POFADDER WIND FACILITY 3 (PTY) LTD

Proposed Development of the Pofadder Wind Energy Facility (WEF) 3 and Associated Infrastructure near Pofadder in the Northern Cape Province

Draft Environmental Management Programme (EMPr)

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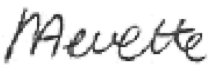
Signature:	
Client:	Pofadder Wind Facility 3 (Pty) Ltd

Confidentiality Statement

POFADDER WIND FACILITY 3 (PTY) LTD

POFADDER WIND ENERGY FACILITY 3

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

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DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

1. INTRODUCTION

Pofadder Wind Facility 3 (Pty) Ltd (The Applicant) is proposing to develop, construct and operate the Pofadder Wind Energy Facility (WEF) 3 and associated infrastructure approximately 35 km south east of Pofadder in the Kai !Garib Local and Z F Mgcawu District Municipalities, in the Northern Cape (**Figure** 1). (**DFFE Reference Number**: 14/12/16/3/3/2/2152). The overall objective of the proposed development is to generate electricity by means of renewable energy technologies capturing wind energy to feed into the national grid. The proposed development will have a maximum output generation capacity of up to 248 megawatt (MW).

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 Pofadder WEF 3 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 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.

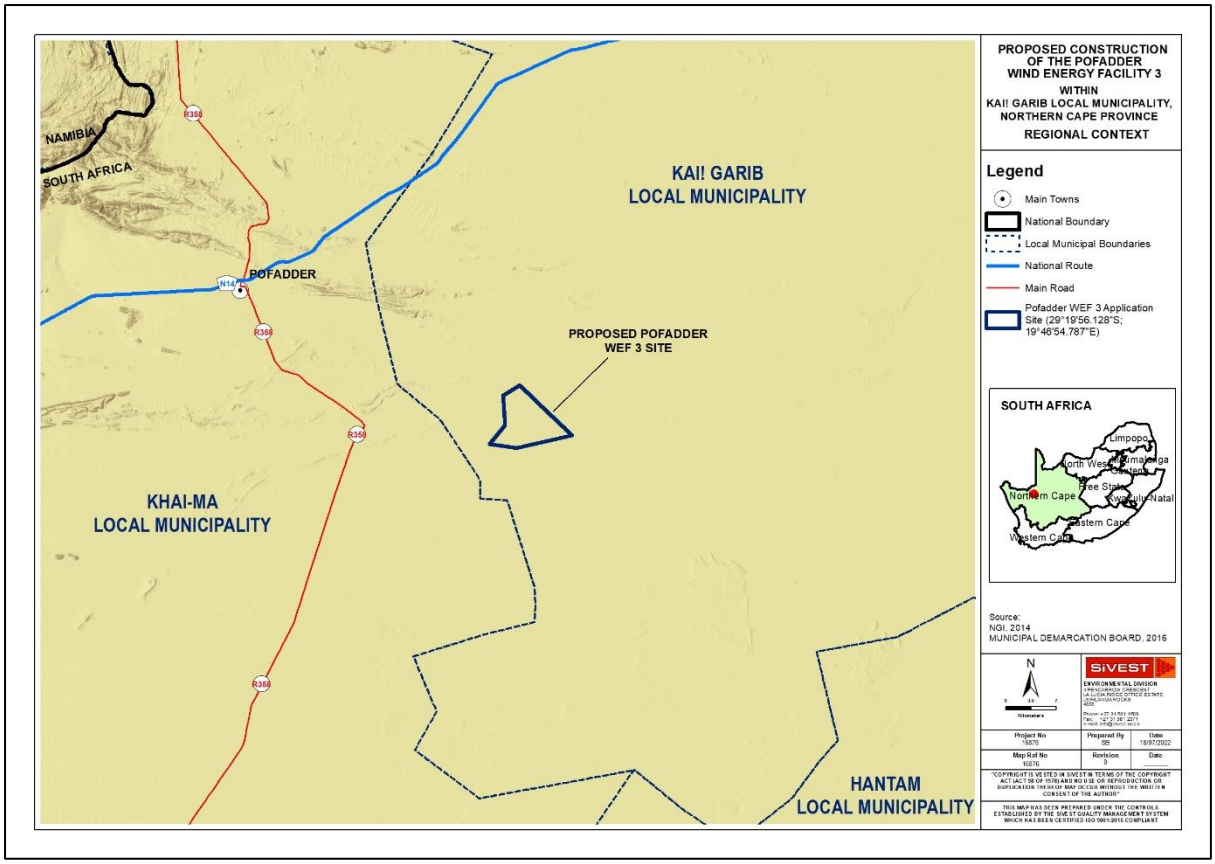

Figure 1: Site Locality

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	Section 3.1 Section 3.2
	(ii) The expertise of that EAP to prepare an EMPr, including a curriculum vitae.	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 environmental	Figure 1 and Figure 5

2014 EIA Regulations, as amended.	Requirements for an EMPr	Location in this EMPr
	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	Pofadder Wind Facility 3 (Pty) Ltd
Physical Address	1501, 15th Floor, Portside Building, 4 Bree Street Cape Town 8001
Postal Address	PO Box 1730 Welgemoed Cape Town Western Cape
Postal Code	7538
Telephone	082 300 6497
Fax	+ 27 (0) 86 514 8184
Email	unai.bravo.urtasun@acciona.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	Michelle Guy
Physical Address	4 Pencarrow Crescent, La Lucia Ridge Office Estate
Postal Address	PO Box 1899, Umhlanga Rocks
Postal Code	4320
Telephone	031 581 1500
Fax	031 566 2371
Email	michelleg@sivest.co.za

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 *(Cert.Sci.Nat.)*	MEnvMgt. (Environmental Management)	SACNASP Registration No. 120356 EAPASA Registration No. 2019/1560 IAIAsa	19
Michelle Guy *(Pr.Sci.Nat.)*	MSc Environmental Science	SACNASP Registration No. 126338 EAPASA Registration No. 2019/868 IAIAsa	10

CV's of SiVEST personnel and EAP declaration are attached in **Appendix 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)
Visual Resource Management Africa (VRM)	Stephen Stead	Visual Impact Assessment	B.A (Hons) Human Geography, 1991 (UKZN, Pietermaritzburg) Registered with the Association of Professional Heritage Practitioners since 2014.	16
ASHA Consulting (Pty) Ltd	Jayson Orton	Heritage Impact Assessment	D.Phil. (Archaeology) Accredited Professional Heritage Practitioner	26
	Marion Bamford	Palaeontology Impact Assessment	PhD (Palaeontology)	25
Johann Lanz Consulting	Johann Lanz	Agriculture and Soils Impact Assessment (desktop)	M.Sc. (Environmental Geochemistry)	24
Safetech	Brett Williams	Noise Impact Assessment	PhD is in Environmental Management	26
Savannah Environmental	Nondumiso Bulunga	Socio-economic Impact Assessment (desktop)	M.Sc. Geographical Information Systems	8
	Neville Bews		D. Litt. et Phil	37
Nkurenkuru Ecological and Biodiversity	Gerhard Botha	Biodiversity and Freshwater Impact Assessment	B.Sc. Hons in Botany (Vegetation Ecology) Pr.Sci.Nat 400502/14	8

Company	Name of representative of the specialist	Specialist	Educational Qualifications	Experience (years)
	Jan-Hendrik Keet		Doctor of Philosophy (Botany)	7
Chris Van Rooyen Consulting	Chris van Rooyen	Avifaunal Impact Assessment	BA LLB	22
	Albert Froneman	Avifaunal Impact Assessment	MSc (Conservation)	22
Camissa Sustainability Consulting	Jonathan Aronson	Bat Impact Assessment	MSc (Zoology), MSc (Environment and Resource Management)	13
Traffic	Merchandt Le Maitre	Transportation Impact Assessment	N Dip: Civil Engineering B Tech: Civil Engineering Pr.Tech.Eng. (Reg. No. 2018300094)	16
ITC Services (Pty) Ltd	H. Goosen	Electromagnetic Interference (EMI) Path Loss and Risk Assessment		

4. ACTIVITY INFORMATION

4.1 Project Description

The preferred project site is approximately 5100 hectares (ha) in extent. It is anticipated that the proposed Pofadder 3 WEF will comprise of up to thirty-one (31) wind turbines with a maximum total energy generation capacity of up to approximately 248 MW. In summary, the proposed Pofadder WEF 3 development will include the following components:

- Up to 31 wind turbines, each with a maximum of 8 MW output per turbine, with a maximum export capacity of approximately 248 MW. This will be subject to allowable limits in terms of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). The final number of turbines and layout of the WEF will, however, be dependent on the outcome of the Specialist Studies conducted during the EIA process.
- Each wind turbine will have a maximum hub height and rotor diameter of up to approximately 200m;
- Concrete turbine foundations and turbine hardstands;
- Each turbine will have a circular foundation with a diameter of up to 32 m and this will be placed alongside the 45 m wide hardstand resulting in an area of about 45 m x 32 m that will be permanently disturbed for the turbine foundation. The combined permanent footprint for the turbines will be approximately 4.4 ha.
- Each turbine will have a crane hardstand of approximately 70 m x 45 m. The permanent footprint for turbine crane hardstands will be approximately 9.5 ha.

- Each turbine will have a blade hardstand of approximately 80 m x 45 m (3 600 m^2). The combined permanent footprint for blade hardstands will be approximately 10.8 ha.
- One (1) new 33/132 kV on-site substation occupying an area of approximately 1.6 ha.
- The wind turbines will be connected to the proposed on-site substation via medium voltage (33 kV) underground cables, which will mainly run alongside the access roads. Where burying of cables is not possible due to technical, geological, environmental or topographical constraints, cables will be overhead via 33 kV monopoles.
- The main access road will be between 8 – 12 m wide (to allow vehicles to pass).
- Internal roads with a width of between 6 – 8 m will provide access to each wind turbine. Existing farm roads will be upgraded and used wherever possible, although new site roads will be constructed where necessary.
- A 12 m wide corridor may be temporarily impacted during construction and rehabilitated to 6 m wide corridor after construction. The internal gravel roads will have an approximate 6 – 8 m wide surface and there will be up to 12m wide impacted during the construction phase, with additional space required for cut and fill, side drains and other stormwater control measures, turning areas and vertical and horizontal turning radii to ensure safe delivery of the turbine components.
- Pofadder WEF 3 will have a total road network of approximately 50 km.
- One (1) construction laydown / staging area of up to approximately 7 ha (to be rehabilitated following construction). It should be noted that no on-site labour camps will be required in order to house workers overnight as all workers will be accommodated in the nearby towns, and transported daily to site (by bus);
- The gate house and security house will occupy an area of up to 0.5 ha.
- Battery Energy Storage System (BESS) of approx. 3.6ha;
- One (1) permanent Operation and Maintenance (O&M) building (including offices, warehouses, workshops, canteen, visitors centre and staff lockers) occupying an area of up to 1 ha;
- A temporary site camp establishment and concrete batching plant occupying an area of up to 1.6 ha.
- Galvanized palisade fencing to be used at the substations with the maximum height of the fencing to be up to 3.5 m;

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

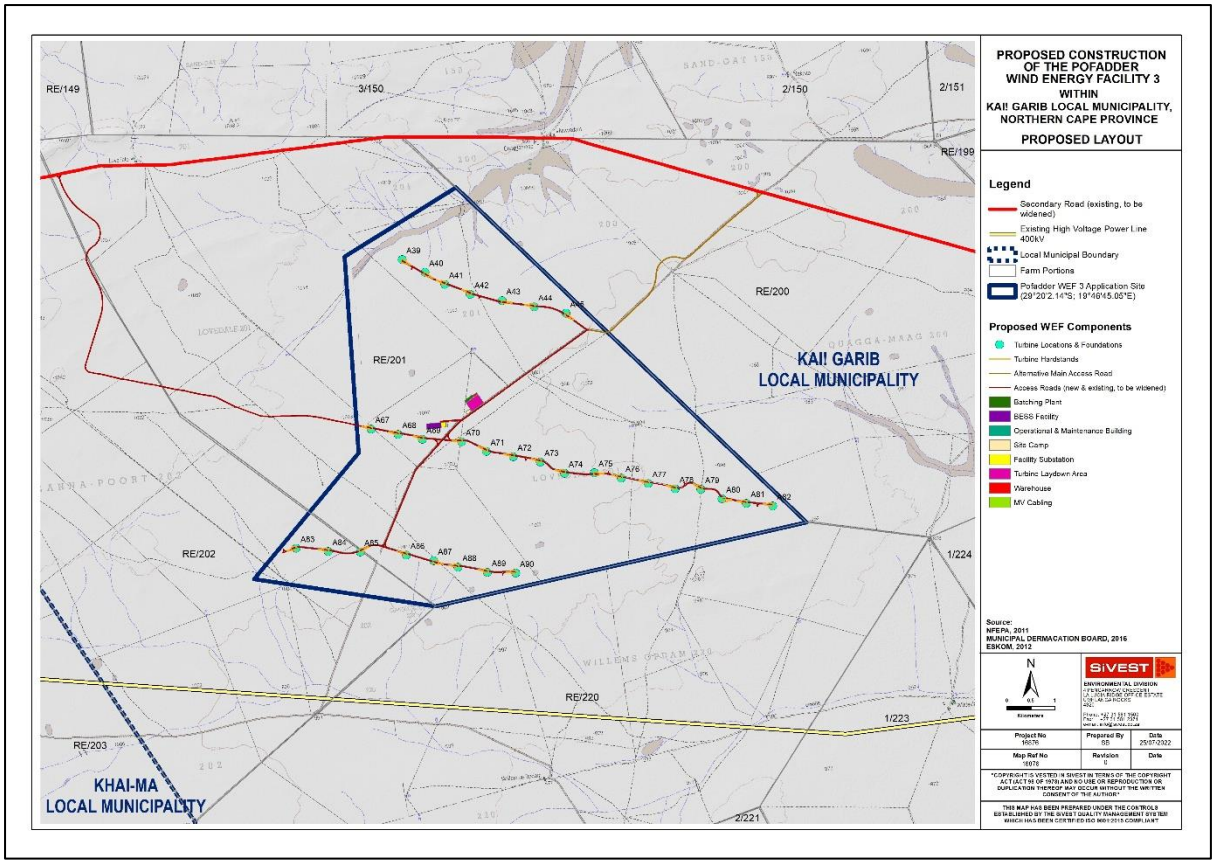

Figure 2: Proposed layout showing proposed location of wind turbines

The wind turbines and all other project infrastructure will be placed strategically within the development 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** below for the typical components of a wind turbine.

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

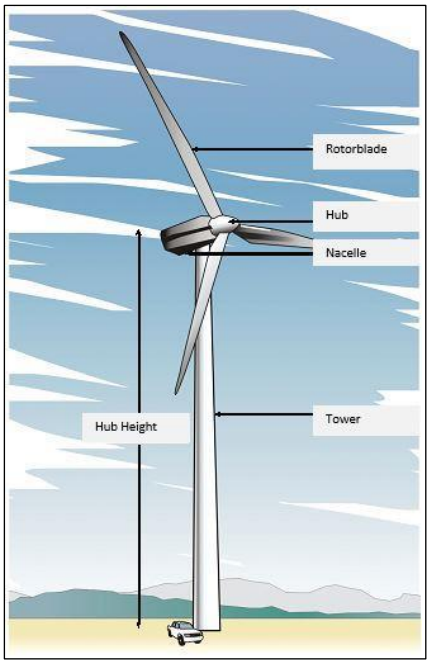

Figure 3: Typical components of a wind farm

Table 6: Technical Detail Summary

Component	Description / Dimensions
Location of site (centre point)	29°20'2.14"S 19°46'45.05"E
Application site area	5100 ha
Turbine development area	Turbine Foundation Area = 45m*32m*30 turbines = 4.4 Ha
SG codes	C03600000000020200000 C03600000000015000003 C03600000000020100000 C03600000000020000000 (only applicable to the existing alternative site access road)
Export capacity	Up to 248 MW
Proposed technology	Wind turbines and associated infrastructure
Hub height from ground	Up to 200 m
Rotor diameter	Up to 200 m
Substation Area	Approximately 1.56 ha
O&M building area	Approximately 1 ha
Temporary construction laydown / staging area	Up to 7 ha
Temporary site camp & concrete batching plant	1.6 ha
Battery Energy Storage System (BESS)	3.6 ha
Gatehouse and Security	Approximately 0.5 ha
Hard stand areas	Approximately 10.8 ha for blade hardstands and 9.5 ha for crane hardstands

Component	Description / Dimensions
Width of internal access roads	Approximately 6 – 8 m
Length of internal access roads	Approximately 50 km
Site Access	The main road located within the region is the N14 National Highway which runs from Upington to Springbok and is located 20 km to the north of the site. A minor district road is located 7.2 km to the west (R358), as well as a minor farm access road routing through the proposed development area (east to west). These roads are for farming access and are gravel, usually unsuited for tourist related traffic.
Proximity to grid connection	Approximately 60 km from application site
Height of fencing (for substation)	Approximately 3.5 m high
Type of fencing (for substation)	Galvanized palisade fencing

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 authorization 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 full Environmental Impact Assessment Process. 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):	Relevant activities as set out in Listing Notices 1, 2 and 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
Relevant Basic Assessment Activities as set out in Listing Notice 1		
11 (i)	**GN R. 327 (as amended) Item 11:** The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.	New on-site substations/collector switching stations will be constructed as part of the proposed developments. The proposed substations/ collector switching stations will be located outside urban areas and will have capacities of 33/132kV respectively. In addition, each facility substation or collector switching station will occupy a footprint of, ± 125 m x 125 m (1.5625 ha). The height of the sub-station will be a maximum of 10 m, however lightning masts may extend up to 25 m in height.
12 (ii) (a) (c)	**GN R. 327 (as amended) Item 12:** The development of: ii) infrastructure or structures with a physical footprint of 100 square metres or more;	Drainage lines and watercourses are scattered across the proposed site. One or more roads and/or medium voltage cabling will cross these

Activity No(s):	Relevant activities as set out in Listing Notices 1, 2 and 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
	where such development occurs- (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.	watercourses or drainage lines or be within 32m thereof. The proposed developments will therefore entail the construction of infrastructure with physical footprints of approximately 100 m^2 or more within a surface water feature / watercourse or within 32 m of a surface water feature / watercourse.
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;	The proposed development will involve the excavation, removal, infilling or depositing of any material of more than 10 m^3 into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 m^3 from some of the identified surface water features / watercourses. Although the layout of the proposed developments has been designed to avoid the identified surface water features / watercourses as far as possible, some of the internal access roads and/or medium voltage cabling will need to traverse the identified surface water features / watercourses. In addition, during construction of these roads, soil will need to be removed from some of the identified surface water features / watercourses.
24 (ii)	**GN R. 327 (as amended) Item 24:** The development of a road - ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres.	The main access road will be approximately 8 - 12 m wide. Internal roads of approximately 6 – 8 m wide will be needed for the WEF with side drains on one or both sides where necessary. During construction the footprint of road construction works will be up to 12 m, with additional space required for cut and fill, side drains and other stormwater control measures, turning areas and vertical and horizontal turning radii to ensure safe delivery of the turbine components.
28 (ii)	**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:	The total area to be developed for the proposed renewable energy facilities is greater than 1ha and occurs outside an urban area in an area currently zoned as agriculture land.

Activity No(s):	Relevant activities as set out in Listing Notices 1, 2 and 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
	(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;	
48 (i) (a) (c)	**GN R. 327 (as amended) Item 48:** The expansion of- (i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; where such expansion occurs— (a) within a watercourse; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;	The proposed developments will entail the expansion (upgrading) of roads and other infrastructure by 100 m^2 or more within a surface water feature / watercourse or within 32 m from the edge of a surface water feature / watercourse. Although the layout of the proposed development has been designed to avoid the surface water features / watercourses identified within the application site as far as possible, some of the internal roads to be upgraded and expanded will need to traverse some of the surface water features / watercourses identified within the application site and construction will occur within some of the surface water features / watercourses identified within the application site and/or be within 32m of some of the surface water features / watercourses identified within the application site.
56 (ii)	**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 - (i) where the existing reserve is wider than 13,5 metres; or (ii) where no reserve exists, where the existing road is wider than 8 metres –	Existing roads will require widening of up to 12m and/or lengthening by more than 1km, to accommodate the movement of heavy vehicles and cable trenching activities associated with the WEF.
Relevant Scoping and EIA Activities as set out in Listing Notice 2 of the EIA Regulations, 2014 as amended		
1	**GN R. 325 (as amended) Item 1:** The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more.	The proposed development will entail the construction of a WEF where the respective electricity output will be approximately 248MW. In addition, the proposed WEF developments will be located outside urban areas.
15	**GN R. 325 (as amended) Item 15:** The clearance of an area of 20 hectares or more of indigenous vegetation.	The proposed WEF development will involve the clearance of more than 20ha of indigenous vegetation. Clearance will also be required for the proposed substations, internal access roads and other associated infrastructure.

Activity No(s):	Relevant activities as set out in Listing Notices 1, 2 and 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
Relevant Basic Assessment Activities as set out in Listing Notice 3 of the EIA Regulations, 2014 as amended		
14 ii. (a) (c) g (ii) (ff)	**GN R. 324 (as amended) Item 14:** The development of— (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. **g. Northern Cape** ii. 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;	The proposed development will entail the development of infrastructure with physical footprints of 10m^2 or more within a watercourse / surface water feature or within 32m from the edge of a watercourse / surface water feature. Although the layouts of the respective proposed developments will be designed to avoid the identified surface water features / watercourse as far as possible, some of the infrastructure / structures will need to traverse the identified surface water features / watercourses. The construction of the infrastructure (MV cabling and roads) for the development will occur within Ecosystem Support Areas located outside of urban areas.
18 g (ii) (ii)	**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- **g. Northern Cape** ii. Outside urban areas: (ii) Areas within a watercourse or wetland; or within 100 m from the edge of a watercourse or wetland.	Secondary/internal access roads will be required to access the wind turbines as well as the respective substations. Existing roads will be used wherever possible. Secondary/Internal access roads will require widening by more than 4m or lengthening by more than 1km. These roads will occur within the Northern Cape Province, outside urban areas. The widening of the roads will occur within a watercourse or wetland or within 100m from the edge of a watercourse or wetland.

5. LOCATION OF THE ACTIVITY

5.1 Regional Locality

The proposed development is located approximately 35 km south east of Pofadder in the Kai !Garib Local and Z F Mgcawu District Municipalities, in the Northern Cape (**Figure 4**)

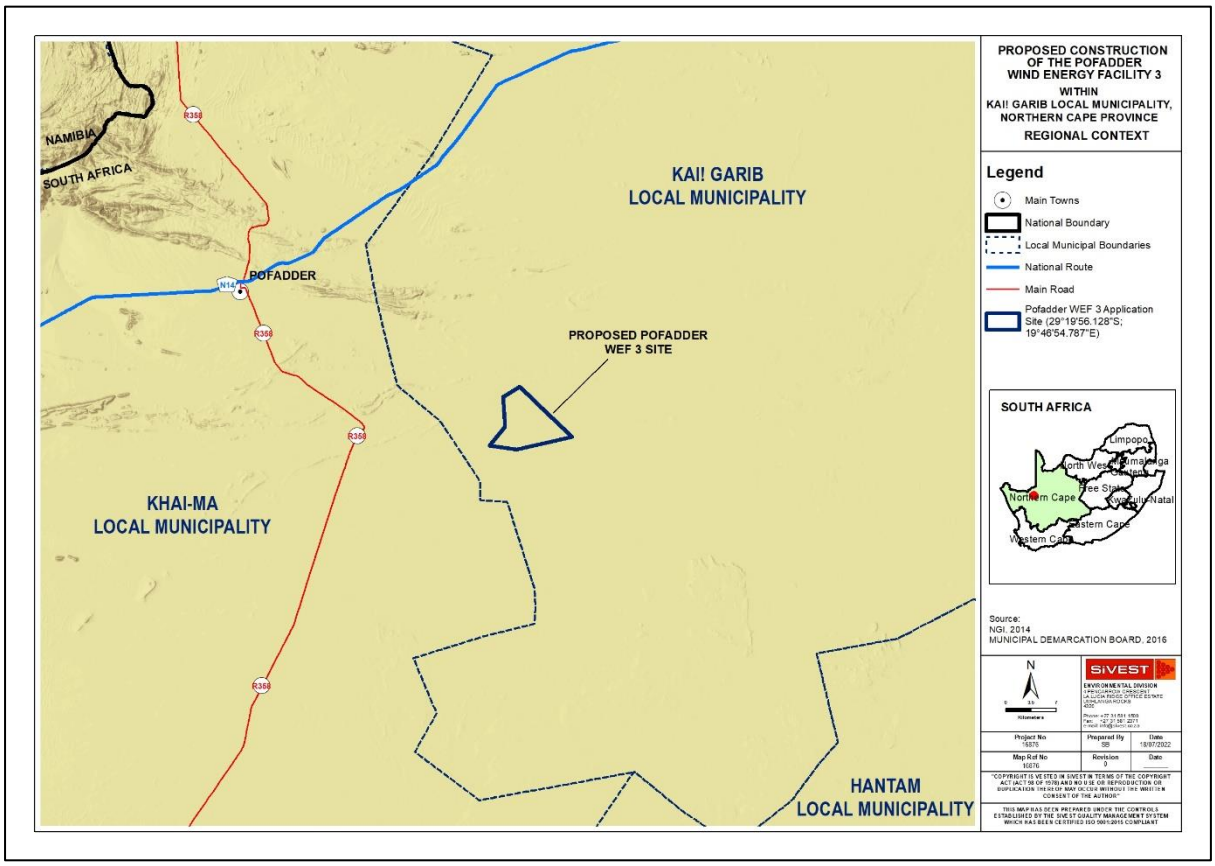

Figure 4: Site Locality

5.2 Summary of affected properties (including SG codes and Farm Names)

Table 8: Summary of affected properties (including SG Codes and Farm Names)

SG CODE	DESCRIPTION
C03600000000020200000	THE FARM GANNA POORT NO. 202
C03600000000015000003	PORTION 3 OF THE FARM SAND GAT NO. 150
C03600000000020100000	THE FARM LOVEDALE NO. 201
C03600000000020000000	THE FARM QUAGGA-MAAG NO. 200 (ONLY APPLICABLE TO THE EXISTING ALTERNATIVE SITE ACCESS ROAD

5.3 Coordinates of the site

The center point coordinates for the sites are as follows:

- Latitude: 29°20'2.14"S
- Longitude: 19°46'45.05"E

The center point coordinates for the site boundary have been included below:

Table 9: Center point coordinates for the Pofadder WEF 3 site boundary

POFFADER 3 WEF: APPLICATION SITE		
COORDINATES AT CORNER POINTS (DD MM SS.sss)		
POINT	**SOUTH**	**EAST**
Centre	29°20'2.14"S	19°46'45.05"E

Table 10: Center point coordinates for the substation on Pofadder WEF 3

POFFADER 3 WEF: SUBSTATION		
COORDINATES AT CENTRE POINT (DD MM SS.sss)		
INFRASTRUCTURE	**SOUTH**	**EAST**
Substation	29°19'54.70"S	19°45'57.76"E

5.4 Study Area Description

Much of the assessment area is classified as “Bare / Barren Land”, interspersed with areas of “Low shrubland (nama Karoo)”. In most cases these patches of land are undisturbed areas with very sparse vegetation cover. The study area is an extensive flat plain with minimal relief, the main exception being a low ridge of white quartzite that runs across the northern part of the layout area. Occasional shallow water courses occur within the landscape. The open plains tend to be sandy with some gravel patches in places.

The current land use of the proposed properties is an arid agricultural area with sheep and goat farming carried out in a very dry environment – this is the only agricultural land use on the site and surrounds which is restricted by the arid nature of the local climate. Due to the limited stock carrying capacity, the farms are large in size. The area has a very low density of rural settlement, with relatively few isolated farmsteads. Man-made modifications associated with farming are related to those typical of the low intensity sheep farming. This includes wind pumps with stock watering points. These features are small in scale in the landscape and do not detract from the sense of place.

The area is extremely arid with cold winters and hot summers, with temperatures ranging between 33˚C in January (summer) and 2˚C in July (winter). Average rainfall happens mostly between December and April and averages about 120mm per year, which makes for a fairly arid climate.

Refer to **Appendix F** for the summary of the specialist findings and recommendations.

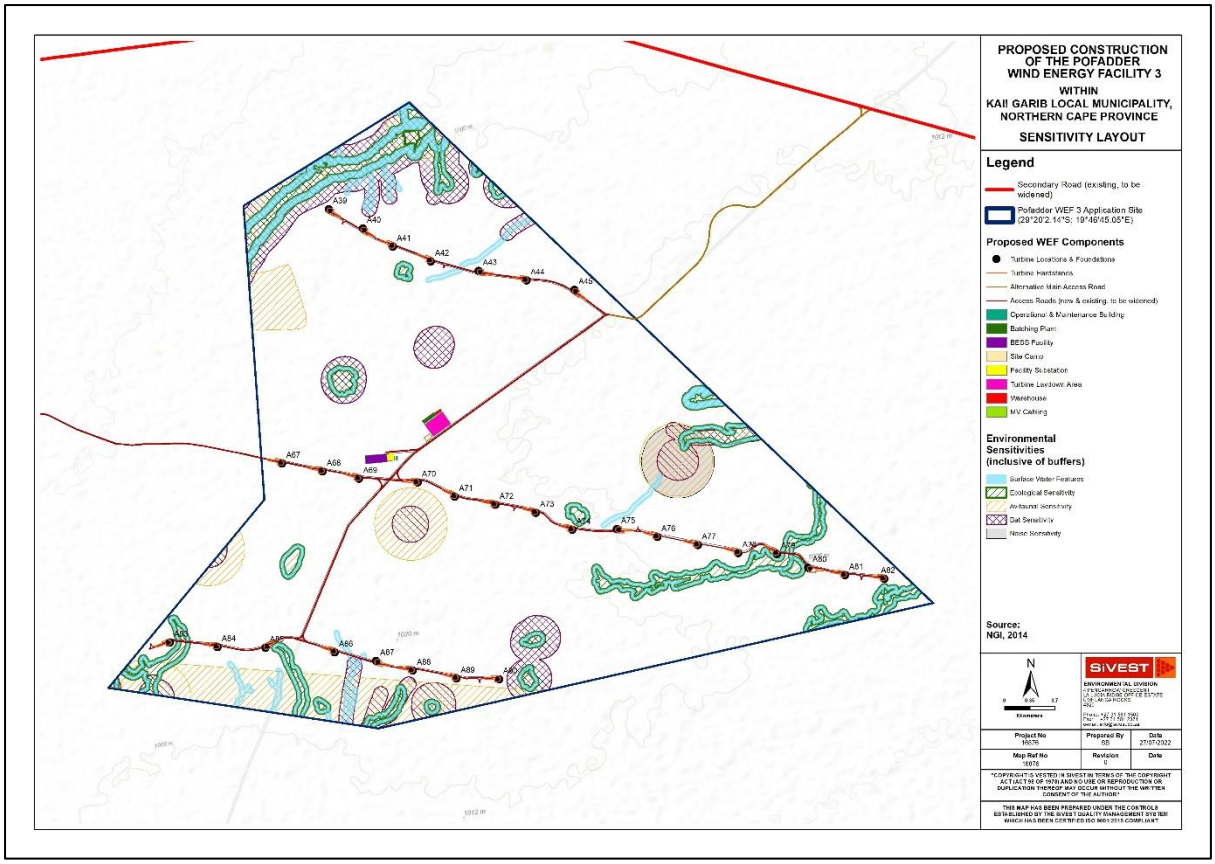

Figure 5: Proposed Layout with Sensitivity Overlay

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 9.2)
- 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 REQURIEMENTS

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 Dust Control Regulations (GN No. R. 827 of 1 November 2013
- 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 is 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 will be applied for and 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 11** below provides a summary of the responsible parties and the auditing process to be carried out.

Table 11: Responsible Parties and Auditing Process

TITLE	PARTY	ROLE DURING CONSTRUCTION	ROLE DURING OPERATION
Project Developer (Proponent)	Pofadder Wind Facility 3 (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 Key Stakeholder Requirements

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Heritage (SAHRA)	Further additional specific conditions are provided for the development as follows: • A walkdown of any unsurveyed areas of the final layout must be conducted and a walkdown report must be submitted to SAHRA for comment prior to construction. SAHRA reserves the right to provide additional conditions for the management of heritage resources based on the results of the walkdown report; • 38(4)c(i) – If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted as per section 35(3) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule; • 38(4)c(ii) – If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Ngqabutho Madida 012 320 8490), must be alerted immediately as per section 36(6) of the	Holder of the EA	Appoint archaeologist and/or or palaeontologist to conduct survey well before construction.	Avoid impacts (preferred) or locate and sample or rescue sites/burials before disturbance	During pre-construction / on-going basis should resources be discovered on site.

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule; • 38(4)d – See section 51 of the NHRA regarding offences; • 38(4)e – The following conditions apply with regards to the appointment of specialists: • With reference to the mitigation work noted above, a qualified archaeologist must be appointed to undertake the work in terms of the permit applied for as noted above; • If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA;				

9.1.2 Site preparation

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

Table 12: Site preparation

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Appointment of ECO	• Appoint an Environmental Control Officer.	Holder of the EA	Undertake regular audits	Avoid construction delays.	Continuous

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• 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.			Ensure the EMPr is adhered to.	
Site demarcation	• 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 (in line with Section 30 of NEMA, 1998) 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	• 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. • Spoil that is removed from the site must be removed to an approved spoil site or a licensed landfill site.	Holder of the EA/Contractor	Undertake regular audits	Site establishment undertaken responsibly Sensitive areas identified and avoided Erosion management plan implemented and hydrological measures in place.	Once off

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• The necessary silt fences and erosion control measures must be implemented in areas where these risks are more prevalent.			Appropriate stormwater structures as informed by the Storm Water Management Plan	
Construction Camp	• 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. • All construction equipment must be stored within the construction camp. • All associated oil changes etc. (no servicing) must take place within the camp over a sealed surface such as a concrete slab. • 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 • All Construction Camps shall be provided with portable fire extinguishing equipment, in accordance with all relevant legislation and must be readily accessible. • 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. • The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed.	Contractor	Undertake regular audits	Prevent unauthorized impact on the environment. Ensure safety of the public and prevent loss/ damage equipment Ensure EMP is adhered to Compliance to all legislative requirements	Continuous

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• 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.				
Training of site staff	• 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. • Staff operating equipment (such as loaders, etc.) shall be adequately trained and sensitised to any potential hazards associated with their tasks. • 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. • 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. • Staff must be trained in the hazards and required precautionary measures for dealing with these substances • Spillage packs must be available at construction areas.	Contractor	Undertake regular audits	All staff members are aware of the EMPr requirements relevant to them All waste managed according to approved the Method Statement compiled by the contractor and approved by the engineer and reviewed by ECO	Continuous

9.1.3 Consultation

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

Table 13: Consultation

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Consultation	• Provide a mechanism through which information could be exchanged between the project proponent and stakeholders. • Identify relevant stakeholders and engage them at applicable stages of the process. • Inform the public about the proposed construction process. • Surrounding communities must be kept informed, through the identified and agreed consultation channels, of the commencement of construction. • Work on site to be restricted to work hours. • Financial provision must be included for rehabilitation in terms of the Renewable Independent Power Producer Programme (REIPPP) financial model requirements. • An agreement/contract should be formalised between the landowner and the applicant, that will ensure that the rehabilitation does not leave any liability to future landowners.	Holder of the EA/ Contractor	Clear communication channels established	Continuous

9.1.4 Heritage

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

Table 14: Heritage

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY

Impacts to archaeology and graves: Damage or destruction of archaeological sites or graves	Pre-construction survey of unsurveyed areas, micro-siting of infrastructure. The LSA archaeological sites at waypoints 519 and 520 must be excavated with at least 25-50 m^2 sampled at each;	Holder of the EA	Appoint archaeologist to conduct survey well before construction.	Avoid impacts (preferred) or locate and sample or rescue sites/burials before disturbance	Once -off during pre-construction
Impacts to archaeology and graves: Damage or destruction of archaeological sites or graves	Reporting chance finds as early as possible, protect in situ and stop work in immediate area.	Construction Manager or Contractor / ECO	Inform staff and carry out inspections of new excavations.	Rescue information, artefacts or burials before extensive damage occurs	Ongoing basis / whenever on site (at least weekly)

9.1.5 Agriculture and Soils

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

Table 15: Agriculture

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY
Protection of soil resources: Erosion	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 (**Appendix D**).	Holder of the EA	Ensure that the stormwater 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.

9.1.6 Avifauna

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

Table 16: Avifauna

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY
Avifauna: Displacement due to disturbance and habitat transformation: Displacement of priority avifauna due to disturbance and habitat transformation	• All surface water (water troughs) should be buffered by 500m (all infrastructure) to prevent displacement of Sclater's Lark breeding population due to disturbance. Alternatively, water troughs could be relocated to maintain a minimum distance of 500m from the closest turbine. • Additional Sclater's Lark breeding areas as identified during the pre-construction monitoring must be designated an all-infrastructure No-Go zone. • Placement of turbines in highly suitable Red Lark habitat to be avoided where possible.	Project Developer	Design lay-out around the proposed buffer zones	Prevent mortality of priority avifauna	Once-off during the planning phase.
Avifauna: Mortality due to collisions with the turbines: Mortality of priority avifauna due to collisions with the wind turbines	• Based on the results of the pre-construction monitoring, a 2.8km turbine exclusion zone must be implemented around the vulture roost on the Aries – Aggeneys 1 400kV high voltage line.	Project Developer	Design lay-out around the proposed buffer zones	Prevent mortality of priority avifauna	Once-off during the planning phase.
Avifauna: Mortality due to electrocution: Electrocution of	• A raptor-friendly pole design must be used, and the pole design must be approved by the avifaunal specialist.	Project Developer	Design engineers to consult with avifaunal specialist on the final design of the poles.	Prevent mortality of priority avifauna	Once-off during the planning phase.

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY
raptors on the internal 33kV poles					

9.1.7 Bat

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

Table 17: Bat

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Modification of Bat Habitat and Roost Disturbance/Destruction	• Minimise clearing of vegetation - Rehabilitate all areas disturbed during construction (including aquatic habitat) • Avoid construction activities at night. • Minimise disturbance and destruction of farm buildings on site • Minimise removal of trees • Minimise blasting and removal of rocky habitat on site • Limit potential for bats to roost in project infrastructure (e.g., buildings, turbines, road culverts).	Pofadder Wind Facility 3 (Pty) Ltd	• Apply good construction abatement control practices to reduce emissions and pollutants (e.g., noise, erosion, waste) • Apply appropriate vegetation rehabilitation practices. • Ensure buildings, turbines and road culverts are correctly insulated and sealed to prevent bats from roosting. • Where trees and rocky crevices will be impacted, these features should be	• No bat roosts are destroyed • No bats colonise new project infrastructure for roosting • No infrastructure in No-Go areas (except roads) • All areas disturbed during construction are rehabilitated	During design and planning phase and throughout construction phase and until rehabilitation is complete.

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			examined for roosting bats.		
Light Pollution	• Use as little lighting as possible to avoid sky-glo	Pofadder Wind Facility 3 (Pty) Ltd	• Using hoods, low pressure sodium and warm white lights • Maximise use of motion-sensor lighting.	• No infrastructure in No-Go areas (except roads) • Use of appropriate lighting technology • Minimised light pollution	Completed during design and construction phase.
Bat Mortality	• No placement of turbines within No-Go areas • Minimum blade sweep of 35 m • Blade feathering must be used to prevent free-wheeling of turbine blades below the turbine cut-in speed • Implement post-construction fatality monitoring • Apply curtailment or deterrents if fatality thresholds are exceeded.	Pofadder Wind Facility 3 (Pty) Ltd	• Adhere to the bat constraints map for No-Go areas (Figure 5). • Select turbine with 35 m minimum blades sweep • Implement blade feathering below turbine cut-in speed • Implement best practise bat fatality monitoring according to Aronson et al. (2020). • Estimate bat fatality using GenEst (Simonis et al. 2018). • Develop bat adaptive management plan if fatality thresholds are	• Bat fatalities do not exceed fatality thresholds for any species.	Turbine layout and turbine model finalised during design phase. Operational Phase fatality monitoring according to Aronson et al. (2020).

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			exceeded which will include a curtailment plan and/or plan for use of acoustic deterrents.		

9.1.8 Aquatic

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

Table 18: Aquatic

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Loss of riparian systems and disturbance of the alluvial water courses: Construction of road and MV cable watercourse crossings	• Existing crossings should be utilized/upgraded. • Where it is possible the underground MV cables should be laid within the roads in order to avoid any unnecessary disturbance to the vegetation of the watercourses. • All crossings over watercourses should be such that the flow within the channels is not impeded and should be constructed perpendicular to the river channel. • Furthermore, for all watercourse crossings, the engineering team must provide an effective means to minimise the loss of riparian vegetation (small as possible footprint). • Where possible, culvert bases must be placed as close as possible with natural levels in mind so that these don't form additional steps / barriers.	Project Company	• Design-Layout taking into account the location, nature, morphology and ecological drivers of the watercourses to be crossed.	• To ensure selection of best environmental option for positioning alignment of proposed infrastructure • To minimise direct impacts/damage to vegetation associated with freshwater resource features	Once-off during the Design Phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Loss of riparian systems and disturbance of the alluvial water courses: Construction of road and MV cable watercourse crossings	• Vegetation rehabilitation management plan. • Minimum requirements are listed under the Construction and Operational Phase EMPr	Project Company and relevant specialist	Compilation of a Vegetation Rehabilitation plan taking into account the various vegetation units, patterns and key plant species, as identified within the terrestrial and aquatic ecological reports.	• To ensure optimal rehabilitation of temporary disturbed areas (post-construction), with a stable, natural occurring vegetation cover, resembling as far as possible the vegetation composition, patterns and structure of the surrounding vegetation cover. • To ensure optimal rehabilitation of development footprint (post-decommissioning), with a stable, natural occurring vegetation cover, resembling as far as possible the vegetation composition, patterns and	Once-off during the Design Phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
				structure of the surrounding vegetation cover.	
Loss of riparian systems and disturbance of the alluvial water courses: Construction of Wind Turbines and supporting infrastructure (excluding roads and mv cable watercourse crossings)	• The recommended buffer areas between the delineated freshwater resource features and proposed project activities should be implemented. • Sites for storing, mixing, and handling topsoil piles (if necessary) or any introduced materials, including all machinery or processing implements, should be placed in an ecologically least sensitive area and at least 100 m from any drainage area. • Other components of the proposed development that may under no circumstance be located in or within 100 m of any drainage systems would include: o Man-camps and/or ablution facilities o Any form of waste/soil/overburden disposal o Any form of storage of materials or machinery o Offices, and o Substations and switching stations o Battery Energy Storage Facilities	Project Company and relevant specialist	Design-Layout taking into account delineated sensitive habitat features and their ecological importance and sensitivity	• To avoid indirect damage/impacts to downslope freshwater resource features and associated vegetation.	Once-off during the Design Phase
Increase in sedimentation and erosion: Construction of road and MV cable watercourse crossings	• Compile a comprehensive erosion control and stormwater management plan for the footprint area as part of the final design of the project	Project Company and relevant specialist	Design-Layout taking into account the location and nature of the specific infrastructure as well as the location, nature and morphology of the area	• To minimise erosion of soil from site during construction.	Once-off during the Design Phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			wherein the infrastructure will be placed	• To maintain watercourses'' RECs • To avoid downstream impacts including: o erosion; o sedimentation; o destabilisation of banks and channels.	
Increase in sedimentation and erosion: Construction of road and MV cable watercourse crossings	• Vegetation rehabilitation management plan. o Minimum requirements are listed under the Construction and Operational Phase EMPr	Project Company and relevant specialist	Compilation of a Vegetation Rehabilitation plan taking into account the various vegetation units, patterns and key plant species, as identified within the terrestrial ecological report.	• To maintain watercourses' RECs • To stabilise previously disturbed areas. • To ensure the continuation of the watercourses' functions and services. • To ensure optimal rehabilitation of development footprint.	Once-off during the Design Phase
Increase in sedimentation and erosion: Construction	• Where new watercourse crossings are required and/or where existing routes will have to be upgraded and widened, the engineering team must provide an effective means to minimise the	Project Company	Design-Layout taking into account the location, nature, morphology and ecological	To simulate, as close as possible natural flow patterns in order to avoid erosion due to	Once-off during the Design Phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
of road and MV cable watercourse crossings	potential effects of sedimentation and erosion (erosion protection). • Design and construct any necessary erosion protection works where the infrastructure intersects the channel banks in order to prevent scouring or outer-bank erosion. Protection works to be considered include gabions, reno mattresses or other stabilising structures to armour them. • Structures that cater for through flows (e.g. culverts) should not only allow for the maximum volume of flows but should distribute flows naturally so not to concentrate flows downstream, which could induce erosion/scouring. • No stormwater runoff must be allowed to discharge directly into any water course along roads, and flows should thus be allowed to dissipate over a broad area covered by natural vegetation.		drivers of the watercourses to be crossed.	channelling, bank scouring, destabilisation of channel banks etc.	
Increase in sedimentation and erosion: Construction of Wind Turbines and supporting infrastructure (excluding roads and mv cable watercourse crossings)	Compile a comprehensive erosion control and stormwater management plan for the footprint area as part of the final design of the project	Project Company and relevant specialist	Design-Layout taking into account the location and nature of the specific infrastructure as well as the location, nature and morphology of the area wherein the infrastructure will be placed	• Prevent upstream erosional features from spreading into the aquatic buffer areas and the resource features themselves. • To allow for natural runoff patterns into the downslope	Once-off during the Design Phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
				freshwater resource features. • To avoid unnatural amounts of sediments carried into the downstream freshwater resource features form their catchments.	
Increase in sedimentation and erosion: Construction of Wind Turbines and supporting infrastructure (excluding roads and mv cable watercourse crossings)	• Vegetation rehabilitation management plan and Alien Invasive Plant (AIP) Management Plan. • Minimum requirements are listed under the Construction and Operational Phase EMPr • Stormwater from hard stand areas, buildings and substation must be managed using appropriate channels and swales when located within steep areas. • No stormwater runoff must be allowed to discharge directly into the watercourses. • The runoff should rather be dissipated over a broad area covered by natural vegetation.	Project Company and relevant specialist	• Compilation of a Vegetation Rehabilitation plan taking into account the various vegetation units, patterns and key plant species, as identified within the terrestrial ecological report. • Design-Layout taking into account the location and nature of the specific infrastructure as well as the location, nature and morphology of the area wherein the infrastructure will be placed	• Prevent upstream erosional features from spreading into the aquatic buffer areas and the resource features themselves. • To allow for natural runoff patterns into the downslope freshwater resource features. • To avoid unnatural amounts of sediments carried into the downstream freshwater resource features	Once-off during the Design Phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
				form their catchments.	
Potential impact on localised surface water quality: All associated infrastructure	Working protocols incorporating pollution control measures (including approved method statements by the contractor) should be clearly set out in the Construction Environmental Management Plan (CEMP) for the project and strictly enforced.	Project Company	Construction Environmental Management Plan	• To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons • To comply with waste management legislation • To avoid environmental harm from waste disposal	Once-off during the Design Phase
Impact on riparian systems through the possible increase in surface runoff on riparian form and function during the operation: Road and MV cable watercourse crossings	• No stormwater runoff must be allowed to discharge directly into any water course along roads, and flows should thus be allowed to dissipate over a broad area covered by natural vegetation. • For the crossing of small seasonal to ephemeral watercourses with sandy substrates and gentle gradients: o Road structures should be stabilized up to the level of the watercourse bed to allow for natural flow across the road.	Project Company	Design-Layout taking into account the location, nature, morphology and ecological drivers of the watercourses to be crossed.	To simulate, as close as possible natural flow patterns in order to avoid erosion due to channelling, bank scouring, destabilisation of channel banks etc.	Once-off during the Design Phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	○ It is crucial that the road surface is level within the watercourse without any flow concentration. • Where the road structure will be built up to the level of the terrestrial land adjacent to the river bed (larger seasonal watercourses with stronger flows, deeper channels and steeper embankments): ○ Engineering team must provide an effective means to allow/simulate natural flow patterns without the consecration/modification of flow through the culverts which must be incorporated into the detailed stormwater management plans based on the final design of the Pofadder WEF 3. ○ Culverts should be sized to transport not only water, but other materials that might be mobilized (i.e. debris) and cause blockages to flow. ○ Appropriate erosion protection measures must be installed to reduce bed erosion / scour. • The base (invert) of culverts must be aligned with the natural ground level of the bed of the channel to limit risks of erosion. Where necessary, additional measures such as drop-inlets or stepped inlet weirs must be constructed to address such risks. • The underground grid line, where crossing watercourses, can be laid within the access				

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	roads (existing), or if not possible, within the shoulder or at least within 3m of the road shoulder.				

9.1.9 Terrestrial Ecology

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

Table 19: Terrestrial Ecology

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Disturbance and loss of vegetation	• Ensure that laydown areas, construction camps and other temporary use areas are located in areas of low and medium sensitivity and are properly fenced or demarcated as appropriate and practically possible. • The location of the construction equipment camp and other temporary use areas shall be approved by the project EO/ECO or the specialist doing the pre-commencement footprint investigation	Project Company and EO/ECO	• Design-Layout taking into account delineated habitat features and their ecological importance and sensitivity	• To ensure selection of best environmental option for positioning alignment of proposed infrastructure • Environmental sensitivities are taken into consideration and avoided as far as possible, thereby mitigating potential impacts	Once-off during the Design Phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Disturbance and loss of vegetation within sensitive habitats	• For watercourse crossings, where it is possible the underground cables should be laid within the roads in order to avoid any unnecessary disturbance to the vegetation of the watercourses. • Furthermore, for all watercourse crossings, the engineering team must provide an effective means to minimise the loss of riparian vegetation (small as possible footprint).	Project Company	• Design-Layout taking into account the location, nature, morphology and ecological drivers of the watercourses to be crossed.	• To ensure selection of best environmental option for positioning alignment of proposed infrastructure • Environmental sensitivities are taken into consideration and avoided as far as possible, thereby mitigating potential impacts	Once-off during the Design Phase
Disturbance and loss of vegetation within sensitive habitats	• Sites for storing, mixing, and handling topsoil piles (if necessary) or any introduced materials, including all machinery or processing implements, should be placed in an ecologically least sensitive area and at least 100 m from any drainage area. • Other components of the proposed development that may under no circumstance be located in or within 100 m of any drainage would include: ○ Man-camps and/or ablution facilities ○ Any form of waste/soil/overburden disposal ○ Any form of storage of materials or machinery ○ Offices, and ○ Substations and switching stations	Project Company	• Design-Layout taking into account delineated sensitive habitat features and their ecological importance and sensitivity	• To ensure selection of best environmental option for positioning alignment of proposed infrastructure • Environmental sensitivities are taken into consideration and avoided as far as possible, thereby	Once-off during the Design Phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	○ Battery Energy Storage Facilities			mitigating potential impacts	
Soil erosion and associated degradation of ecosystems	• Compile a comprehensive erosion control and stormwater management plan for the footprint area as part of the final design of the project	Project Company and relevant specialist	• Design-Layout taking into account the location and nature of the specific infrastructure as well as the location, nature and morphology of the area wherein the infrastructure will be placed	• To minimise impacts on the biophysical environment • To restrict any residual or cumulative impacts to the development footprint where these impacts are maintained to an absolute minimal/acceptable level.	Once-off during the Design Phase
Soil erosion and associated degradation of ecosystems	• Vegetation rehabilitation management plan. ○ Minimum requirements are listed under the Construction and Operational Phase EMPr	Project Company and relevant specialist	Compilation of a Vegetation Rehabilitation plan taking into account the various vegetation units, patterns and key plant species, as identified within the terrestrial ecological report.	• To ensure optimal rehabilitation of temporary disturbed areas (post-construction), with a stable, natural occurring vegetation cover, resembling as far as possible the vegetation composition, patterns and structure of the	Once-off during the Design Phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
				surrounding vegetation cover. • To ensure optimal rehabilitation of development footprint (post-decommissioning), with a stable, natural occurring vegetation cover, resembling as far as possible the vegetation composition, patterns and structure of the surrounding vegetation cover.	
Soil erosion and associated degradation of ecosystems	• Where new watercourse crossings are required and/or where existing routes will have to be upgraded and widened, the engineering team must provide an effective means to minimise the potential effects of sedimentation and erosion (erosion protection). • Design and construct any necessary erosion protection works where the infrastructure intersects the channel banks in order to prevent scouring or outer-bank erosion. Protection works to be considered include gabions, reno	Project Company	Design-Layout taking into account the location, nature, morphology and ecological drivers of the watercourses to be crossed.	• To ensure selection of best environmental option for positioning alignment of proposed infrastructure • Environmental sensitivities are taken into consideration and	Once-off during the Design Phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	mattresses or other stabilising structures to armour them. • Structures that cater for through flows (e.g. culverts) should not only allow for the maximum volume of flows but should distribute flows naturally so not to concentrate flows downstream, which could induce erosion/scouring.			avoided as far as possible, thereby mitigating potential impacts	
Soil erosion and associated degradation of ecosystems	• Stormwater from hard stand areas, buildings and substation must be managed using appropriate channels and swales when located within steep areas. • No stormwater runoff must be allowed to discharge directly into the watercourses. • The runoff should rather be dissipated over a broad area covered by natural vegetation.	Project Company	Design-Layout taking into account the location and nature of the specific infrastructure as well as the location, nature and morphology of the area wherein the infrastructure will be placed	• To ensure selection of best environmental option for positioning alignment of proposed infrastructure • Environmental sensitivities are taken into consideration and avoided as far as possible, thereby mitigating potential impacts	Once-off during the Design Phase

9.1.10 Noise

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

Table 20: Noise

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Reduce construction noise	Conduct noise sensitivity training for all construction staff. No construction piling should occur at night. Piling should only occur during the hottest part of the day to take advantage of unstable atmospheric conditions	Holder of the EA	Training	Reduction in Noise and thus reduction in chance of complaints arising	Before construction commences

9.1.11 Visual

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

Table 21: Visual

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Aircraft Warning Lights (AWL) at night have the potential to significantly extend the project Zone of Visual Influence and can be decreased by reduced number of night-time AWLs, as well as placing the AWL in shallow cups that	Application should be made to CAA for ground shielded, strategic lighting for the total wind farm using the outer corners points for night-time AWL.	Project management and EPC	On commencement of Pre-construction planning, CAA need to be contacted by the Project Management Team to verify suitability of the AWL mitigation.	High intensity, combined AWL lighting does not create a glow in the regional landscape.	NA

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
restrict line of sight to ground areas.					
Large signage on roads, or on turbines, has the potential to create a visual nuisance.	Signage on the road should be moderated in size and use natural colours, while still providing effective directions. No large signage on the turbines (hubs or towers).	Project management and EPC	n/a	Signage is efficient but not dominating for the causal observers.	n/a
Demolition of the concrete towers has the potential to significantly extend the tower impact area and degrade local landscape resources if demolition planning is not properly implemented.	A detailed Environmental Management Plan needs to be generated to define the demolition impact area, specifying how the rubble will be managed and processed, as the expected demolition (fall area) identified, assessed for vegetation impact and suitability of extraction of the rubble to the bury pits. The plan needs to specify the rehabilitation methodology for the impacted area.	Project management and EPC with inputs from demolition and rehabilitation specialist.	To be defined	The landscape remains rural and while some small undulations take place, the effect does not detract from the local landscape character. The bury pits should not be on the rocky outcrops.	Two years prior to closure.
Un-necessary roads have the potential to create a visual disturbance long after the usage as past.	Limit road access to an efficient minimum by coordinated planning between the project management and the environmental control officer.	Project management and EPC	Clear pre-planning is carried out with clear routing identification, and consequences for off-road driving.	The surrounding landscape remains rural and agricultural in landscape and land use.	As required.
Long fencing lines has the potential to be visually dominating.	Fencing should be simple and appear transparent from a distance and located around the construction camp and not encircle the total project area	Project management and EPC	Clear planning of the laydown and construction yards is carried out with security fencing demarcated around the core construction areas.	Security fencing is kept to an effective minimum without jeopardizing	At onset of project planning.

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
				security of the project.	

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 22: Construction Camp

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAME
Construction Camp: Site of construction camp	• The size of the construction camp must be aligned to the approved laydown area. • 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. • Suitable control measures over the Contractor's yard, plant and material storage to mitigate any visual impact of the construction activity must be implemented. • No construction should occur in an area of high or unique agricultural value, or in an area under cultivation.	Holder of the EA/Contractor	Ensure the conditions of the EA are adhered to. Compliance to all legislative requirements. Impacts avoided or managed as per specialist recommendations.	Once-off
Construction Camp: Storage of materials (including hazardous materials)	• 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. • Storage areas must be designated, demarcated and fenced if necessary. • 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.	Holder of the EA/Contractor	Choice of storage areas carefully considered to avoid impact to environment Correct handling, storage and/or disposal and/or	Continuous

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAME
	• Fire prevention facilities must be present at all storage facilities. • Storage areas containing chemical substances / materials must be clearly sign posted. • 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 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. • 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. • All fuel storage areas must be roofed to avoid creation of dirty stormwater • 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. • Staff dealing with these materials / substances must be aware of their potential impacts and follow the appropriate safety measures. • 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. • All excess cement and concrete mixes are to be contained on the construction site prior to disposal off site.		cleanup of all materials to prevent impact to environment All hazardous substances managed according to approved Method Statement.	

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAME
	• 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.			
Construction Camp: Drainage of construction camp	• Surface drainage measures must be established in the Construction Camps so as to prevent o Ponding of water; o Erosion as a result of accelerated runoff; and, o Uncontrolled discharge of polluted runoff.	Holder of the EA/Contractor	Storm Water Management Plan provided and accepted prior to construction commencing Storm Water Management Plan implemented Erosion plan implemented and hydrological measures in place.	Continuous

9.2.2 Environmental Education and Training

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

Table 23: Environmental Education and Training

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Environmental Education and Training:	• 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:	Contractor	Thorough induction to site.	Continuous

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Environmental Training	○ 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 • 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. • Training should be provided to the staff members in the use of the appropriate fire-fighting equipment. • Use should be made of environmental awareness posters on site. • The need for a "clean site" policy also needs to be explained to the workers. • 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	• 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

9.2.3 Waste Management

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

Table 24: Waste Management

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Waste Management: Litter management/general waste	• Refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction site. • 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. • A housekeeping team should be appointed to regularly maintain the litter and rubble situation on the construction site. • 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. • Where vegetation is cleared and is suitable, chipping and/or mulching can be considered. • Littering by the employees of the Contractor shall not be allowed under any circumstances. • Skip waste containers should be maintained on site. These should be kept covered and arrangements made for them to be collected regularly. • Any putrescible waste must be stored in containers that can keep out scavengers such as baboons and birds to prevent the spread of litter. • 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. • The Contractor shall provide a method statement with regard to waste management. • A certificate of disposal shall be obtained by the Contractor and kept on file, if relevant.	Contractor The ECO shall monitor the neatness of the work sites as well as the Contractor campsite.	All waste managed according to approved Method Statement	Continuous

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• Under no circumstances may solid waste be burnt on site. • All waste must be removed promptly to ensure that it does not attract vermin or produce odours.			
Waste Management: Hazardous waste	• 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	• 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	• In the event of an accidental spill or leakage of hazardous substances, such incident(s) must be reported to all relevant authorities, including the	Contractor	All waste managed according to approved Method Statement	Continuous

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	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. • 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. • 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. • If a spill occurs on an impermeable surface such as cement or concrete, the surface spill must be contained using oil absorbent material. • If necessary, oil absorbent sheets or pads must be attached to leaky machinery or infrastructure. • Materials used for the remediation of petrochemical spills must be used according to product specifications and guidance for use. • 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.			

9.2.4 Heritage

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

Table 25: Heritage

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY

Impacts to archaeology and graves: Damage or destruction of archaeological sites or graves	Reporting chance finds as early as possible, protect in situ and stop work in immediate area.	Construction Manager or Contractor / ECO	Inform staff and carry out inspections of new excavations.	Rescue information, artefacts or burials before extensive damage occurs	Ongoing basis / whenever on site (at least weekly)
Impacts to cultural landscape: Visible landscape scarring	Ensure disturbance is kept to a minimum and does not exceed project requirements. Rehabilitate areas not needed during operation.	Construction Manager or Contractor / ECO	Monitoring of surface clearance relative to approved layout	Minimise landscape scarring	Ongoing basis / as required

9.2.5 Agriculture and Soils

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

Table 26: Agriculture and Soils

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY
Aspect: Protection of soil resources Erosion	• 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	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	That disturbance and existence of hard surfaces causes no erosion on or downstream of the site.	Every 2 months during the construction phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY
			action must be implemented to the run-off control system in the event of any erosion occurring.		
Aspect: Protection of soil resources Erosion	• Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.	Engineer/Contractor	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	• 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	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.

9.2.6 Avifauna

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

Table 27: Avifauna

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES / FREQUENCY
Avifauna: Displacement due to disturbance:	• 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	Contractor The ECO shall monitor	1. Implementation of the CEMPr. Oversee activities to ensure that the CEMPr is	Prevent unnecessary displacement of avifauna by	1. On a daily basis 2. Weekly 3. Weekly

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES / FREQUENCY
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	apply good environmental practice during construction. The CEMPr must specifically include the following: ○ No off-road driving; ○ Maximum use of existing roads, where possible; ○ Measures to control noise and dust according to latest best practice; ○ Restricted access to the rest of the property; ○ Strict application of all recommendations in the botanical specialist report pertaining to the limitation of the footprint. • Construction activity should be restricted to the immediate footprint of the infrastructure as far as possible. Access to the remainder of the area should be strictly controlled to prevent unnecessary disturbance of priority species. • Measures to control noise and dust should be applied according to current best practice in the industry.		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. Construction 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	ensuring that contractors are aware of the requirements of the Construction Environmental Management Programme (CEMPr.)	4. Weekly 5. Weekly

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES / FREQUENCY
			via site inspections and report non-compliance.		
Avifauna: Displacement due to habitat transformation 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.	• Ensure that all the recommendations for mitigation from the biodiversity/vegetation specialist, including rehabilitation of disturbed areas, are strictly implemented	Wind farm operator	Appointment of specialist to coordinate and monitor the rehabilitation of the vegetation.	Prevent unnecessary displacement of avifauna by ensuring that the rehabilitation of transformed areas is implemented according to the recommendations of the biodiversity/vegetation specialist..	Once-off

9.2.7 Bat

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

Table 28: Bat

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Modification of Bat Habitat and Roost Disturbance/Destruction	• Minimise clearing of vegetation - Rehabilitate all areas disturbed during construction (including aquatic habitat) • Avoid construction activities at night.	Pofadder Wind Facility 3 (Pty) Ltd	• Apply good construction abatement control practices to reduce emissions and pollutants	• No bat roosts are destroyed • No bats colonise new project	During design and planning phase and throughout construction

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• Minimise disturbance and destruction of farm buildings on site • Minimise removal of trees • Minimise blasting and removal of rocky habitat on site • Limit potential for bats to roost in project infrastructure (e.g., buildings, turbines, road culverts).		(e.g., noise, erosion, waste) • Apply appropriate vegetation rehabilitation practices. • Ensure buildings, turbines and road culverts are correctly insulated and sealed to prevent bats from roosting. • Where trees and rocky crevices will be impacted, these features should be examined for roosting bats.	infrastructure for roosting • No infrastructure in No-Go areas (except roads) • All areas disturbed during construction are rehabilitated	phase and until rehabilitation is complete.
Light Pollution	• Use as little lighting as possible to avoid sky-glo	Pofadder Wind Facility 3 (Pty) Ltd	• Using hoods, low pressure sodium and warm white lights • Maximise use of motion-sensor lighting.	• No infrastructure in No-Go areas (except roads) • Use of appropriate lighting technology • Minimised light pollution	Completed during design and construction phase.
Bat Mortality	• No placement of turbines within No-Go areas • Minimum blade sweep of 35 m	Pofadder Wind Facility 3 (Pty) Ltd	• Adhere to the bat constraints map for No-Go areas (Figure 5).	• Bat fatalities do not exceed fatality	Turbine layout and turbine model finalised during design

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• Blade feathering must be used to prevent free-wheeling of turbine blades below the turbine cut-in speed • Implement post-construction fatality monitoring • Apply curtailment or deterrents if fatality thresholds are exceeded.		• Select turbine with 35 m minimum blades sweep • Implement blade feathering below turbine cut-in speed • Implement best practise bat fatality monitoring according to Aronson et al. (2020). • Estimate bat fatality using GenEst (Simonis et al. 2018). • Develop bat adaptive management plan if fatality thresholds are exceeded which will include a curtailment plan and/or plan for use of acoustic deterrents.	thresholds for any species.	phase. Operational Phase fatality monitoring according to Aronson et al. (2020).

9.2.8 Aquatic

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

Table 29: Aquatic

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Loss of riparian systems and disturbance of the alluvial water courses: Construction of road and MV cable watercourse crossings	• The working servitude within the watercourses must be demarcated on both sides using orange hazard netting prior to construction commencing.	Project Company, monitored by ECO/EO	• Taking into account the final design-layout, and any sensitive areas, demarcate the absolute minimal development footprint, and ensure that the appointed contractor is made aware of where what activities and impacts are allowed and disallowed.	• Minimise and maintain damage of watercourse vegetation the development footprint. • Prevent any residual or cumulative impacts arising. • To ensure the persistence/maintenance of the REC	Prior to commencement of construction activities
Loss of riparian systems and disturbance of the alluvial water courses: Construction of road and MV cable watercourse crossings	• All sensitive aquatic habitats outside of the demarcated construction area must be considered 'No-Go' areas for the duration of the construction phase. • No physical damage should be done to any aspects of the channel and banks of watercourses other than those necessary to complete the works as specified. • Vegetation clearing should occur in a phased manner to minimise erosion and/or run-off. • There should be reduced activity at the site after large rainfall events when the soils are wet.	Contractor/ECO/EO	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments.	• Minimise and maintain damage of watercourse vegetation the development footprint. • Prevent any residual or cumulative impacts arising. • To ensure the persistence/maintenance of the REC	Throughout construction and decommissioning Phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			• Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Loss of riparian systems and disturbance of the alluvial water courses: Excavation and trenching within watercourses	• Avoid stockpiling materials in vegetated areas that will not be cleared. • All material stockpiles should be located outside freshwater resource features. • Excavated soils should be stockpiled on the upslope side of the excavated trench so that eroded sediments off the stockpile are washed back into the trench; • Excavated soils will need to be replaced in the same order as excavated from the trench, i.e. sub-soil must be replaced first and topsoil must be replaced last (this will maximise opportunity for re-vegetation of disturbed areas). • Closure and rehabilitation of the disturbed areas should commence as soon as the laying of underground cable has been completed.	Contractor/ECO/EO	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained	• Minimise and maintain damage of watercourse vegetation the development footprint. • Prevent any residual or cumulative impacts arising. • To ensure the persistence/maintenance of the REC	Throughout construction and decommissioning Phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Loss of riparian systems and disturbance of the alluvial water	• All alien plant re-growth must be monitored, and should it occur, these plants should be eradicated. • Any disturbed areas should be rehabilitated and monitored to ensure that these areas do	Contractor/ECO/EO	• The ECO will need to prepare an induction and training programme to educate the contracting team on the EMPr	• The successful reduction in the treat (significance) posed by Alien Invasive Plants.	Throughout construction and operational phase as well as after the

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
courses: Alien Invasive Plants	not become subject to erosion or invasive alien plant growth. • Mitigation and follow up monitoring of residual impacts (alien vegetation growth and erosion) may be required.		commitments relating to the management/eradication of AIPs. • The EMPr and IAP Management Plan should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the	• Recreate a non-invasive, acceptable vegetation cover that will facilitate the establishment of desirable and/or indigenous species	decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			construction, and operational processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Loss of riparian systems and disturbance of the alluvial water courses: Construction of Wind Turbines and supporting infrastructure (excluding roads and mv cable watercourse crossings)	• The recommended buffer areas between the delineated freshwater resource features and proposed project activities should be maintained.	Project Company, monitored by ECO/EO	• Taking into account the final design-layout, and any sensitive areas, demarcate the absolute minimal development footprint, and ensure that the appointed contractor is made aware of where what activities and impacts are allowed and disallowed.	• No indirect damage to downslope freshwater resource features and their associated vegetation.	Prior to commencement of construction activities
Loss of riparian systems and disturbance of the alluvial water courses: Construction of Wind Turbines and supporting infrastructure (excluding roads and mv cable	• Vegetation clearing should occur in a phased manner to minimise erosion and/or run-off. • Any erosion problems observed to be associated with the project infrastructure should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. • There should be reduced activity at the site after large rainfall events when the soils are wet. No driving off of hardened roads should occur immediately following large rainfall	Contractor/ECO/EO	• The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in	No indirect damage to downslope freshwater resource features and their associated vegetation.	Throughout construction and decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
watercourse crossings)	events until soils have dried out and the risk of bogging down has decreased. • Any stormwater within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities • Stormwater from hardstand areas, buildings and the substation must be managed using appropriate channels and swales when located within steep areas.		the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			authorities with findings of these investigations.		
Increase in sedimentation and erosion: Construction of road and MV cable watercourse crossings	• All construction activities occurring directly within the watercourses to take place within the dry season. • The erosion and stormwater management measures included in the stormwater management plan for the Pofadder WEF 3 must be implemented. • The duration of construction work within the watercourses must be minimised as far as practically possible through proper planning and phasing. • During the construction phases, monitor culverts to see if erosion issues arise and if any erosion control is required. • Any erosion problems observed during the construction phase should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. • Vegetation clearing should occur in a phased manner to minimise erosion and/or run-off. • Any disturbed areas should be rehabilitated and monitored to ensure that these areas do not become subject to erosion • Silt traps should be used where there is a danger of topsoil eroding and entering streams and other sensitive areas. • These silt traps must be regularly monitored and maintained and replaced / repaired immediately as and when required. These	Contractor/ECO/EO	• The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is	• To minimise erosion of soil from site during construction. • To maintain watercourses'' RECs • To avoid downstream impacts including: o erosion; o sedimentation; o destabilisation of banks and channels.	Throughout construction and decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	measures should be regularly checked, maintained and repaired when required to ensure that they are effective • Construction of gabions and other stabilisation features to prevent erosion must be undertaken, if deemed necessary. • Under no circumstances must new channels be created for flow diversion and conveyance purposes unless approved as part of an EA or WUL • There should be reduced activity during the construction phase at the site after large rainfall events when the soils are wet. No driving off of hardened roads should occur immediately following large rainfall events until soils have dried out and the risk of bogging down has decreased. • Closure and rehabilitation of the disturbed areas should commence as soon as the laying of underground cable has been completed. • Soils should be landscaped to the natural landscape profile with care taken to ensure that no preferential flow paths or berms remain		taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Increase in sedimentation and erosion: Construction of road and MV cable	• Any areas disturbed during the construction phase should be encouraged to rehabilitate as fast and effective as possible and were deemed necessary by the ECO or Contractor's EO, artificial rehabilitation (e.g. re-seeding with collected or commercial	Contractor/ECO/EO	• The ECO will need to prepare an induction and training programme to educate the contracting team on the EMPr	• Recreate a non-invasive, acceptable vegetation cover that will facilitate the establishment of desirable and/or indigenous species	After construction and throughout operational phase as well as after the

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
watercourse crossings	indigenous seed mixes) should be applied in order to speed up the rehabilitation process in critical areas (e.g. steep slopes and unstable soils). • All rehabilitated areas must be monitored to ensure that these areas do not become subject to erosion or invasive alien plant growth.		commitments relating to site rehabilitation. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr and Rehabilitation Management Plan should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted	• Prevent accelerated erosion of ecosystem degradation	decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, and operational processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Increase in sedimentation and erosion: Construction of Wind Turbines and supporting infrastructure (excluding roads and mv cable watercourse crossings)	• No unnecessary vegetation clearance may be allowed. • Vegetation clearing should occur in a phased manner to minimise erosion and/or run-off. • Any erosion problems observed to be associated with the project infrastructure should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. • There should be reduced activity at the site after large rainfall events when the soils are wet. • No driving off of hardened roads should occur immediately following large rainfall events until soils have dried out and the risk of bogging down has decreased. • Any stormwater within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities	Contractor/ECO/EO	• The ECO will need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any	• Prevent upstream erosional features from spreading into the aquatic buffer areas and the resource features themselves. • To allow for natural runoff patterns into the downslope freshwater resource features. • To avoid unnatural amounts of sediments carried into the downstream freshwater resource features form their catchments.	Throughout construction and decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Potential impact on localised surface water quality – All associated infrastructure	• Implement appropriate measures to ensure strict use and management of all hazardous materials used on site • Waste should be stored on site in clearly marked containers in a demarcated area. • All waste material should be removed at the end of every working day to designated waste	Contractor/ECO/EO	• Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase	• To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons	Throughout construction, maintenance and decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	facilities at the main construction camp/suitable waste disposal facility. • All waste must be disposed of offsite. • Implement appropriate measures to ensure strict management of potential sources of pollutants (e.g. litter, hydrocarbons from vehicles and machinery, cement during construction etc.) • Implement appropriate measures to ensure containment of all contaminated water by means of careful run-off management on the development site. • Implement appropriate measures to ensure strict control over the behavior of construction workers. • Appropriate ablution facilities should be provided for construction workers during construction and on-site staff during the operation of the substation and WEF. • Vehicles to refuel within a designated area, at least 100m from any freshwater resource feature. • Place spill kits on site which are operated by trained staff members for the adhoc remediation of minor chemical and hydrocarbon spillages.		• A complaints register must be maintained, in which any complaints from the community will be logged. Complaints must be investigated and, if appropriate, acted upon • Observation and supervision of waste management practices throughout construction phase • Waste collection to be monitored on a regular basis • Waste documentation completed • An incident reporting system must be used to record non-conformances to the EMP/IWWMP • An appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase. » Public complaints register must be	• To ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons • To comply with waste management legislation • To minimise production of waste • To ensure appropriate waste storage and disposal • To avoid environmental harm from waste disposal	

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			developed and maintained on site.		

9.2.9 Terrestrial Ecology

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

Table 30: Terrestrial Ecology

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Disturbance/loss of natural vegetation	• Demarcate all areas to be cleared with construction tape or similar material where practical. However, caution should be exercised to avoid using material that might entangle fauna. ○ Prevent unnecessary destructive activity within construction areas (prevent over-excavations and double handling) ○ Create specific turning points and parking areas for vehicles and heavy machinery as needed ○ Strictly prohibit any driving outside designated areas and roads.	Project Company, monitored by ECO/EO	• Taking into account the final design-layout, and any sensitive areas, demarcate the absolute minimal development footprint, and ensure that the appointed contractor is made aware of where what activities and impacts are allowed and disallowed.	• To minimise impacts on the biophysical environment • To prevent any residual or cumulative impacts arising.	Prior to commencement of construction activities
Disturbance/loss of natural vegetation	• No unnecessary vegetation clearance may be allowed. • ECO and/or Contractor's EO to provide supervision and oversight of vegetation clearing activities and other activities which may cause damage to the environment, especially at the initiation of the project, when	Contractor/ECO/EO	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of	• To minimise impacts on the biophysical environment • To prevent any residual or cumulative impacts arising.	EMPr induction and training: Prior to commencement of construction activities

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	the majority of vegetation clearing is taking place. • All vehicles to remain on demarcated roads and no unnecessary driving in the veld outside these areas should be allowed. • Regular dust suppression during construction, if deemed necessary, especially along access roads. • No fires should be allowed on-site • No plants may be translocated or otherwise uprooted or disturbed for rehabilitation or other purpose without express permission from the ECO and or Contractor's EO.		vegetation outside of these areas. • Even within the development footprint, where vegetation can be allowed to persist undisturbed, this must be imposed. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with		Rest of the mitigation measures: Throughout construction and decommissioning phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Disturbance of fauna	• Site access should be controlled and no unauthorised persons should be allowed onto the site.	Contractor/ECO/EO	• At all times be acutely aware of the specified development footprint,	• To minimise impacts on the biophysical environment	EMPr induction and training:

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• Any fauna directly threatened by the associated activities should be removed to a safe location by a suitably qualified person. • The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the demarcated site. • Fires should not be allowed on site. • All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. • All construction vehicles should adhere to a low speed limit (30km/h) to avoid collisions with susceptible species such as snakes and tortoises. • Construction vehicles limited to a minimal footprint on site (no movement outside of the earmarked footprint). • All mammal, large reptiles and avifauna species found injured during construction will be taken to a suitably qualified veterinarian or rehabilitation centre to either be put down in a humane manner or cared for until it can be released again		and remain within this area avoiding any disturbance of vegetation outside of these areas. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments and how address/handle specific fauna when encountered. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with	• To prevent any residual or cumulative impacts arising. • Prevent mortality and injury of faunal species.	Prior to commencement of construction activities Rest of the mitigation measures: Throughout construction and decommissioning phases Daily inspections throughout construction and decommissioning phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, reporting back to the relevant environmental authorities with findings of these investigations. • The ECO will also need to prepare an induction and training programme to educate		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			the contracting team on the EMPr commitments and how address/handle specific fauna when encountered. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance.		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			• The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Disturbance of fauna	• All cable trenches, excavations should be checked on a daily basis for the presence of trapped animals. • Any animals found should be removed in a safe manner, unharmed, and placed in an area where the animal will be comfortable. • If the ECO or contractor is unable to assist in the movement of a fauna species, ensure a member of the conservation authorities assists with the translocation. • Note: the McGregor Museum in Kimberley could be approached for advice on relocating animals if required	Contractor/ECO/EO	• The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments and how address/handle specific fauna when encountered. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's	• To minimise impacts on the biophysical environment • To prevent any residual or cumulative impacts arising. • Prevent mortality and injury of faunal species.	EMPr induction and training: Prior to commencement of construction activities Rest of the mitigation measures: Throughout construction and decommissioning phases Daily inspections throughout construction and decommissioning phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			(Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Disturbance and loss of vegetation within sensitive habitats	• The working servitude within the watercourses must be demarcated on both sides using orange hazard netting prior to construction commencing.	Project Company, monitored by ECO/EO	• Taking into account the final design-layout, and any sensitive areas, demarcate the absolute minimal	• To minimise impacts on sensitive habitats. • To prevent any residual or cumulative impacts arising.	Prior to commencement of construction activities

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			development footprint, and ensure that the appointed contractor is made aware of where what activities and impacts are allowed and disallowed.	• To ensure the persistence/maintenance of the REC	
Disturbance and loss of vegetation within sensitive habitats	• All sensitive habitats outside of the demarcated construction area must be considered 'No-Go' areas for the duration of the construction phase. • For watercourse road and cable crossings, no physical damage should be done to any aspects of the channel and banks of watercourses other than those necessary to complete the works as specified. • Avoid stockpiling materials in vegetated areas that will not be cleared.	Contractor/ECO/EO	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses.	• To minimise impacts on sensitive habitats • To prevent any residual or cumulative impacts arising. • To ensure the persistence/maintenance of the REC	Throughout construction and decommissioning Phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			• The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			back to the relevant environmental authorities with findings of these investigations.		
Disturbance and loss of Faunal and Floral Species of Conservation Concern (SCC) as well as protected species.	• Preconstruction walk-through of the final development footprint for protected species that would be affected and that can be translocated.	Project Company, carried out by a registered Ecologist	• Within the development footprint, Identify, mark (GPS), count, describe and map all populations/individuals of protected and fauna-, flora SCC. • All results to be incorporated in an Ecological Pre-construction Walk-through Report	• To ensure the persistence of healthy, viable populations of protected and SCC within the project site. • To ensure the acceptable rehabilitation of the development footprint.	Prior to commencement of construction activities
Disturbance and loss of Faunal and Floral Species of Conservation Concern (SCC) as well as protected species.	• The above pre-construction footprint investigations will be used together with results from the ecological specialist report to draft the following: o A comprehensive search and rescue program for plants and possible burrowing animals o A comprehensive alien invasive species eradication and management plan	Project Company, carried out by a registered Ecologist	Compile detailed reports, with achievable goals.	• To ensure the persistence of healthy, viable populations of protected and SCC within the project site. • To ensure the acceptable rehabilitation of the development footprint.	Prior to commencement of construction activities
Disturbance and loss of Faunal and Floral Species of Conservation	• Obtain permits for protected plant removal and relocation prior to commencement of any activity related to this development	Project Company, or contractor responsible for vegetation clearing,	Provide the relevant authorities with the necessary information and reports.	• To ensure the persistence of healthy, viable populations of	Prior to commencement of construction activities

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Concern (SCC) as well as protected species.		assisted by an EAP/Specialist		protected and SCC within the project site	
Disturbance and loss of Faunal and Floral Species of Conservation Concern (SCC) as well as protected species.	• Search and Rescue (S&R) of all SCC and protected plants that will be affected by the development, especially species occurring in long term and permanent, hard surface development footprints (i.e. all buildings, new roads and tracks, lay down areas, and turbine positions) should take place. ○ Plants that can be considered for rescue, and included in subsequent rehabilitation programs are all desirable geophytes and indigenous succulents • All rescued species should be transplanted immediately or bagged (or succulents left to first air-dry before planting) and kept in the horticulturist's or a designated on-site nursery, and should be returned to site or land portion once all construction is completed and rehabilitation of disturbed areas is required. • Replanting should occur in summer to early autumn once sufficient rains have fallen, in order to facilitate establishment.	Contractor monitored and approved by ECO/EO	• The ECO will also need to prepare an induction and training programme to educate the contracting team responsible for S&R on the species to be S&R, the commitments, and appropriate methodology. • S&R team to develop an internal reporting structure to record and monitor S&R. • S&R should be enforced and monitored by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience	• To ensure the persistence of healthy, viable populations of protected and SCC within the project site	Initial S&R: Prior to commencement of construction activities Any additional species only observed after the initial S&R: Throughout the construction phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			to ensure that S&R activities are being implemented appropriately. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Disturbance and loss of Faunal and Floral Species of Conservation Concern (SCC) as well as protected species.	• Any additional individuals of protected species affected by and observed within the development footprint during construction (after the initial Search and Rescue) should be translocated under the supervision of the ECO and/or Contractor's Environmental Officer (EO).	Contractor monitored and approved by ECO/EO	• The ECO will also need to prepare an induction and training programme to educate the contracting team responsible for S&R on the species to be S&R, the commitments, and appropriate methodology. • S&R team to develop an internal reporting structure to record and monitor S&R.	• To ensure the persistence of healthy, viable populations of protected and SCC within the project site	Initial S&R: Prior to commencement of construction activities Any additional species only observed after the initial S&R: Throughout the construction phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			• S&R should be enforced and monitored by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that S&R activities are being implemented appropriately. The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Soil erosion and associated degradation of ecosystems	• Vegetation clearing should occur in a phased manner to minimise erosion and/or run-off. • No unnecessary vegetation clearance may be allowed.	Contractor, ECO to control	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any	• To minimise erosion of soil from site during construction • To minimise deposition of soil into downstream	Throughout construction and decommissioning Phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Construction: Soil erosion and associated degradation of ecosystems	• Limit the physical footprint of the road and verges that would require clearing to a minimum.		disturbance of vegetation outside of these areas. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency	freshwater resource features. • To minimise damage to vegetation by erosion or deposition • No accelerated overland flow related surface erosion as a result of a loss of vegetation cover	

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and associated	• No activities or disturbance/transformation permitted outside of the development area. • Any erosion problems observed along access roads or any hardened/ engineered surface should be rectified immediately and monitored thereafter to ensure that they do not re-occur. • Re-instate as much of the eroded area to its pre-disturbed, "natural" geometry (no change	Contractor, ECO to control	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas.	• To minimise erosion of soil from site during construction • To minimise deposition of soil into downstream freshwater resource features.	Throughout construction and decommissioning Phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
degradation of ecosystems	in elevation and any banks not to be steepened) where possible. • Implement best practice erosion protection and stormwater management during construction and operation;		• The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental	• To minimise damage to vegetation by erosion or deposition • No accelerated overland flow related surface erosion as a result of a loss of vegetation cover	

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and associated degradation of ecosystems	• Roads and other disturbed areas should be regularly monitored for erosion problems and problem areas should receive follow-up monitoring by the EO to assess the success of the remediation.	Contractor, ECO to control	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas. • The ECO will also need to prepare an induction and training	• To minimise erosion of soil from site during construction • To minimise deposition of soil into downstream freshwater resource features. • To minimise damage to vegetation by erosion or deposition	Throughout construction and decommissioning Phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action	• No accelerated overland flow related surface erosion as a result of a loss of vegetation cover	

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and associated degradation of ecosystems	• Any stormwater within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities • Run-off generated from cleared and disturbed areas such as access roads and slopes that drain into rivers, streams or wetlands must be controlled using erosion control and sediment trapping measures. These control measures must be established at regular intervals perpendicular to the slope to break surface flow energy and reduce erosion as well as trap sediment. • Sediment barriers (e.g. silt fences, sandbags, hay bales, earthen filter berms or retaining	Contractor, ECO to control	• Design-Layout taking into account the location and nature of the specific infrastructure as well as the location, nature and morphology of the area wherein the infrastructure will be placed. • Additionally, the ECO will need to be responsible for conducting regular	• To minimise erosion of soil from site during construction • To minimise deposition of soil into downslope freshwater resource features. • To minimise damage to vegetation by erosion or deposition • No accelerated overland flow related surface erosion as a result of a loss of vegetation cover	Prior to commencement of construction activities and throughout the construction and decommissioning phases.

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	walls) must be established to protect downstream watercourses from erosion and sedimentation impacts from upslope. Sediment barriers should be regularly maintained and cleared so as to ensure effective drainage.		site-inspections of the construction, and operation footprint areas, identifying any additional areas that will have to be addressed. • Prompt and appropriate response, form the contractor, following any additional recommendations from the ECO.	• No reduction in the surface area or natural functionality of natural freshwater resource features as a result of the establishment of infrastructure • No increase in runoff into downslope freshwater resource featurs as a result of construction of project related infrastructure • No increase in runoff into downslope freshwater resource features as a result of road construction	
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and associated degradation of ecosystems	• Topsoil must be removed and stored separately from subsoil. • Topsoils should be removed (and stored) under dry conditions to avoid excessive compaction whenever topsoil will have to be stored for longer than one year. • Topsoil to be stored in berms with a width of 150 – 200 cm, and a maximum height of 100 cm, preferably lower o Place berms along contours or perpendicular to the prevailing wind direction	Contractor, ECO to control	• Prior to construction, site and soil conditions to be investigated and appropriate area for topsoil storage to be identified. • Ensure the appropriate removal and storage of topsoil as specified within the EMPr. • The EMPr should be enforced and monitored for	• To retain full biological activity and functionality of topsoil • Remove and store all topsoil on areas that are to be excavated; and use this topsoil in subsequent rehabilitation of disturbed areas	Before and during construction phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	○ Adhere to the following general rule: the larger the pile of topsoil storage needs to be, the shorter should be the time it is stored • Topsoil handling should be reduced to stripping, piling (once), and re-application. Between the piling and reapplication, stored topsoils should not undergo any further handling except control of erosion and (alien) invasive vegetation		compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance.		
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and associated degradation of ecosystems	• Topsoil must be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas. • Topsoils should be spread evenly over the ripped or trimmed surface, if possible, not deeper than the topsoil originally removed	Contractor, ECO to control	• Topsoil re-application and rehabilitation done in accordance with the EMPr and Site Rehabilitation Management Plan	• To retain full biological activity and functionality of topsoil • Remove and store all topsoil on areas that are to be excavated; and use this topsoil in subsequent rehabilitation of disturbed areas	During and prior to construction phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• The final prepared surface should not be smooth but furrowed to follow the natural contours of the land • The final prepared surface shall be free of any pollution or any kind of contamination • Care should be taken to prevent the compaction of topsoil				

9.2.10 Transportation

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

Table 31: Transportation

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Additional Traffic Generation: Increase in Traffic	• Ensure staff transport is done in the 'off peak' periods and by bus. • Stagger material, component and abnormal loads • Construction of an on-site concrete batching plant to reduce trips.	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	• Upgrade of existing / new access points. • Reduction in speed of vehicles • Adequate enforcement of the law • Implementation of pedestrian safety initiatives • Regular maintenance of farm fences & access cattle grids • Construction of an on-site concrete batching plant to reduce trips.	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
Additional Traffic Generation: Increase in Dust from gravel roads	• Upgrade of existing / new access point. • Reduction in the speed of the vehicles. • Construction of gravel roads in terms of TRH20. • Implement a road maintenance program under the auspices of the respective transport department. • Possible use of approved dust suppressant techniques. • Construction of an on-site batching plant and tower construction to reduce trips.	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	• Implement a road maintenance program under the auspices of the respective transport department. • Construction of an on-site batching plant to reduce trips.	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	• Ensure abnormal vehicles travel to and from the proposed development in the 'off peak' periods or stagger delivery. • 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	• Enforce a maximum speed limit on the development. • Appropriate, timely and high-quality maintenance required in terms of TRH20. • Possible use of 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

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Internal Access Roads: New / Larger Access points	• Adequate road signage according to the SARTSM • 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

9.2.11Noise

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

Table 32: Noise

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Monitor construction noise	Ambient noise monitoring to be conducted.	Specialist noise consultant	As per the requirements of SANS 10103:2008	Validation of Noise Impact Assessment Findings to determine if further noise mitigation is required.	Three times during the construction phase

9.2.12 Visual

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

Table 33: Visual

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Topsoil loss can reduce the viability of rehabilitation measures and needs to be carefully managed if available.	• Topsoil excavated from the site should be stockpiled and utilised for rehabilitation of the site after construction.	Project management and EPC	As defined by the rehabilitation specialist.	Topsoil is utilized and no sterilization of topsoil takes place.	As required.
Un-necessary roads have the potential to create a visual disturbance long after the usage as past.	• Limit road access to an efficient minimum by coordinated planning between the project management and the environmental control officer.	Project management and EPC	Temporary roads should be well marked and should only cross drainage lines on areas identified as permanent road features where erosion and soil loss management can be contained. Noncompliance with road signage and utilisation of no authorised roads should become a finable offence.	The surrounding landscape remains rural and agricultural in landscape and land use.	As required.
Windblown dust and dust from moving vehicles have the potential to become a significant nuisance factor to local farms	• Set up a clear management plan with clear accountability structures with set thresholds for triggering of mitigations. • Set up a liaison committee to engage with local farmsteads located within 500m of an access road, with monthly communication with the farm	Project management and EPC (as the issue arises).	Should excessive dust be generated from the movement of vehicles on the roads such that the dust becomes visible to the immediate surrounds, dust-retardant measures	Dust generated on site as well as on the access road to the site, is well managed and does not become a nuisance factor for	On-going

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
around the site and along the access road.	owners on the effectiveness of the dust management procedures.		should be implemented under authorisation of the EPC.	the workers or the surrounding farmsteads.	
Buildings painted bright colours can increase the visual presence of the structures in a rural landscape, creating higher levels of visual contrast and attracting the attention of the causal observer.	• The buildings should be painted a grey-brown colour (or other colour in keeping with the surrounding landscape) to assist in reducing colour contrast. • Sheet metal structures should make use of mid-grey colour, and preferable have a rough texture material.	Project management and EPC	At the commencement of construction, purchase order criteria for ordering paints and sheet metals need to be clearly defined.	Colour contrast generated from the buildings as seen from the roads is low and does not attract the attention of the casual observer.	Commencement of construction.
Light spillage from security lighting of structures can significantly increase the visual impact of a project in a rural landscape in a dark-sky context.	• Light spillage mitigation from security lighting should be implemented and monitored by the ECO during construction to ensure that light spillage does not create a glowing effect. • No overhead/ flood lighting of structures or areas. • No up lighting to be used.	Project management and EPC	At the commencement of construction, purchase order criteria for ordering of security lighting need to be clearly defined.	Lights contrast generated from the buildings as seen from the roads is low and does not attract the attention of the casual observer.	Commencement of construction.
Litter has the potential to degrade landscape character and can be contained by fencing around the construction camp/ laydown.	• Littering should be a finable offence. • Fencing around the laydown should be diamond shaped to catch wind blown litter. The fences should be routinely checked for the collection of litter caught on the fence.	Project management and EPC	Littering rules need to be clearly defined and workers effectively informed of the consequences of littering.	Solid waste litter is effectively controlled and does not become a landscape degradation risk.	Checked bi-monthly
Soil erosion can result in visual scarring on prominent areas.	• In areas where construction has taken place on steeper slopes, soil erosion measures need to be implemented.	Project management and EPC (checked monthly)	Clear methodology for rehabilitation and restoration is provided by the	Soil erosion is limited and effectively	Commencement of construction. On-going

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			rehabilitation specialist. As soon as construction has concluded on the area at hand, rehabilitation processes need to commence.	managed such that visual scarring does not take place.	
Cut and Fill areas can generate visual scarring in the landscape beyond the locality.	• Cut & Fill areas should be limited as much as possible, with specific detail placed on prevention of soil erosion. • Slopes should not exceed 1 in 6m gradients and need to be rehabilitated to natural vegetation directly post construction.	Project management and EPC with inputs from rehabilitation specialist.	Clear methodology for rehabilitation and restoration is provided by the rehabilitation specialist. As soon as construction has concluded on the area at hand, rehabilitation processes need to commence.	Cut/ fill scaring is limited and effectively managed and does not dominate the attention of the casual observer.	Commencement of construction. On-going
Topsoil loss can reduce the viability of rehabilitation measures and needs to be carefully managed if available.	• Topsoil excavated from the site should be stockpiled and utilised for rehabilitation of the site after construction.	Project management and EPC	As defined by the rehabilitation specialist.	Topsoil is utilized and no sterilization of topsoil takes place.	As required.

9.2.13 Socio-Economic

This section deals with the issues relative to socio-economic during the construction phase.

Table 34: Socio-Economic

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Noise	The mitigation measures suggested by the noise specialist	The proponent in association with contractors	As stated by the noise specialist	Frequency of complaints laid and the time lag between notification of the complaint and resolutions.	Over construction & operation phases of the project
Increase in crime	Ensure that constructions workers are identifiable. All workers should carry identification cards and wear identifiable clothing. Encourage local people to report any suspicious activity associated with the construction sites through the establishment of community liaison forum. Prevent loitering within the vicinity of the construction camp and construction sites	The proponent in association with contractors	Safety of workforce including security on project site. Fence and secure project site	To minimise the risk potential for local communities	Over the construction phase of the project.
Increase in HIV Infections	Ensure that an onsite HIV Infections Policy is in place and that construction have easy access to condoms Expose workers to a health and HIV/Aids awareness educational program.	Human resource department and project manager	Implement an HIV/AIDs Awareness and Training Programme for contractors workforce within two weeks of commencement of construction	To minimise the risk of the spread of STD's and HIV in the area.	Over construction & operation phases of the project
An influx of construction workers	Communicate the limitation of opportunities created by the project through Community Leaders and Ward Councillors.	The proponent in association with contractors	As far possible source low-skilled workers from local	To minimise the disruptive effect that the workforce	Over construction

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	Draw up a recruitment policy in consultation with the community leaders and Ward Councillors of the area and ensure compliance with this policy		communities and surrounding areas If feasible employ local contractors	may pose for local communities	phase of the project
Hazard exposure	Ensure all construction equipment and vehicles are properly maintained at all times Ensure that operations and drivers are properly trained and make them aware, through regular toolbox talks, of any risk they may pose to the community. Place specific emphasis on the vulnerable sector of the population, such as children and the elderly. Ensure that fires lit by construction staff are only ignited in designated areas and that the appropriate safety precautions, such as not lighting fires in strong winds and completely extinguishing fires before leaving them unattended, are strictly adhered to. Make staff aware of the danger of fire during toolbox talks	The proponent in association with contractors	Provide relevant protection equipment and training to all staff personnel	To avoid and or minimise the potential risk of hazardous exposure on local communities and their livelihoods	Over construction phase of the project
Disruption of daily living pattens	Ensure that, at all times, people have access to their properties as well as to social facilities.	Project proponent in association with contractors	A public grievance and incident register should be established and should be monitored internally by the developer and made available for public scrutiny if requested	Register to be audited to understand any issues regarding property issues.	During operational phase on a monthly basis
Disruptions to social and community infrastructure	Regularly monitor the effect that construction is having on infrastructure and immediately report any damage to infrastructure to the appropriate authority.	Project proponent in association with contractors	A public grievance and incident register should be established and should be monitored internally by the	Register to be audited to understand any	During operational phase on a monthly basis

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			developer and made available for public scrutiny if requested	issues regarding property issues.	

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 35: Construction Site Decommissioning

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Construction Site Decommissioning: Removal of equipment	• All structures comprising the construction camp are to be removed from site. • 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. • 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	• The Contractor must arrange the cancellation of all temporary services. • Temporary roads must be closed and access across these, blocked.	Holder of EA/Contractor	Compliance to all legislative requirements.	Following construction

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• All areas where temporary services were installed are to be rehabilitated to the satisfaction of the ECO.		Ensure the EMPr is adhered to.	
Construction Site Decommissioning: Associated infrastructure	• Surfaces are to be checked for waste products from activities such as concreting or asphalting and cleared in a manner approved by the Engineer. • All surfaces hardened due to construction activities are to be ripped and imported material thereon removed. • 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. • The site is to be cleared of all litter. • The Contractor is to check that all watercourses are free from building rubble, spoil materials and waste materials. • Fences, barriers and demarcations associated with the construction phase are to be removed from the site unless stipulated otherwise by the Engineer. • All residual stockpiles must be removed to spoil or spread on site as directed by the Engineer. • All leftover building materials must be returned to the depot or removed from the site. • 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.	Holder of EA/Contractor	All waste managed according to approved Method Statement	Following construction
Construction Site Decommissioning: Rehabilitation plan	• 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 36: Operation and Maintenance

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Operation and Maintenance: Maintenance	• All applicable standards, legislation, policies and procedures must be adhered to during operation. • Regular ground inspection of the plants must take place to monitor their status. • Compile and adhere to a procedure for the safe handling of battery cells. • Lithium-ion batteries must have battery management systems (containment, automatic alarms, and shut-off systems) to monitor and protect cells from overcharging or damaging conditions, such as temperature extremes. • Compile an Emergency Response Plan for implementation in the event of a spill or leakage. • Record and report all significant fuel, oil, hydraulic fluid, or electrolyte spills or leaks so that appropriate clean-up measures can be implemented. A copy of these records must be made available to authorities on request throughout the project lifecycle. • Frequent and appropriate disposal of both general and hazardous waste must be undertaken to prevent pollution of soil and groundwater. • Install leak detection monitoring systems where possible. • On-site battery maintenance should only be undertaken on impermeable surfaces with secondary containment measures. Any resulting hazardous substances must be disposed of appropriately.	Holder of the EA	Ensure the conditions of the EA are adhered to. Compliance to all legislative requirements	During operation

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• Provide for suitable emergency and safety signage on site, and demarcation of any areas which may pose a safety risk (including hazardous substances). Emergency numbers for the local police, fire department and Eskom must be placed in a prominent clearly visible area on-site			
Operation and Maintenance: Public awareness	• 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 37: Waste Management

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIME FRAME
Waste Management: Recycling and litter management	• 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. • Where vegetation is cleared and is suitable, chipping and/or mulching can be considered. • Any putrescible waste must be stored in containers that can keep out scavengers such as baboons and birds to prevent the spread of litter. • All waste must be removed promptly to ensure that it does not attract vermin or produce odours.	Holder of EA	All waste managed according to approved Method Statement Compliance to all legislative requirements.	Continuous

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIME FRAME
	• Solid waste should be collected on a regular basis			

9.3.4 Heritage

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

Table 38: Heritage

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY
Impacts to cultural landscape: Visible landscape scarring	Ensure disturbance is kept to a minimum and does not exceed project requirements. Rehabilitate areas not needed during operation.	Construction Manager or Contractor / ECO	Monitoring of surface clearance relative to approved layout	Minimise landscape scarring	Ongoing basis / as required

9.3.5 Agriculture and Soils

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

Table 39: Agriculture and Soils

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
Aspect: Protection of soil resources Erosion	• 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: Protection of soil resources Erosion	• 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

9.3.6 Avifauna

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

Table 40: Avifauna

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY
Avifauna: Mortality due to collisions with the wind turbines: Bird collisions with the wind turbines	• 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 Practice Guidelines at the time (Jenkins et al. 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. • A procedure for the immediate removal of carcasses within the development area must be implemented to prevent vultures from being attracted to the area where they could be at risk of collision with the turbines. • Shutdown on demand (SDoD) must be implemented on all turbines for White-backed Vulture, Lappet-faced Vulture, Martial Eagle, Verreaux's Eagle and Lanner Falcon, coupled with a carcass removal programme, to limit the risk of collisions with the turbines. The SDoD must be	1. Wind farm operator 2. Wind farm operator 3. Wind farm operator 4. Wind farm operator/avifaunal specialist 5. Wind farm operator/avifaunal specialist	1. Appoint Avifaunal Specialist to compile operational monitoring plan, including live bird monitoring and carcass searches. 2. Implement operational monitoring plan. 3. Engage with the landowner to design and implement an effective system to locate a carcass promptly and ensure the immediate removal of the carcass before it can attract vultures. 4. Appoint a team of suitably qualified, trained, dedicated and resourced team of observers to be present on site for all daylight hours throughout the year. It is absolutely essential that	Prevention of collision mortality on the wind turbines.	1. Once-off 2. Years 1,2, 5 and every five years after that for the duration of the operational lifetime of the facility. 3. Before the first turbines start turning. 4. As and when required, within six months of threshold having been exceeded.

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY
	implemented for the first two years of the operational phase to assess the dynamics of the situation, whereafter a decision whether to continue must be taken, based on the frequency of shutdown events. •		passionate, hardworking staff are hired for this role. This team must be stationed at observation points with full visible coverage of all turbine locations. The observers must detect incoming priority bird species, track their flights, judge when they enter a turbine proximity threshold, and alert the control room to shut down the relevant turbine until the risk has reduced. 5. A full detailed method statement must be designed by an avifaunal specialist prior to the commercial operations date (COD) and must be in place by the time that the wind farm starts operating. 6. Compile quarterly and annual progress reports detailing the results of the operational monitoring and progress with any		5. Quarterly and annually.

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES /FREQUENCY
			recommended mitigation measures.		
Avifauna: Mortality due to collisions and electrocutions on the 33kV network: Bird electrocutions on the overhead sections of the internal 33kV cables	• Conduct regular inspections of the overhead sections of the internal reticulation network to look for carcasses.	Operations Manager Avifaunal specialist	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.	1. At least once every two months. 2. As and when required, within six months of threshold having been exceeded. 3. Quarterly and annually

9.3.7 Bat

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

Table 41: Bat

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Modification of Bat Habitat and Roost Disturbance/Destruction	• Minimise clearing of vegetation - Rehabilitate all areas disturbed during construction (including aquatic habitat)	Pofadder Wind Energy Facility 3 (Pty) Ltd	• Apply good construction abatement control practices to reduce	• No bat roosts are destroyed	During design and planning phase and

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• Avoid construction activities at night. • Minimise disturbance and destruction of farm buildings on site • Minimise removal of trees • Minimise blasting and removal of rocky habitat on site • Limit potential for bats to roost in project infrastructure (e.g., buildings, turbines, road culverts).		emissions and pollutants (e.g., noise, erosion, waste) • Apply appropriate vegetation rehabilitation practices. • Ensure buildings, turbines and road culverts are correctly insulated and sealed to prevent bats from roosting. • Where trees and rocky crevices will be impacted, these features should be examined for roosting bats.	• No bats colonise new project infrastructure for roosting • No infrastructure in No-Go areas (except roads) • All areas disturbed during construction are rehabilitated	throughout construction phase and until rehabilitation is complete.
Bat Mortality	• No placement of turbines within No-Go areas • Minimum blade sweep of 35 m • Blade feathering must be used to prevent free-wheeling of turbine blades below the turbine cut-in speed • Implement post-construction fatality monitoring • Apply curtailment or deterrents if fatality thresholds are exceeded.	Pofadder Wind Energy Facility 3 (Pty) Ltd	• Adhere to the bat constraints map for No-Go areas (Figure 5). • Select turbine with 35 m minimum blades sweep • Implement blade feathering below turbine cut-in speed • Implement best practise bat fatality monitoring according to Aronson et al. (2020).	• Bat fatalities do not exceed fatality thresholds for any species.	Turbine layout and turbine model finalised during design phase. Operational Phase fatality monitoring according to Aronson et al. (2020).

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			• Estimate bat fatality using GenEst (Simonis et al. 2018). • Develop bat adaptive management plan if fatality thresholds are exceeded which will include a curtailment plan and/or plan for use of acoustic deterrents.		

9.3.8 Aquatic

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

Table 42: Aquatic

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Increase in sedimentation and erosion - Entire development footprint	• All culverts, stormwater run-off infrastructure erosion prevention features/infrastructure must be monitored and maintained. • Any erosion problems observed to be associated with the project infrastructure should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.	Contractor, ECO to control	• Project site and infrastructure annually monitored by EO • The EO should be responsible for driving this process.	• Ensure that all culverts, stormwater run-off infrastructure and erosion prevention features are functioning optimally, • No disturbance or degradation of freshwater resource features occur	Throughout the operational phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
				throughout the operational phase.	

9.3.9 Terrestrial Ecology

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

Table 43: Terrestrial Ecology

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and associated degradation of ecosystems	• Site access should be controlled and no unauthorised persons should be allowed onto the site. • Strictly prohibit any driving outside designated areas and roads	Contractor, ECO to control	• Strict access control and the implementation of standard operating procedures	Prevent any additional disturbance of soil and vegetation outside of the development footprint	Throughout the operational phase
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and associated degradation of ecosystems	• Access roads or any hardened/ engineered surface should be regularly monitored for erosion problems. • Any erosion problems observed should be rectified immediately and monitored thereafter to ensure that they do not re-occur. • Implement best practice erosion protection and stormwater management during operation;	Contractor, ECO to control	• Frequent monitoring of the development site and infrastructure by the ECO/EO, identifying any additional areas that will have to be addressed. • Prompt and appropriate response, form the contractor, following any additional	• Recreate a non-invasive, acceptable vegetation cover that will facilitate the establishment of desirable and/or indigenous species • Prevent accelerated erosion of ecosystem degradation	After construction and throughout operational phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			recommendations from the ECO.		
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and associated degradation of ecosystems	• Re-instate as much of the eroded area to its pre-disturbed, "natural" geometry (no change in elevation and any banks not to be steepened) where possible. • All bare/disturbed areas, affected by the development, should be rehabilitated and re-vegetated with locally occurring species, to bind the soil and limit erosion potential where applicable. • revegetation will be done according to an approved planting/landscaping plan, also indicating the desirable end states of permissible vegetation • The establishment and new growth of revegetated and replanted species shall be closely monitored • Where necessary, reseeding or replanting will have to be done if no acceptable plant cover has been created • Monitor success of rehabilitation and revegetation and take remedial actions as needed according to the respective plan • Erosion shall be monitored at all times and measures taken as soon as detected • Where necessary, reseeding or replanting will have to be done if no acceptable plant cover has been created	Contractor, ECO to control	• The ECO will need to prepare an induction and training programme to educate the contracting team on the EMPr commitments relating to site rehabilitation. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr and Rehabilitation Management Plan should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that	• Recreate a non-invasive, acceptable vegetation cover that will facilitate the establishment of desirable and/or indigenous species • Prevent accelerated erosion of ecosystem degradation	After construction and throughout operational phase as well as after the decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, and operational processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and associated degradation of ecosystems	• Keep disturbance of indigenous vegetation to a minimum • Rehabilitate disturbed areas as quickly as possible • The meticulous implementation of the IAP and Rehabilitation Management Plans. • Regular monitoring by the operation and maintenance team for alien plants must occur and could be conducted simultaneously with erosion monitoring. • When alien plants are detected, these must be controlled and cleared using the	Contractor, monitored by ECO	• The ECO will need to prepare an induction and training programme to educate the contracting team on the EMPr commitments relating to the management/eradication of AIPs. • Contractor to develop an internal reporting structure to monitor	• The successful reduction in the treat (significance) posed by Alien Invasive Plants. • Recreate a non-invasive, acceptable vegetation cover that will facilitate the establishment of desirable and/or indigenous species	Throughout construction and operational phase as well as after the decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur and increase to problematic levels. • Clearing methods must aim to keep disturbance to a minimum. • No planting or importing any listed invasive alien plant species (all Category 1a, 1b and 2 invasive species) to the site for landscaping, rehabilitation or any other purpose must be undertaken.		compliance with the commitments given in the EMPr as construction progresses. • The EMPr and IAP Managment Plan should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			construction, and operational processes, reporting back to the relevant environmental authorities with findings of these investigations.		

9.3.10 Transportation

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

Table 44: Transportation

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Additional Traffic Generation: Increase in Traffic	• 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	• 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

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Additional Traffic Generation: Increase in Dust from gravel roads	• 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	• 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	• 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
Internal Access Roads: New / Larger Access points	• Adequate road signage according to the SARTSM. • 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

9.3.11 Noise

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

Table 45: Noise

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Reduce operational noise	Ambient noise monitoring to be conducted at NSA 40 and NSA 41 when operations commence to verify the noise emissions meet the night time noise rating limit. Mitigation measures to be implemented if the noise impact exceeds the 35dB(A) night noise rating limit such as running the turbines in low power mode at certain wind speeds at night.	Specialist noise consultant	As per the requirements of SANS 10103:2008	Reduction in Noise and thus reduction in chance of complaints arising	Once off during project operations

9.3.12 Visual

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

Table 46: Visual

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Compaction of larger areas can result in soil sterilisation and landscape degradation.	Post construction, the laydown areas and other construction areas no longer needed for operational management, should be ripped (0.5m depth) to restore compacted topsoil, and then rehabilitated to natural vegetation under the supervision of the rehabilitation specialist.	Project management and EPC with inputs from rehabilitation specialist.	As defined by the rehabilitation specialist.	Soil sterilization does not take place and large degraded areas do not occur, with overall landscape integrity maintained.	On completion of construction phase. On-going

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
AWL lights at night have the potential to significantly detract from the 'dark-sky' sense of place of the rural landscape.	• Strategic placement of AWL at total project corner turbines. • Placement of the AWL in shallow cups such that ground flash incidence is limited.	Project management	As specified by the CAA.	AWL do not become dominating such that a clearly defined glow from multiple AWL at night is clearly visible at a regional level.	Project management team.
Soil erosion can result in visual scarring on prominent areas.	In areas where construction has taken place on steeper slopes, soil erosion measures need to be implemented.	Project management and EPC	Clear methodology for rehabilitation and restoration is provided by the rehabilitation specialist. As soon as construction has concluded on the area at hand, rehabilitation processes need to commence.	Soil erosion is limited and effectively managed such that visual scarring does not take place.	Bi-annual
Light spillage from security lighting of structures can significantly increase the visual impact of a project in a rural landscape in a dark-sky context.	Light spillage measures designed during pre-construction phase should be implemented and monitored by the ECO during construction to ensure that light spillage does not create a glowing effect.	Project management and EPC.	A review of the security lights at night is undertaken by the EPC to check that undue light spillage is not taking place without loss of security.	Lights contrast generated from the buildings as seen from the roads is low and does not attract the attention of the casual observer.	At commencement of Operation Phase.
Old turbine blades and equipment have the potential to significantly degrade the local landscape character.	Old turbines and equipment should be removed from site and recycled/ managed according to the National Environmental Management: Waste Act (Act 59 of 2008) (NEMWA) or deposited at a registered landfill if it cannot be recycled or reused.	Project management and EPC (as the need arises).	Old turbines blades are be removed from site and recycled/ managed according to the National Environmental Management: Waste Act (Act 59 of 2008) (NEMWA) or	The project area is not littered with old turbine blades resulting in the management area	On-going

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			deposited at a registered landfill if it cannot be recycled or reused.	becoming visually degraded.	
Windblown dust and dust from moving vehicles have the potential to become a significant nuisance factor to local farms around the site and along the access road.	Should excessive dust be generated from the movement of vehicles on the roads such that the dust becomes visible to the immediate surrounds, dust-retardant measures should be implemented under authorisation of the ECO.	Project management and EPC (as the need arises).	Set up a clear management plan with clear accountability structures with set thresholds for triggering of mitigations.	Dust generated on site as well as on the access road to the site, is well managed and does not become a nuisance factor for the workers or the surrounding farmsteads.	On-going.

9.3.13 Socio-Economic

This section deals with the issues relative to socio-economic during the operation phase.

Table 47: Socio-Economic

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Noise	The mitigation measures suggested by the noise specialist	The proponent in association with contractors	As stated by the noise specialist	Frequency of complaints laid and the time lag between notification of the complaint and resolutions.	Over construction & operation phases of the project

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Shadow flicker	Identifying receptor points and applying appropriate technical measures such as computer modelling in sitting the wind turbines to limit the effect of shadow flicker. Where necessary and appropriate apply tracking technology that will automatically shutoff and restart the affecting wind turbine to eliminate shadow flicker Consider the application of appropriate screening measures to reduce the effect of shadow flicker	The proponent in association with service providers	Assessment through and health-related issues	Through careful siting of wind turbines to avoid residential areas	During operation phase
Blade glint	Calculate and factor in the risk of blade glint in siting the wind turbines Coat wind turbine blades with non-reflective costing to reduce blade glint. Where appropriate, adjust the angle of turbine blades to reduce blade glint.	The proponent in association with service providers	Assessment through residents or visitors coming into the area	The use of non-reflective coatings	During operation phase
Electromagnetic fields and RF interference	Wind turbine mechanism will be elevated and the risk of EMF's will be minimal. Notwithstanding this, it would be pertinent to regularly monitor the levels of EMFs entitled by the turbines and, if necessary make the appropriate adjustments to ensure that these levels remain within acceptable parameters. Ensure that power lines are not routed in close proximity (with 300 meters) of residential areas to limit the effect of EMFs. Consult with the appropriate telecommunication authorities to ensure that the telecommunication	The proponent in association with service providers	Through consultation with relevant authorities under this area of expertise	Ensure project area is not compromised due to any RF interference	During operation phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	installations identified within the vicinity of the project are not comprised through RFI.				
Hazard exposure	Install early detection techniques to avoid or reduce structural damage Install lighting protection systems Install fire prevention and control measures	The proponent in association with project manager	Safety measures to be adhered too at all times.	Avoid any hazard exposure of the development to reduce any damages	During operation phase
Transformation of the sense of place	Apply the mitigation measures suggested in the Visual Impact Assessment Report. Communicate the benefits associated with renewable energy to the broader community Ensure that all affected landowners and tourist associations are regularly consulted A Grievance Mechanism should be put in place and all grievance should be dealt with transparently The mitigation measures recommended in the Heritage and Palaeontology Impact Assessment should be followed.	The proponent in association with project manager	Through consultation understand concerns regarding to changes in visual perspective and address matters	As part of the consultation should there be grievances then a grievance mechanism needs to be in place and dealt with openly	During construction & construction phase
Socio-economic stimulation	Ensure that the procurement policy supports local enterprises Establish a social responsibility programme either in line with the REIPPP BID guidelines or equivalent; Work closely with the appropriate municipal structures regarding establishing a social responsibility programme;	The proponent	Develop policies in place that aligns with local economic plan of the municipality	Work closely with the municipality and various people with the structures of the organisation	During operation, construction and decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	Ensure that any trusts or funds are strictly managed in respect of outcomes and funds				

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 48: On-going Stakeholder involvement

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT ACTIONS	TIME FRAME

Ongoing Stakeholder Involvement	• Community to be notified, as culturally appropriate, timeously of the planned decommissioning, e.g.:
	  ○ 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:
	  ○ 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

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT ACTIONS	TIME FRAME
	• A reporting office/ channel to be established should community members experience problems with contractors/ sub-contractors during the decommissioning phase. • 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 49: Waste Management

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT ACTIONS	TIME FRAME
Waste Management	• All decommissioned equipment must be removed from site and disposed of at a registered land fill. Records of disposal must be kept. • Any putrescible waste must be stored in containers that can keep out scavengers such as baboons and birds to prevent the spread of litter. • 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 50: Agriculture and Soils

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
Aspect: Protection of soil resources Erosion	• 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	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	• Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.	Engineer /Contractor	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	• 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-	Engineer /Contractor	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
	spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.		replacement. Check that topsoil covers the entire disturbed area.		

9.4.4 Avifauna

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

Table 51: Avifauna

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
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	• 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: ○ No off-road driving; ○ Maximum use of existing roads, where possible; ○ Measures to control noise and dust according to latest best practice;	Contractor and ECO	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.	Prevent unnecessary displacement of avifauna by ensuring that contractors are aware of the requirements of the Environmental Management Programme (EMPr.)	1. On a daily basis 2. Weekly 3. Weekly 4. Weekly 5. Weekly

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
	○ Restricted access to the rest of the property; ○ Strict application of all recommendations in the botanical specialist report pertaining to the limitation of the footprint.		4. Monitor the implementation of noise control mechanisms via site inspections and record and report non-compliance. 5. Ensure that the footprint area is demarcated and that construction personnel are made aware of these demarcations. Monitor via site inspections and report non-compliance.		

9.4.5 Bat

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

Table 52: Bat

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Modification of Bat Habitat and Roost Disturbance/Destruction	• Minimise clearing of vegetation - Rehabilitate all areas disturbed during construction (including aquatic habitat) • Avoid construction activities at night. • Minimise disturbance and destruction of farm buildings on site • Minimise removal of trees	Pofadder Wind Facility 3 (Pty) Ltd	• Apply good construction abatement control practices to reduce emissions and pollutants (e.g., noise, erosion, waste)	• No bat roosts are destroyed • No bats colonise new project infrastructure for roosting	During design and planning phase and throughout construction phase and until

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• Minimise blasting and removal of rocky habitat on site • Limit potential for bats to roost in project infrastructure (e.g., buildings, turbines, road culverts).		• Apply appropriate vegetation rehabilitation practices. • Ensure buildings, turbines and road culverts are correctly insulated and sealed to prevent bats from roosting. • Where trees and rocky crevices will be impacted, these features should be examined for roosting bats.	• No infrastructure in No-Go areas (except roads) • All areas disturbed during construction are rehabilitated	rehabilitation is complete.

9.4.6 Aquatic

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

Table 53: Aquatic

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Loss of riparian systems and disturbance of the alluvial water courses: Construction of road and MV cable watercourse crossings	• All sensitive aquatic habitats outside of the demarcated construction area must be considered 'No-Go' areas for the duration of the construction phase. • No physical damage should be done to any aspects of the channel and banks of	Contractor/ECO/EO	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of	• Minimise and maintain damage of watercourse vegetation the	Throughout construction and decommissioning Phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	watercourses other than those necessary to complete the works as specified. • Vegetation clearing should occur in a phased manner to minimise erosion and/or run-off. • There should be reduced activity at the site after large rainfall events when the soils are wet.		vegetation outside of these areas. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and	development footprint. • Prevent any residual or cumulative impacts arising. • To ensure the persistence/maintenance of the REC	

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Loss of riparian systems and disturbance of the alluvial water courses: Excavation and trenching within watercourses	• Avoid stockpiling materials in vegetated areas that will not be cleared. • All material stockpiles should be located outside freshwater resource features. • Excavated soils should be stockpiled on the upslope side of the excavated trench so that eroded sediments off the stockpile are washed back into the trench; • Excavated soils will need to be replaced in the same order as excavated from the trench, i.e. sub-soil must be replaced first and topsoil must be replaced last (this will maximise opportunity for re-vegetation of disturbed areas).	Contractor/ECO/EO	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments.	• Minimise and maintain damage of watercourse vegetation the development footprint. • Prevent any residual or cumulative impacts arising. • To ensure the persistence/maintenance of the REC	Throughout construction and decommissioning Phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• Closure and rehabilitation of the disturbed areas should commence as soon as the laying of underground cable has been completed.		• Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Loss of riparian systems and disturbance of the alluvial water courses: Alien Invasive Plants	• All alien plant re-growth must be monitored, and should it occur, these plants should be eradicated. • Any disturbed areas should be rehabilitated and monitored to ensure that these areas do not become subject to erosion or invasive alien plant growth. • Mitigation and follow up monitoring of residual impacts (alien vegetation growth and erosion) may be required.	Contractor/ECO/EO	• The ECO will need to prepare an induction and training programme to educate the contracting team on the EMPr commitments relating to the management/eradication of AIPs. • The EMPr and IAP Management Plan should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that	• The successful reduction in the treat (significance) posed by Alien Invasive Plants. • Recreate a non-invasive, acceptable vegetation cover that will facilitate the establishment of desirable and/or indigenous species	Throughout construction and operational phase as well as after the decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, and operational processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Loss of riparian systems and disturbance of the alluvial water courses: Construction of Wind Turbines and supporting infrastructure (excluding roads and mv cable watercourse crossings)	• Vegetation clearing should occur in a phased manner to minimise erosion and/or run-off. • Any erosion problems observed to be associated with the project infrastructure should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. • There should be reduced activity at the site after large rainfall events when the soils are wet. No driving off of hardened roads should occur immediately following large rainfall events until	Contractor/ECO/EO	• The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in	No indirect damage to downslope freshwater resource features and their associated vegetation.	Throughout construction and decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	soils have dried out and the risk of bogging down has decreased. • Any stormwater within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities • Stormwater from hardstand areas, buildings and the substation must be managed using appropriate channels and swales when located within steep areas.		the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			authorities with findings of these investigations.		
Increase in sedimentation and erosion: Construction of road and MV cable watercourse crossings	• All construction activities occurring directly within the watercourses to take place within the dry season. • The erosion and stormwater management measures included in the stormwater management plan for the Pofadder WEF 3 must be implemented. • The duration of construction work within the watercourses must be minimised as far as practically possible through proper planning and phasing. • During the construction phases, monitor culverts to see if erosion issues arise and if any erosion control is required. • Any erosion problems observed during the construction phase should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. • Vegetation clearing should occur in a phased manner to minimise erosion and/or run-off. • Any disturbed areas should be rehabilitated and monitored to ensure that these areas do not become subject to erosion • Silt traps should be used where there is a danger of topsoil eroding and entering streams and other sensitive areas. • These silt traps must be regularly monitored and maintained and replaced / repaired immediately	Contractor/ECO/EO	• The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and	• To minimise erosion of soil from site during construction. • To maintain watercourses'' RECs • To avoid downstream impacts including: o erosion; o sedimentation; o destabilisation of banks and channels.	Throughout construction and decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	as and when required. These measures should be regularly checked, maintained and repaired when required to ensure that they are effective • Construction of gabions and other stabilisation features to prevent erosion must be undertaken, if deemed necessary. • Under no circumstances must new channels be created for flow diversion and conveyance purposes unless approved as part of an EA or WUL • There should be reduced activity during the construction phase at the site after large rainfall events when the soils are wet. No driving off of hardened roads should occur immediately following large rainfall events until soils have dried out and the risk of bogging down has decreased. • Closure and rehabilitation of the disturbed areas should commence as soon as the laying of underground cable has been completed. • Soils should be landscaped to the natural landscape profile with care taken to ensure that no preferential flow paths or berms remain		appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Increase in sedimentation and erosion: Construction of road and MV cable watercourse crossings	• Any areas disturbed during the construction phase should be encouraged to rehabilitate as fast and effective as possible and were deemed necessary by the ECO or Contractor's EO, artificial rehabilitation (e.g. re-seeding with collected or commercial indigenous seed mixes) should be applied in order to speed up the	Contractor/ECO/EO	• The ECO will need to prepare an induction and training programme to educate the contracting team on the EMPr commitments relating to site rehabilitation.	• Recreate a non-invasive, acceptable vegetation cover that will facilitate the establishment	After construction and throughout operational phase as well as after the

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	rehabilitation process in critical areas (e.g. steep slopes and unstable soils). • All rehabilitated areas must be monitored to ensure that these areas do not become subject to erosion or invasive alien plant growth.		• Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr and Rehabilitation Management Plan should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted	of desirable and/or indigenous species • Prevent accelerated erosion of ecosystem degradation	decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, and operational processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Increase in sedimentation and erosion: Construction of Wind Turbines and supporting infrastructure (excluding roads and mv cable watercourse crossings)	• No unnecessary vegetation clearance may be allowed. • Vegetation clearing should occur in a phased manner to minimise erosion and/or run-off. • Any erosion problems observed to be associated with the project infrastructure should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. • There should be reduced activity at the site after large rainfall events when the soils are wet. • No driving off of hardened roads should occur immediately following large rainfall events until soils have dried out and the risk of bogging down has decreased. • Any stormwater within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities	Contractor/ECO/EO	• The ECO will need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental	• Prevent upstream erosional features from spreading into the aquatic buffer areas and the resource features themselves. • To allow for natural runoff patterns into the downslope freshwater resource features.	Throughout construction and decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.	• To avoid unnatural amounts of sediments carried into the downstream freshwater resource features form their catchments.	
Potential impact on localised surface water quality – All associated infrastructure	• Implement appropriate measures to ensure strict use and management of all hazardous materials used on site • Waste should be stored on site in clearly marked containers in a demarcated area.	Contractor/ECO/EO	• Observation and supervision of chemical storage and handling practices and vehicle	• To ensure that the storage and handling of chemicals and hydrocarbons	Throughout construction, maintenance and

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• All waste material should be removed at the end of every working day to designated waste facilities at the main construction camp/suitable waste disposal facility. • All waste must be disposed of offsite. • Implement appropriate measures to ensure strict management of potential sources of pollutants (e.g. litter, hydrocarbons from vehicles and machinery, cement during construction etc.) • Implement appropriate measures to ensure containment of all contaminated water by means of careful run-off management on the development site. • Implement appropriate measures to ensure strict control over the behavior of construction workers. • Appropriate ablution facilities should be provided for construction workers during construction and on-site staff during the operation of the substation and WEF. • Vehicles to refuel within a designated area, at least 100m from any freshwater resource feature. • Place spill kits on site which are operated by trained staff members for the adhoc remediation of minor chemical and hydrocarbon spillages.		maintenance throughout construction phase • A complaints register must be maintained, in which any complaints from the community will be logged. Complaints must be investigated and, if appropriate, acted upon • Observation and supervision of waste management practices throughout construction phase • Waste collection to be monitored on a regular basis • Waste documentation completed • An incident reporting system must be used to record non-conformances to the EMP/IWWMP • An appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase. »	on-site does not cause pollution to the environment or harm to persons • To ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons • To comply with waste management legislation • To minimise production of waste • To ensure appropriate waste storage and disposal • To avoid environmental	decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			Public complaints register must be developed and maintained on site.	harm from waste disposal	

9.4.7 Terrestrial Ecology

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

Table 54: Terrestrial Ecology

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Disturbance/loss of natural vegetation	• No unnecessary vegetation clearance may be allowed. • ECO and/or Contractor's EO to provide supervision and oversight of vegetation clearing activities and other activities which may cause damage to the environment, especially at the initiation of the project, when the majority of vegetation clearing is taking place. • All vehicles to remain on demarcated roads and no unnecessary driving in the veld outside these areas should be allowed. • Regular dust suppression during construction, if deemed necessary, especially along access roads. • No fires should be allowed on-site	Contractor/ECO/EO	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas. • Even within the development footprint, where vegetation can be allowed to persist undisturbed, this must be imposed. • Contractor to develop an internal reporting	• To minimise impacts on the biophysical environment • To prevent any residual or cumulative impacts arising.	Throughout construction and decommissioning phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• No plants may be translocated or otherwise uprooted or disturbed for rehabilitation or other purpose without express permission from the ECO and or Contractor's EO.		structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Disturbance of fauna	• Site access should be controlled and no unauthorised persons should be allowed onto the site. • Any fauna directly threatened by the associated activities should be removed to a safe location by a suitably qualified person. • The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the demarcated site. • Fires should not be allowed on site. • All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. • All construction vehicles should adhere to a low speed limit (30km/h) to avoid collisions with susceptible species such as snakes and tortoises. • Construction vehicles limited to a minimal footprint on site (no movement outside of the earmarked footprint).	Contractor/ECO/EO	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency	• To minimise impacts on the biophysical environment • To prevent any residual or cumulative impacts arising. • Prevent mortality and injury of faunal species.	Throughout construction and decommissioning phases Daily inspections throughout construction and decommissioning phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• All mammal, large reptiles and avifauna species found injured during construction will be taken to a suitably qualified veterinarian or rehabilitation centre to either be put down in a humane manner or cared for until it can be released again		skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, reporting back to the relevant environmental authorities with findings of these investigations. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments and how address/handle specific fauna when encountered.		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			• The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Disturbance of fauna	• All cable trenches, excavations should be checked on a daily basis for the presence of trapped animals. • Any animals found should be removed in a safe manner, unharmed, and placed in an area where the animal will be comfortable. • If the ECO or contractor is unable to assist in the movement of a fauna species, ensure a member of the conservation authorities assists with the translocation. • Note: the McGregor Museum in Kimberley could be approached for advice on relocating animals if required	Contractor/ECO/EO	• The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.	• To minimise impacts on the biophysical environment • To prevent any residual or cumulative impacts arising. • Prevent mortality and injury of faunal species.	Throughout construction and decommissioning phases Daily inspections throughout construction and decommissioning phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Disturbance and loss of vegetation within sensitive habitats	• All sensitive habitats outside of the demarcated construction area must be considered 'No-Go' areas for the duration of the construction phase. • For watercourse road and cable crossings, no physical damage should be done to any aspects of the channel and banks of watercourses other than those necessary to complete the works as specified. • Avoid stockpiling materials in vegetated areas that will not be cleared.	Contractor/ECO/EO	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the	• To minimise impacts on sensitive habitats • To prevent any residual or cumulative impacts arising. • To ensure the persistence/maintenance of the REC	Throughout construction and decommissioning Phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and associated degradation of ecosystems	• Vegetation clearing should occur in a phased manner to minimise erosion and/or run-off. • No unnecessary vegetation clearance may be allowed. • Limit the physical footprint of the road and verges that would require clearing to a minimum.	Contractor, ECO to control	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas.	• To minimise erosion of soil from site during construction • To minimise deposition of soil into downstream freshwater	Throughout construction and decommissioning Phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			• The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially	resource features. • To minimise damage to vegetation by erosion or deposition • No accelerated overland flow related surface erosion as a result of a loss of vegetation cover	

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and associated degradation of ecosystems	• No activities or disturbance/transformation permitted outside of the development area. • Any erosion problems observed along access roads or any hardened/ engineered surface should be rectified immediately and monitored thereafter to ensure that they do not re-occur. • Re-instate as much of the eroded area to its pre-disturbed, "natural" geometry (no change in elevation and any banks not to be steepened) where possible. • Implement best practice erosion protection and stormwater management during construction and operation;	Contractor, ECO to control	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor	• To minimise erosion of soil from site during construction • To minimise deposition of soil into downstream freshwater resource features. • To minimise damage to vegetation by erosion or deposition	Throughout construction and decommissioning Phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes,	• No accelerated overland flow related surface erosion as a result of a loss of vegetation cover	

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			reporting back to the relevant environmental authorities with findings of these investigations.		
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and associated degradation of ecosystems	• Roads and other disturbed areas should be regularly monitored for erosion problems and problem areas should receive follow-up monitoring by the EO to assess the success of the remediation.	Contractor, ECO to control	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental	• To minimise erosion of soil from site during construction • To minimise deposition of soil into downstream freshwater resource features. • To minimise damage to vegetation by erosion or deposition • No accelerated overland flow related surface erosion as a result of a loss of vegetation cover	Throughout construction and decommissioning Phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and associated	• Any stormwater within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities • Run-off generated from cleared and disturbed areas such as access roads and slopes that	Contractor, ECO to control	• Design-Layout taking into account the location and nature of the specific infrastructure as well as the location, nature and	• To minimise erosion of soil from site during construction	Prior to commencement of construction activities and throughout the

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
degradation of ecosystems	drain into rivers, streams or wetlands must be controlled using erosion control and sediment trapping measures. These control measures must be established at regular intervals perpendicular to the slope to break surface flow energy and reduce erosion as well as trap sediment. • Sediment barriers (e.g. silt fences, sandbags, hay bales, earthen filter berms or retaining walls) must be established to protect downstream watercourses from erosion and sedimentation impacts from upslope. Sediment barriers should be regularly maintained and cleared so as to ensure effective drainage.		morphology of the area wherein the infrastructure will be placed. • Additionally, the ECO will need to be responsible for conducting regular site-inspections of the construction, and operation footprint areas, identifying any additional areas that will have to be addressed. • Prompt and appropriate response, form the contractor, following any additional recommendations from the ECO.	• To minimise deposition of soil into downslope freshwater resource features. • To minimise damage to vegetation by erosion or deposition • No accelerated overland flow related surface erosion as a result of a loss of vegetation cover • No reduction in the surface area or natural functionality of natural freshwater resource features as a result of the establishment of infrastructure	construction and decommissioning phases.

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
				• No increase in runoff into downslope freshwater resource featurs as a result of construction of project related infrastructure • No increase in runoff into downslope freshwater resource features as a result of road construction	

9.4.8 Transportation

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

Table 55: Transportation

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Additional Traffic Generation: Increase in Traffic	• Ensure staff transport is done in the 'off peak' periods and by bus. • Stagger material, component and abnormal loads.	Holder of the EA/Contractor	All staff members are aware of the	Continuous

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• Construction of an on-site concrete batching plant to reduce trips.		EMPr requirements relevant to them Ensure the EMPr is adhered to.	
Additional Traffic Generation: Increase of Incidents with pedestrians and livestock	• Reduction in speed of vehicles • Adequate enforcement of the law • Implementation of pedestrian safety initiatives • Regular maintenance of farm fences & access cattle grids	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	• Reduction in the speed of the vehicles. • Appropriate, timely and high-quality maintenance required in terms of TRH20. • Possible use of approved dust suppressant techniques. • Implement a road maintenance program under the auspices of the respective transport department. • Construction of an on-site sorter and pressing machine to reduce trips.	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	• 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	• Ensure abnormal vehicles travel to and from the proposed development in the 'off peak' periods or stagger delivery. • Adequate enforcement of the law	Holder of the EA/Contractor	All staff members are aware of the	Continuous

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			EMPr requirements relevant to them Ensure the EMPr is adhered to.	
Internal Access Roads: Increase in Dust from gravel roads	• Enforce a maximum speed limit on the development. • Appropriate, timely and high-quality maintenance required in terms of TRH20. • Possible use of 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	• Adequate road signage according to the SARTSM • 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

9.4.9 Visual

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

Table 56: Visual

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Compaction of larger areas can result in soil sterilisation and landscape degradation.	• Post construction, the laydown areas and other construction areas no longer needed for operational management, should be ripped (0.5m depth) to restore compacted topsoil, and then rehabilitated to natural vegetation under the supervision of the rehabilitation specialist.	Project management and EPC with inputs from rehabilitation specialist.	As defined by the rehabilitation specialist.	Soil sterilization does not take place and large degraded areas do not occur, with overall landscape integrity maintained.	Within 1 year of closure.
Old, unused structures have the potential to significantly degrade the landscape character.	• All structures not required for agricultural purposes post-closure should be removed and where possible, recycled or reused. • Building structures should be broken down (including building foundations but excluding turbine foundations). • The rubble should be managed according to the National Environmental Management: Waste Act (Act 59 of 2008) (NEMWA) and deposited at a registered landfill if it cannot be recycled or reused.	Project management and EPC	As defined by the rehabilitation specialist.	The post operation landscape reverts to rural agricultural without landscape degradation created by un-used/ old structures.	Within 1 year of closure.
Old towers have the potential to significantly degrade the landscape character.	• Should turbine towers be constructed from concrete, the towers need to be demolished, the rubble buried in pits and the area shaped to appear as a natural dome. The pit areas would need to be rehabilitated to natural veld vegetation with input from a rehabilitation specialist.	Project management and EPC (within 1 year of closure).	As defined by the rehabilitation and demolition specialist.	The post operation landscape reverts to rural agricultural without landscape degradation	Within 2 years of closure.

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• Steel towers should be removed from site and managed according to the National Environmental Management: Waste Act (Act 59 of 2008) (NEMWA) and deposited at a registered landfill if it cannot be recycled or reused.			created by un-used/ old structures.	
Old turbine blades and equipment have the potential to significantly degrade the local landscape character.	• Old turbines and equipment should be removed from site and recycled/ managed according to the National Environmental Management: Waste Act (Act 59 of 2008) (NEMWA) or deposited at a registered landfill if it cannot be recycled or reused.	Project management and EPC (as the need arises).	Old turbines blades are be removed from site and recycled/ managed according to the National Environmental Management: Waste Act (Act 59 of 2008) (NEMWA) or deposited at a registered landfill if it cannot be recycled or reused.	The project area is not littered with old turbine blades resulting in the management area becoming visually degraded.	Within 1 year of closure.
Windblown dust and dust from moving vehicles have the potential to become a significant nuisance factor to local farms around the site and along the access road.	• Set up a clear management plan with clear accountability structures with set thresholds for triggering of mitigations. • Set up a liaison committee to engage with local farmsteads located within 500m of an access road, with monthly communication with the farm owners on the effectiveness of the dust management procedures.	Project management and EPC (as the issue arises).	Should excessive dust be generated from the movement of vehicles on the roads such that the dust becomes visible to the immediate surrounds, dust-retardant measures should be implemented under authorisation of the EPC.	Dust generated on site as well as on the access road to the site, is well managed and does not become a nuisance factor for the workers or the surrounding farmsteads.	On-going

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 and 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 supervise them closely at all times. 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 EMPr. 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 EMPr.

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 could 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.

Appendix A:

Curriculum Vitae

MM/YY 01/2022

CURRICULUM VITAE

Michelle Nevette

Name	Michelle Nevette
Profession	Environmentalist
Name of Firm	SiVEST SA (Pty) Ltd
Present Appointment	Divisional Manager: SiVEST Environmental Division
Years with Firm	21 Years
Date of Birth	18 March 1975
ID No.	7503180357085
Nationality	South African

Professional Qualifications

- BA (Economics), Honours in Environmental Management
- MEnvMgt. (Environmental Management) - University of South Africa
- ISO 14001:2015 Introduction and Implementation of an EMS (03/2018)
- Cert.Nat.Sci. reg. No. 120356 (July 2020)

Membership to Professional Societies

- International Association for Impact Assessment South Africa (IAIAsa)
- Environmental Assessment Practitioners Association of South Africa (EAPSA) Reg No.2019/1560
- South African Council for Natural Scientific Professions (SACNASP)Cert. Sci.Nat. Reg No. 120356

Employment Record

Aug 2009 – to date	SiVEST SA (Pty) Ltd Environmental Division: Divisional Manager
April. 1999 – Aug 2009	SiVEST Environmental Division: Senior Environmental Project Manager

Language Proficiency

LANGUAGE	SPEAK	READ	WRITE
English	Fluent	Fluent	Fluent
Afrikaans	Good	Good	Good

Years of Working Experience: 21 years

Countries of Working Experience

- South Africa
- Zimbabwe

Fields of Specialisation

- Environmental Project Management
- Environmental Impact Assessment
- Environmental Management and Auditing
- Environmental Planning including ISO14001:2015

CURRICULUM VITAE

Michelle Nevette

Overview

Michelle's strong managerial skills have been extensively used in setting up and running projects and in establishing and monitoring documentation systems. Responsible for the management of a team of environmental impact assessment practitioners, including financial management of the division in conjunction with the Managing Director, and ongoing responsibilities on various environmental projects.

Michelle has a keen interest in strategic planning and has been responsible for undertaking Strategic Environmental Assessments and for preparing Integrated Environmental Management Programs and Environmental Management Frameworks for various municipalities and private developers. Extensive experience in following the Basic Assessment and Environmental Impact procedure, as well as in preparing Environmental Management Plans, consulting with authorities and conducting Audits.

Expertise gained in a variety of environmental issues relating to municipal planning, mixed use development, agro-industrial developments, business parks, petrol filling stations, the housing sector, and infrastructural projects.

Projects Experience (by Sector)

ENVIRONMENTAL PLANNING /STRATEGIC PROJECTS

- Appointed by the Cato Ridge Logistisc Hub Consortium (Pty) Ltd for the Cato Ridge Pilot Intermodal Project in Cato Ridge, KwaZulu-Natal (planning, BA/EIA and WULA).
- Appointed by Royal Shaka Estate (Pty) Ltd to project manage and obtain the necessary town planning and environmental rights the proposed 2155ha Royal Shaka Estate, North Coast.
- Port of Richards Bay – Strategic Environmental Assessment for Transnet National Ports Authority, (Aug 2018 – May 2019).
- Appointed by SMEC, on behalf of KZN COGTA, to undertake a High-level Environmental Status Quo & Recommendations Report for the Strategic Corridor Plan – Strategic Infrastructure Projects 2: Durban – Free State – Gauteng Development Region (June 2014 – present).
- Appointed by Finningley to assist with finalising the EIA and post authorisation work (including bulk servicing to the site on a mixed use development) which included provision for an Autobody Supply Park.
- Advised Toyota SA on the EIA requirement for a proposed site for a Toyota Autobody
- Preparation of a Strategic Environmental Assessment (SEA) for the Airports Company South Africa (ACSA) for a portion of property known as the Eastern Precinct.
- Appointed by ACSA to undertake an EIA for a portion of property known as the Eastern Precinct to house an automotive park.
- Appointed by Crookes Brothers Limited to prepare an EMF and subsequently an EIA for two properties comprising 1800ha in extent.
- Appointed by the KwaDukuza Municipality to undertake an SEA for KwaDukuza.
- Appointed by the uThungulu District Municipality to prepare an Integrated Environmental
- Management Plan (IEMP) for the District

Pre-feasibility Studies/Screening

- Appointed by Process Projects to undertaken an environmental screening of Site Selection for Lithium ION NMC Precursor Materials Production (IDC project).
- Edgewood New Teaching and Learning Building. University of KwaZulu Natal. Desktop Environmental Screening Assessment and Mapping.
- Izotsha Hub Development, Izotsha. LDM. Desktop Environmental Prefeasibility Assessment and Mapping.
- Cato Ridge Development Project. SMEC. Desktop Biophysical Prefeasibility Assessment.
- Hammarsdale Link Road Project. SMEC. Desktop Environmental Screening Assessment.
- Msinga Cwaka New Town Centre – Appointed by LDM Consulting to undertake an Environmental Pre-feasibility Study for the Cwaka New Town Centre in in Msinga Municipality, KwaZulu-Natal (Dec 2014).
- Avondale Forest Estate – Appointed by Trencon to undertake an Environmental Pre-feasibility
- Study for the Residential Eco-Estate adjacent Zimbali in Ballito, KwaZulu-Natal (Sep 2014).

CURRICULUM VITAE

Michelle Nevette

Climate Change

- Durban Climate Change Strategy – Appointed by eThekwini Municipality Environmental Planning and Climate Protection Department to establish a city status quo and recommendations to facilitate the implementation of climate change work within the city (May – Sep 2018).

Natural Resource Management (Environmental Rehabilitation)

- Renishaw Estate – Appointed by the Department of Environmental Affairs: Natural Resource Management Directorate to undertake the rehabilitation of the 1,833ha Mpambanyoni Conservation Development and Renishaw Estate (a mixed-use estate development with a strong conservation ethic) near Scottburgh, South Coast, KwaZulu-Natal (Dec 2017 – present).

POLICY & LEGISLATION

Review of Section 22 ECA Applications

- Appointed by DEAT to review and assess the pending Environmental Impact Assessment Applications for KZN submitted in terms of Section 22 of Environmental Conservation Act, Act 73 OF 1989.

Alien Vegetation

- Appointed to develop an auditing framework and to audit the eThekweni Municipality Production and Display Nurseries to determine their compliance with the Conservation of Agriculture Resources Act , 1983 (ACT No. 43 OF 1983) (CARA)

Coastal Zone Management

- Environmental Impact of the Alleged Illegal Cottages along the Wild Coast (former Transkei)

Telecommunication Policy for Urban Areas in KwaZulu-Natal

- Prepared on behalf of the Town and Regional Planning Commission. This policy involved extensive stakeholder consultation and included extensive research on the impact of telecommunication towers and associated infrastructure in urban areas. Assisted in the collection and preparation of data.

Training

- Appointed by uThungulu District Municipality to prepare training manuals and operational procedures manuals on EIA's which provided guidelines and principles for the District and Local Municipalities.

Advisory Services

- Appointed by Oxygen to provide environmental advisory services and assistance to municipal projects that have become 'stuck' on behalf of KZN PROV TREASURY for MUNICIPAL INFRASTRUCTURE

BUSINESS/INDUSTRY PROJECTS

- Audit of AMR to review their waste management practice and EMPr on behalf of Hillside Aluminium South 32
- ISO14001:2015 Internal Audit of Hillside Aluminium South 32
- ISO14001: 2015 Compilation of Legal Compliance Register and Aspects and Impacts Register for Technipaint (Pty) Ltd
- Appointed by Richards Bay Minerals (RBM) to conduct a performance assessment of RBM's approved EMPr and compile a legal liability report
- Permit/license external compliance audit for Bayside Aluminium
- Permit/license external compliance audit for Hillside Aluminium
- Permit/license external compliance audit for Metalloys Manganese Smelter in Meyerton

CURRICULUM VITAE

Michelle Nevette

Ports/Marine Infrastructure:

- Basic Assessment Report and EMP for the construction of marine infrastructure required for a floating dry dock in the Port of Richards Bay (Operation Phakisa)
- Preparation of a Sustainability Report and Environmental/Community Interface Report for new CO1 Conveyor for Transet Capital Project as FEL3 phase of Project Life Cycle process.

Petrol Filling Stations:

- Appointed by Engen Petroleum Limited to undertake BAs for the following Service Stations: Engen Ottowa, Engen Tongaat and Engen Galleira
- Appointed by Engen Petroleum Limited to undertake EIAs for the following Service Stations: Engen Umhlali; Engen Riverhorse 1; Engen Riverhorse 2; Engen CBD Downs and Engen Stapleton,;
- Appointed by Shell SA Marketing (PTY) Ltd to undertake EIAs for a petrol filling station, convenience stores and ATM at Mkuze, Phoenix and Hans Dettman.
- Appointed by Shell SA Marketing (Pty) Ltd to undertake the scoping process for a petrol filling station, convenience stores and ATM at Chatsworth, Marionhill, Verulam, Hannaford, Northcroft, Eastbury and Brookdale within Durban.
- Appointed by Shell SA Marketing (Pty) Ltd to undertake application for Exemptions for the upgrade of existing petrol filling stations at Bayhead and Gateway, Durban.
- Appointed by Caltex Oil South Africa (Pty) Ltd to prepare a Scoping Report and EMP for a petrol filling station, convenience stores and ATM at Brackenham, Richards Bay
- Preparation of Scoping Report and EMP for Philani Valley Petrol Station and Commercial Centre
- Preparation of Scoping Report and EMP for Umlazi Valley Petrol Station and Commercial Centre

Crude storage:

- Preparation for the Airports Company South Africa (ACSA) of an EIA for a proposed subdivision and rezoning of a portion of their property for future use by NATCOS (crude storage facility).

Mixed use/Business Park/Logistics/Shopping Centre:

- Appointed by the Cato Ridge Logistisc Hub Consortium (Pty) Ltd for the Cato Ridge Pilot Intermodal Project in Cato Ridge, KwaZulu-Natal (planning, BA/EIA and WULA).
- Preparation of an EIA for a mixed use development at Renishaw
- Appointed by Finningley to assist with finalising the EIA and post authorisation work (including bulks servicing to the site on a mixed use development) which included provision for an autosupply park.
- Advised Toyota SA on the EIA requirement for a proposed site for a Toyota Autobody
- Appointed by Barkomotive (Pty) Ltd, a wholly-owned subsidiary of Ellingham Estate (Pty) Ltd, to undertake an EIA Report for the proposed mixed-use Rorqual Estate Development near Park Rynie, South Coast, KwaZulu-Natal (October 2012).
- Appointed by the Passenger Rail Association of South Africa for the construction of an Intersite. Precinct in Scottburgh, located on the KwaZulu-Natal South Coast.
- Preparation of Duty of Care, Basic Assessment and EMP for Shoprite Distribution Center in Canelands.
- Preparation of a Basic Assessment for Sakhisizwe Holdings (Pty) Ltd for the proposed Warwick Mall as part of the 2010 World Cup Initiatives.
- Preparation of a Basic Assessment Prime Spot Trading 9 (Pty) Limited for the proposed Sithole Mall Shopping Centre in Osizweni
- Basic Assessment Report for a warehouse in Alton, Richards Bay, Briardale Trading
- Basic Assessment Report and EMP for a convenience centre in Gingindlovu
- Basic Assessment Report for the Amangwane Shopping Centre in Ulundi
- Preparation of an EIA for the Airports Company South Africa (ACSA) for a proposed Business Park on a portion of property known as the Eastern Precinct to house an automotive park.
- Preparation of an application for exemption for the Airports Company South Africa (ACSA) to lease a portion of their property to Shoprite-Checkers

CURRICULUM VITAE

Michelle Nevette

Waste License Applications

- Appointed by Richards Bay Minerals to undertake the waste license application for the salvage yard and ZN4.
- Appointed by Richards Bay Coal Terminal to undertake the waste license application for their existing operations.

COMMUNITY UPLIFTMENT PROJECTS

- Appointed by Renishaw Property Development (Pty) Ltd for the construction of a school containing sporting facilities, parking areas and engineering services in Scottburgh.
- Appointed by Industrial Development Corporation (IDC) to undertake an EIA Report for the proposed Nonoti Beach Tourism Development near Blythedale, North Coast, KwaZulu-Nata
- Basic Assessment Report and EMP for the uMhlathuze Multi-Purpose Sport Stadium in Richards Bay, uThungulu District Municipality
- Appointed by the Department of Works to prepare a Scoping Report and EMP for the rezoning of an “open space” area in Port Shepstone to “public administration”
- Appointed by the Department of Works to prepare an Application for Exemption for a police station and community hall in Khenani, Richards Bay.

RESIDENTIAL PROJECTS

Low Cost Housing

- Greater Amaoti Housing Project – Appointed by the Department of Human Settlements to undertake the EIA process for the development of 20 000 housing units in Amaoti. eThekwini Municipality.
- Shayamoya Phase 3 Housing Development – Appointed by the Greater Kokstad Local Municipality to undertake the EIA process for the housing development.
- Appointed by Oxygen Infrastructure Solutions for development of the Marianridge Housing Development in Marianridge, KwaZulu-Natal.
- Appointed by eThekwini to undertake an EIA for Madimeni, Lower Langefontein and Molweni Low Cost Housing.
- Appointed by eThekwini to undertake an EIA for Trenance Park 2B and Redcliffe Low Cost Housing
- Appointed by eThekwini to undertake a Basic Assessment for Philani Valley Phase 17-25 Low Cost Housing
- Appointed by the Ethekwini Housing Department to prepare Environmental Scoping Reports, EMPs and to undertake auditing for the following low cost housing projects:
  - Africa, Inanda
  - Stop 8/Nambia, Emtshabeni
  - Kwamashu Newland
  - Mshayazafe
  - Kwadabeka C
  - Verulam: Trenace Park 2B and Redcliffe
  - Lamontville North West
- Appointed to undertake an Environmental Considerations report for Vulemehlo Low cost Housing

Medium – High Income Housing:

- Appointed by Canboria Developments to prepare a Scoping Report for the proposed medium income housing project at Broadlands.
- Appointed by Midnight Storm Investors to prepare an Environmental Considerations Report for the development of a new multi-storey residential development on Lots 739 – 744, Tongaat.
- Appointed by Midnight Storm Investors to prepare an EMP and undertake auditing for Simbhiti Eco-Estate

CURRICULUM VITAE

Michelle Nevette

LINEAR DEVELOPMENT / INFRASTRUCTURE PROJECTS

- Project management and preparation of a range of Environmental Applications for the uMhlathuze Municipality Engineering Department for the financial year 2003/2004: This included environmental applications and auditing for road, water, canal, subdivisions and informal trading facilities projects.

Water Supply Schemes:

- Northern Aqueduct Augmentation Pipeline: Appointed by Aurecon Consulting Engineers for the construction of a pipeline from Ntuzuma to Ogunjini.
- Appointed by VGC to provide environmental services (environmental application, EMP and auditing) for a range of water supply projects, e.g. Mhlana, Madlebe, Khoza Water Supply Projects.
- Witz Road Water Reticulation for Ethekwini Municipality – Basic Assessment and monthly auditing for a 6500m of 160mm diameter pipeline.
- Appointed by uThungulu to undertake a scoping process for Middledrift water supply
- Mtamvuna River Irrigation Potential Investigation, Izingolweni Sub-region, KwaZulu-Natal.

Roads and Bridges:

- Basic Assessment & EMPr for the upgrade of the Theunissen Road, Stanger
- Basic Assessment & EMPr for the proposed construction of a pedestrian bridge in Burbreeze, Tongaat
- Basic Assessment & EMPr for the proposed construction of a pedestrian bridge in Emansomini, Umlazi
- Integrated Rapid Public Transport Network (IRPTN) – Appointed by the Ethekwini Transport Authority, responsible for the planning, implementation and operations of public transport in the City, to undertake an EIA report for the IRPTN Corridor 1, Bridge City to Durban CBD, and Corridor 9, Bridge City to Umhlanga
- Integrated Rapid Public Transport Network (IRPTN) – Appointed by the Ethekwini Transport Authority, responsible for the planning, implementation and operations of public transport in the City, to undertake a BA report for the IRPTN Corridor 3, Bridge City to Pinetown.
- Appointed by eThekwini to undertake a Basic Assessment for the proposed Warwick Flyover (inbound and outbound) in Warwick Precinct as part of the 2010 World Cup Initiative.
- Appointed by eThekwini to undertake a Basic Assessment for the proposed Inwabi Road I Umlazi.
- Appointed by Umhlathuze Municipality to undertake an application for Exemption for the upgrade of a 1,5km gravel road (including a proper river crossing) within the existing alignment of the road in Ngwelezane.
- Appointed to undertake an application for Exemption for the Greytown Road Upgrade, KwaZulu-Natal
- Appointed to undertake a scoping process (including EMP) for the upgrading of Broadway, Durban North on behalf of the eThekweni Municipality Appointed to undertake an application for Exemption, EMP and auditing for the upgrading of theWick/Todd Street in Verulam

Electricity/ Power lines

- Appointed by appointed by TRANS-AFRICA PROJECTS to manage the environmental process for the proposed Spoornet Coalink Upgrade Project. The project consists of the upgrade of existing infrastructure and three new transmission sub-stations, in order to increase the supply of electricity for new locomotives that Spoornet have ordered to add to the export capacity of coal. The proposed project crosses provincial borders starting in Empangeni (Natal) and extends across Newcastle to Ermelo (Mpumalanga)
- Appointed by uMhlathuze Municipality to undertake an EIA for the proposed Cygnus Electricity Substation project.
- Appointed by Eskom to undertake the scoping process (including the preparation of an EMP) for a substation and associated powerlines in Mtunzini
- Electricity Supply through Mhlanga Forest Estate Development EMP, KwaZulu-Natal, South Africa

CURRICULUM VITAE

Michelle Nevette

Renewable energy projects

- Koup 1 and 2 Wind Energy Facilities and associated infrastructure – Appointed by Genesis EcoEnergy (Pty) Ltd to undertake the BA processes for the renewable wind energy facilities associated infrastructure.
- Beaufort West Wind Energy Facilities and associated infrastructure – Appointed by South Africa Mainstream Renewable Power Developments to undertake BA processes for the renewable wind energy facilities associated infrastructure.
- Ceres Wind Energy Facilities and associated infrastructure – Appointed by South Africa Mainstream Renewable Power Developments to undertake BA processes for the renewable wind energy facilities and associated infrastructure.
- Skilpad 1, 2 and 3 Solar PV Energy Facilities – Appointed by ABO Wind Renewable Energies (Pty) Ltd to undertake the BA processes for three Solar PV Facilities.
- EA Amendment Processes for six (6) renewable energy facilities in the Northern Cape – Appointed by South Africa Mainstream Renewable Power Developments.

Pipelines

- Sezela Marine Outfall Pipeline, Scoping Report & Environmental Management Plan, KZN
- Petronet Re-Routing of existing DJP Pipeline around Pietermaritzburg EIA Scoping Report & Environmental Management Plan, KwaZulu-Natal

Cemeteries

- Basic Assessment & EMPr for the proposed Dannhauser Cemetery, Dannhause

WATER USE LICENSES

- Cato Ridge Pilot Intermodal Project in Cato Ridge (Zone 1), KwaZulu-Natal. Appointed by the Cato Ridge Logistics Hub Consortium (Pty) Ltd. Compilation and Submission of Water Use License.
- Malandela Crossroads Water Use License. Ethekwini Municipality. Compilation and Submission of Water Use license.
- Bridge City Depot Water Use License. Ethekwini Municipality. Compilation and Submission of
- Water Use license.
- Zamani 1B Phase B1 and B2 Water use License. Ethekwini Municipality. Compilation and Submission of Water Use license.

AMENDMENT APPLICATIONS

- Amendment of the Renishaw Mixed Use Development Environmental Authorisation, Phase 3
- Amendment of the environmental authorisation for the Engen Galleria Petrol Filling Station
- Malandela Crossroads Development – Appointed by eThekwini Municipality to amend the Environmental Authorisation to include an amended layout.
- Northern Aqueduct Augmentation Pipeline – Appointed by Aurecon Consulting Engineers to amend the Environmental Authorisation for changes in the pipeline alignment from Ntuzuma to Ogunjini.
- Bridge City Depot – Appointed by the eThekwini Municipality to amend the Environmental Authorisation to extend the footprint of the development and apply for construction within wetland buffers.
- Zamani Low Cost Housing Development – Appointed by the eThekwini Municipality Housing Department to amend/extend the validity of the Environmental Authorisation
- Malandela Crossroads Development – Appointed by eThekwini Municipality to amend the Environmental Authorisation to exclude certain parties from a condition of the EA.
- Integrated Rapid Public Transport Network (IRPTN) C3B – Appointed by eThekwini Transport Authority to amend the Environmental Authorisation to include a deviation in the transport route as well as to add an additional depot site to the authorisation.

CURRICULUM VITAE

Michelle Nevette

Courses Attended

- 2021: Project Management Course
- 2018: ISO 14001:2015 Introduction and Implementation of an EMS
- 2018: Risk ZA
- 2017: Amendments to the EIA Regulations
- 2017: NEC 3 Course

CURRICULUM VITAE

Name	Michelle Guy (neé Evans)
Profession	Environmental Scientist
Name of Firm	SiVEST SA (Pty) Ltd
Present Appointment	Environmental Scientist: Environmental Division
Years with Firm	9 years
Date of Birth	30 September 1986
ID No.	8609300018082
Nationality	South African

Education

- Scottburgh High School
- Rhodes University (2006-2011)

Professional Qualifications

- Bachelor of Arts - Rhodes University, Grahamstown (2009)
- BSc Environmental Science (Hons) – Rhodes University, Grahamstown (2010)
- Master of Science in Environmental Science – Rhodes University, Grahamstown (2010-2011)
- Registered Professional Natural Scientist (SACNASP) Pr.Sci.Nat. Registration No. 126338 (2020)
- Registered Environmental Impact Assessment Practitioner (EAPASA). Reg No. 2019/868

Membership to Professional Societies

- International Association for Impact Assessment South Africa (IAIAsa)
- South African Council for Natural Scientific Professions (SACNASP) Pr. Sci.Nat. Reg No. 126338
- Environmental Assessment Practitioners Association of South Africa (EAPASA). Reg No. 2019/868
- South African Wind Energy Association (SAWEA)

Employment Record

Aug 2012- present	SiVEST SA (Pty) Ltd – Environmental Division: Environmental Scientist
2010	Graduate assistant in the Environmental Science Department of Rhodes University
2009	Graduate assistant in the Environmental Science Department of Rhodes University

Language Proficiency

LANGUAGE	SPEAK	READ	WRITE
English	Fluent	Fluent	Fluent
Afrikaans	Fair	Fair	Fair

Years of Working Experience: 9 YEARS

Countries of Work Experience

- South Africa

Fields of Specialisation

- Project Management
- Environmental Impact Assessments
- Environmental Compliance Monitoring
- Water Use Licence Applications
- GIS analysis (ARCGIS)

Overview

Michelle has been with SiVEST Environmental Division since August 2012 and is an experienced Environmental Scientist. Michelle has completed her Master of Science degree in Environmental Science (with distinction). She has also completed a Bachelor of Science honours degree in Environmental Science and Geography. She is a registered Professional Natural Scientist (SACNASP) and a registered Environmental Assessment Practitioner (EAPASA). Michelle has extensive experience in the compilation of environmental impact assessments, water use licensing, prefeasibility assessments, environmental management programmes, environmental auditing as well as GIS Mapping.

Key Projects Experience

ENVIRONMENTAL CONSULTING (August 2012 – present)

Environmental Impact Assessment Reports

- Wirtz Road Water Reticulation for Ethekwini Municipality – Basic Assessment and monthly auditing for a 6500m of 160mm diameter pipeline.
- Mixed-use Residential Estate Development – Appointed by Barkomotive (Pty) Ltd, a wholly-owned subsidiary of Ellingham Estate (Pty) Ltd, to undertake an EIA Report for the proposed mixed-use Rorqual Estate Development near Park Rynie, South Coast, KwaZulu-Natal (October 2012).
- Integrated Rapid Public Transport Network (IRPTN) – Appointed by the Ethekwini Transport Authority, responsible for the planning, implementation and operations of public transport in the City, to undertake an EIA report for the IRPTN Corridor 1, Bridge City to Durban CBD, and Corridor 9, Bridge City to Umhlanga.
- Shayamoya Phase 3 Housing Development – Appointed by the Greater Kokstad Local Municipality to undertake the EIA process for the housing development.
- Greater Amaoti Housing Project – Appointed by the Department of Human Settlements to undertake the EIA process for the development of 20 000 housing units in Amaoti. eThekwini Municipality.
- Koup 1 and 2 Wind Energy Facilities – Appointed by Genesis Eco-Energy (Pty) Ltd to undertake the EIA processes for the renewable wind energy facilities.
- Beaufort West Wind Energy Facilities – Appointed by South Africa Mainstream Renewable Power Developments to undertake EIA processes for the renewable wind energy facilities.
- Pofadder 1, 2 and 3 Wind Energy Facilities – Appointed by Atlantic Energy Partners to undertaken EIA processes for renewable wind energy facilities.

Basic Assessment Reports

- Integrated Rapid Public Transport Network (IRPTN) – Appointed by the Ethekwini Transport Authority, responsible for the planning, implementation and operations of public transport in the City, to undertake a BA report for the IRPTN Corridor 3, Bridge City to Pinetown.
- Low cost housing project (Assessment Centre Housing Project) – Appointed by the Woodglaze Trading (Pty) Ltd, to provide additional housing in the Phoenix area.
- Intersite Precinct Development – Appointed by the Passenger Rail Association of South Africa for the construction of an Intersite Precinct in Scottburgh, located on the KwaZulu-Natal South Coast.
- Petrol Filling Station – Appointed by Cadismart (Pty) Ltd to for the construction of a petrol filling station, convenience store, dealership show room and farm stall situated on The Farm Grantham no 17754 in Felixton.
- School – Appointed by Renishaw Property Development (Pty) Ltd for the construction of a school containing sporting facilities, parking areas and engineering services in Scottburgh.

- Housing Development – Marianridge Housing Development – Appointed by Oxygen Infrastructure Solutions for development of the Marianridge Housing Development in Marianridge, KwaZulu-Natal.
- Logistics – Appointed by the Cato Ridge Logistics Hub Consortium (Pty) Ltd for the Cato Ridge Pilot Intermodal Project in Cato Ridge, KwaZulu-Natal.
- Pipeline - Northern Aqueduct Augmentation Pipeline – Appointed by Aurecon Consulting Engineers for the construction of a pipeline from Ntuzuma to Ogunjini.
- Renewable Energy Facilities to include Battery Energy Storage Systems (BESS) – Appointed by South Africa Mainstream Renewable Power Developments.
- Koup 1 and 2 Wind Energy Facilities and associated infrastructure – Appointed by Genesis Eco-Energy (Pty) Ltd to undertake the BA processes for the renewable wind energy facilities associated infrastructure.
- Beaufort West Wind Energy Facilities and associated infrastructure – Appointed by South Africa Mainstream Renewable Power Developments to undertake BA processes for the renewable wind energy facilities associated infrastructure.
- Ceres Wind Energy Facilities and associated infrastructure – Appointed by South Africa Mainstream Renewable Power Developments to undertake BA processes for the renewable wind energy facilities and associated infrastructure.
- Skilpad 1, 2 and 3 Solar PV Energy Facilities – Appointed by ABO Wind Renewable Energies (Pty) Ltd to undertake the BA processes for three Solar PV Facilities.
- Pofadder 1, 2 and 3 Wind Energy Facilities – Appointed by Atlantic Energy Partners to undertake BA processes for renewable wind energy facilities grid infrastructure.

Amendment Applications

- Integrated Rapid Public Transport Network (IRPTN) C3B – Appointed by eThekwini Transport Authority to amend the Environmental Authorisation to include a deviation in the transport route as well as to add an additional depot site to the authorisation.
- Malandela Crossroads Development – Appointed by eThekwini Municipality to amend the Environmental Authorisation to exclude certain parties from a condition of the EA.
- Zamani Low Cost Housing Development – Appointed by the eThekwini Municipality Housing Department to amend/extend the validity of the Environmental Authorisation.
- Bridge City Depot – Appointed by the eThekwini Municipality to amend the Environmental Authorisation to extend the footprint of the development and apply for construction within wetland buffers.
- Kindlewood Housing Expansion – Appointed Tongaat Hulett to amend the Environmental Authorisation to include additional residential units.
- Northern Aqueduct Augmentation Pipeline – Appointed by Aurecon Consulting Engineers to amend the Environmental Authorisation for changes in the pipeline alignment from Ntuzuma to Ogunjini.
- Malandela Crossroads Development – Appointed by eThekwini Municipality to amend the Environmental Authorisation to include an amended layout.
- EA Amendment Processes for six (6) renewable energy facilities in the Northern Cape – Appointed by South Africa Mainstream Renewable Power Developments.

Environmental Auditing

- Rocky Park Integrated Residential Development – Appointed by KwaDukuza Municipality to undertake an environmental audit of the Rocky Integrated Residential Development currently under development in Stanger, KwaZulu-Natal (August 2012).
- Mount Edgecombe (Camden 2) Residential Development – Appointed by Rocro Property Development (Pty) Ltd to undertake an environmental audit of Camden 2 Residential Development currently under development in Mount Edgecombe Golf Estates, Mount Edgecombe, KwaZulu-Natal (August 2012).
- Trenance Park Low Cost Housing – Appointed by eThekwini Municipality Housing Department to undertake an environmental audit of the Trenance Park Housing Project in Verulam, KwaZulu-Natal (August 2012).
- Vulamehlo Rural Housing Development – Appointed by the Vulamehlo Municipality to undertake an environmental audit of the Vulamehlo Rural Housing Development in Kenterton, KwaZulu-Natal (January 2013).
- Witz Road Water Reticulation for Ethekwini Municipality – Appointed by the Ethekwini Water and Sanitation Department to undertake the auditing of the sewer reticulation installation.

- Integrated Rapid Public Transport Network (IRPTN) – Appointed by MCA Joint Venture, to undertake an environmental audit for the implementation and operations of the IRPTN Corridor 3, Bridge City to Pinetown (June 2014-December 2018).
- Zamani 1B Phase B1 and B2 Low Cost Housing Project – Appointed by Shula Construction to undertake an environmental audit of the Zamani Low Cost Housing Development in Inanda, KwaZulu-Natal (June 2017).
- Malandela Crossroads Redevelopment Project – Appointed by Ethekwini Municipality to undertake the environmental auditing for the implementation of a taxi rank and associated infrastructure in KwaMashu (January 2018-April 2018).
- Umhlanga Town Lodge – Appointed by City Lodge Hotel Group to undertake the environmental auditing for the implantation of a new Town Lodge Hotel in Umhlanga (January 2018 - present).
- DTPC Support Zone (Double Basement Construction) – Appointed by Dube Tradeport to undertaken the environmental auditing for the construction of the double basement in La Mercy (June 2019 – present)

Pre-feasibility Assessments and GIS

- Florence Nightingale Drive Precinct Plan, Chatsworth KwaZulu Natal. Ethekwini Municipality. Preliminary Environmental Investigation and Mapping.
- Proposed Forest Estate Development in Ballito, South Coast. Trencon Projects. Environmental Prefeasibility Investigation and Mapping.
- Cato Ridge Development Project. SMEC South Africa. Desktop Biophysical Prefeasibility Assessment and Mapping.
- Hammarsdale Link Road Project. SMEC South Africa. Desktop Environmental Screening Assessment and Mapping.
- Edgewood New Teaching and Learning Building. University of KwaZulu Natal. Desktop Environmental Screening Assessment and Mapping.
- Izotsha Hub Development, Izotsha. LDM. Desktop Environmental Prefeasibility Assessment and Mapping.
- Maryvale, Westville Prefeasibility. SLB Consulting. Desktop Environmental Prefeasibility Assessment and Mapping.
- Percy Osborne Road Prefeasibility. SLB Consulting. Desktop Environmental Prefeasibility Assessment and Mapping.
- Mayors Walk Road Upgrade Prefeasibility. SMEC. Desktop Environmental Prefeasibility Assessment and Mapping.
- UKZN High Level Assessment (Westville, Edgewood, Pietermaritzburg, Howard College). LDM. Desktop Environmental Prefeasibility Assessment and Mapping.
- Gledhow Compound Housing Development. Ngeja Consulting Engineers. Environmental Screening Assessment and Mapping.
- Marianridge Housing Development – Appointed by Oxygen Infrastructure Solutions to undertake the Departmental Enquiries, High Level Screening and Mapping for the Marianridge Housing Development in Marianridge.
- Reddam House – Prefeasibility and GIS Mapping for Reddam House School in Umhlanga.

Wetland Assessments

- Proposed construction of the Integrated Rapid Public Transport Network (IRPTN) from Durban CBD to KwaMashu and from Kwa-Mashu to Umhlanga. Ethekwini Transport Authority. Wetland Delineation and Impact Assessment.
- Bridge City Depot in KwaMashu. Ethekwini Transport Authority. Wetland Delineation Report.
- Amanzimtoti River Trunk Sewer Project, KwaZulu Natal. Environmental Planning and Design CC. Surface Water Delineation, Functional Impact Assessment and Rehabilitation and Monitoring Report.
- Ntuzuma Sewer Alignment Project, KwaZulu Natal Province. Environmental Planning and Design CC. Wetland Delineation, Functional and Impact Assessment, Rehabilitation and Monitoring Plan.
- Proposed Kanku Road Housing Development. Map Africa Consulting Engineers. Wetland Delineation, Health and Functional Assessment.

Wetland Rehabilitation Plan

- Izindophe Wetland, Eshowe. Tongaat Hulett Sugar South Africa. Soil and Wetland Rehabilitation Plan.
- John Ross Highway Petrol Filling Station. Union Square Properties. Wetland Rehabilitation Plan and Alien Invasive Plant Removal Programme.

Water Use Licenses

- Malandela Crossroads Water Use License. Ethekwini Municipality. Compilation and Submission of Water Use license.
- Bridge City Depot Water Use License. Ethekwini Municipality. Compilation and Submission of Water Use license.
- Zamani 1B Phase B1 Water use License. Ethekwini Municipality. Compilation and Submission of Water Use license.
- Zamani 1B Phase B2 Water use License. Ethekwini Municipality. Compilation and Submission of Water Use license.
- Cato Ridge Pilot Intermodal Project in Cato Ridge (Zone 1), KwaZulu-Natal. Appointed by the Cato Ridge Logistics Hub Consortium (Pty) Ltd. Compilation and Submission of Water Use License.
- Greater Amaoti Housing Project – Appointed by the Department of Human Settlements to undertake the WULA process for the development of 20 000 housing units in Amaoti. eThekwini Municipality.

Strategic Planning Projects

Provision of database, analysis and GIS mapping support for the following:

- Commissioned by CoGTA as an O&M support plan to the municipalities. Database management and mapping to verify the assets of 6 KZN municipalities
- Commissioned by Focus Project Management on behalf of the Department of Public Works, Province of KwaZulu-Natal as Project Managers for the Department of Education drought programme for mapping of borehole infrastructure at 870 schools in the North Coast region of KwaZulu-Natal.

Project and Research Experience

BACHELOR OF ARTS (BA)

Earth Science 101, Geography 102, 2 & 3, Anthropology 1 & 2, Zoology 101, Psychology 1, Cell Biology, History and Appreciation of Music, Environmental Science 2 & 3.

Research Project: Dams as Green Spaces: Environmental Implications of Recreational Activities in and around Grahamstown

Field Work: site inspections, the distribution of a questionnaire, aerial photograph analysis and an assessment of relative water quality constituents related to recreational use.

BACHELOR OF SCIENCE HONOURS DEGREE IN ENVIRONMENTAL SCIENCE (BSC HONS)

Environmental Impact Assessment, Statistics, Rehabilitation and Disturbance Ecology, Wetland Ecology, Strategic Conservation Assessment.

Research Project: Fluvial style of the Baviaans River
Field Work: Extensive surveying using dumpy level surveying techniques, particle size distribution.

MASTER OF SCIENCE BY THESIS IN ENVIRONMENTAL SCIENCE WITH DISTINCTION

Research Project: The LUNA (Livelihoods, Urbanization, Natural Resources in Africa) Project was started in 2009 as a partnership between five African and three German research institutions, funded by the Volkswagen Foundation. LUNA aims to analyze the impact of urbanization on the use of natural resources and livelihoods in five African countries, namely South Africa, Botswana, Tanzania, Cameroon and Cote d'Ivoire. In addition to examining the overall aims of the LUNA project, my masters

project has an individual focus entitled “Livelihood and coping strategy changes along rural-urban continua, with an emphasis on natural resources”.

Field Work: Administration of a standardized survey instrument to capture household details and livelihood activities.

As part of the LUNA project, Summer Schools were organized for 2010 and 2011 to encourage research partnerships, enhance skills training and monitor the overall progress of the project in each country. The Summer Schools were held in three different countries and the themes planned according to the host institution’s strengths, with student planning and participation forming an intricate part of the process. International trips and conferences:

- Moshi (Tanzania) 24 May – 4 June 2010.
- Freiburg (Germany) 6 September – 19 September 2010.
- Gaborone (Botswana) 18 – 27 May 2011.

Bursaries and Publications

- Full bursary to study Master of Science degree. Volkswagen Germany ZAR 150 000

Publications and Conference Presentations

Popular Publications and Reports
Urbanisation and Natural Resource Use in Phalaborwa, South Africa.
Available: http://gnetmail.co.za/members/link.php?M=7264235&N=4254&L=4191&F=H

LUNA Summer Schools, The Spekboom, Rhodes University.
Available: http://www.ru.ac.za/static/departments/environsci/documents/newsletter/Issue_12.pdf

Appendix B:

Environmental Incidents

LOG Environmental Incident Log

ENVIRONMENTAL INCIDENT LOG				
Date	Env. Condition	Comments *(Include any possible explanations for current condition and possible responsible parties. Include photographs, records etc. if available)*	Corrective Action Taken (*Give details and attach documentation as far as possible)*	*Signature*

Appendix C:

Complaints Record Sheet

Complaints Record Sheet

COMPLAINTS RECORD SHEET	File Ref: Page …. of ….	DATE: ……
COMPLAINT RAISED BY:		
CAPACITY OF COMPLAINANT:		
COMPLAINT RECORDED BY:		
COMPLAINT:		
PROPOSED REMEDIAL ACTION:		
EO: _____ Date: _____		
NOTES BY ECO:		
EO: _____ Date: _____ Site Manager: _____ Date: _____		

Appendix D:

Stormwater Management Plan

POFADDER WIND FACILITY 3 (PTY) LTD

POFADDER WIND ENERGY FACILITY 3

Stormwater Management Plan

Issue Date: 27th July 2022
Revision No: 1
Project No: 16876
Document No: SW_P3

Date:	27th July 2022	
Document Title:	**Pofadder Wind Energy Facility 3** Stormwater Management Plan	
Revision Number:	1	
Author:	Merchandt Le Maitre (Pr. Tech Eng.)	
Signature:	 Pr. N°: 2018300094	Date: 27th July 2022
Reviewed:	Richard Hirst (Pr Tech Eng.)	
Signature:	 Pr. N°: 2018300110	Date: 27th July 2022
For:	POFADDER WIND FACILITY 3 (PTY) LTD	

EXECUTIVE SUMMARY

Objective

The Applicant, Pofadder Wind Facility 3 (PTY) LTD, proposes the construction of a wind energy facility (WEF), known as the Pofadder WEF 3 located on a site ±35 km south-east of Pofadder within the Kai !Garib Local Municipality and the Z F Mgcawu District Municipality in the Northern Cape Province. At this stage, the proposed Pofadder WEF 3 will comprise up to thirty-one (31) wind turbines with a maximum total energy generation capacity of up to approximately 248 MW.

The main objective of the 'Stormwater Management Plan' is to determine the impact/s of the proposed development on the immediate and greater area concerning stormwater and to include these findings in the Environmental Impact Assessment (EIA) submission. The assessment will comprise a desktop assessment and include preliminary stormwater-related matters arising during the construction phase, through the Operation & Maintenance Phase, up to and including the decommissioning phase of the development.

The proposed Pofadder Wind Energy Facility 3 forms part of cluster development with two additional developments adjacent to this facility as separate EIA applications: - Pofadder Wind Energy Facility 1 and Pofadder Wind Energy Facility 2. Although this report only focuses on the Pofadder WEF 3, all three developments are considered for this study as they share common boundaries, drainage lines and catchments.

Key Findings

No significant risks concerning the proposed development are foreseen, provided the recommendations below are noted before and during the detailed design and construction stages. Furthermore, several recommendations were highlighted and therefore noted as important.

The proposed development / infrastructure will have a minimal impact on the stormwater quality and quantities post-development (operational phase). This development's construction phase typically generates the highest surface run-off during the construction phases coinciding with the wet season. However, it will be temporary, and impacts can be mitigated and considered nominal. The post-development stormwater flow from the operation phase will have a minimal impact on the immediate environment if adequate stormwater designs are implemented to maintain existing drainage patterns and flows in the catchment.

Many mitigation measures are proposed to accommodate the development and reduce the impact on the surrounding area.

Recommendation

Concerning this report, the associated assessment and the findings made within, it is SiVEST's opinion that the Pofadder WEF 3 will have a nominal impact on the existing stormwater catchment. The project is therefore deemed acceptable from a stormwater perspective, provided the recommendations and mitigation measures in this report are implemented. Hence, Environmental Authorisation (EA) should be granted for the EIA application.

This document should also be read in conjunction with the EMPr. The developer, owner, and professional team must adhere to the requirements and conditions set out in the EMPr.

DECLARATION BY SPECIALIST

I, MERCHANDT LE MAITRE, declare that –

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

Signature of Specialist:

Name of Company: SiVEST SA (PTY) Ltd

Date: 27th July 2022

POFADDER WIND FACILITY 3 (PTY) LTD

POFADDER WIND ENERGY FACILITY 3

STORMWATER MANAGEMENT PLAN

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LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION

SiVEST Civil Engineering Division has been appointed by the Pofadder Wind Facility 3 (Pty) Ltd. (hereafter referred to as "Pofadder 3" or "Pofadder WEF 3") to complete a Stormwater Management Plan (SWMP) for the proposed 248 MWac Pofadder Wind Energy Facility 3 and associated grid infrastructure (hereafter referred to as the "proposed facility / facilities"). The facility is situated ±35 km south-east of Pofadder within the Kai !Garib Local Municipality and the Z F Mgcawu District Municipality in the Northern Cape Province.

The proposed facility and associated grid infrastructure between Springbok and Upington will not be located within a Renewable Energy Development Zone (REDZ).

The proposed Pofadder Wind Energy Facility 3 forms part of cluster development with two additional developments adjacent to this facility as separate EIA applications: - Pofadder Wind Energy Facility 1 and Pofadder Wind Energy Facility 2. Although this report only focuses on the Pofadder WEF 3, all three developments are considered for this study as they share common boundaries, drainage lines and catchments.

2 WIND ENERGY FACILITY COMPONENTS

The WEF will consist of the following:

2.1 WEF Components

At this stage, the proposed Pofadder 3 WEF will comprise up to thirty-one (31) wind turbines with a maximum total energy generation capacity of up to approximately 248 MW. In summary, the proposed Pofadder WEF 2 development will include the following components:

- Up to 31 wind turbines, each with a maximum of 8 MW output per turbine, with a maximum total export capacity of ±248 MW. This number, size and output of turbines will be subject to allowable limits in terms of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP).
- Each wind turbine will have a maximum hub height and a rotor diameter of up to approximately 200 m;
- Concrete turbine foundations and turbine hardstands;
- Each turbine will have a circular foundation with a diameter of up to 32 m. The turbine foundation will be placed alongside the 45 m wide hardstand, resulting in an area of about 45 m x 32 m that will be permanently disturbed for the foundation. The combined permanent footprint for the turbines will be approximately 4.4 ha.
- Each turbine will have a crane hardstand of approximately 70 m x 45 m. The permanent footprint for turbine crane hardstands will be ±9 ha.
- Each turbine will have a blade hardstand of approximately 80 m x 45 m (3 600 m2). The combined permanent footprint for blade hardstands will be ±10 ha.
- One (1) new 33/132 kV on-site substation occupies an area of approximately 1.6 ha.
- The wind turbines will be connected to the proposed on-site substation via medium voltage (33 kV) underground cables, mainly running alongside the access roads. Where burying of cables is not possible due to technical, geological, environmental or topographical constraints, cables will be overhead via 33 kV monopoles.
- The main access road will be between 8 – 12 m wide (to allow vehicles to pass).

- Internal roads with a width of 6 – 8 m will provide access to each wind turbine. Existing farm roads will be upgraded and used wherever possible, although new site roads will be constructed where necessary.
- A 12 m wide corridor may be temporarily impacted during construction and rehabilitated to a 6 m wide corridor after construction. The internal gravel roads will have a 6 – 8 m wide surface and a 12m wide road clearance during construction. Additional space might be required for cut and fill, side drains and other stormwater control measures, turning areas and vertical and horizontal turning radii to ensure the safe delivery of the turbine components.
- Pofadder WEF 3 will have a total road network of approximately 48 km.
- One (1) construction laydown / staging area of up to approximately 7 ha (to be rehabilitated following construction). It should be noted that no on-site labour camps will be required to house workers overnight as all workers will be accommodated in the nearby towns and transported daily to the site (by bus);
- The gatehouse and security house will occupy an area of up to 0.5 ha.
- Battery Energy Storage System (BESS) of approximately 3.6 ha.
- One (1) permanent Operation and Maintenance (O&M) building (including offices, warehouses, workshops, canteen, visitors centre and staff lockers) occupying an area of up to 1 ha;
- The temporary establishment of a site camp and concrete batching plant occupying an area of up to 1.6 ha.
- Galvanised palisade fencing to be used at the substations with the maximum height of the fencing to be up to 3.5 m.
- Water will be sourced from either the Local Municipality, supplied from a private contractor and trucked in, from existing boreholes within the application site or from a new borehole if none of these options are available.

2.2 Grid Connection Components

In order to evacuate the energy generated by the WEF's to supplement the national grid, Pofadder Grid (Pty) Ltd is proposing two grid connection alternatives which will be assessed in a separate Integrated Grid Basic Assessment Reports (BAR).

3 OBJECTIVE & SCOPE OF WORK

The study's main objective is to develop a conceptual stormwater management plan for the proposed development during the operation & maintenance phase. To achieve this objective, the following will be assessed and discussed under their relevant headings in this report: -

- Climate
- Surface Hydrology
- Development Stormwater Management
- Development run-off Calculations
- Conclusions & Recommendations

The scope of work consist of the following:

a) A site investigation (Completed on 15th July 2022).

b) Consultations with the relevant authorities and / or stakeholders.

c) Extract the climate of the area from sources commonly available

d) Desktop analysis of the existing surface hydrology

e) Evaluate the impact of the proposed development on the existing catchment and propose a suitable SWMP.

f) Conclude and propose possible mitigation measures.

g) Seasonal impacts affect this assessment.

3.1 Legal Requirement & Guidelines

Key legal requirements and guidelines for the proposed facilities are as follows:

- Government Notice 509 (GN509) as published in Government Gazette 40229 of 2016 and refers to the National Water Act, 1998 (Act No. 36 of 1998)
- National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA)
- National Water Act, 1998 (Act No 36 of 1998) (NWA)

4 SPECIALIST CREDENTIALS

Merchandt Le Maitre from SiVEST Consulting Engineers compiled this Stormwater Management Plan. He has a B Tech (Baccalaureus Technologiae) in Civil Engineering with over 17 years of experience, with 12 years in renewable energy. His extensive experience in the different facets of Civil Engineering means he can advise clients in the renewable energy sector in; geotechnical engineering, topographical studies, stormwater management, water demand, transportation studies, access / layout designs and glint & glare assessments. A full Curriculum Vitae is included in 'Appendix A.

Table 4.1 Specialist Credentials & Experience

Company	SiVEST (Pty) Ltd
Contact Details	merchandtm@sivest.co.za
Qualifications	B Tech (Baccalaureus Technologiae) in Civil Engineering
Professional Registrations & Memberships	• Pr. Tech Eng – Engineering Council of South Africa • MSAICE – Member of South African Institute of Civil Engineers • SAWEA – South African Wind Energy Association
Expertise to carry out the Stormwater Management Plan	• Dyansons Klip 5 • De Aar Solar • Droogfontein Solar • Mierdam Solar • Prieska PV • Hoekplaas PV • Noupoort WEF • Copperton PV • Klipgats PV • Euphorbia PV • Verbena PV • Hillardia PV

5 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations are to be noted:

- The analysis is based on the information provided at the time by Pofadder Wind Facility 3 and its representatives.
- Digital Terrain Model: 25m DEM from NGI (2014) & 2m DEM from GeoSmart (2016:2919BA, 2919BB, 2919BC & 2919BD)
- Technical Specifications for the facility are:

Table 5.1 Technical Specification for Pofadder WEF 3

Technical Component	Dimensions
Number of Turbines	Maximum of 31
Capacity	≤ 248 MWac
Hub Height	≤ 200 m
Rotor Diameter	≤ 200 m
Construction Period (assumed)	± 24 months (TBC)
Expected Lifespan	20 - 25 years (TBC)
Road Width	Up to 8 m
Length of Internal Roads	±48 km

- Some of the figures provided are indicative as many of the components are still at the design stage and will only be confirmed closer to the construction time.

6 PROJECT DESCRIPTION

6.1 Locality

Pofadder WEF 3 and associated infrastructure is located ±35 km south-east of Pofadder in the Northern Cape Province. The facility is ±22 km from Road R358 regional road (MR0736) and 29 km from Road DR2986 to the N14 Freeway between Springbok and Upington in the Kai !Garib Local Municipality and the Z F Mgcawu District Municipality as indicated in **Figure 6:1**.

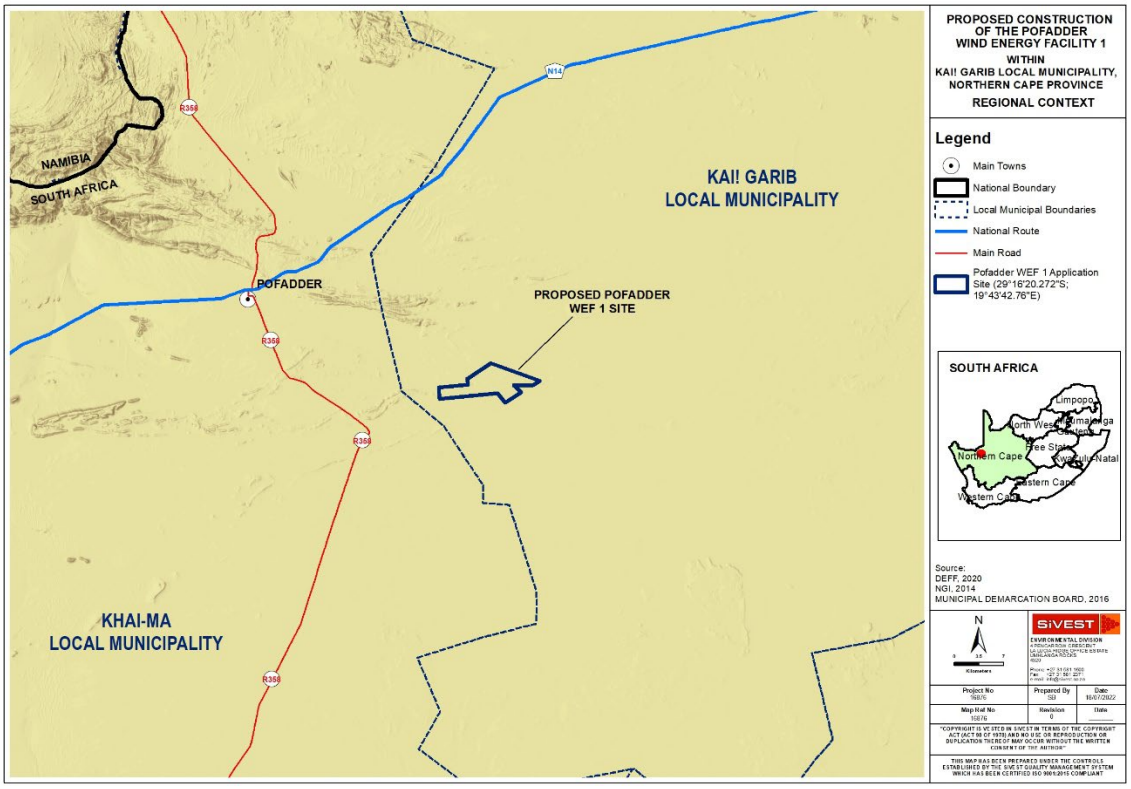


Figure 6:1 Pofadder WEF - Regional Context

The WEF will be located on the following properties (Refer to **Figure 6:2**):

- Remaining Extent of the Farm Ganna-Poort No. 202
- Remaining Extent of the Farm Lovedale No. 201
- Portion 3 of the Farm Sand-Gat No. 150

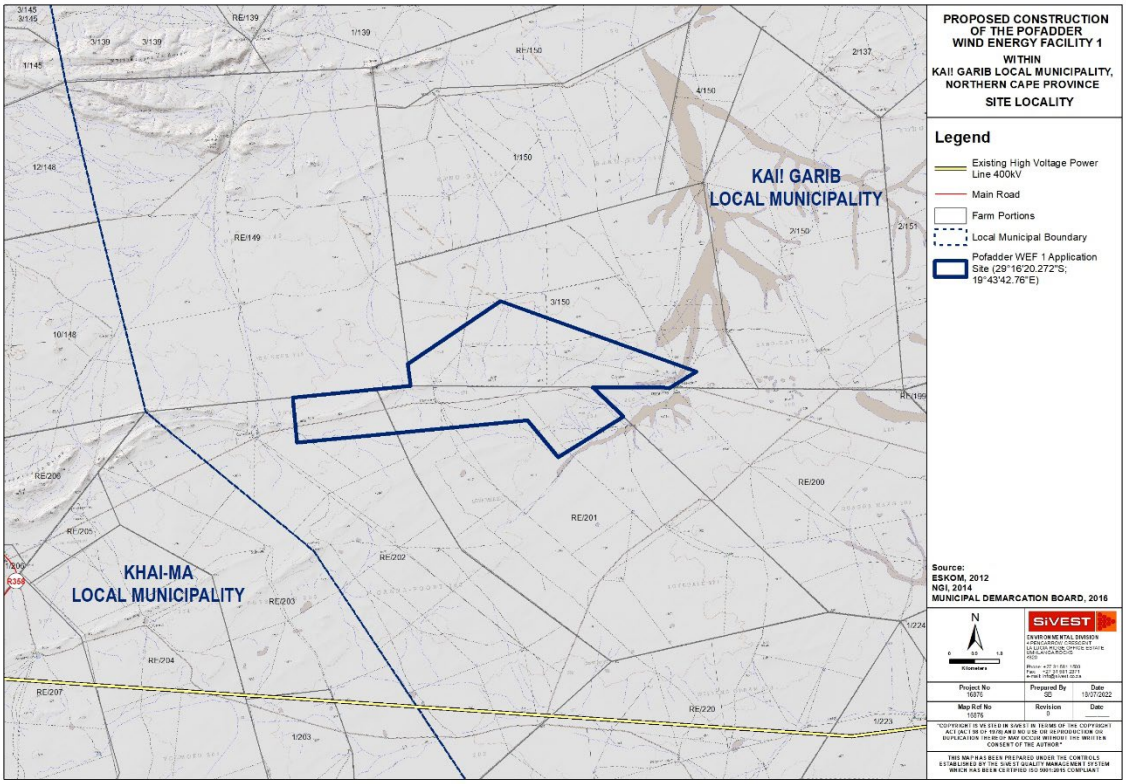


Figure 6:2 Pofadder WEF - Site Locality

7 GEOTECHNICAL STUDY

7.1 Palaeontology Impact Assessment

A comprehensive Palaeontology Impact Assessment[1] for the proposed development was completed in February 2022 by Prof. Marion Bamford on the proposed sites indicated in **Section 6**.

A summary extract from the Palaeontological Impact Assessment confirms the site comprises the following geological context. Refer to **Figure 7:1** and **Table 7:1**:

[1] Bramford, Prof M (2022). Paleontology. Pofadder WEFs 1,2,3. Pofadder Wind Facility 3 (Pty) Ltd

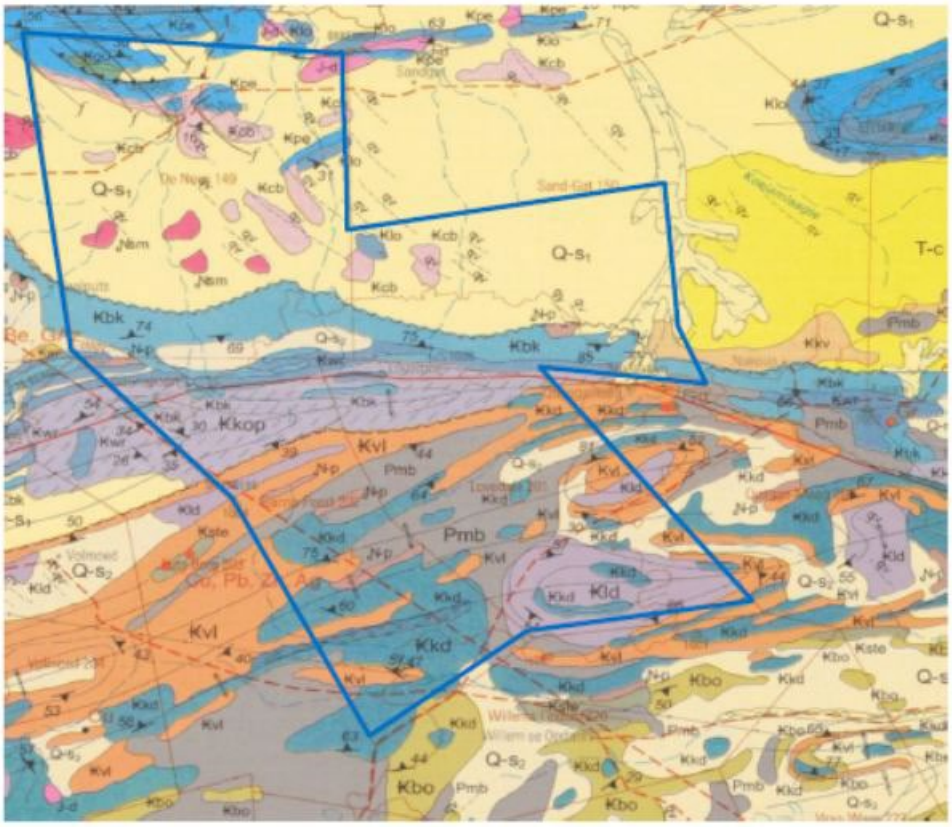


Figure 7:1 Geological Map of Proposed Development Pofadder WEF 1,2 & 3

Abbreviations of the rock types are explained in **Table 7:1** below:

Table 7.1 Explanation of **Figure 7:1** and Approximate Ages

Symbol	Group / Formation	Lithology	Approximate Age
Qs-1	Quaternary Sands	Re windblown sands & Dunes	Quaternary, ca 2.5 Ma to present
Qs-2	Quaternary Sands	Sand, Scree, Rubble, Sandy Soil	
T-c	Tertiary Calcrete	Calcrete	Tertiary, ca 65 Ma to 2.5 Ma
Jd	Jurassic Dyke	Dolerite	Ca 183 Ma
Pmb	Mbizane Formation Dwyka Group Karoo Supergroup	Diamictite, Tillites, Subordinate Sandstone and Mudstone	Late Carboniferous to Early Permian. Ca 300 – 290 Ma
Kbk	Brulkolk Formation Bushmanland Group Namaqua – Natal Suite	Gneiss	>1200 Ma
Kvl	Voelmoed Formation Kamiesberg Group	Quartzite, Schist, Ironstone	Ca 1600 Ma

Symbol	Group / Formation	Lithology	Approximate Age
	Namaqua – Natal Suite		
Kkd	Kraandraai Formation Kamiesberg Group Namaqua – Natal Suite	Gniess	Ca 1600 Ma
Kld	Lekkerdrink Formation Gladkop Group Namaqua – Natal Suite	Gniess	2050-1700 Ma
Kkp	Koeipoort Formation Gladkop Metamorphic Suite Namaqua – Natal Suite	Gniess	2050-1700 Ma

In summary, the facility will have the following typical soil profile: -

- *Tertiary calcretes, quaternary sands (red & grey) and alluvium covering the site*
- *The metamorphic rock of the Namaqua – Natal belts underlies the Karoo sediments.*

Material excavation (soils and sand) is expected to be soft in the upper layers of alluvium / sand with *intermediate to hard* excavation techniques below in the metamorphic rock.

We recommend that a comprehensive Geotechnical Report be carried out to form part of the detailed design stage and refinement of the SWMP.

8 CLIMATE

8.1 Climate Classification[2]

Pofadder WEF 2 and associated infrastructure is located ±35 km south-east of Pofadder in the Northern Cape Province. Referring to the Klöppen-Geiger climate classification system, the Northern Cape Province has a variety of climates and is predominantly dominated by hot desert climates (type 'BWh') and cold semi-arid climates (type 'BSk'). The Pofadder area is classified as a hot desert climate (type 'BWh').

8.2 Average Temperature[3]

The Average Maximum temperatures range between 18.3° and 34.3°C. January is the year's warmest month, with an average high temperature of 34.3°C. July is the coldest month of the year with an average low temperature of 7.4°C. Refer to **Figure 8:1** below.

[2] en-climate-data
[3] Weather Atlas

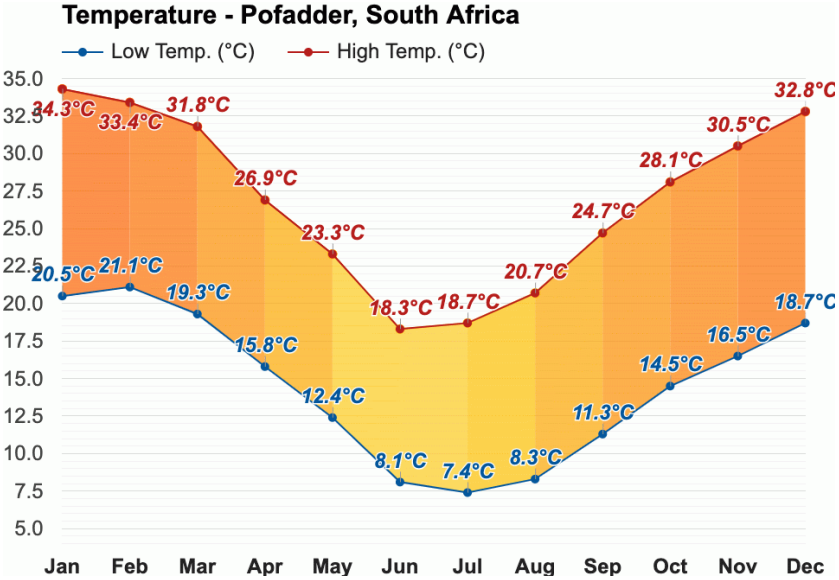


Figure 8:1 Average Temperature – Pofadder, South Africa

8.3 Mean Annual Precipitation (MAP)[4]

As mentioned in **Section 8.1** above, the Pofadder region is a hot desert climate with an annual average rainfall of ±45 mm, mainly between December and April. February is, on average, the wettest month of the year, with ±12 mm accumulated for the month. The driest months with the least amount of rainfall of ±1mm accumulated for the month is the month of July, August and September. Refer to **Figure 8:2** below.

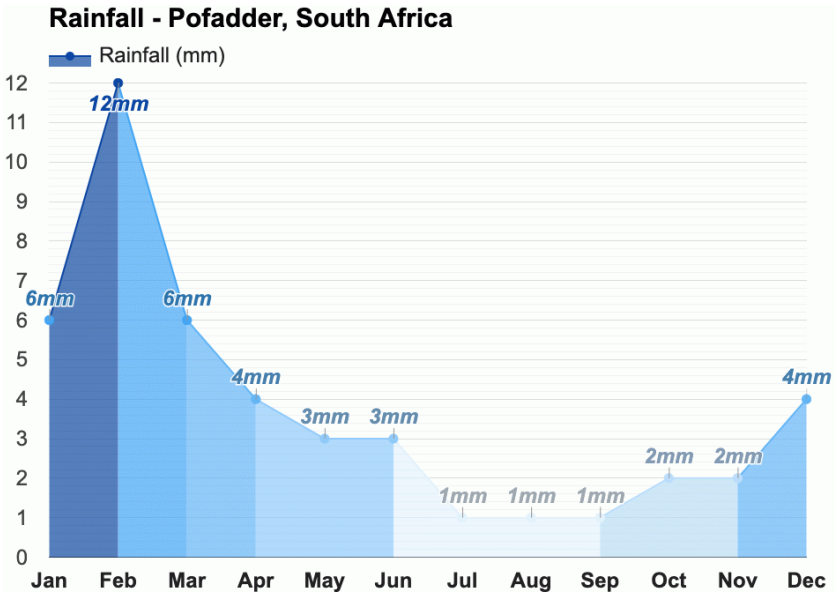


Figure 8:2 Average Rainfall – Pofadder, South Africa

The average rainfall days per annum is ±29 days, with February having the highest number of rainfall days (5.1 days). The month with the least rainfall days is November (0.8 days). Refer to **Figure 8.3** below.

[4] Weather Atlas

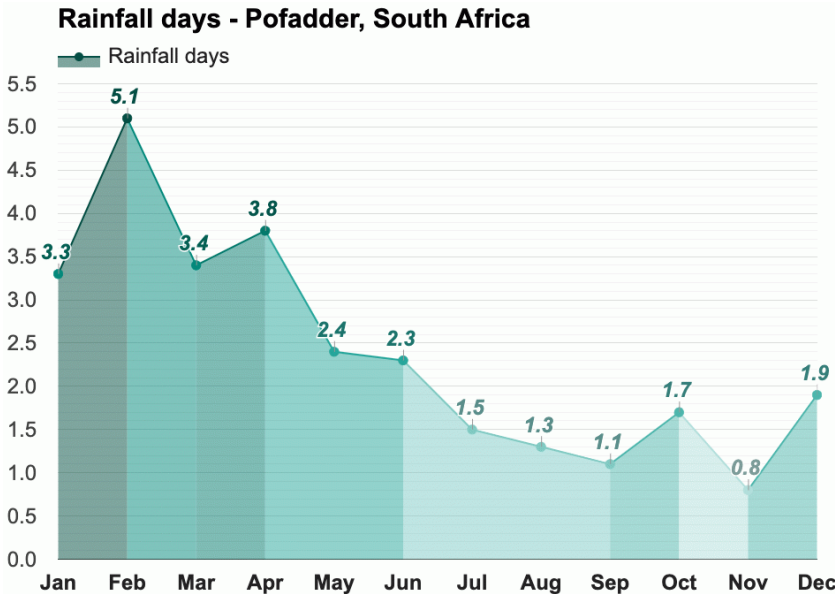


Figure 8:3 Average Rainfall Days – Pofadder, South Africa

8.4 Humidity[5]

The region's relative humidity ranges from a maximum of 46% in June to a minimum of 25% in November.

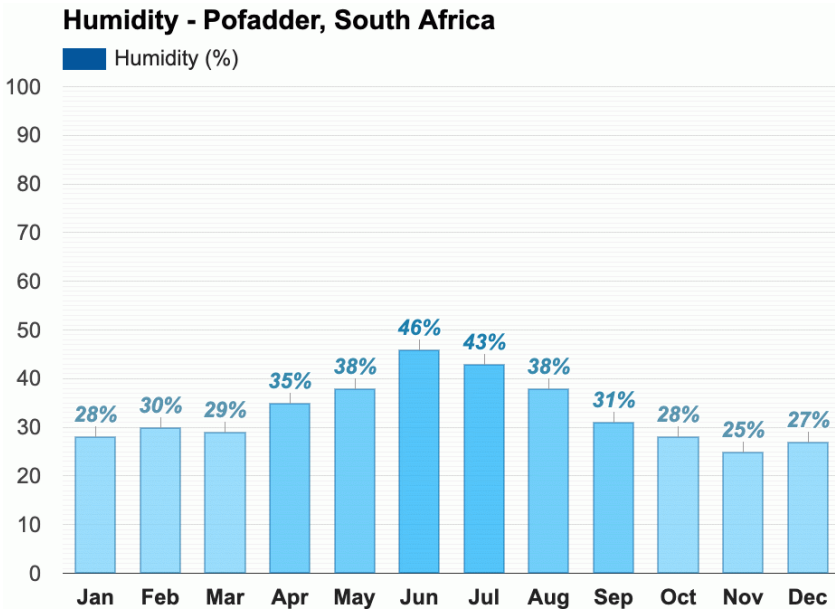


Figure 8:4 Average Relative Humidity – Pofadder, South Africa

8.5 Design Rainfall

Design Rainfall Estimation[6] software was used to obtain the rainfall data (tabulated below in **Table 8:1**) required for the run-off calculations.

[5] Weather Atlas

[6] *Design Rainfall Estimation in South Africa Version 3 developed by MJ Gorven, JC Smithers and RE Schulze*

Table 8.1 Pofadder WEF 2 Design Rainfall Data

Return Period		2yr	5yr	10yr	20yr	50yr	100yr	200yr
Duration		Rainfall Depth (mm)						
5	min	5.80	9.20	11.60	14.10	17.80	20.70	24.00
10	min	8.60	13.50	17.10	20.90	26.20	30.60	35.30
15	min	10.80	16.90	21.50	26.20	32.90	38.40	44.30
30	min	13.20	20.70	26.20	32.00	40.20	46.90	54.10
45	min	14.80	23.30	29.50	35.90	45.10	52.70	60.90
60	min	16.10	25.30	32.00	39.10	49.00	57.30	66.10
90	min	18.10	28.40	36.00	43.90	55.10	64.40	74.30
120	min	19.70	30.90	39.10	47.70	59.90	70.00	80.80
240	min	22.40	35.10	44.50	54.30	68.20	79.60	91.90
360	min	24.10	37.90	48.00	58.50	73.50	85.80	99.10
480	min	25.50	40.00	50.60	61.80	77.50	90.60	104.60
600	min	26.60	41.70	52.80	64.40	80.80	94.40	109.00
720	min	27.50	43.10	54.60	66.60	83.60	97.70	112.80
960	min	29.00	45.50	57.60	70.30	88.20	103.00	119.00
1200	min	30.20	47.40	60.00	73.20	92.00	107.40	124.00
1440	min	31.30	49.00	62.10	75.80	95.20	111.10	128.30
1	day	25.70	40.30	51.10	62.30	78.20	91.40	105.50
2	days	30.00	47.10	59.70	72.80	91.40	106.80	123.30
3	days	32.90	51.60	65.40	79.80	100.20	117.00	135.10
4	days	34.30	53.80	68.10	83.10	104.40	121.00	140.80
5	days	35.40	55.60	70.40	85.90	107.80	125.90	145.40
6	days	36.40	57.10	72.20	88.10	110.70	129.30	149.20
7	days	37.20	58.30	73.90	90.10	113.20	132.20	152.60

9 SURFACE HYDROLOGY

9.1 Drainage of Catchment

9.1.1 Primary Catchment

The site falls within the 'Orange River' drainage catchment (Primary Catchment 'D'), covering an area of ±973 000 km² (including the Vaal River catchment). To the north, the Orange River catchment extends into Namibia, to the east, the Drakensburg mountains, to the south, the Western Cape and Eastern Cape provincial boundaries to the south, ultimately flowing westwards between South Africa and Namibia towards the Atlantic Ocean, shown in **Figure 9.1** below.

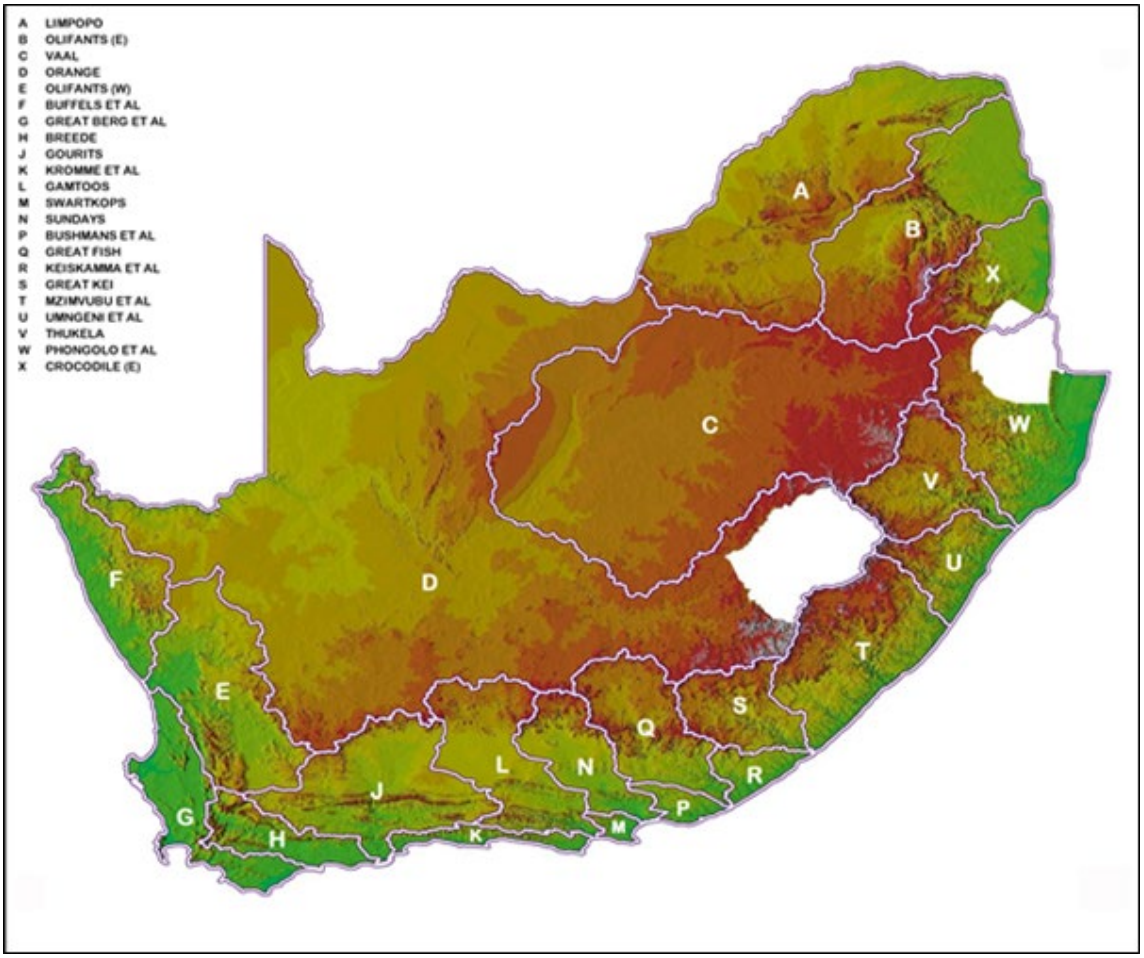


Figure 9:1 Department of Water and Sanitation (DWS) – Primary Catchments

9.1.2 Quaternary Catchment

The proposed facility is located in Quaternary Catchment D81F, D81G and D53G. Catchment D81F and D81G form part of the upper reaches of the Kaboep Rivier, and catchment D53G forms part of the upper reaches of the Sout River, that then ultimately flows into the lower reaches of the Orange River.

10 STORMWATER MANAGEMENT

10.1 Impact of Development[7]

Development is defined as the process of modification or evolution which historically involves the improvement / construction of buildings and civil infrastructure. A new development leads to an alteration in the hydraulic properties of the subjected area, changing surface run-off properties into pervious or impervious layers and subsequently increasing the surface run-off and altering inundation areas. Common historical stormwater infrastructure and surfaces are constructed to manage the run-off more efficiently, resulting in shorter catchment response times and increased peak flows.

As a result of the proposed development, stormwater management is key to reducing the negative impacts and keeping the receiving environment in its natural state. The management is achieved with

[7] *Guidelines for Human Settlement Planning and Design compiled by CSIR Building and Construction Technology*

adequate mitigation measures, per the applicable stormwater drainage standards and policies, to ensure the development can be accommodated within the receiving environment.

10.2 The Purpose of Stormwater Management[8]

The purpose of stormwater management is based on several aspects: health and safety, quality of life, and water conservation. These aspects are briefly described below:

- Directing and discharging the stormwater allows the public to protect their health, welfare, and safety. It also provides for the protection of property from flood hazards.
- Enhance the quality of life in communities that are affected.
- To grasp the opportunity to conserve water for beneficial public uses.
- To safeguard the natural environment.
- The balance of economic development and the necessity for a sustainable environment; and
- Optimum stormwater management methodologies are adopted so that the primary beneficiaries pay as per their possible gains.

10.3 Stormwater Management Policies & Design Guidelines

Urban Stormwater Management policies require that the post-development run-off from an area for storms of similar recurrence intervals may not exceed the run-off generated under the pre-development condition. For rural developments, the emphasis should focus more on the detrimental effect to the immediate environment concerning the control of water velocity and erosion rather than minor increases between the pre and post-development flow volumes.

This study area falls within Kai !Garib Local Municipality and the Z F Mgcawu District Municipality, and, to our knowledge, specific policies, design guidelines, and standards are not available. Therefore, we recommend that the stormwater drainage system refers to the "Red Book[9]" and the "Drainage Manual[10]".

10.4 Stormwater Management Philosophy

The Stormwater Management Philosophy for the proposed development urges the developer, the professional teams, and contractors to achieve the following:

- Always maintain adequate ground cover in all areas to reduce the risk of erosion by wind, water and all forms of traffic.
- Prevent concentration of stormwater flow at any point where the ground is susceptible to erosion. Where unavoidable, adequate protection of the ground must be provided.
- Reduce concentrated stormwater flows as much as possible by providing effective attenuation measures.
- Ensure the development does not increase the stormwater flow rate above what the natural ground can safely accommodate.
- Ensure that all stormwater control structures are constructed safely and aesthetically pleasing in keeping with the overall development.
- Prevent pollution of waterways and water features.
- Contain soil erosion by constructing protective works to trap sediment at appropriate locations. This protection applies particularly during construction; and

[8] *Guidelines for Human Settlement Planning and Design compiled by CSIR Building and Construction Technology*
[9] *Guidelines for Human Settlement Planning and Design compiled by CSIR Building and Construction Technology*
[10] *Drainage Manual 6th Edition, Published by The South African National Roads Agency SOC Ltd, 2013*

- Avoid situations where natural or artificial slopes become saturated and unstable during and after construction.

10.5 Stormwater Management Drainage System

Stormwater drainage systems can be seen as dual systems incorporating minor and major storm return periods.

The minor stormwater drainage system caters for frequent storm events. Storms are of a minor nature, usually including stormwater run-off with frequent return periods such as 2yr, 5yr and / or 10 years.

The major stormwater drainage system caters for severe, infrequent storm events supported by the minor drainage system. Storms of a major nature include less frequent return periods such as 20 years and more.

11 PRE-DEVELOPMENT RUN-OFF CHARACTERISTICS

11.1 Catchment Description

The development falls within eight (8) minor catchment areas, forming part of the three (3) quaternary catchments mentioned in **Section 9.** The development's catchment areas vary in size ranging from 6.1 km^2 to 241 km^2 and flat (<1%). The development catchment shows no evidence of clearly defined watercourses with overland sheet flow occurring in multiple directions through the respective catchments.

The development is located in a rural area of the Northern Cape Province where sheep farming predominantly occurs. Referring to the SANBI Vegetation Map (2012), the vegetation in the area is described as 'Bushmanland Arid Grassland'.

The proposed WEF development is located away from any streams, rivers or floodplains and, therefore, will not be impacted by a flood line.

11.2 Site Topography

Extensive, irregular plains cover the area on a slightly sloping plateau. All three developments combined have a natural ridge line to the north, dividing the development into two catchments, one flowing north and the other south-east. The drainage lines to both catchments ultimately join up again in the Orange River. As mentioned above, no defined drainage lines run through the proposed developments; however, more prominent drainage lines, namely the Kaboep Rivier, Nousrivier, Brabeesrivier and Hartbeesrivier are located within the Quaternary catchments outside the proposed developable area. (Refer to **Figure 11:1** below).

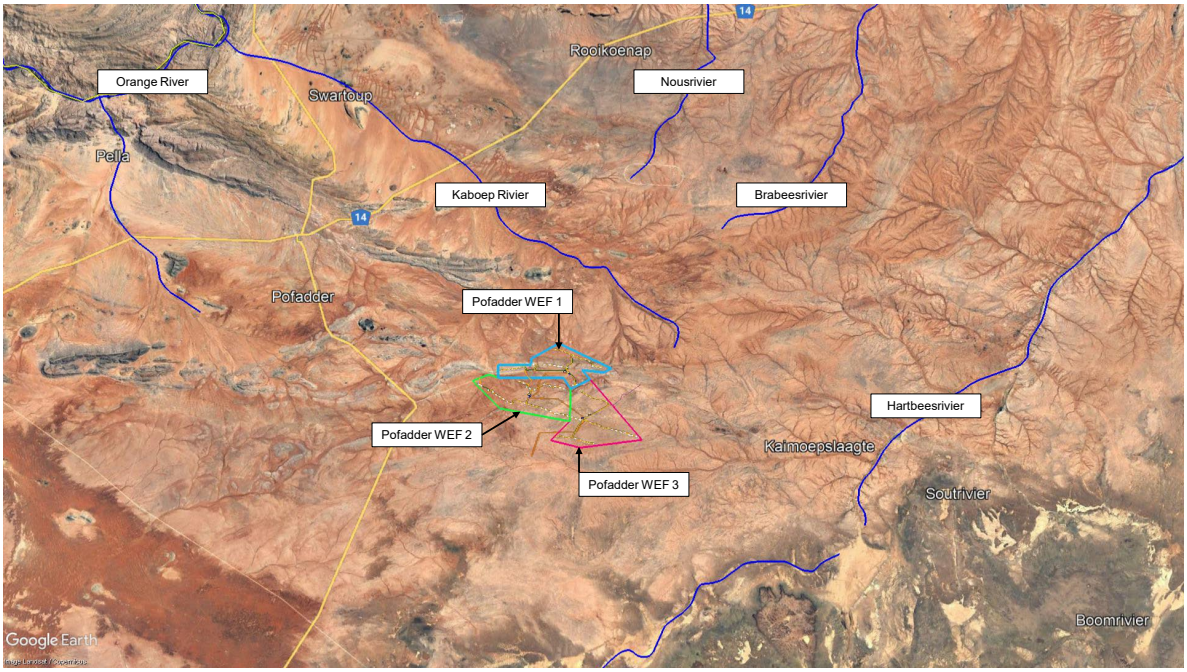


Figure 11:1 Larger Drainage Lines (Blue) outside the development

Please note that detailed contour data was not available for the broader study area. Therefore, the National Geo-Spatial Information (NGI) 's 25 m DEM was sourced to provide terrain data for this area.

Contours were generated from the Digital Elevation Model (DEM) at 2.5 m intervals using ESRI's 3D Analyst Extension for ArcGIS. Therefore, we recommend that an updated and detailed SWMP be completed once a more accurate Digital Terrain Model (DTM) of the site is available

From **Figure 11:2** and **Figure 11:3** below, we confirm a natural slope of less than 3% for catchment areas forming part of the development with the following percentages:

- Wetlands & Pans (<3%) – 95%
- Flat Areas (3% to 10% slope) – 5%
- Hilly Areas (10% to 30% slope) – 0%
- Steep Areas (>30% slope) – 0%

11.3 Site Vegetation

The vegetation in this area is made up of sparsely vegetated plains, dominated by white grasses giving the vegetation a semidesert 'steppe' character. In years of abundant rainfall, more vegetation and longer grass can be expected.

Figure 11:2 Current Site Vegetation (2022 - High Rainfall)

Figure 11:3 Typical Drainage Lines

Figure 11:2 and **Figure 11:3** indicates the typical ground cover on the site, with the following percentage splits applicable: -

- Thick Bush & Plantations – 0%
- Light Bush & Farmlands – 0%
- Grasslands – 50%
- No Vegetation – 50%

11.4 Geotechnical Conditions

Concerning **Section 7** – **Geotechnical Study** above, soil conditions have been assumed as follows: -

- Very Permeable – 20%
- Permeable – 70%
- Semi-permeable – 10%
- Impermeable – 0%

11.5 Hardstand Areas

The property currently has no areas of hardstand: -

- Hardstand Areas – 0%

11.6 Run-Off Coefficient

Based on *Table 3C.1* of the *Drainage Manual – 6th Edition*[11], the following run-off coefficients have been assigned for this calculation: -

Table 11.1 Pre-Development Run-Off Coefficient

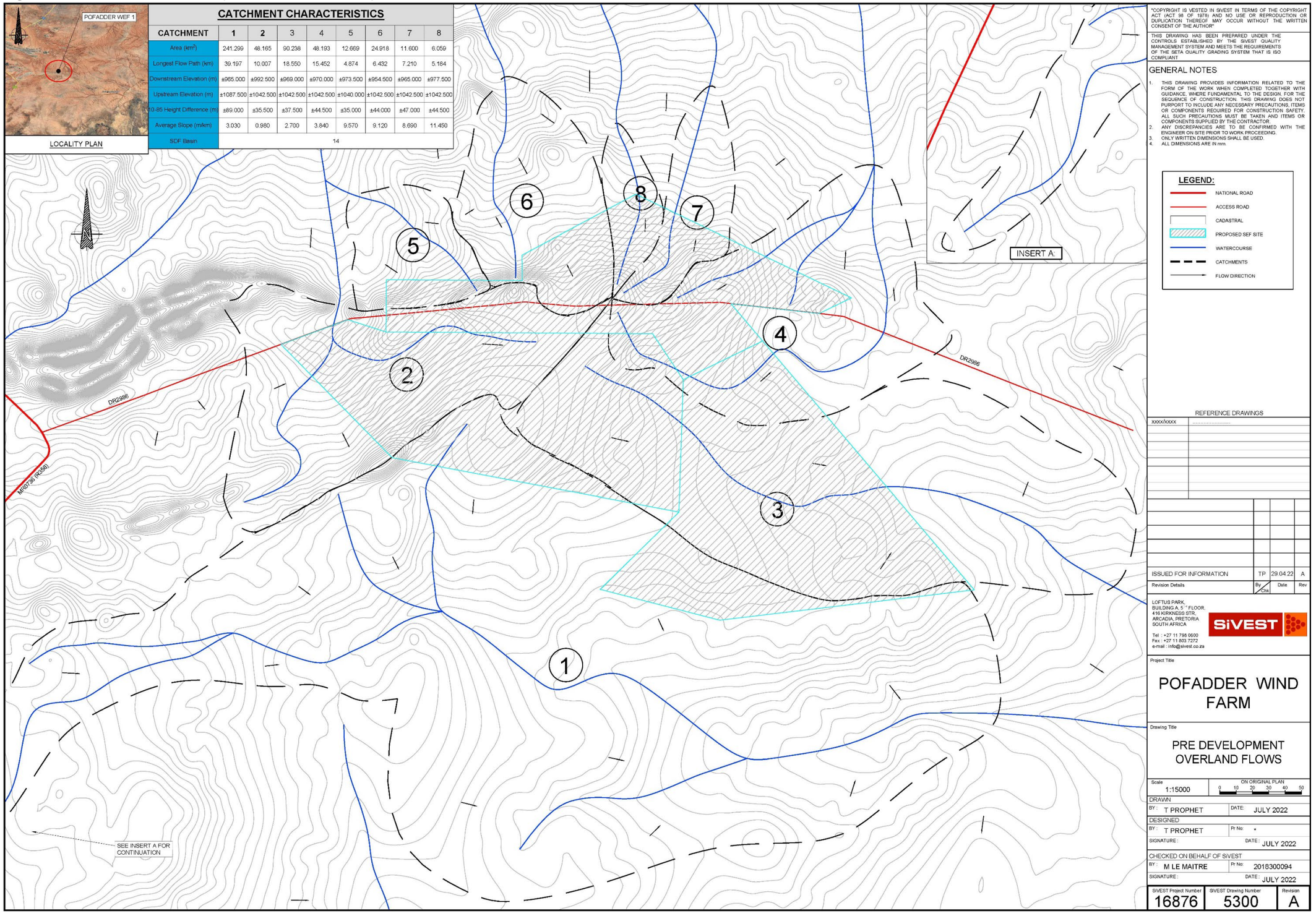
Surface Slope - Wetlands & Pans	**0,03**	**95,0%**	0,029
Surface Slope - Flat Areas (3-10%)	**0,08**	**5,0%**	0,004
Surface Slope - Hilly Areas (10-30%)	**0,16**	**0,0%**	0,000
Surface Slope - Steep Areas (>30%)	**0,26**	**0,0%**	0,000
Soil - Very Permeable	**0,04**	**20,0%**	0,008
Soil - Permeable	**0,08**	**70,0%**	0,056
Soil - Semi-Permeable	**0,16**	**10,0%**	0,016
Soil - Impermeable	**0,26**	**0,0%**	0,000
Vegetation - Thick Bush / Plantations	**0,04**	**0,0%**	0,000
Vegetation - Light Bush / Farmlands	**0,11**	**0,0%**	0,000
Vegetation - Grasslands	**0,21**	**50,0%**	0,105
Vegetation - No Vegetation	**0,28**	**50,0%**	0,140
			0,358

Based on the preceding table, we calculated a **PRE-DEVELOPMENT Run-Off Coefficient** of **0.358**.

It should also be noted that no 'Area Reduction Factor' has been applied as we believe the drainage catchment areas are too small.

[11] *Drainage Manual 6th Edition, Published by The South African National Roads Agency SOC Ltd, 2013*

Figure 11:4 Pofadder WEF 3 Development Area– Pre-Development Overland Flow



12 POST-DEVELOPMENT RUN-OFF CHARACTERISTICS

12.1 Site Development Plan (SDP)

Concerning the SDP, the proposed Pofadder WEF 3 layout will consist of a series of 31 turbines along with an access road, internal roads, substation, battery energy storage system (BESS), turbine laydown areas, auxiliary buildings, and external access roads etc. The total development area will cover a combined area of ±13 500 ha. In contrast, Pofadder WEF 1 will only cover ±3 600 ha, Pofadder WEF 2 ±4 800 ha and Pofadder WEF 3 ±5 100 ha.

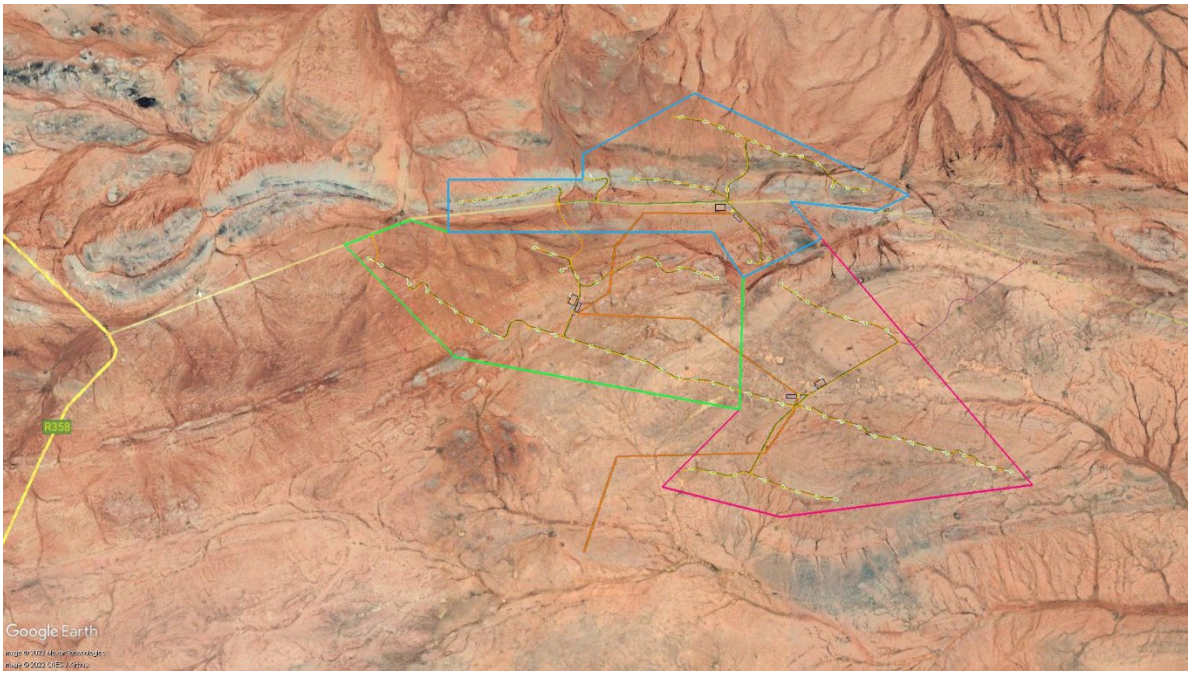


Figure 12:1 Pofadder WEF 3 SDP (Indicated in blue)

12.2 Site Topography

Bulk platforms, roads and buildings will be constructed at less steeper slopes than the natural topography.

The following percentage splits are applicable: -

- Flatter Areas (0% to 3% slope) – 95%
- Flat Areas (3% to 10% slope) – 5%
- Hilly Areas (10% to 30% slope) – 0%
- Steep Areas (>30% slope) – 0%

12.3 Geotechnical Conditions

Concerning **Section 7 – Geotechnical Study**, it has been assumed that the percentages used in the 'pre-development' run-off coefficient will remain unchanged for the 'post-development' as there would be little or no effect from the facility on the existing ground conditions.

The following percentages will be used: -

- Very Permeable – 20%
- Permeable – 70%

- Semi-permeable – 10%
- Impermeable – 0%

12.4 Developed Components

Once developed, it has been confirmed that the property will have no significant impervious surfaces in the form of surfaced roads or buildings other than the natural ground cover. However, gravel roads and platforms will be constructed across the site to provide access to the WTG's. Gravel roads will have frequent discharge points to reduce stormwater concentrations and ultimately minimise the development impact.

A slight increase in the area of imperviousness has therefore been assumed.

- Gravel Roads & Platforms – 94%
- WEF Facility – 6%
- Grasslands – 0%
- No Vegetation – 0%

12.5 Run-Off Coefficient

Based on *Table 3C.1* of the *Drainage Manual – 6th Edition*[12], the following run-off coefficients percentages have been assigned for this calculation: -

Table 12.1 Post-Development Run-Off Coefficient

UN-DEVELOPED COMPONENT: Run-off Percentages			
Surface Slope - Wetlands & Pans	**0,03**	**95,0%**	0,029
Surface Slope - Flat Areas (3-10%)	**0,08**	**5,0%**	0,004
Surface Slope - Hilly Areas (10-30%)	**0,16**	**0,0%**	0,000
Surface Slope - Steep Areas (>30%)	**0,26**	**0,0%**	0,000
Soil - Very Permeable	**0,04**	**20,0%**	0,008
Soil - Permeable	**0,08**	**70,0%**	0,056
Soil - Semi-Permeable	**0,16**	**10,0%**	0,016
Soil - Impermeable	**0,26**	**0,0%**	0,000
Vegetation - Thick Bush / Plantations	**0,04**	**0,0%**	0,000
Vegetation - Light Bush / Farmlands	**0,11**	**0,0%**	0,000
Vegetation - Grasslands	**0,21**	**50,0%**	0,105
Vegetation - No Vegetation	**0,28**	**50,0%**	0,140
			0,358
DEVELOPED COMPONENT: Run-off Percentages			
Surface Slope - Wetlands & Pans	**0,03**	**100,0%**	0,030
Surface Slope - Flat Areas (3-10%)	**0,08**	**0,0%**	0,000
Surface Slope - Hilly Areas (10-30%)	**0,16**	**0,0%**	0,000
Surface Slope - Steep Areas (>30%)	**0,26**	**0,0%**	0,000
Soil - Very Permeable	**0,04**	**20,0%**	0,008
Soil - Permeable	**0,08**	**70,0%**	0,056
Soil - Semi-Permeable	**0,16**	**10,0%**	0,016
Soil - Impermeable	**0,26**	**0,0%**	0,000

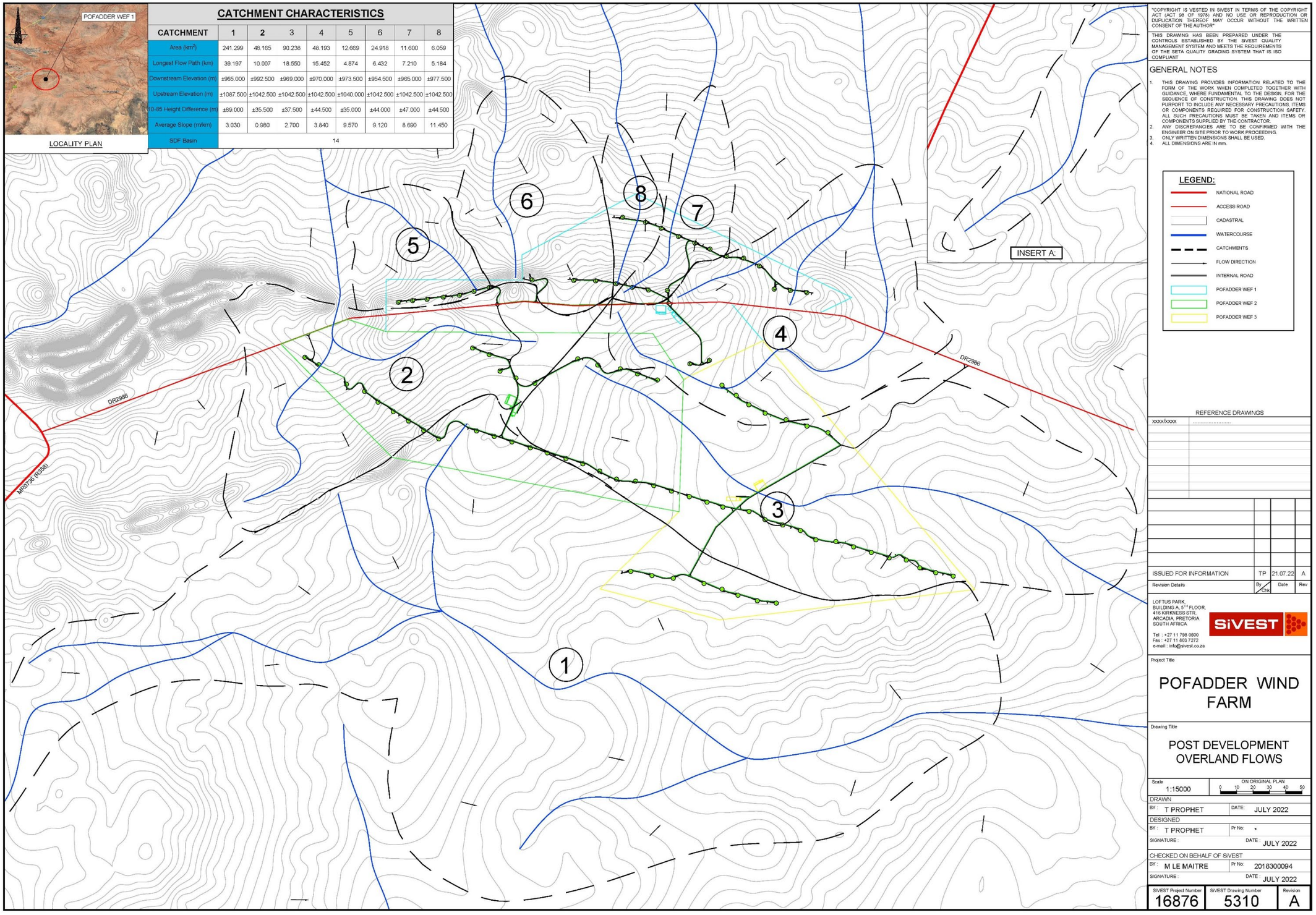
[12] *Drainage Manual 6th Edition, Published by The South African National Roads Agency SOC Ltd, 2013*

Gravel Roads & Platforms	**0,50**	**94,0%**	0,470
WEF Facilities	**1,00**	**6,0%**	0,060
Vegetation - Grasslands	**0,21**	**0,0%**	0,000
Vegetation - No Vegetation	**0,28**	**0,0%**	0,000
			0,640

RUN-OFF COEFFICIENT: Without DOLOMITE		
Percentage **UN-DEVELOPED**	**99,0%**	**0,354**
Percentage **DEVELOPED**	**1,0%**	**0,006**
TOTAL Run-Off coefficient		**0,360**

Based on the preceding table, we calculated a factored **POST-DEVELOPMENT Run-Off Coefficient** of **0.360.**

Figure 12:2 Pofadder WEF 3 – Post-Development Overland Flow



13 SURFACE MODELLING

13.1 Modelling Selection

EMPIRICAL and STATISTICAL METHODS were not considered for this project as insufficient hydrological records and observed points were available for the area. Therefore, a deterministic method has thus been selected to determine the results.

This method comprises mainly manual, graphic and computer-generated spreadsheets. Therefore, we believe our selection of the 'UNIT HYDROGRAPH METHOD '(HRU 1972) is appropriate because the site does not have a varying degree of post-development land change and does not have any existing permanent dams and sub-catchments. Computerised spreadsheets have been used to assist with iterations and to eliminate manual calculation errors.

As noted in **Section 11**, the proposed site is affected by eight (8) minor catchments. **Section 13.2** below modelled the surface run-off for each catchment for Pre and Post-Development conditions.

13.2 Surface Run-Off Modelling Results

Table 13.1 Pre-Development Modelling Results

Return Period	Catchment No.							
	1	2	3	4	5	6	7	8
1 : 2 year	17,06	12,05	10,54	7,98	5,05	7,27	3,33	2,06
1 : 5 year	85,02	49,09	49,91	35,89	18,26	28,51	13,26	7,93
1 : 10 year	111,22	64,21	65,28	46,94	23,88	37,29	17,35	10,38
1 : 25 year	145,84	84,21	85,61	61,56	31,32	48,90	22,75	13,61
1 : 50 year	172,03	99,33	100,98	72,61	36,94	57,68	26,83	16,05
1 : 100 year	207,69	114,45	119,79	84,81	42,56	66,47	30,92	18,49

Table 13.2 Post-Development Modelling Results

Return Period	Catchment No.							
	1	2	3	4	5	6	7	8
1 : 2 year	17,06	12,05	10,54	7,98	5,05	7,27	3,33	2,06
1 : 5 year	85,02	49,09	49,91	35,89	18,26	28,51	13,30	7,95
1 : 10 year	111,22	64,21	65,28	46,94	23,88	37,29	17,39	10,40
1 : 25 year	145,84	84,21	85,61	61,56	31,32	48,90	22,81	13,64
1 : 50 year	172,03	99,33	100,98	72,61	36,94	57,68	26,91	16,09
1 : 100 year	207,69	114,45	119,79	84,81	42,56	66,47	31,00	18,54

The results above indicate that the proposed development will have little to no effect between the Pre and Post-Development flows. Therefore, we believe implementing minor localised stormwater management guidelines can accommodate the proposed development without negatively impacting the downstream catchment.

14 STORMWATER MANAGEMENT & GUIDELINES

The buildings / structures within the development will require the control of stormwater run-off as per the stormwater management philosophy and policies of the local authority / municipality. The following guidelines are intended to assist in the design of the major and minor stormwater infrastructure and to

ensure that the objectives of this SWMP are met during the planning, design, construction, and operational phases of the development.

14.1 Buildings

Any building will inevitably result in some degree of flow concentration or deflection around buildings. The developer / owner shall ensure that all stormwater flow paths are protected against erosion.

Any inlet to a piped system shall be fitted with a screen / grating to prevent debris and refuse from entering the stormwater system. This must be installed immediately on the installation of the infrastructure. The onus is on the owner / developer to maintain the state of the screen / grating to ensure smooth flow.

No building works, earthworks, walls or fences may obstruct or encroach on a watercourse inside or outside the site without approved plans that do not compromise the objectives of the SWMP in addition to any required Authority approvals.

14.2 Roof Drainage

Building designs must ensure that rainfall run-off from roofing and other areas, not subjected to excessive pollution, can be efficiently captured for re-use for on-site irrigation and non-potable water uses.

Where storage for re-use and ground conditions permit, rainwater run-off should connect to detention areas to maximise groundwater recharge. These detention areas must be designed to attenuate run-off, specifically, the peak flows experienced in the reaches of a watercourse-.

14.3 Parking and Paved Areas

Parking or paved areas should be designed to attenuate stormwater run-off to an acceptable degree by allowing ponding or infiltration. Stormwater from such areas must be discharged and controlled as overland sheet flow or larger attenuation facilities.

14.4 Roads

Roads should be designed and graded to avoid the concentration of flow along and off the road. Regular side drains discharge points along roads for overland flow to continue as sheet flow towards drainage lines per pre-development conditions (Refer **Figure 6.1**). Where flow concentration is unavoidable, measures to incorporate the road into the major stormwater system should be taken, providing appropriately designed attenuation storage facilities at suitable points.

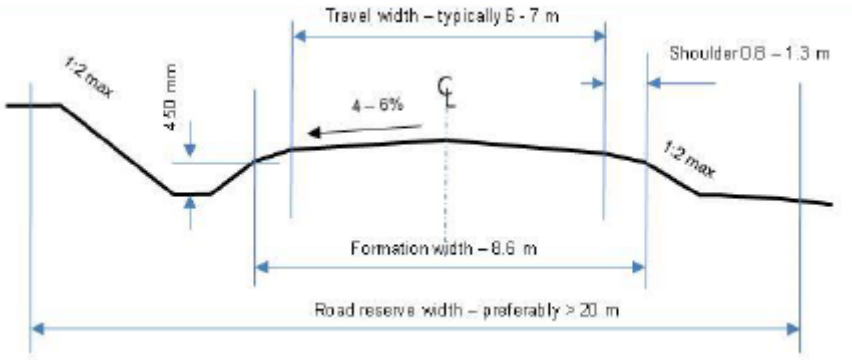


Figure 14:1 Typical Road Cross Section showing side drains

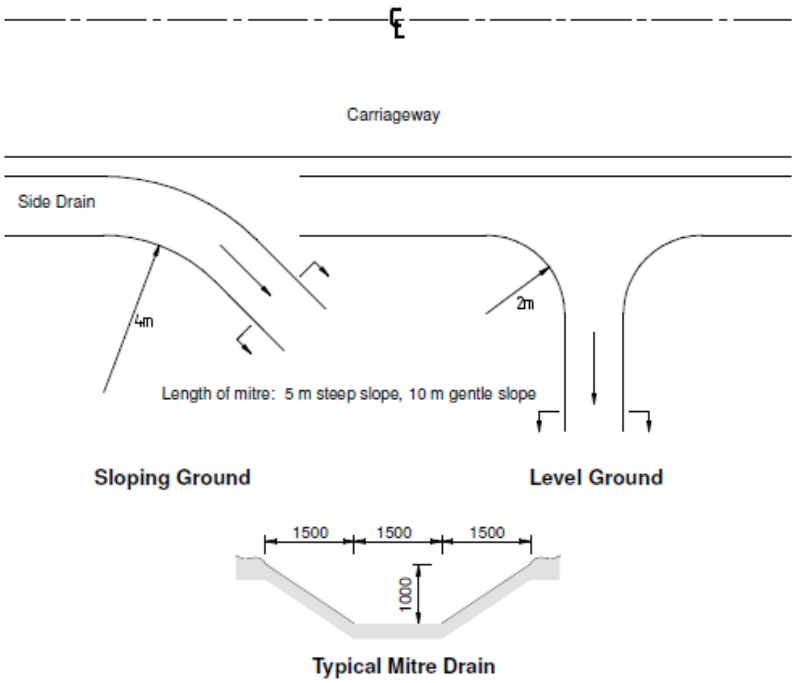


Figure 14:2 Typical Stormwater Mitre Drain / Channel

Gravel roads crossing drainage lines require a suitable sized culvert, concrete causeways or cut-off walls to ensure vehicles can safely pass over natural drainage lines. Culverts for roads must be designed to ensure that the capacity of the culvert does not exceed the pre-development stormwater flow at that point, and attenuation storage should be provided on the upstream side of the road crossing.

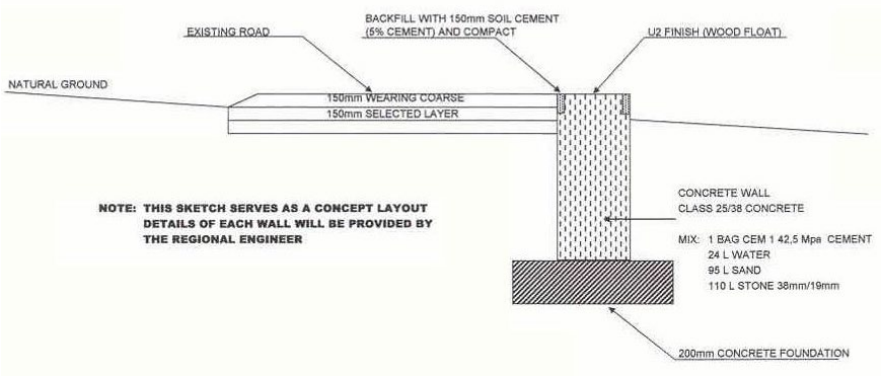


Figure 14:3 Typical Detail of a Cut-Off wall

Figure 14:4 Typical Low-Level Concrete structure

Outlet and culvert discharge points into the natural watercourse must be designed to dissipate flow energy, and any unlined downstream channel must be adequately protected against soil erosion. (Refer **Figure 14.4**)

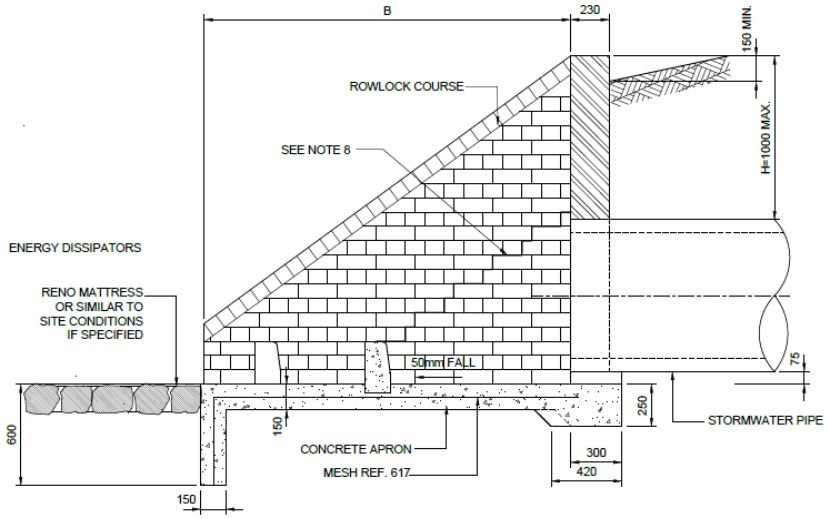


Figure 14:5 Typical Stormwater Headwall with Energy Dissipators

14.5 Subsurface Disposal of Stormwater

Any construction providing for the subsurface disposal of stormwater should be designed to ensure that such disposal does not cause slope instability or areas of concentrated saturation or inundation. Infiltration structures should be integrated into the terrain to be unobtrusive and in keeping with the natural surroundings.

14.6 Channels

Channels may be constructed to convey stormwater directly to a natural watercourse where deemed necessary and unavoidable. The channels must be suitably lined to prevent erosion and scour and provide maximum possible energy dissipation of the flow. Such linings will vary from vegetated earthen to stone pitching or reinforced concrete.

14.7 Energy Dissipation

Measures should be taken to dissipate flow energy wherever concentrated stormwater flow is discharged onto the natural ground.

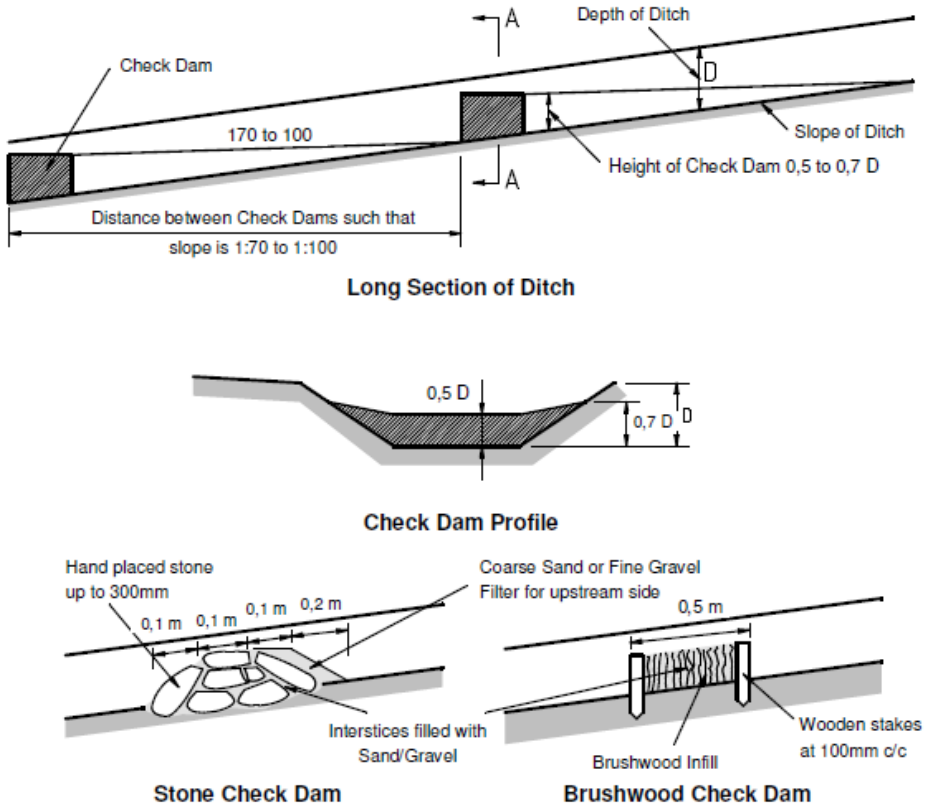


Figure 14:6 Typical Erosion Control

14.8 Open Trenches

Open trenches should not be left open and unprotected for extended periods and should be progressively backfilled as construction proceeds. Excavated material to be used as a backfill must be placed close to the trench on the upstream side to avoid loose material from washing away.

14.9 Stockpiles

Material is to be stockpiled away from drainage paths. Loose material such as stone, sand or gravel must be covered or kept damp to minimise dust. Temporary silt screens are to be positioned immediately downstream of stockpiles to intercept loose material which may be washed away.

14.10 Stormwater Pollution Control

The stormwater systems should be free from materials that could harm the water systems' fauna, flora, and aquatic life.

Sites which generate "dirty" (Grey or Black) water must have measures in place that separates the clean and "dirty" water. Depending on the nature of the "dirty" water, the water must either be discharged into the wastewater system or contained on-site for off-site treatment.

15 STORMWATER MANAGEMENT POLICY

The following rules are to be observed by the owner, developer, professional team, contractors, and sub-contractors:

- The Environmental Management Program (EMPr), as per the EIA and approved by the competent authority, will manage stormwater run-off during construction. All construction activities within the development must comply with the EMPr. This SWMP document is supplementary to the EMPr. The control measures herein are not considered all-encompassing as the contractor will have to adapt site-specific control measures.
- Before the commencement of any construction activities, the contractor must compile and submit his construction SWMP, which needs to comply with the approved EMPr. The plan must include measures to control and prevent erosion during and after construction.
- Existing flood lines / wetlands / stormwater attenuation areas should be protected from encroachment by the development.
- Development designs must include measures for attenuating the increased concentration of stormwater run-off. The post-development peak flows can be attenuated to pre-development conditions if adequate stormwater mitigation measures are not implemented.
- On-site stormwater control systems, such as swales, berms and attenuation ponds, must be constructed before any other construction commences. These systems are to be monitored and appropriately adjusted as construction progresses to ensure complete stormwater, erosion and pollution control.
- All formed embankments must be adequately stabilised.
- An approved landscaping and re-vegetation plan must be implemented immediately after building works have reached a stage where newly established ground cover is not at risk from the construction works.
- The contractor must show that all the provisions, regulations and guidelines in this document have been considered.
- In the event of a failure to adequately implement the approved SWMP, the contractor shall be responsible for all consequential damage at his own cost. The developer is therefore advised to ensure that all members of the professional team and contractors are competent to undertake the development work and are adequately insured.
- Appropriate designed attenuation / detention facilities will be located at appropriately selected sites based on geotechnical, environmental and topographical conditions, including wetland conservation.
- Where conditions permit, open ditches, drains and channels will be used instead of pipes. On steeper slopes, where high flow velocities are anticipated, appropriate linings for all channels must be provided to withstand erosion. Such linings will vary from vegetated earthen to stone pitching and reinforced concrete.
- Flow velocities must be reduced wherever possible to reduce the erosion potential in channels and points of flow concentration (typically at outlets).
- Silt, trash and oil traps must be strategically provided to ensure water quality is not compromised and to prevent blockages in the drainage systems.
- Areas within the proposed development that are bound on stormwater attenuation areas, near road crossings, watercourse confluences and water features might be subject to flooding. In these situations, all development should take place above the outfall levels with an appropriate freeboard allowance.
- Potential future development in these sub-catchments should be considered and any stormwater attenuation requirements should be identified for areas flowing into the development area. Likewise, consideration must be given to the stormwater flowing out of the development, which may impact the downstream areas and watercourses. Appropriate measures must be taken to ensure any upstream development does not result in an increased flood damage risk downstream; and

- All-natural and unlined channels should be inspected for adequate binding of soil by sustainable ground cover. Stone pitching should be used to reinforce channel inverts on steep slopes.

16 CONCLUSION & IMPACT STATEMENT

- In conclusion;
    - The Surface Modelling (**Section 13**) reveals that the proposed development / infrastructure will have a minimal impact on the stormwater quality and quantities of post-development stormwater flow (operational phase).
    - The highest impact will, in all likelihood, occur during the construction phase, and these impacts must be strictly managed under the advisement of the guidelines set out in this document.
    - The need for formal stormwater interventions can be minimised if the development is designed to maintain the existing drainage patterns. Overland flow via poorly-defined drainage paths will be the primary form of conveyance.
    - The Civil Engineers must prepare a detailed stormwater management plan for construction purposes describing and illustrating the proposed stormwater and erosion control measures during the detailed design phase.
    - A comprehensive geotechnical study is completed before the detailed design stage of this development.
    - The guidelines described in **Section 14 – STORMWATER MANAGEMENT & GUIDELINES** should be incorporated into the detailed design of the development.
    - The policy described in **Section 15 – STORMWATER MANAGEMENT POLICY** be implemented.
- Impact Statement;
    - Concerning this report, associated assessment and the findings made within, it is SiVEST's opinion that the Pofadder WEF 3 and associated grid infrastructure will have a nominal impact on the existing stormwater catchment. The project is therefore deemed acceptable from a stormwater perspective, provided the recommendations and mitigation measures in this report are implemented. Hence, Environmental Authorisation (EA) should be granted for the EIA application.
    - This document should also be read in conjunction with the EMPr. The developer, owner, and professional team shall ensure that the requirements and conditions set out in the EMPr are adhered to.

17 REFERENCES

Climate Data for Cities Worldwide (Pofadder) - ***www.en.climate-data.org***

Council for Scientific and Industrial Research (CSIR) - *Guidelines for Human Settlement Planning and Design compiled by CSIR Building and Construction Technology (2003)*

Lauren M. Cook and Richard H. McCuen – *Hydrologic Response of Solar Farms (May 2013)*

MJ Gorven, JC Smithers and RE Schulze - *Design Rainfall Estimation in South Africa (Version 3)*

South African National Botanical Institute – *National Vegetation Map 2012*

South African National Roads Agency – *Drainage Manual 6th Edition (2013)*

Bramford, Prof M – *Paleontology. Pofadder WEFs 1,2,3. Pofadder Wind Facility 3 (Pty) Ltd (2022)*

Weather Atlas (Pofadder) – *www.weather-atlas.com*

Western Cape Provincial Administration – *Gravel Roads Manual Rev 0*

APPENDIX A: SPECIALIST CURRICULUM VITAE

M 03/2022

CURRICULUM VITAE

Merchandt Le Maitre

Name	Merchandt Le Maitre
Profession	Civil Engineer
Name of Firm	SiVEST SA (Pty) Ltd
Present Appointment	Divisional Manager: Civil Engineering Division
Years with Firm	17 Years
Date of Birth	25 September 1982, Johannesburg, South Africa
ID Number	820925 5037 086
Nationality	South African

Education

- University of Johannesburg (2006)
- University of South Africa (2016)

Professional Qualifications

- N Dip: Civil Engineering
- B Tech: Civil Engineering (Water)
- Pr.Tech.Eng. (Reg. No. 2018300094)

Membership in Professional Societies

- Engineering Council of South Africa (ECSA) – Pr Tech Eng; (Reg N° 2018300094)
- South African Institute of Civil Engineers (SAICE)
- South African Wind Energy Associations (SAWEA)

Employment Record

Nov 2020 – present	SiVEST SA (PTY) LTD: Divisional Manager
May 2004 – Oct 2020	SiVEST SA (PTY) LTD: Senior Civil Engineering Technician
Jan 2004 – April 2004	Con Roux Zambia - Junior Foreman
Dec 2002 – Dec 2003	Neda Engineering - Vacation Work

Language Proficiency

LANGUAGE	SPEAK	READ	WRITE
English	Fluent	Fluent	Fluent
Afrikaans	Fluent	Fluent	Fluent

Years of Working Experience: 17

M 03/2022

CURRICULUM VITAE

Merchandt Le Maitre

Countries of Work Experience

- South Africa
- Swaziland
- Zambia
- Kenya
- Namibia

Fields of Expertise

- Bulk Services Studies
- Feasibility Studies
- Service Reports
- Infrastructure Design
- Contract Documentation & Procurement
- Contract Administration
- Procurement and Construction Monitoring

Overview

Merchandt joined SiVEST as a student Civil Engineering Technician in 2004 to which he received a company bursary to complete his studies and join the company permanently thereafter. Since joining permanently he has been actively involved in numerous township projects and associated infrastructure projects.

A summary of the experience in each field is indicated below:

Roads & Stormwater
Design, Implement & Contract Administration:
- Provincial Road Intersections (Class 2 Roads)
- Municipal Roads (Class 3-5 Roads)
- Residential & Industrial Township services
- Bulk Stormwater Infrastructure

Hydrology
- Attenuation Reports
- Flood Inundation Assessments / Floodline Reports
- Stormwater Management Reports
- Stormwater Assessments / Investigations
- Roof Gutter & Down Pipe Design / Assessments / Reports

Water & Sanitation
Design, Implement & Contract Administration:
- Water supply lines including Bulk Water
- Water pump stations
- Sanitation networks including Outfall Sewers
- Sewer pump stations
- Farm Irrigation Network

Renewable Energy
- Transportation Impact Assessments
- Water Demand Assessments
- Glint & Glare Assessments
- Stormwater Management Reports

- Preliminary Engineering Reports & Designs

Projects Experience (by Sector)

TOWNSHIP SERVICES

- Tijger Valley Extension 10, 20, 21, 22, 23, 27, 38-44, 72, 105-113, 19, 62, 103, 104, 34, 35, 36, 123 etc. - Design, Procurement, Contract Administration and Monitoring.
- Derdepoort Extension 181- Design, Procurement, Contract Administration and Monitoring.
- Project Springbok, Sasolburg - Design, Procurement, Contract Administration and Monitoring.
- Arcadia Extension 11 - Design, Procurement, Contract Administration and Monitoring.
- Lakeside Erf 181- Design, Procurement, Contract Administration and Monitoring.
- Longmeadow Extension 10, 11 & 12 - Design, Procurement, Contract Administration and Monitoring.
- Bushwillow Estate - Design, Procurement, Contract Administration and Monitoring.
- Forum Homini – Draughting Monitoring of Dam Spillway construction & sewer reticulation.
- Longmeadow Extension 7, 8, 9, 10, 11, 12 – Township services and design of earth retaining wall.
- Lakeside Erf 181 – Design and supervision of Township Services including Attenuation facilities.
- Mbabane Kingdom Hall – Bulk earthworks and road Design, Procurement, Contract Administration and Monitoring.
- Kungwini Bulk Water – Draughting and supervision of a Steel Bulk Water Supply Pipe.
- Mooikloof Booster Station – Design and supervision of a water booster pump facility..
- PTN 2 of 148 Athol – Compiling and analysis Stormwater Assessment.
- Mooibosch Development – Compiling of Services reports and Floodline Determination.
- Hazeldean Extension 39 – Design and supervision of Township Services.
- Hazeldean Retirement – Design of Township Services.
- Kungwini Collector Sewer – Design of Collector Sewer.
- Maroeladal Extension 9 – Design and compilation of Services Report.
- Hazeldean Oukraal – Design of Township Services
- Hazeldean Business Park – Design and compilation of Services Reports.
- Erf 181 Derdepoort – Design and compilation of Services Reports and preliminary design of Provincial Intersection.
- Erf 92 Edenburg – Floodline Determination and design and compilation of the Services reports.
- Longmeadow Extension 12 Stormwater – Design of Stormwater Reticulation.
- Astral Foods - Design, Procurement, Contract Administration and Monitoring of civil services.
- Eastgate Solar Roof – Glint & Glare Assessment
- Cotton Gin Mpumalanga – Design & Procure all services

ROADS & INTERSECTION DESIGN

- D631 Intersection – Design, Wayleave Approval, Procurement, Contract Administration and Monitoring.
- D36 Intersection & Road Widening - Design, Wayleave Approval, Procurement.
- K34 Intersection – Design, Wayleave Approval, Procurement, Contract Administration and Monitoring.
- K101 Intersection – Design, Wayleave Approval.
- Justice Mahomed, University, Walton Jameson Rd Intersection – Design, Wayleave Approval.
- Cedar Road West – Design, Wayleave Approval, Procurement, Contract Administration and Monitoring.
- Brikor – Design of New Intersection.
- New Zealand Embassy – Design of Intersection.
- East Point Game - Design, Wayleave Approval, Procurement, Contract Administration and Monitoring.

HYDROLOGY AND STORMWATER

- Hazeldean Floodline - Data collection, Flood determination and compilation.

- Gautrain Railway Stormwater Management – Design and compile stormwater management and attenuation facilities.
- Stormwater Modelling for Project Springbok – Attenuation of hazardous material in stormwater system.
- Sappi Ngodwana Floodline – Data collection, Flood determination and compilation. This floodline included cognisance of the Ngodwana dam.
- Irene Mall Stormwater Management - Accommodation of the Post Development stormwater flow through an existing township / suburb.
- Loftus Park Stormwater Management – Accommodation of the Post Development stormwater flow through an existing township / suburb.
- Pienaars River Floodline Modelling – Modelling of the river through two future Class 1 & 3 road bridge structures.
- Renewable Energy Stormwater Management – A number of Management Plans for the Renewable Energy sector has been completed.
- Longmeadow Extension 10 (Pick & Pay) – Design and compilation of Stormwater Management report.
- Erf 4173 Peter Place – Floodline Determination.
- Irene Mall Township – Design of Township Services and Stormwater Management.
- Mitsubishi McCarthy Midrand – Design and compilation of Stormwater Management report.
- Isago @ N12 – Floodline Determination.
- Innoland – Floodline Determination.
- Lot 204 Edenburg – Floodline Determination
- Erf 90 Douglasdale – Floodline Determination.
- PTN 35 Houtkoppen – Floodline Determination.
- Erf 4173 Peter Place – Floodline Determination.
- Hyde Close Floodline – Floodline Determination.
- Chartwell Floodline – Floodline Determination
- Hyundai East Rand – Roof Gutter & Down Pipe design
- Oilifants River – Floodline Determination

WATER TRANSFER / RETICULATION AND SANITATION COLLECTORS / OUTFALLS

- Bojanala Platinum District Municipality – Water & Sanitation Bulk Master Planning.
- Hazeldean Development – Bulk Water Supply & Collector Sewer Design, Procurement, Contract Administration and Monitoring.
- Mamba Kingdom – Bulk Water Analysis.
- Lesedi Local Municipality Bulk Water - Design, Wayleave Approval, Procurement, Contract Administration and Monitoring.
- NEF Tomato Paste Project – Design of Farm Irrigation Network

RENEWABLE ENERGY

- Dyansons Klip 5 – Stormwater Management Report
- De Aar Solar – Stormwater Management Report
- Droogfontein Solar – Stormwater Management Report
- Mierdam Solar – Stormwater Management Report
- Prieska– Stormwater Management Report
- Hoekplaas – Stormwater Management Report
- Noupoort WEF – Stormwater Management Report
- Copperton PV – Stormwater Management Report
- Klipgats PV – Stormwater Management Report
- Tooverberg Wind Energy Facility – Transportation Impact Assessment & Water Demand Assessment
- Umsobomvu Solar Energy - Transportation Impact Assessment
- Prieska Solar Energy - Transportation Impact Assessment Amendment
- Droogfontein Solar Energy - Transportation Impact Assessment Amendment

- Loeriesfontein Solar Energy - Transportation Impact Assessment Amendment
- Koeris WEF - Transportation Impact Assessment Amendment
- East Gate Shopping Centre - Glint & Glare Assessment
- Oya Energy - Glint & Glare Assessment
- Yemaya – Glint & Glare Assessment
- Beaufort West WEF – Preliminary Engineering Design
- Heuweltjies WEF – Transportation Study
- Kraaltjies WEF – Transportation Study
- Koup 1 & 2 – Transportation Study
- Grootegeluk Solar Project – Transportation Study
- Renewstable Swakopmund – Glint & Glare Assessment
- Several projects are Confidential as they are not yet in the public domain and hence have not been included in the list above.

OTHER

- Project Springbok – Design of Services and Railway Siding.
- Phalaborwa Mining Company – Preliminary Design of Bulk Water feed and Railway Line.
- Kansanshi Copper Mine, Zambia – Junior Site Foreman.
- Final QC for Sasol Secunda.
- NDT testing – MMC Nelspruit, Global Forest Products Sabie.
- Boiler inspections and preliminary design – MMC Nelspruit, Global Forest Products, TSB Malelane.

Computer Skills

- AutoCAD Civil 3D
- AutoCAD Storm and Sanitary Analysis
- Microsoft Office
- Microsoft Project
- TechnoCAD
    - Surfmate
    - Roadmate
    - Pipemate
    - Watermate
- AutoTURN (Vehicle Turning Simulation Software)
- RiverCAD
- HecRAS
    - 1D Flood Modelling
    - 2D Flood Modelling

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Appendix E:

Avifaunal Operational Monitoring Plan

APPENDIX 8: OPERATIONAL MONITORING PLAN – WEF

1 INTRODUCTION

The avifaunal post-construction monitoring at the proposed WEF must be conducted in accordance with the latest version (2015) of the *Best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa* (Jenkins *et al*. 2015)[6].

2 AIM OF POST-CONSTRUCTION MONITORING

The avifaunal post construction monitoring aims to assess the impact of the WEF by comparing pre- and post-construction monitoring data and to measure the extent of bird fatalities caused by the WEF. Post-construction monitoring is therefore necessary to:

- Confirm as far as possible what the actual impacts of the WEF are on avifauna; and
- Determine what mitigation is required if need be (adaptive management).

The proposed post-construction monitoring can be divided into three categories:

- Habitat classification
- Quantifying bird numbers and movements (replicating baseline pre-construction monitoring)
- Quantifying bird mortalities.

Post-construction monitoring will aim to answer the following questions:

- How has the habitat available to birds in and around the WEF changed?
- How has the number of birds and species composition changed?
- How have the movements of priority species changed?
- How has the WEF affected priority species' breeding success?
- How many birds collide with the turbines? And are there any patterns to this?
- What mitigation is necessary to reduce the impacts on avifauna?

3 TIMING

Post-construction monitoring should commence as soon as possible after the first turbines become operational to ensure that the immediate effects of the facility on resident and passing birds are recorded,

[6] Jenkins, A.R., Van Rooyen, C.S., Smallie, J.J., Anderson, M.D., & A.H. Smit. 2015. Best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa. Produced by the Wildlife & Energy Programme of the Endangered Wildlife Trust & BirdLife South Africa.

before they have time to adjust or habituate to the development. However, it should be borne in mind that it is also important to obtain an understanding of the impacts of the facility as they would be over the lifespan of the facility. Over time the habitat within the WEF may change, birds may become habituated to, or learn to avoid the facility. It is therefore necessary to monitor over a longer period than just an initial one year.

4 DURATION

Monitoring should take place in Year 1 and 2 of the operational phase, and then repeated in Year 5 and every five years after that. After the first year of monitoring, the programme should be reviewed in order to incorporate significant findings that have emerged. This may entail the revision of the number of turbines to be searched, and the size of the search plots, depending on the outcome of the first year of monitoring. If significant impacts are observed, i.e. exceeding predetermined thresholds, and mitigation is required, the matter should be taken up with the operator to discuss potential mitigation. In such instances the scope of monitoring could be reduced to focus only on the impacts of concern.

5 HABITAT CLASSIFICATION

Any observed changes in bird numbers and movements at a WEF may be linked to changes in the available habitat. The avian habitats available must be mapped at least once a year (at the same time every year), using the same methods which were used during pre-construction.

6 BIRD NUMBERS AND MOVEMENTS

In order to determine if there are any impacts relating to displacement and/or disturbance, all methods used to estimate bird numbers and movements during baseline monitoring must be applied as far as is practically possible in the same way to post-construction work in order to ensure maximum comparability of these two data sets. This includes sample counts of small terrestrial species, counts of large terrestrial species and raptors, focal site surveys and vantage point surveys according to the current best practice.

7 COLLISIONS

The collision monitoring must have three components:

- Experimental assessment of search efficiency and scavenging rates of bird carcasses on the site.
- Weekly searches in the immediate vicinity of the wind farm turbines for collision casualties.
- Estimation of collision rates.

8 SEARCHER EFFICIENCY AND SCAVENGER REMOVAL

The value of surveying the area for collision victims is only valid if some measure of the accuracy of the survey method is developed. The probability of a carcass being detected and the rate of removal/decay of the carcass

must be accounted for when estimating collision rates and when designing the monitoring protocol. This must be done in the form of searcher and scavenger trails at least twice a year.

9 COLLISION VICTIM SURVEYS

9.1 Aligning search protocols

The search protocol must be agreed upon between the bat and bird specialists to constitute an acceptable compromise between the current best practice guidelines for bird and bat monitoring.

Searches must begin as early in the mornings as possible to reduce carcass removal by scavengers. A carcass searcher must walk in straight line transects, 6 m apart, covering 3 m on each side. A team of searchers and one supervisor must be trained to implement the carcass searches. The searchers must have a vehicle available for transport per site. The supervisor must assist with the collation of the data at each site and to provide the data to the specialist in electronic format on a weekly basis. The specialists must ensure that the supervisor is completely familiar with all the procedures concerning the management of the data. The following must be loaded on a cloud server on a weekly basis for the avifaunal specialist to access:

- Carcass fatality data (hardcopy and scans as well as data entered into Excel spreadsheets);
- Pictures of any carcasses, properly labelled
- GPS tracks of the search plots walked; and
- Turbine search interval spreadsheets.

When a carcass is found, it must be bagged, labelled and kept refrigerated for species confirmation when the specialist visits the site.

9.2 Estimation of collision rates

Observed mortality rates need to be adjusted to account for searcher efficiency and scavenger removal. There have been many different formulas proposed to estimate mortality rates. The available methodologies must be investigated, and an appropriate method will be applied. The current method which is used widely is the GenEst method.

10 DELIVERABLES

10.1 Annual report

An operational monitoring report must be completed at the end of each year of operational monitoring. As a minimum, the report must attempt to answer the following questions:

- How has the habitat available to birds in and around the WEF changed?
- How has the number birds and species composition changed?

- How have the movements of priority species changed?
- How has the WEF affected priority species' breeding success?
- What are the likely drivers of any changes observed?
- How many, and which species of birds collided with the turbines and
- associated infrastructure? And are there any patterns to this?
- What is the significance of any impacts observed?
- What mitigation measures are required to reduce the impacts?

10.2 Quarterly reports

Concise quarterly reports must be provided with basic statistics and any issues that need to be addressed.

Appendix F:

Summary of Specialist Findings and Recommendations

POFADDER WEF 3

SUMMARY OF SPECIALIST FINDINGS AND RECOMMENDATIONS

Specialist Study	Findings	Recommendations
Aquatic / Freshwater	According to the guidelines specified within GN509 of 2016 all wetlands within a radius of 500m of the facility footprint were identified and mapped. • A total of 43 freshwater resource features were identified and delineated and include: • One (1) large primary/major ephemeral wash namely the Kaboet River; • Ten (10) smaller ephemeral washes (mainly third order streams); • Twenty-three (23) drainage lines; and • Nine (9) depression wetlands. Overall, with the exception of erosion, dams and present road crossings (most prominent impacts), these freshwater systems are still in a fairly natural, functional condition.	The recommended buffers are in line with the watercourse and wetland buffers that have been recommended in the Strategic Environmental Assessment for Wind and Solar Photovoltaic Energy in South Africa (CSIR, 2015) and are deemed appropriate to the aquatic features and the proposed activities within the project site. • For the Kaboep River and larger ephemeral washes, 100m buffer areas, measured from the outer edge of channel or delineated floodplain is recommended (whichever is the furthest). • For the minor ephemeral washes, 50m buffer areas, measured from the outer edge of channel or delineated floodplain is recommended (whichever is the furthest) • For the depression wetlands, 50m buffer areas, measured from the outer edge of delineated wetland is recommended. • For the small drainage channels, 32m buffer areas, measured from the outer edge of channel is recommended. With mitigation measures in place, impacts on the freshwater resource features' integrity and functioning can be potentially reduced to sufficiently low levels. This would be best achieved by incorporating the recommended management & mitigation measures into an Environmental Management Programme (EMPr) for the site, together with appropriate rehabilitation guidelines and ecological monitoring recommendations. Based on the outcomes of this study it is my considered opinion that the proposed project detailed in this report could be authorised from a freshwater resource perspective.
Terrestrial Ecology	Due to the vast extent of intact, natural vegetation still present within both mentioned vegetation types and the fact that only a very small extent of these vegetation types will be impacted within the project site along with the fact that the development footprint itself will be much smaller, it is highly unlikely that this development will have an	With mitigation measures in place, impacts on terrestrial ecological resource integrity and functioning can be potentially reduced to a sufficiently low level. This would be best achieved by incorporating the recommended management & mitigation measures into an Environmental

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	impact on the status and conservation targets set out for these vegetation types. Due to the high importance of the primary ephemeral wash, this feature is regarded as Very High Sensitive. This feature will however be avoided by the proposed development, and direct impacts on this feature is highly unlikely. Based on the ecology and behaviour of the potential Mammal SCC that may occur within the region, as well as the general design and layout of the WEF (avoiding sandy alluvial washes and floodplains as well steep slopes and tall ridges) it is highly unlikely that this development will threaten local individual and populations of Mammal SCC.	Management Programme (EMPr) for the site, together with appropriate rehabilitation guidelines and ecological monitoring recommendations. Based on the outcomes of this study it is my considered opinion that the proposed project detailed in this report could be authorised from a terrestrial ecological perspective.
Agricultural	The site has very low agricultural potential predominantly because of climate constraints, but also because of soil constraints. As a result of the constraints, the site is unsuitable for crop production, and agricultural production is limited to low capacity grazing. The land impacted by the development footprint is verified in this assessment as being of low agricultural sensitivity.	The recommended mitigation measures are implementation of an effective system of storm water run-off control; maintenance of vegetation cover; and stripping, stockpiling and re-spreading of topsoil.
Avifauna	The proposed Pofadder WEF 3 will have several potential impacts on priority avifauna. These impacts are the following: • Displacement of priority species due to disturbance linked to construction activities in the construction phase - The impact is rated as medium but could be mitigated to low levels. • Displacement due to habitat transformation in the construction phase - The impact is rated as low both pre- and post-mitigation. • Collision mortality caused by the wind turbines in the operational phase - The impact is rated as medium pre-mitigation and low post-mitigation. • Electrocution on the 33kV MV overhead lines (if any) in the operational phase - The impact is rated as medium pre-mitigation and low post-mitigation.	<u>Very High Sensitivity Zones</u> The construction of all infrastructure in these zones should be avoided completely: • 500m buffer zone around water troughs to prevent the displacement of Sclater's Larks due to disturbance and habitat transformation, and to reduce the risk of turbine collisions for priority species using the water troughs for drinking and bathing. Alternatively, water troughs could be relocated to maintain a minimum distance of 500m from the closest turbine. • All identified breeding areas for Sclater's Lark. <u>High Sensitivity Zones</u> The construction of turbines in these zones should be avoided to eliminate the risk of turbine collisions. Other infrastructure is permitted:

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	• Collisions with the 33kV MV overhead lines (if any) in the operational phase - The impact is rated as medium pre-mitigation and low post-mitigation. • Displacement of priority species due to disturbance linked to dismantling activities in the decommissioning phase.	• 2.8km turbine exclusion zone around the vulture roost on the Aries – Aggeneys 400kV powerline. <u>Medium Sensitivity Zones</u> The construction of turbines in these zones should be restricted to a minimum to reduce the risk of turbine collisions. If restriction is not possible, additional mitigation measures will be required, e.g., increasing cut in speeds or shutdown on demand: • Highly suitable Red Lark habitat: Placement of turbines in highly suitable Red Lark habitat to be avoided where possible. If avoidance is not possible, turbine cut in-speeds should be increased to 3m/s (measured at ground level) during daylight hours when a rainfall event of 10mm or higher is recorded at the site, for turbines located in areas of highly suitable Red Lark habitat, as determined by the avifaunal specialist. The increased cut-in speeds to be maintained for a period of six weeks after the rainfall event. • The whole of the project site beyond the 2.8km High sensitivity zone is medium sensitivity, primarily due to the potential presence of White-backed Vultures and Lappet-faced Vultures during certain times of the year, but also due to the potential occurrence of other collision prone Red List species, namely Martial Eagle, Verreaux's Eagle, and Lanner Falcon. It is therefore recommended that shutdown on demand (SDoD) is implemented on all turbines for the above species, coupled with a carcass removal programme, to limit the risk of collisions with the turbines. SDoD has been successfully implemented at a wind farm in the Western Cape and has now been operative for a period of 21 months without any vulture mortalities recorded, despite high passage rates of vultures through the site. The reasons for the influx of the birds in vicinity of the Pofadder sites are not known, but it may be both seasonal and short term, as is the case with other recorded powerline roosts of White-backed Vultures and Lappet-faced Vultures in the Northern Cape where the roosts are seasonal i.e. limited to the period outside the breeding season. It is therefore recommended that the

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		SDoD is implemented for the first two years of the operational phase to assess the dynamics of the situation, whereafter a decision whether to continue will be taken, based on the frequency of shutdown events. This programme must consist of a suitably qualified, trained, dedicated and resourced team of observers present on site for all daylight hours throughout the year. It is absolutely essential that passionate, hardworking staff are hired for this role. This team must be stationed at observation points with full visible coverage of all turbine locations. The observers must detect incoming priority bird species, track their flights, judge when they enter a turbine proximity threshold, and alert the control room to shut down the relevant turbine until the risk has reduced. A full detailed method statement must be designed by an ornithologist prior to the commercial operations date (COD) and must be in place by the time that the wind farm start operating.
Bat	Bat activity was low or medium overall for most of the study period across the site. Only during February and March did bat activity increase to relatively high levels for the Nama Karoo. Thus, bats are at greatest risk to wind energy impacts during specific parts of summer and autumn. However, risk levels vary across a night, by height and meteorological conditions.	Buffers have been placed around key habitat features as per best practice resulting in the identification of several No-Go areas for turbine placement. The turbine layout adheres to the bat constraints as no project infrastructure (except roads) are located in bat buffers. Bat fatality must be monitored for a minimum of two years from commencement of operation and estimated fatality levels compared to the thresholds set for the project. If these thresholds are exceeded, an adaptive management plan for bats must be developed which will outline the use of curtailment and/or acoustic deterrents to reduce fatality to below threshold levels.
Social	It is evident that the cumulative impacts associated with changes to the social environment of the region are more significant than those attached to any one project. The initiative to address these cumulative impacts lies at a far higher level than at an individual project level. In this regard conclusions are drawn to the findings of this assessment conducted for the proposed Pofadder Wind Energy Facility 3 which indicates that during the construction and the operational phase of the proposed	Considering all social impacts associated with the project, it is evident that, at the social level, the positive elements outweigh the negative and that the project carried with it a significant social benefit at a national level and is therefore supported. In addition, no compelling preference emerges in respect of the revised proposed layout and considerable sensitives have been avoided and it would be socially acceptable for the authorisation of Pofadder WEF 3. All negative impacts are low and can be effectively addressed through the mitigation measures provided.

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	development, various employment opportunities, with different levels of skills will be created. In addition this will create local business opportunities benefitting the socio-economic development of the local community of Pofadder.	
Heritage	The main heritage concern for this project is the cultural landscape. No significant archaeological sites are located within the current layout. Impacts to the landscape are unavoidable and mitigation can only deal with impacts at a very localised level. The remaining concern is the introduction of the red flashing lights at night which would cause a considerable change in the night time sense of place with the lights being strongly visible in an otherwise very dark landscape, and potentially over great distances. There are no highly significant concerns for this project and the expected impacts can largely be mitigated. The remaining concerns are likely outweighed by the socio-economic benefits of the project.	It is recommended that the proposed Pofadder WEF 3 be authorised, but subject to the following: • The LSA archaeological sites at waypoints 519 and 520 must be excavated with at least 25-50 m^2 sampled at each; • All unsurveyed parts of the final approved layout must be surveyed for archaeological sites and graves prior to construction to determine whether further mitigation measures are required; and • If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.
Heritage (Palaeontology)	Most of the area is on non-fossiliferous rocks of the Namaqua-Natal Suite. Most of the project area is of zero to insignificant palaeo sensitivity but there are parts that are moderately sensitive. These are on the Mbizane Formation (Dwyka Group, Karoo Supergroup) and the Tertiary calcretes. Fossils are rare and their distribution unpredictable so a Fossil Chance Find Protocol should be followed once excavations for foundations and infrastructure commence.	A Fossil Chance Find Protocol should be followed once excavations for foundations and infrastructure commence. As far as the palaeontology is concerned there are no preferred areas and NO no-go areas because the Significance Rating of the Impact is Negative low. The project should be authorised.
Noise	• There will be a short-term increase in noise in the vicinity of the site during the construction phase. • The area surrounding the construction sites will be affected for short periods of time in all directions, should numerous construction equipment be used simultaneously. • The day time SANS 10103:2008 noise limit of 45 dB(A) will not be exceeded at any of the noise sensitive areas. • The night time outdoor guideline noise rating limit of 35 dB(A) will in all likelihood not be exceeded at any of the noise sensitive areas, except at NSA 38 when the windspeed is above 5m/s.	On site monitoring at the noise sensitive area is recommended. Mitigation measures to be implemented if the noise impact exceeds the 35 dB(A) night noise rating limit, such as running the turbines in low power mode at certain wind speeds at night. It is unlikely that the indoor limit will be exceeded as the residents buildings will attenuate some sound. Due to the potential low noise impacts associated with the construction and operational phases of the proposed project, it is recommended the project receive Environmental Authorisation, from a noise impact perspective.

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	There will most likely be some wind noise masking at this windspeed that will mitigate the effect. • The cumulative impacts will not exceed the day time SANS 10103:2008 noise limit of 45 dB(A). • The cumulative impacts will exceed the night time SANS 10103:2008 noise limit of 35 dB(A) at NSA 38,40,41,43, and 45. There will most likely be some wind noise masking at this windspeed that will mitigate the effect. The construction phase and operational phase will have a low noise impact on the noise sensitive receptors.	
Visual	For the close proximity views as seen by the receptors using the local farm access road, the wind turbines will appear dominating in the landscape due to the strong line, colour and texture contrast generated by the town, hub and moving blades. Some colour and texture contrast would be created by the white flashing Aircraft Warning Lights (AWL) during the day, but strong red colour contrast would be generated by the night-time AWL. With mitigation, the dominating effect of multiple AWL lights taking place repeatedly during the night, can be reduced by placing the lights only on the strategic corners of the total wind farm. For these receptors, the Class III Visual Objective would not be met, without or with mitigation. However, the road is seldom used, and unlikely to see much night-time traffic. While the Visual Objectives would not be met, this is not a Fatal Flaw given the limited usage of the farm road and the remote location. For the approximately three farmstead receptors located in the Mid-Ground/ Background interface, with distance ranging from 7.8 km to 12 km, the Class III Visual Objective would be met with mitigation. At the distance and with arid area atmospheric influences restricting clear view over distance, the Form contrast would not be seen, Line and Texture Contrast would be Moderate to Low, but Colour from the AWL would still be Strong without mitigation. With mitigation, the AWL at night can be reduced to Moderate levels.	• The area is remote, and only four farmstead receptors were located within the project Zone of Visual Influence (ZVI), with Medium to Low Exposure (approximately 8km). • No significant landscape resources were identified within the ZVI, and no tourist related activities are making use of the visual resources of the surrounding landscapes. • As such, Landscape and Visual Impacts can be moderated with mitigation, specifically with regards to the management of night-time AWL. • The nearest other proposed renewable energy project is Namies Suid and Poortjies WEF (authorised, unbuilt), with location approximately 350km east where intervisibility is highly unlikely and cumulative effects rated Low (with mitigation). • While the proposed collective views of the combined 90 turbines will be a dominating landscape feature, the effect is limited to the local landscape context. With the arid environment, the atmospheric influences reduce clear visibility during the day to the Mid-ground distance region. • No Shadow Flicker impact will take place. Mitigations have been provided and should be implemented as part of authorisation, with special attention to the management of AWL. Clear methodology should also be provided on the demolishing of the concrete towers and associated rehabilitation, should concrete towers be utilised.

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	No Shadow Flicker impacts will take place.	
Traffic	The traffic specialist doesn't foresee any major risks concerning the proposed development. The development is located in close proximity to an existing road network. Several new access points are proposed along Road DR2986 to accommodate the adjusted land use and obtain the recommended sight distances of 250 m between the chosen access positions. Approval and a wayleave application will be required from the Northern Cape Department of Public Works & Roads (NCdr&pw) before work commences. The construction phase for this development will typically generate the highest number of additional vehicles. However, it will be temporary, and impacts are considered nominal. Several mitigation measures are proposed to accommodate the development and reduce the impact on the surrounding road network.	Mitigation measures to be included in the construction phase: • Ensure staff transport is done in the 'Off Peak' period and by bus to reduce impact in the peak periods. • Stagger material, component, and abnormal loads deliveries. • Adequate road signage on all external roads carrying development traffic according to the South African Road Traffic Sign Manual (SARTSM). • Reduction in the speed of vehicles. • Adequate enforcement of the law. • Implementation of pedestrian safety initiatives. • Regular maintenance of farm fences & access cattle grids. • Construction of gravel roads in terms of Technical Recommendations for Highways (TRH20). • Implement a road maintenance program under the auspices of the respective transport department; and • Possible use of approved dust suppressant techniques. It is the traffic specialist opinion that the Pofadder WEF 3 will have a nominal impact on the existing traffic network. The project is therefore deemed acceptable from a transportation perspective, provided the recommendations and mitigation measures in this report are implemented. Hence, Environmental Authorisations (EAs) should be granted for the EIA applications.

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