

KARREEBOSCH WIND FARM (RF) (PTY) LTD

# KARREEBOSCH WIND FARM AND ASSOCIATED INFRASTRUCTURE, NORTHERN CAPE & WESTERN CAPE PROVINCES

FINAL ENVIRONMENTAL MANAGEMENT  
PROGRAMME (DFFE REF: 14/12/16/3/3/2/807)

14 OCTOBER 2022

FINAL





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KARREEBOSCH WIND FARM (RF) (PTY)  
LTD

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This Amended Final Environmental Management Programme (Report) has been prepared by WSP Group Africa Proprietary Limited (WSP) on behalf and at the request of Karreebosch Wind Farm (RF) (Pty) Ltd (Client), to provide the Client with an understanding of the mitigation measures required for the proposed project.

Unless otherwise agreed by us in writing, we do not accept responsibility or legal liability to any person other than the Client for the contents of, or any omissions from, this Report.

To prepare this Report, we have reviewed only the documents and information provided to us by the Client or any third parties directed to provide information and documents to us by the Client. We have not reviewed any other documents in relation to this Report, except where otherwise indicated in the Report.

**All additions to the EMPr have been highlighted using underlined text.**

**All text that has been amended or removed based on the final specialist walk down verifications and specialist assessments has been shown as strike through text.**

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# PROJECT DETAILS

DEA Reference No. : 14/12/16/3/3/2/807

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Client : Karreebosch Wind Farm (RF) (Pty) Ltd

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# GLOSSARY

<b>BBU</b>	Birds and Bats Unlimited
<b>DEA</b>	National Department of Environmental Affairs
<b>DFFE</b>	Department of Forestry, Fisheries and the Environment
<b>DWS</b>	Department of Water and Sanitation
<b>EA</b>	Environmental Authorisation
<b>EAP</b>	Environmental Assessment Practitioner
<b>ECO</b>	Environmental Control Officer
<b>EIA</b>	Environmental Impact Assessment
<b>EIAr</b>	Environmental Impact Assessment Report
<b>EMPr</b>	Environmental Management Programme
<b>EO</b>	Environmental Office
<b>FBGF</b>	Fuel-based Generator Facility
<b>GG</b>	Government Gazette
<b>GN</b>	Government Notice
<b>Ha</b>	Hectare
<b>I&amp;AP</b>	Interested and Affected Party
<b>IFC</b>	International Funding Corporation
<b>km<sup>2</sup></b>	Square kilometres
<b>kV</b>	Kilovolt
<b>m<sup>2</sup></b>	Square meters
<b>m/s</b>	Meters per second
<b>MW</b>	Mega Watt
<b>NEMA</b>	National Environmental Management Act (Act No 107 of 1998)
<b>NHRA</b>	National Heritage Resources Act (Act No 25 of 1999)

<b>NIRP</b>	National Integrated Resource Planning
<b>NWA</b>	National Water Act (Act No 36 of 1998)
<b>OHPL</b>	Overhead Powerline
<b>OHSA</b>	Occupational Health and Safety Act (Act 85 of 1993)
<b>PM</b>	Project Manager
<b>REDZ</b>	Renewable Energy Development Zone
<b>SAAO</b>	South African Astronomical Observatory
<b>SAHRA</b>	South African Heritage Resources Agency
<b>SALT</b>	South African Large Telescope
<b>SANRAL</b>	South African National Roads Agency Limited
<b>SHE</b>	Safety, Health and Environment
<b>SIA</b>	Social Impact Assessment
<b>WEF</b>	Wind Energy Facility
<b>ZoR</b>	Zone of Regulation
<b>Alien species</b>	A species that is not indigenous to the area or out of its natural distribution range.
<b>Alternatives</b>	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.
<b>Ambient sound level</b>	The reading on an integrating impulse sound level meter taken at a measuring point in the absence of any alleged disturbing noise at the end of a total period of at least 10 minutes after such meter was put into operation.
<b>Assessment</b>	The process of collecting, organising, analysing, interpreting and communicating information which is relevant.
<b>Biological diversity</b>	The variables among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes they belong to.
<b>Commence</b>	The start of any physical activity, including site preparation and any other activity on site furtherance of a listed activity or specified activity, but does not include any activity required for the purposes of an investigation or feasibility study as long as such investigation or feasibility study does not constitute a listed activity or specified activity.
<b>Construction</b>	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 as per the EIA Regulations. Construction begins with any activity which requires Environmental Authorisation.

<b>Cumulative impacts</b>	Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period and can include both direct and indirect impacts.
<b>Cut-in speed</b>	The minimum wind speed at which the wind turbine will generate usable power.
<b>Cut-out speed</b>	The wind speed at which shut down occurs.
<b>Decommissioning</b>	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.
<b>Department/ the competent authority</b>	Refers to the Department of Environmental Affairs.
<b>Development footprint</b>	in respect of land, means any evidence of its physical transformation as a result of the undertaking of any activity.
<b>Direct impacts</b>	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.
<b>Disturbing noise</b>	A noise level that exceeds the ambient sound level measured continuously at the same measuring point by 7 dB or more, in accordance with the Noise Control Regulations.
<b>‘Do nothing’ alternative</b>	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.
<b>Ecosystem</b>	A dynamic system of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.
<b>Endangered species</b>	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.
<b>Endemic</b>	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.
<b>Environment</b>	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.
<b>Environmental assessment practitioner</b>	An individual responsible for the planning, management and coordinating of environmental management plan or any other appropriate environmental instruments introduced by legislation.



<b>Environmental Impact</b>	An action or series of actions that have an effect on the environment.
<b>Environmental impact assessment</b>	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.
<b>Environmental management</b>	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.
<b>Environmental management inspector</b>	A person designated as an environmental management inspector in terms of Section 31B or 31C on the National Environmental Management Act 107 of 1998.
<b>Environmental management programme</b>	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.
<b>Generator</b>	The generator is what converts the turning motion of a wind turbine's blades into electricity.
<b>Habitat</b>	The place in which a species or ecological community occurs naturally.
<b>Hazardous waste</b>	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).
<b>Indirect impacts</b>	Indirect or induced changes that may occur because 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 because of the activity.
<b>Interested and affected party</b>	Individuals or groups concerned with or are affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups, and the public.
<b>Nacelle</b>	The nacelle contains the generator, control equipment, gearbox, and anemometer for monitoring the wind speed and direction.
<b>Pollution</b>	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.
<b>Pre-construction</b>	The period prior to the commencement of construction, which may include activities which do not require Environmental Authorisation (e.g. geotechnical surveys).
<b>Rare species</b>	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."
<b>Red data species</b>	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).

<b>Rotor</b>	The portion of the wind turbine that collects energy from the wind is called the rotor. The rotor converts the energy in the wind into rotational energy to turn the generator. The rotor has three blades that rotate at a constant speed of about 15 to 28 revolutions per minute (rpm).
<b>Significant impact</b>	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.
<b>Tower</b>	The tower, which supports the nacelle to which the rotor is attached, is constructed from tubular steel or concrete. It is approximately 80 m to 120m 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 80 to 120 m tall. The tower must be strong enough to support the nacelle and blades, and to sustain vibration, wind loading and the overall weather elements for the lifetime of the wind turbine.
<b>Waste</b>	Is defined as follows: a) any substance, material or object, that is unwanted, rejected, abandoned, discarded or b) 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 National Environmental Management: Waste Act (NEM:WA); or c) any other substance, material or object that is not included in Schedule 3 of NEM:WA that may be defined as a waste by the Minister by notice in the Gazette, but any waste or portion of waste, referred to in paragraphs (a) and (b), ceases to be a waste.
<b>Wind power</b>	A measure of the energy available in the wind
<b>Wind speed</b>	The rate at which air flows past a point above the earth's surface.

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- K** HERITAGE WALKDOWN REPORT
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- N** PLANT SEARCH AND RESCUE PLAN AND PLANT PROTECTION PLAN
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# 1 PROJECT DETAILS

## 1.1 OVERVIEW OF PROPOSED PROJECT

Karreebosch Wind Farm (RF) (Pty) Ltd (Karreebosch) proposes to develop the authorised 140 megawatt (MW) Karreebosch Wind Energy Facility (WEF), located approximately 40km North of Matjiesfontein, in the Western Cape Province, and approximately 40km South of Sutherland in the Northern Cape Province, South Africa.

In 2015, Karreebosch appointed Savannah Environmental (Pty) Ltd (Savannah) to facilitate the Scoping and Environmental Impact Assessment (S&EIA) process for the construction and operation of the 140MW Karreebosch WEF. In January 2016, the Department of Environmental Affairs (DEA) (now known as the Department of Forestry, Fisheries and the Environment – DFFE) issued the Environmental Authorisation (EA) (DEA Ref: 14/12/16/3/3/2/807). The EA authorised up to 65 wind turbines of a maximum generating capacity of 140MW in total, with a hub height of 100m and the rotor diameter of 140m.

The project underwent subsequent amendments (EA Ref: 14/12/16/3/3/2/807/AM1, 14/12/16/3/3/2/807/AM2, 14/12/16/3/3/2/807/AM3) which included increases in the hub height (up to 125m), rotor diameter (up to 160m), blade length (up to 80m), and minor amendments to the wording of certain conditions of the authorisation, as well as an extension of the validity of the EA to 2026.

## 1.2 EIA PROCESS HISTORY

Karreebosch Wind Farm (Pty) Ltd (the Applicant) applied for Environmental Authorisation (EA) for the proposed Karreebosch WEF in 2015. The original Environmental Impact Assessment (EIA) was undertaken in September of 2015 for up to 71 wind turbines with a hub height of up to 100m and a rotor diameter of up to 140m including associated infrastructure. Environmental authorisation (EA) for 65 turbines was granted on 29 January 2016 (EA Ref: 14/12/16/3/3/2/807). The project underwent subsequent amendments (EA Ref: 14/12/16/3/3/2/807/AM1, 14/12/16/3/3/2/807/AM2, 14/12/16/3/3/2/807/AM3) which included increases in the hub height (up to 125m), rotor diameter (up to 160m), blade length (up to 80m), and minor amendments to the wording of certain conditions of the authorisation, as well as an extension of the validity of the EA to 2026.

The associated 132V overhead powerline (OHPL) and onsite 33/132kV substation are currently subject to a separate EA application process (DFFE Reference: 14/12/16/3/3/1/2608).

The authorised Karreebosch WEF and associated infrastructure is currently undergoing a Part 2 EA Amendment Process with the proposed amendments tabulated in **Table 1-1** below. Condition 16 of the original EA (EA Ref: 14/12/16/3/3/2/807) requires that the final development layout plan be made available for public comment and thereafter submitted to Department of Forestry, Fisheries and Environment (DFFE) for approval. Condition 18 of the original EA (Ref: 14/12/16/3/3/2/807) states that the Environmental Management Programme (EMPr) submitted as part of the Final EIA Report (2015) was not approved and must be amended to include the final layout which has undergone micro siting and walkdowns by relevant specialists, be made available for public comment and thereafter re-submitted to the DFFE for final approval. The final layout and EMPr approval process will run concurrently with the Part 2 EA Amendment process.

**Table 1-1: Authorised infrastructure in terms of the Karreebosch WEF EA (EA Ref: 14/12/16/3/3/2/807, 26 January 2016)**

<b>COMPONENT</b>	<b>DESCRIPTION / DIMENSIONS</b>
<u>Number of turbines</u>	<u>Up to 65 turbines (generation capacity of up to 140MW)</u>
<u>Hub height</u>	<u>A range up to and including 125m</u>
<u>Blade length</u>	<u>~ 80m</u>
<u>Rotor Diameter</u>	<u>A range up to and including 160m</u>
<u>Area occupied by transformer stations / substation</u>	<u>» Two 33/132kV Substations 100m x 200m » Extension of the existing 400kV substation at Komsberg</u>

<b>COMPONENT</b>	<b>DESCRIPTION / DIMENSIONS</b>
	» Transformer at each turbine: total area <1500 m <sup>2</sup> (2 m <sup>2</sup> per turbine up to 10m <sup>2</sup> at some locations)
Capacity of onsite substation	33kv/132kV
Area occupied by construction camp	300 x 300m = 900 000m <sup>2</sup>
Area occupied by laydown areas	Operation: (70 x 50) x 71 = 248 500 m <sup>2</sup>
Areas occupied by buildings	~10 000 m <sup>2</sup>
Length of (new) internal access roads	~40 km
Width of internal roads	Up to 12 m
Height of fencing	Up to 3m
Type of fencing	Steel or mesh

### 1.3 PROJECT DESCRIPTION

The Karreebosch WEF is located approximately 40km north of Matjiesfontein, and approximately 40 km south of Sutherland. The site falls within the Karoo Hoogland Local Municipality of the Namakwa District Municipality within the Northern Cape Province as well as the Laingsburg Local Municipality of the Central Karoo District Municipality within the Western Cape Province (**Figure 1-1**).

The Karreebosch WEF is currently authorised over seventeen (17) properties as described in the table below. The properties highlighted in grey in the table below are relevant only to the proposed 132kV Karreebosch Overhead Powerline, which is subject to a separate application for Environmental Authorisation. These properties are therefore not affected by the proposed amended Karreebosch WEF final layout. Thus, only the properties relevant to the WEF infrastructure are included in this amendment application. The proposed final layout of the Karreebosch WEF is located over thirteen (13) properties as highlighted in blue in **Table 1-2**.

**Figure 1-2** illustrates the proposed final 40-turbine layout subject to this final layout and EMPr approval process.

**Table 1-2: Farm portions authorised for the Karreebosch WEF (as per the original EA: 14/12/16/3/3/2/807).**

<b>FARM NAME AND NUMBER</b>	<b>21 DIGIT SG CODE</b>	<b>MUNICIPALITY/PROVINCE</b>
Farm Roode Wal No. 187	C0430000000018700000	Karoo Hoogland LM / Northern Cape
Farm Appels Fontein No. 201	C04300000000020100000	Karoo Hoogland LM / Northern Cape
Portion 1 of Farm Ek Kraal No. 199	C04300000000019900001	Karoo Hoogland LM / Northern Cape
Portion 2 (Nuwe Kraal) of farm Ek Kraal No. 199	C04300000000019900002	Karoo Hoogland LM / Northern Cape
Portion 1 of farm Klipbanks Fontein No. 198	C04300000000019800001	Karoo Hoogland LM / Northern Cape
Remainder of Farm Klipbanks Fontein No. 198	C04300000000019800000	Karoo Hoogland LM / Northern Cape
Remainder of Farm Wilgebosch Rivier No. 188	C04300000000018800000	Karoo Hoogland LM / Northern Cape
Farm Rietfontein No. 197	C04300000000019700000	Karoo Hoogland LM / Northern Cape
Remainder of Farm Karreebosch No. 200	C04300000000020000000	Karoo Hoogland LM / Northern Cape

<u>FARM NAME AND NUMBER</u>	<u>21 DIGIT SG CODE</u>	<u>MUNICIPALITY/PROVINCE</u>
<u>Portion 1 of Farm Karreebosch No. 200<sup>1</sup></u>	<u>C04300000000020000001</u>	<u>Karoo Hoogland LM / Northern Cape</u>
<u>Farm Oude Huis No. 195</u>	<u>C04300000000019500000</u>	<u>Karoo Hoogland LM / Northern Cape</u>
<u>Portion 1 of Farm Karree Kloof No. 196</u>	<u>C04300000000019600000</u>	<u>Karoo Hoogland LM / Northern Cape</u>
<u>Remainder of Farm Brandvalley No. 75<sup>2</sup></u>	<u>C04300000000007500000</u>	<u>Laingsburg LM / Western Cape</u>
<u>The Farm Kranskraal 189<sup>3</sup></u>	<u>C04300000000018900000</u>	<u>Karoo Hoogland LM / Northern Cape</u>
<u>Portion 2 of Farm Standvastigheid 210</u>	<u>C04300000000021000002</u>	<u>Karoo Hoogland LM / Northern Cape</u>
<u>The Farm Aprils Kraal 105</u>	<u>C04300000000010500000</u>	<u>Laingsburg LM / Western Cape</u>
<u>The Remainder of Farm Bon Espirange 73</u>	<u>C04300000000007300000</u>	<u>Laingsburg LM / Western Cape</u>
<u>Portion 1 of Farm Bon Espirange 73</u>	<u>C04300000000007300001</u>	<u>Laingsburg LM / Western Cape</u>

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<sup>1</sup> A portion of Access Point 1 traverses a small portion of Karreebosch 1/200 where it joins the R354. The full length of this access road was included in the original EIA and layout assessed in 2015. However, Karreebosch 1/200 was omitted from the original Environmental Authorisation (14/12/16/3/3/2/807).

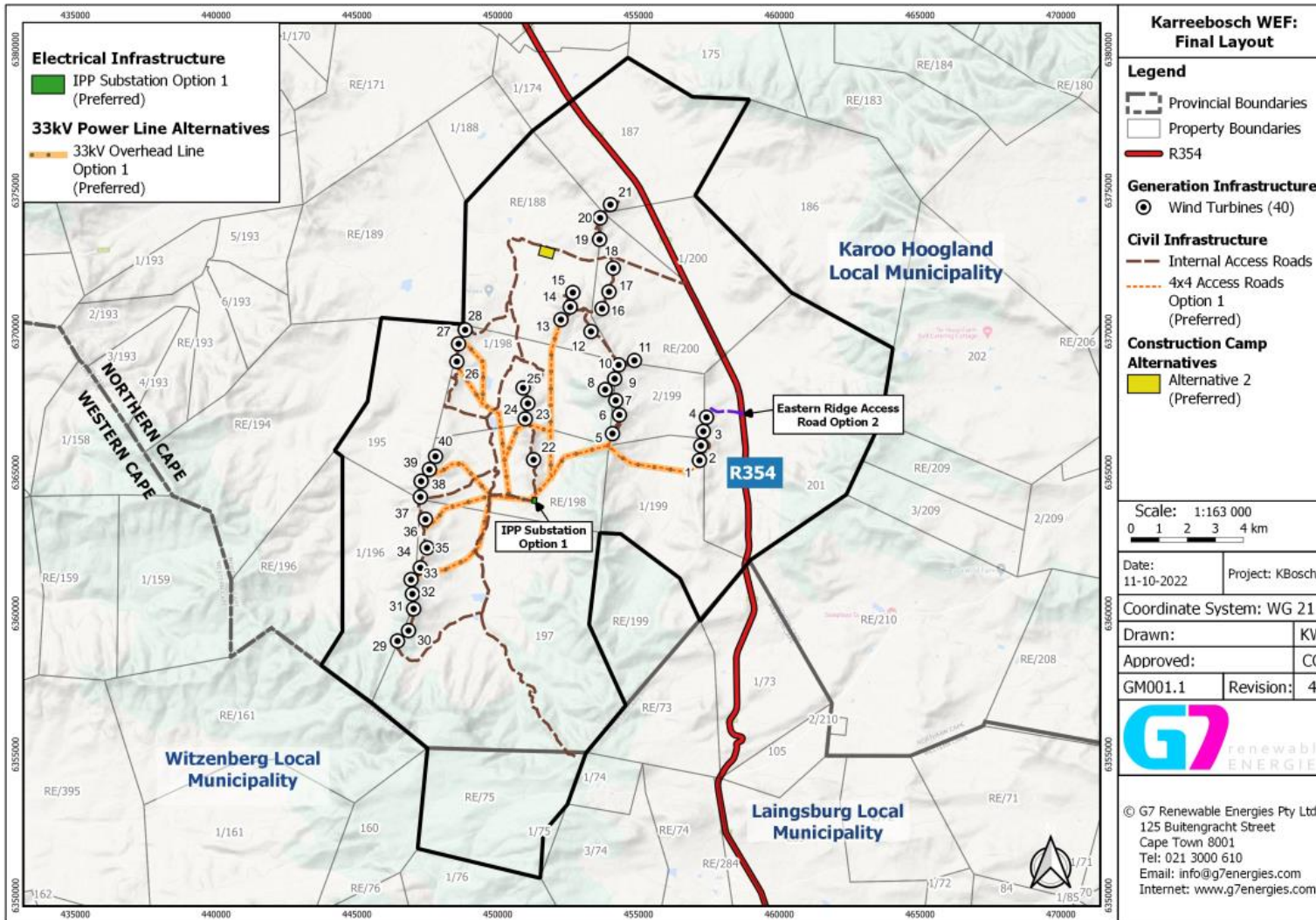
<sup>2</sup> A portion of an existing access road that will require minor road strengthening falls on Brandvalley RE/75. This existing access road will only be used as a 4x4 access track and not as the main access route to the WEF. The full length of this access road was included in the original EIA and layout assessed in 2015. However, Brandvalley RE/75 was omitted from the original Environmental Authorisation (14/12/16/3/3/2/807).

<sup>3</sup> No infrastructure associated with the Karreebosch WEF is located on Kranskraal 189 as indicated in the final layout. This property will therefore be removed from the EA.



**Figure 1-1: Locality of the Karreebosch WEF (Source: G7 Renewable Energies (Pty) Ltd, 2022)**





**Figure 1-2: Final layout, including the 40 turbine positions for the Karreebosch WEF (Source: G7 Renewable Energies (Pty) Ltd, 2022)**

## 1.4 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

The updates to the EMPr (this Report) are based on the original draft EMPr compiled in 2015 by Savannah Environmental, and have been updated by the EAP, under the employ of WSP Group Africa (Pty) Ltd. **Table 1-3** Outlines the details of the EAP and their expertise. The CVs of the Consultant (EAP) and Project Manager are included in **Appendix A**.

**Table 1-3: Details and Expertise of the EAP**

<u>EAP</u>	<u>WSP GROUP AFRICA (PTY) LTD</u>
<u>Contact Person:</u>	<u>Ashlea Strong</u>
<u>Physical Address:</u>	<u>Building C, Knightsbridge, 33 Sloane Street, Bryanston, Johannesburg</u>
<u>Postal Address:</u>	<u>P.O. Box 98867, Sloane Park 2151, Johannesburg</u>
<u>Telephone:</u>	<u>011 361 1392</u>
<u>Fax:</u>	<u>011 361 1301</u>
<u>Email:</u>	<u><a href="mailto:Ashlea.Strong@wsp.com">Ashlea.Strong@wsp.com</a></u>
<u>EAP Qualifications:</u>	<ul style="list-style-type: none"> <li>– <u>Masters in Environmental Management, University of the Free State</u></li> <li>– <u>B Tech, Nature Conservation, Technikon SA</u></li> <li>– <u>National Diploma in Nature Conservation, Technikon SA</u></li> </ul>
<u>EAPASA Registration Number:</u>	<u>EAPASA (2019/1005)</u>

## 1.5 APPLICABLE CONDITIONS OUTLINED IN ENVIRONMENTAL AUTHORISATION

For the purposes of demonstrating adherence to the requirements of the EA for the proposed Karreebosch WEF, **Table 1-4** cross references the sections within this updated EMPr Report as per the applicable EA conditions and DFFE requirements.

The EA granted on 29 January 2016 (Ref No: 14/12/16/3/3/2/807) and its associated amendments are included as **Appendix W**.

**Table 1-4: Requirements as detailed in the Conditions of the EA (Ref Number: 14/12/16/3/3/2/807)**

<u>NO.</u>	<u>CONDITION</u>	<u>EMPR REFERENCE</u>
16	<u>A copy of the final development layout map must be made available for comments by registered Interested and Affected Parties including the South African Large Telescope (SALT) and the South African Astronomical Observatory (SAAO) and the applicant must consider such comments. Once amended, the final development layout map must be submitted to the Department for written approval prior to commencement of the activity. Existing infrastructure must be used as far as possible e.g. roads. The layout map must indicate the following:</u>	<p><u>As part of the finalisation of the EMPr process a final development layout (compliant with the requirements of this condition) has been compiled and is included in <b>Figure 1-2</b> of this EMPr and <b>Appendix B</b> of this EMPr.</u></p> <p><u>This EMPr and final development layout map was released for a 30-day comment period (<b>23 August 2022 to 23 September 2022</b>), and comments received from I&amp;APs were incorporated into this Final EMPr for submission to the Department in order to comply with this condition.</u></p>

**NO.    CONDITION**

**EMPR REFERENCE**

	<p><u>16.1. Position of the wind farm facilities and its associated infrastructure;</u></p> <p><u>16.2. Internal roads indicating width and length;</u></p> <p><u>16.3. Wetlands, drainage lines, rivers, stream and water crossing of roads and cables;</u></p> <p><u>16.4. All sensitive features e.g. heritage sites, wetlands, pans and drainage channels that will be affected by the facility and associated infrastructure;</u></p> <p><u>16.5. Substation(s) inverters and/or transformer(s) sites including their entire footprint;</u></p> <p><u>16.6. Cable routes and trench dimensions (where they are not along internal roads);</u></p> <p><u>16.7. All existing infrastructure on the site, especially roads;</u></p> <p><u>16.8. Buildings, including accommodation; and,</u></p> <p><u>16.9. All “no-go” and buffer areas.</u></p>	<p><u>Comment from SARAO was received on 30 September 2022 (Refer to Table 2-4 of the SER (Appendix R of the Final Amendment Report)</u></p> <p><u>Comment from the Astronomy Management Authority was received on 28 September 2022 (Refer to Appendix G of the SER (Appendix R of the Final Amendment Report)</u></p> <p><u>The Final Layout (Figure 1-2 and Appendix B of this EMPr) and EMPr have been informed by the specialist walkdowns. The layout map includes access roads, substations and the positions of the turbines.</u></p> <p><u>Identified No-Go areas are indicated in Section 9 of the EMPr. Furthermore, micro-siting has been undertaken as part of the specialist walkdowns and final layout approval process. This micro-siting aimed to ensure that the turbine positions or associated infrastructure are located outside of areas mapped or identified as sensitive no-go zones and that any environmental constraints at the specific turbine positions and road alignments are identified, avoided or managed. A sensitivity map has been compiled based on the no-go areas and sensitive features and is included as Figure 4 2 in the EMPr.</u></p>
<p><b>18</b></p>	<p><u>The Environmental Management Programme (EMPr) submitted as part of the EIAR is not approved and must be amended to include mitigation measures against possible impacts on SALT and SAAO and as dictated by the final site lay-out map and micro-siting, and the provisions of this environmental authorisation. The EMPr must be made available for comments by registered Interested and Affected Parties including SALT and SAAO and the holder of this environmental authorisation must consider such comments. Once amended, the final EMPr must be submitted to the Department for written approval prior to commencement of the activity. Once approved the EMPr must be implemented and adhered to.</u></p>	<p><u>WSP has been commissioned to update the EMPr (compliant with the requirements of this condition) which was subject to review by I&amp;APs (draft amended EMPr) for a period of 30 days (23 August 2022 to 23 September 2022) prior to the final amended EMPr being submitted to the DFFE for approval.</u></p> <p><u>Comment from SARAO was received on 30 September 2022 (Refer to Table 2-4 of the SER (Appendix R of the Final Amendment Report)</u></p> <p><u>Comment from the Astronomy Management Authority was received on 28 September 2022 (Refer to Appendix G of the SER (Appendix R of the Final Amendment Report)</u></p> <p><u>Relevant specialists were commissioned, where mitigation measures proposed by the specialists have been included accordingly in the relevant sections.</u></p>
<p><b>19</b></p>	<p><u>The EMPr amendment must include the following:</u></p>	
<p><b>19.1</b></p>	<p><u>All recommendations and mitigation measures recorded in the EIAR and specialist studies attached as part of the EIAR.</u></p>	<p><u>All relevant recommendations and mitigation measures recorded in the 2015 EIAR and specialist studies are confirmed to be included in the EMPr as well as the additional mitigations as suggested by the specialists during the specialist walkdown reporting for the EMPr finalisation .</u></p>
<p><b>19.2</b></p>	<p><u>The grazing withdrawal area agreement as per condition 37.</u></p>	<p><u>This recommendation was included in the EA after the initial assessment undertaken by Todd (2014) and suggested the establishment of a 1,300h exclusion area (restricting sheep grazing) and to maintain the area for a period of 20 years.</u></p> <p><u>This recommendation was reviewed by two independent specialists (Balfour and Logie, 2022) and was found to be poorly justified and an impractical intervention for</u></p>

**NO.    CONDITION**

**EMPR REFERENCE**

		<p><u>promoting conservation of biodiversity in response to perceived agricultural and grazing practices in the area (which found no indication of over-grazing, but presented under stocking) which also have no connection to the development of the WEF itself.</u></p> <p><u>Logie (2022) concludes that the recommendation by Todd (2014) has been founded on weak scientific evidence, if any at all, causing the non-grazing plan to be a fatally flawed mitigation strategy and ecological management philosophy. As such, it is the considered opinion of Logie (2022) that there are exceptionally strong grounds for the removal of the non-grazing plan requirement (as per conditions 19.2 and 37 of the EA - 14/12/16/3/3/2/807) from the Environmental Authorisation in totality. The removal of Conditions 19.2 and 37 of the EA have been included in the Part 2 Amendment application.</u></p> <p><u>Balfour (2022) concludes that the recommendation to establish a 1,300h sheep fenced exclusion area and to maintain it for 20 years is a weakly justified and impractical intervention and that it should be removed from the Environmental Authorisation. The recommendation is based on weak evidence and scientific logic. As such it is the opinion of the specialist that the requirement for a non-grazing plan should not form part of the Environmental Authorisation (EA - 14/12/16/3/3/2/807) and that the following conditions (19.2 and 37) should be removed from said Environmental Authorisation in their totality.</u></p> <p><u>Fencing has not been favoured in general as it can restrict the movement of fauna.</u></p> <p><u>Please refer to the specialist opinion letters (Balfour and Logie, 2022) attached in <b>Appendix X</b> for a detailed motivation.</u></p>
<u>19.3</u>	<u>The requirements and conditions of this environmental authorisation.</u>	<u>The requirements and conditions of the 2015 EA and subsequent Amendments are confirmed to be included in the EMPr (Refer to Sections 5 – 13 of the EMPr).</u>
<u>19.4</u>	<u>Mitigation measures against possible impacts on SALT and SAAO must be included. This must be done in consultation with the respective stakeholders</u>	<p><u>SALT and SAAO have been consulted through the process and any recommendations required in terms of dust and lighting mitigation measures will be adhered to.</u></p> <p><u>Comment from SARAO was received on 30 September 2022 (Refer to Table 2-4 of the SER (Appendix R of the Final Amendment Report)</u></p> <p><u>Comment from the Astronomy Management Authority was received on 28 September 2022 (Refer to Appendix G of the SER (Appendix R of the Final Amendment Report)</u></p> <p><u>Recommendations required in terms of dust and lighting mitigation measures have been included in the EMPr and will be adhered to.</u></p>
<u>19.5</u>	<u>An alien invasive management plan to be implemented during construction and operation of the facility. The plan must include mitigation measures to reduce the invasion</u>	<u>The plan is included in <b>Appendix P</b>.</u>



<u>NO.</u>	<u>CONDITION</u>	<u>EMPR REFERENCE</u>
	<u>of alien species and ensure that the continuous monitoring and removal of alien species is undertaken</u>	
19.6	<u>A plant rescue and protection plan which allows for the maximum transplant of conservation important species from areas to be transformed. This plan must be compiled by a vegetation specialist familiar with the site in consultation with the Environmental Control Officer (ECO) and be implemented prior to commencement of the construction phase.</u>	<u>The plan is included in <b>Appendix N</b>. The search &amp; rescue will be undertaken prior to construction in consultation with the ECO.</u>
19.7	<u>A re-vegetation and habitat rehabilitation plan to be implemented during the construction and operation of the facility. Restoration must be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.</u>	<u>The plan is included in <b>Appendix R</b>.</u>
19.8	<u>A storm water and wash water management plan to be implemented during the construction and operation of the facility. The plan must ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion. The plan must include the construction of design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of storm water run-off.</u>	<u>The plan is included in <b>Appendix T</b>.</u>
19.9	<u>An erosion management plan for monitoring and rehabilitating erosion events associated with the facility. Erosion mitigation must form part of this plan to prevent and reduce the risk of any potential erosion.</u>	<u>The plan is included in <b>Appendix T</b>.</u>
19.10	<u>An effective monitoring system to detect any leakage or spillage of any hazardous substances during their transportation, handling, use or storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems.</u>	<u>Mitigation measures to this effect are included in Section 9.2 – Objective 13.</u>
19.11	<u>Measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments, and other environmental sensitive areas from construction impacts including the direct or indirect spillage of pollutants.</u>	<u>Mitigation measures to this effect are included in Section 9.2 – Objective 8.</u>
19.12	<u>A fire management plan to be implemented during the construction and operation of the facility.</u>	<u>The plan is included in <b>Appendix Y</b>. This will be supplemented with a more detailed Fire Management Plan to be compiled and implemented by the appointed contractors in accordance with this OHS Act (Act 85 of 1993).</u>
19.13	<u>An environmental sensitivity map indicating environmentally sensitive areas and features identified during the EIA process.</u>	<u>The Sensitivity Map as updated during the Part 2 Amendment process and specialist walk downs, is included in Figure 4.2 and <b>Appendix B</b>.</u>

<u>NO.</u>	<u>CONDITION</u>	<u>EMPR REFERENCE</u>
19.14	The final site layout map.	The Final Layout is included in Figure 1.2 and <b>Appendix B</b>
19.15	The final site layout map superimposed (overlain) on the environmental sensitivity map. This map must reflect the approved location of the wind farm as stated in the EIAR and this environmental authorisation.	The Final Layout overlain on the Sensitivity Map is included in Figure 4.2 and <b>Appendix B</b> .
37	The grazing withdrawal area recommended by the Ecological Specialist must form part of the Lease Agreement between the holder of this authorisation and the land owners. A minimum of 1300 ha must be set aside for the grazing withdrawal area; this area must be fenced and not grazed by livestock for at least 20 years. A copy of this agreement must be included in the EMPr.	The recommendation to establish a 1,300h sheep fenced exclusion area and to maintain it for 20 years is a weakly justified and impractical intervention and that it should be removed from the Environmental Authorisation. The recommendation is based on weak evidence and scientific logic. The removal of Conditions 19.2 and 37 of the EA have been included in the Part 2 Amendment application.  As such it the opinion of the specialist that the requirement for a non-grazing plan should not form part of the Environmental Authorisation (EA - 14/12/16/3/3/2/807) and that the following conditions should be removed from said Environmental Authorisation in their totality. Fencing has not been favoured in general as it can restrict the movement of fauna. Please refer to the specialist opinion letters (Balfour and Logie, 2022) attached in <b>Appendix X</b> for a detailed motivation.
47	A pre-construction walk through on the selected power line alignment and turbine positions by a bat specialist, avifaunal specialist and ecologist, must be conducted to ensure that the micro-siting of the turbines and power line has the least possible impact, there are no nests sites of priority species on or close to the construction corridor and all protected plant species impacted are identified.	Findings from the pre-construction walkdowns and micro-siting are included in Section 4.  A 400m corridor was assessed for the 132kV powerline, however, this is covered by a separate EA application and Basic Assessment Process (DFFE Reference: 14/12/16/3/3/1/2608).

## 1.6 CONCLUSIONS AND RECOMMENDATIONS

This EMPr has been developed based on the findings of the Environmental Impact Assessment (EIA) (Savannah Environmental, 2015), and must be implemented to protect sensitive on site and off site features through controlling construction and operation activities that could have a detrimental effect on the environment, and through avoiding or minimising potential impacts.

The findings of the EIA report and the specialist studies undertaken within this EIA for Karreebosch Wind Farm conclude that:

- With the implementation and adoption of the recommended mitigation, monitoring and management measures, there are no environmental grounds or fatal flaws that should prevent the proposed wind energy facility and associated infrastructure from proceeding on the identified site.
- The most significant impacts associated with the construction and operational phases of the development of the Karreebosch wind energy facility (without the use of mitigation measure) are impacts on flora and fauna, and visual impacts.
- Majority of the environmental and social impacts associated with development Karreebosch wind energy facility will be of moderate significance and of acceptable levels. The proposed development also represents an investment in clean, renewable energy, which, given the challenges created by climate change, represents a positive social benefit for society as a whole.

~~The significance levels of the majority of identified negative impacts can generally be reduced by implementing the recommended mitigation measures.~~

~~Although no environmental fatal flaws were identified to be associated with the proposed project, a number of sensitive environmental areas were identified within which specific mitigation and management is required to minimise impacts.~~

## 1.7 ACTIVITIES AND COMPONENTS ASSOCIATED WITH THE FACILITY

The main activities/components associated with the Karreebosch Wind Farm are detailed in **Table 1-5**.

**Table 1-5: Activities Associated with Planning (Post Authorisation), Construction, Operation and Decommissioning of the Facility**

MAIN ACTIVITY/PROJECT COMPONENT	COMPONENTS OF ACTIVITY	DETAILS
<b>Planning (Post-Authorisation)</b>		
<p>Conduct technical surveys and undertake micro-siting</p> <p><u>Micro-siting has been undertaken as part of the specialist walkdowns and final layout approval process. This micro-siting aimed to ensure that the turbine positions or associated infrastructure are located outside of areas mapped or identified as sensitive no-go zones and that any environmental constraints at the specific turbine positions and road alignments are identified, avoided or managed.</u></p>	<ul style="list-style-type: none"> <li>– Detailed geotechnical investigations and surveys by geotechnical engineer</li> <li>– Site survey by specialists and confirmation of the infrastructure micro-siting footprint</li> <li>– Survey of internal access routes</li> <li>– Survey of on-site substation site and grid route</li> </ul>	<ul style="list-style-type: none"> <li>– <u>Micro-siting has been undertaken as part of the specialist walkdowns and final layout approval process as per the EA conditions 18 and 47. Recommendations from the specialists have been included in the EMPr and final layout.</u></li> </ul>
<b>Construction</b>		
<p><b>Establishment of access roads</b></p>	<ul style="list-style-type: none"> <li>– Construction of access/haul roads to the site.</li> <li>– Establish internal access roads: up to 12m wide (<u>turns will have a radius of up to 55m) with additional yet associated servitudes/ reserve for above/underground cabling installation and maintenance where needed. 200m wide road corridor along the internal access roads for micro-siting during construction. Internal 4x4 tracks associated with the 33kV and 132Kv OHPLs will be up to 4m wide and substation access roads of up</u></li> </ul>	<ul style="list-style-type: none"> <li>– Access roads will be constructed/upgraded in advance of any components being delivered to site, and will remain in place after completion for future access and possibly access for replacement of parts if necessary.</li> <li>– Existing access roads to the site will be utilised, and upgraded where required. Special haul roads may need to be constructed to and within the site to accommodate abnormally loaded vehicle access and circulation.</li> <li>– The internal service road alignment <u>was</u> informed by the final micro-siting/positioning of the wind turbines (as well as specialist surveys). Permanent roads are expected to be up to 12m in width</li> </ul>

MAIN ACTIVITY/PROJECT COMPONENT	COMPONENTS OF ACTIVITY	DETAILS
	<p><u>to 9m. These will be permanent roadways within the site between the turbines for use during construction and operational phases.</u></p> <ul style="list-style-type: none"> <li>— Temporary tracks to be established for use during construction phase only where applicable.</li> </ul>	<p><u>(turns will have a radius of up to 55m) with additional yet associated servitudes/ reserve for above/underground cabling installation and maintenance where needed. A 200m wide road corridor along the internal access roads has been assessed for micro-siting during construction. Internal 4x4 tracks associated with the 33kV powerline will be up to 4m wide and substation access roads will be up to 9m.</u></p>
<p><b>Undertake site preparation</b></p>	<ul style="list-style-type: none"> <li>— Site establishment of offices / workshop with ablutions and stores, contractor’s yards.</li> <li>— Clearance of vegetation at the footprint of each turbine.</li> </ul>	<ul style="list-style-type: none"> <li>— These activities will require the stripping of topsoil, which will need to be stockpiled, backfilled and/or spread on site. As per objective 7 of section 7.1.</li> </ul>
<p><b>Establishment of lay down and hardstand areas on site</b></p>	<ul style="list-style-type: none"> <li>— Lay down areas (temporary footprint) at each turbine position for the storage of wind turbine components</li> <li>— Hardstand areas (permanent) for crane lifting equipment.</li> <li>— Temporary lay down area for crane assembly.</li> <li>— Construction site offices.</li> </ul>	<ul style="list-style-type: none"> <li>— Each turbine needs a flat lay down area during the construction process for the storage of wind turbine components. This area can be rehabilitated after construction unless required during operation.</li> <li>— The hardstand area will need to accommodate the cranes required in tower/turbine assembly. Hardstand and lay down areas will be required to be established for the normal civil engineering construction equipment which will be required on site. A large hardstand area will be required at each position where the main lifting crawler crane may be required to be erected and/or disassembled. This area would be required to be compacted and levelled to accommodate the assembly crane, which would need to access the crawler crane from all sides.</li> </ul>
<p><b>Excavate wind turbine foundations</b></p>	<ul style="list-style-type: none"> <li>— Concrete foundations at each turbine location.</li> </ul>	<ul style="list-style-type: none"> <li>— Foundation holes will be mechanically excavated (with blasting being utilised with circumspection, only where necessary).</li> <li>— Shoring and safety barriers will be erected around open excavation.</li> <li>— Aggregate and cement to be transported from the closest batching centre to the development <u>site</u>, with the establishment of an <u>on site concrete batching plant within the construction camp.</u></li> </ul>

MAIN ACTIVITY/PROJECT COMPONENT	COMPONENTS OF ACTIVITY	DETAILS
<b>Transport of components and equipment to site</b>	<ul style="list-style-type: none"> <li>— Flatbed trucks will be used to transport all components to site, including:</li> <li>— Components of the wind turbines, comprising typically 4 segments, a nacelle, rotor and three blades</li> <li>— The normal civil engineering construction equipment for the civil works (e.g. excavators, trucks, graders, compaction equipment, cement mixers, etc.).</li> <li>— Components required for the establishment of the substation (including transformers)</li> <li>— Components required for the establishment of the power line (including towers and cabling)</li> </ul>	<ul style="list-style-type: none"> <li>— The wind turbines, including towers, will be brought to site by the supplier in sections. The individual components are defined as abnormal loads in terms of the Road Traffic Act (Act No 29 of 1989) by virtue of the dimensional limitations (abnormal length of the blades) and load limitations (i.e. the nacelle). The dimensional requirements of the load during the construction phase (length/height) may require alterations to the existing road infrastructure (widening on corners, removal of traffic islands), accommodation of street furniture (electricity, street lighting, traffic signals, telephone lines etc.) and protection of road-related structures (bridges, culverts, portal culverts, retaining walls etc.) as a result of abnormal loading.</li> <li>— The equipment and project components will be transported to the site using appropriate National and Provincial routes, and the dedicated access/haul road to the site itself.</li> </ul>
<b>Erect turbines</b>	<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> <li>— It will take several 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>
<b>Construct substations and associated ancillary infrastructure.</b>	<ul style="list-style-type: none"> <li>— Substation components.</li> <li>— Security fencing around high-voltage (HV) Yard.</li> </ul>	<ul style="list-style-type: none"> <li>— The construction of these components will require the clearing of vegetation and levelling of the development site and the excavation of foundations prior to construction.</li> </ul>

MAIN ACTIVITY/PROJECT COMPONENT	COMPONENTS OF ACTIVITY	DETAILS
	<ul style="list-style-type: none"> <li>— Workshop.</li> </ul>	<ul style="list-style-type: none"> <li>— A lay down area for building materials and equipment associated with these buildings will also be required.</li> <li>— The substation would be constructed as follows: <ul style="list-style-type: none"> <li>— <u>Step 1:</u> Survey of the site</li> <li>— <u>Step 2:</u> Site clearing and levelling and construction of access road to substation site</li> <li>— <u>Step 3:</u> Construction of terrace and foundations</li> <li>— <u>Step 4:</u> Assembly, erection and installation of equipment (including transformers)</li> <li>— <u>Step 5:</u> Connection of conductors to equipment</li> <li>— <u>Step 6:</u> Rehabilitation of any disturbed areas and protection of erosion sensitive areas.</li> </ul> </li> </ul>
<b>Connection of the wind turbines to the on-site substations</b>	<ul style="list-style-type: none"> <li>— Wind turbines</li> <li>— Electrical turbine transformer for each turbine</li> <li>— 33 kV electrical cabling connecting each turbine to the substations.</li> <li>— There will be <del>up to two</del> <u>one</u> electrical substations (33/132kV) on site</li> </ul>	<ul style="list-style-type: none"> <li>— The installation of some these cables will require the excavation of trenches, approximately 1 m in depth within which these cables can then be laid. The underground cables would follow the internal access roads as far as reasonably possible.</li> <li>— There will also be overhead cables that link the turbine strings together and also the on-site substation.</li> </ul>
<b>Connect substations to power grid</b>	<ul style="list-style-type: none"> <li>— A new 132kV overhead power line connecting from the on-site substation into the power grid.</li> <li>— A substation connecting the 132 kV line from the project to the Eskom grid. Substation at Komsberg with several electrical components such as additional feeder bay, transformer bay on the existing substation property</li> </ul>	<ul style="list-style-type: none"> <li>— <u>The 33/132kV substation and 132kV overhead powerline is covered by a separate EA application and Basic Assessment Process (DFFE Reference: 14/12/16/3/3/1/2608).</u></li> <li>— <u>Extension of the existing 400kV Komsberg substation may be required to accommodate the incoming connection.</u></li> </ul>

MAIN ACTIVITY/PROJECT COMPONENT	COMPONENTS OF ACTIVITY	DETAILS
<b>Commissioning of the facility</b>	<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 performance. Physical adjustments may be needed such as changing the pitch of the blades of the turbines.</li> </ul>
<b>Undertake site rehabilitation</b>	<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> <li>— Clean up the site from all construction related rubble, stockpiles and waste.</li> </ul>	<ul style="list-style-type: none"> <li>— On full commissioning of the facility, any access points to the site which are not required during the operation phase will be closed and prepared for rehabilitation.</li> <li>— All rubble, stockpiles and any other waste materials resulting from the construction process will be cleared.</li> </ul>
<b>Operation</b>		
<b>Operation</b>	<ul style="list-style-type: none"> <li>— Operation of turbines within the wind energy facility and grid connection infrastructure</li> <li>— Operation and maintenance (O&amp;M) facility to be a site-based control centre with communications infrastructure for remote access.</li> </ul>	<ul style="list-style-type: none"> <li>— Once operational, the wind farm will be monitored through the O&amp;M facility and remotely.</li> <li>— Operations staff will be required on site but not always there for any extended period. 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, shut-down due to hazard (e.g extreme weather conditions), or maintenance activities.</li> </ul>
<b>Maintenance</b>	<ul style="list-style-type: none"> <li>— Regular Maintenance activities include:</li> <li>— Oil and grease – turbines;</li> <li>— Transformer oil – substation; and</li> <li>— Waste product disposal</li> </ul>	<ul style="list-style-type: none"> <li>— The wind turbines and associated infrastructure will be subject to periodic maintenance and inspection.</li> <li>— 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> </ul>



MAIN ACTIVITY/PROJECT COMPONENT	COMPONENTS OF ACTIVITY	DETAILS
	<ul style="list-style-type: none"> <li>— Other maintenance activities relate to mechanical, communications, electronic and control functions.</li> </ul>	<ul style="list-style-type: none"> <li>— The turbine infrastructure is expected to have a lifespan of approximately 25 - 30 years, with maintenance and potential repowering.</li> </ul>
<b>Decommissioning</b>		
<b>Site preparation</b>	<ul style="list-style-type: none"> <li>— Confirming the integrity of the access to the site to accommodate required equipment.</li> <li>— Preparation of the site (e.g. lay down areas, etc.)</li> <li>— Mobilisation of de-construction equipment and cranes.</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. It is most likely that decommissioning activities of the infrastructure of the facility would comprise the disassembly and removal of the turbines and other infrastructure from the site.</li> </ul>
<b>Disassemble wind turbines</b>	<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> </ul>

## 2 PURPOSE AND OBJECTIVES OF THE EMPR

An Environmental Management Programme (EMPr) is a set of guidelines and actions aimed at ensuring that construction and/or installation activities, and subsequent management of facilities as well as decommissioning, are undertaken in a manner that minimises environmental risks and impacts. An effective EMPr is concerned with both the immediate outcome as well as the long-term impacts of the project. The EMPr is required in order to:

- assist in ensuring continuing compliance with South African legislation and Karreebosch Wind Farm Environmental Health and Safety Policy (a policy is currently being developed for the Wind Energy industry);
- provide a mechanism for ensuring that measures identified in the EIA designed to mitigate potentially adverse impacts are implemented;
- provide a framework for mitigating impacts and environmental risks that may be unforeseen or unidentified prior to commencement of construction;
- provide assurance to regulators and stakeholders that the obligations and/or requirements with respect to environmental and socio-economic performance will be met; and
- provide a framework for compliance auditing and inspection programs.

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

The EMPr has been developed and updated as a set of environmental specifications (i.e. principles of environmental management for the proposed Karreebosch Wind Farm, which are appropriately contextualised to provide clear guidance in terms of the on-site implementation of these specifications (i.e. on-site contextualisation is provided through the inclusion of various monitoring and implementation tools for assisted use of the EMPr by the project implementer as well as compliance monitors). The mitigation measures identified within the Environmental Impact Assessment process are systematically addressed in the EMPr, ensuring the minimisation of adverse environmental impacts to an acceptable level.

Karreebosch Wind Farm (RF) (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. One of these obligations 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 of the proposed development. Since this EMPr is part of the EIA process undertaken for the proposed Karreebosch Wind Farm, it is important that this document be read in conjunction with the EIA Report (August 2015), the Environmental Authorisation and subsequent amendments, Final Amendment Report (2022) and Final Amended EMPr. This will contextualise the EMPr and enable a thorough understanding of its role and purpose in the integrated environmental management process. This EMPr for construction and operation activities has been compiled in accordance with Appendix 4 of the EIA Regulations (GNR982), and will be further developed in terms of specific requirements listed in any authorisations and permits issued for the proposed project.

The EMPr will remain a working document and must be updated at various stages of the planning and implementation process, to ensure incorporation of any additional findings from further studies (e.g. monitoring) and as design details become clearer.

~~It should be noted that the design phase referred to in this EMPr is post environmental authorization phase, and therefore some permitting requirements that are associated with the design phase will only take place once Environmental Authorization is received.~~

Prior to the initiation of the construction phase (post pre-construction monitoring) to ensure that all relevant management actions have been included, including those from the environmental authorisation and specialist walk-through surveys (as detailed in Chapter 5).

Following the construction and rehabilitation phase and after the start of operation, to capture additional and unforeseen mitigation measures that are identified during these activities, and would be relevant to the operational phase.

Prior to final decommissioning and closure.

# 3 FINDINGS OF THE IMPACT ASSESSMENTS

## 3.1 2015 IMPACT SUMMARY<sup>4</sup>

The following Independent Specialist Studies were undertaken during the original S&EIA process for the establishment of the 140MW Karreebosch WEF located within the Karoo Hoogland and Laingsburg Local Municipalities in the Northern and Western Cape Provinces, which was originally authorised on 29 January 2016:

- Heritage, Archaeological and Palaeontological Impact Assessment
- Agriculture and Soils Impact Assessment
- Hydrological Impact Assessment
- Avifaunal Impact Assessment
- Bat Impact Assessment
- Ecological Impact Assessment
- Noise Impact Assessment
- Social Impact Assessment
- Visual Assessment

**Table 3-1 to Table 3-3** provide a summary of the impacts identified during the 2015 S&EIA undertaken for the original 65 Turbine WEF.

**Table 3-1: 2015 Impact Assessment Summary (Planning and Construction Phase)**

<u>Environmental Aspect</u>	<u>Impact</u>	<u>Pre-Mitigation Significance</u>	<u>Residual Impact Significance</u>
<b><u>Flora and Fauna</u></b>	<u>Impacts on vegetation and listed or protected plant species</u>	<b>MAJOR (-)</b>	<b>MODERATE (-)</b>
	<u>Faunal impacts – construction disturbance</u>	<b>MODERATE (-)</b>	<b>MODERATE (-)</b>
	<u>Soil erosion risk during construction</u>	<b>MAJOR (-)</b>	<b>MINOR (-)</b>
<b><u>Birds</u></b>	<u>Habitat loss</u>	<b>MINOR (-)</b>	<b>MINOR (-)</b>
	<u>Disturbance</u>	<b>MINOR (-)</b>	<b>MINOR (-)</b>
<b><u>Bats</u></b>	<u>Destruction of bat roosts due to earthworks and blasting</u>	<b>MODERATE (-)</b>	<b>NEGLIGIBLE</b>
	<u>Artificial lighting</u>	<b>MINOR (-)</b>	<b>NEGLIGIBLE</b>
	<u>Loss of foraging habitat</u>	<b>MODERATE (-)</b>	<b>MINOR (-)</b>
	<u>Erosion</u>	<b>MODERATE (-)</b>	<b>MINOR (-)</b>

<sup>4</sup> The full 2015 specialist reports can be made available on request.

<u>Environmental Aspect</u>	<u>Impact</u>	<u>Pre-Mitigation Significance</u>	<u>Residual Impact Significance</u>
<u>Soils and Agriculture</u>	<u>Dust generation</u>	<b><u>MODERATE (-)</u></b>	<b><u>MINOR (-)</u></b>
	<u>Powerline construction</u>	<b><u>MODERATE (-)</u></b>	<b><u>MINOR (-)</u></b>
<u>Hydrology</u>	<u>Impact on localised surface water quality</u>	<b><u>MODERATE (-)</u></b>	<b><u>MINOR (-)</u></b>
	<u>Impact on riparian systems through the possible increase in surface water runoff from hard surfaces and/or roads on riparian form and function</u>	<b><u>MODERATE (-)</u></b>	<b><u>MINOR (-)</u></b>
	<u>Loss of riparian systems and watercourses</u>	<b><u>MODERATE (-)</u></b>	<b><u>MINOR (-)</u></b>
<u>Visual</u>	<u>Potential visual impact of construction activities on visual receptors in close proximity to the proposed facility</u>	<b><u>MODERATE (-)</u></b>	<b><u>MINOR (-)</u></b>
<u>Heritage</u>	<u>Disturbance or damage to palaeontological resource</u>	<b><u>MINOR (-)</u></b>	<b><u>MINOR (+)</u></b>
	<u>Physical destruction of archaeological material</u>	<b><u>MINOR (-)</u></b>	<b><u>NEGLIGIBLE</u></b>
	<u>Physical destruction of buildings, unauthorised demolition, theft of fabric and fixtures or neglect</u>	<b><u>MINOR (-)</u></b>	<b><u>MINOR (+)</u></b>
<u>Social</u>	<u>Employment and business creation opportunities during the construction phase</u>	<b><u>MINOR (+)</u></b>	<b><u>MODERATE (+)</u></b>
	<u>Benefit of technical advice for local farmers and municipalities</u>	<b><u>NEGLIGIBLE</u></b>	<b><u>MINOR (+)</u></b>
	<u>Impact of construction workers</u>	<b><u>MINOR (-) for communities</u></b>	<b><u>MINOR (-) for communities</u></b>
	<u>Influx of job seekers</u>	<b><u>MINOR (-)</u></b>	<b><u>MINOR (-)</u></b>
	<u>Risk to safety, livestock and damage to farm infrastructure</u>	<b><u>MODERATE (-)</u></b>	<b><u>MINOR (-)</u></b>
	<u>Increased risk of veld fires</u>	<b><u>MODERATE (-)</u></b>	<b><u>MINOR (-)</u></b>
	<u>Impact of construction vehicles on roads</u>	<b><u>MODERATE (-)</u></b>	<b><u>MINOR (-)</u></b>
	<u>Loss of agricultural land</u>	<b><u>MODERATE (-)</u></b>	<b><u>MINOR (-)</u></b>

**Table 3-2: 2015 Impact Assessment Summary (Operational Phase)**

<u>Environmental Aspect</u>	<u>Impact</u>	<u>Pre-Mitigation Significance</u>	<u>Residual Impact Significance</u>
<b><u>Flora and Fauna</u></b>	<u>Impact on flora and fauna</u>	<b><u>MODERATE (-)</u></b>	<b><u>MINOR (-)</u></b>
	<u>Erosion</u>	<b><u>MAJOR (-)</u></b>	<b><u>MINOR (-)</u></b>
	<u>Alien plant invasion</u>	<b><u>MODERATE (-)</u></b>	<b><u>MINOR (-)</u></b>
<b><u>Birds</u></b>	<u>Displacement and disturbance</u>	<b><u>MINOR (-)</u></b>	<b><u>MINOR (-)</u></b>
	<u>Mortality through collision with powerlines</u>	<b><u>MINOR - MODERATE (-)</u></b>	<b><u>MINOR (-)</u></b>
	<u>Mortality through collision with turbines</u>	<b><u>MINOR (-)</u></b>	<b><u>MINOR (-)</u></b>
<b><u>Bats</u></b>	<u>Mortality due to collision of bats with turbines or barotrauma</u>	<b><u>MAJOR (-)</u></b>	<b><u>MINOR (-)</u></b>
<b><u>Soils and Agriculture</u></b>	<u>Loss of high potential agricultural land</u>	<b><u>MINOR (-)</u></b>	<b><u>NEGLIGIBLE</u></b>
<b><u>Hydrology</u></b>	<u>Increase in sedimentation and erosion within the development footprint</u>	<b><u>MODERATE (-)</u></b>	<b><u>MINOR (-)</u></b>
	<u>Impact on localised surface water quality</u>	<b><u>MODERATE (-)</u></b>	<b><u>MINOR (-)</u></b>
	<u>Impact on riparian systems through the possible increase in surface water runoff from hard surfaces and/or roads on riparian form and function</u>	<b><u>MODERATE (-)</u></b>	<b><u>MINOR (-)</u></b>
	<u>Loss of riparian systems and watercourses</u>	<b><u>MODERATE (-)</u></b>	<b><u>MINOR (-)</u></b>
<b><u>Visual</u></b>	<u>Visual impact on observers traveling along arterial and secondary roads in close proximity to the proposed facility</u>	<b><u>MAJOR (-)</u></b>	<b><u>MAJOR (-)</u></b>
	<u>Visual impact on observers residing in close proximity to the proposed facility</u>	<b><u>MODERATE - MAJOR (-)</u></b>	<b><u>MODERATE (-)</u></b>
	<u>Visual impact on sensitive visual receptors within the region</u>	<b><u>MODERATE (-)</u></b>	<b><u>MODERATE (-)</u></b>
	<u>Visual impact of ancillary infrastructure</u>	<b><u>MODERATE (-)</u></b>	<b><u>MODERATE (-)</u></b>
	<u>Visual impact of overhead powerline and substation</u>	<b><u>MODERATE (-)</u></b>	<b><u>MODERATE (-)</u></b>
	<u>Visual impact of shadow flicker</u>	<b><u>NEGLIGIBLE</u></b>	<b><u>NEGLIGIBLE</u></b>
	<u>Visual impact of lighting</u>	<b><u>MODERATE (-)</u></b>	<b><u>MINOR (-)</u></b>

<u>Environmental Aspect</u>	<u>Impact</u>	<u>Pre-Mitigation Significance</u>	<u>Residual Impact Significance</u>
	<u>Visual impact of the wind energy facility on visual character</u>	<u>MINOR - MODERATE (-)</u>	<u>MINOR - MODERATE (-)</u>
	<u>Visual impact of night-lighting on SALT</u>	<u>NEGLIGIBLE</u>	<u>NEGLIGIBLE</u>
<u>Noise</u>	<u>Wind turbine noise during operation (beyond the boundary)</u>	<u>NEGLIGIBLE</u>	<u>NEGLIGIBLE<sup>5</sup></u>
	<u>Wind turbine noise during operation (within the site)</u>	<u>NEGLIGIBLE</u>	<u>NEGLIGIBLE<sup>6</sup></u>
<u>Heritage</u>	<u>Cultural heritage visual or sense of place</u>	<u>MAJOR (-)</u>	<u>MAJOR (-)</u>
<u>Social</u>	<u>Employment and business creation opportunities</u>	<u>MINOR (+)</u>	<u>MINOR (+)</u>
	<u>Community trust benefits</u>	<u>MODERATE (+)</u>	<u>MAJOR (+)</u>
	<u>Promotion of clean renewable energy</u>	<u>MINOR (-)</u>	<u>MINOR (+)</u>
	<u>Sense of place impacts</u>	<u>MODERATE (-)</u>	<u>MODERATE (-)</u>
	<u>Impact on tourism</u>	<u>MINOR (+ and -)</u>	<u>MINOR (+ and -)</u>

**Table 3-3: 2015 Impact Assessment Summary (Decommissioning Phase)<sup>7</sup>**

<u>Environmental Aspect</u>	<u>Impact</u>	<u>Pre-Mitigation Significance</u>	<u>Residual Impact Significance</u>
<u>Flora and Fauna</u>	<u>Inadequate rehabilitation following decommissioning</u>	<u>MODERATE (-)</u>	<u>MINOR (-)</u>
<u>Birds</u>	<u>Habitat Loss</u>	<u>MINOR (-)</u>	<u>MINOR (-)</u>
	<u>Disturbance</u>	<u>MINOR (-)</u>	<u>MINOR (-)</u>
<u>Bats</u>	<u>Artificial Lighting</u>	<u>MINOR (-)</u>	<u>NEGLIGIBLE</u>
	<u>Loss of bat foraging habitat</u>	<u>MINOR (-)</u>	<u>NEGLIGIBLE</u>
<u>Soils and Agriculture</u>	<u>Erosion</u>	<u>MODERATE (-)</u>	<u>MINOR (-)</u>
<u>Hydrology</u>	<u>Impact on localised surface water quality</u>	<u>MODERATE (-)</u>	<u>MINOR (-)</u>

<sup>5</sup> While the recorded noise levels comply with the NNR legal requirements and thus require no mitigation, the NIA found that turbine noise would probably be distinctly audible both outside and within the dwellings.

<sup>6</sup> While the recorded noise levels comply with the NNR legal requirements and thus require no mitigation, the NIA found that turbine noise would probably be distinctly audible both outside and within the dwellings.

<sup>7</sup> Table 10.2 pg 294, Savannah Environmental, 2015 EIR

<b><u>Environmental Aspect</u></b>	<b><u>Impact</u></b>	<b><u>Pre-Mitigation Significance</u></b>	<b><u>Residual Impact Significance</u></b>
<b><u>Visual</u></b>	<u>Potential visual impact of decommissioning activities on visual receptors in close proximity to the proposed WEF</u>	<b><u>MODERATE (-)</u></b>	<b><u>MINOR (-)</u></b>
<b><u>Heritage</u></b>	<u>Disturbance or damage to archaeological resources</u>	<b><u>MINOR (-)</u></b>	<b><u>NEGLIGIBLE</u></b>
	<u>Disturbance or damage to the built environment</u>	<b><u>MINOR (-)</u></b>	<b><u>MINOR (-)</u></b>
	<u>Disturbance or damage to cultural landscape</u>	<b><u>MAJOR (-)</u></b>	<b><u>MAJOR (-)</u></b>
<b><u>Social</u></b>	<u>Social impacts associated with decommissioning</u>	<b><u>MINOR (-)</u></b>	<b><u>NEGLIGIBLE</u></b>

## 3.2 2018 AMENDMENT SUMMARY

In 2018, the above-mentioned Specialists were consulted again as part of the previous amendment process in order to ascertain if the proposed amendments to the WEF would result in additional impacts on the site and its surroundings.

The Specialists all provided statements/revisions advising that the proposed changes will not affect/change the impacts already identified in the already authorised 2015 EIA Report, therefore no additional assessments were required to supplement the Amendment Report at that time.

Based on the specialist findings, it was concluded that the proposed amendments to the turbine and wind measuring mast specifications were not expected to result in an increase to the significance ratings for any of the identified impacts.

Only in the case of the bat specialist assessment, was there a potential decrease in potential risk levels. However, these variances were found not to influence the risk levels enough to change the significance in ratings in the original impact assessment. Therefore, there was not a change to the qualitative category (i.e. Low, Medium, High) in the original significance ratings. This held true for all specialist assessments in that there were no changes to the qualitative category (i.e. Low, Medium, High) in the original significance ratings with respect to the bats, avifaunal, visual and noise assessments.

No new mitigation measures were to be included in the updated EMP. Given the above, the following amendments were approved (EA Ref: 14/12/16/3/2/807/AM2):

- An increase in each wind turbine generation capacity from 2MW to 3.3MW, to a range between 2MW up to and including 5.5MW for each wind turbine;
- An increase of the rotor diameter for each wind turbine from 140m, to a range up to and including 160m;
- An increase of the hub height for each wind turbine from 100m, to a range up to and including 125m;
- An increase in blade length from 70m to be dependent on the final rotor diameter, maximum length to be up to 80m; and
- An increase in height of the wind measuring masts from 100m to up to 125m.



### 3.3 2015 AND 2018 CUMULATIVE IMPACTS

During the 2015 EIA and 2018 Amendment processes, all specialists assessed the cumulative impacts that would result from the existing projects within a 50km radius of the site. The following projects were taken into account during the 2015 and 2018 assessments:

- Konstabel Solar Project;
- Roggeveld Wind Project;
- Perdekraal Wind Project;
- Witberg Wind Project;
- Sutherland Wind and Solar Project;
- Suurplaat Wind Project;
- Hidden Valley Wind Project (Karusa and Soetwater wind farms);
- Gunstfontein Wind Project; and
- Lainsburg Solar Energy Project.

**Table 3-4** provides a summary of the cumulative impacts identified during the 2015 EIA undertaken for the original 65 Turbine WEF. During the 2018 Amendment process, it was noted that the cumulative impacts would remain unchanged for all studies.

**Table 3-4: 2015 Cumulative Impact Assessment Summary**

<u>SPECIALIST REPORT</u>	<u>CUMULATIVE IMPACT SIGNIFICANT (PRE-MITIGATION)</u>	<u>CUMULATIVE IMPACT SIGNIFICANT (POST-MITIGATION)</u>
<u>Fauna: Ecology</u>	<b><u>MODERATE – MAJOR (-VE)</u></b>	<b><u>MODERATE-MINOR</u></b>
<u>Avifauna</u>	<b><u>MINOR</u></b>	<b><u>MINOR</u></b>
<u>Bats</u>	<b><u>MAJOR</u></b>	<b><u>MINOR</u></b>
<u>Visual</u>	<b><u>MODERATE</u></b>	<b><u>MODERATE</u></b>
<u>Agriculture and soils</u>	<b><u>MINOR</u></b>	<b><u>NEGLIGIBLE</u></b>
<u>Hydrology</u>	<b><u>MINOR</u></b>	<b><u>MINOR</u></b>
<u>Heritage</u>	<b><u>MODERATE</u></b>	<b><u>MINOR</u></b>
<u>Socio-Economic</u>	<b><u>MAJOR (+VE) AND MAJOR (-VE)</u></b>	<b><u>MAJOR (+VE) AND MODERATE (-VE)</u></b>
<u>Noise</u>	<b><u>MAJOR</u></b>	<b><u>NEGLIGIBLE</u></b>

# 4 FINDINGS OF THE SPECIALIST WALKDOWNS – 2022

## 4.1 AGRICULTURE, SOIL AND LAND USE CAPACITY

An Agricultural Assessment of the final amended WEF Layout and suitability of the EMPr was undertaken by Johann Lanz in 2022.

The layout was determined to be almost entirely on land of very low potential which is rated as low agricultural sensitivity. Only a small part is on medium sensitivity, which, for all practical purposes, has the same agricultural production potential as the low sensitivity land. The final amended layout entirely avoids any land that is rated more than medium sensitivity, and that would therefore be a higher priority in terms of its conservation for agricultural land use. The final layout is therefore acceptable in terms of agricultural impact.

Due to the very low agricultural production potential of the site, and the effectively uniform agricultural conditions across the site, it was determined that there will be absolutely no material difference between the agricultural impacts of any of the proposed alternatives. These include alternatives for construction camps, substations, 4X4 access roads and access roads off the R354. All alternatives are considered acceptable.

Theoretically the reduction in turbine numbers from 65 authorised turbines to the amended 40, will reduce the agricultural impact, but because the impact of 65 turbines was previously determined to be negligible, the reduction has very little significance.

The EMPr for the Karreebosch WEF has been assessed with regards to protection of agriculture and soils. The important aspects of the protection of agricultural resources are the prevention of erosion and the maintenance of topsoil on the surface. These aspects are adequately covered in the EMPr and it is therefore considered to be adequate in terms of protecting agricultural resources.

The agricultural walkdown report is included in **Appendix C**.

## 4.2 BIODIVERSITY

In summary, the site is located between Sutherland and Matjiesfontein, within the Northern and Western Cape provinces, surrounded by an extensive mountainous area that comprises generally large commercial farms that have historically been used primarily for grazing with limited crops and pastures. More recently the area is being developed for Wind Energy Facilities, in conjunction with ongoing commercial (grazing) farming activities. Within the site, levels of transformation and alien infestation are generally low. Vegetation is primarily Koedoesberge-Moordenaars Karoo in the lowlands and Central Mountain Shale Renosterveld in the mountains, with several communities being differentiated, having slight differences in biophysical conditions (underlying substrate, soils and aspects) and flora composition. The vegetation units are widespread and have a low overall conservation status.

Several species of conservation concern are found in the broader area and could be present most likely as scattered individuals or small clumps or sub-populations. Several range-restricted species of conservation concern are also known to occur in the surrounding area and the vegetation types, with some found in proximity to the powerline at the time of the site assessment. The site assessment has physically screened for the presence of these, and other possible species not identified in the screening tool and is addressed in the respective species assessment section above.

The proposed WEF will result in the limited transformation and loss of some natural habitat, whilst this loss will be highly localised, there is a cumulative loss of the vegetation type and species. This cumulative loss is negligible.

Numerous flora and fauna species protected in terms of the Northern Cape Nature Conservation Act (Act 9 of 2009) and Western Cape Nature Conservation Laws Amendment Act (Act No 3 of 2000) are present or likely to be present and will require the appropriate permits before commencement. Flora and fauna search and rescue is recommended before commencement. It may be most feasible to undertake the search and rescue, in particular of

fauna, in a phased manner prior to site clearance activities. This will increase the likelihood of finding and relocating various species.

Due to the small size of the overall footprint with the broader project and regional context, risks to faunal species are likely to be low. It is likely that the mammal species identified to be of conservation concern would likely be transient visitors. A search and rescue should be conducted before commencement to relocate any small mammals into a nearby area of similar suitable habitat. Several reptile species are present but are also likely transient. A search and rescue must be conducted before commencement to relocate any reptiles into a nearby area of similar suitable habitat. Amphibians are likely less common, being an arid area, with limited or no perennial wetlands noted.

Several more sensitive areas, generally confined to small areas, within the broader homogenous landscape were noted and have been mapped and designated a higher sensitivity. This is due to the prevalence of various protected species that are not common to the surrounding Renosterveld/Karoid mozaic. These habitats are also somewhat less resilient to disturbance, and it is recommended that these patches be avoided as far as is technically possible.

In the event that the proposed Eastern Collector Access Road (i.e., Option 2) is elected for access and construction, this route alignment must be assessed by a professional ecologist/botanist during search & rescue activities in order to ensure that there are no ground-nest bees within or near the route alignment that will be affected or impacted. Where such ground-nest bees are found the route shall be realigned under the advice of the ecologist/botanist in order to protect such nests. Ground-nesting bee nest are strictly no-go areas and may not be disturbed or impacted (vibration and noise from ground works and/or traffic needs to be considered in this regard).

The following sensitivity areas were highlighted:

- Very Low sensitivity areas include transformed areas such as cultivated areas.
- Low sensitivity areas include most of the route within natural Shale Renosterveld and Moordenaars Karoo.
- No Moderate Sensitivity areas were identified.
- High sensitivity areas were identified including Sub-population of Sensitive Species 142 and scattered but localised individuals of *Indigophora hantamensis*.
- No Very High sensitivity areas were identified.
- Specific No-Go areas that have been identified including Seep Area 9 and Two sites of Ground Nesting bees

The following general recommendations are made based on the findings of the walkdown:

- With particular reference to *Sensitive Species 142* situated within the alignment of any 33kV OHP, and inasmuch that *Sensitive Species 142* is a subterranean geophyte:
  - The 4x4 tracks supporting the 33kV OHPs must be developed to follow a ‘path of least resistance’ and without the use of bulldozers or other earth moving equipment, as much as practically possible.
  - Vegetation and any *Sensitive Species 142* should not be removed/relocated to create the 4x4 track but rather left in situ (i.e., create the track by simply driving repeatedly over the same route). If any *Sensitive Species 142* clumps are within the 4x4 track route it would be recommended to divert slightly to avoid if possible. This will achieve the following:
    - Improved survival of *Sensitive Species 142* (and other geophytic plants) by leaving them in situ rather than relocating them;
    - Retention of topsoil and the seed bank in situ improves rehabilitation/regeneration of vegetation;  
and
    - Keeping a natural/endemic vegetative cover embedded into the soil decreases local erosion and topsoil loss from high wind.
  - Where bulldozers or other earth moving equipment are used, then permits must be obtained for prior rescue and relocation of *Sensitive Species 142* and any other protected species.
  - All protected species within any 33kV pylon footprint must be rescued and relocated
- Turbines 6, 8, 25, 27, 33, 34 and 38 are located adjacent to outcrops. The outcrops should be avoided as far as possible during final surveying and pegging out.
- The existing access road also passes through seep area near site laydown area; and must not encroach closer to stream than existing access track.

- Where there are further major changes/updates to the vertical and horizontal alignments of the WEF road network outside the 200m road corridor and site laydown area, such sections/areas must be reassessed in order to determine any further risks and impacts to the ecology and/or species.
- Laydown Area Alternative 2 (also referred to as the Construction Camp throughout this report) is the preferred option as development here will result in the lowest impact to terrestrial biodiversity and ecological functionality. This site also has few, if any, Sensitive Species 142.
- Substation Option 1 is the preferred options and hence the 33kV Collector System associated with Substation Option 1 is the preferred option.
- A flora and fauna search and rescue (relocation) in terms of NEM:BA Threatened or Protected Species (ToPS) and Northern Cape Nature Conservation Act (Act no. 9 of 2009) must be undertaken before commencement of vegetation clearing. A more comprehensive list of species for which permits will be required is provided in Appendix 1: Plant Species of Conservation Concern (Red listed) and Appendix 2: Flora Protected in Terms of Provincial of the Ordinance(s) of the Ecology & Biodiversity Walkdown Report (included in **Appendix D**).
- Removal of requirement for Non-Grazing plan as required by Condition 19.2 and 37 of the EA:  
This recommendation was included in the 2016 EA after the initial assessment undertaken by Todd (2014) and suggested the establishment of a 1,300h exclusion area (restricting sheep grazing) and to maintain the area for a period of 20 years.  
This recommendation was reviewed by two independent specialists (Balfour and Logie (Trusted Partners), 2022) and was found to be poorly justified and an impractical intervention for promoting conservation of biodiversity in response to perceived agricultural and grazing practices in the area (which found no indication of over-grazing, but presented under stocking) which also have no connection to the development of the WEF itself. Logie (2022) concludes that the recommendation by Todd (2014) has been founded on weak scientific evidence, if any at all, causing the non-grazing plan to be a fatally flawed mitigation strategy and ecological management philosophy. As such, it is the considered opinion of Logie (2022) that there are exceptionally strong grounds for the removal of the non-grazing plan requirement (as per conditions 19.2 and 37 of the EA - 14/12/16/3/3/2/807) from the EA in totality.  
Balfour (2022) concludes that the recommendation to establish a 1,300h sheep fenced exclusion area and to maintain it for 20 years is a weakly justified and impractical intervention and that it should be removed from the Environmental Authorisation. The recommendation is based on weak evidence and scientific logic. As such it the opinion of the specialist that the requirement for a non-grazing plan should not form part of the EA (14/12/16/3/3/2/807) and that the following conditions (19.2 and 37) should be removed from said Environmental Authorisation in their totality.

These specialist opinions are included in **Appendix X**

The ecological walkdown report is included in **Appendix D**.

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## 4.3 AVIFAUNA

The final layout takes cognisance of the previous avian assessments as well as the results of the additional pre-construction monitoring.

The previously known Verreux's Eagle nest (#1 1) was given a nest buffer of 1.3-km when first located by African Insights (2016). G7 Renewable Energies (Pty) Limited moved all turbines outside a 1.5-km buffer, and they were then granted Environmental Authorisation for 65 turbines. A new 3 km buffer around the VE nest #1 was instituted in the proposed revision of the (40) larger turbine positions. All turbines now lie outside this 3-km buffer thereby complying with the avian specialists' recommendations. This will reduce the risk inherent in the high flight activity and high Passage Rates recorded here in 2020 (including two pairs of Verreux's Eagles interacting).

Note that two turbines (T5 and T22) do still occur within the revised Verreux's Eagle draft guideline of 3.7 km buffers (Ralston Paton and Murgatroyd in press). Thus, ideally these turbine should be mitigated too. The avifaunal specialist recommended blade-painting or Shut-down-on-demand (SDOD) for these and other turbines (detailed below).

In summary, the specialists propose the following mitigations:

- A 3.0-km buffer is installed around VE nest #1 based on existing Verreaux’s Eagle guidelines (Ralston Paton 2017) – all six turbines are thus removed from within this buffer. This has been incorporated into the revised final Karreebosch WEF layout. BBU also recommends that all turbines within the 5.2km Verreaux’s Eagle precautionary buffer (as per the draft Verreaux’s Eagle guidelines (Ralston Paton and Murgatroyd in press)) are erected with one blade painted with “signal red” paint in two broad stripes to increase blade visibility (or as accepted by the CAA at the time) (McIsaac 2001, May et al. 2020). This recommendation is subject to CAA approval of blades painting and colouring and the selected turbine supplier accepting the warranties of blades being painted. This must include the two turbines (T5 and T22) that lie within the 3.7 km buffer that will be recommended in the draft Verreaux’s Eagle guidelines (Ralston Paton and Murgatroyd in press). BBU have recommended this mitigation to accommodate the precautionary buffer of 5.2 km that the revised Birdlife’s guidelines suggest where multiple flights or eagles are known to occur. Not only is this more cost-effective to instal during construction than other on-turbine mitigations, but it has no operational costs as would SDOD or even curtailment at high risk flight times of day.
- Should these two tiers of mitigation prove insufficient to prevent eagle fatalities (i.e., > 1 eagle death per year post-construction), BBU suggests an adaptive response in the form of a third tier of automated shut-down on demand (e.g., DT-bird or BioSeco) technology to reduce the risk to the eagles.

This order of mitigations:

- (1) place all turbines outside 3-km buffer (Avoidance);
- (2) red-blade mitigation (Increased blade visibility); and
- (3) SDOD (Shut down where necessary), is proposed as the optimal combination.

The number of avian fatalities at all painted-blade turbines within the 5.2km VE nest buffer can then be compared with all un-painted turbines to test the effectiveness of the painted vs non-painted turbines. This maximises the likelihood that eagles will not be killed. According to experience in Norway where painted blades were first tested the painted blades had no post-construction costs (as does SDOD) and thus is the optimal mitigation in high use bird areas (B Iuell, Environmental Advisor at Smøla wind farm, Norway).

The advantages of this two-step mitigation is that<sup>8</sup>:

- (a) raptors see best in colour and, thus, red-blade mitigation is preferred.
- (b) ‘signal red’ is already approved by South African Civil Aviation for towers and other tall structures;
- (c) blade manufacturers such as Siemens and Vestas already produce painted blades in Europe; and
- (d) this mitigation has no running costs.
  - (i) In addition, automatic shut-down on demand (or any other adaptive mitigation measures deemed appropriate by an avifaunal specialist) be installed with systems such as DT-Bird and/or BioSeco.
  - (ii) This two-step process ensures that if the eagles don’t see the (red) blade, technology can detect the eagles and shut down the turbine, reducing the possibility of fatalities.

This suite of amendments and re-location and reduction in number of turbines is thus acceptable from an avian risk perspective with the recommended mitigations detailed above implemented.

A full 24-month post-construction monitoring must be undertaken and if that reveals that one or more Endangered or Vulnerable Red Data species are killed at any one turbine, then an adaptive management plan must be initiated within two months to reduce further fatalities. Mitigations during construction-phase should include avoiding the construction of roads or powerlines within 500-m of active nests of Red Data species during the early breeding season. For Verreaux’s Eagles this is May-July and again in August-September when small vulnerable nestlings are present (Simmons 2005). Should Endangered Black Harriers be found breeding, the recommendations in the

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<sup>8</sup> [www.engineeringnews.co.za/article/opinion-black-blade-mitigation-a-new-and-exciting-mitigation-for-wind-turbines-to-reduce-impacts-to-birds-of-prey-2020-10-09/](http://www.engineeringnews.co.za/article/opinion-black-blade-mitigation-a-new-and-exciting-mitigation-for-wind-turbines-to-reduce-impacts-to-birds-of-prey-2020-10-09/)

Black Harrier guidelines (Simmons et al. 2020) will have to be consulted and enacted. Construction should be avoided in August-September-October for this Endangered species.

The specialist suggests that the Karreebosch wind farm proceeds with caution given the possibility of avian fatalities, and:

- (i) an additional 12-months of construction monitoring and
- (ii) 24 months of post-construction monitoring be undertaken in the Karreebosch WEF;
- (iii) Both avian monitoring stages to be carried out under the guidance and recommendation of the Birdlife South Africa guidelines (Jenkins et al. 2015)
- (iv) all mitigation detailed above be implemented

The avifauna walkdown report is included in **Appendix E**.

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## **4.4 BATS**

According to the passive bat activity data collected on site during the preconstruction study, bat activity at 50m height was significantly less than activity at a lower height of 10m. The proposed amendment will increase the minimum rotor swept height from 45m above ground to 55m above ground. This increase in the lowest rotor swept height can have a positive influence in lowering the probability of bats being impacted. However, it is not significant enough to influence the assessments of the impacts as identified in the EIA phase bat assessment report (2015). Therefore, the impact assessments remain unchanged. Turbines are allowed inside moderate bat sensitivities and their buffers.

The proposed turbine layout respects the bat sensitivity map, it also respects the current guideline criteria which requires turbine blade length to be outside the high sensitivity buffers, except for Turbine 17.

Turbine 17 has been identified to have a proposed foundation position of 250m from a high bat sensitivity (**Figure 4-1**), which means that a blade overhang of 35m will be present if a minimum high sensitivity buffer of 200m is considered. However, when applying the spatial formula described in Section 3, and considering an elevation difference of 20m between the turbine base point and the high bat sensitivity, this turbine base point must be at least 235.8m from the high bat sensitivity (on a two-dimensional map plane) to allow for the blade tip to be 200m from the high bat sensitivity. Currently the turbine base point is 250m from the sensitivity, and therefore no further amendment is required to the location of Turbine 17 and it is considered acceptable.

The final layout takes cognisance of the previous bat assessments as well as the results of the pre-construction monitoring. The available options to minimise bat mortalities, include:

- Minimisation of light pollution;
- Curtailment to prevent freewheeling; and
- Curtailment that increases the cut-in speed.

The following mitigation action plan is applicable:

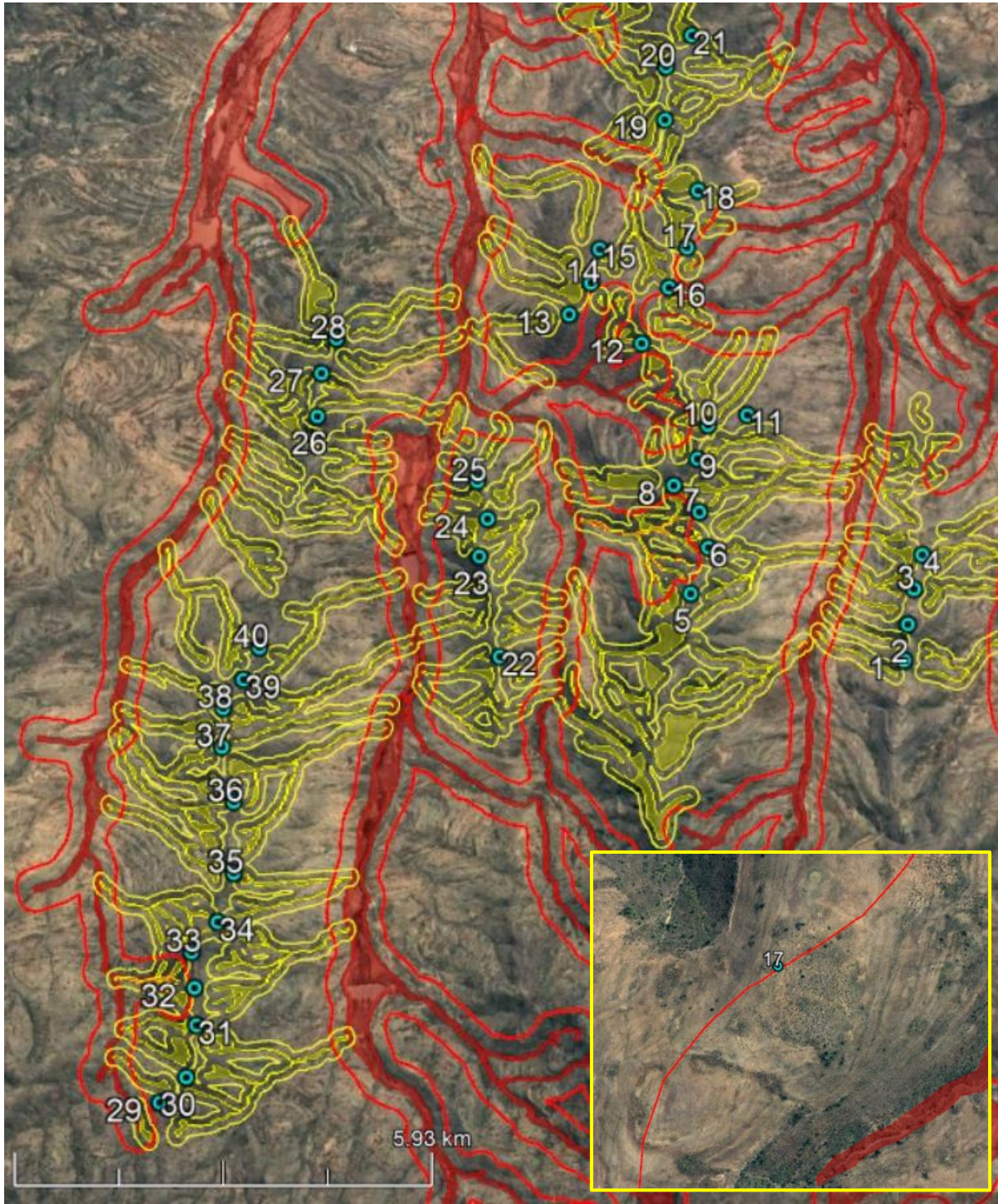
- **Step 1: Minimisation of light pollution**
  - During the planning phase for the Karreebosch WEF it must become mandatory to only use lights with low sensitivity motion sensors that switch off automatically when no persons are nearby, to prevent the creation of regular insect gathering pools, where practically possible without compromising security requirements. This applies to the turbine bases (if applicable) and other infrastructure/buildings. Aviation lights should remain as required by aviation regulations. Floodlights should be down-hooded and where possible, lights with a colour (lighting temperature) that attract less insects should be used. This mitigation step is a simple and cost-effective strategy to effectively decrease the chances of bat mortality on site.
  - Bi-annual visits to the facility at night must be conducted for the operational lifetime of the facility by operational staff of the facility, to assess the lighting setup and whether the passive motion sensors are functioning correctly. The bat specialist conducting the operational bat mortality monitoring must conduct at least one visit to site during nighttime to assess the placement and setup of outside lights on



the facility. When lights are replaced and maintenance on lights is conducted, this Mitigation Action Plan must be consulted.

- Step 2: Appointment of bat specialist to conduct operational bat mortality monitoring
  - As soon as the Karreebosch WEF facility becomes operational, a bat specialist must be appointed to conduct a minimum of 2 years of operational bat mortality monitoring. The methodology of this monitoring must comply with the South African Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy Facilities - 2nd Edition June 2020 (Aronson et al. 2020), or any newer version of the applicable guidelines that may be in force at the start of operation of the facility.
  - The results of the bat mortality study may be used to develop mitigation measures focused on specific problematic turbines. The results of the operational monitoring must be made available, on request, to other bat specialists conducting operational and preconstruction monitoring on WEF's in South Africa.
- Step 3: Curtailment to prevent freewheeling
  - Based on high bat activity detected during the 12-month preconstruction study, from 15 November to 31 March every night for the lifetime of the facility, curtailment must be applied to all turbines by ninety-degree feathering of blades when operating below the manufacturer's cut-in speed, so it is exactly parallel to the wind direction and minimises freewheeling blade rotation as much as possible without locking the blades. This can significantly lower probability of bat mortalities. Influence on productivity is minimal since no power is generated when below the manufacture's cut-in speed.
- Step 4: Additional mitigation by curtailment or acoustic deterrents
  - If mitigation steps 1 – 3 are followed, and the bat mortality monitoring study detects bat mortalities that are above the sustainable threshold for the Karreebosch WEF, then additional mitigation will need to be implemented to bring bat mortalities to or below the sustainable threshold. Such additional mitigation measures may be to curtail problematic turbines according to the mitigation cut-in speed, and/or to utilise acoustic deterrents on problematic turbines.
  - Preliminarily, it is advised that any additional mitigation measures that may be required be applied during the months of November to March, and must be applied to any turbines or group of turbines identified as causing the wind farm's mortalities to be above the sustainable threshold levels. This time period is based on high bat activity months as detected during the 12-month preconstruction study.
  - The bat specialist conducting the operational bat monitoring may recommend other time periods for additional mitigation, based on robust mortality data. If required, the bat specialist may make use of climatic data to allow for an active and adaptable mitigation schedule.
- Step 5: Auditing of bat mortalities for the lifetime of the facility
  - During the implementation of mitigation Steps 1 – 4, it is crucial for the facility to determine and monitor bat mortalities in order to implement, maintain and adapt mitigations as efficiently as possible. For the duration of the lifetime of the facility, the impacts on bats must be audited/monitored by reliable methods of carcass searching and/or electronic devices capable of automatically counting bat mortalities. Such auditing should occur every 5 years (after the end of the initial 2-year operational study) for all turbines on site, and continuously for turbines where mitigations discussed in Step 4 are implemented

The bat walkdown report is included in **Appendix F**.



**Figure 4-1: Bat sensitivity map in relation to the proposed turbine layout. Shaded red = high bat sensitivity; Red line = 250m High bat sensitivity buffer; Shaded yellow = Moderate bat sensitivity; Yellow line = moderate bat sensitivity buffer (Insert – close up of Turbine 17) (Animalia, 2022).**

## 4.5 SURFACE WATER AND WETLAND

During the site visit undertaken in May 2021, several headwater episodic drainage lines (EDLs) without riparian vegetation which flow into larger ephemeral tributaries and rivers in the valley bottom position with riparian



vegetation were identified. These watercourses form part of the Roggeveld, Kleinpoorts, Tankwa and Wilgebos River systems.

With the exception of watercourse road crossings, all other infrastructures (turbines and crane pads, substation, construction camp) are located outside the delineated extent of the watercourses. Due to the ecological sensitivity and importance of the watercourses, the upgrading of access roads directly adjacent to watercourses and the upgrading and development of watercourse crossings by means of installing formal through flow structure poses a Moderate risk significance to the watercourses, with the application of the recommended mitigation measures.

The proposed 33kV collector overhead powerlines will also traverse several watercourses; however, the powerline support structures will be constructed outside the delineated extent of the watercourses and as far as feasible, at least 32 m from the delineated extent of the watercourses. Should the recommended mitigation measures be implemented with specific mention of ensuring proper stormwater management practices during the construction and operational phases, the remainder of the infrastructure associated with the Karreebosch WEF including the 33kV Collector overhead powerlines and cables, turbines, crane pads, Construction Camp Options 1 to 4; and Substation Options 1 and 2 pose a Low risk significance.

However, preference is given to Substation Option 1 and thus the associated 33kV collector overhead powerlines and cables (Option 1) and internal 4x4 access roads associated with it, and the proposed Construction Camp Options 1, 2 and 4, as these were determined to pose the least negative impacts where direct and indirect negative impacts can be reduced to an acceptable level and managed.

Despite direct negative impacts expected from the proposed development, with implementation and strict enforcement of cogent, well-developed mitigation measures as outlined in the surface water report, with specific mention of ensuring all instream construction footprints are rehabilitated and the watercourses monitored for any alien and invasive species establishment, no fatal flaws in terms of freshwater ecological aspects were identified and the proposed development can be considered acceptable.

The following aspects must be considered for the required approvals and/or permits by the relevant authorities:

- The watercourses are considered to be ‘no-go’ areas for building infrastructure components. Linear infrastructure (such as roads and underground cables) as provided, should only be planned within these areas if it is absolutely unavoidable to circumnavigate these watercourses;
- The proposed two eastern ridge access route alternatives are considered acceptable with the implementation of mitigation measures as outlined in the Freshwater Impact report, with specific mention of installing appropriately sized throughflow structures and construction preferably undertaken during the dry period when there is little to no flow within the watercourses and thus no flow diversion required;
- Development of access roads (new and existing) and the proposed 4x4 internal roads within the 200 m corridors will not have any additional impact to the watercourses and ecological functionality over and above what was previously assessed (as part of the Final EIA Report (2015)) or mitigation measures identified;
- Preference is given to Substation Option 1 and thus the associated 33kV collector overhead powerlines and cables (Option 1) and internal 4x4 access roads associated with it, since the proposed Substation Option 1 is located outside the 32 m NEMA ZoR (and GN509 ZoR), and no direct or indirect impacts from Substation Option 1 are expected, as opposed to Substation Option 2 that is located in very close proximity to a watercourse. In addition, Construction Camp Options 1, 2 and 4 are considered acceptable (with implementation of mitigation measures) from a freshwater management perspective considering their distance from the nearest watercourse (approximately at least 28 m from a watercourse), compared to the proposed Construction Camp Option 3 which is located directly outside the delineated boundary of a watercourse; and
- As part of the Part 2 EA amendment, Final layout and EMPr approval process to DFFE, all watercourse crossings and infrastructure within 32 m of a watercourse must be authorised. Based on the outcome of the risk assessment, the proposed amendments and final layout of the Karreebosch WEF are not considered to be a fatal flaw and pose a Moderate to Low risk significance, with the application of the recommended mitigation measures (largely because of direct watercourse crossings from the proposed access roads and the underground cables on top of the ridges along the access roads that cannot practically avoid watercourses). As such, it is the opinion of the freshwater ecologist that the amendments proposed for the authorised Karreebosch WEF and its final layout be authorised.

The surface water walkdown report is included in **Appendix G**.

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## 4.6 NOISE

The revised turbine specifications (an increase in hub height and rotor diameter) necessitated the remodelling of noise impacts of the final layout (40 turbine locations). The 33 noise sensitive areas that were identified during the 2015 noise assessment were reused in the 2022 remodelling of the noise impact.

The wind turbine generator that was modelled is described in **Table 4-1**. This turbine was chosen to represent the worst-case scenario of a wind turbine up to 7.5 MW and 140m hub height. The modelled hub height (140m) is the same as the amendments proposed by the developer.

If a lower final hub height is chosen, the noise impacts could be reduced. Furthermore, if the final turbine that is chosen has a maximum sound power level that is similar or lower than the turbine modelled as part of the 2022 Specialist Statement, it can be assumed that the noise impacts will be similar or lower, irrespective of the turbine manufacturer.

**Table 4-1: Turbine Specifications Used in the Noise Model**

<b>Manufacturer</b>	Goldwind
<b>Type / Version</b>	GW165- 6.0MW
<b>Rated Power</b>	Up to 7.5 MW
<b>Rotor Diameter</b>	Up to 170m
<b>Tower</b>	Tubular
<b>Grid Connection</b>	50/60 Hz
<b>Maximum Sound Power Level</b>	Up to 113.0 dB
<b>Hub Height</b>	Up to 140m

The sound power levels at lower and higher wind speeds as stated above were interpolated from the developer's (Goldwind) acoustic performance report provided by the client. The stated sound power level provided in the acoustic report is 111.0dB(A) for a 6.0MW Wind Turbine. Should the developer wish to increase this rated power output to 7.5MW, it would be difficult to determine the exact sound power level as there is little precise information on turbines of this power rating. Therefore, an increase to 113.0dB(A) was also modelled to draw comparison on the noise impacts. **The actual sound power levels may thus be less than those stated when the final turbine is selected. The levels used in the re-modelling are thus a worst-case scenario.**

The masking effect of the wind noise will mitigate the noise impact. The results are based on NO wind noise masking, which in reality rarely occurs when the turbines are operational. The maximum noise rating limit as per the EA is 45 dB(A).

The proposed windfarm is located adjacent to several other windfarms. The Roggeveld, Karusa and Soetwater Wind Energy Facilities are currently operational. Due to technical constraints of the modelling software, only the nearest wind turbines were analysed. Other projects in the area will have less impact due to the distance from the noise sensitive areas and the noise attenuation. The details of the modelled turbines are as follows:

- Esizayo – 55 wind turbines
- Roggeveld – 47 wind turbines
- Rietkloof – 60 wind turbines<sup>9</sup>
- Witberg – 28 wind turbines
- Brandvalley – 58 wind turbines<sup>10</sup>

The modelling results (outlined in Table 3 of the Noise Specialist Statement included in **Appendix H**) indicate that the Environmental Authorisation Limit and IFC Guideline of 45 dB(A) will be exceeded at NSA 27 for sound power levels of the turbines at 111.0dB(A) and 113.0dB(A). It must however be noted that the wind noise will provide a masking effect and the exceedance is only marginal (0.2 dBA and 2.2dBA). It is therefore unlikely that

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<sup>9</sup> The turbine numbers for the Rietkloof development are lower than that modelled (32 Turbines per development), it can therefore be inferred that the cumulative impacts of these two developments will be lower than that which was modelled

<sup>10</sup> The turbine numbers for the Brandvalley development are lower than that modelled (32 Turbines per development), it can therefore be inferred that the cumulative impacts of these two developments will be lower than that which was modelled

the receiver will be negatively impacted. Furthermore, the modelling assumes the receiver is outdoors at all times and therefore the indoor noise levels are likely to be lower.

The cumulative impact modelling results indicate that the Environmental Authorisation Limit of 45 dB(A) limit will be exceeded at NSA 27 by 0.2 dB(A). If the 113.0dB(A) sound power level is applied, the limit will be exceeded at NSA 27 by 2.2dB(A) due to the Kareebosch WEF. This includes the cumulative impacts from the other windfarms.

It is highly likely that the wind noise will provide a masking effect and the exceedance will therefore be negligible. Furthermore, the modelling assumes the receiver is outdoors at all times and therefore the indoor noise levels are likely to be lower.

The noise report is included in **Appendix H**.

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## 4.7 VISUAL

The proposed new turbine specifications would allow for a hub height of up to 140m and a rotor diameter of up to 170m, resulting in a maximum height at the blade tip of 225m, some 20m higher than the height currently authorised. While an increase in the height of the turbines would increase the visibility of the WEF, a GIS-based visibility analysis has shown that, in this instance the increase in visibility would be marginal and the viewshed would not include any additional receptors. Visual impacts resulting from the larger turbines would be greatest within a 1km to 2km radius, from where the increased height of the structure would be most noticeable. However, all the potentially sensitive receptors identified within 2km of a wind turbine placement are in fact farmsteads located within the Karreebosch WEF project area. As the occupants of these farmsteads are assumed to be involved in the development, they are less likely to perceive the WEF in a negative light. Hence the larger turbines as proposed are not expected to increase the impacts experienced by any of the identified receptors.

In addition, the change in the turbine specifications being proposed for the Karreebosch WEF has allowed for a reduction in the number of turbines required for the facility. Hence, a total of twenty-five (25) turbines have now been removed from the authorised layout. This has in turn resulted in a slight reduction in the area from which the turbines will be visible (viewshed). In addition, with fewer turbines in evidence, there will be less visual clutter in the landscape and the cumulative impacts would be slightly reduced.

In light of this, and the limited human habitation and relatively remote location of the proposed Karreebosch WEF, the proposed changes in the turbine specifications are not expected to result in any increased visual impacts on the identified receptors or affect any additional receptors in the surrounding area.

The proposed updates in the WEF layout as outlined above do not deviate significantly the previous layouts that were fully assessed in the VIA undertaken in July 2015, with further visual comment being provided in July 2018. In addition, it has been established, via desktop assessment using Google Earth imagery, that, although the landscape to the south of Karreebosch WEF is undergoing significant change as a result of the development of the Roggeveld WEF (which has been operational since 2021), there has been little change since 2018 in the baseline characteristics and the number of sensitive receptors across the remainder of the study area. As such, it is not anticipated that the final layout will result in any changes in the significance of the impacts identified in the VIA, nor will it result in any additional visual impacts.

Although the previous VIA considered a number of other existing and proposed renewable energy and electrical infrastructure developments in close proximity to the Karreebosch WEF, it should be noted that there have been some changes in the status of some of these projects in the interim. Construction has been completed in respect of three of the identified projects, namely Roggeveld, Karusa and Soetwater WEFs, all of which are now operational. Hence the landscape has already undergone noticeable change.

In addition, Rietkloof and Brandvalley WEFs have both been awarded preferred bidder status and one new project in the broader area has been granted EA and awarded preferred bidder status. This project, namely Oya Energy Facility is a combined Wind, Solar PV and Fuel-based Generator Facility (FBGF), located some 25kms south-west of the proposed Karreebosch WEF. Although the different technologies are expected to have different impacts, all renewable energy developments and associated grid connection infrastructure are relevant as they contribute to the alteration of the visual character of the broader area. In this instance however, given the distance from the Karreebosch WEF and the hilly topography in the broader area which limits the visibility of the facility,

it is not anticipated that this development will result in any significant increase in the cumulative impacts affecting the landscape or the visual receptors within the assessment area for the Karreebosch project.

Having considered the new information relating to renewable energy developments in the broader area, the overall significance of cumulative impacts remains as High Negative, with few mitigation measures available to reduce the impacts. As stated however, the proposed development is located within a designated renewable energy development zone (REDZ), and thus the relevant authorities support the concentration of renewable energy developments and associated transformation in this area.

The visual report is included in **Appendix I**.

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## 4.8 TRAFFIC AND TRANSPORT

The following conclusions and recommendations are applicable from the 2022 traffic and transport perspective:

– **Access and internal circulation**

- Two access points connecting with the R354 provide access to the project site.
- The main access (access 01) is located off an existing access point thus access spacing restrictions are not envisaged.
- An additional access point (access 02) is proposed south of the main access (access 01) to access the eastern turbine ridge. Two options are considered for access 02 (option 1 approximately 850m south of an existing farm gate and option 2 located approximately 1.5km south of the existing farm gate).

It is therefore noted that a 5km access spacing may not be feasible due to site boundaries and constraints imposed by land terrain. It is recommended that the approving authority consider a minimum 500m access spacing for the site in line with TRH17 access spacing recommendations between successive intersections. This is deemed viable due to the nature of the site (i.e., low operational traffic volumes) and the surrounding site environment (i.e., rural environment with low development densities).

- Access 01 and Access 02-option 2 are located off a straight horizontal curve with relatively flat terrain; therefore, sight line restrictions are not envisaged (i.e., sight lines are expected to meet the 300m minimum sight distance for a 100km/h posted speed). Access 02- Option 1 is located on a horizontal curve with an embankment to the north. Due to the horizontal alignment and roadside terrain of the road section, sight line limitations are envisaged at Access 02-Option 1. Access 02-Option 2 is therefore a more favourable access position to meet sight line requirements.
  - It is recommended that appropriate signage is accommodated to warn road users of the access points and that the road reserve be maintained to prevent obstructions to sight lines.
  - It needs to be noted that all access and internal roads should be investigated for their topographical suitability, i.e., feasibility for plant and truck access and height clearance for any Eskom lines, Telkom lines or similar.
  - Staggered intersections should be avoided where possible.
  - The access points to the site will need to be able to cater for construction and abnormal load vehicles.
  - A minimum road width of 8m is recommended for the access points and the internal roads can have a minimum width of 5m.
  - The radius at the access point needs to be large enough to allow for all construction vehicles to turn safely.
  - It is recommended that the site access to the facility be access controlled. It is also recommended that security staff be stationed on site at the access during construction.
  - A minimum stacking distance of 25m is recommended between the road edge of the external road and the access control.
  - All road markings and signage need to be in accordance with the South African Road Traffic Signs Manual (SARTSM).
- **Haulage routes for wind turbine components**
- The proposed haulage route is outlined in Section 3.2 of the Transport Impact Assessment (TIA) report. The Port of Saldanha haulage route was chosen as the preferred route because it provides the shortest

- route to the wind farm site, utilises higher order routes as far as possible and minimises travelling through towns.
- It is recommended that the respective haulage company conducts a dry-run to determine the restrictions relevant to the haulage vehicle to be utilised. With some route's road signs may need to be moved, overhead cables may need to be raised and bellmouths may need temporary widening to accommodate abnormal loads. A dry-run will help establish relevant changes specific to the abnormal load truck used to deliver the components and materials.
  - **Traffic impact**
    - No capacity improvements are considered necessary based on the following:
    - The site gains access of the R354, which is a Class 2 road designed to accommodate large traffic volumes.
    - The only notable generated traffic would occur during the construction and decommissioning phases. The trips generated during these phases will only occur for short periods of time and the following mitigation measures are recommended for consideration:
      - The delivery of wind turbine components to the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.
      - The use of mobile batching plants and any material sources in close proximity to the site would decrease the impact on the surrounding road network.
      - Staff and general trips can occur outside of peak traffic periods.
      - Staff can be shuttled on scheduled busses to minimise the number of trips and
      - Stagger the removal of turbines, foundations, crane pads etc during the decommissioning phase.
  - **Assessment of traffic related environmental Impacts and Identification of Management Actions**
    - The construction phase includes the construction of the Facility, including construction of the roads, excavations, trenching and ancillary construction works. This phase will temporarily generate the most development traffic. The nature of environmental impact expected with construction traffic is noise and dust pollution. It is estimated that the construction traffic will have a moderate significance rating pre mitigation and a low significance rating post mitigation.
    - The operation and maintenance phase include the operation and maintenance of the WEF. The nature of environmental impact expected with operational traffic is noise and dust pollution. It is estimated that the operational traffic will have a low significance rating pre mitigation and post mitigation.
    - The decommissioning phase will generate construction related traffic including transportation of people, construction materials, water and equipment (abnormal trucks transporting turbine components). It is therefore expected that the decommissioning phase will generate the same impact as that of the construction phase.

The Traffic Report and Management Plan are included in **Appendix J**.

## 4.9 HERITAGE

The specialist confirmed that the amended layout dated July 2022 for the Karreebosch WEF does not impact any known heritage resources and adheres to the recommendations included in the CTS Heritage Walkdown report for this development (July 2022) (included as **Appendix K**), which concludes that *“The final layout for the Karreebosch WEF avoids impact to all known significant heritage resources present within the development area. The walkdown of the final layout revealed no new significant heritage resources that are likely to be impacted. It is therefore recommended that this report is accepted as satisfying the following conditions of the Environmental Authorisation issued for the Karreebosch West WEF project:*

- *The final layout should be shown to the appointed archaeologist before implementation to confirm that all significant heritage resources have been adequately protected.*
- *All buffers and no-go areas stipulated in this (HIA) report must be adhered to for both the facilities and all roads and power lines.”*

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## 4.10 SOCIO- ECONOMIC

Based on a review of the final layout, the following findings are relevant:

- The final layout and reduction on the number of wind turbines from 65 to 40 and the increase in hub height and rotor diameter of the wind turbines associated with the Part 2 Amendment will not change the nature or significance of any of the social impacts previously assessed as part of the SIA (2015) for the Karreebosch WEF. The reduction in the number of turbines also has the potential to reduce the visual impact on the areas sense of place.
- The potential social impacts associated with the increase in the length of internal access roads from 40km to 77km will be negligible and does not have a bearing on the findings of the 2015 SIA.
- The reduction in the number of transformer stations / substations from two to one will not have a bearing on the findings of the 2015 SIA.
- The location of the construction camp and laydown areas and associated 14ha area that is affected will not have a bearing on the findings of the 2015 SIA.
- The mitigation measures for the construction and operational phase of the Karreebosch WEF listed in the SIA (2015) remain appropriate. No additional management outcomes or mitigation measures in terms of social impacts are therefore required.

The social report is included in **Appendix L**.

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## 4.11 GEOTECHNICAL INPUT

In August 2022 JG Afrika undertook a desk top geotechnical assessment for the proposed Karreebosch WEF in the Western Cape (Appendix M). The aim of the study was to assess the geological and geotechnical conditions across the study area, and to provide information on the topographical feasibility of the site for the proposed project, as well as to identify the geological and geotechnical influences and/or constraints on the construction structures.

According to the slope gradient map indicates that the turbines, substation and the construction camp site are located on gentle terrain. The majority of the internal access roads are characterised by flat to gentle slope along the lower lying valley areas and steep terrain characterises the slope sides.

Competent, founding conditions for the turbines, substation, crane pads and the construction camps are anticipated a relatively shallow depths in slightly weathered bedrock, which will have to be assessed during the detailed investigation stage of the project prior to construction.

No fatal flaws from a preliminary geotechnical perspective were identified during the desktop study.

The anticipated impact of the proposed project will have negative effects from a geotechnical perspective and will require mitigation.

The proposed site is considered suitable for the proposed development. It recommended that a detailed assessment is undertaken during the detailed design phase of the project.

Mitigation measures specific to geology and geotechnical aspects are noted to already be included in the EMPr, however, any recommendations over and above those already included have been added in the EMPr as recommended. These include:

- A detailed geotechnical investigation be undertaken during the detailed design phase of the project
- Construction of temporary berms and drainage channels to divert surface water; and
- Minimize earthworks and fills.

The detailed geotechnical investigation must entail the following:

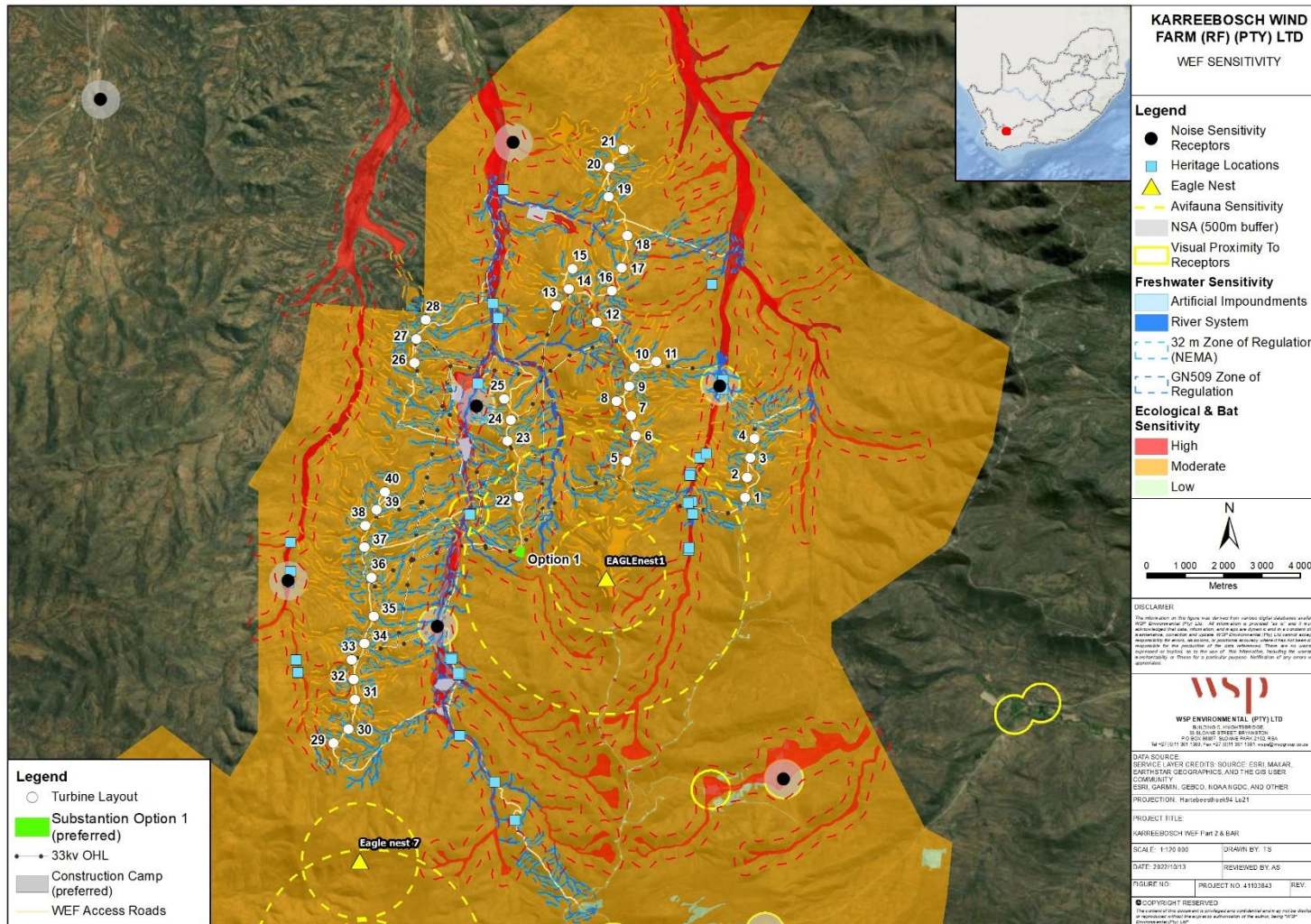
- Profiling and sampling exploratory of trial pits to determine founding conditions for the turbine modules, substation and pylons.
- An investigation to determine the subgrade conditions for internal roads and a materials investigation (if required).



- Thermal resistivity and electrical resistivity geophysical testing for electrical design and ground earthing requirements.
  - Groundwater sampling of existing boreholes to establish a baseline of the groundwater quality for construction purposes.
  - Dynamic Probe Super Heavy (DPSH) tests and rotary core drilling may be required depending on the soil profiles and imposed loads of the structures
- 

## 4.12 SENSITIVITY MAP

The overall environmental sensitivity of the Karreebosch WEF is show in **Figure 4-2** below based on the final layout.



**Figure 4-2: Environmental sensitivity map overlain over the Final Karreebosch WEF Layout**



# 5 STRUCTURE OF THIS EMPR

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

- Legislative permitting requirements
- Roles and responsibilities
- Pre-construction (planning and design) activities
- Construction activities
- Operation activities
- Decommissioning activities

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

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

<b>Project component/s</b>	List of project components affecting the objective, i.e.: <ul style="list-style-type: none"> <li>— Wind turbines</li> <li>— Access roads</li> <li>— Substations</li> <li>— Power line</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</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 throughout the life of the facility whenever changes, such as the following, occur:

- Planned activities change (i.e. in terms of the components of the facility).
- Modification to or addition to environmental objectives and targets.

- Additional or unforeseen environmental impacts are identified, and additional measures are required to be included in the EMPr to prevent deterioration or curb further deterioration of the environment.
- Relevant legal or other obligations/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.

Any amendments must be approved by the Competent Authority (i.e. DFFE) prior to implementation through an amendment process, unless these are required to address an emergency situation.

## 5.1 CONTENT OF THE EMPR: LEGISLATED AND DFFE REQUIREMENTS

**Table 5-1** cross-references the sections within the Environmental Management Programme (EMPr) with the legislated requirements as per Appendix 4 of Government Notice Regulation (GNR) 982 (as amended).

**Table 5-1: Content of this EMPr in terms of NEMA and Appendix 4 of the EIA Regulations of December 2014 as well as DFFE requirements in the Acceptance of Scoping letter**

REQUIREMENT	EMPR REFERENCE
<b>EMPr REQUIREMENTS IN TERMS OF APPENDIX 4 OF EIA REGULATIONS (GNR 982, as amended)</b>	
a) details of— (i) the EAP who prepared the EMPr; and (ii) the expertise of the EAP to prepare an EMPr	Section 1.4
b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 1.7, Table 1.5
c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers;	Figure 4-2 and Appendix B
d) a description of the impact management objectives, including management statements, identifying the impacts that need to be avoided, managed and/or mitigated as identified through the environmental impact assessment process for all phases of the development including— (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iii) where relevant operation activities; and (iv) rehabilitation of the environment after construction and where applicable post closure;	Chapter 8 – Preconstruction and planning Chapter 9 – Construction activities Chapter 10 – Rehabilitation Chapter 11 – Operation activities
e) a description of impact management outcomes, identifying the standard of impact management required for the aspects contemplated in paragraph (c);	Chapters 8 - 11

**REQUIREMENT****EMPR REFERENCE**

<p>f) a description of impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (c) and (d) will be achieved, and may include actions to —</p> <p>(i) modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;</p> <p>(ii) comply with any prescribed environmental management standards or practices;</p> <p>(iii) comply with any applicable provisions of the Act regarding closure, where applicable;</p> <p>(iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable</p>	<p>Actions listed in terms of each Objective detailed in Chapters 8 - 11</p> <p>No financial provisions in terms of the NEMA are applicable for the Karreebosch Wind Farm.</p> <p>Financial provisions of the act do not apply to renewable energy projects but rather mining related projects.</p>
<p>g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (e);</p>	<p>Monitoring requirements listed under each Objective detailed in Chapters 8 - 11</p>
<p>h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (e);</p>	<p>Monitoring requirements and timeframes listed under each Objective detailed in Chapters 8 - 11</p>
<p>i) an indication of the persons who will be responsible for the implementation of the impact management actions;</p>	<p>Responsibility listed for each management action under each Objective detailed in Chapters 8 - 11</p>
<p>j) the time periods within which the impact management actions contemplated in paragraph (e) must be implemented;</p>	<p>Timeframes listed for each management action under each Objective detailed in Chapters 8 - 11</p>
<p>k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (e);</p>	<p>Monitoring requirements listed under each Objective detailed in Chapters 8 - 11</p>
<p>l) a program for reporting on compliance, taking into account the requirements as prescribed by these Regulations; and</p>	<p>Section 9.5</p>
<p>m) an environmental awareness plan describing the manner in which—</p> <p>(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and</p> <p>(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment.</p>	<p>Section 9.4</p>
<b>EMPR REQUIREMENTS IN TERMS OF ACCEPTANCE OF SCOPING APPROVAL LETTER</b>	
<p>All recommendations and mitigation measures in EIAR and specialist studies</p>	<p>Chapters 8 - 11</p>
<p>Final site layout map</p>	<p>Figure 1.2 and Appendix B</p>
<p>Measures as dictated by final site layout map and micro siting</p>	<p>Chapter 4</p>
<p>Sensitivity map</p>	<p>Figure 4.2 and Appendix B</p>
<p>Final layout overlain on sensitivity map</p>	<p>Figure 4.2 and Appendix B</p>

REQUIREMENT	EMPR REFERENCE
Alien invasive management plan	Appendix P
Plant rescue & protection plan	Appendix N
Re-vegetation and habitat rehabilitation plan	Appendix R
Open space management plan	Appendix Q
Traffic management plan	Appendix J
Transportation plan	Appendix J
Erosion management plan	Appendix T
Fire management plan	Objective 15, Section 7.2 Objective 7, Section 9.2
Leak / spillage monitoring system	Objective 13,
Measures to protect hydrological features from spillage of pollutants	Objective 8,

## 5.2 GENERIC EMPR RELEVANT TO AN APPLICATION FOR SUBSTATION INFRASTRUCTURE

NEMA requires that an EMPr be submitted where an EIA has been identified as the environmental instrument to be utilised as the basis for a decision on an application for environmental authorisation. The content of an EMPr must either contain the information set out in Appendix 4 of the EIA Regulations, 2014, as amended, or must be a generic EMPr relevant to an application as identified and gazetted by the Minister in a government notice. Once the Minister has identified, through a government notice, that a generic EMPr is relevant to an application for EA, that generic EMPr must be applied by all parties involved in the EA process, including, but not limited to, the applicant and the CA.

GN 435 of 22 March 2019 identified a generic EMPr relevant to applications for substations and overhead electricity transmission and distribution infrastructure which require authorisation in terms of Section 42(2) of NEMA. Applications for overhead electricity transmission and distribution infrastructure that trigger Activity 11 of Listing Notice 1 or Activity 9 of Listing Notice 2 and any other listed or specified activities must use the generic EMPr.

The objective of the generic EMPr is “to prescribe and pre-approve generally accepted impact management outcomes and impact management actions, which can commonly and repeatedly be used for the avoidance, management and mitigation of impacts and risks associated with the development or expansion of overhead electricity transmission and distribution infrastructure. The use of a generic EMPr is intended to reduce the need to prepare and review individual EMPrs for applications of a similar nature.”<sup>11</sup>

The *Generic Environmental Management Programme (EMPr) for the Development and Expansion of Substation Infrastructure for the Transmission and Distribution of Electricity* is attached as **Appendix V**.

<sup>11</sup> DEA (2019) *Appendix 1: Generic Environmental Management Programme (EMPr) for the Development and Expansion for Overhead Electricity Transmission and Distribution Infrastructure*

# 6 LEGISLATIVE PERMITTING REQUIREMENTS

Activities undertaken during site preparation, construction and operation may require additional permits, over and above the Environmental Authorisation. Karreebosch Wind Farm (RF) (Pty) Ltd is responsible for ensuring that the necessary permits are in place in order to comply with national and local regulations. The legislative permitting requirements relevant to the wind farm are detailed in **Table 6-1**.

**Table 6-1: Relevant legislative permitting requirements applicable to the Karreebosch Wind Farm**

LEGISLATION / POLICY / GUIDELINE	APPLICABLE REQUIREMENTS	RELEVANT AUTHORITY	COMPLIANCE REQUIREMENTS
<b>National Legislation</b>			
<b>National Environmental Management Act (Act No 107 of 1998 as amended)</b>	<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 sections 24 and 24D of NEMA, as read with Government Notices R983, R984 and R985, a Scoping and EIA process is required to be undertaken for the proposed project.</p>	<p>National Department of Environmental Affairs – lead authority.</p> <p>Provincial Environmental Departments – commenting authority.</p>	<p><u>The final EIA report was submitted to the DFFE and Provincial Environmental</u></p> <p><u>The EA was issued on 29 January 2016 (Ref: 14/12/16/3/3/2/807).</u></p> <p><u>The EA and associated Amendments are included in Appendix W.</u></p>
<b>National Environmental Management Act (Act No 107 of 1998)</b>	<p>In terms of the Duty of Care provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with this project is avoided, stopped or minimised.</p> <p>In terms of NEMA, it has become the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.</p>	<p>Department of Environmental Affairs (as regulator of NEMA).</p>	<p><u>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.</u></p>
<b>National Environmental Management: Waste Act (Act No 59 of 2008)</b>	<p>The Minister may by notice in the Gazette publish a list of waste management activities that have, or are</p>	<p>Hazardous Waste – National DFFE</p>	<p><u>The volumes of waste generated during construction and operation</u></p>

LEGISLATION / POLICY / GUIDELINE	APPLICABLE REQUIREMENTS	RELEVANT AUTHORITY	COMPLIANCE REQUIREMENTS
	<p>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 921), 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</li> <li>– any other way rendered unfit for the safe storage of waste.</li> <li>– Adequate measures are taken to prevent accidental spillage or leaking.</li> <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>	<p>General Waste DEA&amp;DP; DEDET</p>	<p>– <u>of the facility are not expected to be large enough to require a waste license.</u></p>
<p><b>Environment Conservation Act (Act No 73 of 1989)</b></p>	<p>In terms of section 25 of the ECA, the national noise-control regulations (GN R154 in Government Gazette No. 13717 dated 10 January 1992) were promulgated. The NCRs were revised under Government Notice No R55 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 Western Cape Province.</p>	<p>National Department of Environmental Affairs Provincial Environmental Department commenting authority. Local Municipality</p>	<p>There is no requirement for a noise permit in terms of the legislation; although a provision is made that exemption from any of the regulations of the NCR can be applied for from a local authority. <u>A Noise Impact Assessment has been conducted and the mitigation measures are included in this EMPr.</u></p>

LEGISLATION / POLICY / GUIDELINE	APPLICABLE REQUIREMENTS	RELEVANT AUTHORITY	COMPLIANCE REQUIREMENTS
	Allows the Minister of Environmental Affairs to make regulations regarding noise, among other concerns.		
<b>National Environmental Management: Air Quality Act (Act No 39 of 2004)</b>	<p>Sections 18, 19 and 20 of the Act allow certain areas to be declared and managed as “priority areas” in terms of air quality.</p> <p>Declaration of controlled emitters (Part 3 of Act) and controlled fuels (Part 4 of Act) with relevant emission standards.</p> <p>Section 32 makes provision for measures in respect of dust control.</p> <p>Section 34 makes provision for:</p> <p>(1) the Minister to prescribe essential national noise standards -</p> <p>(a) for the control of noise, either in general or by specified machinery or activities or in specified places or areas; or</p> <p>(b) for determining –</p> <p>(i) a definition of noise</p> <p>(ii) the maximum levels of noise</p> <p>(2) When controlling noise the provincial and local spheres of government are bound by any prescribed national standards.</p> <p><u>The National Dust Control Regulations (Government Notice No. R. 827 of 1 November 2013) prohibits a person from conducting any activity in such a way as to give rise to dust in such quantities and concentrations that the dust, or dust fallout, has a detrimental effect on the environment, including human health.</u></p>	<p>National Department of Environmental Affairs – air quality</p> <p>Local Municipality – Noise</p>	<u>No permitting or licensing requirements applicable for air quality aspects.</u>
<b>National Heritage Resources Act (Act No 25 of 1999)</b>	<p>Section 38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including</p> <p>– the construction of a road, power line, pipeline, canal or other similar linear development or barrier exceeding 300 m in length;</p>	<p>– National Department of Environmental Affairs where heritage assessment is a component of the EIA</p> <p>– South African Heritage Resources</p>	A permit may be required should identified cultural/heritage sites on site be required to be disturbed or destroyed as a result of the proposed development.

LEGISLATION / POLICY / GUIDELINE	APPLICABLE REQUIREMENTS	RELEVANT AUTHORITY	COMPLIANCE REQUIREMENTS
	<ul style="list-style-type: none"> <li>– any development or other activity which will change the character of a site exceeding 5 000 m<sup>2</sup> in extent.</li> </ul> <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 rezoning 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>	<ul style="list-style-type: none"> <li>Agency (SAHRA) – National heritage sites (grade 1 sites) as well as all historic graves and human remains.</li> <li>– Heritage Western Cape – Issue of permits for removal or destruction of heritage resources in the Western Cape.</li> <li>– Ngwao Boswa Kapa Bokoni: Northern Cape - Issue of permits for removal or destruction of heritage resources in the Northern Cape</li> </ul>	<p><u>A Chance Find Procedure is included in Appendix U.</u></p>
<p><b>National Environmental Management: Biodiversity Act (Act No 10 of 2004)</b></p>	<ul style="list-style-type: none"> <li>– Provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process (S53)</li> <li>– A list of threatened and protected species has been published in terms of S 56(1) - Government Gazette 29657.</li> <li>– 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).</li> <li>– 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</li> </ul>	<p>National Department of Environmental Affairs</p>	<p>Pre-construction specialist walkdowns have been conducted for fauna and flora (including avifauna and bats). The relevant recommendations have been included in this EMPr.</p> <p><u>A comprehensive list of species for which permits will be required is provided in Appendix 1: Plant Species of Conservation Concern (Red listed) and Appendix 2: Flora Protected in Terms of Provincial of the Ordinance(s) of the Ecology &amp; Biodiversity Walkdown Report (both Appendix 1 and Appendix 2 are included in Appendix D)</u></p>



LEGISLATION / POLICY / GUIDELINE	APPLICABLE REQUIREMENTS	RELEVANT AUTHORITY	COMPLIANCE REQUIREMENTS
	<p>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> <ul style="list-style-type: none"> <li>— This Act also regulates alien and invader species.</li> <li>— Under this Act, a permit would be required for any activity which is of a nature that may negatively impact on the survival of a listed protected species.</li> <li>—</li> <li>— The developer has a responsibility for: <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> </ul> </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>		
<p><b>Conservation of Agricultural Resources Act (Act No 43 of 1983)</b></p>	<p>Regulation 15 of GNR1048 provides for the declaration of weeds and invader plants, and these are set out in Table 3 of GNR1048. Declared Weeds and Invaders in South Africa are categorised according to one of the following categories:</p> <ul style="list-style-type: none"> <li>— <u>Category 1 plants</u>: are prohibited and must be controlled.</li> <li>— <u>Category 2 plants</u>: (commercially used plants) may be grown in demarcated areas providing that</li> </ul>	<p>Department of Agriculture</p>	<p>of <u>An alien plant management plan is contained in Appendix P.</u></p>

LEGISLATION / POLICY / GUIDELINE	APPLICABLE REQUIREMENTS	RELEVANT AUTHORITY	COMPLIANCE REQUIREMENTS
	<p>there is a permit and that steps are taken to prevent their spread.</p> <p>– <u>Category 3 plants</u>: (ornamentally used plants) may no longer be planted; existing plants may remain, as long as all reasonable steps are taken to prevent the spreading thereof, except within the floodline of watercourses and wetlands.</p> <p>These regulations provide that Category 1, 2 and 3 plants must not occur on land and that such plants must be controlled by the methods set out in Regulation 15E.</p>		
<b>National Veld and Forest Fire Act (Act 101 of 1998)</b>	<p>In terms of Section 21 the applicant would be obliged to burn firebreaks to ensure that should a veld fire occur on the property, that it does not spread to adjoining land.</p> <p>In terms of section 12 the applicant must ensure that the firebreak is wide and long enough to have a reasonable chance of preventing the fire from spreading, not causing erosion, and is reasonably free of inflammable material.</p> <p>In terms of section 17, the applicant must have such equipment, protective clothing and trained personnel for extinguishing fires.</p>	Department of Water Affairs	<u>A Fire Management Plan is included in Appendix Y.</u>
<b>National Forests Act (Act No 84 of 1998)</b>	<p>Protected trees: According to this act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that ‘ no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister’.</p> <p>Forests: Prohibits the destruction of indigenous trees in any natural forest without a licence.</p>	Department of Environmental Affairs	A permit or license is required for the destruction of protected tree species and/or indigenous tree species within a natural forest. No protected tree species were observed within or near the study area.
<b>Aviation Act (Act No 74 of 1962) 13<sup>th</sup> amendment of</b>	Any structure exceeding 45m above ground level or structures where the top of the structure exceeds 150m	South African Civil Aviation Authority (SACAA)	Appropriate marking on the turbine structures is required to meet the

LEGISLATION / POLICY / GUIDELINE	APPLICABLE REQUIREMENTS	RELEVANT AUTHORITY	COMPLIANCE REQUIREMENTS
<p><b>the Civil Aviation Regulations (CARS) 1997</b></p>	<p>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>specifications as detailed in the CAR Part 139.01.33. An obstacle approval for the wind energy facility is required to be obtained from the CAA prior to the start of construction.</p>
<p><b>Hazardous Substances Act (Act No 15 of 1973)</b></p>	<p>This Act regulates the control of substances that may cause injury, or ill health, or death by reason of their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products.</p> <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</p>	<p>Department of Health</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
	fuel) is prohibited without an appropriate license being in force.		
<b>National Road Traffic Act (Act No 93 of 1996)</b>	<p>The Technical Recommendations for Highways (TRH 11): “Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads” outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed.</p> <p>Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges and culverts.</p> <p>The general conditions, limitations and escort requirements for abnormally dimensioned 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>	<ul style="list-style-type: none"> <li>– Provincial Department of Transport (provincial roads)</li> <li>– South African National Roads Agency Limited (national roads)</li> </ul>	<u>A Traffic Management Plan is included in Appendix J.</u>
<b>Development Facilitation Act (Act No 67 of 1995)</b>	<p>Provides for the overall framework and administrative structures for planning throughout the Republic.</p> <p>Sections 2- 4 provide general principles for land development and conflict resolution.</p>	Provincial Department of Environmental Affairs and Development Planning (DEA&DP)	The applicant must submit a land development application in the prescribed manner and form as provided for in the Act. A land development applicant who wishes to establish a land development area must comply with procedures set out in the DFA.
<b>Astronomy Geographic Advantage Act (Act 21 of 2007)</b>	The Astronomy Geographic Advantage Act (No. 21 of 2007) provides for the preservation and protection of areas within South Africa	National Department of Science and Technology	The site falls within the designated Sutherland Central Astronomy Advantage Area and about 50km from the South

LEGISLATION / POLICY / GUIDELINE	APPLICABLE REQUIREMENTS	RELEVANT AUTHORITY	COMPLIANCE REQUIREMENTS
	that are uniquely suited for optical and radio astronomy;		African Large Telescope (SALT).  <u>Comment from the Astronomy Management Authority was received on 28 September 2022 (Refer to Appendix G of the SER (Appendix R of the Final Amendment Report)</u>
<b>Subdivision of Agricultural Land Act (Act No 70 of 1970)</b>	Details the subdivision of agricultural land and provisions under which the act is triggered. It also provides for the approval of such division by the Minister of Agriculture. Applies for subdivision of all agricultural land and long-term leasing of portions of agricultural land.	National Department of Agriculture, Forestry and Fisheries (DAFF)  Provincial Departments of Agriculture and Environment - commenting authority.  Local Municipality – competent authority	Long-term leases on portions or subdivision of the site properties will require an approval of the Minister of Agriculture. An application to DAFF will need to be submitted detailing the areas to be subdivided or leased for the purposes of the proposed development. An application in terms of SALA will need to be undertaken and submitted following the issuing of an environmental authorization for the proposed project.
<b>Provincial Policies / Legislation</b>			
<b>Western Cape Noise Control Regulations: PN 627 of 1998</b>	The control of noise in the Western Cape Province is legislated in the form of Noise Control Regulations promulgated in terms of section 25 of the Environment Conservation Act No. 73 of 1989.	Western Cape DEA&DP	In terms of Regulation 4 of the Noise Control Regulations: “No person shall make, produce or cause a disturbing noise (greater than 5 dBA), or allow it to be made, produced or caused by any person, animal, machine, device or apparatus or any combination thereof”. The NCR is not triggered by the proposed project.
<b>Northern Cape Planning and Development Act, 1998 (Act 7 of 1998)</b>	— The Northern Cape Planning and Development Act, 1998 (Act 7 of 1998) (NCPDA) provides for a single set of procedures and regulations to complement the accelerated development procedures as provided for in the Development Facilitation Act, 1995;	Karoo Hoogland Local Municipality  Northern Cape Provincial Planning –Commenting authority  Provincial and National Departments of	The development proposal of a wind energy facility implies a non-conforming land use on land zoned as Agriculture Zone I, with The primary use of agriculture. Hence, an application is made to

LEGISLATION / POLICY / GUIDELINE	APPLICABLE REQUIREMENTS	RELEVANT AUTHORITY	COMPLIANCE REQUIREMENTS
	<ul style="list-style-type: none"> <li>Ensures effective and co-operative planning and land development within the provincial and local spheres of the government of the Northern Cape province,</li> </ul>	Agriculture Commenting Authority	<ul style="list-style-type: none"> <li>change the zoning of land as per provisions in the applicable Scheme regulations for the properties in the Northern Cape.</li> </ul>
<b>Western Cape Land Use Planning Ordinance 15 of 1985</b>	<p>The Provincial Government Western Cape promulgated Scheme Regulations PN 189/2011 dated 29 July 2011 in order to make the development of commercial wind and solar energy facilities possible on land zoned Agriculture Zone I.</p>	<p>Laingsburg Municipality</p> <p>Local</p> <p>Western Cape Department of Environmental Affairs and Development Planning – Commenting authority</p> <p>Provincial and National Departments of Agriculture – Commenting Authority</p>	<p>An application must be submitted to obtain the land use right of consent use in order to accommodate the establishment of a wind energy facility on land zoned as Agriculture Zone 1 for the properties located in the Western Cape. The application will be submitted in terms of Section 4.6 of the Scheme regulations in terms of the Land Use Planning Ordinance, 1985 (Ord. 15 of 1985) promulgated in provincial notice, no PN 1048/1998 and as amended by provincial notice, no PN 189/2011.</p>
<b>The Nature and Environmental Ordinance 19 of 1974, (as amended by the Western Cape Nature Conservation Laws Amendment Act, Act 2 of 2000</b>	<p>The Nature and Environmental Ordinance 19 of 1974, (as amended by the Western Cape Nature Conservation Laws Amendment Act, Act 2 of 2000) defines the protection status of plants as follows:</p> <ul style="list-style-type: none"> <li>“endangered flora” means flora of any species which is in danger of extinction and is specified in Schedule 3 or Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, 1973; provided that it shall not include flora of any species specified in such Appendix and Schedule 4; (thus all Schedule 3 species)</li> <li>“protected flora” means any species of flora specified in Schedule 4 or Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, 1973; provided that it shall not include any species of</li> </ul>	CapeNature	Removal / relocation of protected plant / animal species require a permit to be obtained from CapeNature

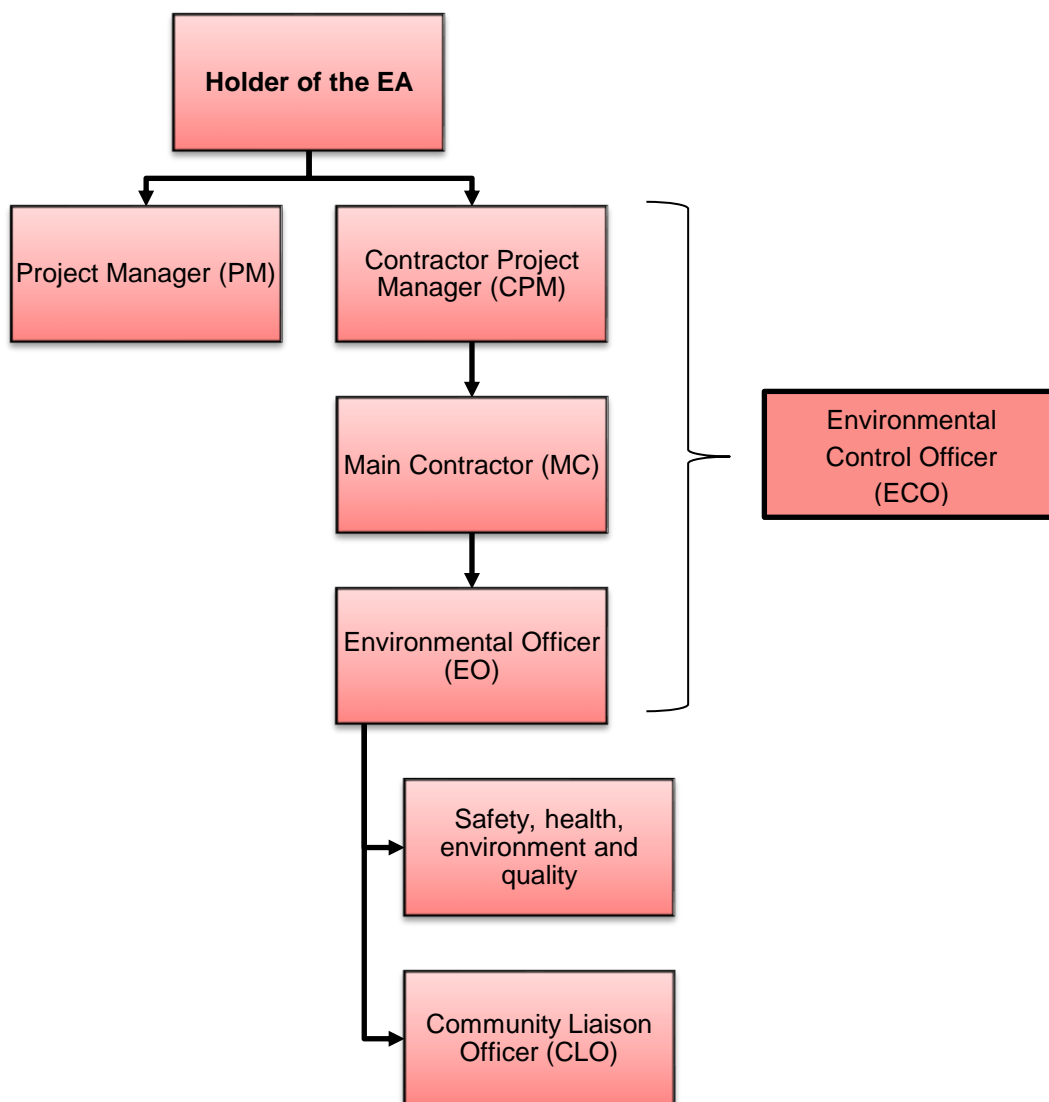
LEGISLATION / POLICY / GUIDELINE	APPLICABLE REQUIREMENTS	RELEVANT AUTHORITY	COMPLIANCE REQUIREMENTS
	<p>flora specified in such Appendix and Schedule 3</p> <ul style="list-style-type: none"> <li>— “indigenous unprotected flora” means any species of indigenous flora not specified in Schedule 3 or 4;</li> </ul>		
<p><b>Northern Cape Nature Conservation Act, Act No. 9 of 2009</b></p>	<p>This Act provides for the sustainable utilisation of wild animals, aquatic biota and plants; provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; and 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> <li>— The Act provides lists of protected species for the Province.</li> </ul>	<p>Provincial Department of Environmental Affairs - DENC</p>	<p>Permitting or licensing requirements arise from this legislation for the proposed activities to be undertaken for the proposed project as there are a succulent plants species on the proposed development site. A permit is required to remove the plants.</p>
<p><b>Western Cape Transportation Amendment Act of 1996</b></p>	<p>The provincial MEC may grant permit to undertake works within 200m of the published route upon receipt of the report assessing the potential impacts thereof.</p>	<p>Western Cape Department of Public Transport and Public Works</p>	<p>Any application for authorisation contemplated in the ECA and NEMA in respect of a 200m area on either side of a published route determination for a provincial road must be accompanied by a report that addresses the issues listed in that section of the Act.</p>

# 7 ROLES AND RESPONSIBILITIES

As the Proponent, Karreebosch Wind Farm (RF) (Pty) Ltd must ensure that the implementation of the proposed project complies with the requirements of 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. Karreebosch Wind Farm (RF) (Pty) Ltd will retain various key roles and responsibilities during the construction of the wind energy facility. These are outlined below.

The following section outlines the roles and responsibilities of those involved in the proposed installation, operation and decommissioning of the wind energy facility. An organogram showing a suggested reporting structures is provided in **Figure 7-1**.

Although the exact terminology of the respective roles may differ, the structure below outlines the intended hierarchy in terms of reporting to ensure successful implementation of the EMPr. Similar reporting and responsibility protocols or improved structures are also allowed.



**Figure 7-1: Reporting structure basic organogram**



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## 7.1 KARREBOSCH WIND FARM (RF) (PTY) LTD

~~KWF's Development Manager will have the ultimate responsibility for ensuring the measures outlined in the EMPr are delivered and that the measures are implemented by their contractors and subcontractors. In this respect the Development Manager will review and approve contractor plans for delivery of the actions contained in the EMPr during construction and ensure that during operation performance will be evaluated through monitoring and auditing.~~

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### ~~7.1.1 DEVELOPMENT MANAGER~~

~~The Development Manager's responsibilities will encompass the following:~~

- ~~— Liaison with the project engineers to ensure that the Wind Farm is designed to meet all the specified environmental parameters and legal requirements as specified in the EMPr and Environmental Authorisation;~~
- ~~— Authority to stop works in emergency situations;~~
- ~~— Approval of method statements; and~~
- ~~— Liaison with authorities.~~

~~The Project Manager, or any other person appointed to the role, is responsible for the implementation of the EMPr, and will report directly to the Development Manager on environmental, health and safety matters.~~

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### 7.1.2 PROJECT MANAGER

The Project Manager, or any other person appointed to the role, is the designated person responsible for the implementation of the EMPr and therefore the person responsible for managing the environmental issues that arise during the construction phase of the project.

The Project Manager's main role is to regularly inspect and manage the construction activities on site in order to ensure compliance with the EMPr. The Project Manager will liaise with the Environmental Control Officer (ECO) and Contractor and report to the Development Manager.

The Project Manager's responsibilities will encompass the following:

- Training of contractors on environmental matters;
- Inspect the site at least once every two weeks for the duration of the construction phase;
- Management of the contractors in terms of the EMPr;
- Review of contractor method statements and ensure alignment with the EMPr;
- Reporting on environmental problems to the Development Manager;
- Record keeping of
  - environmental incidents;
  - contractors non-compliance to the EMPr; and
  - contractor fines and penalties.
- Making recommendations or implementing actions relating to a contractor's failure to comply with the EMPr, which may include enforcement of penalties and even contract termination and removal of contractor from the site;
- Recommending the suspension of work activities where such activities contravene the EMPr requirements; and
- The authority to stop works in emergency situations when the Development Manager is not available and construction activities seriously threaten the environment.

The Project Manager will also be responsible for implementing the community engagement plan. The Project Manager will be required to participate in community meetings that will be held in affected communities prior to, during and upon completion of construction.

During the construction phase an ECO will be responsible for ensuring the overall environmental and socio-economic objectives of the EMPr are met. Specialists such as palaeontologists, bird specialists etc. will be employed as required. When working on site, the ECO will report to the Project Manager.

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## 7.2 ENVIRONMENTAL CONTROL OFFICER

KWF will appoint an independent Environmental Control Officer (ECO) prior to commencement of construction. The ECO will remain employed throughout the construction phase of the project until such time as rehabilitation is complete and the site is ready for operation. The ECO shall hold a relevant environmental degree or diploma and have experience in ECO work.

The ECO will be responsible for monitoring, reviewing and verifying compliance by the EPC Contractor with the environmental specifications of the EMP and the conditions of the Environmental Authorisation. Accordingly, the ECO will:

- Be fully knowledgeable with the contents with the Environmental Impact Assessment.
- Be fully knowledgeable with the contents with the conditions of the Environmental Authorisation (once issued).
- Be fully knowledgeable with the contents with the EMPr.
- Be fully knowledgeable of all the licences and permits issued to the site.
- Be fully knowledgeable with the contents with all relevant environmental legislation, and ensure compliance with them.
- Ensure that the contents of this EMPr are communicated to the Contractor site staff and that the Site Manager and Contractor are constantly made aware of the contents through discussion.
- Ensure that the compliance of the EMPr is monitored through regular and comprehensive inspection of the site and surrounding areas.
- Ensure that if the EMPr conditions or specifications are not followed then appropriate measures are undertaken to address any non-compliances (for example an ECO may cease construction or an activity to prevent a non-compliance from continuing).
- Monitoring and verification must be implemented to ensure that environmental impacts are kept to a minimum, as far as possible.
- Ensure that the Site Manager has input into the review and acceptance of construction methods and method statements.
- Ensure that activities on site comply with all relevant environmental legislation.
- Remedial action will be required by the responsible party in the event of contravention of the specifications of the EMPr.
- Ensure that the compilation of progress reports for submission to the Project Manager, with input from the Site Manager, takes place on a regular basis, including a final post-construction audit.
- Ensure that there is communication with the Site Manager regarding the monitoring of the site.
- Ensure that any non-compliance or remedial measures that need to be applied are reported.
- Keep record of all activities on site, problems identified, transgressions noted and a schedule of tasks undertaken by the ECO in the form of a daily diary.
- Independently report to DFFE in terms of compliance with the specifications of the EMP and conditions of the Environmental Authorisation (once issued).

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## 7.3 CONTRACTORS AND SITE PERSONNEL

During site preparation and construction, the contractor will be responsible for ensuring compliance with all relevant legislation as well as adherence to all environmental and socio-economic mitigation measures specified in the EMPr and the Environmental Authorisation (EA). The contractor is also responsible under the contract for managing the potential environmental, socio-economic, safety and health impacts of all contracted activities

whether these are undertaken by themselves or by their subcontractors. The contractor has overriding responsibility for the activities of all direct staff and subcontractors.

Adherence to the provisions of the EMPr will be a condition of contract with the contractor. The contractor will need to demonstrate to KWF's satisfaction how compliance with the requirements of the EMPr will be met. The contractor will also be expected to demonstrate commitment to the EMPr at all levels in the contractor's management structure and will be required to identify individuals responsible for overall environment, socio-economic, safety and health management.

The contractor will be required to undertake regular environmental and socio-economic inspections and provide reports to KWF to monitor and evaluate performance against the measures and objectives established in the EMPr. In this regard, the contractor's performance in complying with the EMPr will be monitored and audited by the ECO, Project Manager and Development Manager.

The Contractor should employ a Safety, Health and Environment (SHE) Representative to be responsible for managing the day-to-day on-site implementation of this EMPr, and for the compilation of regular (usually weekly) Monitoring Reports. In addition, the SHE must act as liaison and advisor on all environmental and related issues and ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor. This representative should be suitably qualified and should:

- Be well versed in environmental matters.
- Understand the relevant environmental legislation and processes.
- Understand the hierarchy of Environmental Compliance Reporting, and the implications of Non-Compliance.
- Know the background of the project and understand the implementation programme.
- Be able to resolve conflicts and make recommendations on site in terms of the requirements of this Specification.
- Keep accurate and detailed records of all EMPr-related activities on site.

# 8 MANAGEMENT PLAN FOR THE WEF: PRE-CONSTRUCTION

## 8.1 GOAL FOR PRE-CONSTRUCTION (PLANNING AND DESIGN)

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

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

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

## 8.2 OBJECTIVES

### 8.2.1 OBJECTIVE 1: TO ENSURE THAT THE DESIGN OF THE FACILITY RESPONDS TO THE IDENTIFIED ENVIRONMENTAL CONSTRAINTS AND OPPORTUNITIES

From the specialist investigations undertaken for the proposed Karreebosch Wind Farm development site, areas of high sensitivity were identified. The principle mitigation should be avoidance of identified sensitive areas as is proposed in terms of the recommended preferred layout for implementation.

<b>Project component/s</b>	<ul style="list-style-type: none"><li>– Wind turbines</li><li>– Access roads</li><li>– Substations</li><li>– Power lines</li><li>– Laydown areas</li><li>– Concrete batching plant</li><li>– Ancillary infrastructure</li></ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"><li>– Design fails to respond optimally to the identified environmental considerations</li></ul>
<b>Activities/risk sources</b>	<ul style="list-style-type: none"><li>– Positioning of turbines and access roads</li><li>– Positioning of substation</li><li>– Routing of power lines</li></ul>

<b>Mitigation: Target/Objective</b>	— To ensure that the design of the facility responds to the identified environmental constraints and opportunities
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<b>MITIGATION: ACTION/CONTROL</b>	<b>RESPONSIBILITY</b>	<b>TIMEFRAME</b>
Consider design level mitigation measures recommended by the specialists, especially with respect to ecology, avifauna and bat sites, as detailed within the EIA report and relevant appendices.	Engineering Design Consultant / turbine supplier Karreebosch Wind Farm (RF) (Pty) Ltd	Tender design, design review stage
Final infrastructure positions must be informed by adhere to the detailed micro-siting surveys (geotechnical and specialist ecological, avifaunal and heritage surveys)	Engineering Design Consultant Karreebosch Wind Farm (RF) (Pty) Ltd Specialists	Tender design, design review stage
The final facility design should adhere to the recommended layout within the EIA as far as possible. No infrastructure must be placed within no go areas and areas of high sensitivity as per the specialists recommendations.	Engineering Design Consultant Karreebosch Wind Farm (RF) (Pty) Ltd	Tender design, design review stage
As far as possible, the number of roads should be reduced to the minimum possible and routes should also be planned to avoid areas of high sensitivity.	Engineering Design Consultant Karreebosch Wind Farm (RF) (Pty) Ltd	Tender design, design review stage
Make use of existing roads where possible when planning the access road layout for the facility.	Relevant specialists Engineering Design Consultant Karreebosch Wind Farm (RF) (Pty) Ltd	Design phase
Should the layout (or type of wind turbines used) change significantly during the final design, the new layout must be submitted to the Department for approval prior to implementation.	Karreebosch Wind Farm (RF) (Pty) Ltd	Design phase
<u>Implement a detailed stormwater management plan for hard/compacted surfaces (e.g. substation footprints) as part of the final design of the project (refer to <b>Appendix T</b>).</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Design phase</u>
<u>Turbines 6, 8, 25, 27, 33, 34 and 38 are located adjacent to outcrops. The outcrops should be avoided as far as possibly during final surveying and pegging out.</u>	<u>Engineering Design Consultant Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Design phase</u>
<u>The existing access road also passes through seep area near site laydown area, and must not encroach closer to stream than existing access track.</u>	<u>Engineering Design Consultant Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Design phase</u>
<u>Where there are further major changes/updates to the vertical and horizontal WEF, alignments of the road network outside the 200m road corridor and site laydown area, such sections/areas must be reassessed in order to determine any further risks and impacts to the ecology and/or species</u>	<u>Engineering Design Consultant Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Design phase</u>
<u>Laydown Area Alternative 2 is the preferred option as development here will result in the lowest impact to terrestrial biodiversity and ecological functionality. This site also has few, if any, Sensitive Species 142</u>	<u>Engineering Design Consultant Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Design phase</u>
<u>Substation Option 1 is the preferred options as described in Trusted Partners Report: TP220511-01A: Karreebosch</u>	<u>Engineering Design Consultant Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Design phase</u>

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
<u>Wind Energy Facility: Biodiversity &amp; Terrestrial Ecology Assessment – Karreebosch 132kV Powerline and Substation, 2022/08/15; and hence the 33kV Collector System associated with Substation Option 1 is the preferred option.</u>		
<u>A flora and fauna search and rescue (relocation) in terms of NEM:BA Threatened or Protected Species (ToPS) and Northern Cape Nature Conservation Act (Act no. 9 of 2009) must be undertaken before commencement of vegetation clearing.</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Preconstruction phase</u>
<u>The findings of the A detailed 1:100 year floodline analysis must be taken into consideration.</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Design phase (post environmental authorization)</u>
<p>A Health and Safety Plan must be developed prior to the commencement of construction to identify and avoid work related accidents. This shall include:</p> <ul style="list-style-type: none"> <li>– Safety zones from residences, roads, right of way</li> <li>– Buffer zone to minimise electromagnetic interference with communication (eg microwave, radio and television transmissions)</li> <li>– Chemical ablution facilities</li> <li>– Approval from the South African Civil Aviation Authority and consultation with telecommunication providers to ensure that the wind farm does not interfere with the performance of aerodrome, radio communications, Navigation and Surveillance equipment. Copies of such approvals or comments must be kept onsite to ensure that the construction teams are aware of the conditions and obligations</li> </ul> <p>Turbines must be spaced in accordance with minimum standards for minimising safety risks from each other, powerlines and other infrastructure.</p>	Karreebosch Wind Farm (RF) (Pty) Ltd	Design phase
<p>Alternative sources of aggregate should be considered and should include the option of sourcing aggregate from nearby borrow pits (of similar soil and vegetation type i.e. quartzite) in preference to opening new quarries on the Karreebosch site. Consideration should be given to the option of several smaller borrow pits versus one or two large ones. The primary goal should be to use as much rock material from turbine foundations in preference to opening new borrow pits and to limit the quantity required from new borrow pits.</p> <p>Where importing aggregate is not feasible, several borrow pit locations should be selected based on the technical requirements of the project and an appropriately qualified botanist/ecologist should visit the sites to assess the site options.</p>	Karreebosch Wind Farm (RF) (Pty) Ltd	Design phase

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
Borrow pit sites should be carefully selected to avoid rare edaphic habitats such as quartz or gravel patches which often contain rare dwarf succulents.		
Mining permit/license to be obtained for any borrow pits to be established for the project (if applicable).		
Obtain required abnormal load permits for transportation of project components to site.	Karreebosch Wind Farm (RF) (Pty) Ltd /contractor	<del>Design phase</del> <u>Pre-construction</u>
The noise emission specifications of wind turbine generators should be considered when selecting the equipment in order to ensure that noise impacts do not contravene the Noise Control Regulations.	Karreebosch Wind Farm (RF) (Pty) Ltd	Design phase
Identify and record alien plant species present at the site from the ecological walk through survey undertaken.	Karreebosch Wind Farm (RF) (Pty) Ltd Ecological Specialist	Pre-construction
Undertake plant search and rescue within all development footprint areas (refer to Plant Search and Rescue Plan contacted in <b>Appendix N</b> ).	Karreebosch Wind Farm (RF) (Pty) Ltd Ecological Specialist	Pre-construction
<u>Plan the placement of lay-down areas, the concrete batching plant and infrastructure in order to avoid areas of high sensitivity and minimise vegetation clearing.</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Design phase</u>
<u>A lighting engineer or relevant authority must be consulted to assist in the planning and placement of light fixtures in order to reduce visual impacts associated with glare and light trespass.</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd Lighting Engineer</u>	<u>Design</u>
Aviation warning lights must be planned on turbine hub or such measures required by the Civil Aviation Authority.	Karreebosch Wind Farm (RF) (Pty) Ltd	Design
<u>Bird diverters should be planned on the power line as per the avifauna specialist recommendations to make the lines, and especially the earth-wires, more conspicuous.</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Design</u>
<u>Use bird safe structure as agreed with a bird specialist to minimise the risk of electrocutions on the grid infrastructure components.</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Design</u>
Investigate and establish the best mechanism and vehicle for the advancement of local development needs; specifically at the farm and local municipality levels. Projects for implementation should be identified in consultation with the local municipalities and community representatives.	Karreebosch Wind Farm (RF) (Pty) Ltd	Pre-construction
Identify potential opportunities for local businesses.	Karreebosch Wind Farm (RF) (Pty) Ltd	Tender Design and Review stage
Disseminate information to a local database of local BEE service providers and ensure that they are informed of relevant tenders and job opportunities.	Karreebosch Wind Farm (RF) (Pty) Ltd	Pre-construction
Establish a procurement policy which sets reasonable targets for the procurement of goods and services from	Karreebosch Wind Farm (RF) (Pty) Ltd	Pre-construction



MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
South African residents /suppliers, particularly local residents as far as possible.		
<del>A Transport Study must be undertaken at least three months prior to the commencement of construction in order to determine the most appropriate route from port to site.</del>	<del>Karreebosch Wind Farm (RF) (Pty) Ltd</del>	<del>Pre-construction</del>
<del>A The Traffic Management Plan must be implemented during construction. (Appendix J)</del>	<del>Karreebosch Wind Farm (RF) (Pty) Ltd EPC Contractor Transportation Contractors</del>	<del>Pre-construction</del>
<u>Access 01 and Access 02-option 2 are located off a straight horizontal curve with relatively flat terrain; therefore, sight line restrictions are not envisaged (i.e., sight lines are expected to meet the 300m minimum sight distance for a 100km/h posted speed). Access 02- Option 1 is located on a horizontal curve with an embankment to the north. Due to the horizontal alignment and roadside terrain of the road section, sight line limitations are envisaged at Access 02-Option 1. Access 02-Option 2 is therefore a more favourable access position to meet sight line requirements</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Design phase</u>
<u>It is recommended that appropriate signage is accommodated to warn road users of the access points and that the road reserve be maintained to prevent obstructions to sight lines.</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Design phase</u>
<u>It needs to be noted that all access and internal roads should be investigated for their topographical suitability, i.e., feasibility for plant and truck access and height clearance for any Eskom lines, Telkom lines or similar.</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Design phase</u>
<u>Staggered intersections should be avoided where possible.</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Design phase</u>
<u>The access points to the site will need to be able to cater for construction and abnormal load vehicles.</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Design phase</u>
<u>A minimum road width of 8m is recommended for the access points and the internal roads can have a minimum width of 5m.</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Design phase</u>
<u>The radius at the access point needs to be large enough to allow for all construction vehicles to turn safely.</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Design phase</u>
<u>All road markings and signage need to be in accordance with the South African Road Traffic Signs Manual (SARTSM)</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Design phase</u>
<u>Obtain any additional environmental permits required (e.g. water use license, protected plant permits, etc.). Copies of permits/licenses must be kept onsite to ensure that the construction teams and contractors are aware of the conditions and obligations</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Design phase</u>
<u>ECO to be appointed prior to the commencement of any authorised activities. Once appointed the name and</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Pre-construction</u>

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
contact details of the ECO must be submitted to the Director: Compliance Monitoring at the DFFE.		
Advise DFFE of the commencement of activities as per the requirements/condition of the Environmental Authorisation (once issued).	Karreebosch Wind Farm (RF) (Pty) Ltd	Pre-construction
This EMPr and the Environmental Authorisation must be included in all tender documentation and Contractors contracts.	Karreebosch Wind Farm (RF) (Pty) Ltd	Contractor tender process

## 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 energy facility. 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>– Access roads</li> <li>– Substations</li> <li>– <u>Collector Systems</u></li> <li>– Laydown areas</li> <li>– Concrete batching plant</li> <li>– Ancillary 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 construction</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>

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
<u>Implement a the grievance mechanism procedure for the public (as outlined in <b>Appendix O</b>) during both the construction and operational phases of the facility.</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Pre-construction (construction procedure)</u> <u>Pre-operation (operation procedure)</u>
<del>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.</del>	<del>Karreebosch Wind Farm (RF) (Pty) Ltd</del>	<del>Pre-construction (construction procedure)</del> <del>Pre-operation (operation procedure)</del>
Liaison with landowners is to be undertaken prior to the commencement of construction in order to agree on	Karreebosch Wind Farm (RF) (Pty) Ltd	Pre-construction

**MITIGATION: ACTION/CONTROL****RESPONSIBILITY****TIMEFRAME**

landowner-specific conditions during construction and maintenance.		
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<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>– Effective communication procedures in place for all phases as required.</li> <li>– Fewer or no grievance/complaints remained unresolved in the schedule/record (to be kept on site).</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>– An incident reporting system should be used to record non-conformances to the EMP. Grievance mechanism procedures should be implemented.</li> </ul>

# 9 MANGEMENT PLAN FOR WEF: PRE-CONSTRUCTION & CONSTRUCTION

## 9.1 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 appropriately managed in respect of environmental aspects and impacts and enables the wind farm construction activities to be undertaken without significant disruption to other land uses in the area, in particular with regard to noise impacts, traffic and road use, and effects on local residents. The construction phase of the facility should also be undertaken in such a way as to minimise the impact on the vegetation, fauna, avifauna and bats on the site as well as on any archaeological and historical value the site may have, as determined by the EA, associates amendments and specialist walkdowns.

## 9.2 OBJECTIVES

In order to meet the goal outlined in Section 9.1, the following objectives have been identified, together with necessary actions and monitoring requirements.

### 9.2.1 OBJECTIVE 1: SECURING THE SITE AND SITE ESTABLISHMENT

The Contractor must take all reasonable measures to ensure the safety of the public in the surrounding area.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>— Wind turbines</li> <li>— Access and internal roads</li> <li>— Substations</li> <li>— <u>Collector systems</u></li> <li>— Laydown areas</li> <li>— Concrete batching plant</li> <li>— Ancillary infrastructure</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>— Hazards to landowners/public</li> <li>— Security of materials</li> <li>— damage to natural vegetation</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 vehicles 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>

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
Secure site, working areas and excavations in an appropriate manner.	Contractor	During site establishment Maintenance: for duration of Contract
Where necessary to control access, secure area and implement access control procedures.	Contractor	During site establishment Maintenance: for duration of Contract
Fence and secure Contractor's equipment camp.	Contractor	During site establishment Maintenance: for duration of Contract
Where the public could be exposed to danger by any of the works or site activities, the Contractor must, as appropriate, provide suitable flagmen, barriers and/or warning signs in English and any other relevant indigenous languages, all to the approval of the Site Manager.	Contractor	Duration of Contract
<u>Adhere to final approved layout and avoid no go areas</u>	<u>Contractor</u>	<u>During site establishment</u>
<u>All unattended open excavations must be adequately demarcated and/or fenced</u>	<u>Contractor</u>	<u>Erection: during site establishment</u> <u>Maintenance: for duration of Contract</u>

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>– Site is secure and there is no unauthorised entry</li> <li>– Prevent members of the public/ landowners/workers get injured</li> </ul>
<b>Monitoring</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>– ECO to monitor all construction areas on a continuous basis until all construction is completed; immediate report backs to site manager.</li> <li>– ECO to address any infringements with responsible contractors as soon as these are recorded.</li> </ul>

## 9.2.2 OBJECTIVE 2: APPROPRIATE MANAGEMENT OF THE CONSTRUCTION SITE AND CONSTRUCTION WORKERS

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>– Wind turbines</li> <li>– Access roads</li> <li>– Substations</li> <li>– <u>Collector Systems</u></li> <li>– Laydown areas</li> <li>– Concrete batching plant</li> <li>– Ancillary infrastructure</li> </ul>
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<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>– Damage to indigenous natural vegetation and sensitive areas.</li> <li>– Damage to and/or loss of topsoil (i.e. pollution, compaction etc.).</li> <li>– Impacts on the surrounding environment due to inadequate sanitation and waste removal facilities.</li> <li>– Pollution/contamination of the environment.</li> </ul>
<b>Activities/Risk Sources</b>	<ul style="list-style-type: none"> <li>– Vegetation clearing and levelling of equipment storage area/s.</li> <li>– Access to and from the equipment storage area/s.</li> <li>– Ablution facilities.</li> <li>– Accommodation facilities.</li> <li>– Contractors 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>– Limit equipment storage within demarcated designated areas.</li> <li>– Ensure adequate sanitation facilities and waste management practices.</li> <li>– 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>
Only security personnel may be accommodated on site. Contractors and their employees should be accommodated at existing accommodation facilities in the <u>surrounding area</u> .	Contractor	Pre-construction
Construction equipment will need to be stored at appropriate locations on site <u>and location to adhere to the approved layout and avoid no go areas</u> . No temporary site camps will be allowed outside the footprint of the development area.	Contractor	Pre-construction
Ensure that all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm. This can be achieved through the provision of appropriate environmental awareness training to all personnel (refer to Section 9.5). Records of all training undertaken must be kept.	Contractor	Duration of construction
Safety representatives, managers and workers must be trained in workplace safety. The construction process must be compliant with all safety and health measures as prescribed by the relevant Act.	Contractor and sub-contractor/s	Duration of contract
Emergency numbers for the police, fire department, clinic and relevant responsible staff will be made available in conspicuous locations.	Contractor	Duration of contract
Provide appropriate numbers of chemical toilets within appropriate areas of the site for use by construction personnel as required by the OHSA (Act 85 of 1993).	Contractor	Site establishment, and duration of construction
Ensure ablution facilities are appropriately maintained. Ablutions must be cleaned regularly and associated waste disposed of at a registered/permited waste disposal site.	Contractor	Site establishment, and duration of construction

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
Contractors must use chemical toilets/ablution facilities situated at designated areas of the site; no ablution activities will be permitted <u>outside of the approved layout and must avoid no go areas.</u>	Contractor and sub-contractor/s	Duration of contract
Cooking/meals must take place in a designated area. No firewood or kindling may be gathered from the site or surrounds.	Contractor and sub-contractor/s	Duration of contract
Informal vending stations should not be allowed on or near the construction site.	Contractor	Construction
Fire-fighting equipment and training must be provided before the construction phase commences.	Contractor and sub-contractor/s	Duration of contract
All litter must be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area. Particular attention needs to be paid to food waste.	Contractor and sub-contractor/s	Duration of contract
Appropriate numbers of waste disposal bins should be provided within appropriate areas on the site. Ensure waste disposal facilities are maintained and emptied as and when required.	Contractor	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 borrow pits. Solid waste (general waste) to be disposed of at the closest municipal landfill site. Slips of disposal to be retained as proof of responsible disposal	Contractor	Site establishment, and duration of construction
No one may disturb flora or fauna outside of the demarcated construction area/s.	Contractor and sub-contractor/s	Duration of contract
Sub-contractors appointed by the Contractor must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms.	Contractor and sub-contractor/s	Construction
<del>Provide opportunities for workers to go home over weekends where required and practically possible.</del>	<del>Contractor and sub-contractor/s</del>	<del>Construction</del>
Water resources to be used sparingly and use not to exceed the resource potential or recharge rate. Contractor to keep detailed records of water quantities used.	Contractor	Construction
Road borders must be regularly maintained to ensure that vegetation remains short to serve as an effective firebreak. An emergency fire plan to be developed with emergency procedures in the event of a fire.	Contractor	Erection: during site establishment  Maintenance: duration of contract
Rehabilitate all disturbed areas at the construction equipment camp as soon as construction is complete within an area.	Contractor	Duration of Contract
Information distributed as part of the existing HIV/Aids awareness campaigns should again be focused on and communicated to the local workforce.	Owner EPC Contractor	Construction



MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
No vehicles or machinery are to be washed on site, outside of the designated areas.	Contractor	Duration of contract
<del>Only security personnel may be accommodated on site. Contractors and their employees should to be accommodated at existing accommodation facilities in the study area or within an appropriately sited construction camp.</del>	<del>Contractor</del>	<del>Pre-construction</del>
Construction equipment will need to be stored at appropriate locations on site. The siting of the construction equipment camp/s must take cognisance of any sensitive areas identified by the EIA studies and reflected on the site layout plan included within this EMPr. No temporary site camps will be allowed outside the footprint of the development area.	Contractor	Pre-construction
Ensure that all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm. This can be achieved through the provision of appropriate environmental awareness training to all personnel (refer to Section 9.5). Records of all training undertaken must be kept.	Contractor	Duration of construction
Safety representatives, managers and workers must be trained in workplace safety. The construction process must be compliant with all safety and health measures as prescribed by the relevant Act.	Contractor and sub-contractor/s	Duration of contract
Emergency numbers for the police, fire department, clinic and relevant responsible staff will be made available in conspicuous locations.	Contractor	Duration of contract
Provide appropriate numbers of chemical toilets within appropriate areas of the site for use by construction personnel.	Contractor	Site establishment, and duration of construction
Ensure ablation facilities are appropriately maintained. Ablutions must be cleaned regularly and associated waste disposed of at a registered/permited waste disposal site.	Contractor	Site establishment, and duration of construction
<del>Contractors must use chemical toilets/ablation facilities situated at designated areas of the site; no ablation activities will be permitted outside the designated areas.</del>	<del>Contractor and sub-contractor/s</del>	<del>Duration of contract</del>
Cooking/meals must take place in a designated area. No firewood or kindling may be gathered from the site or surrounds.	Contractor and sub-contractor/s	Duration of contract
Informal vending stations should not be allowed on or near the construction site.	Contractor	Construction
Fire-fighting equipment and training must be provided before the construction phase commences.	Contractor and sub-contractor/s	Duration of contract
All litter must be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area. Particular attention needs to be paid to food waste.	Contractor and sub-contractor/s	Duration of contract

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
Appropriate numbers of waste disposal bins should be provided within appropriate areas on the site. Ensure waste disposal facilities are maintained and emptied as and when required.	Contractor	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 borrow pits. Solid waste (general waste) to be disposed of at the closest municipal landfill site. Slips of disposal to be retained as proof of responsible disposal	Contractor	Site establishment, and duration of construction
No one may disturb flora or fauna outside of the demarcated construction area/s.	Contractor and sub-contractor/s	Duration of contract
Sub-contractors appointed by the Contractor must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms.	Contractor and sub-contractor/s	Construction
<del>Provide opportunities for workers to go home over weekends where required and practically possible.</del>	<del>Contractor and sub-contractor/s</del>	<del>Construction</del>
Water resources to be used sparingly and use not to exceed the resource potential or recharge rate. Contractor to keep detailed records of water quantities used.	Contractor	Pre-Construction
Road borders must be regularly maintained to ensure that vegetation remains short to serve as an effective firebreak. An emergency fire plan to be developed with emergency procedures in the event of a fire.	Contractor	Erection: during site establishment  Maintenance: duration of contract
Rehabilitate all disturbed areas at the construction equipment camp as soon as construction is complete within an area.	Contractor	Duration of Contract
Information distributed as part of the existing HIV/Aids awareness campaigns should again be focused on and communicated to the local workforce.	Owner EPC Contractor	Construction
No vehicles or machinery are to be washed on site, outside of the designated areas.	Contractor	Duration of contract
<u>Comply with Chance Find Procedure included in Appendix U with regards to heritage and palaeontological resources.</u>	<u>Contractors</u>	<u>Construction</u>
<u>Concrete mixing must be done in a banded area to ensure that no runoff will enter the watercourses</u>	<u>Contractor</u>	<u>Construction</u>

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>— The construction equipment camps have avoided sensitive areas and adhered to approved layout and no go areas.</li> <li>— Ablution and waste removal facilities are appropriately maintained and limit pollution to the environment due to mismanagement.</li> <li>— All areas are rehabilitated promptly after construction in an area is complete.</li> </ul>
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	<ul style="list-style-type: none"> <li>— Limit complaints regarding contractor behaviour or habits.</li> <li>— Appropriate training of all staff is undertaken prior to them commencing work on the construction site.</li> <li>— Contractors' Code of Conduct drafted before commencement of construction phase.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>— Regular audits of the construction camps and areas of construction on site by the ECO.</li> <li>— Proof of maintenance of ablution and waste management facilities available on site.</li> <li>— An incident reporting system should be used to record non-conformances to the EMP.</li> <li>— Complaints investigated and, if appropriate, acted upon.</li> </ul>

### 9.2.3 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.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>— Construction activities associated with the establishment of the wind energy facility, including associated infrastructure.</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. However, due to the relatively small size of the facility the number of employment and business opportunities for locals will be limited.</li> <li>— There is also a potential challenge of local skills or business people not being able to meet the standard of service required for the facilities.</li> </ul>
<b>Activities/risk sources</b>	<ul style="list-style-type: none"> <li>— 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.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>— Maximise the number of employment opportunities for local community members</li> </ul>

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
Employ workers (skilled, semi-skilled / low-skilled) from the local area/ nearby towns, when possible. The appointed contractor should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories.	Contractor	Construction
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.	Contractor	Pre-construction

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>— Source as many local labourers as possible.</li> <li>— Database of potential local BEE services providers in place before construction phase commences.</li> </ul>
<b>Monitoring and Reporting</b>	<ul style="list-style-type: none"> <li>— Karreebosch Wind Farm (RF) (Pty) Ltd 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 must be developed and maintained on site.</li> </ul>

#### 9.2.4 OBJECTIVE 4: AVOID THE NEGATIVE SOCIAL IMPACTS ON FAMILY STRUCTURES AND SOCIAL NETWORKS DUE TO THE PRESENCE OF CONSTRUCTION WORKERS

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

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

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>— Construction and establishment activities associated with the establishment of the wind energy facility, including associated infrastructure.</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>— Presence of construction workers on site may result in loss of livestock due to stock theft and damage to farm infrastructure, such as gates and fences. Poaching of wild animals may also occur.</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 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> </ul>

#### MITIGATION: ACTION/CONTROL

#### RESPONSIBILITY

#### TIMEFRAME

<del>Employ as many workers (skilled, semi-skilled / low-skilled) from the local area as possible. This should be included in the tender documents. Construction workers</del>	Contractor	<del>Identify suitable local contractors prior to the contractor tender process for the construction phase.</del>
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MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
should be recruited from the local area in and around the towns such as Sutherland.		
Ensure that construction workers attend a briefing 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.	Karreebosch Wind Farm (RF) (Pty) Ltd Contractor	Briefing session for construction workers held before they commence work on site.
Ensure that construction workers who are found guilty of breaching the Code of Conduct are dealt with appropriately. Dismissals must be in accordance with South African labour legislation.	Karreebosch Wind Farm (RF) (Pty) Ltd and contractors	Construction
No housing of construction workers on the site to be permitted, apart from security personnel.	Contractors	Construction
Implement a policy that no employment will be available at the gate.	Contractors	Construction
Compensate farmers / community members for cost for any losses, such as livestock, damage to infrastructure etc, proven to be associated with the project.	Contractors	Construction

<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>— 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> </ul>
<b>Monitoring and Reporting</b>	<ul style="list-style-type: none"> <li>— Karreebosch Wind Farm (RF) (Pty) Ltd 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 EMP.</li> <li>— Public complaints register must be developed and maintained on site.</li> </ul>

### 9.2.5 OBJECTIVE 5: NOISE CONTROL

Various construction activities would be taking place during the development of the facility and may pose a noise risk to sensitive receptors.

<b>Project component/s</b>	— Construction of infrastructure
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<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 500m from potentially sensitive receptors (PSR)</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <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>
Where possible, construction work should be undertaken during normal working hours (06H00 – 18H00), from Monday to Friday. If work is required outside of these times and/or on the weekend / public holiday, agreements can be reached (in writing) with the landowners adjacent to the work, these working hours can be extended.	Contractor	Construction
The construction crew must abide by the national standards and <u>provincial regulations and local</u> by-laws regarding noise.	Contractor	<u>Construction</u>
All construction equipment, including vehicles, must be properly and appropriately maintained in order to minimise noise generation.	Contractor	Construction
Establish a line of communication and notify all stakeholders and sensitive receptors of the means of registering any issues, complaints or comments.	Contractor	All phases of project
Notify potentially sensitive receptors about work to take place at least 2 days before the activity in the vicinity (within 500 m) of the Potentially Sensitive Receptors (PSR) is to start. The following information to be presented in writing: <ul style="list-style-type: none"> <li>— Description of activity to take place</li> <li>— Estimated duration of activity</li> <li>— Working hours</li> <li>— Contact details of responsible party</li> </ul>	Contractor	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> </ul>
<b>Monitoring and Reporting</b>	<ul style="list-style-type: none"> <li>— Should a complaint about noise be reported, Karreebosch Wind Farm (RF) (Pty) Ltd 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 must be developed and maintained on site by the Contractor.</li> </ul>

## 9.2.6 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 turbines</li> <li>— Access roads</li> <li>— Substations</li> <li>— <u>Collector Systems</u></li> <li>— Laydown areas</li> <li>— Concrete batching plant</li> <li>— Ancillary infrastructure</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> </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> </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> </ul>

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
Implement appropriate dust suppression measures on site (e.g. wetting roads on a regular basis) <u>while taking into account water shortages.</u>	Contractor	Construction
Haul vehicles moving outside the construction site carrying material that can be wind-blown should be covered with tarpaulins <u>where possible.</u>	Contractor	Duration of contract
Ensure vehicles adhere to speed limits on public roads and speed limits set within the site by the Site Manager ( <u>up to 40km/hr</u> ). Vehicles should be fitted with recorders to record when vehicles exceed the speed limit.	Contractor/ contractor transportation	Duration of contract
Disturbed areas must be re-vegetated using appropriate vegetation as soon as practicable after construction is complete in an area.	Contractor	At completion of the construction phase
Vehicles and equipment must be maintained in a road-worthy condition at all times.	Contractor	Prior to construction phase
Ensure that damage to gravel public roads and access roads attributable to construction vehicles is repaired before completion of construction phase.	Contractor	Before completion of construction phase
Regular dust control of materials (sand, soil, cement) must be used at concrete batching plants on site	Contractor	Construction
The National Dust Control Regulations (Government Notice No. R. 827 of 1 November 2013) must be adhered to.	Contractor	Construction



<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.</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>— Karreebosch Wind Farm (RF) (Pty) Ltd 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 must be developed and maintained on site.</li> </ul>

### 9.2.7 OBJECTIVE 7: SOIL AND ROCK DEGRADATION AND EROSION CONTROL

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

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

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>— Wind turbines</li> <li>— Access roads</li> <li>— Substations</li> <li>— <u>Collector systems</u></li> <li>— Laydown areas</li> <li>— Concrete batching plant</li> <li>— Ancillary infrastructure</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>— Erosion and soil loss</li> <li>— Negative impacts on drainage lines/watercourses</li> <li>— Sedimentation of drainage lines/watercourses</li> <li>— A loss of indigenous vegetation cover</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>— Water 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>— Watercourse/drainage line road crossings</li> <li>— Roadside drainage ditches</li> <li>— Project related infrastructure, such as roads, 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 rock, 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 of drainage lines and other watercourses as a result of the establishment of infrastructure</li> <li>— Minimal loss of vegetation cover due to construction related activities</li> <li>— No increase in runoff into drainage lines as a result of construction of project related infrastructure</li> </ul>

<b>MITIGATION: ACTION/CONTROL</b>	<b>RESPONSIBILITY</b>	<b>TIMEFRAME</b>
<u>Avoid no go areas and adhere to approved layout, demarcate areas where possible</u>	<u>Contractor</u>	<u>Construction</u>
Stockpile topsoil 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.	Contractor	During site establishment and any activity related to earthworks as well as the duration of construction
New access roads to be carefully planned and constructed to minimise the impacted area and prevent unnecessary excavation, placement and compaction of soil.	Engineer / Contractor	Before and during construction
Rehabilitate disturbance areas as soon as construction in an area is completed.	Contractor	During and after construction
Stockpiles not used in three (3) months <u>where possible</u> after stripping must be seeded or appropriately covered to prevent dust and erosion - only if natural seeding does not occur.	Contractor	During and after construction
<del>Erosion control measures must be implemented for erosion prone areas such as steep slopes and could include: run off attenuation on slopes (sand bags, logs), silt fences, stormwater catch pits, shade nets or temporary mulching over denuded areas.</del>	Contractor	Erection: Before construction Maintenance: Duration of contract
Particular care should be taken in the design of road drainage line and wetland crossings in order to ensure there is no step in the channel bed, substrate continuity is maintained and no undue constriction of flow takes place.	Contractor	Erection: during site establishment Maintenance: for duration of contract

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
Where access roads cross natural drainage lines or watercourses, culverts (or other appropriate measures) must be designed to allow free flow. Regular maintenance of the culverts must be carried out.	Engineer / Contractor	Before and during construction
Control depth of all excavations and stability of cut faces/sidewalls.	Engineer / Contractor	Maintenance over duration of contract
Implement stormwater management and erosion management plan (Refer to <b>Appendix T</b> ) during construction	Contractor	Construction
Cement batching to take place in designated areas only, as approved on site layout (if applicable).	Contractor	Construction
Spillages of cement to be cleaned up immediately and appropriately disposed of or re-used in the construction process.	Contractor	Construction
Spill kits to be kept on active parts of the construction site & at site offices.	Contractor	Construction
<u>Construction of temporary berms and drainage channels to divert surface water-</u>	<u>Contractor</u>	<u>Construction</u>
<u>Minimise earthworks and fills</u>	<u>Contractor</u>	<u>Construction</u>

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>– No activity outside of designated areas</li> <li>– Minimal level of soil erosion around site as a result of construction activities</li> <li>– Minimal level of increased siltation in drainage lines as a result of construction activities</li> <li>– Minimal level of soil degradation as a result of construction activities</li> </ul>
<b>Monitoring and Reporting</b>	<ul style="list-style-type: none"> <li>– Continual inspections of the site by ECO</li> <li>– Fortnightly inspections of sediment control devices by ECO</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 EMP.</li> <li>– Public complaints register must be developed and maintained on site.</li> </ul>

### 9.2.8 OBJECTIVE 8: LIMIT DISTURBANCE AND AVOID DAMAGE TO DRAINAGE LINES

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>– Access roads</li> <li>– Cabling</li> </ul>
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<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, direct removal of soil of vegetation, dumping of material within wetlands). The focus should be on the functioning of the drainage line as a natural system.</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>– No damage to drainage lines within project area</li> </ul>

<b>MITIGATION: ACTION/CONTROL</b>	<b>RESPONSIBILITY</b>	<b>TIMEFRAME</b>
Rehabilitate any disturbed areas as soon as possible once construction is completed in an area.	Contractor	Construction
Control stormwater and runoff water. Contaminated runoff from the construction site(s) should be prevented from entering the rivers/streams.	Contractor	Construction
For any new construction where direct impacts on drainage lines are unavoidable cross watercourses perpendicularly to minimise disturbance footprints.	Contractor	Construction
Construction must not result in the width of the watercourse being narrowed.	Contractor	Construction
Utilise erosion control measures on access roads and drainage lines where required <u>as per the storm water management plan.</u>	Contractor	Construction
Ablution facilities at the construction sites must be located at least 50m away from drainage lines and regularly serviced	Contractor	Construction
<u>Concrete batching plants and stockpiles to be located more than 100m away from drainage lines.</u>	<u>Contractor</u>	<u>Construction</u>
<u>During construction of the surface infrastructure within the defined GN509 Zone of Regulation (but outside the watercourses), regular spraying of non-potable water or the use of chemical dust suppressants, that are approved for use near watercourses must be implemented to reduce dust and to ensure no smothering of vegetation within the watercourses occurs from excessive dust settling. It must be noted that specifics as to what type of dust suppressant (grey water vs. chemical dust suppressant) that will be utilised as part of the proposed development was not available at the time of assessment. Should this detail become available, it is recommended that the freshwater ecologist provide a statement on the suitability of the use of the proposed dust suppressant, particularly if a chemical dust suppressant is selected; •</u>	<u>Contractor</u>	<u>Construction</u>
<u>The watercourses outside the construction footprint not having authorised road crossings must be considered as no-go areas. No construction vehicles, nor construction</u>	<u>Contractor</u>	<u>Construction</u>

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
<u>personnel or vehicles may traverse through these watercourses (except on approved road crossings);</u>		
<u>Contractor laydown areas, and material storage facilities to remain outside of the defined GN509 ZoR</u>	<u>Contractor</u>	<u>Construction</u>
<u>All vehicle re-fuelling is to take place outside of the GN509 ZoR (at least 100 m from the nearest watercourse);</u>	<u>Contractor</u>	<u>Construction</u>
<u>No vegetation may be removed from the GN509 ZoR surrounding the watercourse where no infrastructure is planned, as this provides a natural buffer zone around the watercourses which disperse surface runoff into the watercourses, and thus prevents sedimentation and erosion thereof.</u>	<u>Contractor</u>	<u>Construction</u>
<u>It is imperative that all construction works be undertaken during the dry periods when there is little to no flow within the watercourses, and thus no diversion of flow would be necessary;</u>	<u>Contractor</u>	<u>Construction</u>
<u>The reaches of the watercourses where no activities are planned to occur must be considered no-go areas. These no-go areas can be marked at a maximum distance of 5 m upstream and downstream of the proposed road upgrade crossing. This 5 m buffer area would allow for construction personal, vehicles (if applicable) to enter the watercourse crossing where the road is proposed to be upgraded</u>	<u>Contractor</u>	<u>Construction</u>
<u>For trenching of the cables, the topsoil has to be stored separately and may not be contaminated. Furthermore, the soil layers should be replaced in the same order and the topsoil returned last; and</u>	<u>Contractor</u>	<u>Construction</u>
<u>The removed vegetation must be stockpiled outside of the delineated boundary of the watercourse. The footprint areas of these stockpiles should be kept to a minimum, and may not exceed a height of 2 m. Should the vegetation not be suitable for reinstatement after the construction phase or be alien/invasive vegetation species, all material must be disposed of at a registered garden refuse site and may not be burned or mulched on site</u>	<u>Contractor</u>	<u>Construction</u>
<u>The construction footprint must be limited to the 5 m construction buffer (upstream and downstream of the watercourse crossing) only. •</u>	<u>Contractor</u>	<u>Construction</u>
<u>Upgrading of the most westerly access route (bisecting the investigation are in a north to south direction) must take cognisance of the delineated extent of the Wilgebos River and a tributary of the Wilgebos River, located within close proximity to the road. Should the road be increased in width, the road must be expanded on the side opposite of the river, to ensure that the remaining</u>	<u>Contractor</u>	<u>Construction</u>

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
<u>natural buffer (where still intact) between the access road and the river remains intact;</u>		
<u>Material to be used (gravel – if applicable) as part of the upgrading of the existing roads must be stockpiled outside the delineated extent of the watercourses (preferably at least 32 m from the watercourse) to prevent sedimentation thereof and to avoid any other vegetation being impacted by the construction activities. These stockpiles may not exceed a height of 2 m if possible and should be protected from wind using tarpaulins</u>	Contractor	Construction
<p><u>The following are applicable with regards to excavation works and any concrete related activities:</u></p> <ul style="list-style-type: none"> <li>– <u>The culvert crossing must be designed to ensure that the structures are geotechnically sound and that they are hydraulically stable. The designs should follow the recommendations of the NatureStamp 2022 hydrology assessment and Stormwater Management Plan for the proposed development, to ensure a free draining landscape, and maintenance of the hydraulic functioning of the systems. In addition, the crossings must be designed such that should they be overtopped, they remain stable and do not lead to excessive downstream erosion and incision. It must be ensured that the final design accounts for appropriate wetting frequencies and patterns are maintained in the pre-development condition (with input from the freshwater ecologist, where necessary);</u></li> <li>– <u>During the excavation activities, any soil/sediment or silt removed from the watercourse may be temporarily stockpiled in the road reserve but outside the delineated extent of the watercourse. These stockpiles may not exceed 2 m in height, and their footprint should be kept to a minimum. Stockpiling of removed materials may only be temporary (may only be stockpiled during the period of construction at a particular site) and should be disposed of at a registered waste disposal facility;</u></li> <li>– <u>Excavated materials should not be contaminated, and it should be ensured that the minimum surface area is taken up. Mixture of the lower and upper layers of the excavated soil should be kept to a minimum, for later usage as backfill material or as part of rehabilitation activities;</u></li> <li>– <u>Care must be taken to ensure that no scouring or erosion occurs as a result of the proposed culvert crossing. Installation of riprap or gabion mattresses adjacent to the abutments may be required (especially within the larger, low lying watercourses such as the Wilgebos and Tankwa Rivers) and/or concrete aprons associated with any culverts;</u></li> <li>– <u>All construction material (with specific mention of prefabricated culvert structures) must be</u></li> </ul>	Contractor	Construction

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
<p><u>stockpiled in the construction camp and must only be imported to the construction site when required;</u></p> <ul style="list-style-type: none"> <li>— <u>Machinery/vehicles used to install culvert structures must be parked on the existing road surface and may not enter the watercourses; and</u></li> <li>— <u>Reno-mattresses or riprap must be installed at the outlet side of the culvert/bridge structures to ensure energy dissipation and prevent concentrated runoff into the downstream watercourse where possible and practical. The reno mattress/riprap must be installed flush with the culvert outlet.</u></li> </ul>		
<p><u>Control measures specific to concrete works:</u></p> <ul style="list-style-type: none"> <li>— <u>Fresh concrete and cement mortar should not be mixed near or in the watercourses. Mixing of cement may be done within a construction camp, however it may not be mixed on bare soil, and must be within a lined, bound or banded portable mixer. Consideration must be given to the use of ready-mix concrete;</u></li> <li>— <u>No mixed concrete shall be deposited directly onto the ground or within the watercourses. All concrete must be brought in via a cement mixing truck which must remain within the road reserve, and cement must be piped down to the proposed crossing. Any areas that require manual application of cement require that the mixed materials be placed on a batter board or other suitable platform/mixing tray until it is deposited;</u></li> <li>— <u>A washout area should be designated outside of the delineated extent of the watercourses, and wash water should be treated on-site or discharged to a suitable sanitation system;</u></li> <li>— <u>At no point may batter boards/mixing trays or cement trucks be rinsed off on site and run-off water may not be allowed into the watercourses;</u></li> <li>— <u>Cement bags (if any) must be disposed of in the demarcated hazardous waste receptacles and the used bags must be disposed of through the hazardous substance waste stream; and</u></li> <li>— <u>Spilled or excess concrete must be disposed of at a suitable landfill site. Chain of custody documentation must be provided.</u></li> </ul>	Contractor	Construction

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>— Limits impacts on water quality and water quantity within affected drainage lines</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.</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> </ul>



## 9.2.9 OBJECTIVE 9: LIMIT DISTURBANCE OF VEGETATION AND LOSS OF PROTECTED FLORA DURING CONSTRUCTION

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 (refer to alien plant management plan contained in **Appendix P** and Open Space Management Plan contained in **Appendix Q**).

<b>Project component/s</b>	All infrastructure and activities which result in vegetation loss or clearing including: <ul style="list-style-type: none"> <li>– Wind turbines</li> <li>– Access roads</li> <li>– Substations</li> <li>– <u>Collector systems</u></li> <li>– Laydown areas</li> <li>– Concrete batching plant</li> <li>– Ancillary infrastructure</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>– Loss of plant cover leading to erosion</li> <li>– Loss of faunal habitat</li> <li>– Loss of specimens of protected plants</li> </ul>
<b>Activity/risk source</b>	<ul style="list-style-type: none"> <li>– Vegetation clearing for the infrastructure establishment and temporary construction areas</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>– To reduce the footprint and impact on terrestrial environment</li> <li>– To reduce the impact on protected and sensitive plant species</li> </ul>

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
A flora and fauna search and rescue (relocation) in terms of NEM:BA Threatened or Protected Species (ToPS) and Northern Cape Nature Conservation Act (Act no. 9 of 2009) must be undertaken before commencement of vegetation clearing.	Karreebosch Wind Farm (RF) (Pty) Ltd Ecological Specialist	Preconstruction
Identify and demarcate construction areas for general construction work and restrict construction activity to these areas <u>where applicable and possible</u> .	Contractor	Construction
<u>Adhere to the no go areas for surface water features, excluding access roads where crossing of water courses has been approved by DWS</u>	<u>Contractor</u>	<u>Construction</u>
Minimise vegetation clearance as far as possible.	Contractor	Construction
Clearing of vegetation must be undertaken as the work front progresses. Mass clearing should not be permitted unless the entire cleared area is to be rehabilitated immediately.	Contractor	Construction
Destruction or translocate affected individuals of protected species must be undertaken in accordance with appropriate permit.	Contractor	Construction

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
<del>Clearing of vegetation is not allowed within 32m of any wetland, 80m of any wooded area, within 1:100 year floodlines, in conservation servitude areas or on slopes steeper than 1:3 except where approved in terms of the final layout for the facility</del>	Contractor	Construction
Ensure vehicle movement is restricted to designated roads.	Contractor	Construction
Avoid creating conditions in which alien plants may become established: » Keep disturbance of indigenous vegetation to a minimum » Rehabilitate disturbed areas as quickly as possible once construction is complete in an area » Do not import soil from areas with alien plants	Contractor	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) (refer to <b>Appendix P</b> ).	Contractor	Construction
Immediately control any alien plants that become established using registered control methods. Cleared areas that have become invaded can be sprayed with appropriate herbicides provided that these are such that break down on contact with the soil. Residual herbicides should not be used.	Contractor	Construction
<u>Revegetate disturbed areas as soon as possible after construction is completed in an area.</u>	<u>Contractor</u>	<u>Construction</u>
<u>Adhere to site rehabilitation programme (refer to <b>Appendix R</b>).</u>	<u>Contractor in consultation with Specialist</u>	<u>Duration of contract</u>

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>— Vegetation loss must be restricted to infrastructure footprint</li> <li>— Low impact on protected plant species</li> <li>— Destruction or translocate affected individuals of protected species undertaken in accordance with appropriate permit.</li> </ul>
<b>Monitoring and Reporting</b>	<ul style="list-style-type: none"> <li>— ECO to monitor construction to ensure that: <ul style="list-style-type: none"> <li>* Vegetation is cleared only within essential areas</li> <li>* Erosion risk is maintained at an acceptable level through flow regulation structures where appropriate and the maintenance of plant cover wherever possible</li> </ul> </li> <li>— Contractor's SHE Officer to document alien plant distribution and control measures applied within the site on a 3-monthly basis</li> </ul>

## 9.2.10 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</li> <li>– Access roads</li> <li>– Substations</li> <li>– <u>Collector Systems</u></li> <li>– Laydown areas</li> <li>– Concrete batching plant</li> <li>– Ancillary infrastructure</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>– Vegetation clearance and associated impacts on faunal habitats</li> <li>– Disturbance of fauna and birds</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</li> <li>– Mobile construction equipment</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>– To minimise footprints of habitat destruction</li> <li>– To minimise disturbance to resident and visitor faunal and avifaunal species</li> </ul>

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
Clearly mark areas to be cleared in order to eliminate unnecessary clearing/disturbance.	Contractor in consultation with Specialist	Pre-construction
The extent of clearing and disturbance vegetation must be kept to a minimum so that impact on fauna and their habitats is restricted.	Contractor	Site establishment & duration of contract
Minimise the destruction of riparian habitat in the valley bottoms when upgrading existing tracks to allow heavy vehicle access	Contractor	Site establishment & duration of contract
Adhere to site rehabilitation programme implemented (refer to <b>Appendix R</b> ).	Contractor in consultation with Specialist	Duration of contract
<u>Bee colonies, and any other bees colony found in future, must be regarded as No-Go Area.</u>	<u>Contractor</u>	<u>Duration of contract</u>
<u>Implement Bat Mitigation Action Plan (Marais, 2022) (Appendix F)</u>	<u>Contractor in consultation with Specialist</u>	<u>Site establishment &amp; duration of contract</u>
<u>Conduct an additional 12-months of construction monitoring for avifauna.</u>	<u>Contractor in consultation with Specialist</u>	<u>Site establishment &amp; duration of contract</u>

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>– Minimum disturbance outside of designated work areas</li> <li>– Minimised clearing of existing/natural vegetation and habitats for fauna and avifauna</li> </ul>
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	<ul style="list-style-type: none"> <li>– Limited impacts on faunal species (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 ECO throughout construction phase</li> <li>– Supervision of all clearing and earthworks</li> <li>–</li> <li>– by ECO</li> <li>– An incident reporting system must be used to record non-conformances to the EMP.</li> <li>– Public complaints register must be developed and maintained on site.</li> </ul>

### 9.2.11 OBJECTIVE 11: 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>– Wind turbines</li> <li>– Access roads</li> <li>– Substations</li> <li>– <u>Collector system</u></li> <li>– Laydown areas</li> <li>– Concrete batching plant</li> <li>– Ancillary infrastructure</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.</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</li> <li>– Minimised construction traffic, where possible</li> </ul>

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
The general appearance of construction activities, construction equipment camps and lay-down areas must be maintained and kept neat and tidy by means of the timely removal of rubble and disused construction materials.	Contractor	Construction
The turbines must be painted a pale, matt, non reflective colour (i.e. off white, as specified by CAA) before erection of the turbines.	Contractor	Erection of turbines

Limit access to the construction sites (during both construction and operational phases) along existing access roads as far as possible.	Contractor	Duration of contract
Ensure all disturbed areas are appropriately rehabilitated once construction in an area is complete.	Contractor	Duration of construction

<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>– Monitoring of vegetation clearing during the construction phase.</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 developed and maintained on site.</li> </ul>

### 9.2.12 OBJECTIVE 12: TO MINIMISE TRAFFIC RELATED IMPACTS

A large amount of traffic will be generated during the construction phase. The following activities will probably occur during the construction phase:

- Construction of the internal access roads,
- Stripping and stockpiling of topsoil,
- Excavation and construction of the foundations for the wind turbines,
- Construction of the operations building,
- Erection/Assembly and disassembly of the cranes
- Assembly of the towers, nacelles and blades,
- Trenching for cabling and
- Reinstatement of the site.

The tower foundations are large reinforced concrete footings. It is assumed that the material removed during excavation will be utilised within the site to create hardstand areas for the cranes, roads and in reinstating the site after construction. It is assumed that the concrete will be mixed on site and the raw materials will be transported to the site via the existing road network.

<b>Project component/s</b>	Traffic related impacts on existing road infrastructure and property owners situated along the routes to be travelled and those surrounding the construction site, as well as possible impact on local road users.
<b>Potential Impact</b>	Impact of abnormal sized vehicles and general heavy construction vehicles on road surfaces, and possible increased risk in accidents involving people and animals
<b>Activities/risk sources</b>	Construction vehicle movement Speeding on local roads Degradation of local road conditions
<b>Mitigation: Target/Objective</b>	Minimise the impact of the increase in abnormal and heavy vehicles on existing infrastructure, property owners, animals and road users.

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
Develop and implement a traffic management plan (Refer to <b>Appendix J</b> )	Karreebosch Wind Farm (RF) (Pty) Ltd, Contractor	Pre-construction Construction
All regulations and legislation pertaining to the use of provincial and local roads by abnormal vehicles to transport the wind turbines should be noted and adhered to.	Karreebosch Wind Farm (RF) (Pty) Ltd, Contractor and relevant government departments (national and provincial)	Pre-construction Construction
<u>Adhere to speed limits.</u>	<u>Contractor</u>	<u>Construction</u>
Strict vehicle safety standards should be implemented and monitored.	Contractor	Construction
Property owners of the surrounding farms should at all times have proper access to their properties.	Contractor	Construction
The local gravel access roads frequently used by construction vehicles should regularly be graded to limit the degradation of the road surface.	Contractor	Construction
Signage must be used for public road safety along the R354 during the transport and construction phases.	Contractor	Construction
<u>It is recommended that the site access to the facility be access controlled. It is also recommended that security staff be stationed on site at the access during construction.</u>	<u>Contractor</u>	<u>Construction</u>
<u>A minimum stacking distance of 25m is recommended between the road edge of the external road and the access control.</u>	<u>Contractor</u>	<u>Construction</u>
<u>The delivery of wind turbine components to the site can be shut and trips can be scheduled to occur outside of peak traffic periods.</u>	<u>Contractor</u>	<u>Construction</u>
<u>The use of mobile batching plants and any material sources in close proximity to the site would decrease the impact on the surrounding road network</u>	<u>Contractor</u>	<u>Construction</u>
<u>Staff and general trips can occur outside of peak traffic periods.</u>	<u>Contractor</u>	<u>Construction</u>
<u>Staff can be shuttled on scheduled busses to minimise the number of trips</u>	<u>Contractor</u>	<u>Construction</u>
<u>Dust suppression of gravel roads as required.</u>	<u>Contractor</u>	<u>Construction</u>
<u>Regular maintenance of site gravel roads by the Contractor when needed</u>	<u>Contractor</u>	<u>Construction</u>
<u>The use of mobile batch plants and quarries near the site would decrease traffic on the surrounding road network.</u>	<u>Contractor</u>	<u>Construction</u>

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>– Vehicles keeping to the speed limits.</li> <li>– Vehicles are in good working order and safety standards are implemented.</li> <li>– Local residents and road users are aware of vehicle movements and schedules.</li> <li>– Property owners have access to their properties at all times.</li> <li>– Limit traffic related accidents are experienced.</li> <li>– Local road conditions and road surfaces are up to standard.</li> <li>– Complaints of residents are not received (e.g. with regards to the speeding of heavy vehicles).</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>– Karreebosch Wind Farm (RF) (Pty) Ltd and/or appointed ECO must monitor indicators listed above to ensure that they have been implemented.</li> </ul>

### 9.2.13 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.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>– Wind turbines</li> <li>– Access roads</li> <li>– Substations</li> <li>– <u>Collector Systems</u></li> <li>– Laydown areas</li> <li>– Concrete batching plant</li> <li>– Ancillary 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</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>– Substation construction activities</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>	<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</li> <li>— To avoid environmental harm from waste disposal</li> </ul>
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<b>MITIGATION: ACTION/CONTROL</b>	<b>RESPONSIBILITY</b>	<b>TIMEFRAME</b>
The storage of flammable and combustible liquids such as oils must be in designated areas which are appropriately banded, and stored in compliance with Material Safety Data Sheets (MSDS) files.	Contractor	Duration of contract
Any spills will receive the necessary clean-up action. Bioremediation kits are to be kept on-site and used to remediate any spills that may occur. Appropriate arrangements to be made for appropriate collection and disposal of all cleaning materials, absorbents and contaminated soils (in accordance with a waste management plan).	Contractor	Duration of contract
Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals will be complied with.	Contractor	Duration of contract
Routine servicing and maintenance of vehicles is not to take place on-site (except for emergency situations or large cranes which cannot be moved off-site). If repairs of vehicles must take place on site, an appropriate drip tray must be used to contain any fuel or oils.	Contractor	Duration of contract
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations.	Contractor	Duration of contract
Waste disposal records must be available for review at any time.	Contractor	Duration of contract
Construction contractors must provide specific detailed waste management plans to deal with all waste streams.	Contractor	Duration of contract
Specific areas must be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste (wood and metal scrap) and contaminated waste. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage and vermin control.	Contractor	Duration of contract
Where possible, construction and general wastes on-site must be reused or recycled. Bins and skips must be available on-site for collection, separation and storage of waste streams (such as wood, metals, general refuse etc.).	Contractor	Duration of contract

<b>MITIGATION: ACTION/CONTROL</b>	<b>RESPONSIBILITY</b>	<b>TIMEFRAME</b>
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors and licensed waste disposal sites.	Contractor	Duration of contract
Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area.	Contractor	Duration of contract
Waste and surplus dangerous goods must be kept to a minimum and must be transported by approved waste transporters to sites designated for their disposal.	Contractor	Duration of contract
Documentation (waste manifest) must be maintained detailing the quantity, nature and fate of any hazardous waste.	Contractor	Duration of contract
An incident/complaints register must be established and maintained on-site.	Contractor	Duration of contract
Hazardous and non-hazardous waste must be separated at source. Separate waste collection bins must be provided for this purpose. These bins must be clearly marked and appropriately covered.	Contractors	Erection: during site establishment Maintenance: for duration of Contract within a particular area
All solid waste collected must be disposed of at a registered waste disposal site. A certificate of disposal must be obtained and kept on file. The disposal of waste must be in accordance with all relevant legislation. Under no circumstances may solid waste be burnt or buried on site.	Contractors	Erection: during site establishment Maintenance: for duration of Contract within a particular area
Supply waste collection bins at construction equipment and construction crew camps.	Contractors	Erection: during site establishment Maintenance: for duration of Contract within a particular area
Construction equipment must be refuelled within designated refuelling locations, or where remote refuelling is required, appropriate drip trays must be utilised.	Contractor	Duration of contract
All stored fuels to be maintained within a bund and on a sealed surface.	Contractor	Duration of contract
Fuel storage areas must be inspected regularly to ensure bund stability, integrity and function.	Contractor	Duration of contract
Construction machinery must be stored in an appropriately sealed area.	Contractor	Duration of contract
Oily water from bunds at the substation must be removed from site by licensed contractors.	Contractor	Duration of contract
Spilled cement and concrete must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site.	Contractor	Duration of contract
Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures.	Contractor	Duration of contract

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
In the event of a major spill or leak of contaminants, the relevant administering authority must be immediately notified as per the notification of emergencies/incidents. Spill kits to be kept on-site	Contractor	Duration of contract
Any contaminated/polluted soil removed from the site must be disposed of at a licensed hazardous waste disposal facility.	Contractor	Duration of contract
Upon the completion of construction, the area will be cleared of potentially polluting materials.	Contractor	Completion of construction

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>– <del>No Limit</del> chemical spills outside of designated storage areas</li> <li>– <del>No Limit</del> water or soil contamination by chemical spills</li> <li>– <del>No Limit</del> complaints received regarding waste on site or indiscriminate dumping</li> <li>– Internal site audits ensuring that waste segregation, recycling and reuse is occurring appropriately</li> <li>– Provision of all appropriate waste manifests for all waste streams</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 will 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 EMP.</li> <li>– The appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase</li> </ul>

### 9.2.14 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 EA, associated amendments, specialist walkdowns and this EMP, as well as the requirements of all relevant environmental legislation.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>— Wind turbines</li> <li>— Access roads</li> <li>— Substations</li> <li>— Collector System</li> <li>— Laydown areas</li> <li>— Concrete batching plant</li> <li>— Ancillary infrastructure</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>— Pollution/contamination of the environment</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 EMP, 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>
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 no go areas and avoid floodline and river, wetland or drainage line.	Contractor (and sub-contractor/s)	Duration of contract
Cooking must take place in a designated area. No firewood or kindling may be gathered from the site or surrounds.	Contractor (and sub-contractor/s)	Duration of contract
All litter must be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area; particular attention needs to be paid to food waste.	Contractor (and sub-contractor/s)	Duration of contract

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>— Compliance with specified conditions of Environmental Authorisation, EIA report and EMPr.</li> <li>— <del>No</del> <u>Limit</u> complaints regarding contractor behaviour or habits.</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.</li> <li>— An incident reporting system must be used to record non-conformances to the EMPr.</li> </ul>

**9.2.15 OBJECTIVE 15: TO AVOID AND OR MINIMISE THE POTENTIAL RISK OF INCREASED VELD FIRES DURING THE CONSTRUCTION PHASE.**

<b>Project component/s</b>	– Wind energy facility and associated infrastructure
<b>Potential Impact</b>	– 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.
<b>Activity/risk source</b>	– Contractors are not aware of the requirements of the EMP, leading to unnecessary impacts on the surrounding environment
<b>Mitigation: Target/Objective</b>	– To ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment

<b>MITIGATION: ACTION/CONTROL</b>	<b>RESPONSIBILITY</b>	<b>TIMEFRAME</b>
Ensure that open fires on the site for cooking or heating are not allowed except in designated areas.	Contractor	Construction
Provide adequate firefighting equipment on-site.	Contractor	Construction
Provide fire-fighting training to selected construction staff.	Contractor	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.	Contractor	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>– Firefighting 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 in the EMP.</li> </ul>

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## 9.3 DETAILING METHOD STATEMENTS

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### 9.3.1 OBJECTIVE 16: ENSURE ALL CONSTRUCTION ACTIVITIES ARE UNDERTAKEN WITH THE APPROPRIATE LEVEL OF ENVIRONMENTAL AWARENESS TO MINIMISE ENVIRONMENTAL RISK

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

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

- 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.

The Contractor may not commence the activity covered by the Method Statement until it has been approved, except in the case of emergency activities and then only with the consent of the Site Manager. Approval of the Method Statement will not absolve the Contractor from their obligations or responsibilities in terms of their contract.

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## 9.4 AWARENESS AND COMPETENCE: CONSTRUCTION PHASE OF THE RENEWABLE ENERGY FACILITY

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### 9.4.1 OBJECTIVE 17: 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

This describes the manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work; and risks that must be dealt with in order to avoid pollution or the degradation of the environment"

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

- Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment.
- Ensuring that a copy of the EMPr is readily available on-site, and that all site staff are aware of the location and have access to the document. Employees will be familiar with the requirements of the EMPr and the environmental specifications as they apply to the construction of the facility.
- Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended an Environmental Awareness Training course. The course must provide the site staff with an appreciation of the project's environmental requirements (or any environmental risk which may result from their work), and how they are to be implemented (in order to avoid pollution or the degradation of the environment).
- Basic training in the identification of archaeological sites/objects, paleontological sites, and protected flora and fauna that may be encountered on the site.
- Awareness of any other environmental matters, which are deemed necessary by the ECO.
- Ensuring that appropriate communication tools are used to outline the environmental “do’s” and “don’ts” (as per the environmental awareness training course) to employees.
- Ensuring risks are dealt with in order to avoid pollution or the degradation of the environment;
- Records must be kept of those that have completed the relevant training.
- Refresher sessions must be held to ensure the contractor’s staff are aware of their environmental obligations

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## 9.5 MONITORING PROGRAMME: CONSTRUCTION PHASE OF THE RENEWABLE ENERGY FACILITY

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### 9.5.1 OBJECTIVE 18: TO MONITOR THE PERFORMANCE OF THE CONTROL STRATEGIES EMPLOYED AGAINST ENVIRONMENTAL OBJECTIVES AND STANDARDS

An environmental monitoring programme should be developed and implemented not only to ensure conformance with the EMPr, but also to monitor any environmental issues and impacts which have not been accounted for in the EMP that are, or could result in significant environmental impacts for which corrective action is required. The period and frequency of environmental monitoring will be monthly external audits during the construction phase and annual external audits during the operation phase.

Where this is not clearly dictated, Karreebosch Wind Farm (RF) (Pty) Ltd must determine and stipulate the period and frequency of monitoring required in consultation with relevant stakeholders and authorities. The Project Manager must ensure that the monitoring is conducted and reported.

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

- Monitor and audit compliance with the prescriptive and procedural terms of the environmental specifications
- Ensure adequate and appropriate interventions to address non-compliance
- Ensure adequate and appropriate interventions to address environmental degradation
- Provide a mechanism for the lodging and resolution of public complaints
- Ensure appropriate and adequate record keeping related to environmental compliance



- Determine the effectiveness of the environmental specifications and recommend the requisite changes and updates based on audit outcomes, in order to enhance the efficacy of environmental management on site
- Aid communication and feedback to authorities and stakeholders

The Environmental Control Officer (ECO) will monitor compliance with the EMPr during construction, and will conduct monitoring activities on a regular basis. An independent ECO must be appointed, and have the appropriate experience and qualifications to undertake the necessary tasks. The ECO will report any non-compliance or where corrective action is necessary to the Site Manager, DFFE and/or any other monitoring body stipulated by the regulating authorities.

# 10 MANAGEMENT PLAN FOR WEF: REHABILITATION OF DISTURBED AREAS

## 10.1 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.

## 10.2 OBJECTIVES

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

### 10.2.1 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. Refer to revegetation and rehabilitation plan contained in **Appendix R**.

<b>Project component/s</b>	<ul style="list-style-type: none"><li>— Wind turbines</li><li>— Access roads</li><li>— Substations</li><li>— Power lines</li><li>— Laydown areas</li><li>— Concrete batching plant</li><li>— Ancillary infrastructure</li></ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"><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>	<ul style="list-style-type: none"><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</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>

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
The site rehabilitation programme should be implemented (refer to <b>Appendix R</b> ).	Contractor in consultation with Specialist	Duration of contract
All temporary facilities, equipment and waste materials must be removed from site and appropriately disposed of.	Contractor	Following execution of the works
All temporary fencing and danger tape should be removed once the construction phase has been completed.	Contractor	Following completion of construction activities in an area
Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion.	Contractor	Following completion of construction activities in an area
<del>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.</del>	<del>Contractor in consultation with rehabilitation specialist</del>	<del>Following completion of construction activities in an area</del>
<del>Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.</del>	<del>Karreebosch Wind Farm (RF) (Pty) Ltd in consultation with rehabilitation specialist</del>	<del>Post-rehabilitation</del>
<u>On-going alien plant monitoring and removal should be undertaken as per the alien invasive management plan (<b>Appendix P</b>).</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd in consultation with rehabilitation specialist</u>	<u>Post-rehabilitation</u>

<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 40% plant cover achieved on rehabilitated sites over a period of 2 to 5 years.</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 <u>or as needed</u>.</li> <li>— An incident reporting system must be used to record non-conformances to the EMPr.</li> </ul>

# 11 MANAGEMENT PROGRAMME FOR THE WEF: OPERATION

An environmental manager should be appointed during operation whose duty it will be to minimise impacts on surrounding sensitive habitats, including wetlands. In addition, it is important to monitor the incidence of bird collisions with the wind turbines, as well as bat fatalities. Should any significant impacts of the facility on priority bird or bat populations be detected by the monitoring programmes, mitigation could be required to be investigated for those selected problem turbines.

## 11.1 OVERALL GOAL FOR OPERATION

**Overall Goal for Operation:** To ensure that the operation of the wind energy facility does not have unforeseen impacts on the environment and to ensure that all impacts are monitored and the necessary corrective action taken in all cases. In order to address this goal, it is necessary to operate the wind energy facility in a way that ensures that operation activities are properly managed in respect of environmental aspects and impacts and enables the wind energy facility operation activities to be undertaken without significant disruption to other land uses in the area, in particular with regard to noise impacts, farming practices, traffic and road use, and effects on local residents as well as minimising impacts on birds and other fauna using the site.

## 11.2 OBJECTIVES

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

### 11.2.1 OBJECTIVE 1: SECURING THE SITE

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

<b>Project component/s</b>	<ul style="list-style-type: none"><li>— Wind turbines</li><li>— Access roads</li><li>— Substations</li><li>— Power lines</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</li><li>— To protect members of the public/landowners/residents</li></ul>

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
Where necessary to control access, fence and secure access to the site and entrances to the site.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation
Post information boards about public safety hazards and emergency contact information.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation

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

### 11.2.2 OBJECTIVE 2: LIMIT THE ECOLOGICAL FOOTPRINT OF THE FACILITY

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.</li> <li>— Areas disturbed during the construction phase and subsequently rehabilitated at its completion.</li> </ul>
<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>	<ul style="list-style-type: none"> <li>— Movement of employee vehicles within and around site.</li> </ul>
<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>

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
Vehicle movements must be restricted to designated roadways.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
Existing roads must be maintained to ensure limited erosion and impact on areas adjacent to roadways.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation
<del>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</del>	<del>Karreebosch Wind Farm (RF) (Pty) Ltd / Specialist</del>	<del>Operation</del>
An on-going alien plant monitoring and eradication programme must be implemented, where necessary.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation
Annual site inspection for erosion or water flow regulation problems – with follow up remedial action where problems are identified	Karreebosch Wind Farm (RF) (Pty) Ltd /Specialist	Annual monitoring until successful re-establishment of vegetation in an area
<u>No indiscriminate movement of construction equipment through the watercourses may be permitted during standard operational activities or maintenance activities. Use must be made of the existing and authorised watercourse crossings only;</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation</u>
<u>Unnecessary disturbances surrounding the perimeter of the surface infrastructure must be avoided</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation</u>
<u>Vehicles used in the development site must be regularly washed (on a non-permeable surface or off-site) to avoid the dispersal of seeds on any alien or invasive species into the watercourses</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation</u>
<u>Ensure that routine inspections and monitoring of any instream infrastructure are undertaken to monitor any build-up of debris that will impact on structure integrity or lead to erosion and sedimentation. Furthermore, monitoring to determine the establishment of indigenous vegetation and the presence of any alien or invasive plant species;</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation</u>
<u>Should erosion be noted at the base of the powerline support structures, the construction camp or surrounding the crane pads that may potentially impact on a watercourse in the surrounding area, the area must be rehabilitated by infilling the erosion gully and revegetation thereof with suitable indigenous vegetation;</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation</u>
<u>The surface infrastructure areas must be inspected to ensure that no concentrated runoff from these areas form erosion gullies leading to erosion and sedimentation of receiving watercourses. Should these impacts be noted, these gullies/preferential flow paths must be infilled with in situ material and appropriately stabilised and/or revegetated; and</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation</u>
<u>Monitoring for the establishment for alien and invasive vegetation species must be undertaken, specifically at the road crossings and surface infrastructures. Should alien and invasive plant species be identified, they must be removed and disposed of as per an alien and invasive</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation</u>

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
<u>species control plan and the area must be revegetated with suitable indigenous vegetation.</u>		
<u>Hot spots for the build-up of debris and excess sediment must be identified and when necessary, debris/excess sediment must be removed by hand to prevent future flooding and potential damage to infrastructure.</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation</u>
<u>Routine maintenance of the roads must be undertaken to ensure that no concentration of flow and subsequent erosion occurs due to the road crossings/instream infrastructure. Such maintenance activities must specifically be undertaken after high rainfall events</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation</u>
<u>Stormwater runoff from the road crossings should be monitored (by the Operation and Maintenance (O&amp;M) Manager), to ensure it does not result in erosion of the watercourses. Stormwater should be allowed to diffusely spread across the landscape, by ensuring adequate surface roughness in the watercourse (through vegetation and rocky areas):</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation</u>
<u>Maintenance vehicles must make use of dedicated access roads and no indiscriminate movement in the watercourses may be permitted:</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation</u>
<u>During periodic maintenance activities of the roads, monitoring for erosion should be undertaken</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation</u>
<u>Should erosion be observed, caused by the road crossings/instream infrastructure, the area must be rehabilitated by infilling the erosion gully and revegetation thereof with suitable indigenous vegetation. Use can also be made of rocks collected from the surrounding area to infill any area prone to erosion, as a natural dispersal mechanism</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation</u>

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>— No further disturbance to vegetation or terrestrial faunal habitats</li> <li>— No erosion problems within the facility <del>or along the power line route</del></li> <li>— Low abundance of alien plants within affected areas</li> <li>— Maintenance of a ground cover of perennial grasses and forbs <u>where necessary</u> that resist erosion</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.</li> <li>— Regular inspections to monitor plant regrowth/performance of rehabilitation efforts and weed infestation compared to natural/undisturbed areas</li> <li>— Annual monitoring and documentation of alien species presence and clearing actions</li> <li>— Annual monitoring and documentation of erosion problems and mitigation actions taken with photographs</li> </ul>



### 11.2.3 OBJECTIVE 3: PROTECTION OF AVIFAUNA, PRIORITY BIRD SPECIES AND BAT SPECIES

During operation of the facility, the threat of collision of birds and bats with the turbine blades is a concerning issue. However, the real extent of this threat is not currently well understood within the South African context due to the limited numbers of wind turbines in South Africa with which bird and bat interactions have been monitored. Lighting of turbines and other infrastructure has the potential to attract birds, thereby increasing the risk of collisions with turbines. Bird and bat monitoring is to be undertaken during the operation of the facility in order to monitor impacts on the facility on these communities and make recommendations for any additional measures which may be required to be implemented to minimise this impact.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>– Wind energy facility (turbines)</li> <li>– Substations</li> <li><del>– Power lines</del></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>– Disturbance to or loss of bats as a result of collision with turbines and/or barotrauma</li> <li><del>– Electrocutation and collision with the power line</del></li> </ul>
<b>Activity/risk source</b>	<ul style="list-style-type: none"> <li>– Spinning turbine blades</li> <li>– Substation</li> <li>– <u>Power lines</u></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</li> <li>– Minimise impacts associated with the substation</li> </ul>

#### MITIGATION: ACTION/CONTROL

#### RESPONSIBILITY

#### TIMEFRAME

A site monitoring programme must be implemented for surveying bird and bat movements in relation to the wind energy facility and fully documenting all collision and electrocution casualties with the turbines (refer to <b>Appendix S</b> ).	Karreebosch Wind Farm (RF) (Pty) Ltd / environmental manager	Operation
Periodically collate and analyse post-construction monitoring data for bird and bat monitoring and recommend additional mitigation measures for implementation as required.	Advising scientist/biologist	Every <del>3 months</del> of monitoring <u>period</u> .
<u>A 3.0-km buffer is installed around VE nest #1 based on existing Verreux's Eagle guidelines (Ralston Paton 2017) – all six turbines are thus removed from within this buffer</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd / environmental manager</u>	<u>Operation</u>
<u>All turbines within the 5.2km Verreux's Eagle precautionary buffer are erected with one blade painted with "signal red" paint in two broad stripes to increase blade visibility. This recommendation is subject to CAA approval of blades painting and colouring and the selected turbine</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd / environmental manager</u>	<u>Operation</u>

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
supplier accepting the warranties of blades being painted. This must include the two turbines (T5 and T22) that lie within the 3.7 km buffer that will be recommended in the update Verreux's Eagle guidelines (Ralston Paton and Murgatroyd in press).		
Should one or more threatened species fatalities still occur per year (post-construction), BBU suggests an adaptive response in the form of a third tier of automated shut-down on demand (e.g., DT-bird or BioSeco) technology to reduce the risk to avifauna.	Karreebosch Wind Farm (RF) (Pty) Ltd / environmental manager	Operation
A full 24-month post-construction monitoring must be undertaken and if that reveals that one or more Endangered or Vulnerable Red Data species are killed at any one turbine, then an adaptive management plan must be initiated within two months to reduce further fatalities.	Karreebosch Wind Farm (RF) (Pty) Ltd / environmental manager Advising scientist/biologist	Operation
Review bird and bat monitoring report on the full year of post construction monitoring, and integrate findings into operational EMP and broader mitigation scheme.	Advising scientist/biologist, monitoring agency	1 year post construction

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>Minimal additional disturbance to bird or bat populations on the wind energy facility site.</li> <li>Continued improvement of bird and bat protection devices, as informed by the operational monitoring.</li> <li>Regular provision of clearly worded, logical and objective information on the interface between the local avifauna and bats 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>The monitoring team to monitor turbine field for fatalities.</li> <li>Review of bird monitoring report on the full 2 years of post-construction monitoring</li> </ul>

#### 11.2.4 OBJECTIVE 4: MINIMISATION OF VISUAL IMPACT

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. The visual impact assessments concluded that, although anticipated visual impacts on nearby sensitive receptors are high, they are not considered to be fatal flaws for the proposed WEF. Potential visual impacts are largely contained within the Tankwa River sub-catchment and limited sensitive receptors or tourist routes are expected to be affected by the proposed WEF. In addition, anticipated impacts of major significance are generally limited in extent.

Alternative colour schemes (i.e. painting the turbines sky blue, grey or darker shades of white) are not permissible currently by as the CAA's *Marking of Obstacles* expressly states, "Wind turbines shall be painted white to provide the maximum daytime conspicuousness". Failure to adhere to the prescribed colour specifications will result in the fitting of supplementary daytime lighting to the wind turbines, once again aggravating the visual impact. The potential for mitigation is therefore low or non-existent.

Another source of glare light, albeit not as intense as flood lighting, is the aircraft warning lights mounted on top of the hub of the wind turbines. These lights are less aggravating due to the toned-down red colour, but have the potential to be visible from a great distance. The Civil Aviation Authority (CAA) prescribes these warning lights and the potential to mitigate their visual impacts is low. Indications are that the facility may not be required to fit a light to each turbine, but rather place synchronous flashing lights on the turbines representing the outer perimeter of the facility. In this manner less warning lights can be utilised to delineate the facility as one large obstruction, thereby lessening the potential visual impact. The regulations for the CAA's *Marking of Obstacles* should be strictly adhered too, as the failure of complying with these guidelines may result in the developer being required to fit additional light fixtures at closer intervals thereby aggravating the visual impact.

The mitigation of secondary visual impacts, such as security and functional lighting, construction activities, etc. may be possible and should be implemented and maintained on an on-going basis. The operational, security and safety lighting fixtures of the proposed wind energy facility.

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

<b>MITIGATION: ACTION/CONTROL</b>	<b>RESPONSIBILITY</b>	<b>TIMEFRAME</b>
Maintain the general appearance of the facility in an aesthetically pleasing way.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation and maintenance
Undertake regular maintenance of light fixtures.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation and maintenance

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>– Appropriate visibility of infrastructure to aircraft</li> <li>– The effective containment of the light to the substation site</li> </ul>
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<b>Monitoring and Reporting</b>	<ul style="list-style-type: none"> <li>– Ensure that aviation warning lights or other measures are installed before construction is completed and are fully functional at all time, as per the condition of approval by the Civil Aviation Authority.</li> <li>– The monitoring of the condition and functioning of the light fixtures during the operational phase of the project.</li> </ul>
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### **11.2.5 OBJECTIVE 5: 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>	<ul style="list-style-type: none"> <li>– Wind energy facility</li> <li>– Substations</li> <li>– Collector System</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>– Inefficient use of resources resulting in excessive waste generation</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</li> <li>– Transformers and switchgear - substation</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</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.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation
Storage areas for hazardous substances must be appropriately sealed and banded.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation
All structures and/or components replaced during maintenance activities must be appropriately disposed of at an appropriately licensed waste disposal site or sold to a recycling merchant for recycling.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation
Care must be taken to ensure that spillage of oils and other hazardous substances are limited during maintenance. Handling of these materials should take place within an appropriately sealed and banded area. Should any accidental spillage take place, it must be cleaned up according to specified standards regarding bioremediation.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation and maintenance

MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
Waste handling, collection and disposal operations must be managed and controlled by a waste management contractor.	Karreebosch Wind Farm (RF) (Pty) Ltd / waste management contractor	Operation
Used oils and chemicals: » Where these cannot be recycled, appropriate disposal must be arranged with a licensed facility in consultation with the administering authority. » Waste must be stored and handled according to the relevant legislation and regulations.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation
General waste must be recycled where possible or disposed of at an appropriately licensed landfill.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation
Hazardous waste (including hydrocarbons) and general waste must be stored and disposed of separately.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation
No waste may be burned or buried on site.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>— Limit complaints received regarding waste on site or dumping.</li> <li>— Internal site audits identifying that waste segregation, recycling and reuse is occurring appropriately.</li> <li>— Provision of all appropriate waste manifests.</li> <li>— Limit contamination of soil or water.</li> </ul>
<b>Monitoring and Reporting</b>	<ul style="list-style-type: none"> <li>— Waste collection must be monitored 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.</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>

### 11.2.6 OBJECTIVE 6: MAXIMISE LOCAL EMPLOYMENT AND BUSINESS OPPORTUNITIES DURING OPERATION

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

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>– Wind energy facility</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.</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>– Benefit to local tourism by providing the area with a potential additional tourist attraction.</li> <li>– In the medium- to long-term employ as many locals as possible to fill the full time employment opportunities.</li> </ul>

#### MITIGATION: ACTION/CONTROL

#### RESPONSIBILITY

#### TIMEFRAME

Identify local members of the community who are suitably qualified or who have the potential to be employed full time.	Karreebosch Wind Farm (RF) (Pty) Ltd	Prior to commencement of operation
Develop training and skills transfer programme for local personnel.	Karreebosch Wind Farm (RF) (Pty) Ltd	Prior to commencement of operation

<b>Performance Indicator</b>	Public exposure to the project. Meeting with Local Municipality and local tourism organisations during the construction phase.
<b>Monitoring and Reporting</b>	Indicators listed above must be met for the operational phase.

### 11.2.7 OBJECTIVE 7: IMPLEMENT 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>	<ul style="list-style-type: none"> <li>– Operation and maintenance of the wind energy facility and associated infrastructure.</li> </ul>
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<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 firefighting equipment on site. Apply for membership to local Fire Protection Association, should there be one in existence.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation
Provide fire-fighting training to selected operation and maintenance staff.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation
Ensure that appropriate communication channels are established to be implemented in the event of a fire.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation
Fire breaks should be established where and when required. Cognisance must be taken of the relevant legislation when planning and burning firebreaks (in terms of timing, etc.). Access roads may also act as fire breaks.	Karreebosch Wind Farm (RF) (Pty) Ltd and landowners	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.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation
Contact details of emergency services should be prominently displayed on site.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation

<b>Performance Indicator</b>	— Firefighting equipment and training provided before the construction phase commences. — Appropriate fire breaks in place.
<b>Monitoring and Reporting</b>	— Karreebosch Wind Farm (RF) (Pty) Ltd must monitor indicators listed above to ensure that they have been met.



## **11.2.8 OBJECTIVE 8: 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 additional 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.</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.</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.</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>— Communication with landowner and local farming bodies regarding operational activities.</li> <li>— Mitigation of intrusion impacts on property owners.</li> <li>— Mitigation of impact on farming activities.</li> </ul>

### **MITIGATION: ACTION/CONTROL**

### **RESPONSIBILITY**

### **TIMEFRAME**

<b>MITIGATION: ACTION/CONTROL</b>	<b>RESPONSIBILITY</b>	<b>TIMEFRAME</b>
Effective management of the facility to avoid any environmental pollution focusing on water, waste and sanitation infrastructure and services.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation
Vehicle movement to and from the site should be minimised as far as possible.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation
Local roads should be maintained to keep the road surface up to a reasonable standard.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation
Limit the development of new access roads on site.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation
Ensure on-going communication with the landowners of the site in order to ensure minimal impact on farming activities	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation

<u>Impact rating for Wind Turbines at 111.0dB(A): Conduct Noise Monitoring at NSA 27 if complaints arise. Ensure all wind turbines are placed at least 500m from the nearest Noise Sensitive Area.</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation</u>
<u>Impact rating for Wind Turbines at 113.0dB(A): Conduct Noise Monitoring at NSA 27 during the operational phase. Ensure all wind turbines are placed at least 500m from the nearest Noise Sensitive Area</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation</u>

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>— Limit environmental pollution occurs (i.e. waste, water and sanitation).</li> <li>— Limit intrusion on private properties and on the activities undertaken on the surrounding properties.</li> <li>— Continuation of farming activities on site.</li> </ul>
<b>Monitoring and reporting</b>	<ul style="list-style-type: none"> <li>— Karreebosch Wind Farm (RF) (Pty) Ltd should be able to demonstrate that facility is well managed without environmental pollution and that the above requirements have been met.</li> </ul>

# 12 MANAGEMENT PLAN FOR WEF: DECOMMISSIONING

The turbine infrastructure which will be utilised for the proposed Wind Energy Facility is expected to have a lifespan of 25 to 30 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 legislation applicable at that time, which may require this section of the EMP to be revisited and amended.

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## 12.1 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.

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## 12.2 DISASSEMBLE AND REMOVE EXISTING COMPONENTS

The wind (turbine and tower sections) of the proposed facility will be disassembled if applicable 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.

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## 12.3 REHABILITATION OF THE SITE

In order to minimise the extent of rehabilitation activities required during the decommissioning phase, Karreebosch Wind Farm (RF) (Pty) Ltd must ensure that constant effort is applied to rehabilitation activities throughout the construction, operation and maintenance phases of the project.

In decommissioning the facility, Karreebosch Wind Farm (RF) (Pty) Ltd 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 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/hr or as determined by the Site Manager) 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 10) is also relevant to the decommissioning of sections of the proposed distribution line and must be adhered to.

# 13 REVISION OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

The EMPr is a dynamic document, which must be updated to include any additional specifications as and when required. In addition, the EMPr should be updated throughout the life of the facility in order to ensure that appropriate measure are included for the minimisation of impacts on the environment.

Any amendments must be approved by the Competent Authority (i.e. DFFE) prior to implementation, unless these are required to address an emergency situation.

Any future amendments must be undertaken in compliance with Conditions 20 – 24 of the EA.

# APPENDIX

**A**

EAP CV



# APPENDIX

# B

MAPS





# APPENDIX

C

AGRICULTURAL REPORT



# APPENDIX

**D**

ECOLOGICAL WALKDOWN  
REPORT



# APPENDIX

## **E** AVIFAUNA WALKDOWN REPORT



# APPENDIX

**F**

BAT WALKDOWN REPORT

# APPENDIX

**G**

SURFACE WATER  
WALKDOWN REPORT

# APPENDIX

**H**

NOISE REPORT

# APPENDIX



VISUAL REPORT





# APPENDIX

**J**

TRAFFIC REPORT AND TRAFFIC  
MANAGEMENT PLAN

# APPENDIX

**K**

HERITAGE WALKDOWN  
REPORT

# APPENDIX

## **L** SOCIAL REPORT



# APPENDIX

**M**

GEOTECHNICAL REPORT



# APPENDIX

**N**

PLANT SEARCH AND  
RESCUE PLAN AND PLANT  
PROTECTION PLAN

## PLANT SEARCH AND RESCUE PLAN AND PLANT PROTECTION PLAN

The purpose of the plant rescue plan is to implement avoidance and mitigation measures to reduce the impact of the development of the Karreebosch Wind Farm on listed and protected plant species and their habitats. Where conflicting or outdated recommendations are proposed within this plan, the latest ecological specialist recommendations as per Trusted Partners 2022 should take preference.

### 1. Background & Identification of Species of Conservation Concern

The ToPS (Threatened and Protected Species) regulations provide for the regulation of activities which may directly or indirectly impact threatened and protected species. Such species are identified under NEMBA as well as by the National Red Data List of Plants. At a provincial level, the Western Cape Nature Conservation Laws Amendment Act (2000), also provides lists of species which are protected within the province. Species listed under the National Red Data List of Plants as well as those protected under the provincial legislation must be specified on permit applications required for site clearing.

According to the SIBIS database nearly 1000 indigenous species are known from the quarter degree squares 3220 CD and DC. This is an exceptionally high number of species given the relative aridity of the area. This includes 26 threatened species and an additional 44 species of lower conservation concern. The quarter degree squares admittedly cover a larger area than the study area and includes a variety of habitats, some of which are not found in the study area. This serves to illustrate the high species richness of the area and high potential impact of the development on plant species of conservation concern. Species listed as Threatened (CR, EN and VU) are regulated under the Biodiversity Act (Act No. 10 of 2004), by the Threatened and Protected Species Regulations (ToPS) promulgated under the Act. Any activities which have a direct or indirect impact on ToPS-listed species require a ToPS permit.

Species of conservation concern that were observed at the site include *Brunsvigia josephinae* (VU), *Duvalia parviflora* (VU), *Romulea hallii* (VU), *Adromischus mammillaris* (EN), *Pelargonium torulosum* (Rare), *Eriosephalus grandiflorus* (Rare) and *Drimia altissima* (Declining). Of significance, is that *Drimia uranthera* (VU) was also observed at the site. This species has not been recorded from the area before, being known from the Little Karoo near Ladismith. This species is relatively obscure, but was relatively common on clay soils in the lowlands of the site, and is not likely to be significantly affected by the development given its habitat largely outside of the development footprint.

Species which can be confirmed present within the development footprint include *Romulea hallii*, which occurs along the eastern ridges, *Eriosephalus grandiflorus* which is fairly common in areas of well weathered shale gravel along the ridges in the east and the west, and *Pelargonium torulosum* which occurs among rocks, usually on rocky outcrops along the ridges. Significant populations of these species occur within the area affected by the development and preconstruction checks and walk-through during the flower season with additional mitigation and avoidance measures would be a critical measure to ensure a reduced impact on these species.

Apart from the species listed above by the South African Red Data list of Plants a number of genera are listed in their entirety as protected by the Western Cape Nature Conservation Laws Amendment Act of 2000. Of particular relevance to the current site, are the species within the following families and genera: Amaryllidaceae, Asclepiadaceae, Iridaceae, Aloe except *Aloe ferox*, Haworthia, Lachenalia, Mesembryanthemaceae, Orchidaceae, Anacampseros, Rutaceae and Diascia. Although the affected species within these families and genera may not be rare, they are protected under the provincial legislation and will need to be specified on any clearing permit applications for the site.

### 2. Mitigation and Avoidance Options

Ideally, the development should strive to avoid impact to listed plant species through micro-siting of the roads and turbines. This can be informed by the specialist ecological walk through survey which is recommended to take place prior to the commencement of construction. Due to various other constraints, avoidance may not always be possible and some impact on listed plant species may be inevitable. Where listed plant species fall within the development footprint and avoidance is not possible, then it may be possible to translocate the affected individuals outside of the development

footprint. However, not all species are suitable for translocation as only certain types of plants are able to survive the disturbance. Suitable candidates for translocation include most geophytes and succulents. Although there are exceptions, the majority of woody species do not survive translocation well. An appropriate permit must be obtained from the relevant conservation authorities prior to undertaking any search and rescue operations, or prior to destruction of protected plant species.

### **3. Rescue and Protection Plan**

#### **Pre-construction**

Before construction commences at the site, the following actions should be taken:

- » Walk-through of the final development footprint by a suitably qualified botanist/ecologist to locate and identify all listed and protected species which fall within the development footprint. This would need to happen during the peak flowering season at the site which depending on rainfall is likely to be during September.
- » Compilation of a walk-through report which identifies areas where minor deviations to roads and other infrastructure can be made to avoid sensitive areas and important populations of listed species. As well as contains a full list of localities where listed species occur within the development footprint and the number of affected individuals in each instance; and
- » Search and rescue operation of all listed species within the development footprint that cannot be avoided. Where appropriate, affected individuals should be translocated to a similar habitat outside of the development footprint and marked for monitoring purposes.
- » Pre-construction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness as to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas etc.
- » Relocated individuals should be marked and monitored for at least a year after transplanting to establish the success rate of the relocation exercise.

#### **Construction**

- » The ECO is to 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 and any listed species present which are able to survive translocation should be translocated to a safe site;
- » Any listed species observed within the development footprint that were missed during the preconstruction plant sweeps should be translocated to a safe site under the supervision of the ECO;
- » Many listed species are also sought after for traditional medicine or by collectors and so the ECO should ensure that all staff attend environmental induction training in which the legal and conservation aspects of harvesting plants from the wild are discussed; and
- » The ECO should monitor construction activities in sensitive habitats such as near rivers and wetlands carefully to ensure that impacts to these areas are minimized.
- » ECO to provide supervision and oversight of vegetation clearing activities and other activities which may cause damage to the environment, especially at the initiation of the project, when the majority of vegetation clearing is taking place.
- » Ensure that lay down areas, construction camps and other temporary use areas are located in areas of low sensitivity and are properly fenced or demarcated as appropriate,

#### **Operation**

- » Access to the site should be strictly controlled and all personnel entering or leaving the site should be required to sign and out with the security officers; and
- » The collecting of plants or their parts should be strictly forbidden and signs stating so should be placed at the entrance gates to the site.
- » No plants may be translocated or otherwise uprooted or disturbed for rehabilitation or other purpose without a valid permit.



# APPENDIX

O

GRIEVANCE MECHANISM  
FOR PUBLIC COMPLAINTS AND  
ISSUES

## **GRIEVANCE MECHANISM / PROCESS**

The IFC (International Finance Corporation) Performance Standards require that any project that is likely to generate adverse environmental and social impacts on Affected Communities, have in place a project level grievance mechanism. Such a mechanism should be made readily accessible to the Affected Communities and allow for the receiving, addressing, recording and documenting of complaints and communications from external stakeholders. Grievance mechanisms are an important part of IFC's approach for the requirements related to community engagement by clients under the Policy and Performance Standards on Social and Environmental Sustainability.

Local people need a trusted way to voice and resolve concerns linked to a development project, and companies need an effective way to address community concerns. A locally based grievance resolution mechanism provides a promising avenue by offering a reliable structure and set of approaches where local people and the company can find effective solutions together. The aim of the grievance mechanism is to ensure that grievances / 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.

A grievance mechanism provides a way to reduce risk for projects, offers communities an effective avenue for expressing concerns and achieving remedies and promotes a mutually constructive relationship.

It should be noted that the grievance mechanism does not replace the right of an individual, community, group or organization to take legal action should they so wish. However, the aim should be to address grievances in a manner that does not require a potentially costly and time consuming legal process.

### **Proposed generic grievance process**

- Local landowners, communities and authorities will be informed in writing by the proponent (the renewable energy company) of the grievance mechanism and the process by which grievances can be brought to the attention of the proponent.
- A company representative will be appointed as the contact person for grievances to be addressed to. The name and contact details of the contact person will 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 will be registered with the contact person who, within 5 working days of receipt of the grievance, will contact the Complainant to discuss the grievance and agree on suitable date and venue for a meeting. Unless otherwise agreed, the meeting will be held within 2 weeks of receipt of the grievance.
- The contact person will 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.
- Prior to the meeting being held the contact person will contact the Complainant to discuss and agree on 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 will be chaired by the company representative appointed to address grievances. The proponent will provide a person to take minutes of and record the meeting/s. The costs associated with hiring venues will be covered by the proponent. The proponent will also cover travel costs incurred by the Complainant, specifically in the case of local, resource poor communities.
- Draft copies of the minutes will 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 will 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 will 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 the dispute being declared. The Complainant, in

consultation with the proponent, will identify the preferred mediator and agree on a date for the next meeting. The cost of the mediator will be borne by the proponent. The proponent will 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 will 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 will 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 addressing the grievance.
- The draft report will 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. As indicated above, 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

**P**

ALIEN INVASIVE MANAGEMENT  
PLAN

# **ALIEN INVASIVE PLANT MANAGEMENT PLAN**

## **1. Overall Objective**

Manage alien and invasive plant species during the construction and operation of the Karreebosch Wind Energy Facility, through the implementation of an alien invasive species management and control programme. Where conflicting or outdated recommendations are proposed within this plan, the latest ecological specialist recommendations as per Trusted Partners 2022 should take preference.

## **2. Problem Outline**

Alien plants replace indigenous vegetation leading to severe loss of biodiversity and change in landscape function. Potential consequences include loss of biodiversity, loss of grazing resources, increased fire risk, increased erosion, loss of wetland function, impacts on drainage lines, increased water use etc.

In addition, the Conservation of Agricultural Resources Act (Act 43 of 1983), as amended in 2001, requires that land users clear Declared Weeds from their properties and prevent the spread of Declared Invader Plants on their properties.

## **3. Current Status of Alien Plants at the Site**

The higher-lying parts of the site are currently in good condition with regards to the presence of alien species and very few alien species were observed in these areas. This can be ascribed to the low levels of disturbance in these areas. The disturbance associated with the construction of the facility will however encourage the invasion of alien species into these previously near-pristine areas. 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. The lowlands of the site on the other hand have been more heavily impacted by intensive agriculture and human activity and a variety of alien species were observed present within these areas. Species observed include:

- » *Bromus spp.*
- » *Salsola kali*
- » *Malva parviflora*
- » *Prosopis glandulosa*

- » *Atriplex inflata*

Although the presence of these species within the lowlands is 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.

#### **4. Vulnerable Habitats**

The susceptibility of the site to alien invasion is not homogenous and specific environments and habitats can be singled out as being more vulnerable to invasion. This includes:

- » Riparian areas and wetlands
- » Disturbed areas which receive runoff
- » Construction camps experiencing prolonged use
- » Lay down areas experiencing prolonged use

These areas are likely to require specific attention and repeated alien clearing may be required to keep these areas clear of invasives.

#### **5. Specific Management Objectives:**

- » Although the wind energy facility includes a number of different landowners, the alien plant management plan should be inclusive and cover all the properties involved.
- » Ensure alien plants do not become dominant in parts or the whole landscape.
- » Initiate and implement a monitoring and eradication program for alien and invasive species.
- » Regular monitoring for alien plants at the site should occur and could be conducted simultaneously with erosion monitoring.
- » Control alien and invasive species dispersal & encroachment. When alien plants are detected, these should be controlled and cleared using the recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur.
- » Clearing methods should themselves aim to keep disturbance to a minimum.
- » No planting or importing any alien species to the site for landscaping, rehabilitation or any other purpose.
- » Promote the planting of indigenous species.



## 6. General Clearing & 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. Alien problems at the site should be identified during preconstruction surveys of the development footprint. This may occur simultaneously to other required searches and surveys. The clearing plan should then form part of the preconstruction reporting requirements for the site.
- » The plan should include a map showing the alien density & indicating dominant alien species in each area.
- » The lighter infested areas should be cleared first (with young/ immature, less dense trees) to prevent the build-up of seed banks.. In the case of alien species confined to rivers, it is ideal to start in the headwaters and then move downstream, thereby removing the source of re-infestation.
- » Dense mature stands ideally should be left for last, as they probably won't increase in density or pose a greater threat than they are at the moment.
- » Collective management and planning with neighbours may be required as seeds of aliens are easily dispersed across boundaries by wind or water courses.
- » All clearing actions should be monitored and documented to keep track of which areas are due for follow-up clearing.
- » Clearing methods should themselves aim to keep disturbance to a minimum.
- » Alien vegetation and other removed vegetation must be disposed of at an appropriately licenced facility.
- » The affected municipalities should be consulted for available options to deal with green waste

## 7. Clearing Methods

- » Different species require different clearing methods such as manual, chemical or biological methods or a combination of both.
- » 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 DWA Working for Water Website

## 8. Identification of Alien Species

The National Environmental Biodiversity Management Act lists all declared weeds and invader plants. Alien plants are divided into 3 categories based on their risk as an invader.

- » Category 1 - These plants must be removed and controlled by all land users. They may no longer be planted or propagated and all trade in these species is prohibited.
- » Category 2 - These plants pose a threat to the environment but nevertheless have commercial value. These species are only allowed to occur in demarcated areas and a

landuser must obtain a water use licence as these plants consume large quantities of water.

- » Category 3 – These plants have the potential of becoming invasive but are considered to have ornamental value. Existing plants do not have to be removed but no new plantings may occur and the plants may not be sold.

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.*

## **9. Use of Herbicides for Alien 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 resprout. Where herbicides are to be used, the impact of the operation on the natural environment should be minimised by observing the following:

- » The use of herbicides should be restricted for the control of alien species that cannot easily be controlled manually and should be applied according to the relevant instructions and by appropriately trained personnel.
- » 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 in 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 guidelines should be followed: *Working for Water: Policy on the Use of Herbicides for the Control of Alien Vegetation.*

# APPENDIX

Q

OPEN SPACE MANAGEMENT  
PLAN



## **OPEN SPACE MANAGEMENT PLAN**

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

**R**

REVEGETATION AND  
REHABILITATION PLAN



## **REVEGETATION AND REHABILITATION PLAN**

### **1. PURPOSE**

The purpose of the Karreebosch wind facility revegetation and rehabilitation plan is to ensure that areas cleared or impacted during construction activities of the proposed Karreebosch Wind Farm are rehabilitated with a plant cover that reduces the risk of erosion from these areas as well as restores some ecosystem function. Where conflicting or outdated recommendations are proposed within this plan, the latest ecological specialist recommendations as per Trusted Partners 2022 should take preference.

The purpose of the rehabilitation at the site can be summarized as follows:

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

It is also important to recognise that the rehabilitation plan and the erosion control plan should function hand in hand as the two factors are inextricably linked.

### **2. ECOSYSTEM CONTEXT**

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, the site is within an extensive natural ecosystem of high biodiversity value and the use of any 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 active rehabilitation outside of the wet season may lead to very poor results on account of dry conditions and low rainfall which is likely to characterize the dry season.

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

The construction activities required for the development will result in a lot of 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 large parts of the site are devoid of topsoil, the lower-lying areas contain significant topsoil that should be saved wherever possible. The topsoil should be 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 are killed;
- » 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.
- » Construction of gabions and other stabilization features on steep slopes to prevent erosion should occur.



## **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, where possible, 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, where possible, 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;
- » 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 where possible. 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 if feasible or livestock restricted if agreed to by the landowner/s;
- » 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 6 months during the first year and once thereafter during the next year.
- » Re-vegetated areas showing inadequate surface coverage should be prepared and re-vegetated.
- » Where transplants have been used, the survival rate of the different species used should be monitored every 6 months during the first year and once thereafter during the next year. The results should be used to inform the choice of species for transplant and other factors which may influence survival.

## **7. RIDGELINE SENSITIVITY**

The priority high elevation sections of the ridges have been identified in the Ecological Assessment report. Three different ridge sections have been identified as potential priority areas but it is the larger central ridge that is considered the most important. The extent of the demarcated area on the central ridge is approximately 3000 ha and the protection of this area from grazing would significantly improve the quality of the remaining habitat and is deemed to be the most suitable mitigation measure to address the likely impacts of the development on the ridgeline habitats.

As this requires the co-operation of the landowners, it may not be possible to secure the entire area and a minimum of 2000 ha is identified as a minimum area required to counter or 'offset' the impact of the development. As these areas are currently within much larger paddocks, it may be necessary to fence some of these areas off in order to retain the use of the lower lying areas for livestock grazing. As it would not be possible to fence off the areas as demarcated, the actual area set aside would need to be larger than required as it would include areas outside of the demarcated area.

The rationale for setting these areas aside from grazing is that the ridgelines are currently grazed by livestock and this has a visible impact on the vegetation condition of these areas and also introduces alien species in sheep wool and dung. Setting these areas aside from grazing would release the vegetation from grazing pressure and improve the quality of the habitat for fauna as well as grazing sensitive plant species. Although grazing is an important disturbance that serves to maintain the diversity of plant communities, there are more than enough indigenous grazing animals in these areas to perform this function and the overall impact of livestock is negative.

~~With the implementation of the above grazing protection mitigation area, the impacts on listed flora and the cumulative impact on the ridgeline habitat would be reduced to an acceptable level. The implementation of such an area should be included as part of the required mitigation measures to be implemented by the wind farm development as there do not appear to be any other viable mitigation mechanisms available.~~

# APPENDIX

## **S** BIOLOGICAL MONITORING PLAN

## BIOLOGICAL MONITORING

The most recent monitoring recommendations made by the relevant specialists during the 2022 Part 2 EA Amendment, final layout and EMPr approval process should take preference.

Specific mention is made to the fauna and floral search & rescue plans, the bat mitigation action plan and the monitoring requirements as per the final avifaunal report (BBU, 2022).

### 1. Introduction

Specific biological monitoring requirements that are required to be undertaken through the various phases of the Karreebosch Wind Farm have been identified through specialist studies and are described in this section. The monitoring programs described below were developed by the specialists as part of the EIA specialist studies. Biological monitoring is required during the pre-construction, construction and operational phases of the project, particularly for birds and bats.

Table 1 provides a summary of what monitoring is required at the various phases of the development. KWF is responsible for ensuring that all monitoring measures described in this section are undertaken by appointing the relevant specialists where necessary. The pre-construction bird and bat monitoring for the Karreebosch wind farm has been completed and therefore no protocol is included in this section.

**Table 1:** Monitoring Requirements

	<b>Ecology</b>	<b>Bats</b>	<b>Birds</b>
Pre-construction		X	X
Construction	X		
Operational	X	X	X

### 2. Pre-construction Phase

Pre-construction monitoring is an essential requirement prior to construction in order to validate within reason that final turbine placement and arrangement, as well as mitigation and management measures as included in this EMPr, will minimize potential impacts on birds, bats and other terrestrial ecological components and also in order to gain consequential knowledge for future wind farm projects to be developed in the country. The pre-construction bird and bat monitoring for the Karreebosch wind farm has been completed and therefore no protocol is included in this section.

#### 2.1. Ecological Monitoring (excluding Bats and Birds)

##### 2.1.1. Monitoring Impacts on Rare or Endangered Plant Species

There are a number of listed plant species which may occur at the site. If required and determined by the ecologist, monitoring should occur pre-construction to identify listed species within areas that will be impacted by the development. The following recommendations are made in this regard:

- » preconstruction surveys of the turbine sites is recommended in order to avoid impacts on listed species and rare edaphic habitats and should be marked so that they can be relocated to an adjacent similar environment at the appropriate time.
- » Number and identities of all species translocated should be recorded.
- » Relocated individuals should be marked and monitored for at least a year after transplanting to establish the success rate of the relocation exercise.

## **2.2. Construction Phase**

Mammals, reptiles and amphibians are most likely to be exposed to impacts during the construction phase of the Karreebosch Wind Farm primarily through loss of habitat and impacts associated with construction vehicles and workforce. This section describes the biological monitoring measures that should be undertaken during the construction phase.

### **2.2.1. Ecological Monitoring (excluding Bats and Birds)**

In general, during the construction phase, monitoring should be used to ensure that the development takes place within the guidelines provided by this document to ensure that construction minimises or avoids impacts on adjacent natural vegetation, fauna and ecosystems.

#### **Monitoring Loss of Habitat and Habitat Fragmentation**

Habitat loss and fragmentation is primarily a concern during the construction phase since this is when the majority of disturbance will take place. Specific areas that should be monitored include:

- » Any deviations from the final construction plan, including the location, extent and nature of vegetation impact and transformation.
- » The location and extent of temporary lay-down areas, these should be included in the sweeps for alien species.
- » Any inadvertent or otherwise unintended destruction of natural vegetation and the remediation steps taken to encourage the recovery of the impacted areas.
- » Monitoring frequency would need to be high, daily or weekly during the construction phase. During the operational phase monitoring could be conducted on an ad-hoc basis coincide with maintenance activities that may impact natural vegetation, such as servicing of the turbines.

- » During the operational phase, it is recommended that a fire monitoring system is set in place to record the date, extent and source of all fires at the site. ~~Fire is a key ecological driver in fynbos vegetation and the extent to which the development impacts the fire regime at the site should be established so as to better inform long-term fire management at the site.~~

It is important to note that although Renosterveld is usually a fire-prone ecosystem, there was little evidence of regular fires at the site. Discussions with the local farmers also confirmed that although fires do occasionally occur, they are not a regular feature and are not used by farmers as a veld management tool. Within arid Renosterveld types, the significance of fire is reduced and it does not appear that fire is an important ecosystem driver at the site that may be disrupted by the development. Fire scars at the site indicated that occasional natural fires may be caused by lightning ground-strikes, but their subsequent spread appears to be limited to areas of dense vegetation on south-facing slopes or other moist environment where sufficient biomass can accumulate.

#### Monitoring Impacts on Sensitive Environments

The sensitive environments at the site require specific attention to avoid and mitigate negative impacts to these areas. Sensitive areas include rare edaphic environments as well as ridgelines, drainage lines, seeps and wetlands. These areas will be particularly vulnerable to negative impact during the construction phase when the major infrastructure associated with the development is laid down. ~~The ridges are the most important habitat at the site since the turbines will be located on the ridges and the majority of the footprint would be along the ridges. In terms of the current study, the ridges can be divided into two basic types, the two eastern ridges and the two western ridges. In general the eastern ridges can be considered more sensitive than the western ridges as the eastern ridges are wetter and contain a significantly higher abundance of species of conservation concern as well as sensitive plant communities. There are however some very high elevation sections along the most western ridge which are considered sensitive.~~

~~Three different ridge sections have been identified as potential priority areas but it is the larger central ridge that is considered the most important. The extent of the demarcated area on the central ridge is approximately 3000 ha and the protection of this area from grazing would significantly improve the quality of the remaining habitat and is deemed to be the most suitable mitigation measure to address the likely impacts of the development on the ridgeline habitats. As this requires the co-operation of the landowners, it may not be possible to secure the entire area and a minimum of 1300 ha is identified as a minimum area required to counter or 'offset' the impact of the development. As these areas are currently within much larger paddocks, it may be necessary to fence some of these areas off in order to retain the use of the lower lying areas for livestock grazing. As it would not be possible to fence off the areas as demarcated, the actual area set aside would need to be larger than required as it would include areas outside of the demarcated area.~~



~~The rationale for setting these areas aside from grazing is that the ridgelines are currently grazed by livestock and this has a visible impact on the vegetation condition of these areas and also introduces alien species in sheep wool and dung. Setting these areas aside from grazing would release the vegetation from grazing pressure and improve the quality of the habitat for fauna as well as grazing sensitive plant species. Although grazing is an important disturbance that serves to maintain the diversity of plant communities, there are more than enough indigenous grazing animals in these areas to perform this function and the overall impact of livestock is negative.~~

~~With the implementation of the above grazing protection mitigation area, the impacts on listed flora and the cumulative impact on the ridgeline habitat would be reduced to an acceptable level. The implementation of such an area should be included as part of the required mitigation measures to be implemented by the wind farm development as there do not appear to be any other viable mitigation mechanisms available.~~

During the construction phase, monitoring should largely be directed towards enforcement to ensure that these areas are not negatively impacted. As such, monitoring of these aspects should be on a continuous basis. During the operational phase there are not likely to be many activities which pose a direct risk to these areas. Specific recommendations include:

- ~~» Before roads are constructed, their proposed routes should be inspected on foot and all wetlands and riparian areas mapped and recorded on a GPS. Where planned roads traverse wetlands, these should be rerouted so as to avoid the wetlands. The services of an ecologist trained in the field may be required to accurately identify and delineate the wetlands. Layout of roads must adhere to the final approved layout which has been informed by specialist assessment and walkdowns.~~
- » Where roads traverse rivers and drainage lines, the sites should be monitored to ensure that the presence of the road is not resulting in erosion or the deposition of large amounts of silt.
- ~~» The state of potentially vulnerable wetlands near to roads should be recorded, preferably during the late wet season. A repeat photography method is suggested as a simple yet cost effective manner for monitoring wetland state. It is important to note that near and close up pictures would be required to adequately assess changes in wetland state.~~
- ~~» The implementation of a livestock grazing free area within the high ridges should be implemented to reduce the long term impact of the development in listed and protected plant species.~~
- » Ensure that lay down areas, construction camps and other temporary use areas are located in areas of low sensitivity and are properly fenced or demarcated as appropriate,

- » All vehicles to remain on demarcated roads and no driving in the veld should be allowed.
- » No-Go areas should be demarcated and labelled in areas in proximity to the development footprint, such as drainage areas or sensitive habitats.

#### Monitoring Impacts on Rare or Endangered Plant Species

There are a number of listed plant species which may occur at the site. Monitoring should occur pre-construction to identify listed species within areas that will be impacted by the development. The following recommendations are made in this regard:

- » Number and identities of all species translocated should be recorded.
- » Relocated individuals should be marked and monitored for at least a year after transplanting to establish the success rate of the relocation exercise.

#### Monitoring Direct Faunal Impacts

Particularly during the construction phase but also during the operational phase, direct faunal impacts are a concern of the development. Monitoring during the construction phase should be used to ensure that human-animal interactions are kept to a minimum and during the operational phase to assess the extent to which animal populations are vulnerable to or recover from the negative effects of the development.

- » The traffic on the access and service roads poses a significant risk to many animals, particularly during the construction phase when traffic volumes on the roads are likely to be heavy. Any fauna accidentally killed during construction or maintenance activities should be reported and a log of such mortalities maintained. Where possible the species killed should be identified and recorded as well. Monitoring should be on an ad-hoc basis, as incidents occur.
- » The activities of construction staff should be monitored to ensure that undesirable activities such as hunting, illegal collecting of plants, seeds or any other biological material does not occur, and that fires outside of the designated and demarcated areas do not occur. Any incidents or transgressions relating to these aspects should be logged, as well as the remedial steps taken to rectify the situation.
- » As part of mitigation, monitoring studies on potentially vulnerable species or groups of species such as tortoises, by students or universities could be encouraged and funded. There is a general paucity of knowledge on the ecological impacts of renewable energy facilities in South Africa and better knowledge will enable improved understanding of the nature of impacts as well as improve mitigation strategies.
- » If any parts of the facility need to be fenced off then no electrical fencing should be placed within 40cm of the ground to avoid impacts on tortoises.

- » All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition.
- » Ensure that the cabling and electrical infrastructure at the site is buried sufficiently deeply to avoid being excavated by fauna and that where such infrastructure emerges above-ground that it is sufficiently protected from gnawing animals such as porcupines and springhare, which may seek such material out.
- » Any dangerous fauna (snakes, scorpions etc) that are encountered during construction should not be handled or molested by the construction staff and the ECO or other suitably qualified persons should be contacted to remove the animals to safety.
- » Holes and trenches should not be left open for extended periods of time and should only be dug when needed for immediate construction where feasible. Trenches that may stand open for some days, should have places where the loose material has been returned to the trench to form an escape ramp present at regular intervals to allow any fauna that fall in to escape.

### **2.3. Operational Phase**

Birds and bats are likely to be impacted during the operational phase of the Karreebosch Wind Farm, primarily through collisions with the wind turbines or electrocutions with existing power lines. It is important to note that pre-construction monitoring has been completed. This section describes the monitoring measures to be undertaken during the operational phase of the Karreebosch Wind Farm. The monitoring requirements presented here may be updated and modified based on the results of post-construction monitoring and these recommendations should therefore be regarded as provisional.

#### **2.3.1. Bat Monitoring**

The degree and type of post-construction monitoring is dependent on pre-construction monitoring programme results.

Identifying spatial patterns of bat fatalities among turbines within a facility is important for developing mitigation strategies to reduce or eliminate fatalities. For example, if fatalities are concentrated at specific turbines, then turbine specific mitigation strategies, such as curtailment, removal, or relocating the turbine, may reduce bat fatalities; however, if fatalities are broadly distributed, then facility-wide mitigation strategies must be considered. ~~An outline of preliminary methodology to be employed during operation monitoring for bats has been included Appendix F of the EIA report, Savannah 2015 ).~~ The monitoring must be in line with the latest version of the **South African Good Practice Guidelines for Surveying Bats at Wind Energy Facility Developments** document.

#### **2.3.2. Bird Monitoring**

The primary aims of long term bird monitoring during the operational phase of the wind farm are similar to those of the pre-construction monitoring discussed above. In addition, monitoring during the operational phase seeks to register and as far as possible document the circumstances surrounding all avian collisions with the turbines for at least a full calendar year after the facility becomes operational.

The operational monitoring protocol outlined below was developed by an avifauna specialist (Dr. Andrew Jenkins), however, the final operational monitoring methodology for the Karreebosch Wind Farm may be further refined or replaced by the avifaunal specialist appointed to undertake the monitoring, using the latest guidelines (i.e. the South African Birds and Wind Energy Specialist Group BAWESG guidelines) and best practice.

#### Avian densities

A set of at least 10 walk-transect routes, each of at least 1000 m in length, should be established in areas representative of all the avian habitats present within a 10 km radius of the centre of the Karreebosch site. Each of these should be walked at least 6-12 months after the wind farm is commissioned. The transects should be walked after 06h00 and before 09h00, and the species, number and perpendicular distance from the transect line of all birds seen should be recorded for subsequent analysis and comparison.

In addition:

- » The cliff-lines within or close to the development area should be surveyed for cliff-nesting raptors at least every six months using documented protocols (Malan 2009).
- » Known large eagle nest sites should also be checked twice annually for signs of occupation and breeding activity.
- » All sightings of key species (e.g. Verreaux's Eagle, Namaqua Sandgrouse, Martial Eagles, Black Harriers, Jackal Buzzard, Rock Kestrel and White Necked Raven) as stated in the pre-construction bird monitoring programme report should be carefully plotted and documented.

#### Bird activity monitoring

Monitoring of bird activity in the vicinity of the Wind Farm should be done over a 2-3 day period at least once per quarter for a full calendar year starting at least six months after the Wind Farm is commissioned. Each monitoring day should involve:

- » Half-day counts of all priority species flying over or past the wind energy facility impact area; and
- » Opportunistic surveys of cranes (and bustards), raptors and any other important species seen when travelling around the Karreebosch site.

#### Passage Rates of Priority Bird Species

Counts of bird traffic over and around the operational wind farm should be conducted from suitable vantage points (and a number of these should be selected and used to provide coverage of avian flights in relation to all areas of the wind farm), and extend alternately from an hour before dawn to midday, or from midday to an hour after dusk, so that the equivalent of four full days of counts is completed each count period. This should provide an adequate (if minimal) sample of bird movements around the facility in relation to a representative cross-section of conditions and times of day, for all seasons of the year. Details regarding specific measures to be undertaken post construction are identical to those listed for monitoring of passage rates of priority bird species during the pre-construction phase .

#### Avian collisions

Collision monitoring should have two components: (i) experimental assessment of search efficiency and scavenging rates of bird carcasses on the site, and (ii) regular searches of the vicinity of the wind farm for collision casualties.

#### Assessing search efficiency and scavenging rates

The value of surveying the area for collision victims only holds if some measure of the accuracy of the survey method is developed (Morrison 2002). To do this, a sample of suitable bird carcasses (of similar size and colour to the priority species – e.g. Egyptian Goose *Alopochen aegyptiacus*, domestic waterfowl and pigeons) should be obtained and distributed randomly around the site without the knowledge of the surveyor, sometime before the site is surveyed (e.g. Shaw *et al.* 2010a & b). This process should be repeated opportunistically (as and when suitable bird carcasses become available) for the first two months of the monitoring period, with the total number of carcasses not less than 20. The proportion of the carcasses located in surveys will indicate the relative efficiency of the survey method.

Simultaneous to this process, the condition and presence of all the carcasses positioned on the site should be monitored throughout the initial two-month period, to determine the rates at which carcasses are scavenged from the area, or decay to the point that they are no longer obvious to the surveyor. This should provide an indication of scavenge rate that should inform subsequent survey work for collision victims, particularly in terms of the frequency of surveys required to maximize survey efficiency and/or the extent to which estimates of collision frequency should be adjusted to account for scavenge rate (Osborn *et al.* 2000, Morrison 2002). Scavenger numbers and activity in the area may vary seasonally so, ideally, scavenge and decomposition rates should be measured twice during the monitoring year, once in winter and once in summer.

#### Collision victim surveys

The area within a radius of at least 50 m of the outer arc of the blades of each of the turbines at the facility should be checked regularly for bird casualties (Anderson *et al.* 1999, Morrison 2002). The frequency of these surveys should be informed by assessments

of scavenge and decomposition rates conducted in the initial stages of the monitoring period (see above), but they should be done at least weekly for the first two months of the study, and surveys should commence as soon as possible after construction is completed. The area around each turbine, or a larger area encompassing the entire wind facility, should be divided into quadrants, and each should be carefully and methodically searched for any sign of a bird collision incident (carcasses, dismembered body parts, scattered feathers, injured birds). All suspected collision incidents should be comprehensively documented, detailing the precise location (a GPS reading), date and time at which the evidence was found, and the site of the find should be photographed with all the evidence *in situ*. All physical evidence should then be collected, bagged and carefully labelled, and refrigerated or frozen to await further examination. If any injured birds are recovered, each should be contained in a suitably-sized cardboard box. The local conservation authority (in this case CapeNature, failing this inform the monitoring project specialist) should be notified and requested to transport casualties to the nearest reputable veterinary clinic or wild animal/bird rehabilitation centre. In such cases, the immediate area of the recovery should be searched for evidence of impact with the turbine blades, and any such evidence should be fully documented (as above).

### **2.3.3. Ecological Monitoring (Excluding Birds and Bats)**

During the operational phase, monitoring should be focused on ensuring that there are no residual impacts such as soil erosion and alien plant invasion resulting from the construction phase, and on reducing the day to day impact of the Karreebosch Wind Farm.

Operational monitoring can be undertaken by ~~a suitably qualified ecologist or the facility environmental control officer~~ on an ad-hoc bases ~~monthly basis~~. After the first year, monitoring of rehabilitation measures could be checked twice annually for the next two years, and thereafter operational monitoring could be restricted to annual checks.

Specific aspects to be monitored during operation would include:

#### *Disturbance of sensitive habitat during maintenance:*

Habitat damage caused by movement of vehicles and equipment during turbine or infrastructure maintenance activities.

#### *Alien Plant Invasion*

The large amount of disturbance at the site is likely to render it highly vulnerable to alien plant invasion, particularly in the first few years post-construction. The roads and disturbed areas around the turbines are likely to be the major invasion foci. Monitoring for aliens should include the following:

- » In a similar manner to erosion, an alien monitoring system should be set up which allows for the occurrence, persistence and treatment of alien plants to be monitored in a manner which allows the data to be interrogated in a GIS.
- » Monitoring for alien plants could be done simultaneously with erosion monitoring and at a similar interval.
- » The system should record the species present, their location, the control measures used and their success rate.

# APPENDIX

**T**

STORMWATER MANAGEMENT  
AND EROSION MANAGEMENT  
PLAN



# APPENDIX

U

CHANCE FIND PROCEDURE

## **CULTURAL HERITAGE, STRUCTURES, ARCHAEOLOGY, PALAEOLOGY, METEORS AND PUBLIC MONUMENTS**

- The heritage resource must be avoided and all activities in the immediate vicinity temporarily ceased;
- The PM/EO and/or EO must be notified of the discovery;
- A qualified specialist must be deployed to consider the heritage resource, either via communicating with the EO/EO via telephone or email, or based on a site visit and recommend appropriate mitigation measures;
- Should the specialist conclude that the find is a heritage resource protected in terms of the NHRA, the EO/EO will notify SAHRA and/or HWC; and
- SAHRA/HWC may require that a HIA in terms of NHRA Section 38 must take place that may include rescue excavations.

If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA Archaeology, Palaeontology and Meteorites (APM) Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted as per section 35(3) of the National Heritage Resources Act (no. 25 of 1999) (NHRA). Non-compliance with section 35(3) of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule.

## **BURIAL GROUNDS AND GRAVES**

- In the event that human remains are accidentally exposed, the EO/EO must immediately be notified of the discovery in order to take the required further steps:
  - The local SAPS will be notified;
  - A suitably qualified specialist will be deployed to inspect the exposed burial and determine in consultation with the SAPS the temporal context of the remains, (i.e. authentic burial grave (informal or older than 60 years) or archaeological (older than 100 years)) and if any additional graves may exist in the vicinity;
- Should the specialist conclude that the find is a heritage resource protected in terms of the NHRA, the EO/EO will notify SAHRA and/or HWC;
- SAHRA/HWC may require that an identification of interested parties, consultation and /or grave relocation take place;
- Consultation must take place in terms of Regulations 39, 40 and 42 of NHRA; and
- Grave relocation must take place in terms of Regulation 34 of NHRA.

If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. Non-compliance with section 36(3) of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule

## APALAEONTOLOGY

<b>Province &amp; region:</b>	Western Cape (Laingsburg Local Municipality) and Northern Cape (Karoo Hoogland Local Municipality)	
<b>Responsible Heritage Resources Agency</b>	Heritage Western Cape for the Western Cape (Contact details: Heritage Western Cape. 3 <sup>rd</sup> Floor Protea Assurance Building, 142 Longmarket Street, Green Market Square, Cape Town 8000. Private Bag X9067, Cape Town 8001. Tel: 021 483 5959 Email: ceoheritage@westerncape.gov.za) SAHRA for the Northern Cape (Contact details: South African Heritage Resources Agency. 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel : 021 462 4502).	
<b>Rock unit(s)</b>	Abrahamskraal Formation (Lower Beaufort Group, Karoo Supergroup), Late Caenozoic alluvium, colluvium, eluvium	
<b>Potential fossils</b>	Fossil vertebrate bones, teeth, large burrow casts, trackways, petrified wood, plant-rich beds in the Abrahamskraal Fm bedrocks. Fossil mammal bones, teeth, horncores, freshwater molluscs, plant material, calcretised termitaria in Late Caenozoic alluvium.	
<b>ECO protocol</b>	<p>1. Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately (<i>N.B.</i> safety first!), safeguard site with security tape / fence / sand bags if necessary.</p> <p>2. Record key data while fossil remains are still <i>in situ</i>:</p> <ul style="list-style-type: none"> <li>• Accurate geographic location – describe and mark on site map / 1: 50 000 map / satellite image / aerial photo</li> <li>• Context – describe position of fossils within stratigraphy (rock layering), depth below surface</li> <li>• Photograph fossil(s) <i>in situ</i> with scale, from different angles, including images showing context (e.g. rock layering)</li> </ul> <p>3. If feasible to leave fossils <i>in situ</i>: Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation Ensure fossil site remains safeguarded until clearance is given by the Heritage Resources Agency for work to resume</p> <p>3. If <i>not</i> feasible to leave fossils <i>in situ</i> (emergency procedure only): <i>Carefully</i> remove fossils, as far as possible still enclosed within the original sedimentary matrix (e.g. entire block of fossiliferous rock) Photograph fossils against a plain, level background, with scale Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags Safeguard fossils together with locality and collection data (including collector and date) in a box in a safe place for examination by a palaeontologist Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation</p> <p>4. If required by Heritage Resources Agency, ensure that a suitably-qualified specialist palaeontologist is</p>	
	appointed as soon as possible by the developer.	
	5. Implement any further mitigation measures proposed by the palaeontologist and Heritage Resources Agency	
<b>Specialist palaeontologist</b>	Record, describe and judiciously sample fossil remains together with relevant contextual data (stratigraphy / sedimentology / taphonomy). Ensure that fossils are curated in an approved repository (e.g. museum / university / Council for Geoscience collection) together with full collection data. Submit Palaeontological Mitigation report to Heritage Resources Authority. Adhere to best international practice for palaeontological fieldwork and Heritage Resources Agency minimum standards.	

# APPENDIX

## V

### GENERIC EMPR FOR SUBSTATIONS

# APPENDIX

**W** EA (DEA REF:  
14/12/16/3/3/2/807) AND  
ASSOCIATED AMENDMENTS

# APPENDIX

## **X** SPECIALIST OPINIONS REGARDING REMOVAL OF NON-GRAZING PLAN

# APPENDIX

**Y**

FIRE MANAGEMENT PLAN

## **FIRE MANAGEMENT PLAN**

This will be updated with more detailed management plans as per the appointed contractors Method statements

- » The Contractor shall take all the necessary precautions to ensure that fires are not started as a consequence of his activities on site.
- » The Contractor, sub-contractors and all employees are expected to be conscious of fire risks. The Contractor shall hold fire prevention talks with staff to create an awareness of the risks of fire. Regular reminders to his staff on this issue are required.
- » A fire officer is to be appointed by the contractor to ensure immediate and appropriate actions in the event of a fire and shall ensure that employees are aware of the procedures to be followed;
- » The Contractor shall forward the name of the Fire Officer to the ESCO / ECO for his approval within 7 days of being on site;
- » A fire break shall be constructed around the footprint area prior to construction if necessary. The firebreak must be maintained in consultation with the Fire Chief;
- » "No-smoking" signs to be placed in areas used for storage of oil and fuel;
- » All construction camps shall be provided with portable fire extinguishing equipment, in accordance with all relevant legislation and must be readily accessible;
- » Fire extinguishers to be serviced by an accredited service provider on an annual basis;
- » The Contractor shall ensure that there is basic firefighting equipment available on site at all times. This shall include at least rubber beaters when working in urban open spaces and natural areas, and at least one fire extinguisher of the appropriate type when welding or other "hot" activities are undertaken;
- » The Contractor shall take specific measures to prevent the spread of veld fires, caused by activities at the campsites. These measures must include appropriate instruction of employees about fire risks and designated smoking areas;
- » Smoking must only be permitted in designated smoking areas. Fire extinguishers will be available in these areas at all times;
- ~~» Prevention of runaway fires by keeping vegetation short in working areas;~~
- » Fire prevention facilities must be present at all storage facilities. No open fires shall be allowed on site under any circumstance. No cooking on open fires shall be done onsite to prevent runaway fires;
- » Emergency numbers for local police and fire department etc. must be placed in a prominent area;
- » All fires must be prohibited on site and only designated cooking areas will be allowed where fire-fighting equipment is available;
- » Any fires that occur shall be reported to the ESCO / ECO immediately who will then liaise with the local Fire Protection Agency;
- » The Contractor shall appoint a Fire Officer who shall be responsible for ensuring immediate and appropriate actions in the event of a fire and shall ensure that employees are aware of the procedures to be followed;



- » ~~The Contractor shall forward the name of the Fire Officer to the ESCO / ECO for his approval within 7 days of being on site;~~
- » The Contractor shall be liable for any expenses incurred by any organisations called to assist with fighting fires that were started as a result of his activities or personnel, and for any cost relating to the rehabilitation of burnt areas, or consequential damages