Role
Atmospheric Emissions Licence, Section 24G for the ER Galvanizing plant and operations, Johannesburg, Gauteng	ER Galvanizers Pty Ltd	Project Manager, Environmental consultant, Public Participation
City of Johannesburg nature reserve proclamation (Phase II), Johannesburg, Gauteng	City of Johannesburg SOC Ltd	Project Manager, Environmental consultant, Public Participation, Botanical specialist
Hope Village township development water use licence, Johannesburg, Gauteng	Door of Hope Charity Organisation	Project Manager, Environmental consultant, Public Participation
Diamond Park Township Development Section 24G, Kimberley, Northern Cape	Sol Plaatje Local Municipality	Project Manager, Environmental consultant, Public Participation
Boschendal Wine Estate hydro-electric power station Water Use Licence and S24G application, Stellenbosch, Western Cape	Boschendal Wine Estate	Environmental consultant
City of Johannesburg nature reserve proclamation boundary verification (Phase I), Johannesburg, Gauteng	City of Johannesburg SOC Ltd	Environmental consultant
PRDW Cape Town harbour breakwater rehabilitation EMPr, Cape Town, Western Cape	PRDW Engineering	Project Manager, Environmental consultant
PRDW Bushman's Estuary dune encroachment project management, Kenton-on-sea, Eastern Cape	PRDW Engineering	Environmental consultant
Corner Berg and Drooge Street township development water use licence application, Zeerust, North-West Province	Ramotshere Moiloa Local Municipality	Project Manager, Environmental consultant
Corner Kort and Bree Street township development water use licence, Zeerust, North-West Province	Ramotshere Moiloa Local Municipality	Project Manager, Environmental consultant
Bloekombos (Kraaifontein) hospital water use licence application, Cape Town, Western Cape	Western Cape Provincial Government (PGWC)	Project Manager, Environmental consultant, Botanical specialist, Wetland specialist

**SPECIALIST STUDIES**

<b>Project Name &amp; Location</b>	<b>Client Name</b>	<b>Role</b>
Boshoek Loop Rail Upgrade BAR and Water Use Licence, Rustenburg, North-West Province	Transnet SOC Ltd	Wetland specialist
City of Johannesburg nature reserve proclamation (Phase II), Johannesburg, Gauteng	City of Johannesburg SOC Ltd	Botanical specialist
SANRAL Bierspruit R510 road upgrade Water Use Licence, Basic Assessment, Thabazimbi, Limpopo Province	SANRAL SOC Ltd & Royal HaskoningDHV South Africa	Ecological specialist
Kibler Park Church Development Ecological Assessment, Johannesburg, Gauteng	Riverside Community Church	Ecological specialist
Barberton IAPS Waste Water Treatment Works development BAR, water use licence and SASS 5 assessment, Barberton, Mpumalanga Province	Umjindi Local Municipality and Rhodes University	Aquatic specialist
Wijnberg Trust Dam 2 expansion Aquatic Impact Assessment	Wijnberg Trust	Aquatic specialist
SANRAL Caledon N2 Section 3 road upgrade project Basic Assessment, Water Use Licence and Specialist reports, Caledon, Western Cape Province	JG Afrika Engineering	Ecological specialist
City of Johannesburg nature reserve proclamation boundary verification (Phase I), Johannesburg, Gauteng	City of Johannesburg SOC Ltd	GIS specialist
iGas integrated biodiversity screening, Saldanha, Western Cape	Central Energy Fund - iGas (subsidiary)	Faunal specialist (assistant)
Bloekombos (Kraaifontein) botanical baseline and impact assessment, Cape Town, Western Cape	Western Cape Provincial Government (PGWC)	Wetland specialist Botanical specialist

## CURRICULUM VITAE OF NICOLENE VENTER

<b>Profession :</b>	Public Participation and Social Consultant
<b>Specialisation:</b>	Public participation process; stakeholder engagement; facilitation (workshops, focus group and public meetings; public open days; steering committees); monitoring and evaluation of public participation and stakeholder engagement processes
<b>Work Experience:</b>	21 years' experience as a Public Participation Practitioner and Stakeholder Consultant

### VOCATIONAL EXPERIENCE

Over the past 21 years Nicolene established herself as an experienced and well recognised public participation practitioner, facilitator and strategic reviewer of public participation processes. She has experience in managing public participation projects and awareness creation programmes. Her experience includes designing and managing countrywide public participation and awareness creation projects, managing multi-project schedules, budgets and achieving project goals. She has successfully undertaken several public participation processes for EIA, BA and WULA projects. The EIA and BA process include linear projects such as the NMPP, Eskom Transmission and Distribution power lines as well as site specific developments such as renewable energy projects i.e. solar, photo voltaic and wind farms. She also successfully managed stakeholder engagement projects which were required to be in line with the Equator Principles.

### SKILLS BASE AND CORE COMPETENCIES

- Project Management
- Public Participation, Stakeholder Engagement and Awareness Creation
- Public Speaking and Presentation Skills
- Facilitation (workshops, focus group meetings, public meetings, public open days, working groups and committees)
- Social Assessments (Stakeholder Analysis / Stakeholder Mapping)
- Monitoring and Evaluation of Public Participation and Stakeholder Engagement Processes
- Community Liaison
- IFC Performance Standards
- Equator Principles
- Minute taking, issues mapping, report writing and quality control

### EDUCATION AND PROFESSIONAL STATUS

#### Degrees:

- Higher Secretarial Certificate, Pretoria Technicon (1970)

#### Short Courses:

- Techniques for Effective Public Participation, International Association for Public Participation, IAP2 (2008)
- Foundations of Public Participation (Planning and Communication for Effective Public Participation, IAP2 (2009)
- Certificate in Public Relations, Public Relation Institute of South Africa, Damelin Management School (1989)



**Professional Society Affiliations:**

- Board Member of International Association for Public Participation (IAP2): Southern Africa

**EMPLOYMENT**

Date	Company	Roles and Responsibilities
November 2018 – current	Savannah Environmental (Pty) Ltd	<p>Public Participation and Social Consultant</p> <p><u>Tasks include:</u></p> <p>Tasks include: Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document, Letters to Stakeholders and Interested and/or Affected Parties (I&amp;APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, Tribal Chiefs, affected landowners, etc.</p> <p>Managing interaction between Stakeholders and Team Members, liaising with National, Provincial and Local Authorities, managing community consultation and communications in project affected areas, attend to the level of technical information communicated to and consultation with all level of stakeholders involved.</p>
2016 – October 2018	Imaginative Africa (Pty) Ltd (company owned by Nicolene Venter)	<p>Independent Consultant</p> <p>Consulting to various Environmental Assessment Practitioners for Public Participation and Stakeholder Engagements:</p> <p><u>Tasks include:</u></p> <p>Tasks include: Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document, Letters to Stakeholders and Interested and/or Affected Parties (I&amp;APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, Tribal Chiefs, affected landowners, etc.</p> <p>Managing interaction between Stakeholders and Team Members, liaising with National, Provincial and Local Authorities, managing community consultation and communications in project</p>

		<p>affected areas, attend to the level of technical information communicated to and consultation with all level of stakeholders involved</p> <p><u>Clients:</u> SiVEST Environmental, Savannah Environmental, Baagi Environmental; Royal Haskoning DHV (previously SSI)</p>
<b>2013 - 2016</b>	<p>Zitholele Consulting</p> <p>Contact person: Dr Mathys Vosloo Contact number: 011 207 2060</p>	<p>Senior Public Participation Practitioner and Project Manager</p> <p><u>Tasks included:</u> Project managed public participation process for EIA/BA/WULA/EAL projects. Manages two Public Participation Administrators. Public Participation tasks as outlined as above and including financial management of public participation processes.</p>
<b>2011 - 2013</b>	<p>Imaginative Africa (Pty) Ltd (company owned by Nicolene Venter)</p>	<p>Independent Consultant Consulting to various Environmental Assessment Practitioners for Public Participation and Stakeholder Engagements</p> <p><u>Tasks included:</u> Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document, Letters to Stakeholders and Interested and/or Affected Parties (I&amp;APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, Tribal Chiefs, affected landowners, etc.</p> <p>Managing interaction between Stakeholders and Team Members, liaising with National, Provincial and Local Authorities, managing community consultation and communications in project affected areas, attend to the level of technical information communicated to and consultation with all level of stakeholders involved</p> <p><u>Clients:</u> Bohlweki Environmental, Bemban Sustainability (Pty) Ltd; Naledzi Environmental</p>
<b>2007 – 2011</b>	<p>SiVEST SA (Pty) Ltd</p> <p>Contact person: Andrea Gibb Contact number: 011 798 0600</p>	<p>Unit Manager: Public Participation Practitioner</p> <p><u>Tasks included:</u> Project managed public participation process for EIA/BA projects. Manages two Junior Public Participation Practitioners. Public Participation</p>

		tasks as outlined as above and including financial management of public participation processes.
<b>2005 – 2006</b>	Imaginative Africa (Pty) Ltd (company owned by Nicolene Venter)	<p>Independent Consultant Public Participation and Stakeholder Engagement Practitioner</p> <p><u>Tasks included:</u> Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document, Letters to Stakeholders and Interested and/or Affected Parties (I&amp;APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, Tribal Chiefs, affected landowners, etc.</p> <p>Managing interaction between Stakeholders and Team Members, liaising with National, Provincial and Local Authorities, managing community consultation and communications in project affected areas, attend to the level of technical information communicated to and consultation with all level of stakeholders involved.</p> <p><u>Clients:</u> Manyaka-Greyling-Meiring (previously Greyling Liaison and currently Golder Associates)</p>
<b>1997 - 2004</b>	Imaginative Africa (Pty) Ltd (company owned by Nicolene Venter)	<p>Independent Consultant: Public Participation Practitioner.</p> <p><u>Tasks included:</u> Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document, Letters to Stakeholders and Interested and/or Affected Parties (I&amp;APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, affected landowners, etc.</p> <p>Managing interaction between Stakeholders and Team Members, liaising with National, Provincial Local Authorities, managing community consultation and communications in project affected areas, attend to the level of technical</p>

		<p>information communicated to and consultation with all level of stakeholders involved.</p> <p><u>Clients:</u>  Greyling Liaison (currently Golder Associates);  Bembani Sustainability (Pty) Ltd; Lidwala Environmental; Naledzi Environmental</p>
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## PROJECT EXPERIENCE

### **RENEWABLE POWER GENERATION PROJECTS: PHOTOVOLTAIC SOLAR ENERGY FACILITIES**

#### ***Environmental Impact Assessments and Environmental Management Programmes***

<b>Project Name &amp; Location</b>	<b>Client Name</b>	<b>Role</b>
Lichtenburg PVs (3 PVs) & Power Lines (grid connection), Lichtenburg, North West Province	Atlantic Energy Partners EAP: Savannah Environmental	Project Manage the Public Participation Process Facilitate all meetings Consultation with Government Officials, Key Stakeholders, Landowners & Community Leaders
Allepad PVs 4 PVs) & Power Lines (grid connection), Upington, Northern Cape Province	IL Energy EAP: Savannah Environmental	
Hyperion Solar PV Developments (4 PVs) and Associated Infrastructures, Kathu, Northern Cape Province	Building Energy EAP: Savannah Environmental	
Aggeneys Solar PV Developments (2 PVs) and Associated Infrastructures, Aggeneys, Northern Cape Province	Atlantic Energy Partners and ABO Wind EAP: Savannah Environmental	

<b>Project Name &amp; Location</b>	<b>Client Name</b>	<b>Role</b>
Tlitseng PV, including Substations & Power Lines, Lichtenburg, North West Province	BioTherm Energy EAP: SiVEST	Public Participation, Landowner and Community Consultation
Sendawo PVs, including Substations & Power Lines, Vryburg, North West Province		
Helena Solar 1, 2 and 3 PVs, Copperton, Northern Cape Province		
Farm Spes Bona 23552 Solar PV Plants, Bloemfontein, Free State Province	Surya Power EAP: SiVEST	Public Participation, Landowner and Community Consultation
De Aar Solar Energy Facility, De Aar, Northern Cape Province	South Africa Mainstream Renewable Power Developments EAP: SiVEST	Public Participation, Landowner and Community Consultation
Droogfontein Solar Energy Facility, Kimberley, Northern Cape Province		
Kaalspruit Solar Energy Facility, Loeriesfontein, Northern Cape Province		
Platsjambok East PV, Prieska, Northern Cape Province		
Renosterburg PV, De Aar, Northern Cape Province	Renosterberg Wind Energy Company EAP: SiVEST	Public Participation, Landowner and Community Consultation

19MW Solar Power Plant on Farm 198 (Slypklip), Danielskuil, Northern Cape Province	Solar Reserve South Africa EAP: SiVEST	Public Participation, Landowner and Community Consultation
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**Basic Assessments and Environmental Management Programmes – Located within the Renewable Energy Development Zones (REDZ)**

Project Name & Location	Client Name	Role
Moeding Solar PV Solar Energy Facility, Vryburg, North West Province	Kabi Solar EAP: Savannah Environmental	Project Manage the Public Participation Process Facilitate all meetings Consultation with Government Officials, Key Stakeholders, Landowners & Community Leaders
Sirius Solar PV Solar Energy Facility, Upington, Northern Cape Province	SOLA Future Energy EAP: Savannah Environmental	

**RENEWABLE POWER GENERATION PROJECTS: WIND ENERGY FACILITIES**

**Environmental Impact Assessments and Environmental Management Programmes**

Project Name & Location	Client Name	Role
Aletta Wind Farm, Copperton, Northern Cape Province	BioTherm Energy EAP: SiVEST	Public Participation
Eureka Wind Farm, Copperton, Northern Cape Province		
Loeriesfontein Wind Farm, Loeriesfontein, Northern Cape Province	South Africa Mainstream Renewable Power Developments EAP: SiVEST	Public Participation
Droogfontein Wind Farm, Loeriesfontein, Northern Cape Province		
Four Leeuwberg Wind Farms, Loeriesfontein, Northern Cape Province		
Noupoort Wind Farm, Noupoort, Northern Cape Province		
Mierdam PV & Wind Farm, Prieska, Northern Cape Province		
Platsjambok West Wind Farm & PV, Prieska, Northern Cape Province		

**Basic Assessments and Environmental Management Programmes – Located within the Renewable Energy Development Zones (REDZ)**

Project Name & Location	Client Name	Role
Nama Wind Energy Facility, Northern Cape Province	Genesis ECO EAP: Savannah Environmental	Project Manage the Public Participation Process Facilitate all meetings Consultation with Government Officials, Key Stakeholders, Landowners & Community Leaders
Zonnequa Wind Energy Facility, Northern Cape Province		

**Environmental Authorisation Amendments**

Project Name & Location	Client Name	Role
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Beaufort West 280MW Wind Farm into two 140MW Trakas and Beaufort West Wind Farms, Western Cape	South Africa Mainstream Renewable Power Developments EAP: SiVEST	Public Participation
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## **RENEWABLE POWER GENERATION PROJECTS: CONCENTRATED SOLAR FACILITIES (CSP)**

### **Environmental Impact Assessments and Environmental Management Programmes**

<b>Project Name &amp; Location</b>	<b>Client Name</b>	<b>Role</b>
Upington Concentrating Solar Plant and associated Infrastructures, Northern Cape Province	Eskom Holdings EAP: Bohlweki Environmental	Public Participation

## **GRID INFRASTRUCTURE PROJECTS**

### **Environmental Impact Assessments and Environmental Management Programmes**

Project Name & Location	Client Name	Role
Pluto-Mahikeng Main Transmission Substation and 400kV Power Line (Carletonville to Mahikeng), Gauteng and North West Provinces	Eskom Holdings EAP: Baagi Environmental	
Thyspunt Transmission Lines Integration Project, Eastern Cape Province	Eskom Holdings EAP: SiVEST	Public Participation, Landowner and Community Consultation
Westrand Strengthening Project, Gauteng Province		Public Participation,
Mookodi Integration Project, North-West Province		
Transnet Coallink, Mpumalanga and KwaZulu-Natal Provinces		
Delarey-Kopela-Phahameng Distribution power line and newly proposed Substations, North-West Province		
Invubu-Theta 400kV Eskom Transmission Power Line, KwaZulu-Natal Province	Eskom Holding EAP: Bembani Environmental	

## **Facilitation**

<b>Project Name &amp; Location</b>	<b>Client Name</b>	<b>Meeting Type</b>
Bloemfontein Strengthening Project, Free State Province	Eskom Holdings EAP: Baagi Environmental	Public Meetings
Moodraai-Smitkloof 132kV Power Line and Substation, Northern Cape Province	Eskom Holdings EAP: SSI	Focus Group Meetings
Aggeneis-Oranjemond 400kV Eskom Transmission Power Line, Northern Cape Province	Eskom Holdings EAP: Savannah Environmental	Focus Group Meetings & Public Meetings
Ariadne-Eros 400kV/132kV Multi-Circuit Transmission Power Line (Public Meetings)	Eskom Holdings EAP: ACER Africa	Public Meetings
Majuba-Venus 765kV Transmission Power Lines, Mpumalanga Province		Public Meetings

### **Basic Assessments and Environmental Management Programmes**

<b>Project Name &amp; Location</b>	<b>Client Name</b>	<b>Role</b>
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Melkhout-Kudu-Grassridge 132kV Power Line Project (project not submitted to DEA), Eastern Cape Province	Eskom Holdings EAP: SiVEST	Public Participation, Landowner and Community Consultation
Tweespruit-Welroux-Driedorp-Wepener 132Kv Power Line, Free State Province		Public Participation, Landowner and Community Consultation
Kuruman 132Kv Power Line Upgrade, Northern Cape Province	Eskom Holdings EAP: Zitholele	Public Participation, Landowner and Community Consultation
Vaalbank 132Kv Power Line, Free State Province		Public Participation, Landowner and Community Consultation
Pongola-Candover-Golela 132kV Power Line (Impact Phase), KwaZulu-Natal Province		Public Participation, Landowner and Community Consultation
Ndumo-Geziza 132kV Power Line, KwaZulu-Natal Province		Public Participation, Landowner and Community Consultation

#### Screening Studies

Project Name & Location	Client Name	Role
Potential Power Line Alternatives from Humansdorp to Port Elizabeth, Eastern Cape Province	Nelson Mandela Bay Municipality EAP: SiVEST	Social Assessment

### CONVENTIONAL POWER GENERATION PROJECTS (COAL, GAS AND ASSOCIATED INFRASTRUCTURE)

#### Stakeholder Engagement

Project Name & Location	Client Name	Role
Determination, Review and Implementation of the Reserve in the Olifants/Letaba System	Department of Water and Sanitation	Secretarial Services
Orange River Bulk Water Supply System	Golder Associates	
Levuvu-Letaba Resources Quality Objectives		

#### Facilitation

Project Name & Location	Client Name	Meeting Type
Thabametsi IPP Power Station, Limpopo Province	Thabametsi Power Company EAP: Savannah Environmental	Focus Group Meeting & Public Meeting

#### Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Richards Bay Combined Cycle Power Plant, Richards Bay, Kwa-Zulu Natal Province (Impact Phase)	Eskom Holdings EAP: Savannah Environmental	Public Participation
Medupi Flue Gas Desulphurisation Project (up to completion of Scoping Phase), Limpopo Province	Eskom Holdings SOC Ltd EAP: Zitholele Consulting	Public Participation, Landowner and Community Consultation
Kendal 30-year Ash Disposal Facility, Mpumalanga Province		
Kusile 60-year Ash Disposal Facility, Mpumalanga Province		



Camden Power Station Ash Disposal Facility, Mpumalanga Province		
Tutuka Fabric Filter Retrofit and Dust Handling Plant Projects, Mpumalanga Province	Eskom Holdings SOC Ltd EAP: Lidwala Environmental	Public Participation, Landowner and Community Consultation
Eskom's Majuba and Tutuka Ash Dump Expansion, Mpumalanga Province		Public Participation, Landowner and Community Consultation
Hendrina Ash Dam Expansion, Mpumalanga Province		Public Participation, Landowner and Community Consultation

### **INFRASTRUCTURE DEVELOPMENT PROJECTS (BRIDGES, PIPELINES, RAILWAY LINES, ROADS, WATER RESOURCES, STORAGE FACILITIES, ETC)**

#### **Facilitation**

<b>Project Name &amp; Location</b>	<b>Client Name</b>	<b>Meeting Type</b>
Determination, Review and Implementation of the Reserve in the Olifants/Letaba System	Department of Water and Sanitation Golder Associates	Secretarial Services
Orange River Bulk Water Supply System	Department of Water and Sanitation Golder Associates	Secretarial Services
Levuvu-Letaba Resources Quality Objectives	Department of Water and Sanitation Golder Associates	Secretarial Services
SmancorCR Chemical Plant (Public Meeting), Gauteng Province	Samancor Chrome (Pty) Ltd EAP: Environmental Science Associates	Public Meeting
SANRAL N4 Toll Highway Project (2 <sup>nd</sup> Phase), Gauteng & North West Provinces	Department of Transport EAP:	Public Meetings

#### **Environmental Impact Assessments and Environmental Management Programmes**

<b>Project Name &amp; Location</b>	<b>Client Name</b>	<b>Role</b>
Transnet's New Multi-Products Pipeline traversing Kwa-Zulu Natal, Free State and Gauteng Provinces	Transnet EAP: Bohlweke Environmental	Public Participation

#### **Basic Assessments**

<b>Project Name &amp; Location</b>	<b>Client Name</b>	<b>Role</b>
Realignment of the Bulshoek Dam Weir near Klawer and the Doring River Weir near Clanwilliam, Western Cape Province	Dept of Water and Sanitation EAP: Zitholele	Public Participation

### **MINING SECTOR**

#### **Environmental Impact Assessment and Environmental Management Programme**

<b>Project Name &amp; Location</b>	<b>Client Name</b>	<b>Role</b>
Zero Waste Recovery Plant at highveld Steel, Mpumalanga Province	Anglo African Metals EAP: Savannah Environmental	Public Participation
Koffiefontein Slimes Dam, Free State Province	Petra Diamond Mines EAP: Zitholele	Public Participation



<i>Baobab Project: Ethenol Plant, Chimbanje, Middle Sabie, Zimbabwe</i>	<i>Applicant: Green Fuel EAP: SiVEST</i>	<i>Public Participation &amp; Community Consultation</i>
<i>BHP Billiton Energy Coal SA's Middelburg Water Treatment Plant, Mpumalanga</i>	<i>BHP Billiton Group EAP: Jones &amp; Wagener</i>	<i>Public Participation</i>



## CURRICULUM VITAE OF HERMIEN SLABBERT

**Profession :** Environmental Consultant

**Specialisation:** Environmental Permitting, Project Management, Environmental Impact Assessments, Geographical Information Systems (GIS), Project administration

**Work Experience:** 2 years of experience in renewable energy

### VOCATIONAL EXPERIENCE

Hermien Slabbert has two years of experience in the renewable energy sector, specifically relating to Solar Photovoltaic projects. She has experience in project management as well as environmental permitting.

### SKILLS BASE AND CORE COMPETENCIES

- Project management
- Environmental Permitting
- Administrative tasks
- GIS Mapping

### EDUCATION AND PROFESSIONAL STATUS

#### Degrees:

- B.Sc. (Hons) Environmental Management (2014), North-West University, Potchefstroom
- B.Sc. Degree, Geography and Geology (2013), North-West University, Potchefstroom

#### Courses:

- Environmental Law (2017), Centre for Environmental Management, Johannesburg
- Occupational Health and Safety law (2018), Centre for Environmental Management, Johannesburg

**EMPLOYMENT**

Date	Company	Roles and Responsibilities
January 2019 – current	Savannah Environmental (Pty) Ltd	<p>Trainee Environmental Consultant</p> <p>Tasks include: Environmental Impact Assessment Reports, Basic Assessments and Environmental management programmes; Specialist management and the Process of EIA Applications.</p> <p>GIS (utilising ArcGIS)</p> <p>Tasks include: Analysis and manipulation of data and compilation of maps.</p>
January 2017 – October 2017	FedGroup Holdings (Pty) Ltd	<p>Project coordinator</p> <p>Tasks include:</p> <p>Project coordination, project finance, financial modelling, project proposals</p>
August 2015- December 2016	Subsolar Energy (Pty) Ltd	<p>Project Assistant</p> <p>Tasks include:</p> <p>Environmental Permitting, Specialist management, Project management, Site selection</p>

**PROJECT EXPERIENCE****RENEWABLE POWER GENERATION PROJECTS: WIND ENERGY FACILITIES****Part 1 Amendment Applications**

Project Name & Location	Client Name	Role
Rheboksfontein WEF, Western Cape Province	Moyeng Energy	EAP
Dorper WEF, Eastern Cape Province	Dorper Wind Farm	EAP
West Coast One WEF, Western Cape Province	Aurora Wind	EAP

**Part 2 Amendment Applications**

Project Name & Location	Client Name	Role
Great Karoo WEF, Northern Cape Province	African Clean Energy Developments	EAP
Gunstfontein WEF, Northern Cape Province	African Clean Energy Developments	EAP

**RENEWABLE POWER GENERATION PROJECTS: SOLAR ENERGY FACILITIES****Project Management**

Project Name & Location	Client Name	Role
Gamma SEF, North West Province	Subsolar	Project Manager
Khubu SEF, North West Province	Subsolar	Project Manager
Boitshoko SEF, Northern Cape Province	Subsolar	Project Manager
Camel Thorn SEF, Northern Cape Province	Subsolar	Project Manager
Beta SEF, Free state Province	Subsolar	Project Manager

Oryx SEF, Free state Province	Subsolar	Project Manager
Kappa SEF, North West Province	Subsolar	Project Manager
Delta SEF, North West Province	Subsolar	Project Manager

#### **Geographical Information Systems (GIS)**

Project Name & Location	Client Name	Role
Steynsrus PV 1, Free state Province	Cronimet Power Solutions	GIS Consultant
Steynsrus PV 2, Free state Province	Cronimet Power Solutions	GIS Consultant
Heuningspruit PV 1, Free state Province	Cronimet Power Solutions	GIS Consultant
Aggeneys PV 1, Northern Cape Province	ABO Wind	GIS Consultant
Aggeneys PV 2, Northern Cape Province	ABO Wind	GIS Consultant
Sirius PV3, Northern Cape Province	Sola future	GIS Consultant
Sirius PV4, Northern Cape Province	Sola future	GIS Consultant

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

Project Name & Location	Client Name	Role
Gamma SEF, North West Province	Subsolar	Project Manager
Camel Thorn SEF, Northern Cape Province	Subsolar	Project Manager
Boitshoko SEF, Northern Cape Province	Subsolar	Project Manager
Khubu SEF, North West Province	Subsolar	Project Manager

#### **GAS PROJECTS**

##### **Geographical Information Systems (GIS)**

Project Name & Location	Client Name	Role
Richards Bay Combined Cycle Power Plant (CCPP) power plant, KwaZulu-Natal (EIA phase)	Eskom	GIS Consultant

#### **TRANSPORT SECTOR PROJECTS**

##### **Basic Assessment**

Project Name & Location	Client Name	Role
Dwarsrug Access Road, Northern Cape Province	Mainstream Renewable Energy Developments	EAP

##### **Geographical Information Systems (GIS)**

Project Name & Location	Client Name	Role
Dwarsrug Access Road, Northern Cape Province	Mainstream Renewable Energy Developments	GIS Consultant

#### **INFRASTRUCTURE DEVELOPMENT PROJECTS (BRIDGES, PIPELINES, ROADS, WATER RESOURCES, STORAGE, ETC)**

##### **Basic Assessments**

Project Name & Location	Client Name	Role
Nigel gas transmission pipeline, Gauteng Province	Energy Group	EAP

##### **Geographical Information Systems (GIS)**

Project Name & Location	Client Name	Role
Nigel Gas Transmission Pipeline, Gauteng Province	Energy Group	GIS Consultant

<i>Wilmar Oil Pipeline</i>	<i>Wilmar Processing</i>	<i>GIS Consultant</i>
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**GRID NFRASTRUCTURE PROJECTS**

**Geographical Information Systems (GIS)**

<b>Project Name &amp; Location</b>	<b>Client Name</b>	<b>Role</b>
<i>Bloemhoek 1 Power Line, Northern Cape Province</i>	<i>ABO Wind</i>	<i>GIS Consultant</i>
<i>Bloemhoek 2 Power Line, Northern Cape Province</i>	<i>ABO Wind</i>	<i>GIS Consultant</i>