




**SOUTH AFRICA MAINSTREAM RENEWABLE
POWER DEVELOPMENTS (PTY) LTD**

**Proposed Development of the Karee
Wind Energy Facility (WEF), Battery
Energy Storage System (BESS) and
Associated Infrastructure near
Ceres in the Western Cape Province**

**Draft Environmental Management
Programme (EMPr)**

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**SOUTH AFRICA MAINSTREAM RENEWABLE POWER
DEVELOPMENTS (PTY) LTD**

KAREE WIND ENERGY FACILITY (WEF)

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

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SOUTH AFRICA MAINSTREAM RENEWABLE POWER DEVELOPMENTS (PTY) LTD

KAREE WIND ENERGY FACILITY (WEF)

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

1. INTRODUCTION

South Africa Mainstream Renewable Power Developments (Pty) Ltd (hereafter referred to as 'Mainstream') is proposing to construct the Karee Wind Energy Facility (WEF), Battery Energy Storage System (BESS) and associated infrastructure near the town of Ceres in the Witzenberg Local Municipality, in the Cape Winelands District Municipality (**Figure 4**) (**DFFE Reference Number: To be allocated**). The proposed development will have a maximum export capacity / contracted capacity of up to approximately 200-megawatt (MW) ac and will be referred to as the Karee WEF. The overall objective of the proposed development is to generate electricity by means of renewable energy technologies capturing wind energy and to feed into the national grid, which will be procured under either the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), other government run procurement programmes or potential private offtake entities.

SiVEST Environmental Division has subsequently been appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the required Draft Environmental Management Programme (EMPr) (in line with the National Environmental Management Act, 1998 (Act 107 of 1998)) for the proposed construction of the Karee WEF, Battery Energy Storage System (BESS) and associated grid infrastructure.

This EMPr provides a set of guidelines for the environmental management of all works executed by the Developer, Engineer, Contractor and Sub-contractor/s to have a minimum impact on the environment in accordance with all relevant legislation, policies and standards. In this context, it should be viewed as a dynamic or "living" document which may require updating or revision during the life-cycle of the development to address new circumstances as the need arises. It is essentially, a written plan of how the environment is to be managed in practical and achievable terms. The EMPr shall be deemed to have contractual standing on the developer and contractors onsite.

The effectiveness of the EMPr is limited by the level of adherence to the conditions set forth in this report by the Developer, Engineer and the Contractor and Sub-contractors. It is further assumed that compliance with the EMPr will be monitored and audited on a regular basis as set out in the EMPr and contractual clauses.

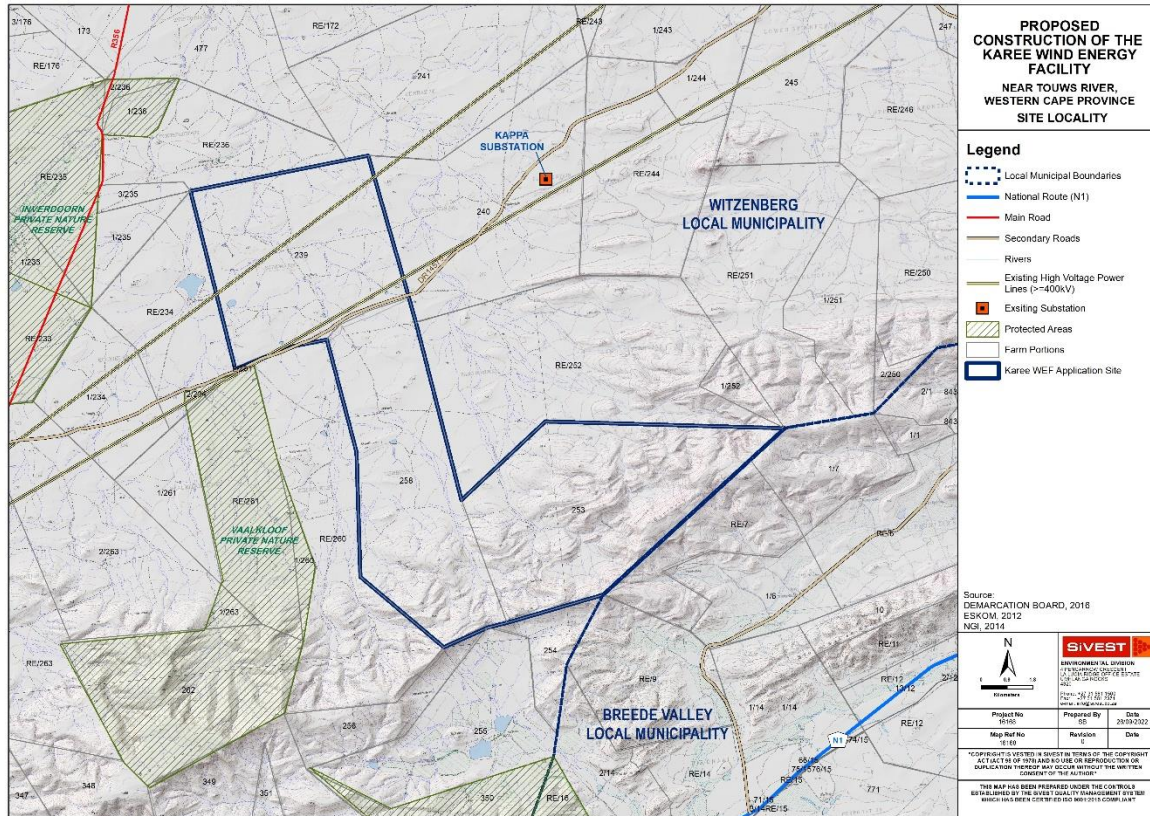


Figure 1: Site Locality

1.1 Content Requirements for an Environmental Management Programme (EMPr)

The content requirements for an EMPr (as provided in Appendix 4 of the EIA Regulations 2014, as amended), as well as details of which section of the report fulfils these requirements, are shown in **Table 1** below.

Table 1: Content requirements for a EMPr

2014 EIA Regulations, as amended.	Requirements for an EMPr	Location in this EMPr
Appendix 4, Section 1. (1)	An EMPr must comply with section 24N of the Act and include -	Refer to relevant reference sections below:
Appendix 4, Section 1 (a)	Details of –	-
	(i) The EAP who prepared the EMPr; and (ii) The expertise of that EAP to prepare an EMPr, including a curriculum vitae.	Section 3.1 Section 3.2
Appendix 1, Section 3 (b)	a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 4.1
Appendix 4, Section 1 (c)	a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the	Figure 1 and Figure 5

2014 EIA Regulations, as amended.	Requirements for an EMPr	Location in this EMPr
	environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	
Appendix 4, Section 1 (d)	a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and 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; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities;	Section 9
Appendix 4, Section 3 (f)	a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to — (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;	Section 9
Appendix 4, Section 3 (g)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 9
Appendix 4, Section 3 (h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 9
Appendix 4, Section 3 (i)	an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 8 Section 9
Appendix 4, Section 3 (j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 9
Appendix 4, Section 3 (k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 9
Appendix 4, Section 3 (l)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 9
Appendix 4, Section 3 (m)	an environmental awareness plan describing the manner in which— (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Section 11
Appendix 4, Section 3 (n)	any specific information that may be required by the competent authority.	Section 7.3 Section 10
Appendix 4 Section 2	Where a government notice gazetted by the Minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.	Generic EMPr has been compiled and included.

2. DETAILS OF APPLICANT

2.1 Name and contact details of the Applicant

Name and contact details of Applicant:

Table 2: Name and contact details of the applicant

Business Name of Applicant	South Africa Mainstream Renewable Power Developments (Pty) Ltd
Physical Address	4th Floor Mariendahl House, Newlands on Main, Cnr Main Road and Campground, Claremont, Cape Town
Postal Address	PO Box 45063, CLAREMONT, Cape Town
Postal Code	7735
Telephone	073 871 5781
Fax	021 671 5665
Email	eugene.marais@mainstreamrp.com

3. DETAILS AND EXPERTISE OF THE EAP

3.1 Name and contact details of the Environmental Assessment Practitioner (EAP)

The table below provides the name and contact details of the Lead EAP for the project:

Table 3: Name and contact details of the Environmental Consultant who prepared the report

Business Name of EAP	SiVEST SA (PTY) Ltd
Name of Lead EAP	Rendani Rasivhetshela
Physical Address	12 Autumn Road, Rivonia
Postal Address	PO Box 2921, Rivonia
Postal Code	2128
Telephone	011 798 0600
Fax	-
Email	rendanir@sivest.com

3.2 Names and expertise of the EAPs

The table below provides the names of the people who prepared this report and their expertise:

Table 4: Names and details of the expertise of the EAP's involved in the preparation of this report

Name of representative of the EAP	Educational Qualifications	Professional Affiliations	Experience (years)
Michelle Nevette	MSc Environmental Science	SACNASP Registration No. 120356 EAPASA Registration No. 2019/1560 IAIAsa	19
Natalie Pullen	MSc (Environmental Biotechnology)	EAPASA Registration No. 2018/132 IAIAsa	18
Rendani Rasivhetshela –	BSc Honours	EAPASA Registration No. 2019/1729	6

SOUTH AFRICA MAINSTREAM RENEWABLE POWER DEVELOPMENTS (PTY) LTD

Prepared by:



Project No. 16168
Description Karee WEF EMPr
Revision No. 0.1

Date: 05 December 2022

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Name of representative of the EAP	Educational Qualifications	Professional Affiliations	Experience (years)
EAP	Environmental Management		

CV's of SiVEST personnel and EAP declaration are attached in **Annexure A**.

3.3 Names and expertise of the specialists

Specialist studies have been conducted in terms of the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(A) and (H) And 44 of the NEMA when applying for EA, as well as the EIA Regulations, 2014 (as amended). The table below provides the names of the specialists involved in the project:

Table 5: Names of specialists involved in the project

Company	Name of representative of the specialist	Specialist	Educational Qualifications	Experience (years)
SiVEST SA (Pty) Ltd	Kerry Schwartz	Visual Impact Assessment	BA (Geography) GTc GISc 1187	25
SiVEST SA (Pty) Ltd	Merchandt Le Maitre	Transportation Impact Assessment	N Dip: Civil Engineering B Tech: Civil Engineering Pr.Tech.Eng. (Reg. No. 2018300094)	16
PGS Heritage (Pty) Ltd	Wouter Fourie	Heritage Impact Assessment	Professional Archaeologist with the Association of Southern African Professional Archaeologists (ASAPA) Accredited Professional Heritage Practitioner with the Association of Professional Heritage Practitioners (APHP)	22
	John Almond	Palaeontological Impact Assessment	PhD (Palaeontology) Palaeontological Society of South Africa, Associated of Professional Heritage (W Cape)	40
	Nikki Mann	Archaeological Assessment	Msc Archaeology Professional Archaeologist with ASAPA	7
	Emmylou Bailey	Cultural Landscape Assessment	MA Archaeology and Heritage Management APHP, ASAPA	15
Gage Consulting	Duan Gage	Desktop Geotechnical Assessment	Professional registered SACNASP, PrNatSci (137543), MSAIEG, Master of Science	4

Company	Name of representative of the specialist	Specialist	Educational Qualifications	Experience (years)
			(Engineering Geology), *Doctoral Candidate (Engineering Geology)	
Johann Lanz Consulting	Johann Lanz	Agriculture and Soils Impact Assessment (desktop)	M.Sc. (Environmental Geochemistry)	24
Enviro Acoustic Research	Morné de Jager	Noise Impact Assessment	B. Ing (Chemical) SAAI, ASA	14
Dr. Neville Bews & Associates	Dr Neville Bews	Social Impact Assessment (desktop)	D Litt et Phil	20
EnviroSci (Pty) Ltd	Dr Brian Colloty	Surface Water Impact Assessment	Ph D (Botany – Estuaries & Mangroves) Pr. Sci. Nat. 400268/07	25
		Biodiversity Impact Assessment		
Chris Van Rooyen Consulting	Chris van Rooyen	Avifaunal Impact Assessment	BA LLB	22
	Albert Froneman	Avifaunal Impact Assessment	MSc (Conservation)	22
Stephanie Dippenaar Consulting	Stephanie Dippenaar	Bat Impact Assessment	MEM (Masters in Environmental Management)	22

4. ACTIVITY INFORMATION

4.1 Project Description

The proposed Karee WEF will comprise up to thirty-five (35) wind turbines with a maximum export capacity of up to approximately 200MWac. The electricity generated by the proposed WEF development will be fed into the national grid via a 132kV overhead power line. In summary, the proposed Karee WEF will include the following components:

- A total of 35 wind turbines, with a maximum export capacity of approximately 200MWac.
- Each wind turbine will have a hub height of between 120m and 200m and rotor diameter of up to approximately 200m;
- Permanent compacted hardstanding areas / platforms (also known as crane pads) of approximately 100m x 100m (total footprint of approx. 10000m²) per turbine during construction and for on-going maintenance purposes for the lifetime of the proposed development;
- Each wind turbine will consist of a foundation of up to approximately 30m in diameter. In addition, the foundations will be up to approximately 3m in depth;
- Electrical transformers (690V/33kV) adjacent to each wind turbine (typical footprint of up to approximately 2m x 2m) to step up the voltage to between 11kV and 33kV;
- One (1) new 11kV - 33/132kV on-site substation consisting of two (2) portions: IPP portion / yard (33kv portion of the shared 33kv/132kv portion) and an Eskom portion (132kv portion of the shared 33kv/132kv portion) including associated equipment and infrastructure, occupying a total area of approximately 25ha (i.e. 250 000m²) i.e. 12.5 ha for the IPP Portion and 12.5 ha for the Eskom Portion. The Eskom portion will be ceded over to Eskom once the IPP has constructed the onsite substation. The necessary Transfer of Rights will be lodged with DFFE when required;
- A Battery Energy Storage System (BESS) will be located next to the IPP portion / yard of the shared onsite 33/132kV substation and will be included as part of the 12.5ha. The storage capacity and type of technology would be determined at a later stage during the development phase, but most likely comprise an array of containers, outdoor cabinets and/or storage tanks;
- The wind turbines will be connected to the proposed substation via 11 to 33kV underground cabling and overhead power lines;
- Road servitude of 8m and a 20m underground cable or overhead line servitude;
- Internal roads with a width of up to approximately 5m wide will provide access to each wind turbine. Existing site roads will be used wherever possible, although new site roads will be constructed where necessary. Turns will have a radius of up to 50m for abnormal loads (especially turbine blades) to access the various wind turbine positions. It should be noted that the proposed application site will be accessed via the DR1475 District Road and DR1475, MR316 and MR319 WCG provincial Roads;
- One (1) construction laydown / staging area of up to approximately 3ha to be located on the site identified for the substation. It should be noted that no construction camps will be required in order to house workers overnight as all workers will be accommodated in the nearby town;
- Operation and Maintenance (O&M) buildings, including offices, a guard house, operational control centre, O&M area / warehouse / workshop and ablution facilities to be located on the site identified for the substation. This will be included in the 33kv portion/yard of the substation area i.e.12.5 ha of the IPP portion of the onsite substation;
- A wind measuring lattice (approximately 120m in height) mast has already been strategically placed within the wind farm application site in order to collect data on wind conditions;

- No new fencing is envisaged at this stage. Current fencing is standard farm fence approximately 1-1.5m in height. Fencing might be upgraded (if required) to be up to approximately 2m in height;
- Water will either be sourced from existing boreholes located within the application site or will be trucked in, should the boreholes located within the application site be limited; and
- Optic fibre overhead or underground line from the Adamskraal Substation to the proposed on-site substation.

The Proposed Layout is reflected below in **Figure 2**.

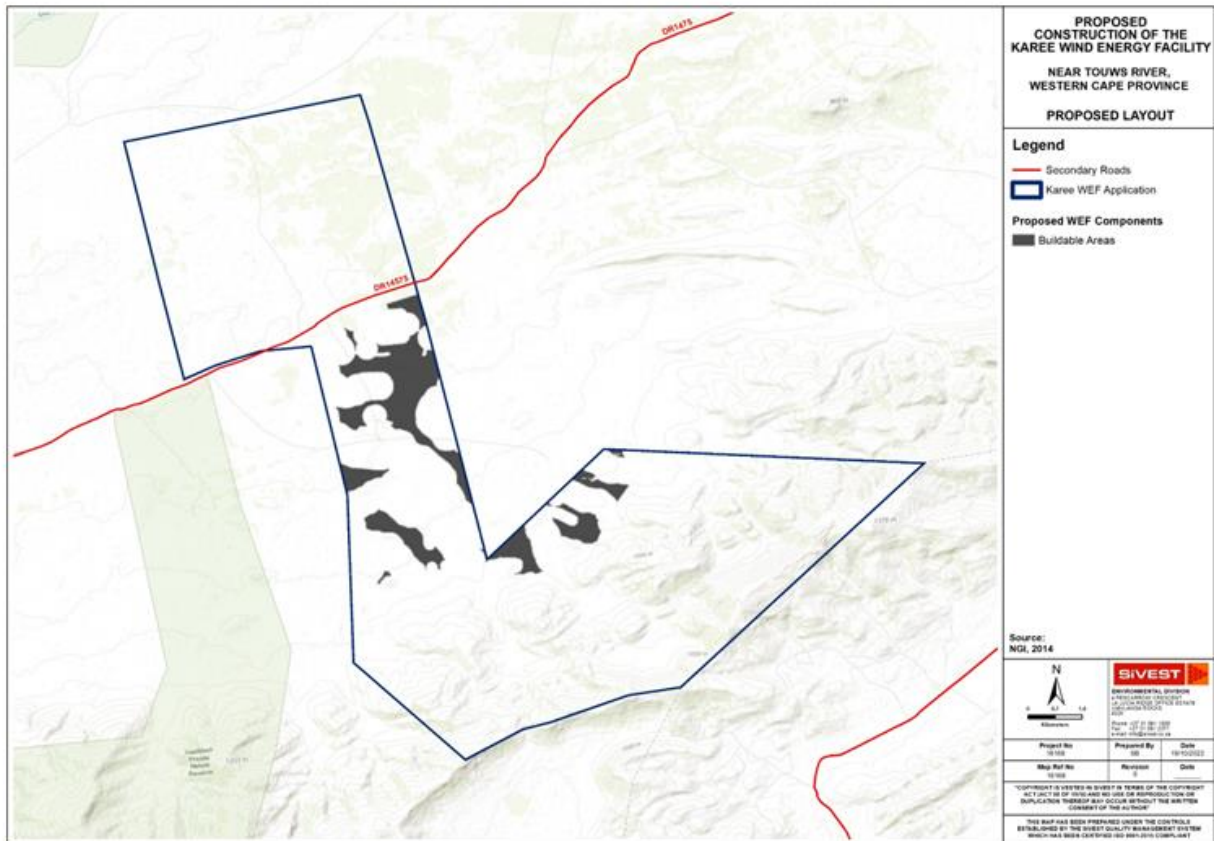


Figure 2: Preliminary layout showing proposed development area

The wind turbines and all other project infrastructure will be placed strategically within the buildable area based on environmental constraints. The exact location of the turbines and associated infrastructure will be determined during the final design stages of the WEF design process.

Please refer to **Figure 3** alongside for the typical components of a wind turbine.

A summary of the project technical details is provided in **Table 6** below.

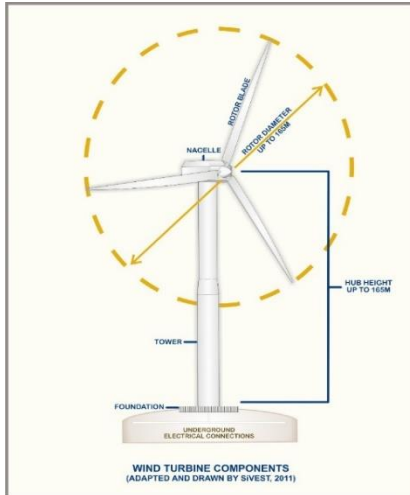


Figure 3: Typical components of a Wind Turbine

Table 6: Technical Detail Summary

Component	Description / Dimensions
Location of site (centre point)	Latitude: 33°10'46.06"S Longitude: 19°56'41.15"E
Application site area	The project site is approximately 11 841 hectares (ha) in extent.
Development area	A smaller development area (790 ha, including the IPP substation area) has been identified within the project site where the WEF is planned to be located.
Turbine development area (per turbine)	100m x 100m (total footprint of approx. 10000m ²)
SG codes	C01900000000023900000 C01900000000025300000 C01900000000025800000
Export capacity	Up to 200MWac
Proposed technology	Wind turbines and associated infrastructure
Hub height from ground	Between 120m and 200m
Rotor diameter	Up to approximately 200m
Substation and O&M building area	Approximately 25 hectare (ha) of which 12.5 is the IPP portion and is included in this WEF EIA and the other 12.5 ha will be the Eskom portion which will be ceded to Eskom once the IPP has constructed the

Component	Description / Dimensions
	onsite substation. The IPP portion of the substation is being undertaken in a separate BA assessment.
Construction laydown area	3 ha included within the onsite substation area.
Permanent laydown area	To be determined based on final layout
Electrical transformers	Electrical transformers with a capacity of 690V/33 kV will be situated adjacent to each of the proposed wind turbines in order to step up the voltage to 11kV and 33kV. It should be noted that the typical footprint of such a transformer is approximately 2 m x 2 m.
Cabling	Underground 33kV cables, buried along access roads where feasible; and outside of the road footprints and where topography and environmental concerns preclude underground cabling, overhead 33kV power lines will be used.
Battery Energy Storage System (BESS)	A BESS will be located next to the IPP portion / yard of the shared onsite 33/132kV substation and will be included as part of the 12.5ha. The storage capacity and type of technology would be determined at a later stage during the development phase, but most likely comprise an array of containers, outdoor cabinets and/or storage tanks.
On-site Substation	One (1) new 11kV - 33/132kV on-site substation consisting of two (2) portions: IPP portion / yard (33kV portion of the shared 33kV/132kV portion) and an Eskom portion (132kV portion of the shared 33kV/132kV portion) including associated equipment and infrastructure, occupying a total area of approximately 25ha (i.e. 250 000m ²) i.e. 12.5 ha for the IPP Portion and 12.5 ha for the Eskom Portion. The Eskom portion will be ceded over to Eskom once the IPP has constructed the onsite substation. The necessary Transfer of Rights will be lodged with DFFE when required.
Width of internal access roads	Up to 5m
Length of internal access roads	Existing internal roads may require widening by more than 6m or lengthening by more than 1km. Existing site roads will be used wherever possible, although new site roads will be constructed where necessary. Turns will have a radius of up to 50m for abnormal loads (especially turbine blades) to access the various wind turbine positions.
Site Access	The proposed application site will be accessed via the DR1475 District Road and DR1475, MR316 and MR319 Western Cape Government (WCG) provincial Roads.
Proximity to grid connection	Two (2) grid corridors have been identified for the 132kV overhead line and 132kV portion/yard of the shared 33kV/132kV onsite substation. These are being assessed in a separate Grid Infrastructure BA Process:

Component	Description / Dimensions
	<ul style="list-style-type: none"> • Option 1: The line from the 132kV portion/yard of the 33/132kV onsite substation moves in a north easterly direction for about 7.5 km, then turns sharply in a north westerly directly for about 0.5km and then turns left for about 0.5km in a west north westerly direction before terminating at the Kappa MTS. The associated grid connection route to the Kappa Main Transmission Substation is shorter i.e. approximately 8.5km – 10.5km in length (Preferred). • Option 2: The line from the 132kV portion/yard of the 33/132kV onsite substation moves in a northerly direction for about 3.2km, turning right in a north easterly direction for about 6.7 km and then left for about 0.5km in a northerly direction before terminating at the Kappa MTS. The associated grid connection route to the Kappa Main Transmission Substation is slightly longer i.e. approximately 10.4km to 11.4km in length.
Fencing	No new fencing is envisaged at this stage. Current fencing is standard farm fence approximately 1-1.5m in height. Fencing might be upgraded (if required) to be up to approximately 2m in height.
Other	<p>One (1) construction laydown / staging area of up to approximately 3ha to be located on the site identified for the substation. It should be noted that no construction camps will be required in order to house workers overnight as all workers will be accommodated in the nearby town;</p> <p>Water will either be sourced from existing boreholes located within the application site, through surface water abstraction or trucked in, should the boreholes located within the application site be limited.</p> <p>Optic fibre overhead or underground line from the Adamskraal Substation to the proposed on-site substation.</p>

4.2 NEMA Listed Activities

The amended EIA Regulations promulgated under Section 24(5) of the National Environmental Management Act, Act 107 of 1998 and published in Government Notice No. R. 326 list activities which may not commence without environmental authorisation from the Competent Authority. The proposed activity is identified in terms of Government Notice No. R. 327, 325 and 324 for activities which must follow a Basic Assessment Process. This is since the proposed WEF, Battery Energy Storage System (BESS) and associated grid infrastructure is located within the Komsberg Renewable Energy Development Zone (REDZ 2), as published in terms of Section 24(5) of the NEMA in GN R114 of 16 February 2018.

The project will trigger the following listed activities:

Table 7: Listed activities in terms of NEMA: EIA Regulations 2014 (as amended in 2017), applicable to the proposed project

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
11 (i)	<p>GN R. 327 (as amended) Item 11: The development of facilities or infrastructure for the transmission and distribution of electricity—</p> <p>(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.</p>	<p>One (1) new 11kV - 33/132kV on-site substation consisting of two (2) portions: IPP portion / yard (33kV portion of the shared 33kV/132kV portion) and an Eskom portion (132kV portion of the shared 33kV/132kV portion) including associated equipment and infrastructure, occupying a total area of approximately 25ha (i.e. 250 000m²) i.e. 12.5 ha for the IPP Portion and 12.5 ha for the Eskom Portion. The Eskom portion will be ceded over to Eskom once the IPP has constructed the onsite substation. The necessary Transfer of Rights will be lodged with DFFE when required.</p>
12 (ii) (a) (c)	<p>GN R. 327 (as amended) Item 12: The development of:</p> <p>ii) infrastructure or structures with a physical footprint of 100 square metres or more;</p> <p>where such development occurs-</p> <p>(a) within a watercourse;</p> <p>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.</p>	<p>The proposed development will entail the construction of a WEF and associated infrastructure (including the IPP portion/ yard of the 33kV/132kV shared on-site substation and BESS) within the proposed project site which will have a physical footprint of approximately 100m² or more and may occur within some of the surface water features / watercourses identified within the application site or within 32m of some of the surface water features / watercourses identified within the application site.</p> <p>The infrastructure associated with the proposed development will avoid the surface water features / watercourses identified within the application site where possible, although some structures (such as internal site roads) will occur within some of the surface water features /</p>

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
		watercourses identified within the application site and/or within 32m of some of the surface water features / watercourses identified within the application site.
14	GN R. 327 (as amended) Item 14: The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80m ³ or more but not exceeding 500m ³ .	<p>The proposed development will include the construction of an on-site BESS. The storage capacity and type of technology for the proposed BESS will be determined at a later stage during the development phase, but most likely will comprise an array of containers, outdoor cabinets and/or storage tanks.</p> <p>It should be noted that no stand-alone facilities for the storage of dangerous goods external to the BESS will be constructed as part of the proposed development.</p>
19	GN R. 327 (as amended) Item 19: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;	<p>The proposed development involves the construction of a WEF as well as other associated infrastructure (including the IPP portion/ yard of the 33kV/132kV shared on-site substation and BESS) within the proposed project site.</p> <p>Although the buildable area has been designed to avoid the identified surface water features / watercourses as far as possible, some of the internal site roads to be constructed (as required) will need to traverse some of the identified surface water features / watercourses. In addition, during construction of these roads (as required), soil will need to be removed from some of the identified surface water features / watercourses.</p>

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
24 (ii)	<p>GN R. 327 (as amended) Item 24: The development of a road -</p> <p>ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres.</p>	<p>Internal roads are required within the project site in order to provide access to each wind turbine, the shared 33kV/132kV on-site substation and the BESS, as well as to facilitate access throughout the WEF.</p> <p>Existing roads will be used wherever possible, although new site roads will be constructed where necessary. In addition, turns will have a radius of up to approximately 50m for abnormal loads (especially turbine blades) to access the various wind turbine positions.</p> <p>During construction the roads will be up to 13.5m in some parts (i.e. for bringing in transformers etc), after construction they will be rehabilitated back down to 8m or less.</p> <p>It should be noted that the proposed application site will be accessed via the DR1475 District Road and DR1475, MR316 and MR319 WCG provincial Roads.</p>
28 (ii)	<p>GN R. 327 (as amended) Item 28: Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:</p> <p>(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;</p>	<p>The proposed development site is currently zoned for agricultural land use, however, the property is no longer actively used for agricultural activities. The proposed development will result in special zoning being required, as an area greater than 1ha will be transformed into industrial / commercial use.</p>
56 (ii)	<p>GN R. 327 Item 56: The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre -</p> <p>(ii) where no reserve exists, where the existing road is wider than 8 metres –</p>	<p>Internal roads are required within the application site in order to provide access to each wind turbine, the shared 33kV/132kV on-site substation and the BESS, as well as to facilitate access throughout the WEF.</p>

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
		Existing internal roads may require widening by more than 6m or lengthening by more than 1km.

Activity No(s):	Provide the relevant Scoping and EIA Activity(ies) as set out in Listing Notice 2 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
1	GN R. 325 Item 1: The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 MW or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs – (a) within an urban area; or (b) on existing infrastructure.	It is proposed that a wind farm with an export capacity up to 200MWac will be constructed.
15	GN R. 325 Item 56: The clearance of an area of 20 ha or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for – (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	The proposed development will transform more than 20 hectares of indigenous vegetation. Clearance will also be required for the proposed 33/132kV shared on-site substation, O&M building, internal access roads and other associated infrastructure.

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
4 i. (ii) (aa)	GN R. 324 (as amended) Item 4: The development of a road wider than 4 metres with a reserve less than 13,5 metres. i. Western Cape ii. Areas outside urban areas; (aa) Areas containing indigenous vegetation;	The development of the WEF facilities and associated infrastructures is likely to require the development of roads wider than 4m with a reserve of less than 13.5m in areas containing indigenous vegetation. Internal roads with a width of up to approximately 5m wide will provide access to each wind turbine. These roads will occur within the Western Cape Province, outside urban areas.

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
12 i. ii.	<p>GN R. 324 (as amended) Item 12: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.</p> <p>i. Western Cape ii. Within critical biodiversity areas identified in bioregional plans;</p>	The proposed WEF development will involve the clearance of more than 300m ² or more of indigenous vegetation. Clearance will also be required for the proposed on-site substation, BESS, internal roads and other associated infrastructure.
14	<p>GN R. 324 (as amended) Item 14: The development of—</p> <p>(ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs—</p> <p>(a) within a watercourse; (b) in front of a development setback; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;</p> <p>excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.</p> <p>i. Western Cape i. Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.</p>	<p>The proposed energy facility will likely entail the development of roads and other infrastructure with a physical footprint of 10m² or more within a watercourse or within 32m from the edge of a watercourse. Although the layout of the proposed development will be designed to avoid the identified surface water features as far as possible, some of the internal and access roads, will likely need to traverse the identified surface water features.</p> <p>The construction of roads and other infrastructure for the development will occur within Critical Biodiversity Areas (CBAs) located outside of urban areas.</p>
18 i. ii. (aa)	<p>GN R. 324 (as amended) Item 18: The widening of a road by more than 4 meters, or the lengthening of a road by more than 1 kilometer-</p> <p>i. Western Cape ii. All areas outside urban areas: (aa) Areas containing indigenous vegetation</p>	Internal roads are required within the Buildable area in order to provide access to each wind turbine, the 33kV/132kV shared on-site substation and the BESS, as well as to facilitate access throughout the WEF. Existing site roads will be used wherever possible, although new site roads will be constructed where necessary.

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
		<p>Existing internal roads will thus need to be upgraded as part of the proposed development (where required). Internal roads will be widened by more than 4m or lengthened by more than 1km. These roads located within the application site will occur within the Western Cape Province, outside urban areas. In addition, the proposed buildable area contains indigenous vegetation.</p>

5. LOCATION OF THE ACTIVITY

5.1 Regional Locality

The proposed WEF, Battery Energy Storage System (BESS) and associated grid infrastructure is located approximately 20km north (respectively) of Touws River in the Western Cape Province and is within the Witzenberg Local Municipality, in the Cape Winelands District Municipality. (**Figure 4**). The project site is approximately 11 841 hectares (ha) in extent. A smaller development area (790 ha) has been identified within the project site where the WEF is planned to be located.

The application site for the proposed WEF development incorporates the following three (3) farm portions / properties:

- Farm Sadawa No 239
- Farm Tier Berg No 258; and
- Farm Voetpads Kloof No 253.

Note whilst Mainstream will no longer be proceeding with turbines on Sadawa 239 (northernmost land parcel), it will remain part of the buildable area but not the Development Footprint.¹

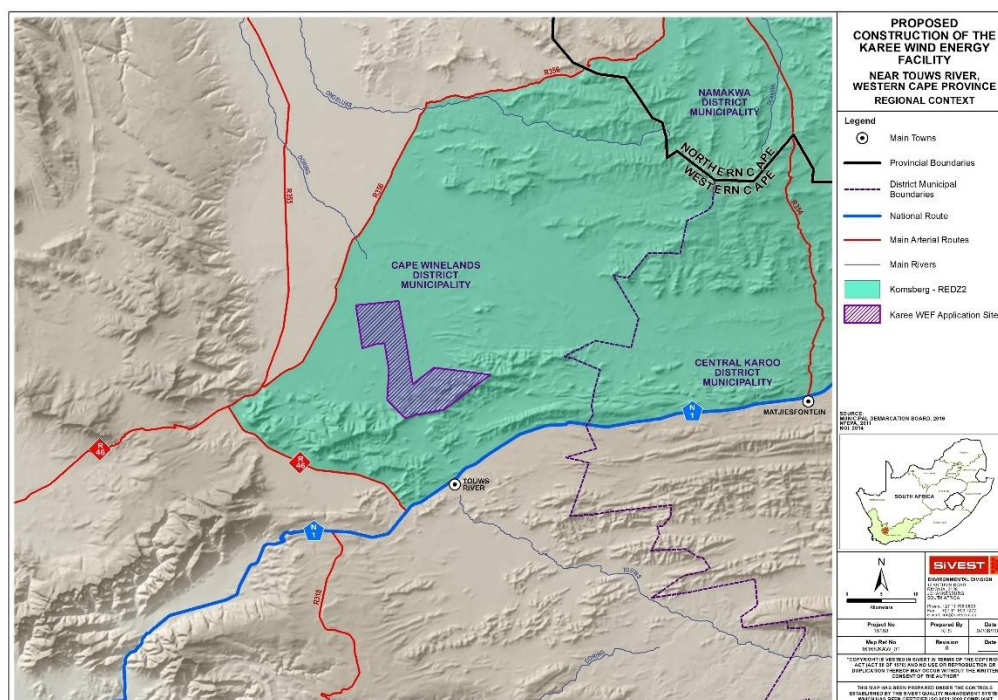


Figure 4: Regional Locality Map

- Development area: The development area is that identified area (located within the project site) where the Renewable Energy Facility is planned to be located. This area has been selected as a practicable option for the facility, considering technical preference and constraints.
- Development envelop: An area identified considering and avoiding identified environmental constraints present within the development area.
- Development Footprint: means any evidence of physical alteration as a result of the undertaking of any activity;

5.2 Study Area Description

According to the South African National Land Cover dataset (Geoterraimage 2018), much of the assessment area is classified as “Barren Land” and low shrubland. In most cases these patches of land are merely undisturbed areas with very sparse vegetation cover. Small tracts of grassland occur along drainage lines throughout the study area.

Grazing of both sheep and game is the dominant agricultural land use in the area. Grazing capacity of the site is very low at 70 hectares per large stock unit. There is almost no cultivation in the area and what there is, is confined to small, isolated patches of land along water courses. The site is classified by the national web-based environmental screening tool as mostly medium and low sensitivity for impacts on agricultural resources, except for a few pixels that are indicated as high sensitivity, but are considered insignificant. There is only one small isolated patch of land within the application area that is classified as cultivated land and therefore given high agricultural sensitivity.

The site climate classifies as BSk by Köppen-Geiger system, which is a typical cold, semi-arid climate. The area experiences hot, drier, summers and cold, wetter, winters, with precipitation being controlled by cold fronts and orographic rainfall. Rainfall is generally lowest in January (average 10 mm) and greatest in June (average 31 mm). The hottest month is February and coldest is July with average temperatures of 21°C and 8.9°C, respectively.

The species composition clearly followed a gradient from the higher lying areas in the south, with a marked reduction in plant species diversity and abundance in habitats observed in the northern parts of the study area, i.e. the shale dominated areas associated with the Tanqua Karoo vegetation unit was rather depauperate when compared to both the Matjiesfontein vegetation units in the south .

Approximately 179 animal species have been previously observed within the two quarter degrees square areas associated with the study area. These are predominantly Mammal (20%), Reptile (19%) and Insect species (50%), which for the most part highly mobile and or habitat specific.

The DFFE screening tool results only include one important species (High & Medium Sensitivity), namely the Critically Endangered Riverine Rabbit (*Bunolagus monticularis*). Riverine rabbits are habitat-specific associated with dense patches of riverine bush along seasonal rivers similar to those found downstream of the site (Doring & Groot rivers). The Riverine rabbit is the only indigenous burrowing species in Africa, and thus requires deep, soft alluvial soils. It is therefore important that the Alluvial Wash Floodplains with riparian areas, which also contain both *Lycium* and *Salsola* plant species, a favoured food source for this rabbit, are avoided as far as possible by the proposed development. The Riverine Rabbit has been observed within a 15-20km radius of the site.

In terms of fauna the following are species which potentially occur at the site and are listed as protected species, with those species highlighted in BOLD being observed in this and past assessments:

Schedule 1: Specially Protected Fauna as per the Western Cape Nature Conservation Ordinance (No. 3 of 2000) that may occur within the region or have suitable habitat present:

- *Felis nigripes* - Black-footed cat/Miersshooptier
- *Felis silvestris* - African wild cat/Afrika wildekat
- ***Ictonyx striatus* - Striped polecat/Stinkmuishond**
- *Mellivora capensis* - Honey badger/Ratel
- ***Otocyon megalotis* - Bat-eared fox/Bakoovos**
- *Proteles cristatus* – Aardwolf/Maanhaarjakkals
- *Vulpes chama* - Cape fox / Silver jackal Silwervos
- *Orycteropus afer* - Aardvark / Ant-bear Erdvark / Aardvark
- *Atelerix frontalis* – South African hedgehog
- Family: *Chamaeleonidae* - Chamaeleons, all species
- Family: *Cordylidae* Girdled lizards, all species

Based on the above, the specialist assessments conducted their assessment to address the potential impacts relating to the proposed development in order to ascertain the level of each identified impact, as well as mitigation measures which may be required. No location alternatives are being considered for the Karee Wind Farm as these sites were selected prior to the commencement of the BA Process. The buildable area that was prepared for the Karee WEF has been assessed by specialists to identify potential impacts that may arise from the development. Based on the findings of the specialists, the potential impacts identified, the buildable area has been updated to avoid environmental sensitivities where possible. Up to a maximum of 35 wind turbines and all associated infrastructure will be developed within the buildable area. No further layout alternatives have been considered as part of the BA process. Impact assessments have been undertaken on the buildable area. No technology alternatives will be considered. The choice of turbine to be used will ultimately be determined by technological and economic factors at a later stage. Specialist assessments have therefore informed the overall sensitivity of the site and the buildable area has been superimposed with the resulting specialist sensitivities as depicted in **Figure 5** below. A summary of the specialist findings and recommendations is included in **Annexure H**.

Table 9: Coordinates at corner points

KAREE WEF: APPLICATION SITE		
COORDINATES AT CORNER POINTS (DD MM SS.sss)		
POINT	SOUTH	EAST
1	S33° 6' 1.842"	E19° 52' 40.247"
2	S33° 5' 43.613"	E19° 56' 40.180"
3	S33° 8' 54.948"	E19° 57' 19.924"
4	S33° 12' 17.680"	E19° 57' 54.943"
5	S33° 11' 0.289"	E19° 59' 57.159"
6	S33° 11' 35.975"	E20° 5' 12.901"
7	S33° 14' 20.001"	E20° 0' 48.999"
8	S33° 14' 42.777"	E19° 58' 11.563"
9	S33° 14' 59.281"	E19° 57' 10.715"
10	S33° 13' 31.077"	E19° 55' 30.468"
11	S33° 11' 11.930"	E19° 55' 42.920"
12	S33° 9' 3.342"	E19° 55' 19.757"
13	S33° 9' 6.571"	E19° 54' 34.340"
14	S33° 9' 25.440"	E19° 53' 14.345"

The coordinates for the substation and substation alternatives are listed in the table below. It should be noted that the BESS, Construction laydown and Operation and Maintenance (O&M) Buildings will be housed within the substation footprint.

6. ENVIRONMENTAL MANAGEMENT PROGRAMME

6.1 Introduction

The Environmental Management Programme (EMPr) has been prepared in order to comply with the requirements as stipulated in the National Environmental Management Act (No. 107 of 1998).

This EMPr includes:

- Details and expertise of the EAP who prepared the EMPr including curriculum vitae;
- Project Description;
- Facility Illustration Plans;
- Mitigation measures as contained in the Impact Assessment Report;
- Recommendations and conclusions emanating from the specialist studies;
- Impact Management Objectives and Actions; and
- A copy of the EA (if granted).

6.2 Aim and Objectives of the EMPr

The aim of the EMPr is to:

- Identify those construction activities identified for the proposed development that may have a negative impact on the environment;
- Outline the mitigation measures that will need to be taken and the steps necessary for their implementation;
- Describe the reporting system to be undertaken during construction.

The objectives of the EMP are to:

- Identify a range of mitigation measures which could reduce and mitigate the potential adverse impacts to minimal or insignificant levels.
- Provide a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on site.
- Provide management structures that address the comments raised by I&APs pertaining to the development.
- Ensure that the environmental specifications are identified, effective and contractually binding so as to enable compliance on site.

6.3 Layout of the EMPr

The EMPr identifies the four phases of development as:

- Preconstruction Planning Phase Activities (Section 9.1)
- Construction Phase Activities (Section 0)
- Operation Phase Activities (Section 9.3)
- Decommissioning Phase Activities (Section 9.4)

The generic and specific provisions are included together under each phase for each environmental consideration. The generic provisions are the general environmental issues, procedures and controls that can be applied to the project and site as a whole. The specific provisions are those environmental issues, procedures and controls that are relevant to a particular section of the site. It should be understood that the EMP is considered an evolving document and may be amended at any time by the relevant authorities (DFFE, DWS etc.).

7. LEGAL AND OTHER REQUIREMENTS

7.1 Compliance with Applicable Laws

The supreme law of the land is “The Constitution of the Republic of South Africa”, which states: “*Every person shall have the right to an environment which is not detrimental to his or her health or wellbeing*”. Laws applicable to the protection of the environment in terms of Environmental Management (and relating to construction activities) include but are not restricted to:

- Animals Protection Act, Act No. 71 of 1962
- Astronomy Geographic Advantage (Act No. 21 of 2007)
- Civil Aviation Act (Act No.13 of 2009)
- Conservation of Agricultural Resources Act, Act No. 43 of 1983
- Development Facilitation Act No. 67 of 1995
- Environment Conservation Act, Act No. 73 of 1989
- Environmental Planning Act, Act No. 88 of 1967
- Hazardous Substances Act, Act No. 15 of 1973
- Land Survey Act, Act No. 9 of 1921
- Minerals Act, Act No. 50 of 1991
- National Environmental Management: Air Quality Act, Act No. 39 of 2004);
- National Environmental Management: Biodiversity Act, Act No. 10 of 2004, as amended)
- National Environmental Management Act, Act No.107 of 1998
- NEMA EIA Regulations, 2014 (as amended)
- National Environmental Management: Protected Areas Act (NEM: PAA) (Act No. 57 of 2003, as amended)
- National Environmental Management: Waste Act, Act No. 59 of 2008
- National Forests Act (NFA) (Act No. 84 of 1998)
- The National Heritage Resources Act, Act No. 25 of 1999
- National Water Act, Act No. 36 of 1998
- National Road Traffic (Act No. 93 of 1996, as amended)

- Occupational Health and Safety Act, Act No. 85 of 1993
- Provincial and Local Government Ordinances and Bylaws
- Soil Conservation Act, Act No. 76 of 1969
- Subdivision of Agricultural Land (Act No. 70 of 1970, as amended)
- Water Services Act, Act No. 108 of 1997

Several regulations will be applicable to the construction phase of the project. These guidelines are mentioned in the EMPr tables. The EMPr forms part of the Contract Documentation and is thus a legally binding document.

7.2 Compliance with the Environmental Management Programme

A copy of the EMPr must be kept on site during the construction period at all times. The EMPr will be made binding on all contractors operating on the site and will be included within the Contractual Clauses. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance with the Environmental Authorisation (EA) issued by DFFE.

It should be noted that in terms of Section 28 of the National Environmental Management Act (NEMA) Act No. 107 of 1998, those responsible for Environmental Damage must pay the repair costs both to the environment and human health and the preventative measures to reduce or prevent further pollution and/or environmental damage. (The polluter pays principle).

In terms of the EA, non-compliance of the EA may result in invalidation of the EA, criminal prosecution or other actions provided for in the NEMA (as amended) and associated regulations. Any non-compliance must result in an immediate stop to works being issued. The contractor and developer will be held liable for any damage and consequent rehabilitation to environmentally sensitive areas outside the site boundary. In the event of any dispute concerning the significance of a particular impact, the opinion of DFFE in respect of its significance will prevail.

National government, provincial government, local authorities or committees appointed in terms of the conditions of the EA or any other public authority shall not be held responsible for any damages or losses suffered by the authorisation holder or successor in title in any instance where construction or operation subsequent to construction is temporarily or permanently stopped for reasons of non-compliance by the authorisation holder with the conditions of authorisation as set out in this document or any subsequent document emanating from these conditions of authorisation.

7.3 Specific Conditions Pertaining to Authorisations

Should the Department of Forestry, Fisheries and the Environment (DFFE) issue an Environmental Authorisation (EA), this EMPr will be updated to include any additional pre-construction, construction, operation and decommissioning conditions stipulated in the EA not already included below.

A water use license may become applicable to the proposed project at a later stage.

Specific conditions pertaining to regulatory processes, or Licensee / Holder of the Authorisation requirements, have not been included within the EMPr and will only be included on finalization of the EMPr (pending decision). These conditions are to be undertaken by the Licensee / Holder of the Authorisation prior to the commencement of construction.

8. PROJECT RESPONSIBILITIES

8.1 Responsible Parties and associated roles

As described above, **Table 10** below provides a summary of the responsible parties and the auditing process to be carried out.

Table 10: Responsible Parties and Auditing Process

TITLE	PARTY	ROLE DURING CONSTRUCTION	ROLE DURING OPERATION
Project Developer (Proponent)	South Africa Mainstream Renewable Power Developments (Pty) Ltd	Assume ultimate responsibility	Assume ultimate responsibility
Project Manager	To be appointed by proponent	Project management	N/A
Contractor's Project Manager	Balance of Plant Contractor	Construction management	N/A
Main Contractor/s	There will be multiple contracts placed for the construction phase. These will cover civil earthworks and concrete, structural mechanical and electrical / instrumentation. There could also be the construction camp management contract. These may be managed by the Contractor's Project Manager (or other).	Main Contractor will undertake day to day construction activities covering aspects such as civil earthworks and concrete, structural mechanical and electrical / instrumentation.	N/A
Environmental Officer	To be appointed by Main Contractors	Day to day environmental responsibility, point of contact for ECO	N/A
Environmental Control Officer	To be appointed by Project developer	Monthly audits	Annual audits
Competent Authority	National Department of Forestry, Fisheries and the Environment (DFFE)	Conduct site visits when necessary.	Conduct site visits when necessary

The above may be updated based on the outcome of the Environmental process should additional responsibilities be identified.

9. IMPACT MANAGEMENT ACTIONS AND OUTCOMES

9.1 Pre-construction Phase

9.1.1 Site preparation

This section deals with the issues relative to site preparation during the pre-construction phase.

Table 11: Site preparation

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Specialist Investigations	<ol style="list-style-type: none"> 1. An avifaunal walk-through must be undertaken by the avifaunal specialist prior to the construction commencing, to confirm the location and status of all priority species nests within the area of influence of the wind farm. 2. Preconstruction biodiversity walk-through of the facility to micro-site roads and turbines. 3. A preconstruction micro-survey for access roads, substations, laydown areas and gridlines should be completed with CLA specialist to ensure appropriate buffers are maintained during operational activities. 4. Turbine layouts must adhere to the sensitivity areas and buffers, and the layout should be approved by a bat specialist upon finalisation of turbine specifications. 5. A pre-construction walkthrough by the ecologist is recommended, who can assist with the development of the Rehabilitation and Monitoring plan, coupled to micro-siting of the final layout. 6. A pre-construction walkthrough with an aquatic specialist is recommended and they can assist with the development of the stormwater management plan and 	Holder of the EA/ Relevant specialists	As per specialist requirements.	Ensure the EMPr is adhered to.	Pre-construction

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	Aquatic Rehabilitation and Monitoring plan, coupled to micro-siting of the final layout.				
Appointment of ECO	1. Appoint an independent Environmental Control Officer.	Holder of the EA	Undertake regular audits	Avoid construction delays. Ensure the EMPr is adhered to.	Continuous.
Site demarcation	<ol style="list-style-type: none"> Before construction begins, all areas to be developed must be clearly demarcated with fencing or orange construction barrier where applicable. All Construction Camps are to be fenced off in such a manner that unlawful entry is prevented and access is controlled. All access points to the Construction Camp should be controlled by a guard or otherwise monitored, to prevent unlawful access. Records of all environmental incidents must be maintained and a copy of these records be made available to provincial department on request throughout the project execution. 	Contractor	Undertake regular audits	Prevent unauthorized impact on the environment. Ensure safety of the workers, public and prevent loss/ damage to equipment Ensure the conditions of the EA are adhered to Compliance to all legislative requirements	Continuous
Site clearing	<ol style="list-style-type: none"> Site clearing must take place in a phased manner, as and when required. Areas which are not to be constructed on within two months must not be cleared to reduce erosion risks. The area to be cleared must be clearly demarcated and this footprint strictly maintained. 	Holder of the EA/Contractor	Undertake regular audits	Site establishment undertaken responsibly Sensitive areas identified and avoided Erosion management plan implemented and	Once off

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<ol style="list-style-type: none"> 4. Spoil that is removed from the site must be removed to an approved spoil site or a licensed landfill site. 5. The necessary silt fences and erosion control measures must be implemented in areas where these risks are more prevalent. 			hydrological measures in place. Appropriate stormwater structures as informed by the Storm Water Management Plan	
Construction Camp	<ol style="list-style-type: none"> 1. Site establishment shall take place in an orderly manner and all required amenities shall be installed at camp sites before the main workforce move onto site. 2. All construction equipment must be stored within the construction camp. 3. All associated oil changes etc. (no servicing) must take place within the camp over a sealed surface such as a concrete slab. 4. An area for the storage of hazardous materials must be established that conforms to the relevant safety requirements and that provides for spillage prevention and containment 5. All Construction Camps shall be provided with portable fire extinguishing equipment, in accordance with all relevant legislation and must be readily accessible. 6. The Contractor must provide sufficient ablution facilities, in the form of portable / VIP toilets, at the Construction Camps, and shall conform to all relevant health and safety standards and codes. No pit latrines, French drain systems or soak away systems shall be allowed and toilets may not be situated within 100 meters of any surface water body or 1:100-year flood line. A sufficient number of toilets shall be provided to accommodate the number of personnel working in the area. 	Contractor	Undertake regular audits	<p>Prevent unauthorized impact on the environment.</p> <p>Ensure safety of the public and prevent loss/ damage equipment</p> <p>Ensure EMP is adhered to</p> <p>Compliance to all legislative requirements</p>	Continuous

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<p>7. The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed.</p> <p>8. No fires will be allowed and the Contractor must make alternative arrangements for heating. LP Gas may be used, provided that all required safety measures are in place. The Contractor shall take specific measures to prevent the spread of fires, caused by activities at the campsites. These measures may include appropriate instruction of employees about fire risks and the construction of firebreaks around the site perimeter.</p>				
Training of site staff	<p>1. Environmental awareness training for construction staff, concerning at a minimum the general environmental awareness, conservation of fauna and flora, the prevention of accidental spillage of hazardous chemicals and oil; pollution of water resources (both surface and groundwater), air pollution and litter control and identification of archaeological artefacts.</p> <p>2. Staff operating equipment (such as loaders, etc.) shall be adequately trained and sensitised to any potential hazards associated with their tasks.</p> <p>3. No operator shall be permitted to operate critical items of mechanical equipment without having been trained by the Contractor and certified competent by the Project Manager.</p> <p>4. Staff should be educated as to the need to refrain from indiscriminate waste disposal and/or pollution of local soil and water resources and receive the necessary safety training.</p>	Contractor	Undertake regular audits	<p>All staff members are aware of the EMPr requirements relevant to them</p> <p>All waste managed according to approved the Method Statement compiled by the contractor and approved by the engineer and reviewed by ECO</p>	Continuous

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	5. Staff must be trained in the hazards and required precautionary measures for dealing with these substances 6. Spillage packs must be available at construction areas.				
SPECIFIC MITIGATION MEASURES					
Aspect: Protection of soil resources Erosion	7. Design an effective system of stormwater run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion. This is included in the stormwater management plan.	Holder of the EA Engineer/Contractor	Ensure that the storm water run-off control is included in the engineering design.	That disturbance and existence of hard surfaces causes no erosion on or downstream of the site.	Once-off during the design phase.
Visual: <ul style="list-style-type: none"> ▪ Potential alteration of the visual character and sense of place. ▪ Potential visual impact on receptors in the study area. ▪ Potential visual impact on the night time visual environment. 	1. Ensure that wind turbines are not located within 1km of any farmhouses in order to minimise visual impacts on these dwellings. 2. Where possible, fewer but larger turbines with a greater output should be utilised rather than a larger number of smaller turbines with a lower capacity. 3. Where possible, the operation and maintenance buildings and laydown areas should be consolidated to reduce visual clutter. 4. Where possible, underground cabling should be utilised.	Holder of the EA/Contractor	Undertake regular audits	Ensure the EMPr is adhered to.	Continuous
Surface Water Damage or loss of riparian and or drainage line systems i.e. disturbance of the waterbodies in the construction phase	1. A detailed monitoring plan must be developed in the pre-construction phase by an aquatic specialist, where any delineated system occurs within 50 m of existing crossings.	Holder of the EA to appoint aquatic specialist to implement	Construction Monitoring and audit reports	Impacts avoided or managed as per specialist recommendations.	Continuous

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
				Ensure the conditions of the EA are adhered to.	

9.1.2 Consultation

This section deals with the issues relative to consultation during the pre-construction phase.

Table 12: Consultation

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Consultation	<ol style="list-style-type: none"> 1. Provide a mechanism through which information could be exchanged between the project proponent and stakeholders. 2. Identify relevant stakeholders and engage them at applicable stages of the EIA process. 3. Inform the public about the proposed construction process. 4. Surrounding communities must be kept informed, through the identified and agreed consultation channels, of the commencement of construction. 5. Work on site to be restricted to work hours. 	Holder of the EA/ Contractor	Clear communication channels established	Continuous
Noise	<ol style="list-style-type: none"> 1. At all stages, surrounding receptors should be informed about the project, providing them with factual information without setting unrealistic expectations. 2. The developer must implement a line of communication (i.e. a help line where complaints could be lodged). All potential sensitive receptors should be made aware of these contact numbers. 3. The proposed WEF should maintain a commitment to the local community (people staying within 2,000 m from construction or operational activities) and respond to noise concerns in an expedient fashion. Sporadic and legitimate noise complaints could be raised. For example, sudden and 	Holder of the EA	<p>Clear communication channels established</p> <p>Ensure that total daytime construction noise levels are less than 52 dBA at all potential NSDs (dwellings used for residential purposes)</p>	Continuous

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	sharp increases in sound levels could result from mechanical malfunctions or perforations or slits in the blades. Problems of this nature can be corrected quickly and it is in the developer's interest to do so		Ensure that total noise levels due to operational activities are less than 45 dBA at all potential NSDs (dwellings used for residential purposes) Prevent the generation of nuisance noises.	

9.1.3 Avifauna

This section deals with the issues relative to avifauna during the pre-construction phase.

Table 13: Avifauna

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Avifauna: Mortality due to collisions with the turbines: Mortality of priority avifauna due to collisions with the wind turbines	1. The results of the pre-construction monitoring must guide the lay-out of the turbines, especially as far as proposed no-turbine zones are concerned. No turbines must be constructed in the buffer zones which were identified based on the results of the pre-construction monitoring, with a specific view to limiting the risk of collisions to a variety of birds, including several Red Data species.	Project Developer	1. Design the facility with 200m buffers around dams and water troughs, and 150m buffers around major drainage lines. 2. A 3.7km circular high-risk turbine exclusion zone must be implemented around the Verreux's Eagle nests 1 – 9 to the south of the PAOI, 3. A 5km high-risk turbine exclusion zone must be	Prevent mortality of priority avifauna	Once-off during the planning phase.

			implemented around the Martial Eagle present tower 26 of the Kappa – Muldersvlei 1 transmission line.		
Avifauna: Mortality due to electrocution: Electrocution of raptors on the internal 33kV poles	1. Use underground cabling as much as is practically possible. 2. Where the use of overhead lines is unavoidable due to technical reasons, the Avifaunal Specialist must be consulted to ensure that a raptor friendly pole design is used, and that appropriate mitigation is implemented pro-actively for complicated pole structures e.g. insulation of live components to prevent electrocutions on terminal structures and pole transformers.	Project Developer	1. Design the facility with underground cabling. 2. Consult with Avifaunal Specialist during the design phase of the overhead lines.	Prevent electrocutions	Once-off during the planning phase.

9.1.4 Bats

This section deals with the issues relative to bats during the pre-construction phase.

Table 14: Bats

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
DESIGN PHASE					
Not Applicable					

9.1.5 Heritage

This section deals with the issues relative to Heritage during the pre-construction phase.

Table 15: Heritage

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Cultural landscape - Ecological	<ol style="list-style-type: none"> 1. Critical Biodiversity Areas, and Ecological Support Areas (along drainage lines), should be protected from development of the wind turbines or any associated development during all phases. 2. No wind turbines should be placed within the 1:100-year flood line of the watercourses. In the context of the sensitivity to soil erosion in the area, as well as potential archaeological resources, it would be a risk to include any structures close to these drainage lines. 3. Renosterveld, and in this case, the Matjiesfontein Shale Renosterveld is found in the mid-elevations, and should be kept free from development. Renosterveld is classified as a threatened ecosystem, only found within the boundaries of South Africa. Care should be taken that we do not needlessly destroy our rare resources that determine the character of the Karoo landscape, and often on the mid-slopes. 4. Identified medicinal plants used for healing or ritual purposes should be conserved during all phases if threatened for use and continued access to these resources be maintained. 5. Careful planning should incorporate areas for stormwater runoff where the base of the structure disturbed the natural soil. Local rocks found on the site could be used to slow stormwater (instead of concrete, or standard edge treatments), and prevent erosion that would be an unfortunate consequence that would alter the character of the site. By using rocks from site it helps to sensitively keep to the character. 	Holder of the EA	Ensure the EMPr is adhered to.	Continuous

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
<p>Cultural landscape - Aesthetic</p>	<ol style="list-style-type: none"> 1. Where additional infrastructure (i.e. roads) is needed, the upgrade of existing roads to accommodate the development should be the first consideration. 2. Avoid development of infrastructure (such as buildings, wind turbines and power lines), on crests or ridgelines due to the impact on the visual sensitivity of skylines. The visual impact of turbines can be reduced by distancing them from viewpoints such as roads and farmsteads and placing them in lower lying plains to reduce their impact on the surrounding sensitive cultural landscape. 3. Significant and place-making viewsheds of surrounding ridgelines and distant mountain should be maintained by limiting the placement of turbines or associated infrastructure on opposing sides of any of the regional roads, so that at any time a turbine-free view can be found when travelling through the landscape or at the historic farmsteads. 4. Retain view-lines and vistas focused on prominent natural features such as mountain peaks or hills, such as Tooverberg, Pramberg and the Pienaarspoort, as these are important place making and orientating elements for experiencing the cultural landscape. 5. Prevent the construction of new buildings/structures/ new roads on visually sensitive, steep, elevated or exposed slopes, ridgelines and hillcrests. 6. Turbine and new road placement to avoid slopes steeper than 10% with existing farm roads to be used for access to turbines as far possible. 7. Due to the scenic and historic significance of the regional road, a buffer of 500m to either side of the district road should be maintained for no development associated with the WEF other than sensitive road upgrades, which must not impact on the views from the road. 8. Due to the impact of the noise and shadow flicker of wind turbines on residents, the turbines should be placed at 1km from any occupied homestead. 9. Alternative Option 2 for the grid corridor is preferred in terms of cultural landscape assessment as it limits the construction to a smaller footprint on 	<p>Holder of the EA</p>	<p>Ensure the EMPr is adhered to.</p>	<p>Continuous</p>

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<p>the landscape and locates the infrastructure close to existing industrial elements.</p> <p>10. Neither substation option location is preferred as they are proposed for slopes of 3%-10% which would increase their visibility in the flat terrain of the surrounding alluvial plains. An option should be found in an area below 3% slope without impacting on the CBAs or other cultural landscape buffers.</p> <p>11. The impact of WEF turbine night lighting on the wilderness landscape is intrusive and overwhelms the rural character of the landscape, giving it an industrial sense of place after dark. Reduce the impact of turbine night lighting by minimizing the number of turbines with lighting to only those necessary for aviation safety, such as a few identified turbines on the outer periphery, or use aircraft triggered night lighting. Due to the reduced receptors on the roads at night, the impact of the lighting at night is reserved mainly for farmsteads and other places of overnight habitation such as the surrounding tourist facilities, which would be heavily impacted by the light pollution on a long term and ongoing basis.</p>			
<p>Cultural landscape - Historic</p>	<ol style="list-style-type: none"> 1. Due to the scenic and historic significance of the regional road, a buffer of 500m to either side of the district road should be maintained for no development associated with the WEF other than sensitive road upgrades, which must not impact on the views from the road. 2. The integrity of the historic farmsteads and their associated cultivated areas and relationship to the riverine corridors and other natural elements, such as Tooverberg, should be maintained and protected. Location of proposed turbines should be limited to a 1000m buffer around the farmsteads as far possible to limit impact to the farmsteads. 3. Any development that impacts the inherent character of the werf component should be discouraged and a development buffer of 50m around the outer boundary of farm werfs and 300m around any graded heritage structure, must be maintained, including the associated cultivated areas, cemeteries and unmarked graves, for all new infrastructure. 	<p>Holder of the EA</p>	<p>Ensure the EMPr is adhered to.</p>	<p>Continuous</p>

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<p>4. The existing names of places, routes, watercourses and natural features in the landscape that are related to its use, history and natural character should be retained and used as heritage resources related to intangible heritage. Public access to these sites should be encouraged.</p> <p>5. Burial grounds and places of worship are automatically regarded as Grade IIIa or higher. Any development that threatens the inherent character of family burial grounds must be assessed and should be discouraged. No development closer than 100m from the boundary of any burial grounds or unmarked graves. A preconstruction micro-survey of each turbine footprint and any new access roads should be conducted to ensure no further unmarked graves are threatened.</p> <p>6. Commonages and outspans were located at water points, and these places were likely gathering points before the arrival of colonists and continued to provide communal resources. In the mid-20th century, many old commonages came under the ownership of the Municipality, and have since been rented out to private individuals or organisations. The Municipality should facilitate the use of common land in a way that promotes the well-being and quality of life of the public. These sites can play a restorative role within the community, for instance for those who have limited alternative opportunities for recreation.</p> <p>7. Maintain traditional movement patterns across rural landscapes or to places of socio-historical value. (a) Avoid privatization or the creation of barriers to traditional access routes (b) Retain old roadways, which have been replaced by newer roads, for use as recreation trails.</p> <p>8. Respect existing patterns, typologies and traditions of settlement-making by promoting the continuity of heritage features. These include: (a) indigenous; (b) colonial; and (c) current living heritage in the form of tangible and intangible associations to place.</p> <p>9. Alterations and additions to conservation-worthy structures should be sympathetic to their architectural character and period detailing.</p>			

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
<p>Cultural landscape - Socio-economic</p>	<ol style="list-style-type: none"> 1. The findings of this report must be shared with identified interested and affected parties, including non-landowner residents on the development properties, in the EIA public participation process in order to further ascertain any intangible cultural resources that may exist on the landscape that have not been identified. A specialist qualified in recognising and discussing significance of intangible heritage resources should be present during the public meetings. The findings should inform the recommendations for appropriate mitigation for impacts to the cultural landscape. 2. The continued use of the landscape for human habitation and cultivation by historic residents of the area should be retained and encouraged as far possible to sustain the continual use pattern and human-environment relationship which is the ultimate significance of this cultural landscape element. The WEF development must allow and support this, including financially, and not degrade this continued relationship. 3. The local community on and around the development should benefit from job opportunities created by the proposed development and the development should not cause reduction in economic viability of surrounding properties in excess of those offered by the development. Short-term job opportunities at the expense of long term economic benefit and local employment opportunities must be prevented. 4. Local residents must be offered employment on the construction/ decommissioning and operational phases before 'importing' staff from elsewhere. 5. Local residents must be offered employment training opportunities associated with WEF developments at all phases. 	<p>Holder of the EA</p>	<p>Ensure the EMPr is adhered to.</p>	<p>Continuous</p>

9.2 Construction Phase

9.2.1 Construction Camp

This section deals with the issues relative to the construction camp during the construction phase.

Table 16: Construction Camp

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAME
Construction Camp: Site of construction camp	<ol style="list-style-type: none"> 1. The size of the construction camp must be aligned to the approved laydown area. 2. Adequate parking must be provided for site staff and visitors. The Contractor must attend to drainage of the camp site to avoid standing water and / or sheet erosion. 3. Suitable control measures over the Contractor's yard, plant and material storage to mitigate any visual impact of the construction activity must be implemented. 4. No construction should occur in an area of high or unique agricultural value, or in an area under cultivation. 	Holder of the EA/Contractor	<p>Ensure the conditions of the EA are adhered to.</p> <p>Compliance to all legislative requirements.</p> <p>Impacts avoided or managed as per specialist recommendations.</p>	Once-off
Construction Camp: Storage of materials (including hazardous materials)	<ol style="list-style-type: none"> 1. Choice of location for storage areas must take into account prevailing winds, distances to water bodies, general onsite topography and water erosion potential of the soil. Impervious surfaces must be provided where necessary. 2. Storage areas must be designated, demarcated and fenced if necessary. 3. Storage areas should be secure so as to minimize the risk of crime. They should also be safe from access by unauthorised persons i.e. children / animals etc. 4. Fire prevention facilities must be present at all storage facilities. 5. Storage areas containing chemical substances / materials must be clearly sign posted. 6. Proper storage facilities for the storage of oils, paints, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the temporary storage area(s). These pollution prevention measures for storage 	Holder of the EA/Contractor	<p>Choice of storage areas carefully considered to avoid impact to environment</p> <p>Correct handling, storage and/or disposal and/or cleanup of all materials to prevent impact to environment</p> <p>All hazardous substances managed according to</p>	Continuous

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAME
	<p>must include a bund wall high enough to contain at least 110% of any stored volume, and this must be sited away from drainage lines in a site with the approval of the Project Manager. The bund wall must be high enough to contain 110% of the total volume of the stored hazardous material with an additional allocation for potential stormwater events.</p> <ol style="list-style-type: none"> 7. These storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of storm water from surrounding areas and that will not infiltrate into the ground in order to ensure that accidental spillage does not pollute local soil or water resources. 8. All fuel storage areas must be roofed to avoid creation of dirty stormwater 9. Material Safety Data Sheets (MSDSs) shall be readily available on site for all chemicals to be used on site. Where possible the available, MSDS's must additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or escapes. 10. Staff dealing with these materials / substances must be aware of their potential impacts and follow the appropriate safety measures. 11. An approved waste disposal contractor must be employed to remove and recycle waste oil, if practical. The contractor must ensure that its staff is made aware of the health risks associated with any hazardous substances used and has been provided with the appropriate protective clothing/equipment in case of spillages or accidents and have received the necessary training. 12. All excess cement and concrete mixes are to be contained on the construction site prior to disposal off site. 13. All major spills as specified in the contractor emergency response procedure of any materials, chemicals, fuels or other potentially hazardous or pollutant substances must be cleaned immediately and the cause of the spill investigated. Preventative measures must be identified and submitted to the MC and ECO for information. Emergency response procedures to be followed and implemented. 		<p>approved Method Statement.</p>	

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAME
Construction Camp: Drainage of construction camp	<ol style="list-style-type: none"> Surface drainage measures must be established in the Construction Camps so as to prevent <ul style="list-style-type: none"> Ponding of water; Erosion as a result of accelerated runoff; and, Uncontrolled discharge of polluted runoff. 	Holder of the EA/Contractor	<p>Storm Water Management Plan provided and accepted prior to construction commencing</p> <p>Storm Water Management Plan implemented</p> <p>Erosion plan implemented and hydrological measures in place.</p>	Continuous

9.2.2 Construction traffic and access

This section deals with the issues relative to construction traffic and access during the construction phase.

Table 17: Construction Traffic and Access

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Construction Traffic and Access: Construction Traffic	<ol style="list-style-type: none"> Construction routes and required access roads must be clearly defined. Recommendations of the stormwater management plan must be implemented. Delivery of equipment must be undertaken with the minimum amount of trips to reduce the carbon footprint of these activities Access of all construction and material delivery vehicles should be strictly controlled, especially during wet weather to avoid compaction and damage to the topsoil structure. 	Holder of the EA/Contractor	<p>A traffic management strategy developed and implemented throughout the construction and operation phases.</p> <p>Storm Water Management Plan implemented</p>	Continuous

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<ol style="list-style-type: none"> 5. Damping down of the un-surfaced roads must be implemented to reduce dust and nuisance. 6. Vehicles and equipment shall be serviced regularly to avoid the contamination of soil from oil and hydraulic fluid leaks etc. 7. Servicing must be done in dedicated service areas on site or else off site if no such area exists. 8. Oil changes must take place on a concrete platform and over a drip tray to avoid pollution. 9. Soils compacted by construction shall be deep ripped to loosen compacted layers and re-graded to even running levels. 		Ensure the EMPr is adhered to	
Construction Traffic and Access: Access	<ol style="list-style-type: none"> 1. The main routes on the site must be clearly sign posted and printed delivery maps must be issued to all suppliers and Sub-contractors. 2. Planning of access routes to the site for construction purposes shall be done in conjunction with the Contractor and the Landowner. All agreements reached should be documented and no verbal agreements should be made. The Contractor shall clearly mark all access roads. Roads not to be used shall be marked with a "NO ENTRY for construction vehicles" sign. 3. Access to the site must be via secondary roads as requested by SANRAL. 	Holder of the EA/Contractor	A traffic management Strategy developed and Implemented throughout the construction and operation phases.	Continuous
Construction Traffic and Access: Road Maintenance	<ol style="list-style-type: none"> 1. Where necessary suitable measures shall be taken to rehabilitate damaged areas. 2. Contractors should ensure that access roads are maintained in good condition by attending to potholes, corrugations and stormwater damages as soon as these develop. 3. If necessary, staff must be employed to clean surfaced roads adjacent to construction sites where materials have spilt. 4. Recommendations of the surface water report must be taken into consideration. 	Holder of the EA/Contractor	A traffic management Strategy developed and Implemented throughout the construction and operation phases.	Continuous
Construction Traffic and Access: General	<ol style="list-style-type: none"> 1. The contractor shall meet safety requirements under all circumstances. All equipment transported shall be clearly labelled as to their potential hazards 	Holder of the EA	A traffic management Strategy developed and	Continuous

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<p>according to specifications. All the required safety labelling on the containers and trucks used shall be in place.</p> <p>2. The Contractor shall ensure that all the necessary precautions against damage to the environment and injury to persons are taken.</p> <p>3. Care for the safety and security of community members crossing access roads should receive priority at all times.</p>		<p>Implemented throughout the construction and operation phases.</p> <p>Adhere to Health and Safety Regulations</p>	

9.2.3 Environmental Education and Training

This section deals with the issues relative to environmental education and training during the construction phase.

Table 18: Environmental Education and Training

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
<p>Environmental Education and Training: Environmental Training</p>	<p>1. Ensure that all site personnel have a basic level of environmental awareness training. The Contractor must submit a proposal for this training to the ECO for approval. Translators are to be used where necessary. Topics covered should include:</p> <ul style="list-style-type: none"> • What is meant by “Environment” • Why the environment needs to be protected and conserved • How construction activities can impact on the environment • What can be done to mitigate against such impacts • Awareness of emergency and spills response provisions • Social responsibility during construction e.g. being considerate to local residents <p>2. It is the Contractor’s responsibility to provide the site foreman with no less than 1 hour’s environmental training and to ensure that the foreman has sufficient understanding to pass this information onto the construction staff.</p>	Contractor	Thorough induction to site.	Continuous

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	3. Training should be provided to the staff members in the use of the appropriate fire-fighting equipment. 4. Use should be made of environmental awareness posters on site. 5. The need for a “clean site” policy also needs to be explained to the workers. 6. Staff operating equipment (such as loaders, etc.) shall be adequately trained and sensitized to any potential hazards associated with their tasks.			
Environmental Education and Training: Monitoring of environmental training	1. The Contractor must monitor the performance of construction workers to ensure that the points relayed during their introduction have been properly understood and are being followed. If necessary, the ECO and / or a translator should be called to the site to further explain aspects of environmental or social behaviour that are unclear. Toolbox talks are recommended.	Contractor	Thorough induction to site.	Continuous

9.2.4 Waste Management

This section deals with the issues relative to waste management during the construction phase.

Table 19: Waste Management

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Waste Management: Litter management/general waste	<ol style="list-style-type: none"> 1. Refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction site. 2. The Contractor shall supply waste collection bins where such is not available and all solid waste collected shall be disposed of at registered/licensed landfill. 3. A housekeeping team should be appointed to regularly maintain the litter and rubble situation on the construction site. 4. If possible and feasible, all waste generated on site must be separated into glass, plastic, paper, metal and wood and recycled. An independent contractor can be appointed to conduct this recycling. 5. Littering by the employees of the Contractor shall not be allowed under any circumstances. 6. Skip waste containers should be maintained on site. These should be kept covered and arrangements made for them to be collected regularly. 7. All waste must be removed from the site and transported to a landfill site promptly to ensure that it does not attract vermin or produce odours. 8. The Contractor shall provide a method statement with regard to waste management. 9. A certificate of disposal shall be obtained by the Contractor and kept on file, if relevant. 10. Under no circumstances may solid waste be burnt on site. 11. All waste must be removed promptly to ensure that it does not attract vermin or produce odours. 	<p>Contractor</p> <p>The ECO shall monitor the neatness of the work sites as well as the Contractor campsite.</p>	<p>All waste managed according to approved Method Statement</p>	<p>Continuous</p>

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Waste Management: Hazardous waste	<ol style="list-style-type: none"> All waste hazardous materials, if present, must be carefully and appropriately stored, and then disposed of off-site at a licensed landfill site, where practical. Contaminants to be stored safely to avoid spillage. Machinery must be properly maintained to keep oil leaks in check All necessary precaution measures shall be taken to prevent soil or surface water pollution from hazardous materials used during construction and any spills shall immediately be cleaned up and all affected areas rehabilitated. 	Contractor	All waste managed according to approved Method Statement	Continuous
Waste Management: Sanitation	<ol style="list-style-type: none"> The Contractor shall install mobile chemical toilets on the site. The construction of "Long Drop" toilets are forbidden. Rather, portable toilets are to be used. Staff shall be sensitised to the fact that they should use these facilities at all times. No indiscriminate sanitary activities on site shall be allowed. Under no circumstances may open areas, neighbours fences or the surrounding bush be used as a toilet facility. Ablution facilities shall be within proximity from workplaces and not closer than 100m from any natural water bodies or boreholes. There should be enough toilets available to accommodate the workforce (minimum requirement 1: 15 workers). Male and females must be accommodated separately where possible. Toilets shall be serviced regularly and the ECO shall inspect toilets regularly. Potable water must be provided for all construction staff. 	Contractor	Staff members aware of EMPr requirements and ablutions used and maintained accordingly	Continuous
Waste Management: Remedial Actions	<ol style="list-style-type: none"> In the event of an accidental spill or leakage of hazardous substances, such incident(s) must be reported to all relevant authorities, including the Directorate: Pollution and Chemicals Management, in accordance with section 30(5) of the NEMA, 1998 pertaining to the control of incidents. Depending on the nature and extent of the spill, contaminated soil must be either excavated or treated on-site. 	Contractor	All waste managed according to approved Method Statement	Continuous

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<ol style="list-style-type: none"> 3. Excavation of contaminated soil must involve careful removal of soil using appropriate tools/machinery to storage containers until treated or disposed of at a licensed hazardous landfill site. 4. The precise method of treatment for polluted soil must be identified by a suitable specialist. This could involve the application of soil absorbent materials as well as oil-digestive powders to the contaminated soil. 5. If a spill occurs on an impermeable surface such as cement or concrete, the surface spill must be contained using oil absorbent material. 6. If necessary, oil absorbent sheets or pads must be attached to leaky machinery or infrastructure. 7. Materials used for the remediation of petrochemical spills must be used according to product specifications and guidance for use. 8. Contaminated remediation materials must be carefully removed from the area of the spill so as to prevent further release of petrochemicals to the environment and stored in adequate containers until appropriate disposal. 			

9.2.5 Agriculture and Soils

This section deals with the issues relative to agriculture and soils during the construction phase.

Table 20: Agriculture and Soils

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Aspect: Protection of soil resources Erosion	1. Implement an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off	Engineer/Contractor ECO	Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of the storm water run-off control system and to specifically record	That disturbance and existence of hard surfaces causes no erosion on or	Every 2 months during the construction phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	water from all accumulation points and it must prevent any potential down slope erosion.		the occurrence of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring.	downstream of the site.	
Aspect: Protection of soil resources Erosion	1. Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.	Engineer/Contractor ECO	Undertake a periodic site inspection to record the occurrence of and re-vegetation progress of all areas that require re-vegetation.	That vegetation clearing does not pose a high erosion risk.	Every 4 months during the construction phase
Aspect: Protection of soil resources Topsoil loss	1. If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.	Engineer/Contractor ECO	Record GPS positions of all occurrences of below-surface soil disturbance (e.g. excavations). Record the date of topsoil stripping and replacement. Check that topsoil covers the entire disturbed area.	That topsoil loss is minimised	As required, whenever areas are disturbed.
Disturbance/ displacement/ removal of soil and Rock: Ground disturbance during access road construction, foundation earthworks, platform earthworks	1. Design access roads and turbine locations (including crane pads) to minimise earthworks and levelling based on high resolution ground contour information 2. Correct topsoil and spoil management 3. Materials utilisation to minimise opening of borrow pits or creation of spoil	Engineer/Contractor Holder of EA	Undertake regular audits	Erosion plan implemented and hydrological measures in place Ensure the EMPr is adhered to.	Continuous

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Soil Erosion: Increased erosion due to vegetation clearing, alteration of natural drainage	<ol style="list-style-type: none"> 1. Avoid development in preferential drainage paths. 2. Appropriate engineering design of road drainage and watercourse crossings. 3. Temporary berms and drainage channels to divert surface runoff where needed. 4. Landscape and rehabilitate disturbed areas timeously (e.g. regressing). 5. Use designated access and laydown areas only to minimise disturbance to surrounding areas. 	Engineer/Contractor Holder of EA	Undertake regular audits	<p>Erosion plan implemented and hydrological measures in place</p> <p>Ensure the EMPr is adhered to.</p>	Continuous

9.2.6 Avifauna

This section deals with the issues relative to avifauna during the construction phase.

Table 21: Avifauna

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Avifauna: Displacement due to disturbance associated with the construction of the wind turbines and associated infrastructure	<p>A site-specific CEMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the CEMPr and should apply good environmental practice during construction. The CEMPr must specifically include the following:</p> <ol style="list-style-type: none"> 1. No off-road driving; 2. Maximum use of existing roads, where possible; 3. Measures to control noise and dust according to latest best practice; 4. Restricted access to the rest of the property; 	Contractor & ECO	<ol style="list-style-type: none"> 1. Implementation of the CEMPr. Oversee activities to ensure that the CEMPr is implemented and enforced via site audits and inspections. Report and record any non-compliance. 2. Ensure that construction personnel are made aware of the impacts relating to off-road driving. 	Prevent unnecessary displacement of avifauna by ensuring that contractors are aware of the requirements of the Construction Environmental Management Programme (CEMPr.)	<ol style="list-style-type: none"> 1. On a daily basis 2. Weekly 3. Weekly 4. Weekly 5. Weekly

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
The noise and movement associated with the construction activities at the development footprint will be a source of disturbance which would lead to the displacement of avifauna from the area.	5. Strict application of all recommendations in the botanical specialist report pertaining to the limitation of the footprint.		<p>3. Construction access roads must be demarcated clearly. Undertake site inspections to verify.</p> <p>4. Monitor the implementation of noise control mechanisms via site inspections and record and report non-compliance.</p> <p>5. Ensure that the construction area is demarcated clearly and that construction personnel are made aware of these demarcations. Monitor via site inspections and report non-compliance.</p>		
Avifauna: Displacement due to habitat transformation associated with the construction of the wind turbines and associated infrastructure	<p>1. Develop a Habitat Restoration Plan (HRP) and ensure that it is approved.</p> <p>2. Monitor rehabilitation via site audits and site inspections to ensure compliance. Record and report any non-compliance.</p> <p>3. Vehicle and pedestrian access to the site should be controlled and restricted to the facility footprint as much as possible to prevent unnecessary destruction of vegetation.</p>	Operations Manager /SHE Manager	<p>1. Appointment of rehabilitation specialist to develop Habitat Restoration Plan (HRP).</p> <p>2. Site inspections to monitor progress of HRP.</p>	Prevent unnecessary displacement of avifauna by ensuring that the rehabilitation of transformed areas is implemented by an appropriately qualified rehabilitation specialist, according to the recommendations of	<p>1. Once-off</p> <p>2. Once a year</p>

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Total or partial displacement of avifauna due to habitat transformation associated with the vegetation clearance and the presence of the wind turbines and associated infrastructure.				the botanical specialist study.	

9.2.7 Bats

This section deals with the issues relative to bats during the construction phase.

Table 22: Bats

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
The destruction of features that could serve as potential roosts, such as	<ul style="list-style-type: none"> Construction activities must be kept out of all 'no-go' and high bat sensitive 	<ol style="list-style-type: none"> Apart from access roads, construction activities to be kept out of all 'no-go' 	<ul style="list-style-type: none"> Monitor the efficiency of the EMPR. 	<ul style="list-style-type: none"> During construction phase. 	<ul style="list-style-type: none"> Project Developer Bat specialist and ECO.

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
<p>rock formations and the removal of trees on site. The destruction of derelict holes, such as aardvark holes, and any fragmentation of woody habitat which include dense bushes. The removal of limited trees and bushes would have an impact on all bats that could potentially roost in and on the foraging habitat of clutter and clutter-edge species.</p>	<p>areas apart from access roads</p> <ul style="list-style-type: none"> Rock formations occurring along the ridge lines should be avoided during construction, as these serve as roosting space for bats. Destruction of trees should be avoided during construction. Care should be taken if any dense bushes are destroyed. Aardvark holes or any large derelict holes or excavations should not be destroyed before careful examination for bats. The ECO or a responsible appointed person or site manager should contact a bat specialist before construction commences so that they know what to look out for during construction. 	<p>and high bat sensitive areas.</p> <ol style="list-style-type: none"> Rock formations occurring along the ridge lines should be avoided during construction, as these serve as roosting space for bats. Destruction of trees should be avoided during construction. Care should be taken if any dense bushes are destroyed. Aardvark holes or any large derelict holes or excavations should not be destroyed before careful examination for bats. The Environmental Control Officer (ECO), or a responsible appointed person or site manager, should contact a bat specialist before construction commences so that they know what to look out for during construction. 	<ul style="list-style-type: none"> Monitor whether proposed measures are adhered to. ECO should be trained to recognize bat species and roost locations before construction starts. 	<ul style="list-style-type: none"> ECO should be trained before construction commences. Erosion and pollution monitoring during construction phase. Monitoring of off-road driving during construction phase. Monitor before anything is removed that could contain a bat roost. 	

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
<p>Creating new habitat amongst the turbines which might attract bats. This includes buildings with roofs that could serve as roosting space or open water sources from quarries or excavation where water could accumulate.</p>	<ul style="list-style-type: none"> Completely seal off roofs of new buildings (e.g., substations and site buildings). Note, a small bat species could enter a hole the size of 1 cm². Roofs need to be regularly inspected during the lifetime of the WEF, and any new holes need to be sealed. <p>Excavation areas, quarries or any other artificial depressions should be filled and rehabilitated to avoid creating new areas of open water sources which could attract bats during rainy spells.</p>	<ol style="list-style-type: none"> Completely seal off roofs of new buildings (e.g., substations and site buildings). Note, a small bat species could enter a hole the size of 1 cm². Roofs need to be regularly inspected during the lifetime of the WEF, and any new holes need to be sealed. Excavation areas, quarries or any other artificial depressions should be filled and rehabilitated to avoid creating new areas of open water sources which could attract bats during rainy spells. 	<ul style="list-style-type: none"> Visual inspection and continuous monitoring of high sensitivity areas, erosion prevention, chemical pollution and vehicle activity to prevent habitat destruction. If buildings, trees or structures providing potential roosts need to be demolished, the ECO is required to investigate the features before commencement of the works. 	<ul style="list-style-type: none"> Throughout construction ECO to be present during all site clearance activities Access to bat specialist if ECO needs information or confirmation concerning bat presence 	<ul style="list-style-type: none"> Project Developer. Holder of EA to appoint ECO. Appointed bat specialist to train the ECO, if necessary.
<p>Construction noise, especially during night-time.</p>	<ul style="list-style-type: none"> Prevent disturbance to bat activity and behaviour. 	<ol style="list-style-type: none"> Nightly construction activities should be avoided, or if necessary, minimised to the shortest period possible. Except for compulsory civil aviation lightning, artificial lightening during construction should be 	<ul style="list-style-type: none"> Monitor construction to reduce noise and minimise disturbance in bat sensitive areas. Avoid construction activities at night, as far as possible. 	<p>Throughout construction phase.</p>	<p>Project Developer and construction site manager.</p>

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		<p>minimised, especially bright lights or spotlights.</p> <p>3. Lights should avoid skyward illumination. Turbine tower lights should be switched off when not in operation, where possible.</p>			

9.2.8 Biodiversity

This section deals with the issues relative to biodiversity during the construction phase.

Table 23: Biodiversity

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY
<p>Loss of species of special concern:</p> <p>The construction activities will result in the disturbance of both aquatic and terrestrial</p>	<p>1. Develop and implement an Rehabilitation and Monitoring plan post Environmental Authorisation. This must be developed following the finalisation of the turbine / road layout and a walk down has been completed. This plan should include relocation of suitable plant species, but more important protect any topsoil stores and promote the collection of vegetative material and propagules / seed to assist with the revegetation of the site</p> <p>2. Where possible, temporary construction lay-down or assembly areas should be sited on transformed areas; and</p>	Holder of the EA ECO/specialist	Construction Monitoring and audit reports	<p>Impacts avoided or managed as per specialist recommendations.</p> <p>Alien Plant Management Plan Implemented</p> <p>Plant Rehabilitation Implemented</p>	Continuous

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY
habitats that may contain listed and or protected plant or animal species. However, none of these were observed during this assessment within the tower positions proposed	3. Rapid regeneration of plant cover must be encouraged by setting aside topsoil during earthmoving and replacing onto areas where the re-establishment of plant cover is desirable to prevent erosion.			Ensure the conditions of the EA are adhered to.	
Loss of terrestrial habitats – flora and vegetation: The construction of the proposed infrastructure will require the need to clear vegetation which could then have a secondary impact on ecological	<p>4. All alien plant re-growth, which is currently low within the greater region must be monitored and should it occur, these plants must be eradicated within the project footprints.</p> <p>5. Where possible, temporary construction lay-down or assembly areas should be sited on transformed areas; and</p> <p>6. Rapid regeneration of plant cover must be encouraged by setting aside topsoil during earthmoving and replacing onto areas where the re-establishment of plant cover is desirable to prevent erosion.</p>	Holder of the EA ECO/specialist	Construction Monitoring and audit reports	<p>Impacts avoided or managed as per specialist recommendations.</p> <p>Alien Plant Management Plan Implemented</p> <p>Plant Rehabilitation Implemented</p> <p>Ensure the conditions of the EA are adhered to.</p>	Continuous

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY
connectivity and especially Critical Biodiversity Areas, linked to the large riverine corridors.					
Loss of terrestrial species – fauna: Although most of the species observed are mobile, the increase in vehicle movement could result in an increase in road mortalities.	<ol style="list-style-type: none"> 1. Clear demarcation during the construction phase of all undisturbed sensitive areas that are not within the direct footprint of the REF to ensure that there is no uncontrolled access by construction vehicles and labourers; 2. Educate contractors as to the importance of the undisturbed conservations areas and importance of avoiding them; 3. All vehicles must stick to designated and prepared roads and adhere to the speed limit on site of 40km/hr; 4. Mitigating the risk of poaching by fencing in the accommodation compounds of the construction crews, to prevent individuals from wandering in the veld after hours; banning the possession of dogs on site by construction and maintenance staff. 	Holder of the EA ECO/specialist	Construction Monitoring and audit reports	<p>Impacts avoided or managed as per specialist recommendations.</p> <p>Alien Plant Management Plan Implemented</p> <p>Plant Rehabilitation Implemented</p> <p>Ensure the conditions of the EA are adhered to.</p>	Continuous

9.2.9 Surface Water

This section deals with the issues relative to surface water during the construction phase.

Table 24: Surface Water

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY
<p>Damage or loss of riparian and alluvial systems in the construction phase Construction could result in the loss of drainage systems that are fully functional and provide an ecosystem services within the site especially where new access roads are required or road upgrades will widen any current bridges or drifts. Loss can also include a functional loss, through change in vegetation type via alien encroachment for example</p>	<ol style="list-style-type: none"> 1. All alien plant re-growth, which is currently low within the greater region must be monitored and should it occur, these plants must be eradicated within the project footprints and especially in areas near the proposed crossings. Where roads and crossings are upgraded, the following applies: 2. Existing pipe culverts must be removed and replaced with suitable sized box culverts, especially where road levels are raised to accommodate any large vehicles. 3. River levels, regardless of the current state of the river / water course must be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist during a pre-construction walkdown. 4. Where large cut and fill areas are required these must be stabilised and rehabilitated during the construction process, to minimise erosion and sedimentation. 5. Suitable stormwater management systems must be installed along roads and other areas and monitored during the first few months of use. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc). 6. A detailed monitoring plan must be developed in the pre-construction phase by an aquatic specialist, where any delineated system occurs within 50 m of existing crossings. 	Holder of the EA	Construction Monitoring and audit reports	<p>Impacts avoided or managed as per specialist recommendations.</p> <p>Ensure the conditions of the EA are adhered to.</p>	Continuous

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY
<p>Potential impact on localised surface water quality (construction materials and fuel storage facilities) during the construction and decommissioning phases:</p> <p>During construction earthworks will expose and mobilise earth materials, and a number of materials as well as chemicals will be imported and used on site and may end up in the surface water, including soaps, oils, grease and fuels, human wastes, cementitious wastes, paints and solvents, etc. Any spills during transport or while works area conducted in proximity to a watercourse has the potential to affect the</p>	<ol style="list-style-type: none"> 1. All liquid chemicals including fuels and oil, including the BESS must be stored in with secondary containment (bunds or containers or berms) that can contain a leak or spill. Such facilities must be inspected routinely and must have the suitable PPE and spill kits needed to contain likely worst-case scenario leak or spill in that facility, safely. 2. Washing and cleaning of equipment must be done in designated wash bays, where rinse water is contained in evaporation/sedimentation ponds (to capture oils, grease cement and sediment). 3. Mechanical plant and bowsers must not be refuelled or serviced within 100m of a river channel. 4. All construction camps, lay down areas, wash bays, batching plants or areas and any stores should be more than 50 m from any demarcated water courses. Note comment regards Camp A that requires micro-siting. 5. Littering and contamination associated with construction activity must be avoided through effective construction camp management; No stockpiling should take place within or near a water course 6. All stockpiles must be protected and located in flat areas where run-off will be minimised and sediment recoverable; 	Holder of the EA	Construction Monitoring and audit reports	<p>Impacts avoided or managed as per specialist recommendations.</p> <p>Ensure the conditions of the EA are adhered to.</p>	Continuous

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY
<p>surrounding biota. Leaks or spills from storage facilities also pose a risk and due consideration to the safe design and management of the 30 000l fuel storage facility must be given. Although unlikely, consideration must also be provided for the proposed Battery Energy Storage System (BESS), with regard safe handling during the construction phase. This to avoid any spills or leaks from this system.</p>					

9.2.10 Noise

This section deals with the issues relative to noise during the construction phase.

Table 25: Noise

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Noise Special Conditions	<ol style="list-style-type: none"> 1. Ensure that equipment is well maintained and fitted with the correct and appropriate noise abatement measures. Engine bay covers over heavy equipment could be pre-fitted with sound absorbing material. Heavy equipment that fully encloses the engine bay should be considered, ensuring that the seam gap between the hood and vehicle body is minimised. 2. The applicant includes a component covering environmental noise in the Health and Safety Induction to sensitize all employees and contractors about the potential impact from noise, especially those employees and contractors that have to travel past receptors at night or might be required to do work close (within 1,000m) to NSRs at night. 3. The developer must investigate any reasonable and valid noise complaint if registered by a receptor staying within 2,000 m from the location where construction activities are taking place or operational wind turbine is present. A complaints register must be kept on site. 4. The developer must minimize night-time construction traffic if the access roads are closer than 150 m from any NSD, alternatively, the access road must be relocated further than 120 m from NSDs (night-time traffic passing occupied houses). 5. The developer should implement a noise monitoring programme at NSD06 before the construction phase, as well as a noise measurement programme during the operational phase. If the noise levels exceed 45 dBA, a noise abatement program should be developed and implemented. 	Holder of EA/Contractor	<p>Noise and lighting managed according to approved Method Statement</p> <p>Ensure the EMPr is adhered to.</p>	Continuous
<p>Noise impacts during the day: Construction activities relating to hardstand areas, digging of</p>	<ol style="list-style-type: none"> 1. No specific mitigation measures recommended for construction activities at the WTG locations or for substations. 2. Continuing management objectives would be: 	Holder of EA/Contractor	Noise and lighting managed according to approved Method Statement	Continuous

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
foundations for wind turbines, civil works as well as erection of wind turbines	<ul style="list-style-type: none"> Ensure that total daytime construction noise levels are less than 52 dBA at all potential NSDs (dwellings used for residential purposes); Ensure that total night-time construction noise levels are less than 45 dBA at all potential NSDs (dwellings used for residential purposes); Ensure that total noise levels due to operational activities are less than 45 dBA at all potential NSDs (dwellings used for residential purposes); and Prevent the generation of nuisance noises. 		Ensure the EMPr is adhered to.	
Noise impacts at night: Construction activities relating to civil works as well as erection of wind turbines	<ol style="list-style-type: none"> Night-time construction activities closer than 1,000 m from and NSD06 to be minimized. Night-time construction activities (closer than 800 m) are not recommended and it should be minimized where possible. If construction activities take place closer than 800 m at night (such as the pouring of concrete), NSD should be notified of the activity that will be taking place at night. 	Holder of EA/Contractor	Noise and lighting managed according to approved Method Statement Ensure the EMPr is adhered to.	Continuous

9.2.11 Heritage

This section deals with the issues relative to Heritage during the construction phase.

Table 26: Heritage

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Paleontology	<ol style="list-style-type: none"> During the construction phase the Chance Fossil Finds Protocol summarized in Annexure D should be fully implemented. The Environmental Control Officer (ECO) / Environmental Site Officer (ESO) responsible for the development should be made aware of the possibility of important fossil remains (vertebrate bones, teeth, petrified wood, plant-rich horizons etc.) being found 	Paleontologist/ECO	Ensure the EMPr is adhered to.	Continuous

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<p>or unearthed during the construction phase of the development. Monitoring for fossil material of all major surface clearance and deeper (>1m) excavations by the Environmental Site Officer on an on-going basis during the construction phase is therefore recommended. Significant fossil finds should be safeguarded and reported at the earliest opportunity to Heritage Western Cape for recording and sampling by a professional palaeontologist (Contact details: Heritage Western Cape. 3rd 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).</p>			
<p>Cultural landscape - Ecological</p>	<ol style="list-style-type: none"> 1. Critical Biodiversity Areas, and Ecological Support Areas (along drainage lines), should be protected from development of the wind turbines or any associated development during all phases. 2. No wind turbines should be placed within the 1:100-year flood line of the watercourses. In the context of the sensitivity to soil erosion in the area, as well as potential archaeological resources, it would be a risk to include any structures close to these drainage lines 3. Remaining areas of endemic and endangered natural vegetation should be conserved. 4. Renosterveld, and in this case, the Matjiesfontein Shale Renosterveld is found in the mid-elevations, and should be kept free from development. Renosterveld is classified as a threatened ecosystem, only found within the boundaries of South Africa. Care should be taken that we do not needlessly destroy our rare resources that determine the character of the Karoo landscape, and often on the mid-slopes. 5. Areas of critical biodiversity should be protected from any damage during all phases; where indigenous and endemic vegetation should be preserved at all cost. 	<p>Holder of the EA/Contractor</p>	<p>Ensure the EMPr is adhered to.</p>	<p>Continuous</p>

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<ol style="list-style-type: none"> 6. Areas of habitat are found among the rocky outcrops and contribute to the character, as well as biodiversity of the area. Care should be taken that habitats are not needlessly destroyed. 7. Identified medicinal plants used for healing or ritual purposes should be conserved during all phases if threatened for use. 8. Careful planning should incorporate areas for stormwater runoff where the base of the structure disturbed the natural soil. Local rocks found on the site could be used to slow stormwater (instead of concrete, or standard edge treatments), and prevent erosion that would be an unfortunate consequence that would alter the character of the site. By using rocks from site it helps to sensitively keep to the character. 9. Water use for the construction/ decommissioning phase of the development must not negatively impact on the water resources in the area and must not negatively impact on the access or usage of water and water infrastructure for local inhabitants. 			
<p>Cultural landscape - Aesthetic</p>	<ol style="list-style-type: none"> 1. Encourage mitigation measures (for instance use of vegetation) to 'embed' or disguise the proposed structures within the surrounding tourism and agricultural landscape at ground level, road edges etc; 2. The continuation of the traditional use of material could be enhanced with the use of the rocks on the site as building material. This would also help to embed structures into the landscape and should not consist of shipping containers or highly reflective untreated corrugated sheeting that clutters the landscape and exacerbates the foreign intrusion on the natural landscape. 3. Using material found on the site adds to the sense of place and reduces transportation costs of bringing materials to site. 4. The local material such as the rocks found within the area could be applied to address storm water runoff from the road to prevent erosion. 	<p>Holder of the EA/Contractor</p>	<p>Ensure the EMP is adhered to.</p>	<p>Continuous</p>

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<p>5. Duration and magnitude of construction/ decommissioning activity must be minimized as far possible to reduce the impact of heavy vehicles on the roads as well as the associated dust from the activity. Lightest vehicles possible should be used to reduce degradation to the farm roads and the need to upgrade roads to scale and extent that negatively impacts on the integrity of the historic farm roads. Construction/ decommissioning traffic must operate at speeds that reduce dust and noise as far possible.</p>			
<p>Cultural landscape - Historic</p>	<ol style="list-style-type: none"> 1. Historic farmsteads must be protected from the impacts of heavy construction vehicles and increased numbers of people. No construction traffic should pass through or closer than 50m to the outer boundaries of a farm werf, or 200m from graded structures, which includes the associated historically cultivated lands, cemeteries, unmarked burials. The most appropriate use of existing farm roads must be found to avoid farm werfs as far as possible and reduce construction impact on these heritage features. 2. Duration and magnitude of construction/ decommissioning activity must be minimized as far possible to reduce the impact of heavy vehicles on the roads as well as the associated dust from the activity. Lightest vehicles possible should be used to reduce degradation to the farm roads and the need to upgrade roads to scale and extent that negatively impacts on the integrity of the historic farm roads. Construction decommissioning traffic must operate at speeds that reduce dust and noise as far possible. 3. Accommodation of construction staff must not negatively impact on existing farm residents or degrade the integrity of the farmstead complexes and should, without negative impact to ecological or aesthetic resources, be located outside of the farmstead complexes or site. Farm residents should be consulted on the preferable location for construction staff accommodation. 	<p>Holder of the EA/Contractor</p>	<p>Ensure the EMP is adhered to.</p>	<p>Continuous</p>

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<p>4. Traditional planting patterns should be protected by ensuring that existing trees are not needlessly destroyed, as these signify traces of cultural intervention in a harsh environment. These planting patterns include the trees planted around the werfs and along travel routes. Interpretation of these landscape features as historic remnants should occur. A buffer of 50m around such planting patterns should be maintained.</p> <p>5. Burial grounds and places of worship are automatically regarded as Grade IIIa or higher. Any development that threatens the inherent character of family burial grounds must be assessed and should be discouraged. No turbines have been proposed for placement near known unmarked burials or family cemeteries. A preconstruction micro-survey of each turbine footprint and any new access roads should be conducted to ensure no further unmarked graves are threatened.</p> <p>6. Mountain slopes have been used for traditional practices for many years, and care should be taken that any significant cultural sites, such as burials and veldkos/medicinal plant resources, are not disturbed.</p> <p>7. Farms in the area followed a system of stone markers to demarcate the farm boundaries in the area. Where these structures are found on the site, care should be taken that they are not destroyed, as they add to the layering of the area.</p> <p>8. Roads running through the area have historic stone way markers. Where these are found care should be taken that they are left in tact and in place. Road upgrades must not move or threaten their position and they should be visible from the road they are related to by passing travellers.</p> <p>9. Where the historic function of a building/site is still intact, the function has heritage value and should be protected.</p> <p>10. Surviving examples (wagon routes, outspans, and commonage), where they are owned in some public or communal way (or by a</p>			

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<p>body responsible for acting in the public interest) and where they are found to be actively operating in a communal way, will have cultural and heritage value and should be enhanced and retained. The historic route running through Karee should be maintained and integrity as a communal road for farm residents must be retained.</p> <p>11. Maintain traditional movement patterns across rural landscapes or to places of socio-historical value. (a) Avoid privatization or the creation of barriers to traditional access routes, such as the Voetpadsloof over the Bontebergen. (b) Retain old roadways, which have been replaced by newer roads, for use as recreation trails.</p>			
<p>Cultural landscape - Socio-economic</p>	<p>1. An updated cultural landscapes impact assessment report must be completed should the WEF continue to be used after the term granted in this application. This report should include a detailed assessment of the socio-economic impacts to the cultural landscape and its outcomes and recommendations need to be considered in the decision for recommissioning and be implemented if recommissioning is approved.</p> <p>2. The continued use of the landscape for human habitation and cultivation by historic residents of the area should be retained and encouraged as far possible to sustain the continual use pattern and human-environment relationship which is the ultimate significance of this cultural landscape element. The WEF development must allow and support this, including financially, and not degrade this continued relationship.</p> <p>3. The local community on and around the development should benefit from job opportunities created by the proposed development and the development should not cause reduction in economic viability of surrounding properties in excess of those offered by the development. Short-term job opportunities at the</p>	<p>Holder of the EA/Contractor</p>	<p>Ensure the EMPr is adhered to.</p>	<p>Continuous</p>

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<p>expense of long term economic benefit and local employment opportunities must be prevented.</p> <p>4. Local residents must be offered employment on the construction/ decommissioning and operational phases before 'importing' staff from elsewhere.</p> <p>5. Local residents must be offered employment training opportunities associated with WEF developments at all phases.</p> <p>6. Sheep, cattle or game farming should be allowed to continue below the wind turbines, or be rehabilitated to increase biodiversity in the area.</p>			

9.2.12 Visual

This section deals with the issues relative to visual during the construction phase.

Table 27: Visual

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
<p>Potential alteration of the visual character and sense of place</p> <p>Potential visual impact on receptors in the study area</p>	<ol style="list-style-type: none"> 1. Carefully plan to minimise the construction period and avoid construction delays. 2. Inform receptors within 1km of the WEF development area of the construction programme and schedules. 3. Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. 4. Vegetation clearing should take place in a phased manner. 5. Maintain a neat construction site by removing rubble and waste materials regularly. 6. Position storage / stockpile areas in unobtrusive positions in the landscape, where possible. 7. Where possible, underground cabling should be utilised. 8. Make use of existing gravel access roads where possible. 	Holder of the EA/Contractor	Ensure the EMP is adhered to.	Continuous

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	9. Limit the number of vehicles and trucks travelling to and from the construction site, where possible. 10. Ensure that dust suppression techniques are implemented: <ul style="list-style-type: none"> • on all access roads; • in all areas where vegetation clearing has taken place; • on all soil stockpiles. 			
<p>Potential alteration of the visual character and sense of place in the broader area.</p> <p>Potential visual impact on receptors in the study area.</p> <p>Potential visual impact on the night time visual environment.</p>	<ol style="list-style-type: none"> 1. Carefully plan to minimise the construction period and avoid construction delays. 2. Position laydown areas and related storage/stockpile areas in unobtrusive positions in the landscape, where possible. 3. Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. 4. Vegetation clearing should take place in a phased manner. 5. Where possible, the operation and maintenance buildings should be consolidated to reduce visual clutter. 6. As far as possible, limit the number of maintenance vehicles which are allowed to access the facility. 7. Ensure that dust suppression techniques are implemented on all gravel access roads. 8. As far as possible, limit the amount of security and operational lighting present on site. 9. Light fittings for security at night should reflect the light toward the ground and prevent light spill. 10. Lighting fixtures should make use of minimum lumen or wattage. 11. Mounting heights of lighting fixtures should be limited, or alternatively foot-light or bollard level lights should be used. 12. If possible, make use of motion detectors on security lighting. 13. The operations and maintenance (O&M) buildings should not be illuminated at night. 14. The O&M buildings should be painted in natural tones that fit with the surrounding environment. 	Holder of the EA	Ensure the EMPr is adhered to.	Continuous

9.2.13 Social

This section deals with the issues relative to social during the construction phase.

Table 28: Social

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Hazard exposure to the public and employees associated with construction and operational activities and construction and operational related traffic.	<ol style="list-style-type: none"> 1. Restrict public access to construction areas. 2. Only allow site access after appropriate induction and use of appropriate personal protective equipment. 3. Impose vehicle speed restrictions and display appropriate signage. 4. Ensure use and storage of hazardous materials is in accordance with Health and Safety regulations. 5. Keep a record of all accidents or transgressions of safety in accordance with the OHS Act and implement corrective action. 6. Ensure that fires are not lit on site. 7. Engage a safety officer. 	Project developer in association with contractors.	Accident and incident tally and compliance with the OHS Act.	Construction phase
Annoyance and health risks.	<ol style="list-style-type: none"> 1. Plan the siting of turbines, substations and power lines so as to avoid sensitive areas such as dwellings. 2. Consult with local communities and, if necessary, make adjustments during the site pegging stage of the project. 	Project developer and contractors.	The frequency of complaints laid, and the time lag between notification of the complaint and resolution. Level of public satisfaction.	Construction
Degraded air quality and potential impact on human and animal health and accumulation of dust on vegetation used for grazing.	<ol style="list-style-type: none"> 1. Wet gravel roads regularly. 2. Ensure that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. 3. Ensure that all vehicles are roadworthy and drivers are qualified and made aware of the potential noise and dust issues. 4. Ensure that drivers adhere to speed limits. 5. Re-vegetate disturbed areas as soon as is practical after construction. 6. Appoint a community liaison officer to deal with complaints and grievances from the public. 	Project developer in association with contractors.	Frequency of complaints from the public, and time-lapse between receiving and resolving complaints. Public satisfaction in having their complaints addressed. Overall public satisfaction.	Construction

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	7. If complaints reach unacceptable levels an air quality survey should be undertaken to assess the situation, identify the source and rectify.			
General nuisance factor resulting from construction and operational activities and associated traffic.	<ol style="list-style-type: none"> 1. Schedule the delivery hours to avoid peak hour traffic, weekends and evenings. 2. Limit the need for transportation over long distances by sourcing as much materials and goods as is feasible from local suppliers. 3. Alert traffic authorities well in advance of any heavy loads that will be transported on local roads and elicit their assistance in controlling traffic associated with the transportation of these loads. 4. Alert the workforce to the need to behave in a socially responsible manner, being considerate towards local residents. 5. Establish a code of conduct for the workforce. 6. Restrict work activities that require power tools and plant that generates noise to normal working hours and limit such activities over weekends. 7. Ensure that local by-laws are always adhered to. 8. Appoint a community liaison officer. 9. Ensure that a grievance/complaint reporting procedure is in place, appropriately implemented and that all submissions received are managed by: <ul style="list-style-type: none"> ➤ Recording grievance submission date. ➤ Keeping complainant informed of progress towards corrective action. ➤ Keeping a record of corrective action taken and recording closure date. 10. Introduce an incident reporting system to be tabled at weekly/monthly project meetings. 	Project developer in association with contractors.	The frequency of complaints laid and the time lag between notification of the complaint and resolution. Level of public satisfaction.	Construction
Health and well-being: Increased risk of HIV infections	<ol style="list-style-type: none"> 1. Implement an HIV/AIDS Awareness and Training Programme for the Contractor's workforce and, if feasible the local community, within two weeks of commencement of construction. 2. Ensure that the HIV/AIDS Awareness and Training Programme is consistent with national guidelines and/or IFC's Good Practice. 	Human resource department and project manager. Contractors.	The stability of STDs and HIV infections amongst the workforce.	Construction

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<ol style="list-style-type: none"> 3. Focus on the recruitment of local labour which may help to stabilise the risk of the spread of HIV/AIDS by avoiding the need to introduce migrant labour during the construction phase. 4. Provide voluntary and free counselling, free testing and condom distribution services. 			
Health and well-being: Influx of construction workers	<ol style="list-style-type: none"> 1. As far as possible source low-skilled workers from local communities and surrounding areas. 2. If feasible employ local contractors. 	Project developer and contractors.	The frequency of complaints and incidents between the workforce and local communities	Construction
Construction activities may result in opportunities for criminal activities, such as theft, damage to property, stock theft and alcohol-related crime amongst others.	<ol style="list-style-type: none"> 1. Encourage contractors and local residents to report any suspicious activity associated with crime to the appropriate authorities. 2. Inform workers that trespassing onto adjoining private properties is not permitted. 3. Ensure that the local municipalities, police, security companies, and policing forums are alerted to the increased construction activities in the region and the risk it poses in respect of crime. 4. Prevent loitering within the vicinity of the construction camp as well as construction sites. 5. Manage the growth of informal settlements that may arise as a response to perceived job opportunities by promptly alerting the appropriate authorities. 	Project developer and contractors.	Frequency of incidents of project-related crime experienced.	Construction
Employment opportunity for local people and business opportunity for local businesses.	<ol style="list-style-type: none"> 1. Ensure that the majority of the low-skilled workforce are recruited locally, where possible. 2. Undertake a skills audit to determine the level of skills and what development and training programmes are required. 3. Commence with skill development programmes within the first month of construction. 4. Identify employment opportunities for women and ensure that they receive appropriate training. 5. Identify opportunities for local businesses and ensure that the services from local businesses are prioritised. 	Human Resources, Project developer and contractors.	Composition of the labour force and value of procurement from local businesses. Level of skills imparted to the local workforce.	Continuous

9.2.14 Transportation

This section deals with the issues relative to transportation during the construction phase.

Table 29: Transportation

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Additional Traffic Generation: Increase in Traffic	<ol style="list-style-type: none"> 1. Ensure staff transport is done in the 'off peak' periods and by bus. 2. Stagger material, component and abnormal loads 3. Construction of an on-site concrete batching plant to reduce trips. 	Holder of the EA/Contractor	<p>All staff members are aware of the EMPr requirements relevant to them</p> <p>Ensure the EMPr is adhered to.</p>	Continuous
Additional Traffic Generation: Increase of Incidents with pedestrians and livestock	<ol style="list-style-type: none"> 1. Upgrade of existing / new access points 2. Reduction in speed of vehicles 3. Adequate enforcement of the law 4. Implementation of pedestrian safety initiatives 5. Regular maintenance of farm fences & access cattle grids 6. Construction of an on-site concrete batching plant to reduce trips. 	Holder of the EA/Contractor	<p>All staff members are aware of the EMPr requirements relevant to them</p> <p>Ensure the EMPr is adhered to.</p>	Continuous
Additional Traffic Generation: Increase in Dust from gravel roads	<ol style="list-style-type: none"> 1. Upgrade of existing / new access point Reduction in speed of the vehicles 2. Construction of gravel roads in terms of TRH20 3. Implement a road maintenance program under the auspices of the respective transport department. 4. Possible use of an approved dust suppressant techniques 5. Construction of an on-site batching plant and tower construction to reduce trips. 	Holder of the EA/Contractor	<p>All staff members are aware of the EMPr requirements relevant to them</p> <p>Ensure the EMPr is adhered to.</p>	Continuous
Additional Traffic Generation: Increase in Road Maintenance	<ol style="list-style-type: none"> 1. Implement a road maintenance program under the auspices of the respective transport department. 2. Construction of an on-site batching plant to reduce trips. 	Holder of the EA/Contractor	<p>All staff members are aware of the EMPr requirements relevant to them</p>	Continuous

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			Ensure the EMPr is adhered to.	
Additional Abnormal Loads	<ol style="list-style-type: none"> 1. Ensure abnormal vehicles travel to and from the proposed development in the 'off peak' periods or stagger delivery. 2. Adequate enforcement of the law 	Holder of the EA/Contractor	<p>All staff members are aware of the EMPr requirements relevant to them</p> <p>Ensure the EMPr is adhered to.</p>	Continuous
Internal Access Roads: Increase in Dust from gravel roads	<ol style="list-style-type: none"> 1. Enforce a maximum speed limit on the development 2. Appropriate, timely and high quality maintenance required in terms of TRH20 3. Possible use of an approved dust suppressant techniques 	Holder of the EA/Contractor	<p>All staff members are aware of the EMPr requirements relevant to them</p> <p>Ensure the EMPr is adhered to.</p>	Continuous
Internal Access Roads: New / Larger Access points	<ol style="list-style-type: none"> 1. Adequate road signage according to the SARTSM 2. Approval from the respective roads department 	Holder of the EA/Contractor	<p>All staff members are aware of the EMPr requirements relevant to them</p> <p>Ensure the EMPr is adhered to.</p>	Continuous

9.3 Operation Phase

9.3.1 Construction Site Decommissioning

This section deals with the issues relative to construction site decommissioning during the operation phase.

Table 30: Construction Site Decommissioning

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Construction Site Decommissioning: Removal of equipment	1. All structures comprising the construction camp are to be removed from site. 2. The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc., and these shall be cleaned up. 3. All hardened surfaces within the construction camp area should be ripped, all imported materials removed, and the area shall be top soiled and regressed using the guidelines set out in the re-vegetation that forms part of this document.	Holder of EA/Contractor	Compliance to all legislative requirements. Ensure the EMPr is adhered to.	Following construction
Construction Site Decommissioning: Temporary services	1. The Contractor must arrange the cancellation of all temporary services. 2. Temporary roads must be closed and access across these, blocked. 3. All areas where temporary services were installed are to be rehabilitated to the satisfaction of the ECO.	Holder of EA/Contractor	Compliance to all legislative requirements. Ensure the EMPr is adhered to.	Following construction
Construction Site Decommissioning: Associated infrastructure	1. Surfaces are to be checked for waste products from activities such as concreting or asphaltting and cleared in a manner approved by the Engineer. 2. All surfaces hardened due to construction activities are to be ripped and imported material thereon removed. 3. All rubble is to be removed from the site to an approved disposal site as approved by the Engineer. Burying of rubble on site is prohibited. 4. The site is to be cleared of all litter. 5. The Contractor is to check that all watercourses are free from building rubble, spoil materials and waste materials. 6. Fences, barriers and demarcations associated with the construction phase are to be removed from the site unless stipulated otherwise by the Engineer.	Holder of EA/Contractor	All waste managed according to approved Method Statement	Following construction

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	7. All residual stockpiles must be removed to spoil or spread on site as directed by the Engineer. 8. All leftover building materials must be returned to the depot or removed from the site. 9. The Contractor must repair any damage that the construction works has caused to neighbouring properties, specifically, but not limited to, damage caused by poor storm water management.			
Construction Site Decommissioning: Rehabilitation plan	1. Rehabilitate and re-vegetate cleared areas with indigenous plant species.	Holder of EA/Contractor	Alien Plant Management Plan Plant Rehabilitation implemented	Following construction

9.3.2 Operation and Maintenance

This section deals with the issues relative to operation and maintenance during the operation phase.

Table 31: Operation and Maintenance

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Operation and Maintenance: Maintenance	1. All applicable standards, legislation, policies and procedures must be adhered to during operation. 2. Regular ground inspection of the plants must take place to monitor their status.	Holder of the EA	Ensure the conditions of the EA are adhered to. Compliance to all legislative requirements	During operation
Operation and Maintenance: Public awareness	1. The emergency preparedness plan must be ready for implementation at all times should an emergency situation arise.	Holder of the EA	Adhere to Emergency Evacuation Plan	During operation

9.3.3 Waste Management

This section deals with the issues relative to waste management during the operation phase.

Table 32: Waste Management

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIME FRAME
Waste Management: Recycling and litter management	<ol style="list-style-type: none"> The site should be kept clear of litter at all times. Solid waste separation and recycling should take place for the duration of the operational phase for the development at the administration block. All waste must be removed promptly to ensure that it does not attract vermin or produce odours. Solid waste should be collected on a regular basis. 	Holder of EA	All waste managed according to approved Method Statement Compliance to all legislative requirements.	Continuous

9.3.4 Agriculture and Soils

This section deals with the issues relative to agriculture and soils during the operation phase.

Table 33: Agriculture and Soils

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
Aspect: Protection of soil resources Erosion	<ol style="list-style-type: none"> Maintain the storm water run-off control system. Monitor erosion and remedy the storm water control system in the event of any erosion occurring. 	Facility Environmental Manager	Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of the storm water run-off control system and to specifically record the occurrence of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring.	That existence of hard surfaces causes no erosion on or downstream of the site.	Bi-annually

ASPECT/ IMPACT	IMPACT ACTIONS	MANAGEMENT	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
Aspect: Protection of soil resources Erosion	1. Facilitate re-vegetation of denuded areas throughout the site.		Facility Environmental Manager	Undertake a periodic site inspection to record the progress of all areas that require re-vegetation.	That denuded areas are re-vegetated to stabilise soil against erosion	Bi-annually
Soil Erosion: Increased erosion due to alteration of natural drainage	1. Maintain drainage channels 2. Monitor for erosion and remediate and rehabilitate timeously		Engineer/Contractor Holder of EA	Undertake regular audits	Erosion plan implemented and hydrological measures in place All waste managed according to approved Method Statement Ensure the EMP is adhered to.	Continuous

9.3.5 Avifauna

This section deals with the issues relative to avifauna during the operation phase.

Table 34: Avifauna

ASPECT/ IMPACT	IMPACT ACTIONS	MANAGEMENT	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY
Avifauna: Mortality due to collisions with the wind turbines:	1. Formal live-bird monitoring and carcass searches should be implemented at the start of the operational phase, as per the most recent edition of the Best		1. Operations Manager 2. Operations Manager	1. Appoint Avifaunal Specialist to compile operational monitoring plan, including live bird monitoring and carcass searches.	Prevention of collision mortality on the wind turbines.	1. Once-off 2. Years 1,2, 5 and every five years after that for

ASPECT/ IMPACT	IMPACT ACTIONS	MANAGEMENT	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY
Bird collisions with the wind turbines	<p>Practice Guidelines at the time (Jenkins <i>et al.</i> 2015) to assess collision rates. The exact time when operational monitoring should commence, will depend on the construction schedule, and should commence when the first turbines start operating. The Best Practice Guidelines require that, as an absolute minimum, operational monitoring should be undertaken for the first two (preferably three) years of operation, and then repeated again, in year 5, and again every five years thereafter for the operational lifetime of the facility.</p> <p>2. If estimated annual collision rates indicate unacceptable mortality levels of priority species, i.e if it exceeds mortality thresholds as determined by the avifaunal specialist in consultation with BLSA and other avifaunal specialists, additional measures will have to be implemented which could include shut down on demand or other proven measures.</p>		<p>3. Operations Manager</p> <p>4. Operations Manager</p>	<p>2. Implement operational monitoring plan.</p> <p>3. Design and implement mitigation measures if mortality thresholds are exceeded.</p> <p>4. Compile quarterly and annual progress reports detailing the results of the operational monitoring and progress with any recommended mitigation measures.</p>		<p>the duration of the operational lifetime of the facility.</p>

ASPECT/ IMPACT	IMPACT ACTIONS	MANAGEMENT	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY
Avifauna: Mortality due to collisions and electrocutions on the 33kV network: Bird electrocutions on the overhead sections of the internal 33kV cables	<p>1. Conduct regular inspections of the overhead sections of the internal reticulation network to look for carcasses.</p> <p>A site-specific EMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the EMPr and should apply good environmental practice during construction. The EMPr must specifically include the following:</p> <ol style="list-style-type: none"> 1. No off-road driving. 2. Maximum use of existing roads. 3. Measures to control noise and dust according to latest best practice. 4. Restricted access to the rest of the property. 5. Strict application of all recommendations in the botanical specialist report pertaining to the limitation of the footprint. 		Operations Manager	<ol style="list-style-type: none"> 1. Carcass searchers under the supervision of the Avifaunal Specialist. 2. Design and implement mitigation measures if mortality thresholds are exceeded. 3. Compile quarterly and annual progress reports detailing the results of the operational monitoring and progress with any recommended mitigation measures. 	Prevention of electrocution mortality on the overhead sections of the 33kV internal cable network.	At least once every two months.

9.3.6 Bats

This section deals with the issues relative to bats during the operation phase.

Table 35: Bats

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
<p>Fatality through direct collision or barotrauma of resident bats occupying the airspace amongst the turbines. The turning blades of the turbines during operation are the most important aspect of the project that would impact negatively on bats. High flying species have predominantly been confirmed at the proposed Karee WEF site.</p>		<ol style="list-style-type: none"> All turbines and turbine components, including the rotor swept zone, should be kept out of all 'no-go' and high sensitivity zones. Mitigation, as proposed, should be applied as soon as the test period of turbines are completed, and turbines start turning. Mitigation, as proposed for medium sensitivity zones proposed in Section 9, Table 8, should be applied after testing, as soon as turbines start to turn. A bat specialist should be appointed before the turbines start to turn, and operational bat monitoring should start when all the turbines start to turn, for a minimum of two years, or described by the latest South African bat guidelines. At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring for Bats at 	<ul style="list-style-type: none"> Regular bat monitoring reports, informed by the relevant SABAA operational bat monitoring guidelines. Adhere to the mitigation measures as indicated by the EA and Section 9 of the Bat Monitoring report. Maintain a register of bat mortality/injury. Regular communication 	<p>Throughout operation and during operational bat monitoring period.</p>	<p>Site manager, Project developer</p>

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		<p>Wind Energy facilities (Aronson, et.al., 2020), or later versions of the guidelines valid at the time of monitoring, as well as other relevant South African guidelines as applicable during the monitoring period.</p> <p>6. Mitigation should be discussed between the bat specialist and developer during the operational phase. Mitigation should be adapted and implemented without delay. Where high bat mortality occurs, turbine specific mitigation measures should be applied, using Section 9 as a starting point for discussions.</p> <p>7. Except for compulsory lighting required in terms of civil aviation, artificial lighting should be minimised, especially bright lights. Lights should rather be turned downwards. Turbine tower lights should be switched off when not in operation, if possible.</p> <p>8. It is understood that static bat monitoring equipment on turbines has a cost implication. Although it is not a requirement at this stage, as it depends on whether the Met mast will be deployed for the life span of the turbines but having more refined static data from sampling points at height, would aid in interpreting future bat</p>	between bat specialist and site manager.		

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		fatality records of the Karee WEF. Therefore, the installation of more than one monitoring system at height, is important.			
Bat fatality during migration. A limited number of calls like <i>Miniopterus natalensis</i> (Natal Long-fingered bat), a Near Threatened migration species, have been recorded. Not much research has been conducted on migration of bats in South Africa, and some of the other species occurring on site could also migrate.	<ol style="list-style-type: none"> Mitigate potential impacts on bats during operation of wind farm. Reduce bat mortality during the operational lifetime of the wind farm. Supervise all bat monitoring activities. 	<ol style="list-style-type: none"> Care should be taken during post construction monitoring to verify the activity of <i>M. natalensis</i>, especially within the rotor swept area of the turbine blades. Carcasses should be identified so as to establish the fatality of this species. All turbines and turbine components, including the rotor swept zone, should be kept out of all 'no-go' and high sensitivity zones. Mitigation, as proposed, should be applied as soon as the test period of turbines are completed and turbines start turning. Mitigation, as proposed for medium sensitivity zones proposed, should be applied after testing, as soon as turbines start to turn. A bat specialist should be appointed before the turbines start to turn, and operational bat monitoring should start when all the turbines start to turn, for a minimum of two years, or described by the latest South African bat guidelines. 	<ul style="list-style-type: none"> Regular bat monitoring reports, informed by the relevant SABAA operational bat monitoring guidelines. Adhere to the mitigation measures as indicated by the EA and Section 9 of the Bat Monitoring report. Maintain a register of bat mortality/injury. Regular communication between bat 	Throughout operation and during operational bat monitoring period.	Site manager, Project developer

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		<p>6. At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy facilities (Aronson, et.al., 2020), or later versions of the guidelines valid at the time of monitoring, as well as other relevant South African guidelines as applicable during the monitoring period.</p> <p>7. Mitigation should be discussed between the bat specialist and developer during the operational phase. Mitigation should be adapted and implemented without delay. Where high bat mortality occurs, turbine specific mitigation measures should be applied.</p> <p>8. Except for compulsory lighting required in terms of civil aviation, artificial lighting should be minimised, especially bright lights. Lights should rather be turned downwards. Turbine tower lights should be switched off when not in operation, if possible.</p> <p>9. It is understood that static bat monitoring equipment on turbines has a cost implication. Although it is not a requirement at this stage, as it depends on whether the Met mast will</p>	specialist and site manager		

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		be deployed for the life span of the turbines but having more refined static data from sampling points at height, would aid in interpreting future bat fatality records of the Karee WEF. Therefore, the installation of more than one monitoring system at height, is important.			
Loss of bats of conservation value.		<ol style="list-style-type: none"> 1. Loss of bats of conservation value. A limited number of calls like the red <i>data Miniopterus natalensis</i> have been recorded, as well as the endemic <i>E. hottentotus</i>. Proven mitigation measures, such as curtailment, should be timeously applied if high activity of bats of conservation value is recorded, or if high numbers of carcasses are collected, during post-construction. 2. All turbines and turbine components, including the rotor swept zone, should be kept out of all 'no-go' and high sensitivity zones. 3. Mitigation, as proposed, should be applied as soon as the test period of turbines are completed and turbines start turning. 4. Mitigation, as proposed for medium sensitivity zones proposed, should be applied after testing, as soon as turbines start to turn. 		Throughout operation and during operational bat monitoring period.	Site manager, Project developer

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		<p>5. A bat specialist should be appointed before the turbines start to turn and operational bat monitoring should start when all the turbines start to turn, for a minimum of two years, or described by the latest South African bat guidelines.</p> <p>6. At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy facilities (Aronson, et.al., 2020), or later versions of the guidelines valid at the time of monitoring, as well as other relevant South African guidelines as applicable during the monitoring period.</p> <p>7. Mitigation should be discussed between the bat specialist and developer during the operational phase. Mitigation should be adapted and implemented without delay. Where high bat mortality occurs, turbine specific mitigation measures should be applied, using Section 9 as a starting point for discussions.</p> <p>8. Except for compulsory lighting required in terms of civil aviation, artificial lighting should be minimised, especially bright lights. Lights should rather be turned downwards. Turbine</p>			

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		<p>tower lights should be switched off when not in operation, if possible.</p> <p>9. It is understood that static bat monitoring equipment on turbines has a cost implication. Although it is not a requirement at this stage, as it depends on whether the Met mast will be deployed for the life span of the turbines but having more refined static data from sampling points at height, would aid in interpreting future bat fatality records of the Karee WEF. Therefore, the installation of more than one monitoring system at height, is important.</p>			
Bat fatality due to the attraction of bats to turbine blades.	Avoid activities that will attract bats to turbines.	<ol style="list-style-type: none"> 1. Bat mortality due to the attraction of bats to wind turbines (Horn, et al., 2008). Bats have been shown to sometimes be attracted to wind turbines out of curiosity or reasons still under investigation. 2. Except for compulsory lighting required in terms of civil aviation, artificial lighting should be minimised, especially bright lights. Lights should rather be turned downwards. Turbine tower lights should be switched off when not in operation, if possible. 	Reduce lights as far as possible.	Ongoing	Site manager/Project Developer

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		3. Little is known about this impact, and mitigation could be adapted if more research becomes available.			
Loss of habitat and foraging space during operation of the wind turbines.	<ul style="list-style-type: none"> Mitigate the loss of habitat and foraging space to avoid bat mortality. Reduce bat mortality during the operational lifetime of the wind farm. 	<ol style="list-style-type: none"> All turbines and turbine components, including the rotor swept zone, should be kept out of all 'no-go' and high sensitivity zones. Mitigation, as proposed in should be applied as soon as the test period of turbines are completed and turbines start turning. Mitigation, as proposed for medium sensitivity zones proposed, should be applied after testing, as soon as turbines start to turn. A bat specialist should be appointed before the turbines start to turn, and operational bat monitoring should start when all the turbines start to turn, for a minimum of two years, or described by the latest South African bat guidelines. At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring 	Adaptive mitigation plan.	During operations.	Site manager/Project Developer and ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		<p>for Bats at Wind Energy facilities (Aronson, et.al., 2020), or later versions of the guidelines valid at the time of monitoring, as well as other relevant South African guidelines as applicable during the monitoring period.</p> <p>6. Mitigation should be discussed between the bat specialist and developer during the operational phase. Mitigation should be adapted and implemented without delay. Where high bat mortality occurs, turbine specific mitigation measures should be applied.</p> <p>7. Except for compulsory lighting required in terms of civil aviation, artificial lighting should be minimised, especially bright lights. Lights should rather be turned downwards. Turbine tower lights should be switched off when not in operation, if possible.</p> <p>8. It is understood that static bat monitoring equipment on turbines has a cost implication. Although it is not a requirement at this stage, as it depends on whether the Met mast will be deployed for the life span of the turbines but having more refined static</p>			

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		<p>data from sampling points at height, would aid in interpreting future bat fatality records of the Karee WEF. Therefore, the installation of more than one monitoring system at height, is important.</p>			
<p>Reduction in size, genetic diversity, resilience, and persistence of bat populations.</p>	<p>Monitor potential impacts on bats during operation of wind farm. Prevent activities that will attract bats to high-risk areas on site.</p>	<ol style="list-style-type: none"> 1. Proven mitigation measures, such as curtailment, should be applied if high activity of bats of conservation value is recorded, or if high numbers of carcasses are collected, during post-construction. 2. All turbines and turbine components, including the rotor swept zone, should be kept out of all 'no-go' and high sensitivity zones. 3. Mitigation, as proposed, should be applied as soon as the test period of turbines are completed, and turbines start turning. 4. Mitigation, as proposed for medium sensitivity zones should be applied after testing, as soon as turbines start to turn. 5. A bat specialist should be appointed before the turbines start to turn, and operational bat monitoring should start when all the turbines start to turn, for a minimum of two years, or described by the latest South African bat guidelines. 	<p>Adaptive mitigation plan.</p>	<p>During operations.</p>	<p>Project Developer/Site manager and ECO.</p>

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		<p>6. At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy facilities (Aronson, et.al., 2020), or later versions of the guidelines valid at the time of monitoring, as well as other relevant South African guidelines as applicable during the monitoring period.</p> <p>7. Mitigation should be discussed between the bat specialist and developer during the operational phase. Mitigation should be adapted and implemented without delay. Where high bat mortality occurs, turbine specific mitigation measures should be applied.</p> <p>8. Except for compulsory lighting required in terms of civil aviation, artificial lighting should be minimised, especially bright lights. Lights should rather be turned downwards. Turbine tower lights should be switched off when not in operation, if possible.</p> <p>9. It is understood that static bat monitoring equipment on turbines has a cost implication. Although it is not a requirement at this stage, as it depends on whether the Met mast will</p>			

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		<p>be deployed for the life span of the turbines but having more refined static data from sampling points at height, would aid in interpreting future bat fatality records of the Karee WEF. Therefore, the installation of more than one monitoring system at height, is important. should be minimised, especially bright lights. Lights should rather be turned downwards.</p> <p>10. Turbine tower lights should be switched off when not in operation, if possible, depending on civil aviation laws.</p> <p>11. At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy facilities (Aronson, et.al., 2020) or later versions of the guidelines valid at the time of monitoring.</p> <p>12. Prolonged post construction mitigation, beyond the prescribed two years, might be necessary if advised by the operational bat specialist.</p>			

9.3.7 Biodiversity

This section deals with the issues relative to biodiversity during the operation phase.

Table 36: Biodiversity

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/FREQUENCY
<p>Loss of terrestrial species - fauna</p> <p>Although most of the species observed are mobile, the increase in vehicle movement could result in an increase in road mortalities.</p>	<ol style="list-style-type: none"> 1. Clear demarcation during the construction phase of all undisturbed sensitive areas that are not within the direct footprint of the REF to ensure that there is no uncontrolled access by construction vehicles and labourers; 2. Educate contractors as to the importance of the undisturbed conservations areas and importance of avoiding them; 3. All vehicles must stick to designated and prepared roads and adhere to the speed limit on site of 40km/hr; 4. Mitigating the risk of poaching by fencing in the accommodation compounds of the construction crews, to prevent individuals from wandering in the veld after hours; banning the possession of dogs on site by construction and maintenance staff. 	Holder of the EA/Contractor	Construction Monitoring and audit reports	<p>Impacts avoided or managed as per specialist recommendations.</p> <p>Ensure the conditions of the EA are adhered to.</p> <p>Alien Plant Management Plan Implemented</p> <p>Open Space Management Plan</p> <p>Plant Rehabilitation Implemented</p>	Continuous

9.3.8 Surface Water

This section deals with the issues relative to security during the operation phase.

Table 37: Surface Water

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
<p>Impact on aquatic systems through the possible increase in surface water runoff on form and function during the operational phase:</p> <p>Increase in hard surface areas, and roads that require stormwater management will increase through the concentration of surface water flows that could result in localised changes to flows (volume) that would result in form and function changes within aquatic systems, which are currently ephemeral. This then increases the rate of erosions and sedimentation of downstream areas.</p>	<p>1. A stormwater management plan must be developed in the preconstruction phase, detailing the stormwater structures and management interventions that must be installed to manage the increase of surface water flows directly into any natural systems. This stormwater control systems must be inspected on an annual basis to ensure these are functional. Effective stormwater management must include effective stabilisation (gabions and Reno mattresses) of exposed soil and the re-vegetation of any disturbed riverbanks</p>	<p>Holder of the EA/Contractor</p>	<p>Construction Monitoring and audit reports</p>	<p>Impacts avoided or managed as per specialist recommendations.</p> <p>Erosion Management Plan and Rehabilitation Plan Implemented</p> <p>Ensure the conditions of the EA are adhered to.</p>

9.3.9 Noise

This section deals with the issues relative to noise during the operation phase.

Table 38: Noise

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Noise impacts during the night: Noises from operating wind turbines.	<ol style="list-style-type: none"> The developer may relocate the WTG located to the north of NSD06 further than 800 m from this NSD. No WTG should be located within 800 m from this NSD; or The developer can use a mitigated WTG with a sound power emission level less than 107.2 dBA (re 1 pW) (all WTGs closer than 1,000m from NSD 06). 	Holder of EA/Contractor	<p>Noise and lighting managed according to approved Method Statement</p> <p>Ensure the EMPr is adhered to.</p>	Continuous

9.3.10 Heritage

This section deals with the issues relative to Heritage during the operation phase.

Table 39: Heritage

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Cultural landscape - Ecological	<ol style="list-style-type: none"> Areas of endemic and endangered natural vegetation should be conserved. Critical Biodiversity Areas, and Ecological Support Areas (along drainage lines), should be protected. Areas of habitat are found among the rocky outcrops and contribute to the character, as well as biodiversity of the area. Care should be taken that habitats are not needlessly destroyed. Identified medicinal plants used for healing or ritual purposes should be conserved during all phases if threatened for use. Access to these resources should be made available to those who have had historic access to them. Renosterveld, and in this case, the Matjiesfontein Shale Renosterveld is found in the mid-elevations, and should be kept free from development. 	Holder of the EA/Contractor	Ensure the EMPr is adhered to.	Continuous

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<p>Renosterveld is classified as a threatened ecosystem, only found within the boundaries of South Africa. Care should be taken that we do not needlessly destroy our rare resources that determine the character of the Karoo landscape, and often on the mid-slopes.</p> <p>6. Water use for the operational phase of the development must not negatively impact on the water resources in the area and must not negatively impact on the access or usage of water and water infrastructure for local inhabitants.</p>			
<p>Cultural landscape - Aesthetic</p>	<ol style="list-style-type: none"> 1. Infrastructure improvement or maintenance work, including new roads and upgrades to the road network, should be appropriate to the rural context (scale, material etc.) and avoid steep slopes over 10% as well as ridges. 2. Prevent the construction of new buildings/structures on visually sensitive, steep (over 3%), elevated or exposed slopes, ridgelines and hillcrests or within 1000m of the farmsteads and 500m of the district roads. 3. Avoid visual clutter in the landscape by intrusive signage, and the intrusion of commercial, corporate development along roads. 4. Duration and magnitude of operational activity must be minimized as far possible to reduce the impact of heavy vehicles on the roads as well as the associated dust from the activity. Lightest vehicles possible should be used to reduce degradation to the farm roads and the need to upgrade roads to scale and extent that negatively impacts on the integrity of the historic farm roads. Operational traffic must operate at speeds that reduce dust and noise as far possible. 5. The impact of WEF turbine night lighting on the wilderness landscape is intrusive and overwhelms the rural character of the landscape, giving it an industrial sense of place after dark. Reduce the impact of turbine night lighting by minimizing the number of turbines with lighting to only those necessary for aviation safety, such as a few identified turbines on 	<p>Holder of the EA/Contractor</p>	<p>Ensure the EMP is adhered to.</p>	<p>Continuous</p>

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<p>the outer periphery, or use aircraft triggered night lighting. Due to the reduced receptors on the roads at night, the impact of the lighting at night is reserved mainly for farmsteads and other places of overnight habitation such as the surrounding tourist facilities, which would be heavily impacted by the light pollution on a long term and ongoing basis.</p>			
<p>Cultural landscape - Historic</p>	<p>6. Historic farmsteads must be protected from the impacts of operational facility vehicles and increased numbers of people. No WEF operations traffic should pass through or closer than 50m to the outer boundaries of a farm werf, or 200m from graded structures, which includes the associated historically cultivated lands, cemeteries, unmarked burials. The most appropriate use of existing farm roads must be found to avoid farm werfs as far as possible and reduce construction impact on these heritage features.</p> <p>7. Traditional planting patterns should be protected by ensuring that existing trees are not needlessly destroyed, as these signify traces of cultural intervention in a harsh environment. These planting patterns include the trees planted around the werfs and along travel routes. Interpretation of these landscape features as historic remnants should occur.</p> <p>8. Burial grounds and places of worship are automatically regarded as Grade IIIa or higher. Any development that threatens the inherent character of family burial grounds must be assessed and should be discouraged and a buffer of 100m around all burial ground or unmarked graves should be in place. No turbines have been proposed for placement near known unmarked burials or family cemeteries. A preconstruction micro-survey of each turbine footprint and any new access roads should be conducted to ensure no further unmarked graves are threatened.</p> <p>9. Mountain slopes have been used for traditional practices for many years, and care should be taken that any significant cultural sites, such as burials and veldkos/medicinal plant resources, are not disturbed.</p>	<p>Holder of the EA/Contractor</p>	<p>Ensure the EMP is adhered to.</p>	<p>Continuous</p>

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<p>10. Farms in the area followed a system of stone markers to demarcate the farm boundaries in the area. Where these structures are found on the site, care should be taken that they are not destroyed, as they add to the layering of the area.</p> <p>11. Roads running through the area may have historic stone way markers. Where these are found care should be taken that they are left in tact and in place. Road upgrades must not move or threaten their position and they should be visible from the road they are related to by passing travellers.</p> <p>12. Where the historic function of a building/site is still intact, the function has heritage value and should be protected.</p> <p>13. Surviving examples (wagon routes, outspans, and commonage), where they are owned in some public or communal way (or by a body responsible for acting in the public interest) and where they are found to be actively operating in a communal way, will have cultural and heritage value and should be enhanced and retained. The historic route running through Karee should be maintained and integrity as a communal road for farm residents must be retained.</p> <p>14. Accommodation of WEF staff must not negatively impact on existing farm residents or degrade the integrity of the farmstead complexes and should, without negative impact to ecological or aesthetic resources, be located outside of the farmstead complexes or site. Farm residents should be consulted on the preferable location for construction staff accommodation.</p> <p>15. Lightest vehicles possible should be used to reduce degradation to the farm roads and the need to upgrade roads to scale and extent that negatively impacts on the integrity of the historic farm roads. Operational traffic must operate at speeds that reduce dust and noise as far possible.</p> <p>16. Maintain traditional movement patterns across rural landscapes or to places of socio-historical value. (a) Avoid privatization or the creation of</p>			

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	barriers to traditional access routes (b) Retain old roadways, which have been replaced by newer roads, for use as recreation trails.			
Cultural landscape - Socio-economic	<ol style="list-style-type: none"> 1. The local community on and around the development should benefit from job opportunities created by the proposed development and the development should not cause reduction in economic viability of surrounding properties in excess of those offered by the development. Short-term job opportunities at the expense of long term economic benefit and local employment opportunities must be prevented. 2. The continued use of the landscape for human habitation and cultivation by historic residents of the area, should be retained and encouraged as far possible to sustain the continual use pattern and human-environment relationship which is the ultimate significance of this cultural landscape element. The WEF development must allow and support this, including financially, and not degrade this continued relationship. 3. Local residents must be offered employment on the construction/ decommissioning and operational phases before 'importing' staff from elsewhere. 4. Local residents must be offered employment training opportunities associated with WEF developments at all phases. 5. Crop cultivation, sheep, cattle or game farming should be allowed to continue below the wind turbines, or be rehabilitated to increase biodiversity in the area. 	Holder of the EA/Contractor	Ensure the EMPr is adhered to.	Continuous

9.3.11 Visual

This section deals with the issues relative to visual during the operation phase.

Table 40: Visual

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
<p>Potential alteration of the visual character and sense of place.</p> <p>Potential visual impact on receptors in the study area.</p> <p>Potential visual impact on the night time visual environment.</p>	<ol style="list-style-type: none"> 1. Turbine colours should adhere to CAA requirements. Bright colours and logos on the turbines should be kept to a minimum. 2. Inoperative turbines should be repaired promptly, as they are considered more visually appealing when the blades are rotating (or at work) (Vissering, 2011). 3. If turbines need to be replaced for any reason, they should be replaced with the same model, or one of equal height and scale to lessen the visual impact. 4. As far as possible, limit the number of maintenance vehicles which are allowed to access the site. 5. Ensure that dust suppression techniques are implemented on all gravel access roads. 6. As far as possible, limit the amount of security and operational lighting present on site. 7. Light fittings for security at night should reflect the light toward the ground and prevent light spill. 8. Lighting fixtures should make use of minimum lumen or wattage. 9. Mounting heights of lighting fixtures should be limited, or alternatively foot-light or bollard level lights should be used. 10. If possible, make use of motion detectors on security lighting. 11. Where possible, the operation and maintenance buildings should be consolidated to reduce visual clutter. 12. The operations and maintenance (O&M) buildings should not be illuminated at night. 13. The O&M buildings should be painted in natural tones that fit with the surrounding environment. 	<p>Holder of the EA/Contractor</p>	<p>Noise and lighting managed according to approved Method Statement</p> <p>All waste managed according to approved Method Statement</p> <p>Plant Rehabilitation Implemented</p>	<p>During operation</p>

9.3.12 Social

This section deals with the issues relative to social during the operation phase.

Table 41: Social

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Same as the construction impacts mentioned above.				

9.3.13 Transportation

This section deals with the issues relative to transportation during the operation phase.

Table 42: Transportation

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Additional Traffic Generation: Increase in Traffic	1. The increase in traffic for this phase of the development is negligible and will not have a significant impact	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous
Additional Traffic Generation: Increase of Incidents with pedestrians and livestock	1. The increase in traffic for this phase of the development is negligible and will not have a significant impact	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous
Additional Traffic Generation: Increase in Dust from gravel roads	1. The increase in traffic for this phase of the development is negligible and will not have a significant impact	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous
Additional Traffic Generation: Increase in Road Maintenance	1. The increase in traffic for this phase of the development is negligible and will not have a significant impact	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous
Additional Abnormal Loads	1. The increase in traffic for this phase of the development is negligible and will not have a significant impact	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Internal Access Roads: New / Larger Access points	1. Adequate road signage according to the SARTSM.	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous

9.4 Decommissioning Phase

9.4.1 On-going Stakeholder involvement

This is the process that is recommended when the proposed wind farms are decommissioned.

Table 43: On-going Stakeholder involvement

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT ACTIONS	TIME FRAME
Ongoing Stakeholder Involvement	<ol style="list-style-type: none"> Community to be notified, as culturally appropriate, timeously of the planned decommissioning, e.g.: <ul style="list-style-type: none"> Proposed decommissioning start date; and Process to be followed. Recommend that a meeting with community leader(s) be held before decommissioning commence to inform them: <ul style="list-style-type: none"> What activities will take place during the decommissioning phase. How these activities will impact upon the communities and/or their properties. Regarding the timeframes of scheduled activities Regular interaction between the client and community leader(s) during the decommissioning phase 	Holder of the EA	Clear communication channels maintained	During decommissioning

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT ACTIONS	TIME FRAME
	<ol style="list-style-type: none"> 4. A reporting office/ channel to be established should community members experience problems with contractors/ sub-contractors during the decommissioning phase. 5. A register to be kept of problems reported by community members and the steps taken to address / resolve it. 			

9.4.2 Waste Management

This section deals with the issues relative to waste management during the decommissioning phase.

Table 44: Waste Management

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT ACTIONS	TIME FRAME
MITIGATION	<ol style="list-style-type: none"> 1. All decommissioned equipment must be removed from site and disposed of at a registered land fill. Records of disposal must be kept. 2. Wind turbines must be returned to the manufacturer or relevant recycling agent to be recycled. 	Holder of the EA	All waste managed according to approved Method Statement	During decommissioning

9.4.3 Agriculture and Soils

This section deals with the issues relative to agriculture and soils during the decommissioning phase.

Table 45: Agriculture and Soils

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
Aspect: Protection of soil resources Erosion	1. Implement an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion.	Engineer /Contractor ECO	Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of the storm water run-off control system and to specifically record the occurrence of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring.	That disturbance and existence of hard surfaces causes no erosion on or downstream of the site.	Every 2 months during the decommissioning phase, and then every 6 months after completion of decommissioning, until final sign-off is achieved.
Aspect: Protection of soil resources Erosion	2. Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.	Engineer /Contractor ECO	Undertake a periodic site inspection to record the occurrence of and re-vegetation progress of all areas that require re-vegetation.	That vegetation clearing does not pose a high erosion risk.	Every 4 months during the decommissioning phase, and then every 6 months after completion of decommissioning, until final sign-off is achieved.
Aspect: Protection of soil resources Topsoil loss	1. If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During	Engineer /Contractor ECO	Record GPS positions of all occurrences of below-surface soil disturbance (e.g. excavations). Record the date of topsoil stripping and	That topsoil loss is minimised	As required, whenever areas are disturbed.

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
	rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.		replacement. Check that topsoil covers the entire disturbed area.		
Disturbance/ displacement/ removal of soil and Rock: Ground disturbance during platform earthworks, road rehabilitation, removal of subsurface infrastructure	<ol style="list-style-type: none"> 1. Restore natural site topography 2. Landscape and rehabilitate disturbed areas timeously (e.g. regrassing) 	Engineer /Contractor	Undertake regular audits	<p>Erosion plan implemented and hydrological measures in place</p> <p>Ensure the EMPr is adhered to.</p>	Continuous
Soil Erosion: Increased erosion due to ground disturbance during rehabilitation activities	<ol style="list-style-type: none"> 1. Temporary berms and drainage channels to divert surface runoff where needed. 2. Restore natural site topography. 3. Use designated access and laydown areas only to minimise disturbance to surrounding areas. 	Engineer /Contractor	Undertake regular audits	<p>Erosion plan implemented and hydrological measures in place</p> <p>Ensure the EMPr is adhered to.</p>	Continuous

9.4.4 Avifauna

This section deals with the issues relative to avifauna during the decommissioning phase.

Table 46: Avifauna

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
<p>Avifauna: Displacement due to disturbance: The noise and movement associated with the de-commissioning activities at the WEF footprint will be a source of disturbance which would lead to the displacement of avifauna from the area</p>	<p>A site-specific EMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the EMPr and should apply good environmental practice during construction. The EMPr must specifically include the following:</p> <ol style="list-style-type: none"> 1. No off-road driving; 2. Maximum use of existing roads, where possible; 3. Measures to control noise and dust according to latest best practice; 4. Restricted access to the rest of the property; 5. Strict application of all recommendations in the botanical specialist report pertaining to the limitation of the footprint. 	Contractor and ECO	<ol style="list-style-type: none"> 1. Implementation of the EMPr. Oversee activities to ensure that the EMPr is implemented and enforced via site audits and inspections. Report and record any non-compliance. 2. Ensure that construction personnel are made aware of the impacts relating to off-road driving. 3. Access roads must be demarcated clearly. Undertake site inspections to verify. 4. Monitor the implementation of noise control mechanisms via site inspections and record and report non-compliance. 5. Ensure that the construction area is demarcated clearly and that construction personnel are made aware of these demarcations. Monitor via site inspections and report non-compliance. 	Prevent unnecessary displacement of avifauna by ensuring that contractors are aware of the requirements of the Environmental Management Programme (EMPr.)	<ol style="list-style-type: none"> 1. On a daily basis 2. Weekly 3. Weekly 4. Weekly 5. Weekly

9.4.5 Bats

This section deals with the issues relative to bats during the decommissioning phase.

Table 47: Bats

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
DECOMMISSIONING PHASE					
Removal of turbines of Bat disturbance due to decommissioning activities and associated noise, especially during night-time.	Mitigate disturbance due to decommissioning activities.	<ol style="list-style-type: none"> 1. Except for compulsory lighting required in terms of civil aviation, artificial lighting during construction should be minimised, especially bright lights or spotlights. 2. Lights should avoid skyward illumination. 3. Night-time decommissioning activities should be avoided as far as possible. 	Implement a decommissioning and rehabilitation plan to reduce the development footprint.	During decommissioning phase.	Site manager/ECO

9.4.6 Biodiversity

This section deals with the issues relative to biodiversity during the decommissioning phase.

Table 48: Biodiversity

ASPECT/IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY
Loss of species of special concern:	1. Develop and implement an Rehabilitation and Monitoring plan post Environmental Authorisation. This must be developed following the finalisation	Holder of the EA ECO/specialist	Construction Monitoring and audit reports	Impacts avoided or managed as per specialist recommendations.	Continuous

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY
The construction activities will result in the disturbance of both aquatic and terrestrial habitats that may contain listed and or protected plant or animal species. However, none of these were observed during this assessment within the tower positions proposed	<p>of the turbine / road layout and a walk down has been completed. This plan should include relocation of suitable plant species, but more important protect any topsoil stores and promote the collection of vegetative material and propagules / seed to assist with the revegetation of the site</p> <ol style="list-style-type: none"> Where possible, temporary construction lay-down or assembly areas should be sited on transformed areas; and Rapid regeneration of plant cover must be encouraged by setting aside topsoil during earthmoving and replacing onto areas where the re- establishment of plant cover is desirable to prevent erosion. 			<p>Alien Plant Management Plan Implemented</p> <p>Plant Rehabilitation Implemented Ensure the conditions of the EA are adhered to.</p>	
<p>Loss of terrestrial habitats – flora and vegetation: The construction of the proposed infrastructure will require the need to clear vegetation which could then have a secondary impact on ecological connectivity and especially Critical Biodiversity Areas, linked to the large riverine corridors.</p>	<ol style="list-style-type: none"> All alien plant re-growth, which is currently low within the greater region must be monitored and should it occur, these plants must be eradicated within the project footprints. Where possible, temporary construction lay-down or assembly areas should be sited on transformed areas; and Rapid regeneration of plant cover must be encouraged by setting aside topsoil during earthmoving and replacing onto areas where the re- establishment of plant cover is desirable to prevent erosion. 	Holder of the EA ECO/specialist	Construction Monitoring and audit reports	<p>Impacts avoided or managed as per specialist recommendations.</p> <p>Alien Plant Management Plan Implemented</p> <p>Plant Rehabilitation Implemented Ensure the conditions of the EA are adhered to.</p>	Continuous

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY
Loss of terrestrial species – fauna: Although most of the species observed are mobile, the increase in vehicle movement could result in an increase in road mortalities.	<ol style="list-style-type: none"> 1. Clear demarcation during the construction phase of all undisturbed sensitive areas that are not within the direct footprint of the REF to ensure that there is no uncontrolled access by construction vehicles and labourers; 2. Educate contractors as to the importance of the undisturbed conservations areas and importance of avoiding them; 3. All vehicles must stick to designated and prepared roads and adhere to the speed limit on site of 40km/hr; 4. Mitigating the risk of poaching by fencing in the accommodation compounds of the construction crews, to prevent individuals from wandering in the veld after hours; banning the possession of dogs on site by construction and maintenance staff. 	Holder of the EA ECO/specialist	Construction Monitoring and audit reports	Impacts avoided or managed as per specialist recommendations. Alien Plant Management Plan Implemented Plant Rehabilitation Implemented Ensure the conditions of the EA are adhered to.	Continuous

9.4.7 Surface Water

This section deals with the issues relative to surface water during the decommissioning phase.

Table 49: Surface Water

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY
Damage or loss of riparian and alluvial systems in the construction phase Construction could result in the loss of drainage systems that are fully functional and	<ol style="list-style-type: none"> 1. All alien plant re-growth, which is currently low within the greater region must be monitored and should it occur, these plants must be eradicated within the project footprints and especially in areas near the proposed crossings. Where roads and crossings are upgraded, the following applies: 	Holder of the EA	Construction Monitoring and audit reports	Impacts avoided or managed as per specialist recommendations.	Continuous

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY
provide an ecosystem services within the site especially where new access roads are required or road upgrades will widen any current bridges or drifts. Loss can also include a functional loss, through change in vegetation type via alien encroachment for example	<ol style="list-style-type: none"> 2. Existing pipe culverts must be removed and replaced with suitable sized box culverts, especially where road levels are raised to accommodate any large vehicles. 3. River levels, regardless of the current state of the river / water course must be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist during a pre-construction walkdown. 4. Where large cut and fill areas are required these must be stabilised and rehabilitated during the construction process, to minimise erosion and sedimentation. 5. Suitable stormwater management systems must be installed along roads and other areas and monitored during the first few months of use. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc). 6. A detailed monitoring plan must be developed in the pre-construction phase by an aquatic specialist, where any delineated system occurs within 50 m of existing crossings. 			Ensure the conditions of the EA are adhered to.	
<p>Potential impact on localised surface water quality (construction materials and fuel storage facilities) during the construction and decommissioning phases:</p> <p>During construction earthworks will expose and</p>	<ol style="list-style-type: none"> 1. All liquid chemicals including fuels and oil, including the BESS must be stored in with secondary containment (bunds or containers or berms) that can contain a leak or spill. Such facilities must be inspected routinely and must have the suitable PPE and spill kits needed to contain likely worst-case scenario leak or spill in that facility, safely. 2. Washing and cleaning of equipment must be done in designated wash bays, where rinse water is contained in 	Holder of the EA	Construction Monitoring and audit reports	<p>Impacts avoided or managed as per specialist recommendations.</p> <p>Ensure the conditions of the EA are adhered to.</p>	Continuous

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY
<p>mobilise earth materials, and a number of materials as well as chemicals will be imported and used on site and may end up in the surface water, including soaps, oils, grease and fuels, human wastes, cementitious wastes, paints and solvents, etc. Any spills during transport or while works area conducted in proximity to a watercourse has the potential to affect the surrounding biota. Leaks or spills from storage facilities also pose a risk and due consideration to the safe design and management of the 30 000l fuel storage facility must be given. Although unlikely, consideration must also be provided for the proposed Battery Energy Storage System (BESS), with regard safe handling during the construction phase. This to avoid any spills or leaks from this system.</p>	<p>evaporation/sedimentation ponds (to capture oils, grease cement and sediment).</p> <ol style="list-style-type: none"> 3. Mechanical plant and bowzers must not be refuelled or serviced within 100m of a river channel. 4. All construction camps, lay down areas, wash bays, batching plants or areas and any stores should be more than 50 m from any demarcated water courses. Note comment regards Camp A that requires micro-siting. 5. Littering and contamination associated with construction activity must be avoided through effective construction camp management; No stockpiling should take place within or near a water course 6. All stockpiles must be protected and located in flat areas where run-off will be minimised and sediment recoverable; 				

9.4.8 Heritage

This section deals with the issues relative to Heritage during the decommissioning phase.

Table 50: Heritage

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Cultural landscape - Ecological	<ol style="list-style-type: none"> 1. Critical Biodiversity Areas, and Ecological Support Areas (along drainage lines), should be protected from development of the wind turbines or any associated development during all phases. 2. No wind turbines should be placed within the 1:100-year flood line of the watercourses. In the context of the sensitivity to soil erosion in the area, as well as potential archaeological resources, it would be a risk to include any structures close to these drainage lines 3. Remaining areas of endemic and endangered natural vegetation should be conserved. 4. Renosterveld, and in this case, the Matjiesfontein Shale Renosterveld is found in the mid-elevations, and should be kept free from development. Renosterveld is classified as a threatened ecosystem, only found within the boundaries of South Africa. Care should be taken that we do not needlessly destroy our rare resources that determine the character of the Karoo landscape, and often on the mid-slopes. 5. Critical Biodiversity Areas, and Ecological Support Areas (along drainage lines), should be protected from development of the wind turbines or any associated development during all phases. 6. Areas of critical biodiversity should be protected from any damage during all phases; where indigenous and endemic vegetation should be preserved at all cost. 7. Areas of habitat are found among the rocky outcrops and contribute to the character, as well as biodiversity of the area. Care should be taken that habitats are not needlessly destroyed. 	Holder of the EA/Contractor	Ensure the EMPr is adhered to.	Continuous

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<ol style="list-style-type: none"> 8. Identified medicinal plants used for healing or ritual purposes should be conserved during all phases if threatened for use. 9. Careful planning should incorporate areas for stormwater runoff where the base of the structure disturbed the natural soil. Local rocks found on the site could be used to slow stormwater (instead of concrete, or standard edge treatments), and prevent erosion that would be an unfortunate consequence that would alter the character of the site. By using rocks from site it helps to sensitively keep to the character. 10. Water use for the construction/ decommissioning phase of the development must not negatively impact on the water resources in the area and must not negatively impact on the access or usage of water and water infrastructure for local inhabitants. 			
<p>Cultural landscape - Aesthetic</p>	<ol style="list-style-type: none"> 1. Encourage mitigation measures (for instance use of vegetation) to 'embed' or disguise the proposed structures within the surrounding tourism and agricultural landscape at ground level, road edges etc; 2. The continuation of the traditional use of material could be enhanced with the use of the rocks on the site as building material. This would also help to embed structures into the landscape and should not consist of shipping containers or highly reflective untreated corrugated sheeting that clutters the landscape and is exacerbates the foreign intrusion on the natural matte landscape. 3. Using material found on the site adds to the sense of place and reduces transportation costs of bringing materials to site. 4. The local material such as the rocks found within the area could be applied to address storm water runoff from the road to prevent erosion. 5. Duration and magnitude of construction/ decommissioning activity must be minimized as far possible to reduce the impact of heavy vehicles on the roads as well as the associated dust from the activity. Lightest vehicles possible should be used to reduce 	<p>Holder of the EA/Contractor</p>	<p>Ensure the EMPr is adhered to.</p>	<p>Continuous</p>

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	degradation to the farm roads and the need to upgrade roads to scale and extent that negatively impacts on the integrity of the historic farm roads. Construction/ decommissioning traffic must operate at speeds that reduce dust and noise as far possible.			
Cultural landscape - Historic	<ol style="list-style-type: none"> 1. Historic farmsteads must be protected from the impacts of heavy construction vehicles and increased numbers of people. No construction traffic should pass through or closer than 50m to the outer boundaries of a farm werf, or 200m from graded structures, which includes the associated historically cultivated lands, cemeteries, unmarked burials. The most appropriate use of existing farm roads must be found to avoid farm werfs as far as possible and reduce construction impact on these heritage features. 2. Duration and magnitude of construction/ decommissioning activity must be minimized as far possible to reduce the impact of heavy vehicles on the roads as well as the associated dust from the activity. Lightest vehicles possible should be used to reduce degradation to the farm roads and the need to upgrade roads to scale and extent that negatively impacts on the integrity of the historic farm roads. Construction decommissioning traffic must operate at speeds that reduce dust and noise as far possible. 3. Accommodation of construction staff must not negatively impact on existing farm residents or degrade the integrity of the farmstead complexes and should, without negative impact to ecological or aesthetic resources, be located outside of the farmstead complexes or site. Farm residents should be consulted on the preferable location for construction staff accommodation. 4. Traditional planting patterns should be protected by ensuring that existing trees are not needlessly destroyed, as these signify traces of cultural intervention in a harsh environment. These planting patterns include the trees planted around the werfs and along 	Holder of the EA/Contractor	Ensure the EMPr is adhered to.	Continuous

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<p>travel routes. Interpretation of these landscape features as historic remnants should occur. A buffer of 50m around such planting patters should be maintained.</p> <ol style="list-style-type: none"> 5. Burial grounds and places of worship are automatically regarded as Grade IIIa or higher. Any development that threatens the inherent character of family burial grounds must be assessed and should be discouraged. No turbines have been proposed for placement near known unmarked burials or family cemeteries. A preconstruction micro-survey of each turbine footprint and any new access roads should be conducted to ensure no further unmarked graves are threatened. 6. Mountain slopes have been used for traditional practices for many years, and care should be taken that any significant cultural sites, such as burials and veldkos/medicinal plant resources, are not disturbed. 7. Farms in the area followed a system of stone markers to demarcate the farm boundaries in the area. Where these structures are found on the site, care should be taken that they are not destroyed, as they add to the layering of the area. 8. Roads running through the area have historic stone way markers. Where these are found care should be taken that they are left in tact and in place. Road upgrades must not move or threaten their position and they should be visible from the road they are related to by passing travellers. 9. Where the historic function of a building/site is still intact, the function has heritage value and should be protected. 10. Surviving examples (wagon routes, outspans, and commonage), where they are owned in some public or communal way (or by a body responsible for acting in the public interest) and where they are found to be actively operating in a communal way, will have cultural and heritage value and should be enhanced and retained. 			

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<p>The historic route running through Karee should be maintained and integrity as a communal road for farm residents must be retained.</p> <p>11. Maintain traditional movement patterns across rural landscapes or to places of socio-historical value. (a) Avoid privatization or the creation of barriers to traditional access routes, such as the Voetpads kloof over the Bontebergen. (b) Retain old roadways, which have been replaced by newer roads, for use as recreation trails.</p>			
<p>Cultural landscape - Socio-economic</p>	<ol style="list-style-type: none"> 1. An updated cultural landscapes impact assessment report must be completed should the WEF continue to be used after the term granted in this application. This report should include a detailed assessment of the socio-economic impacts to the cultural landscape and its outcomes and recommendations need to be considered in the decision for recommissioning and be implemented if recommissioning is approved. 2. The continued use of the landscape for human habitation and cultivation by historic residents of the area should be retained and encouraged as far possible to sustain the continual use pattern and human-environment relationship which is the ultimate significance of this cultural landscape element. The WEF development must allow and support this, including financially, and not degrade this continued relationship. 3. The local community on and around the development should benefit from job opportunities created by the proposed development and the development should not cause reduction in economic viability of surrounding properties in excess of those offered by the development. Short-term job opportunities at the expense of long term economic benefit and local employment opportunities must be prevented. 	<p>Holder of the EA/Contractor</p>	<p>Ensure the EMPr is adhered to.</p>	<p>Continuous</p>

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<ol style="list-style-type: none"> 4. Local residents must be offered employment on the construction/ decommissioning and operational phases before 'importing' staff from elsewhere. 5. Local residents must be offered employment training opportunities associated with WEF developments at all phases. 6. Sheep, cattle or game farming should be allowed to continue below the wind turbines, or be rehabilitated to increase biodiversity in the area. 			

9.4.9 Visual

This section deals with the issues relative to visual during the decommissioning phase.

Table 51: Visual

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
<p>Potential visual intrusion resulting from vehicles and equipment involved in the decommissioning process;</p> <p>Potential visual impacts of increased dust emissions from decommissioning activities and related traffic; and</p>	<ol style="list-style-type: none"> 1. All infrastructure that is not required for post-decommissioning use should be removed. 2. Carefully plan to minimize the decommissioning period and avoid delays. 3. Maintain a neat decommissioning site by removing rubble and waste materials regularly. 4. Ensure that dust suppression procedures are maintained on all gravel access roads throughout the decommissioning phase. 5. All cleared areas should be rehabilitated as soon as possible. 	Holder of the EA/Contractor	<p>Noise and lighting managed according to approved Method Statement</p> <p>All waste managed according to approved Method Statement Plant Rehabilitation Implemented</p>	During decommissioning

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Potential visual intrusion of any remaining infrastructure on the site.	6. Rehabilitated areas should be monitored post-decommissioning and remedial actions implemented as required.			

9.4.10 Transportation

This section deals with the issues relative to transportation during the decommissioning phase.

Table 52: Transportation

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Additional Traffic Generation: Increase in Traffic	<ol style="list-style-type: none"> 1. Ensure staff transport is done in the 'off peak' periods and by bus. 2. Stagger material, component and abnormal loads. 	Holder of the EA/Contractor	<p>All staff members are aware of the EMPr requirements relevant to them</p> <p>Ensure the EMPr is adhered to.</p>	Continuous
Additional Traffic Generation: Increase of Incidents with pedestrians and livestock	<ol style="list-style-type: none"> 1. Reduction in speed of vehicles 2. Adequate enforcement of the law 3. Implementation of pedestrian safety initiatives 4. Regular maintenance of farm fences & access cattle grids. 	Holder of the EA/Contractor	<p>All staff members are aware of the EMPr requirements relevant to them</p> <p>Ensure the EMPr is adhered to.</p>	Continuous
Additional Traffic Generation: Increase in Dust from gravel roads	<ol style="list-style-type: none"> 1. Reduction in speed of the vehicles 2. Appropriate, timely and high quality maintenance required in terms of TRH20 3. Possible use of an approved dust suppressant techniques 4. Implement a road maintenance program under the auspices of the respective transport department. 	Holder of the EA/Contractor	<p>All staff members are aware of the EMPr requirements relevant to them</p> <p>Ensure the EMPr is adhered to.</p>	Continuous

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	5. Construction of an on-site batching plant and tower construction to reduce trips.			
Additional Traffic Generation: Increase in Road Maintenance	1. Implement a road maintenance program under the auspices of the respective transport department.	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous
Additional Abnormal Loads	1. Ensure abnormal vehicles travel to and from the proposed development in the 'off peak' periods or stagger delivery. 2. Adequate enforcement of the law	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous
Internal Access Roads: Increase in Dust from gravel roads	1. Enforce a maximum speed limit on the development 2. Appropriate, timely and high quality maintenance required in terms of TRH20 3. Possible use of an approved dust suppressant techniques	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous
Internal Access Roads: New / Larger Access points	1. Adequate road signage according to the SARTSM 2. Approval from the respective roads department	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous

10. AMENDMENTS TO THE EMPR

The Environmental Control Officer (ECO) has the right to request (in writing) a method statement to be compiled by the contractor in cases where the Construction EMPr may not adequately address the issue or nature of the activity/site warrants the need thereof. The method statement must be approved in writing by the ECO prior to carrying out the activity.

Any major issues not covered in the EMPr as submitted as well as any layout changes, will be addressed as an addendum to the EMPr and must be submitted for approval prior to implementation.

Authorised officials of the Department reserve the right to review the approved EMPr during the construction and operational phases of the above-mentioned activity and amend/add any condition as it is deemed necessary. Authorised officials also reserve the right to inspect the project during both construction and operational phase of development.

11. ENVIRONMENTAL AWARENESS PLAN

Appendix 4 of GN R326 EIA Regulations 2014 (as amended) requires that an Environmental Awareness Plan 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 must be dealt with in order to avoid pollution or the degradation of the environment”*. In recognition of the need to protect our environment, environmental management should not only be seen as a legal obligation but also as a moral obligation.

This Environmental Awareness Plan is intended to create the required awareness and culture with personnel and contractor's / service providers on environmental safety and health issues associated with the development activities.

11.1 Policy on Environmental Awareness

This Environmental Awareness Plan must serve as the basis for the induction of all new employees (as well as contractors depending on the nature of their work on site) on matters as described herein and read in conjunction with the EMPr. The Plan will also be used to hone awareness of all employees on a continuous basis.

Specific environmental awareness performance criteria will also form part of the job descriptions of employees, to ensure diligence and full responsibility at all levels of the organisational work force.

11.2 Implementation of Environmental Awareness

General environmental awareness will be fostered among the project's workforce to encourage the implementation of environmentally sound practices throughout the project's duration. This will ensure that environmental accidents are minimised and environmental compliance maximised.

Environmental awareness will be fostered in the following manner:

- Induction course for all workers on site, before commencing work on site;
- Refresher courses as and when required;

- Daily toolbox talks with all workers on the site at the start of each day, where workers can be alerted to particular environmental concerns associated with their tasks for that day or the area/habitat in which they are working; and
- Displaying of information posters and other environmental awareness material at the general assembly points.

11.3 Training and awareness

The main contractor is to take responsibility for the management of their staff and subcontractors on the project site during the construction phase and always supervise them closely. The onus is on the contractor to make sure that all their staff and subcontractors fully comprehend the contents of the EMPr. The contractor must organise environmental awareness training programmes, which should be targeted at the two levels of employee: management and labour.

11.4 Training of construction workers

All construction staff must receive basic training in environmental awareness, including the storage and handling of hazardous substances, minimisation of disturbance to sensitive areas, management of waste, and prevention of water pollution. They must be informed of how to recognise historical / archaeological artefacts that may be uncovered. They must also be apprised of the EMPr's requirements. Environmental awareness training programmes need to be formulated for these employee levels and must comprise:

- A record of all names, positions and duties of staff to be trained;
- A framework for the training programmes;
- A summarised version of the training course(s); and
- An agenda for the delivery of the training courses.

Such programmes will set out the training requirements, which need to be conducted prior to any construction works occurring and will include:

- Acceptable behaviour with regard to flora and fauna;
- Management and minimising of waste, including waste separation;
- Maintenance of equipment to prevent the accidental discharge or spill of fuel, oil, lubricants, cement, mortar and other chemicals;
- Responsible handling of chemicals and spills;
- Environmental emergency procedures and incident reporting; and
- General code of conduct towards I&APs.

12. CONCLUSION

The environmental and social impacts of the project were identified through the four project phases (pre-construction, construction, operation and decommissioning). The following section briefly describes some of the major impacts and proposed mitigation measures within each of the project phases.

12.1 Pre-Construction Phase

The first site activities before mobilization of equipment will be a survey, required for final design of wind farm foundations. There will be negative impacts on land associated with the construction of camps (temporary loss) and storage of construction materials, and foundations for the buildings (permanent loss) and wind turbines. Expectations of improvement in livelihood among locals should be addressed through public participation. Construction contracts will include environmental monitoring and management procedures and requirements. These must be in place prior to the commencement of any construction activities. Avifauna and Bat Monitoring programmes have been initiated to document the current baseline of avifauna and bat activity on the site and the area surrounding the site. Once the final site has been selected for the wind farm and the layouts plans have been finalised a detailed geotechnical investigation should be undertaken.

12.2 Construction Phase

This phase of the activity will have both positive and negative impacts. The positive impacts are employment opportunities offered to the construction workers and any other labourer who will be hired to provide their services during the construction phase. The negative impacts would include wastes generated, accidents, air, dust and noise pollution, vegetation clearance, soil erosion, socio-environmental issues, loss of vegetation, and compaction of soil. Most of the negative impacts are minor and temporary and the significance of the impacts can be greatly reduced by the implementation of mitigation measures, which are outlined in this EMP. The contractor shall ensure that all staff have adequate protective clothing and are adequately trained. Avifauna and Bat Monitoring should be initiated to document the impact of the construction phase on Avifauna and bat activity on the site and the area surrounding the site.

12.3 Operational Phase

The proposed project will have minimal negative effects which mainly relates to loss of aesthetic value and habitat. The habitat that will be lost is not regarded as pristine and therefore, is not viewed as significant. Most of the negative impacts are minor and the significance of the impacts can be greatly reduced by the implementation of mitigation measures, which are outlined in this EMP.

12.4 Decommissioning Phase

As with any project, the facilities used in this project will have a lifetime after which they may no longer be cost effective to continue with operation. At that time, the project would be decommissioned, and the existing equipment removed.

Potential environmental impacts caused during decommissioning are those, which will be mitigated as provided by the Environmental Management Programme. These include: noise and emissions to the

surrounding environment, removal of hazardous waste and substances, fire, oil spills, wastes and public safety.

The disposal of materials from the decommissioned plant is not viewed as high risk. Much of the material would be recyclable (steel structures and turbine engines etc.) or inert (concrete foundations, etc.). These materials would however, need to be disposed of at a formal waste disposal or recycling centre.

Based on the above information, it is unlikely that the Project will have significant adverse social and environmental impacts. Most adverse impacts will be of a temporary nature during the construction phase and can be managed to acceptable levels with implementation of the recommended mitigation measures for the Project such that the overall benefits from the Project will greatly outweigh the few adverse impacts.

All the negative impacts can be easily mitigated and will either be moderate or less in rating. Generally, the proposed wind farm will result in appreciable benefits to the people in the project area of influence and bring opportunities for development to the country.



Annexure A:

Curriculum Vitae



Annexure D:

Heritage Requirements



Annexure E:

Specific Bat Mitigations



Annexure F:

Operational Bird Monitoring Plan



Annexure G:

Environmental Noise Monitoring Plan

Environmental Noise Monitoring can be divided into two distinct categories, namely:

- Passive monitoring – the registering of any complaints (reasonable and valid) regarding noise; and
- Active monitoring – the measurement of ambient sound (or noise) levels at identified locations.

Because the total projected noise levels would be higher than 42 dBA (higher than the projected residual noise level, as well as more than 7 dBA of the night-time rural rating level), active noise monitoring is recommended.

In addition, should a reasonable and valid noise complaint be registered, the WEF developer should investigate the noise complaint as per the guidelines below. These guidelines should be used as a rough guideline as site specific conditions may require that the monitoring locations, frequency or procedure be adapted.

Measurement Localities and Frequency

Once-off noise measurements are recommended at the location of NSD06 before the construction phase start, to allow the defining of existing ambient sound levels. Once the WEF is operational, noise measurements should be repeated to assess the noise levels at NSD06. If the dwellings at NSD06 are not used for residential purposes, no noise monitoring would be required.

Should there be a noise complaint, once-off noise measurements must be conducted at the location of the person that registered a valid and reasonable noise complaint. The measurement location should consider the direct surroundings to ensure that other sound sources cannot influence the reading.

Measurement Procedures

Ambient sound measurements should be collected as defined in SANS 10103:2008, though the protocols as defined by ETSU-R97 are recommended. Due to the variability that naturally occurs in sound levels at most locations, it is recommended that semi-continuous measurements are conducted over a period of at least 48 hours, covering at least a full day- (06:00 – 22:00) and night-time (22:00 – 06:00) period. Spectral frequencies should also be measured to define the potential origin of noise. When a noise complaint is being investigated, measurements should be collected during a period or in conditions similar to when the receptor experienced the disturbing noise event.



Annexure H:

Summary of Specialist Findings and Recommendations



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