POFADDER WIND FACILITY 1 (PTY) LTD

Proposed Development of the Pofadder Wind Energy Facility (WEF) 1 and Associated Infrastructure near Pofadder in the Northern Cape Province

Final Environmental Impact Assessment Report

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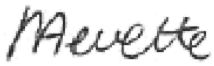
Signature:	
Client:	Pofadder Wind Facility 1 (PTY) LTD

Confidentiality Statement

KEY PROJECT INFORMATION

PROJECT DESCRIPTION

The preferred project site is approximately 3 600 hectares (ha) in extent. It is anticipated that the proposed Pofadder WEF 1 will comprise of up to twenty-eight (28) wind turbines with a maximum total energy generation capacity of up to approximately 224 MW. In summary, the proposed Pofadder WEF 1 development will include the following components:

- Up to 28 wind turbines, each with a maximum of 8 MW output per turbine, with a maximum export capacity of approximately 224 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 200 m;
- 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 4.2 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 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 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).
- The main access road is off the R358 and continues for approximately 14.5 km before reaching the Pofadder 1 WEF. The road then branches off into the internal roads for access to each turbine.
- 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 12 m 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 1 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 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 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;
- 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;
- Water will be sourced from either the Local Municipality, a private contractor, from existing boreholes located within the application site or from a new borehole if none of these options are available. All required permits will be applied for prior to commencement of construction.

Component	Description / Dimensions
Location of site (centre point)	29° 16' 27.84" S 19° 44' 1.91" E
Application site area	3 600 ha
Turbine development area	Turbine Foundation Area = 45m*32m*28 turbines = 4.2 Ha
SG codes	C03600000000020200000 C03600000000015000003 C03600000000020100000
Export capacity	Up to 224 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 1.6 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 ha for blade hardstands and 9 ha for crane hardstands
Width of internal access roads	Approximately 6 – 8 m
Length of internal access roads	Approximately 48 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

Component	Description / Dimensions
Type of fencing (for substation)	Galvanized palisade fencing

COORDINATES

POFFADER 1 WEF: APPLICATION SITE		
COORDINATES AT CENTRE POINT (DD MM SS.sss)		
POINT	**SOUTH**	**EAST**
Center	29°16'27.84"S	19°44'1.91"E

POFFADER 1 WEF: SUBSTATION INFRASTRUCTURE		
COORDINATES AT CENTER POINT (DD MM SS.sss)		
INFRASTRUCTURE	**SOUTH**	**EAST**
Substation	29°16'51.86"S	19°44'43.69"E

POFADDER WIND FACILITY 1 (PTY) LTD

POFADDER WIND ENERGY FACILITY (WEF) 1

FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT

EXECUTIVE SUMMARY

INTRODUCTION AND PROJECT DESCRIPTION

Pofadder Wind Facility 1 (The Applicant) (Pty) Ltd is proposing to develop, construct and operate the Pofadder Wind Energy Facility (WEF) 1 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**: **14/12/16/3/3/2/2150**). 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 224 megawatt (MW).

SiVEST Environmental Division has subsequently been appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the Environmental Impact Assessment (EIA) process for the proposed construction and operation of the Pofadder WEF 1 and associated infrastructure. The proposed development requires an (Environmental Authorisation (EA) from the National Department Forestry, Fisheries and the Environment (DFFE). However, the provincial authority (i.e. the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform) will also be consulted. The EIA for the proposed development will be conducted in terms of the EIA Regulations, 2014 (as amended) promulgated in terms of Chapter 5 of the NEMA. In terms of these regulations, a full EIA process is required for the proposed development. All relevant legislation and guidelines will be consulted during the EIA process and will be complied with at all times.

Two additional WEF's are concurrently being considered on the properties and are assessed by way of separate impact assessment processes contained in the 2014 Environmental Impact Assessment Regulations (GN No. R982, as amended) for listed activities contained Listing Notices 1, 2 and 3 (GN R983, R984 and R985, as amended). These projects are known as Pofadder Wind Energy Facility 2 (**DFFE Reference Number: 14/12/16/3/3/2/2151**) and Pofadder Wind Energy Facility 3 (**DFFE Reference Number: 14/12/16/3/3/2/2152**).

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 BAR (**DFFE Reference Number: To be Allocated**).

The respective WEF's and grid connection infrastructure will require separate Environmental Authorisations (EAs) and are subject to separate Environmental Impact Assessment (EIA) and Basic Assessment (BA) processes respectively. The proposed grid connection infrastructure will be handed

over to Eskom once constructed (Eskom grid connection works). The substations will include an Eskom portion (switching station) and an Independent Power Producer (IPP) portion (facility substation) hence the facility substations will be included in the respective WEF EIAs and the Eskom switching stations in the respective associated grid connection infrastructure BA in order to allow for handover to Eskom.

Although the respective WEF's and associated grid connection infrastructure (switching stations and overhead power lines) will be assessed separately, it is proposed that a single public participation process be undertaken to consider all of the proposed projects [i.e. three (3) WEF EIAs]. The grid connection basic assessment will be circulated for comment separately. The potential environmental impacts associated with all of the proposed developments mentioned above will be assessed as part of the cumulative impact assessment.

APPLICABILITY OF NEMA EIA REGULATIONS, 2014 (AS AMENDED IN 2017)

The following activities are applied for:

Activity No(s):	Relevant Basic Assessment Activities as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended
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.
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; 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.
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;
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.
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: (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; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;
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 (ii) where no reserve exists, where the existing road is wider than 8 metres –

Activity No(s):	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,
15	**GN R. 925 (as amended) Item 15:** The clearance of an area of 20 hectares or more of indigenous vegetation.
Activity No(s):	**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;
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 100m from the edge of a watercourse or wetland.

DETAILS OF ALTERNATIVES CONSIDERED

Nature of Alternatives Considered	Description of the Alternatives relating to the Pofadder WEF 1
Site-specific and Layout Alternatives	One preferred project site has been identified for the development of the Pofadder WEF 1 due to site specific characteristics such as the wind resource, land availability, topographical considerations, and environmental features. The project site is 3 600 ha in extent which is considered to be sufficient for the development of a wind farm with a contracted capacity of up to 224 MW
Activity Alternatives	Only the development of a renewable energy facility is considered by Pofadder Wind Facility 1 (Pty) Ltd. Due to the location of the project site and the suitability of the wind resource, only the development of a wind farm is considered feasible considering the natural resources available to the area and the current land-use activities undertaken within the project site (i.e. grazing activities and sheep/goat farming).
Technology Alternatives	Only the development of a wind farm is considered due to the characteristics of the site, including the natural resources available
No-Go Alternative	The option to not construct the Pofadder WEF 1. No impacts (positive or negative) are expected to occur on the social and environmental sensitive features or aspects located within or within the surrounding areas of the project site. The opportunities associated with the development of the wind farm for the Pofadder area will not be made available

PUBLIC PARTICIPATION PROCESS TO BE UNDERTAKEN FOR THE EIA PHASE

The following was undertaken during the EIA Phase (as per the approved Final Scoping and Plan of Study):

- The I&AP database was updated as and when necessary during the execution of the EIA.
- The DEIAR underwent a 30-day comment and review period that ran from the 12th of August until the 12th of September 2022.
- All parties on the IA&P database were notified via email or sms of the opportunity to review the Draft EIA Report, the review period and the process for submitting comments on the report (proof included in Appendix 5).
- The availability of the draft report for review and comment was advertised on Die Gemsbok newspaper on the 12th of August 2022.
- Reminder notifications of the closing of the DEIR comment period were sent out on the 29th of August 2022, the 5th of September 2022, and the 12th of September 2022 to ensure that comments and/or concerns were received from the OoS and/or registered I&APs.
- All comments received from I&APs and the responses thereto have been included in the final EIA Report submitted to DFFE.
- A copy of the Draft EIA Report was made available at the Khai-Ma Local Municipality, Nuwe Street 21, Pofadder, 88900.
- A Comments and Response Report has been updated and included in the Final EIA Report, which records the date that issues were raised, a summary of each issue, and the response of the team to address the issue. The Final EIA report with all comments included has been submitted to DFFE for review and approval.
- All I&APs will be notified via email or sms after having received written notice from DFFE on the final decision on the application. These notifications will include the process required to lodge an appeal, as well as the prescribed timeframes in which documentation should be submitted.

POSITIVE AND NEGATIVE IMPACTS ASSOCIATED WITH THE PROPOSED POFADDER WEF 1

Impact	Pre-mitigation	Post-mitigation
PLANNING		
None identified		
CONSTRUCTION		
Impacts to Biophysical Systems		
Aquatic / Freshwater		
Direct physical destruction or disturbance of aquatic habitat caused by vegetation clearing, disturbance of riparian habitat, encroachment/colonisation of habitat by invasive alien plants and alteration of river geomorphological profiles (including stream beds and banks).	High	Low
Alteration in the physical characteristics of freshwater resource features as a result of increased turbidity and sediment deposition - Caused by soil erosion and earthworks that are associated with construction activities.	Medium	Low
During preconstruction and construction, chemical pollutants (hydrocarbons from equipment and vehicles, cleaning fluids, cement powder, wet concrete, shutter-oil,	Medium	Low

Impact	Pre-mitigation	Post-mitigation
etc.) associated with site-clearing machinery, construction and maintenance activities could be washed downslope via the ephemeral systems.		
Terrestrial Ecology		
Vegetation clearing for access roads, turbines and their service areas and other infrastructure will impact on vegetation and protected plant species. Impacts on vegetation and protected plant species would occur due to the construction of the facility and associated infrastructure.	Medium	Low
Increased levels of noise, pollution, disturbance and human presence during construction will be detrimental to fauna. Sensitive and shy fauna would move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed. Some impact on fauna is highly likely to occur during construction.	Medium	Low
Agricultural – compliance statement – none identified		
Avifaunal		
Displacement due to disturbance associated with the construction of the wind turbines and associated infrastructure.	Medium	Low
Displacement due to habitat transformation associated with the construction of the wind turbines and associated infrastructure.	Low	Low
Bat		
Vegetation clearing for access roads, turbines and their service areas and other infrastructure, as well as noise and dust generated during the construction phase, will indirectly impact bats by removing habitat used for foraging/commuting and through disturbance.	Low	Low
Construction of WEF infrastructure could result in destruction (direct impact) of bat roosts (trees, rock crevices) and disturbance (indirect impact) of bat roosts (trees, building, rock crevices) potentially resulting in roost abandonment. Bats may also roost in project infrastructure (e.g., buildings, turbines, road culverts) potentially attracting them to risky locations.	Low	Low
Impacts to Socio-Economic Component		
Social		
Noise	Low	Low
Increase in crime	Low	Low
Increase risk of HV infections	High	Medium
An influx of construction workers	Low	Low
Hazard exposure	Low	Low
Quality of the living environment - Disruption of daily living patterns	Low	Low
Quality of the living environment - Disruption to social and community infrastructure	Low	Low
Economic - Job creation and skills development	Medium	Medium
Economic - Socio-economic stimulation	Medium	Medium
Heritage		
Archaeological Resources - Grubbing and excavations for roads, turbines and other infrastructure will impact on archaeological sites and artefacts	Low	Low
Graves - Grubbing and excavations for roads, turbines and other infrastructure may directly impact on graves	High	Medium
Cultural landscape and structures - Introduction of construction equipment and turbines directly alters landscape quality, sense of place and context of structures	Low	Low
Heritage (Palaeontology)		

Impact	Pre-mitigation	Post-mitigation
If fossils of scientific value (rare, complete, index fossils) are present they might be destroyed when excavations for foundations commence	Low	Low
Noise		
Noise pollution due to construction activities (equipment and vehicle noise)	Low	Low
Visual		
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.	Low	Low
Topsoil loss can reduce the viability of rehabilitation measures and needs to be carefully managed if available.	Low	Low
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.	Medium	Low
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.	Low	Low
Litter has the potential to degrade landscape character and can be contained by fencing around the construction camp/ laydown.	Low	Low
Long fencing lines has the potential to be visually dominating, degarding the rural landscape sense of place.	Medium	Low
Soil erosion can result in visual scarring on prominent areas.	Low	Low
Cut and Fill areas can generate visual scarring in the landscape beyond the locality.	Medium	Low
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.	Low	Low
Un-necessary roads have the potential to create a visual disturbance long after the usage as past.	Low	Low
Traffic		
Increase in traffic	Medium	Low
Increase of Incidents with pedestrians and livestock	Medium	Low
Increase in dust from gravel roads	Low	Low
Increase in Road Maintenance	Low	Low
Additional Abnormal Loads	Low	Low
Increase in dust from gravel roads	Low	Low
New / Larger Access points	Low	Low
OPERATIONAL		
Impacts to Biophysical Systems		
Aquatic / Freshwater		
Alteration to the hydrological character of the freshwater resource features	Medium	Low
Alteration in the physical characteristics of freshwater resource features as a result of increased turbidity and sediment deposition	Medium	Low
Terrestrial Ecology		
Ecosystem integrity and the delivery of ecosystem services such as grazing and clean water.	Medium	Low
Biodiversity, ecosystem integrity and the delivery of ecosystem services such as forage - Increased alien plant invasion is one of the greatest risk factors associated with this development following the construction phase	Medium	Low
Agricultural - compliance statement – none identified		
Avifaunal		
Mortality of priority species due to collisions with the wind turbines.	Medium	Low

Impact	Pre-mitigation	Post-mitigation
Mortality of priority species due to electrocutions on the overhead sections of the internal 33kV cables.	Medium	Low
Mortality due to collisions with the overhead sections of the internal 33kV cables.	Medium	Low
Bat		
Bat mortality (direct impact) through collisions and/or barotrauma with wind turbine blades.	Medium	Low
The installation of lighting in the landscape at project infrastructure can attract insects and in turn foraging bats, bringing them into the vicinity of wind turbines. Insects can also die at lighting infrastructure, removing bat prey resources.	Low	Low
Impacts to Socio-Economic Component		
Social		
Noise	Low	Low
Increase in crime	Low	Low
Increased risk of HIV infections	High	Medium
Influx of construction workers	Low	Low
Quality of living environment – Transformation of sense of place	Medium	Low
Economic - Job creation and skills development	Medium	Medium
Economic - Socio-economic stimulation	Medium	Medium
Heritage		
Existence of the WEF in a rural/natural landscape directly alters landscape quality, sense of place and context of structures, including night time impacts from red flashing lights	Medium	Low
Heritage (Palaeontology) – none identified		
Noise		
Mechanical and aerodynamic noise from the operation of the wind turbine components. (Day time)	Low	Low
Mechanical and aerodynamic noise from the operation of the wind turbine components. (Night time)	Low	Low
Visual		
Compaction of larger areas can result in soil sterilisation and landscape degradation.	Medium	Low
AWL lights at night have the potential to significantly detract from the 'dark-sky' sense of place of the rural landscape.	High	Medium
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.	Low	Low
The dumping of old turbine blades on site have the potential to significantly degrade the local landscape character.	Low	Low
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.	Medium	Low
Soil erosion can result in visual scarring on prominent areas.	Low	Low
Shadow Flicker from the turning turbine blades has the potential to be strong annoyance factor.	Low	Low
Traffic		
Increase in traffic	Low	Low
Increase of incidents with pedestrians and livestock	Low	Low
Increase in dust from gravel roads	Low	Low
Increase in road maintenance	Low	Low
Additional abnormal loads	Low	Low
New / Larger access points	Low	Low

Impact	Pre-mitigation	Post-mitigation
DECOMMISSIONING		
Impacts to Biophysical Systems		
Aquatic / Freshwater		
Direct physical destruction or disturbance of aquatic habitat caused by vegetation disturbance of riparian habitat, encroachment/colonisation of habitat by invasive alien plants and alteration of river geomorphological profiles (including stream beds and banks).	High	Low
Alteration in the physical characteristics of freshwater resource features as a result of increased turbidity and sediment deposition	Medium	Low
Alteration or deterioration in the physical, chemical and biological characteristics of water resources (i.e. water quality) such as wetlands & rivers as a result of water/soil pollution. The term 'water quality' must be viewed in terms of the fitness or suitability of water for a specific use (DWAF, 2001). In the context of this impact assessment, water quality refers to its fitness for maintaining the health of aquatic ecosystems.	Medium	Low
Terrestrial Ecology		
Faunal impacts due to decommissioning activities	Medium	Low
Ecosystem integrity and the delivery of ecosystem services such as grazing and clean water.	Medium	Low
Biodiversity, ecosystem integrity and the delivery of ecosystem services such as forage.	Medium	Low
Agricultural – none identified		
Avifaunal		
Displacement due to disturbance associated with the dismantling of the wind turbines and associated infrastructure.	Medium	Low
Bat		
Disturbance to bats due to decommissioning activities through noise and dust, and damage to vegetation.	Low	Low
Impacts to Socio-Economic Component		
Social		
Noise	Low	Low
Increased in crime	Low	Low
Increased risk of HIV infections	High	Medium
Influx of construction workers	Low	Low
Hazard exposure	Low	Low
Disruption of daily living patterns	Low	Low
Disruptions to social and community infrastructure	Low	Low
Job creation and skills development	Medium	Medium
Socio-economic stimulation	Medium	Medium
Heritage		
Introduction of construction equipment directly alters landscape quality, sense of place and context of structures	Medium	Low
Heritage (Palaeontology) – none identified		
Noise		
Noise pollution due to construction activities (equipment and vehicle noise)	Low	Low
Visual		
Abandoning of old structures - Old, unused structures have the potential to significantly degrade the landscape character.	Medium	Low

Impact	Pre-mitigation	Post-mitigation
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.	Medium	Low
Abandoning of old towers and blades - Old towers have the potential to significantly degrade the landscape character.	High	Low
Traffic		
Increase in Traffic	Medium	Low
Increase of Incidents with pedestrians and livestock	Medium	Low
Increase in dust from gravel roads	Low	Low
Increase in Road Maintenance	Low	Low
Additional Abnormal Loads	Low	Low
Increase in dust from gravel roads	Low	Low
New / Larger Access points	Low	Low
CUMULATIVE		
Impacts to Biophysical Systems		
Aquatic / Freshwater		
Compromised ecological processes as well as ecological functioning of important habitats associated with the Kaboep River	Medium	Low
Terrestrial Ecology		
Broad-scale ecological processes, especially habitat fragmentation - Transformation of intact habitats could potentially compromise ecological processes as well as ecological functioning of important habitats and would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations.	Medium	Low
Agricultural – compliance statement - none identified		
Avifaunal		
Mortality due to collisions with the wind turbines Displacement due to disturbance during construction and operation of the wind farm Displacement due to habitat change and loss at the wind farm Mortality due to electrocution on the electrical infrastructure	Low	Low
Bat		
Cumulative impacts to bats across multiple wind energy projects	High	Medium
Impacts to Socio-Economic Component		
Social		
Noise	Low	Mitigation can only be considered implemented through a readiness action plan at a regional level and will driven on a provincial and municipal
Shadow Flicker	Low	
Blade glint	Low	
Risk of HIV and AIDS	High	
Sense of place	High	
Service supplies and infrastructure	Low	
Job creation and skills development	Very high	
Socio-economic stimulation	Medium	

Impact	Pre-mitigation	Post-mitigation
		basis; underpinned by national government, private sector and public support
Heritage		
Grubbing of surface and introduction of WEF to the landscape directly impacts archaeology and alters landscape	High	Medium
Heritage (Palaeontology)		
If fossils of scientific value (rare, complete, index fossils) are present they might be destroyed when excavations for foundations commence.	Low	Low
Noise		
Mechanical and aerodynamic noise from the operation of the wind turbine components of all three Pofadder WEFs.	Low	Low
Visual		
AWL at night intervisibility of the Pofadder Wind Farm with the proposed Namies Wind Farm located approximately 30 km to the west.	Low	Low
Traffic		
Increase in Traffic	Medium	Medium
Increase of Incidents with pedestrians and livestock	Medium	Medium
Increase in dust from gravel roads	Medium	Low
Increase in Road Maintenance	Low	Low
Additional Abnormal Loads	Medium	Low
Increase in dust from gravel roads	Medium	Low
New / Larger Access points	Low	Low

SPECIALIST STUDIES

The following specialist studies have been undertaken for the project and their main findings and recommendations are included below:

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 71 freshwater resource features were identified and delineated and include: • One (1) large primary/major ephemeral wash namely the Kaboet River; • Twelve (12) smaller ephemeral washes (mainly third order streams); and • Fifty-eight (58) drainage channels.	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

Specialist Study	Findings	Recommendations
	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.	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, 50 m buffer areas, measured from the outer edge of delineated wetland is recommended. • For the small drainage channels, 32 m 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 all three vegetation types and the fact that only a very small extent of these vegetation types are located 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 impact on the status and conservation targets set out for these vegetation types. The linear ridge system and the rocky outcrops are characterised by higher spatial heterogeneity due to the range of differing aspects (north, south, and variations thereof), slopes and altitudes all resulting in differing soil (e.g. depth, moisture, temperature, drainage, nutrient content), light and hydrological conditions. The structurally more complex, upper slopes of the linear ridge, are regarded as more sensitive and it	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 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.

Specialist Study	Findings	Recommendations
	is recommended that this portion of the ridge be avoided as much as possible. 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.	
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 1 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 33 kV 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: • 500 m 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 500 m 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:

Specialist Study	Findings	Recommendations
	• Collisions with the 33 kV 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.	• 2.8 km turbine exclusion zone around the vulture roost on the Aries – Aggeneys 400 kV 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 3 m/s (measured at ground level) during daylight hours when a rainfall event of 10 mm 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 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

Specialist Study	Findings	Recommendations
		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 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	Considering all social impacts associated with the project, it is evident that, at the social level, the positive elements outweigh the

Specialist Study	Findings	Recommendations
	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 1 which indicates that during the construction and the operational phase of the proposed 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.	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 1. All negative impacts are low and can be effectively addressed through the mitigation measures provided.
Heritage	The main heritage concerns for this project are archaeological sites and the cultural landscape. Some archaeological sites are within the current layout but none of these are highly significant sites and none require in situ conservation. It is, of course, always best to avoid any sites that have some research value and hence cultural significance, but excavation within a commercial mitigation context would be completely acceptable for all of the sites concerned here. 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 1 be authorised, but subject to the following: • 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 and the Quaternary sands but there are some areas of moderately palaeosensitivity. Most of the project area is of zero to insignificant palaeo sensitivity but there are parts that are moderately sensitive (refer Figure 21 below). These are on the Mbizane Formation (Dwyka	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

Specialist Study	Findings	Recommendations
	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.	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 two noise sensitive areas (40 and 41) when the windspeed is above 5 m/s. 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 45dB(A). • The cumulative impacts will exceed the night time SANS 10103:2008 noise limit of 35dB(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.	On site monitoring at the two noise sensitive areas (40 and 41) 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.
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	• The area is remote, and only four farmstead receptors were located within the project Zone of Visual Influence, with Medium to Low Exposure (approximately 8 km). • 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,

Specialist Study	Findings	Recommendations
	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.	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 30 km 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. • Shadow Flicker impacts are unlikely to occur, and if they did, they would be low intensity and suitably addressed with mitigation. 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. On condition the above mitigation measures are implemented, the proposed development is acceptable from a visual and landscape perspective and there is no objection to its authorisation.
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	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.

Specialist Study	Findings	Recommendations
	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. Recommendation	• 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 1 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.

ENVIRONMENTAL IMPACT STATEMENT

Pofadder Wind Facility 1 (Pty) Ltd is proposing to construct the Pofadder WEF 1 and associated infrastructure on a site located approximately 20 km South East of Pofadder within the Kai !Garib Local Municipality and the ZF Mgcawu District Municipality in the Northern Cape Province.

The overall objective of the proposed development is to generate much needed electricity by means of renewable energy technologies capturing wind energy to feed into the national grid. The use of renewable energy to provide power to South Africa is supported at international, national, provincial and local level. Given South Africa's need for additional electricity generation and the need to decrease the country's dependency on coal-based power, renewable energy has been identified as a national priority, with wind energy identified as one of the readily available, technically viable and commercially cost-effective sources of renewable energy.

Taking into consideration the findings of the EIA process for the proposed development and the fact that specialist recommendations have been used to inform the project design and layout of the facility, it is the opinion of the Environmental Assessment Practitioner (EAP) that the majority of the negative impacts associated with the implementation of the proposed project can be mitigated to acceptable levels. While there are potential negative environmental impacts associated with the proposed development, the extent of the positive benefits associated with the implementation of the project in terms of renewable energy supply and positive local and regional economic impact are considered to outweigh the negative impacts.

After consideration of the findings presented in the EIR and based on the preferred layout presented within this report, it is the reasoned opinion of the EAP that the proposed Pofadder Wind Energy Facility 1 is acceptable and Environmental Authorisation could be granted.

The Pofadder WEF 1 will assist by converting wind energy into electricity, thereby releasing no harmful by-products into the environment which will in turn reduce the dependency on fossil fuels.

The following specialist studies have been undertaken for the project:

- Agriculture and Soils Impact Assessment
- Avifaunal Impact Assessment
- Bat Impact Assessment
- Ecological Impact Assessment
- Heritage Impact Assessment (including Paleontology, Archaeology and Cultural Landscapes)
- Desktop Geotechnical Investigation
- Noise Impact Assessment
- Social Impact Assessment
- Freshwater Impact Assessment
- Transportation Impact Assessment
- Visual Impact Assessment

The specialist assessments were conducted to address the potential impacts relating to the proposed development in order to ascertain the level of each identified impact, as well as mitigation measures which may be required. A summary of the main findings of the specialists are included in **Section 16**.

The agricultural assessment (refer to **Appendix 6**) concluded that the proposed development will not have an unacceptable negative impact on the agricultural production capability of the site and is therefore acceptable. This is substantiated by the facts that the land is of very limited land capability and is not suitable for crop production, the amount of agricultural land loss is well within the allowable development limits, the proposed development poses a low risk in terms of causing soil degradation, and the development offers some positive impact on agriculture as well as wider, societal benefits.

The avifaunal assessment (refer to **Appendix 6**) concluded that the proposed Pofadder WEF 1 could potentially have a range of pre-mitigation negative impacts on priority avifauna ranging from low to medium, all of which could be reduced to acceptable levels with appropriate mitigation. No fatal flaws were discovered during the investigations.

The bat assessment (refer to **Appendix 6)** concluded that the turbine layout adheres to the bat constraints as no project infrastructure (except roads) are located in bat buffers. Once operational, bat fatality monitoring must be undertaken to search for bat carcasses beneath wind turbines to measure the observed impact of the WEF on bats for a minimum of two years. Mitigation measures that are known to reduce bat fatality if needed based on the fatality monitoring results include curtailment and acoustic deterrents. If these are adhered to, the Pofadder WEF 1 can be authorized without unacceptable levels of impacts to bats.

The ecological impact assessment (refer to **Appendix 6**) concluded that 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 and 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 the specialists considered opinion that the proposed project could be authorised from a terrestrial ecological perspective.

The heritage impact assessment (refer to **Appendix 6**) concluded that 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. Given that (1) all the expected impacts after mitigation are in the low to medium range (with those rated medium perhaps better rated as low), (2) direct impacts to archaeology can generally be easily mitigated if it is found during the preconstruction survey that impacts would occur, and (3) there are no highly significant landscapes or scenic routes in the vicinity of the site, it is the opinion of the heritage specialist that the proposed project may be authorised in full.

The palaeontology assessment (refer to **Appendix 6**) concluded that 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.

The noise assessment (refer to **Appendix 6**) concluded that, based on the modelling results, the impact will be low from a noise perspective. It is recommended that the development receive environmental authorisation.

The social impact assessment (refer to **Appendix 6**) stated that 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.

The aquatic impact assessment (refer to **Appendix 6**) concluded that 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 the study it is the aquatic specialists considered opinion that the proposed project could be authorised from a freshwater resource perspective.

The transportation impact assessment (refer to **Appendix 6**) concluded that the Pofadder WEF 1 and associated grid infrastructure will have a nominal impact on the existing traffic network. The project is therefore deemed acceptable from a transport perspective, provided the recommendations and mitigation measures in the report are implemented. Hence, Environmental Authorisations (EAs) should be granted for the EIA applications.

The visual impact assessment (refer to **Appendix 6**) concluded that the proposed development is acceptable from a visual and landscape perspective and there is no objection to its authorisation, provided the mitigation measures as contained in the draft EMP are implemented.

No location alternatives are being considered for the Pofadder WEF 1 as these sites were selected prior to the commencement of the EIA Process. The layout that was prepared for the Pofadder WEF 1 has been assessed by specialists to identify potential impacts that may arise from the development. Based on the findings of the specialists, the potential impacts identified and the outcomes of the public participation process of the Scoping Phase, the layout has been updated to avoid environmental

sensitivities (except for a few roads and MV cabling) to produce a final layout. This final layout has been further assessed by all specialists (refer to Impact Tables in **Section 14.3** and findings and recommendations in **Section 16**). No further layout alternatives have been considered as part of the EIA process. Impact assessments have been undertaken on the revised layout. No technology alternatives will be considered. The choice of turbine to be used will ultimately be determined by technological and economic factors at a later stage.

POFADDER WIND FACILITY 1 (PTY) LTD

POFADDER WIND ENERGY FACILITY (WEF) 1

FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT

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POFADDER WIND ENERGY FACILITY (WEF) 1

FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT

1. INTRODUCTION

Pofadder Wind Facility 1 (The Applicant) (Pty) Ltd is proposing to develop, construct and operate the Pofadder Wind Energy Facility (WEF) 1 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: 14/12/16/3/3/2/2150**). 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 224 megawatt (MW).

SiVEST Environmental Division has subsequently been appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the Environmental Impact Assessment (EIA) process for the proposed construction and operation of the Pofadder WEF 1 and associated infrastructure. The proposed development requires an (Environmental Authorisation (EA) from the National Department Forestry, Fisheries and the Environment (DFFE). However, the provincial authority (i.e. the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform) will also be consulted. The EIA for the proposed development will be conducted in terms of the EIA Regulations, 2014 (as amended) promulgated in terms of Chapter 5 of the NEMA. In terms of these regulations, a full EIA process is required for the proposed development. All relevant legislation and guidelines will be consulted during the EIA process and will be complied with at all times.

Two additional WEF's are concurrently being considered on the properties and are assessed by way of separate impact assessment processes contained in the 2014 Environmental Impact Assessment Regulations (GN No. R982, as amended) for listed activities contained Listing Notices 1, 2 and 3 (GN R983, R984 and R985, as amended). These projects are known as Pofadder Wind Energy Facility 2 (**DFFE Reference Number: 14/12/16/3/3/2/2151**) and Pofadder Wind Energy Facility 3 (**DFFE Reference Number: 14/12/16/3/3/2/2152**).

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 BAR (**DFFE Reference Number: To be Allocated**):

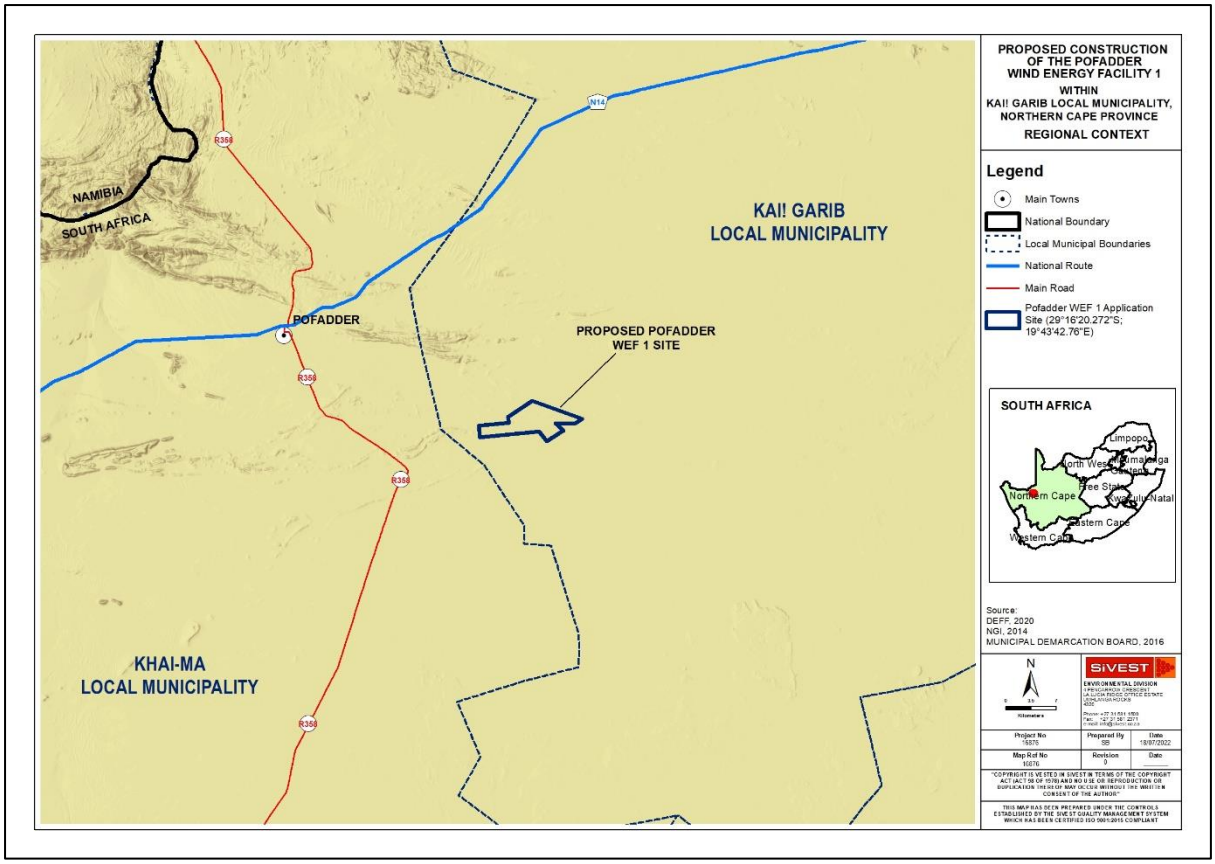

Figure 1: Pofadder WEF 1 Regional Context

Although the respective WEF developments will be assessed separately, a single public participation process is being undertaken to consider all of the proposed projects [i.e. three (3) WEF EIAs]. The grid connection BA will be circulated for comment separately. The potential environmental impacts associated with all three WEFs will be assessed as part of the cumulative impact assessment.

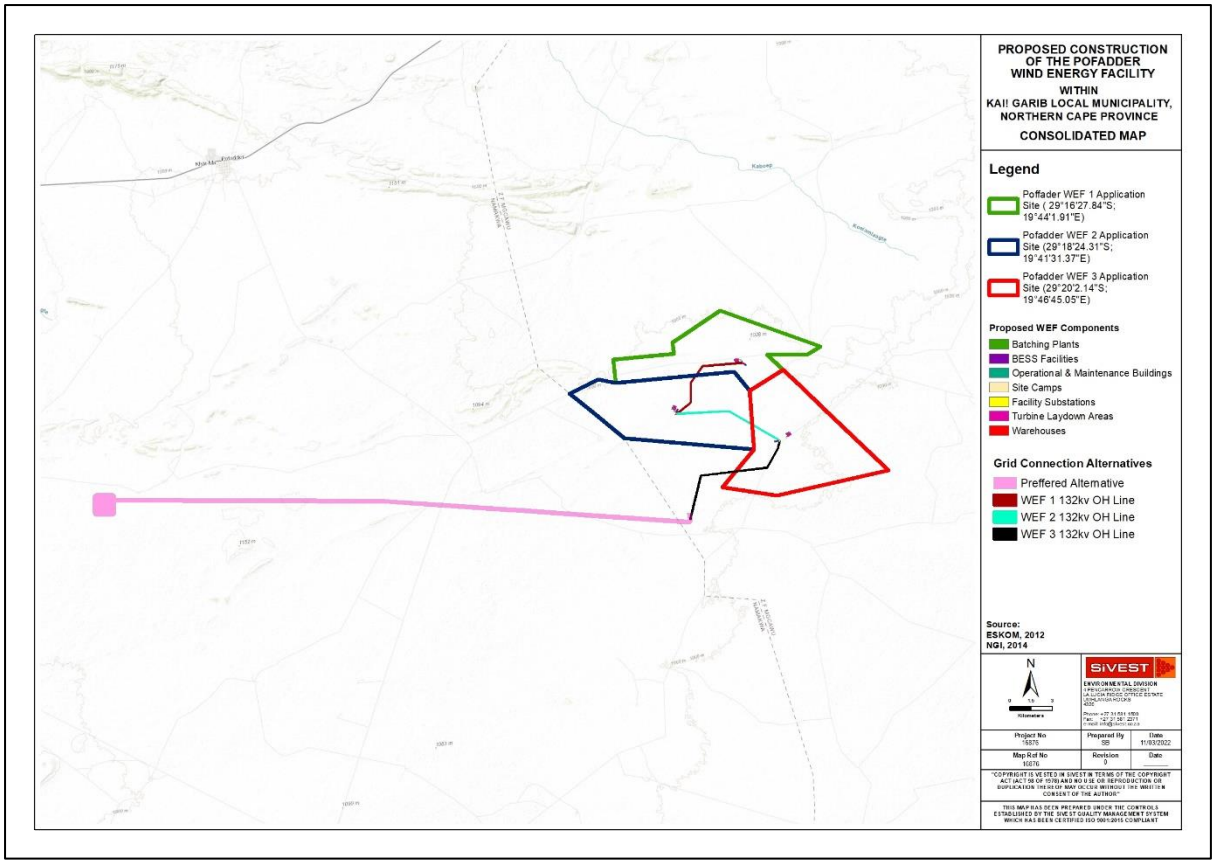

Figure 2: Layout showing context of Pofadder WEF 1, Pofadder WEF 2 and Pofadder WEF 3 and Pofadder Grid Corridor

1.1 Overview of the EIA Process

The National Environment Management Act, 1998 (Act No 107 of 1998) (NEMA) promotes the use of scoping and EIA in order to ensure integrated environmental management. The purpose of an EIA is to provide the Authority with sufficient information to make an informed decision on whether an activity should proceed or not, and to assist with selecting an option that will provide the most benefit, and cause the least impact. The EIA process should identify activities which may have a detrimental effect on the environment, and which would therefore require Environmental Authorisation prior to commencement.

This project requires an Environmental Authorisation (EA) in terms of the National Environmental Management Act (NEMA) (Act No. 107 of 1998, as amended) and the 2014 EIA Regulations (as amended). The process triggered is a Scoping and Environmental Impact Assessment report (S&EIR). All the phases including the Environmental Management Programme report (EMPr) must be prepared in terms of the NEMA and GN R. 982, (as amended by GN R. 326) and the associated activities listed under GN R. 983, GN R. 984 and GN R. 985 (as amended by GN R 327, GN R 325, and GN R 324 respectively).

Objectives and Overview of the Environmental Impact Assessment (EIA) Phase

The EIA Phase is a comprehensive study that addresses all the issues raised in the Scoping Phase as well as provides further assessment of the sensitivities identified by the various specialist as well as the

proposed impacts of the proposed development. The main objectives of the EIA phase is to assess the significance of the impacts that may occur from the proposed development, provide mitigation measures and management recommendations to reduce the significant impacts, compile an Environmental Management Programme for use during construction to ensure correct monitoring procedures are follows as well as to undertake further PPP.

The EAP therefore compiled a Draft Environmental Impact Assessment Report and a draft Environmental Management Programme which was made available for public and stakeholder comment for a period of 30 days as part of the public participation process. All comments received in response to the DEIAr are then considered and responded to, incorporated into the Final EIA Phase and submitted to the Department for decision.

Public Participation Process

Public and Stakeholder participation is a fundamental component of the EIA Process. The inclusion of the views of the affected and interested public aids in ensuring the EIA Process is open, transparent and robust, as well as that the decision-making process is equitable and fair. This in turn guides informed choice and better environmental outcomes. It further presents a valuable source of information on key impacts, potential mitigation measures and the identification and selection of feasible alternatives. This process allows the EAP to engage further with identified key stakeholders and Interested and Affected Parties (I&APs). The Draft EIA Report was made available to all I&APs as well as Organs of State for a period of 30 days from the 12th of August 2022 until the 12th of September 2022. All comments have been included in the Comments and Response Report submitted to the Department for decision.

1.2 Content Requirements for an Environmental Impact Assessment Report

An Environmental Impact Assessment Report must contain the information that is necessary for the competent authority to consider and come to a decision on the application. The content requirements for an Environmental Impact Assessment Report (as provided in Appendix 3 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 an Environmental Impact Assessment

Content Requirements	Applicable Section
(a) details of- (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae;	4
(b) the location of the activity, including- (i) the 21-digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	5
(c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is- (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	5

Content Requirements	Applicable Section
(d) a description of the scope of the proposed activity, including- (i) all listed and specified activities triggered; (ii) a description of the activities to be undertaken, including associated structures and infrastructure;	6.2
(e) a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;	10
(f) a motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report;	12
(g) a motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report;	13
(h) a full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including: (i) details of all the alternatives considered; (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; (iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts— (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks; (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (viii) the possible mitigation measures that could be applied and level of residual risk; (ix) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and (x) a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;	14
(i) a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the	14.3 Appendix 7

Content Requirements	Applicable Section
preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including— (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	
(j) an assessment of each identified potentially significant impact and risk, including— (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be mitigated;	14.3
(k) where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	16
(l) an environmental impact statement which contains— (i) a summary of the key findings of the environmental impact assessment: (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	17
(m) based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	18
(n) the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	19
(o) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	20
(p) a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	21
(q) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	22
(r) where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;	22
(s) an undertaking under oath or affirmation by the EAP in relation to- (i) the correctness of the information provided in the report;	Appendix 1

Content Requirements	Applicable Section
(ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	
(t) where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	n/a
(u) an indication of any deviation from the approved scoping report, including the plan of study, including– (i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and (ii) a motivation for the deviation;	24
(v) any specific information required by the competent authority; and	25
(w) any other matter required in terms of section 24(4)(a) and (b) of the Act.	All requirements have been met in this report.
(2) Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a scoping report, the requirements as indicated in such notice will apply.	All requirements have been met in this report.

2. PROJECT TITLE

Proposed Development of the Pofadder Wind Energy Facility (WEF) 1 and Associated Infrastructure near Pofadder in the Northern Cape Province.

3. DETAILS OF APPLICANT

3.1 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 1 (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

4. DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTIONER AND SPECIALISTS

4.1 Name and contact details of the Environmental Consultant

The table below provides the name and contact details of the Environmental Consultants who prepared this report:

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

Business Name of EAP	SiVEST SA (PTY) Ltd
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

4.2 Names and expertise of the Environmental Assessment Practitioner (EAP)

The table below provides the names of the EAP's who prepared this report:

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 IAIA	19
Michelle Guy *(Pr.Sci.Nat)*	MSc Environmental Science	SACNASP Registration No. 126338 EAPASA Registration No. 2019/868 IAIA	10
Luvanya Naidoo *(Pr.Sci.Nat)*	BSc Geography	SACNASP Registration No. 126107 EAPASA Registration No. 2019/1404 IAIA	12

CV's of SiVEST personnel and the EAP declaration are attached in **Appendix 1.**

4.3 Names and expertise of the specialists

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 and Shadow Flicker	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	Terrestrial Ecology and Freshwater Impact Assessment	B.Sc. Hons in Botany (Vegetation Ecology) Pr.Sci.Nat 400502/14	8
	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
SiVEST SA		Transportation Impact Assessment		16

Company	Name of representative of the specialist	Specialist	Educational Qualifications	Experience (years)
	Merchandt Le Maitre	Stormwater Management Plan	N Dip: Civil Engineering B Tech: Civil Engineering Pr.Tech.Eng. (Reg. No. 2018300094)	
ITC Services (Pty) Ltd	H. Goosen	Electromagnetic Interference (EMI) Path Loss and Risk Assessment		
Council for Geoscience	Ms K Mphuthi	Geotechnical report		

5. LOCATION OF THE ACTIVITY

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.

5.1 21 Digit Surveyor General Codes and Farm names of the sites

Table 6: 21 Digit Surveyor General Code

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

5.2 Coordinates of the site

The centre point coordinates for the sites are as follows:

- Latitude: 29°16'27.84"S
- Longitude: 19°44'1.91"E

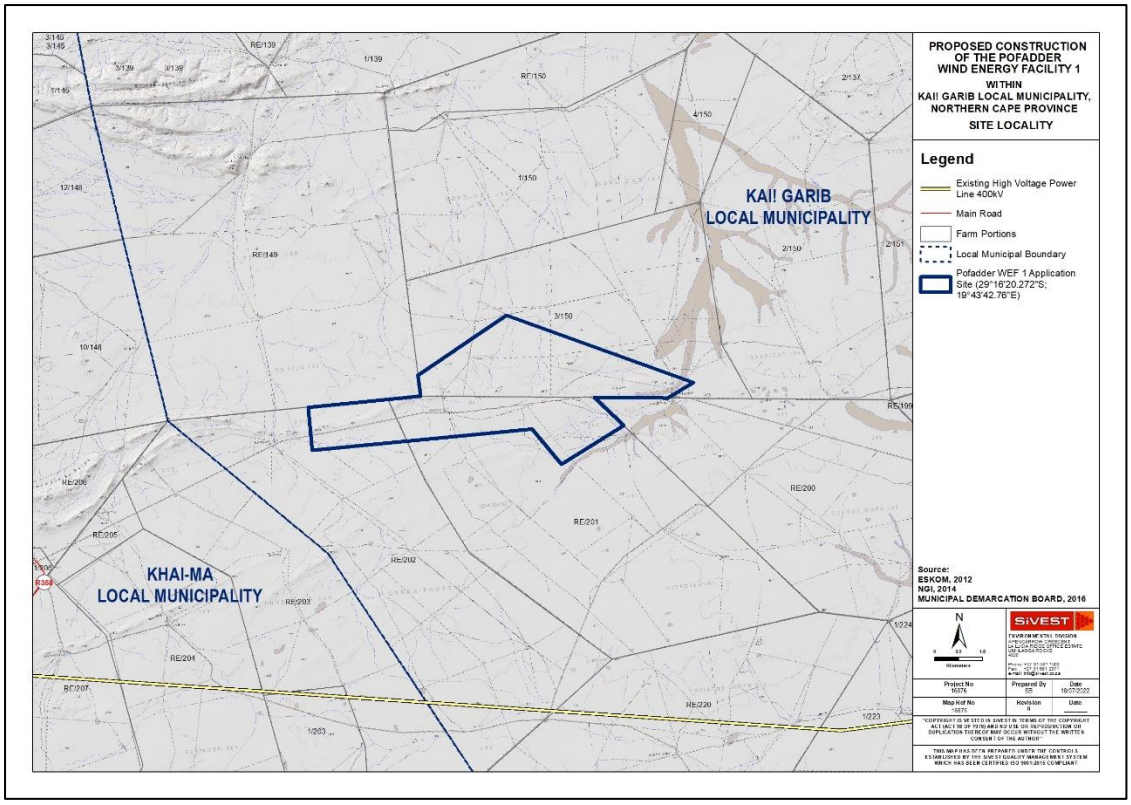

Figure 3: Site locality

The centre point coordinates of the site have been included below:

Table 7: Centre point coordinates for the Pofadder WEF 1 site boundary

POFFADER 1 WEF: APPLICATION SITE		
COORDINATES AT CENTER POINT (DD MM SS.sss)		
POINT	**SOUTH**	**EAST**
Centre	29°16'27.84"S	19°44'1.91"E

The substation coordinates have been included below:

Table 8: Substation site coordinates

POFFADER 1 WEF: SUPPORTING INFRASTRUCTURE		
COORDINATES AT CENTER POINT (DD MM SS.sss)		
INFRASTRUCTURE	**SOUTH**	**EAST**
Substation	29°16'51.86"S	19°44'43.69"E

6. ACTIVITY INFORMATION

6.1 Project Description

6.1.1 WEF and Associated Infrastructure

The preferred project site is approximately 3 600 hectares (ha) in extent. It is anticipated that the proposed Pofadder 1 WEF will comprise of up to twenty-eight (28) wind turbines with a maximum total energy generation capacity of up to approximately 224 MW. In summary, the proposed Pofadder WEF 1 development will include the following components:

- Up to 28 wind turbines, each with a maximum of 8 MW output per turbine, with a maximum export capacity of approximately 224 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 200 m;
- 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 4.2 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 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 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 12 m 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 1 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 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 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;

- 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;
- Water will be sourced from either the Local Municipality, a private contractor, from existing boreholes located within the application site or from a new borehole if none of these options are available. All required permits will be applied for prior to commencement of construction.

Please refer to the section below for a description of the typical components of a wind turbine.

6.1.2 Main components of a Wind Turbine

The turbine consists of the following major components (as shown in **Figure 4**):

- The foundation unit
- The tower
- The rotor
- The nacelle

The Foundation

The foundation is used to secure each wind turbine to the ground. These structures are commonly made of reinforced concrete and are designed to withstand the vertical loads (weight) and lateral loads (wind).

The Tower

The tower is a hollow structure (steel or concrete or a combination of the two materials, known as hybrid) allowing access to the nacelle (up to 200 m in height). The height of the tower is a key factor in determining the amount of electricity a turbine can generate as the wind speed varies with height. Towers are typically delivered to site in sections and then erected and joined together on site. Most towers are made of steel however some are made of reinforced post-stressed concrete.

The tower on which a wind turbine is mounted is not just a support structure. It also raises the wind turbine so that its blades safely clear the ground and so it can reach the stronger winds at higher elevations. The tower must be strong enough to support the wind turbine and to sustain vibration, wind loading and the overall weather elements for the lifetime of the wind turbine.

The Rotor

The portion of the wind turbine that collects energy from the wind is called the rotor. The rotor comprises of three rotor blades. The rotor blades use the latest advances in aeronautical engineering materials science to maximise efficiency. The greater the number of turns of the rotor the more electricity is produced. The rotor converts the energy in the wind into rotational energy to turn the generator. The rotor has three blades that rotate at about 15 to 28 revolutions per minute (rpm). The speed of rotation of the blades is controlled by turning the blades to face into the wind (‘yaw control’), and changing the angle of the blades (‘pitch control’) to make the most use of the available wind.

The rotor blades function in a similar way to the wing of an aircraft, utilising the principles of lift. When air flows past the blade, a wind speed and pressure differential is created between the upper and lower

blade surfaces. The pressure at the lower surface is greater and therefore acts to "lift" the blade. When blades are attached to a central axis, like a wind turbine rotor, the lift is translated into rotational motion. Lift-powered wind turbines are well suited for electricity generation.

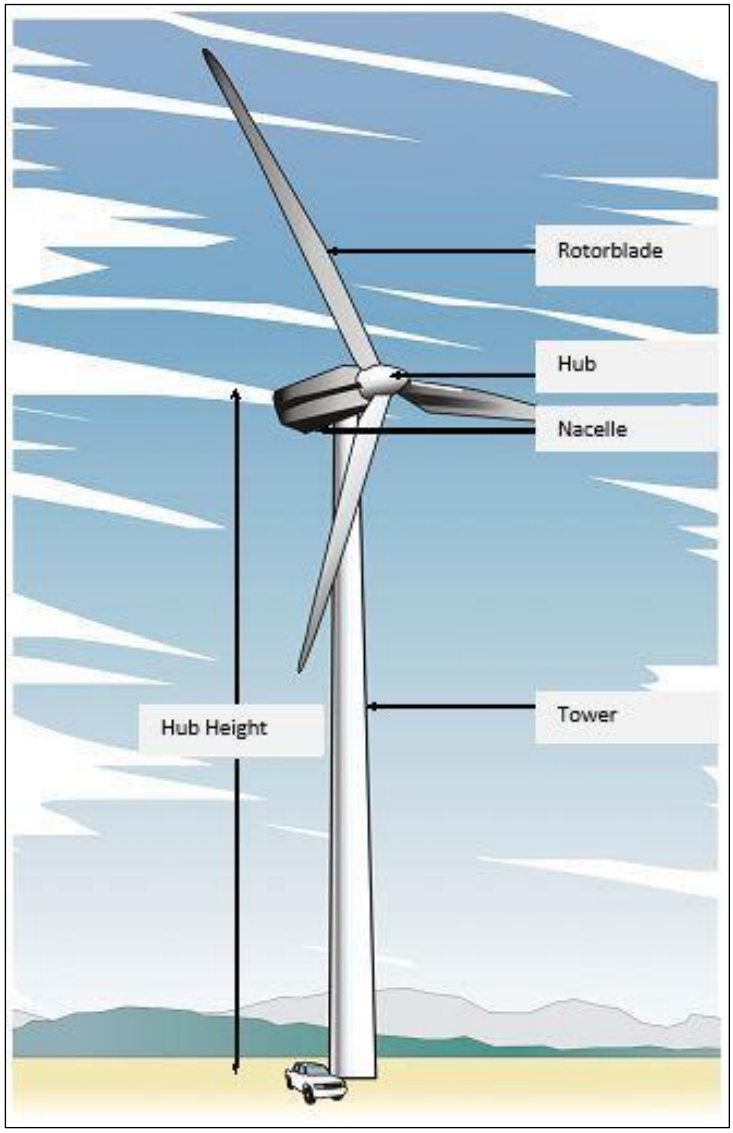

Figure 4: Illustration of the main components of a Wind Turbine

The Nacelle

The nacelle at the top of the tower accommodates the gears, the generator, anemometer for monitoring the wind speed and direction, cooling and electronic control devices, and yaw mechanism. Geared nacelles generally have a longer form/ structure than gearless turbines. The generator is what converts the turning motion of a wind turbine's blades into electricity. Inside this component, coils of wire are rotated in a magnetic field to produce electricity. The generator's rating, or size, is partly dependent on the length of the wind turbine's blades because more energy is captured by longer blades.

6.1.3 Roads

As stated above Pofadder WEF 1 will have a total road network of approximately 48 km. The main access road is off the R358 and continues for approximately 14.5 km along an existing provincial/district road before reaching the Pofadder 1 WEF as illustrated below. The main access road will require widening and will be between 8 – 12 m wide. The road then branches off into the internal access roads for access to each turbine. The internal roads will have a width of between 6 – 8 m and will consist of both new roads and roads that will be upgraded.

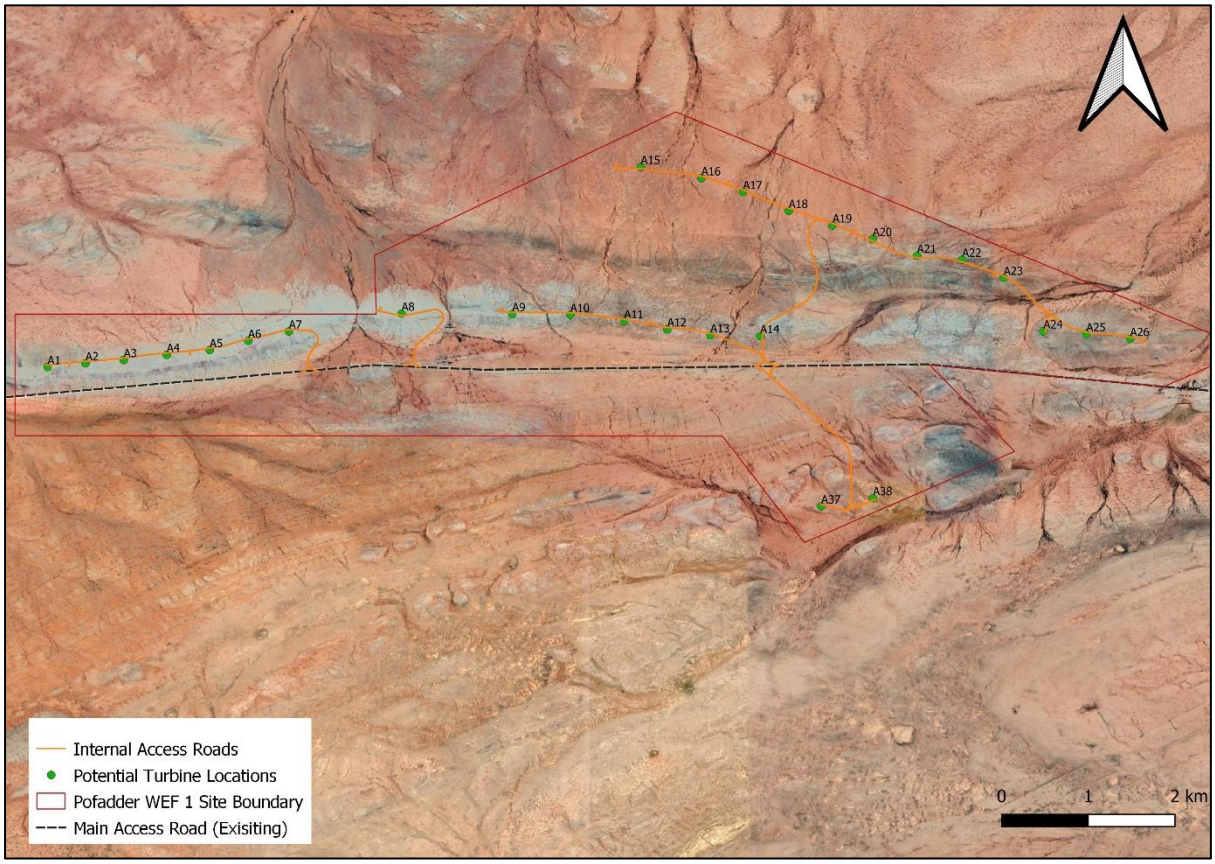

Figure 5: Pofadder 1 roads

6.1.4 Battery Energy Storage System (BESS)

A Battery Energy Storage System (BESS) of approximately 3.6 ha in size is proposed to be included as part of the Pofadder WEF 1 project. The battery storage facility is proposed to be constructed adjacent to the on-site substation.

Battery storage has the advantage of being flexible in terms of site location and sizing. Therefore, they can be incorporated into, and placed in close proximity, to a wind or solar facility. They also have the advantage of being easily scaled and designed to meet specific demands.

As technological advances within battery energy storage systems (BESS) are frequent, two BESS technology alternatives are considered: Solid state battery electrolytes (e.g., lithium-ion (Li-ion) zinc hybrid cathode, sodium ion, zinc bromine, sodium sulphur) and Redox-flow technology.

Considering the nature of the project, only a solid-state technology type would be envisaged for implementation. The technology includes batteries housed within containers which are fully enclosed and self-contained. Therefore, the assessment proposes all solid-state technologies for authorisation to allow the precise technology to be selected when the project is implemented, on the understanding that further investigation into the specific technologies available at the time of being awarded preferred bidder status will allow for one of two to be selected and ultimately developed.

Figure 6: Example of a 100 MW/129 MWh Lithium-ion battery on the Hornsdale wind farm in Australia.

The exact design will depend on the manufacturer and technology chosen, however as an example, traditional utility-scale Li-ion battery storage facilities include the following main components:

- Battery cells → modules → packs → racking system (DC).
- Storage container (HVAC system, thermal management, monitors and controls, fire suppression, switchgear, and energy management system).
- Power conversion system (bidirectional inverter to convert AC to DC for battery charging and DC to AC for discharging).
- Transformer (to step up 480-V inverter output to 12 – 66 kV).

It is likely that the batteries will require a solid foundation/ plinths, such as a concrete pad, grade beams or a structural steel deck. These will need to be strong enough to support the equipment and large enough to account for any necessary equipment clearances. The final foundation design will be undertaken by a relevant qualified civil or structural engineer. The design will be in accordance with local building standards.

The installation process includes site clearing, site preparation, delivery, unloading, anchoring the containers, wire and cable connections, commissioning and fine tuning and electrical inspection and testing. Refer image below of the installation of a BESS facility.

Figure 7: Installation of the 100 MW/129 MWh Li-ion battery at the Hornsdale wind farm

Any maintenance, service or repairs required to be carried out on the proprietary battery storage equipment will be conducted by the supplier's personal or their authorised agent. This includes any preventative maintenance that is identified to be carried out on the plant.

Any necessary maintenance equipment and spares will be kept in the renewable energy facility general maintenance building and/or storage area. No hazardous or dangerous goods will be stored in a container on site in volumes that may meet or exceed the thresholds specified in EIA regulations (refer paragraph below on legislation).

It should be noted that it is highly unlikely that battery modules will be stored on site for strategic spares purposes. Most Lithium Battery Technologies have a recommended depth of discharge of 80%, meaning that the life of the battery will significantly increase if the depth of each discharge is limited to 80% of the rated capacity. It is therefore detrimental for battery cells to be stored for long periods on site, as they may discharge below their recommended limit (potentially down to 100% depth of discharge) and potentially become unusable. It is therefore very likely that battery modules will be shipped to site on a needs-be basis during operation of the plant.

Legislation requirements in terms of the BESS facility

In March 2020, the Department of Forestry Fisheries and the Environment (DFFE) clarified the applicability of listed activities, under the EIA regulations (as amended), which relate to the development and operation of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers in volumes that may meet or exceed the thresholds specified under the Listing Notices 1, 2 & 3.

As per the DFFE's response, installations, facilities or infrastructure related to the development and operation (or expansion and operation) of battery energy storage will not trigger any of these listed activities. Batteries are not regarded as facilities or infrastructure for the storage or storage and handling of a dangerous good, considering that its inherent purpose or objective is not to store, or store and handle a dangerous good. Furthermore, a battery is not deemed to be a "container".

Although a battery will not trigger these listed activities, the following should be noted:

- There may be instances where the battery is not fully assembled and the electrolyte (or substance making up the electrolyte) intended for the battery, may be stored in a container on site prior to filling. In these instances, these activities would be applicable as the purpose would be the storage of that substance (if indeed a dangerous good), and not the storage of energy.

- Battery storage facilities have the potential to trigger other listed or specified activities. It is therefore important to consider all other listed and/ or specified activities in the context of the development and relevant scenario. All listed or specified activities that will be triggered by the development must be identified, described and assessed in the EIA.

In the case of this application, while other listed activities are triggered, no electrolyte nor dangerous good will be stored in a container on site in volumes that may meet or exceed the thresholds specified in EIA regulations. Therefore, activities relating to the storage and handling of a dangerous good, where such storage occurs in containers, will not be triggered.

6.1.5 Final Proposed Layout and Technical Detail Summary

The Final Proposed Layout is reflected below in **Figure 8** and attached in **Appendix 3**. Photographs of the site are included in **Appendix 4**.

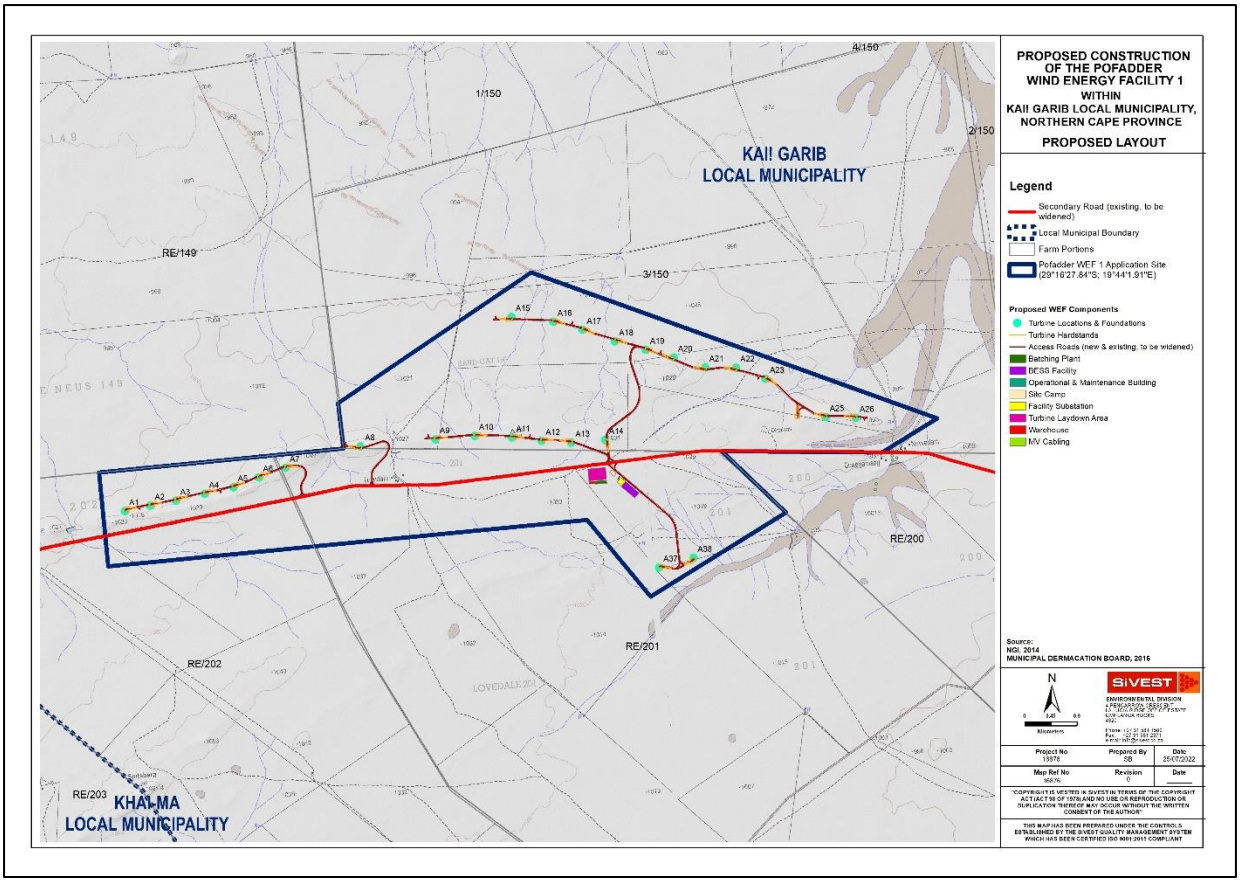

Figure 8: Final layout showing proposed location of wind turbines

The wind turbines and all other project infrastructure have been placed strategically within the development area based on environmental constraints and sensitivity findings.

A summary of the project technical details is provided in **Table 9** below.

Table 9: Technical Detail Summary

Component	Description / Dimensions
Location of site (centre point)	29° 16' 27.84" S 19° 44' 1.91" E
Application site area	3 600 ha
Turbine development area	Turbine Foundation Area = 45m*32m*28 turbines = 4.2 Ha
SG codes	C03600000000020200000 C03600000000015000003 C03600000000020100000
Export capacity	Up to 224 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 1.6 ha
O&M building area	Approximately 1 ha
Temporary construction laydown / staging area	Up to 7 ha

Component	Description / Dimensions
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 ha for blade hardstands and 9 ha for crane hardstands
Width of internal access roads	Approximately 6 – 8 m
Length of internal access roads	Approximately 48 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

6.2 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 10: 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 likely occupy a footprint of, ± 125 m x 125 m (1.5625 ha). The height of the sub-station will be a maximum of 10

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.
		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; 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.	Drainage lines and watercourses are scattered across the proposed site. One or more roads and/or medium voltage cabling will cross these 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 will be designed to avoid the identified surface water features / watercourses as far as possible, some of the internal access road and/or medium voltage cabling will need to traverse the identified surface water features / watercourses. In addition, during construction of these roads, soil may 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 (secondary road) will be approximately 8 - 12 m wide. Internal access 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	The total area to be developed for the proposed Pofadder WEF 1 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.
	afforestation on or after 01 April 1998 and where such development: (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 32 m 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 12 m and/or lengthening by more than 1 km, 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 up to 224 MW. 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 20 ha 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 10 m^2 or more within a watercourse / surface water feature or within 32 m 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 100 m from the edge of a watercourse or wetland.

7. NATIONAL WEB-BASED ENVIRONMENTAL SCREENING TOOL

The National Web based Environmental Screening Tool is a geographically based web-enabled application which allows a proponent intending to submit an application for environmental authorisation in terms of the Environmental Impact Assessment (EIA) Regulations 2014, as amended to screen their proposed site for any environmental sensitivity.

According to the DFFE Screening Tool Report (attached in **Appendix 9**), the following themes described in **Table 11** below are applicable to the proposed development:

Table 11: DFFE Screening Tool Environmental Sensitivity

Theme	Sensitivity	Comment
Agriculture Theme	Low	The Agricultural Compliance Statement is included in **Appendix 6** of the Final EIA Report. The low agricultural sensitivity of the entire site, as identified by the screening tool, is confirmed by the specialist.
Animal Species Theme	High	The Terrestrial Ecological Report is included **Appendix 6** of the Final EIA Report. Apart from the avifaunal SCC that may potentially inhabit the project site, no other faunal SCC have been listed within Screening Report that may potentially inhabit the project site. Only one faunal species of conservation concern (SCC) was observed during the site-visit namely; Bushmanland Tent Tortoise - *Psammobates tentorius verroxii* (Near Threatened). Due to a general low to moderate habitat and structural complexity as well as the fact that large tracts of land within the region being largely intact and undisturbed, the site is likely to have a moderate faunal diversity, including other potential SCC.
Aquatic Biodiversity Theme	Very High	The Terrestrial Ecological Report is included in **Appendix 6** of the Final EIA Report. The majority of the Very High sensitive areas are based primarily on the NFEPA coverage and SANBI's 2018 National Wetland Map 5 and 2018 National River Map. With meticulous implementation of recommended mitigation measures proposed by the specialist, the proposed development of the Pofadder 1 WEF will not have an impact on these freshwater resource features.
Archaeological and Cultural Heritage Theme	Low	The Heritage Report is included in **Appendix 6** of the Final EIA Report.

Theme	Sensitivity	Comment
		This site sensitivity verification has verified the expected sensitivity as being generally low but with a number of small areas of higher sensitivity ranging from low-medium to high.
Avian (Wind) Theme	Low	The Avifaunal Report is included in **Appendix 6** of the Final EIA Report. The Project Site and immediate environment is classified as **Medium** and **High** sensitivity for terrestrial animals according to the Terrestrial Animal Species Theme. The High and Medium sensitivity classifications are linked to Burchell's Courser Cursorius rufus, Ludwig's Bustard Neotis ludwigii and Secretarybird Sagittarius serpentarius. The Project Site contains confirmed habitat for species of conservation concern (SCC) as defined in the Protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial animal species (Government Gazette No 43855, 30 October 2020). The classification of high sensitivity for Terrestrial Animals with regards to Avifauna is confirmed based on the presence of species of conservation concern (SCC) recorded during onsite surveys and pre-construction monitoring at the project site
Bats (Wind) Theme	High	The Bat Report is included in **Appendix 6** of the Final EIA Report. The overall sensitivity of the site is classified as medium, lower than the high sensitivity rating given by the Screening Tool. However, the two sensitivities are based on different data types. The Screening Tool is based on broad scale habitat data whereas the SSV is based on bat collision risk with wind turbines derived from activity data collected within the project boundary and is therefore a better approximation of the project sensitivity because collision is the primary impact. As such the SSV disputes the current environmental sensitivity of the proposed project area, arguing that the sensitivity should be reduced to medium.
Civil Aviation (Wind) Theme	Low	The closest airport is the Kenhardt Aerodrome, located approximately 145 km from the site.
Defence (Wind) Theme	Low	The entire site has a low sensitivity in terms of the defence theme. No further specialist study required.
Flicker Theme	Very High	The Visual Assessment is included in **Appendix 6** of the Final EIA Report.

Theme	Sensitivity	Comment
		Impact Assessment of the Shadow Flicker (SF) effect was undertaken, and the expected SF Impact without mitigation was rated Low. This was based on the low probability of the SF impact occurring due to the location of the dwellings on the outer edge of the potential SF Impact Area. Mitigation was proposed, where the SF Impact could be reduced to a Negligible effect with simple mitigations. This would require an on-site survey to the dwellings once Operation Phase has commenced to determine if the SF effect was applicable and has the potential to incur a nuisance factor to the occupants.
Landscape (Wind) Theme	Very High	The Visual Assessment is included in **Appendix 6** of the Final EIA Report. The area is remote, and only four farmstead receptors were located within the project Zone of Visual Influence, with Medium to Low Exposure (approximately 8 km). 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.
Palaeontology Theme	Medium	The Heritage Report is included in **Appendix 6** of the Final EIA Report. This site sensitivity verification has verified the expected sensitivity as being generally low but with a number of small areas of higher sensitivity ranging from low-medium to high.
Noise Theme	Very High	The Noise Site Sensitivity Verification Report is included in **Appendix 6** of the Final EIA Report. The initial identification of potential noise sensitive areas was conducted through a visual scan of satellite imagery of the area. A total of 64 Noise Sensitive Areas (NSA's) were identified. These NSAs are a combination of farmer's houses, staff houses, remote homesteads and possibly "Shepherd's Huts". Of the 64 NSAs that were identified, one is situated on the development site and two are situated directly adjacent to the site. Due to the presence of these NSAs, it can be confirmed that the sensitivity rating "Very High" is applicable.

Theme	Sensitivity	Comment
Plant Species Theme	Medium	The Terrestrial Ecological Report is included **Appendix 6** of the Final EIA Report. No floral species of conservation concern (SCC) were observed during the screening site-visit. In terms of individual Plant SCC and/or important populations of Plant SCC, potential suitable habitats persist within the project site and surroundings, and as such the classification of the development area as Medium Sensitivity, in terms of Plant SCC, within the Screening Tool, is consistent with the on-site findings.
RFI (Wind Theme)	Very High	The screening tool described the study area as very high Radio Frequency Interference Theme (RFI) sensitivity due to the cluster falling within the Square Kilometre Array (SKA) Karoo Central Radio Astronomy Advantage Area 1 buffer. A high-level path loss study was commissioned to understand if there is any impact to SKA receptors and if so what mitigation is required. The South African Radio Astronomy Observatory (SARAO) office reviewed the report and conducted an internal high-level impact assessment and determined based on the information provided that the project represents a low risk of interference to the SKA radio telescope with a compliance surplus of 11.80 dBm/Hz. As such, SARAO do not object to the proposed Pofadder WEF 1 development. Please refer to the letter from SARAO in Appendix 5.
Terrestrial Biodiversity Theme	Very High	The Terrestrial Ecological Report is included **Appendix 6** of the Final EIA Report. The majority of the “Very High Sensitive” areas identified within the affected properties are based primarily on the NFEPA coverage (mainly FEPA and Upstream Catchments) and Northern Cape CBA coverage (mainly ESA and CBA2). With the exclusion of sensitive areas, as specified within the above-mentioned sections, and with the meticulous implementation of mitigation measures the proposed development of the Pofadder WEF 1 will not have an impact on the province’s biodiversity targets.

8. DESCRIPTION OF THE PHYSICAL ENVIRONMENT

8.1 Geographical

The proposed WEF is located approximately 35 km south-east of Pofadder in the Northern Cape Province and is within the Kai !Garib Local Municipality, in the Z F Mgcawu District Municipality Central Karoo District Municipality. The regional context of the proposed application site is shown in **Figure 9** below.

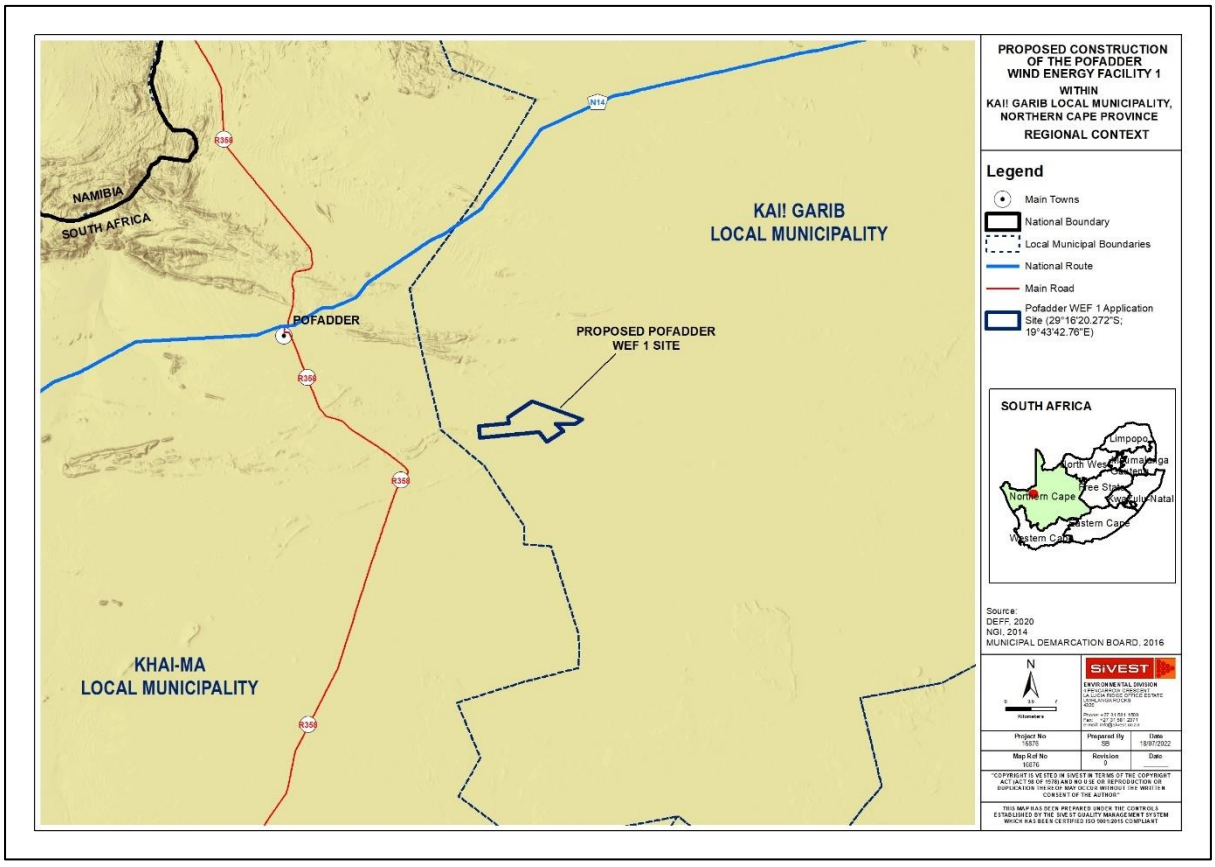

Figure 9: Regional context

8.2 Land Use

According to the South African National Land Cover dataset (2018), much of the assessment area is classified as “Bare / Barren Land”, interspersed with areas of “Low shrubland (nama Karoo)” (**Figure 10**). 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 (**Figure 11** and **12**), 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.

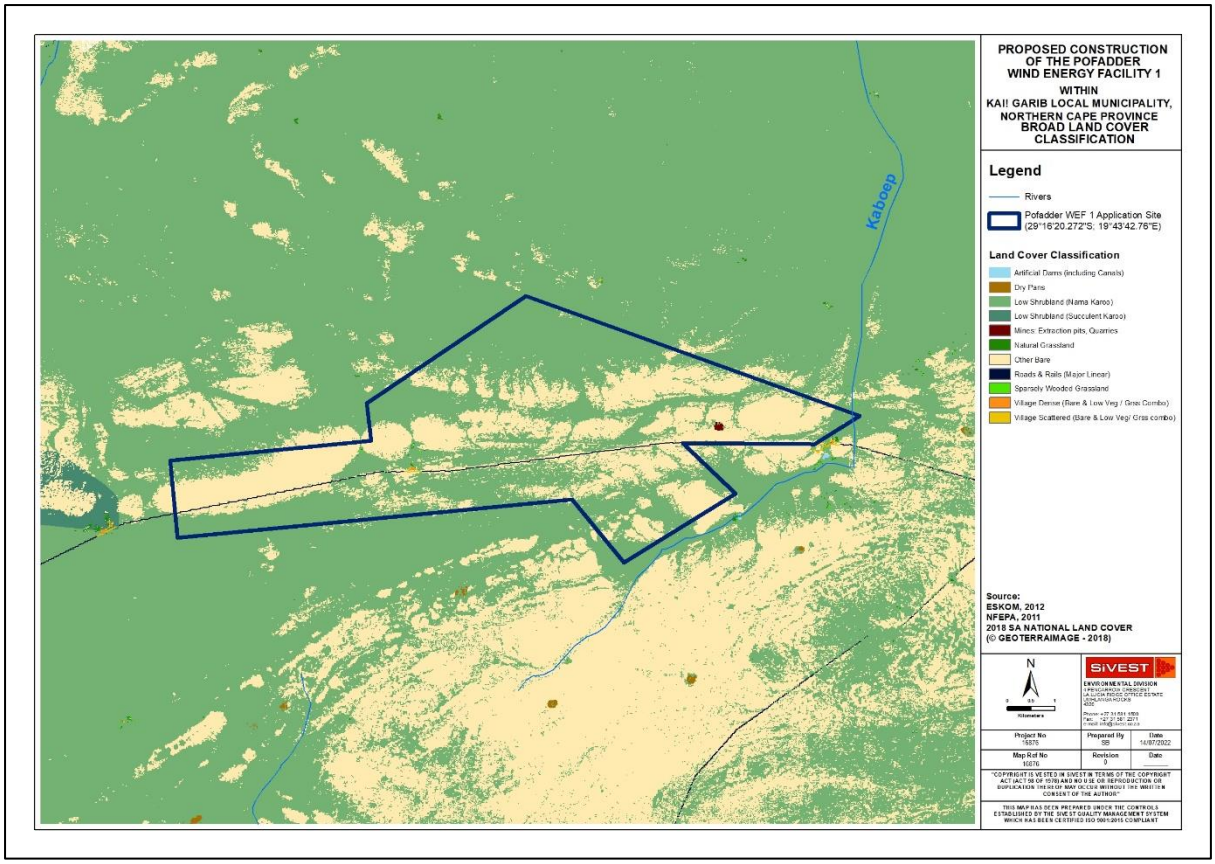

Figure 10: Land Cover Classification

Figure 11: Typical site area

Figure 12: Typical site area

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 (**Figure 13**). 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.

Figure 13: Farm houses on Pofadder 1 site

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 (**Figure 14**). 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 (**Figure 15**), usually unsuited for tourist related traffic.

Further human influence is visible in the area - located in the southern portion of the study area is an Aries Aggeneis 400 kV power line. Within the 2 km distance from the power line, the landscape character is likely to be strongly defined as a power line corridor.

Figure 14: N14 National Road northbound just before Aggeneys Town

Figure 15: Typical gravel road west of the study area

The closest built-up area is the town of Pofadder which is situated approximately 35 km north-west of the Pofadder WEF 1 application site. The town is well outside the study area for this project and is thus not expected to have an impact on the visual character of the study area.

8.3 Climate

The Pofadder 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 120 mm per year, which makes for a fairly arid climate.

8.4 Topography

The area is semi-arid with short, sparse grass and low bushes. The topography is generally flat with low ridges and shallow water courses for ephemeral streams and pans.

The characteristics of the ecoregion are:

- Topography is diverse, but plains with a moderate to high relief and lowlands, hills and mountains with moderate to high relief are dominant. Vegetation consists almost exclusively of Nama Karoo vegetation types;
- Most of the rivers in the region are seasonal to ephemeral,
- Perennial rivers that traverse this region are the Riet and Orange;
- Rainfall is moderate to low in the east, decreasing to arid in the west. Coefficient of variation of annual precipitation is moderate to high in the east to very high in the west;
- Drainage density is generally low, but medium to high in some parts;

8.5 Geology

The Council for Geoscience (CGS) prepared a report to advise on the potential mineral resources of the area in which the Pofadder WEF 1 is proposed.

Geologically, this farm is dominated by the Quaternary System comprises sand, red and grey aeolian dune sand. The Koeipoort Granite is part of the highly-metamorphosed Late Precambrian rocks of the Aggeneys Subgroup (Bushmanland Group). Dolerite is post-tectonic, most likely of Karoo age and occurs as sills and remnant hillocks. Non-diamondiferous kirnberlite pipes occur in the west and their emplacement appears to have been structurally controlled, being situated along the Nouzees shear zone. The basal Wortel Formation (650– 920 m thick) consists of interlayers of biotite-sillimanite schist and subordinate quartzite, which is magnetite-bearing in places.

The central parts of the Bushmanland Subprovince are characterized by voluminous concordant to semi-concordant bodies of red-weathered quartzofeldspathic gneisses, often referred to as the “Pink Gneiss” or “Hoogoor Suite” (Joubert, 1971; Albat, 1984). However, in the southern Garies Terrane Macey et al. (2011) refers to these “pink gneisses” as the Lekkerdrink Gneiss. Biotite gneiss of Klipvlei Formation. Wortel Formation shale, quartzite and muscovite schist, white quartzite. Brulkolk Formation medium-grained biotite gneiss, calc-silicate rocks with lenses and layers of muscovite schist, limestone, conglomerate and amphibolite.

Noubestaan gneiss dark-grey-weathering, medium-grained, well-foliated biotite gneiss with well developed, elongated k-feldspar megacrysts and numerous fine-grained biotite-rich xenoliths. Swartmodder Gneiss medium-grained augen gneiss. Pella Subgroup quartzite, quartz-muscovite and mica-sillimanite schists, iron-formation, nodular gneisses, minor conglomerate. Longsiekvlei Formation calc-silicate rocks, quartzite, amphibolite, conglomerate. Koeipoort Granite pink-weathering, medium-grained granite/gneiss. Mbizane Formation diamictite, sandstone, siltstone, mudrock (Maclaren, 1984) and Volmoed Formation white to grey, glassy (recrystallized), medium-grained, monomineralic quartzite and interbedded feldspathic quartzite, schist and iron-formation.

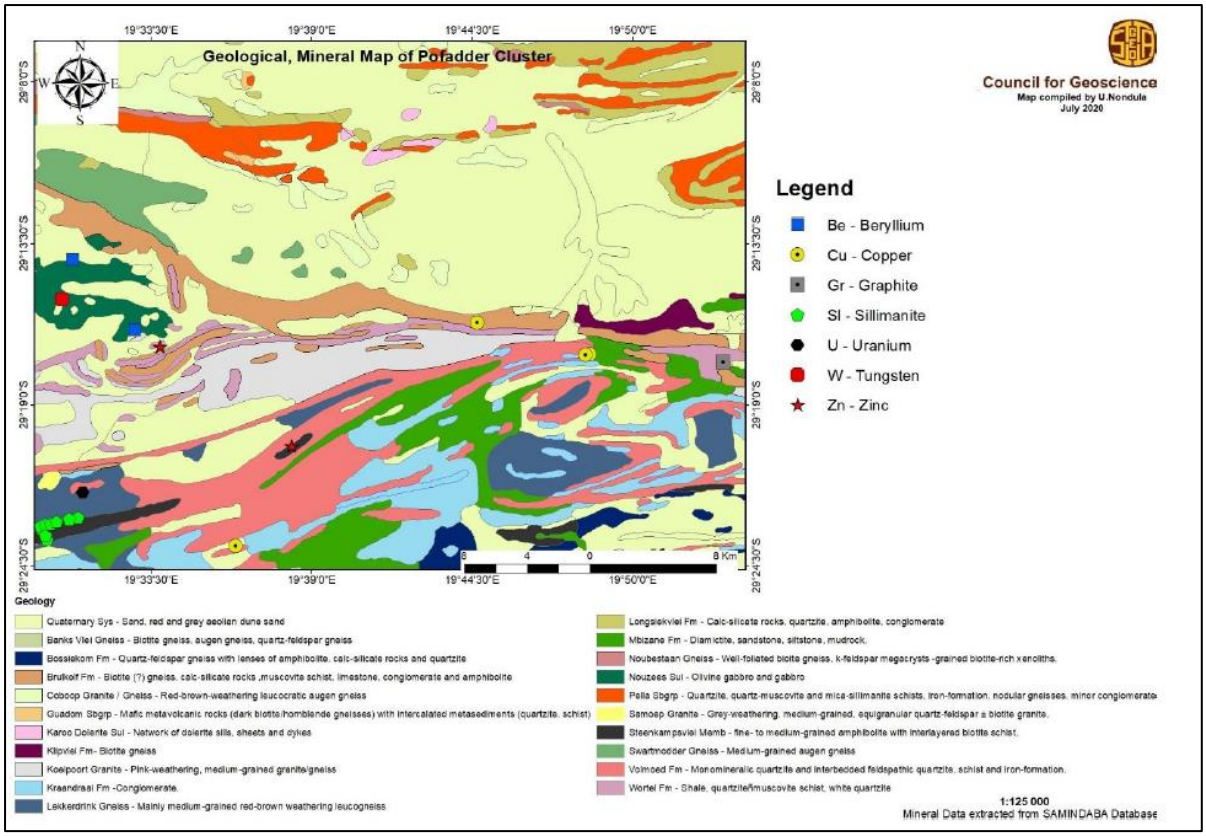

Figure 16: Geological map for Pofadder Cluster

8.6 Freshwater Resource Assessment

A Freshwater Resource Assessment was undertaken by Nkurenkuru Ecological and Biodiversity (report dated July 2022).

The Pofadder WEF1 project is located within the Nama Karoo Level 1 ecoregion. The Nama Karoo ecoregion incorporates a number of northward flowing rivers, with the main system into which these rivers flow being the Orange River.

The study site is located primarily within the D81F Quaternary Catchment (QDR) whilst a fairly small portion of the project site extends into the Quaternary Drainage Region D81G, however, according to the proposed layout almost all of the infrastructure will be restricted to the D81F QDR. Both of these QDRs are located within the Lower Orange Water Management Area. The main drainage feature within the region is the Kaboep, which drains directly into the Orange River some 80km to the north-west.

The on-site / in-field assessment of the freshwater resource indicators was conducted on the 24th to 26th October 2021. The area was, prior to the time of the survey, experiencing an extensive drought period, however during the inspection, the conditions were slightly more favourable, as the area received some precipitation just prior to the site visit, resulting in slightly more favourable survey conditions.

In terms of the development, no Strategic Water Source Areas (SWSAs) will be impacted as the project site is well outside any of these areas. Similarly, no National Freshwater Ecosystem Priority Areas (NFEPA) are located in close proximity to the proposed site. No FEPA and/or Upstream rivers as well

as FEPA wetlands will be directly impacted by the proposed development. Furthermore, due to the nature of WEF developments, the development of the Pofadder 1 WEF will not result in any significant/detrimental transformations of the FEPA1 and Upstream prioritized sub-quaternary catchments and their associated drainage characteristic. Potential impacts on local drainage characteristics can be significantly and successfully mitigated.

In terms of Critical Biodiversity Areas (CBA), no CBA1 or CBA2 will be impacted (refer **Figure 16** below). Furthermore, a very small/limited impact is planned to occur within ESAs and will lead to a very limited loss of ESA (with the necessary mitigation measures in place). However, this loss of ESA is regarded as acceptable and will not threaten the province's conservation targets.

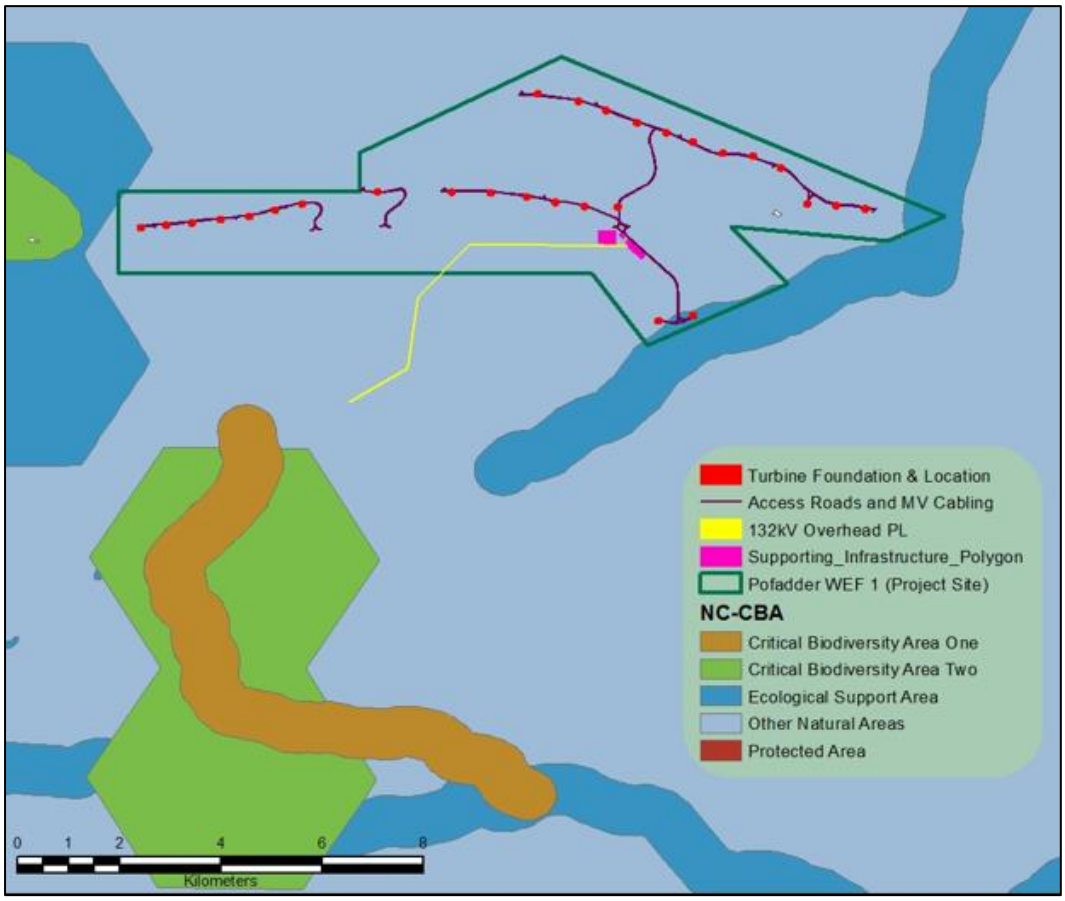

Figure 17: Critical Biodiversity Map

8.6.1 Aquatic / Freshwater Resource Delineation

Wetland Features

Soil and vegetation sampling in conjunction with the recording of topographical features enabled the delineation of one depression wetland unit within the project site (refer **Figure 18** below). This depression wetland is located outside of the proposed WEF development footprint and this wetland will not be impacted by the proposed development.

Ephemeral Streams and Washes

One major/primary wash, and 12 minor streams/washes were identified and delineated (**Figure 18**). These delineated features represent larger and wider watercourses that include broad watercourses that may lack distinct channel development. Washes are typically discontinuous, diffuse channels on a flat topography in dry environments.

Smaller Ephemeral Channels and Drainage Lines

A total of fifty-eight (58) drainage lines were identified within the project site (refer **Figure 18**). These features were captured as lines during the delineation process and are expected to be consistent with the NWA watercourse definition of 'natural channels that flow regularly or intermittently'. They can be marginal in nature with discontinuous or poorly developed channels that represent swales due to poor channel development in arid areas with low rainfall, high evapotranspiration and high infiltration in areas with sandy soils. No hydromorphic (wetland soil) or hydrophyte (wetland plant) indicators were recorded in these watercourses.

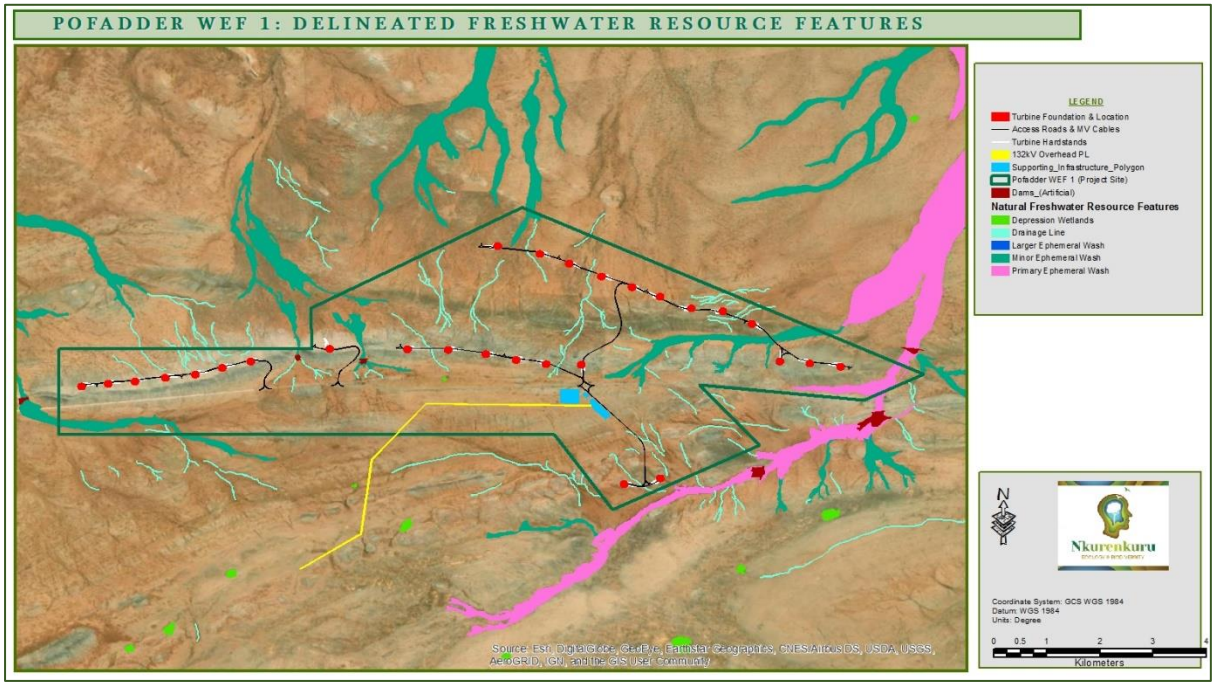

Figure 18: Aquatic / Freshwater Resource Features delineated within the Pofadder WEF 1 development

8.6.2 Present Ecological State (PES)

The results of the PES assessments are summaries in the table below:

Table 12: Summary results of the river IHI (Index of Habitat Integrity) assessment

Freshwater Resource Feature	HABITAT COMPONENT		
	Instream PES Category with % Intact	Riparian PES Category with % Intact	Overall PES (weighted 60:40)
Primary Ephemeral Wash	A: Natural/Unmodified (94% intact)	B: Largely Natural (89% intact)	A: Natural/Unmodified (92% intact)

Freshwater Resource Feature	HABITAT COMPONENT		
	Instream PES Category with % Intact	Riparian PES Category with % Intact	Overall PES (weighted 60:40)
Minor Ephemeral Washes	B: Largely Natural (86% intact)	B: Largely Natural (83% intact)	B: Largely Natural (85% intact)
Drainage Channels	A: Unmodified (94% intact)	B: Largely Natural (81% intact)	B: Largely Natural (89% intact)

Table 13: Results of Level 1 Wet-Health Assessment

Hydro-geomorphic Unit	Hydrology	Geomorphology	Vegetation	Overall PES
Depression Wetland	A: Natural/Unmodified (PES Score: 0)	A: Natural/Unmodified (PES Score: 0)	C: Moderately Modified (PES Score 2)	A: Natural/Unmodified (PES Score: 0.57)

Very little change has occurred to the hydrological and geomorphological characteristics of most of the freshwater resource features. The vegetation characteristics of all of these freshwater resource features have been impacted by grazing in the past and have allowed for some encroachment of especially *Rhigozum trichotomum* within the ephemeral wash and drainage systems and *Rosenia spinescens* within some portions of the depression wetland. The smaller ephemeral washes that cut through the linear ridge have been dammed by small gravel dams just above their points of narrowing. The primary ephemeral wash has been dammed at two locations to the east of the project site (outside of the project site). Other, "minor" impacts include twin track crossings, farm fences, soil capping and sheet erosion. A few of the ephemeral washes to the north and east are crossed by the larger gravel access route. Subsequently, the majority of these freshwater systems are still in a mostly natural, functional condition.

8.6.3 Wetland Ecological Importance and Sensitivity (EIS)

The EI&S indicates the following:

Depression Wetlands – the depression wetland is considered to be ecologically important and sensitive.

Major Ephemeral Streams/Washes – all major ephemeral streams/washes are considered to be ecologically important and sensitive.

Smaller Ephemeral Washes/Streams and Drainage Features – All smaller ephemeral washes and drainage channels are considered to be of high ecologically importance and sensitivity.

According to the current layout of the development footprint, all "Very High" sensitive ephemeral wash systems are located well away from planned infrastructure, and the development will not have a direct impact on these features.

The "High" sensitivity areas coincide with the smaller ephemeral washes (tributaries of the primary ephemeral wash) and the depression wetland. In order to avoid any detrimental impacts on these minor ephemeral features' functions, services and ecological drivers a 50m buffer is recommended around the ephemeral washes and depression wetlands. Development within these freshwater resource features as well as their buffer areas should be largely restricted. The use/upgrade of existing access routes and minimal construction of new routes and the laying of underground mv cables are the only activities allowed within these areas.

According to the current layout, only one such ephemeral wash feature will be impacted by the proposed development, through a single access road and the lying of an underground mv cable. With the necessary mitigation measures in place, this watercourse crossing can be regarded as acceptable and will not impact the ecosystems integrity and ability to perform its important ecological functions and services. All other minor ephemeral wash features as well as the depression wetland along with their buffer areas will be successfully avoided.

The drainage lines ephemeral washes and depression wetlands are slightly less important than the ephemeral wash features and are subsequently regarded as "Medium/Moderate" sensitive. Development within these drainage lines as well as their buffer areas should be largely restricted. The use/upgrade of existing access routes and minimal construction of new routes and the laying of underground mv cables are the only activities allowed within these areas.

According to the current layout, only nine such feature will be impacted by the proposed development, through the construction of access roads and the lying of underground MV cables. With the necessary mitigation measures in place, these watercourse crossings can be regarded as acceptable and will not impact these ecosystems' integrity and ability to perform its ecological functions and services.

Figure 19 indicates the sensitivity ratings of the various freshwater resources.

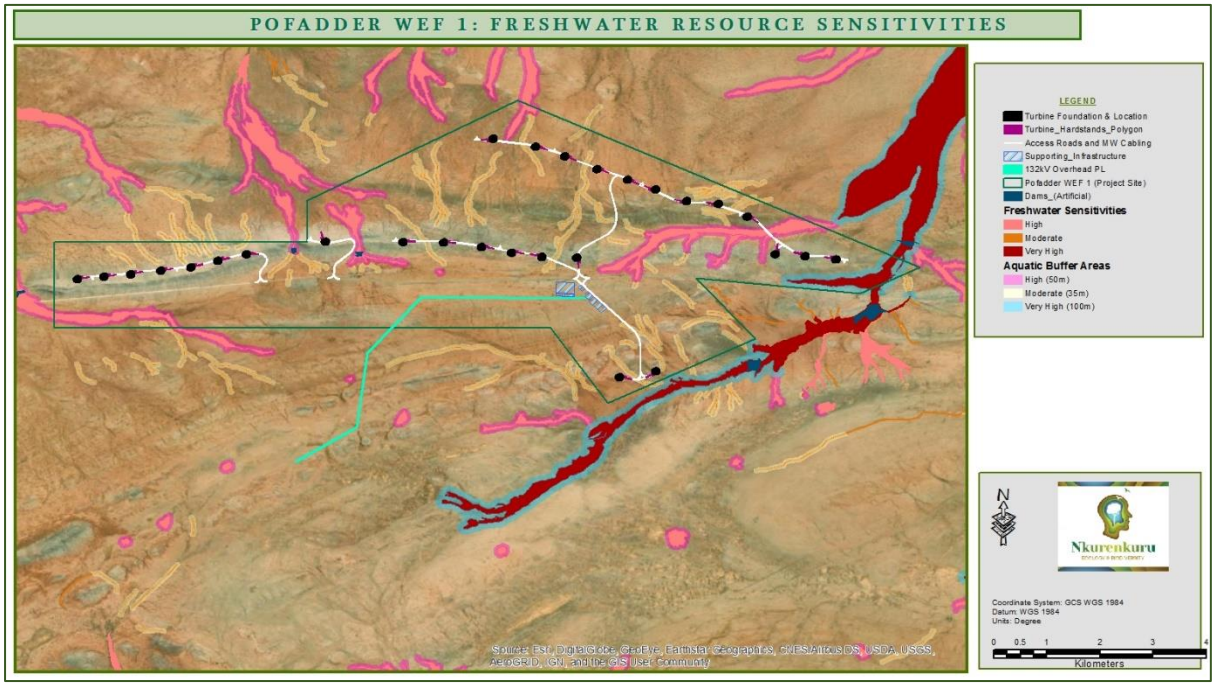

Figure 19: Aquatic/Freshwater resource sensitivity mapping for Pofadder 1

8.6.4 Wetland Buffer Zones

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, 100 m buffer areas, measured from the outer edge of channel or delineated floodplain is recommended (whichever is the furthest).
- For the minor ephemeral washes, 50 m buffer areas, measured from the outer edge of channel or delineated floodplain is recommended (whichever is the furthest)
- For the depression wetlands, 50 m buffer areas, measured from the outer edge of delineated wetland is recommended.
- For the small drainage channels, 32 m buffer areas, measured from the outer edge of channel is recommended.

8.6.5 Recommended Ecological Condition of Freshwater Resource Features

Based on the natural to largely natural ecological condition of the aquatic ecosystems (mostly a PES of B and the majority of the headwater drainage features being classified as A), their high to medium ecological importance and sensitivity and the catchment context of these freshwater resource features, the recommended management objective for all water resource units was assessed as being to 'maintain the current status quo of aquatic ecosystems without any further loss of integrity (PES) or functioning'.

It is highly unlikely that the proposed development will result in deterioration of the present ecological state, provided the recommended mitigation measures are implemented.

8.6.6 Freshwater Impact Assessment Conclusions

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 the aquatic specialists considered opinion that the proposed project could be authorised from a freshwater resource perspective.

8.7 Terrestrial Ecological Assessment

A Terrestrial Ecological Assessment was undertaken by Nkurenkuru Ecological and Biodiversity (report dated July 2022).

The largest portion of the project site has been classified as Bushmanland Arid Grassland (81.2%). Bushmanland Basin Shrubland is mostly confined to the deeper sandier pediments surrounding the narrow ridge system, and only cover approximately 12.5% of the site. The narrow, west to east running ridge located within the northern portion of the site has been classified as Bushmanland Inselberg Shrubland and covers an area of around 6.4%. Namakwa Klipkoppe Shrubland is the smallest vegetation unit within the project site and cover less than 1% of the project site.

Due to the vast extent of intact, natural vegetation still present within all three mentioned vegetation types and the fact that only a very small extent of these vegetation types are located 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 impact on the status and conservation targets set out for these vegetation types. A general habitat map has been compiled, based on the finding of the screening site visit, and is illustrated in the map below.

8.7.1 Findings of the Botanical Assessment

At the time of the survey, the area was still fairly dry, even though the area has received some precipitation prior to the site surveys. Subsequently the vegetation was in a fairly poor condition preceding a prolonged drought, however the area was in the process of recovering somewhat as a result of a few good late summer/autumn downpours. The majority of the expected species were either absent or grazed short. Similarly, many of the dwarf shrubs were without any foliage and only a few were flowering. It can thus be expected that several additional species, mostly annuals and species resprouting from underground storage organs, can emerge throughout the study area during the following rainfall season. A total of 109 plant species were found on site, which consisted of 14 protected, 2 Northern Cape endemic, 11 alien, and 1 invasive species. The landscape features can be identified in **Figure 20** below.

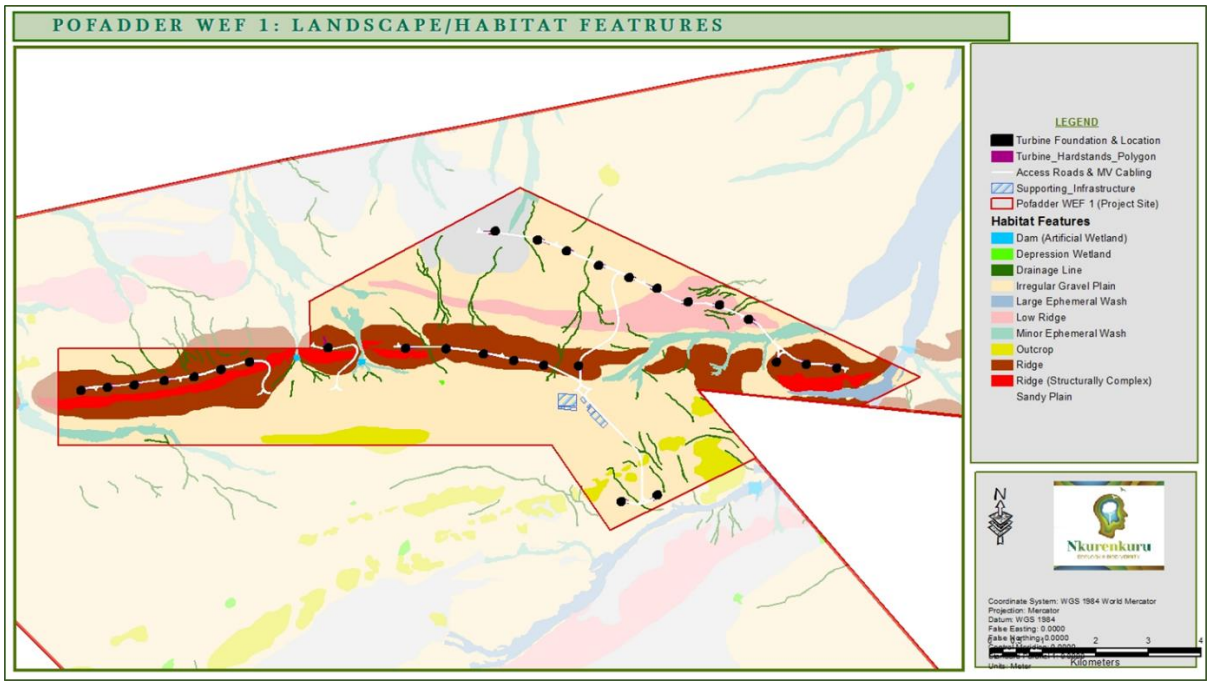

Figure 20: Landscape features found within the project site for the Pofadder WEF 1 development

Bushmanland Arid Grassland - In total more than half of the site consisted of this unit (2860.698 ha; 60.54%). Bushmanland Arid Grassland is an extensive unit. Moreover, given its extensive area on site and its low overall number of species, more than half of which occur within other units, it is the best unit within which development can proceed.

Bushmanland Inselberg Shrubland - A fairly sizeable part of this vegetation type occurs within the site, namely 1601.46 ha (inclusive of the community variations). However, the total nationwide mapped extent of this unit is fairly moderate, covering about 638 km^2. The more gradual, lower lying ridges are less sensitive to disturbances and development within these areas are acceptable. However, the upper slopes of the linear ridge as well as the quartzite outcrops scattered throughout the Bushmanland Arid Grassland, contributes to spatial heterogeneity and subsequently species and habitat diversity, within this area. Varied topography is recognised as one of the most powerful influences contributing to biodiversity.

These upper slopes of the linear ridge system and the rocky outcrops are characterised by higher spatial heterogeneity due to the range of differing aspects (north, south, and variations thereof), slopes and altitudes all resulting in differing soil (e.g. depth, moisture, temperature, drainage, nutrient content), light and hydrological conditions. The structurally more complex, upper slopes of the linear ridge, are regarded as more sensitive and it is recommended that this portion of the ridge be avoided as much as possible.

Azonal Vegetation: Washes, Drainage Features and Depressions - All of the freshwater resource features on and around the site are intermittent or ephemeral, being inundated only for brief periods each year, with periods of drought that are unpredictable in duration. The two alluvial floodplains or washes located to the east of the project site are regarded as the dominant drainage feature of the project site. These washes are characterised by multiple channels that traverse a floodplain, valley floor or alluvial fan. Surface water may flow along a particular channel in one year, but due to their being little topographic definition or gradient across the landscape, a parallel channel may be eroded the following year, leading to a network of channels. These larger washes are fed by numerous small drainage lines. A few small to small-medium gravel dams are associated with the larger ephemeral washes, especially within the higher reaches and due to the dry and sometimes inconspicuous nature of these washes, a few dirt roads traverse these features.

The azonal habitats, combined, had the second highest species diversity of the vegetation types found on site: a total of 42 species were recorded, of which 24 were found only in this unit (57%) and 18 were shared with one or more of the other units. This high level of unique species is expected due to the nature of these habitats, as mentioned previously

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. The smaller ephemeral washes and the depression wetland are slightly less important and is subsequently regarded as High Sensitive. Only one such ephemeral wash feature will be impacted by the proposed development, through a single access road and the laying of an underground mv cable. With the necessary mitigation measures in place, this watercourse crossing can be regarded as acceptable and will not impact the ecosystems integrity and ability to perform its important ecological functions and services. In terms of proposed impacts on the drainage lines, nine small drainage lines will be crossed by access roads and underground cables. This is deemed acceptable, with the necessary mitigation measures in place, as these crossings will not impact the more important downstream freshwater resource features. In terms of the depression wetland, this feature will however be avoided by the proposed development, direct impacts on this feature is highly unlikely.

8.7.2 Findings of the Faunal Assessment

Mammals Species of Conservation Concern (SCC) - 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.

Reptiles - Of the 41 reptile species that have a distribution that include the project area, seven (7) indigenous reptile species have been observed. During the site visit the only Reptile SCC recorded was Psammobates tentorius verroxii. In terms of the likely impacts of the development on these tortoise species, habitat loss is not likely to be highly significant as the direct footprint of the development is not

likely to exceed a few hundred hectares and this would not be significant in context of the relatively homogenous and intact surrounding landscape.

Amphibians - No amphibian species have been recorded within the project area, however there are available habitat for these species and the likelihood of some of these species to occur. Impacts on amphibians are likely to be low given the limited extent of the development as well as low likely density of amphibians in the area.

The ecological sensitives identified for the Pofadder WEF 1 are indicated in **Figure 21**.

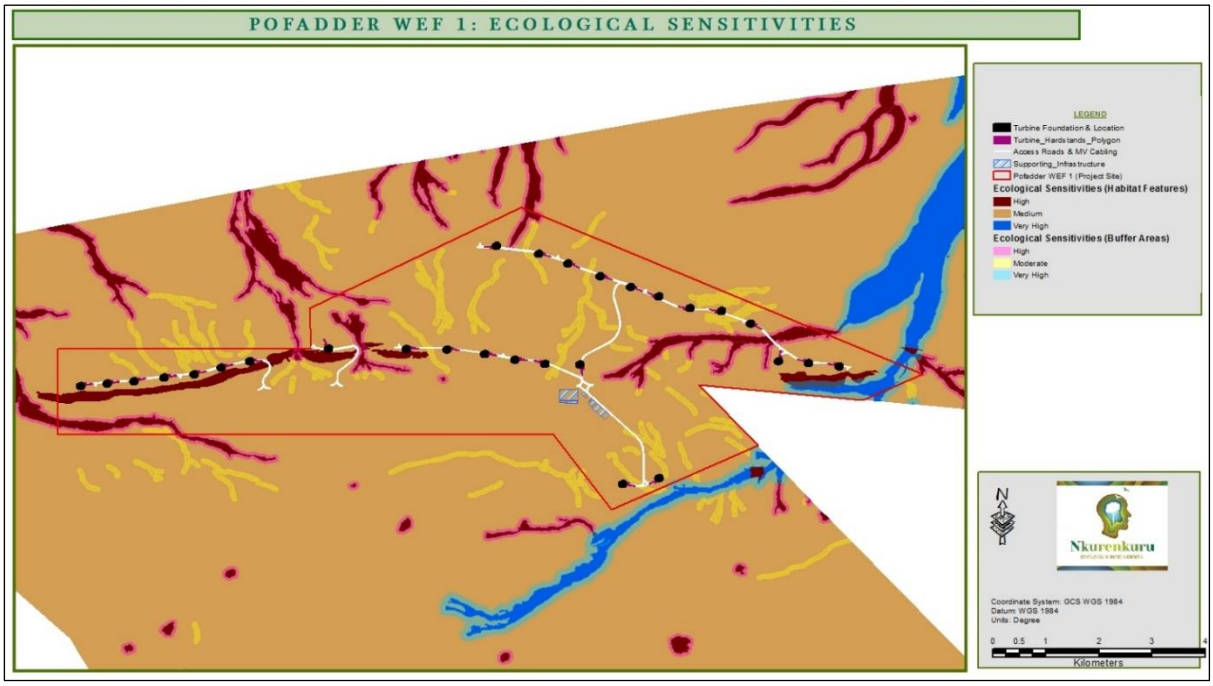

Figure 21: Ecological Sensitivity Mapping

8.7.3 Ecological Impact Assessment Conclusions

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 Management Programme (EMPr) for the site, together with appropriate rehabilitation guidelines and ecological monitoring recommendations.

Based on the outcomes of this study it is the specialists considered opinion that the proposed project detailed in this report could be authorised from a terrestrial ecological perspective.

8.8 Agricultural

An agricultural compliance statement and site sensitivity verification was undertaken by Johann Lanz (report dated July 2022). An agricultural compliance statement was applicable and therefore compiled as a result of the low sensitivity identified in the DFFE screening tool. According to the agricultural report, 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 amount of agricultural land loss caused by the project is well within the allowable development limits prescribed by the agricultural protocol to ensure appropriate conservation of agricultural production land. The footprint of the development is approximately eight times smaller than what the development limits allow.

The Agricultural report concluded that the proposed development will not have an unacceptable negative impact on the agricultural production capability of the site. The proposed development is therefore acceptable and it is recommended that the development be approved.

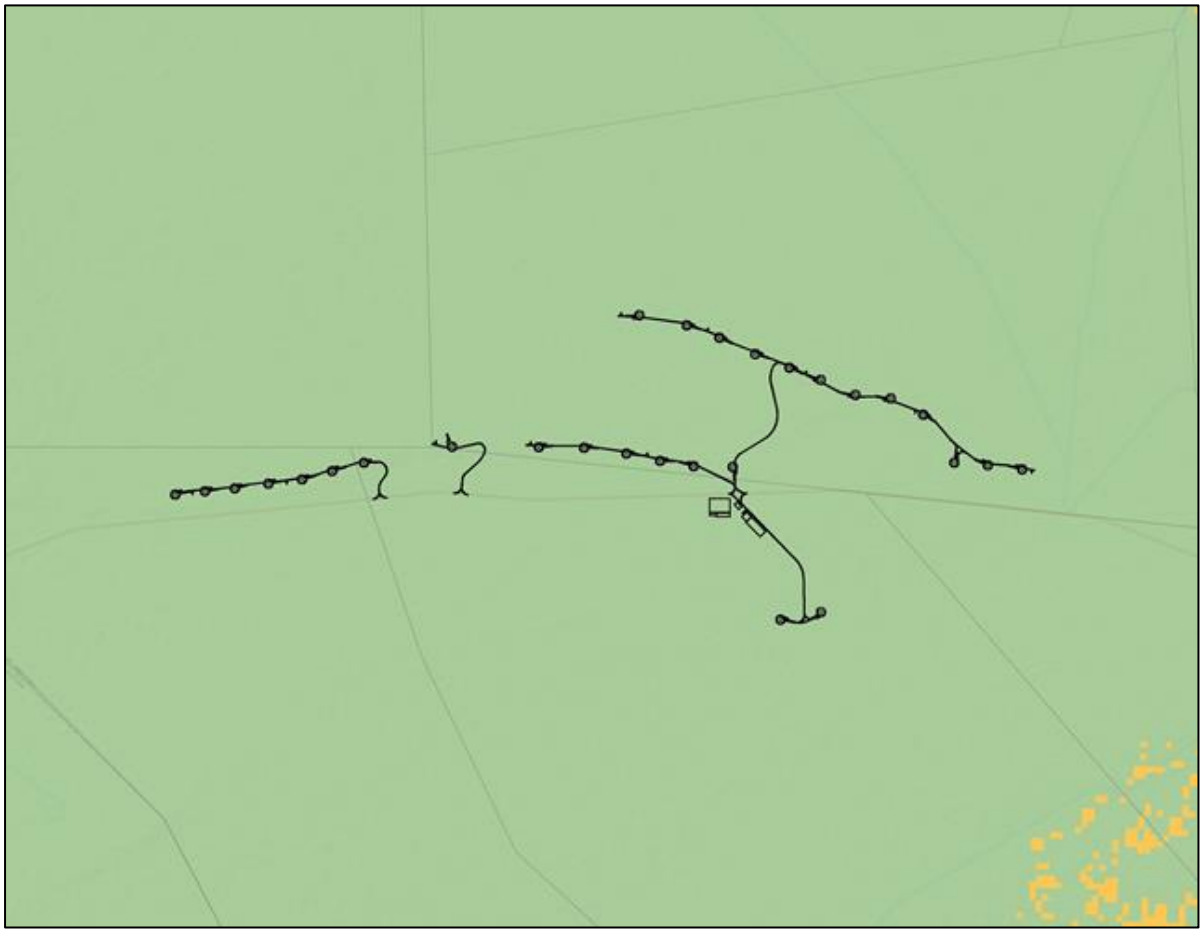

Figure 22: Agricultural sensitivity from DEA screening tool (green=low sensitivity)

8.9 Avifauna

An Avifaunal Assessment was undertaken by Chris van Rooyen Consulting (report dated July 2022).

8.9.1 Important Bird Areas (IBAs)

The project site and proposed development area do not fall within a formally protected area. The Gamsberg Nature reserve is the closest protected area however the Pofadder WEF 1 is not expected to impact on the avifauna from the reserve, as it is a considerable distance from the nearest turbines.

In terms of Important Bird Areas (IBA), the Mattheus-Gat Conservation Area is situated approximately 12km to the North of the site. This IBA is one of a few sites protecting both the globally threatened Red Lark and the near-threatened Sclaters Lark. A Verreaux's Eagle nest is located approximately 12km from the closest planned turbine. The proposed wind energy facility is not expected to impact on the avifauna in the Mattheus-Gat Conservation Area due to the distance from the nearest planned turbines.

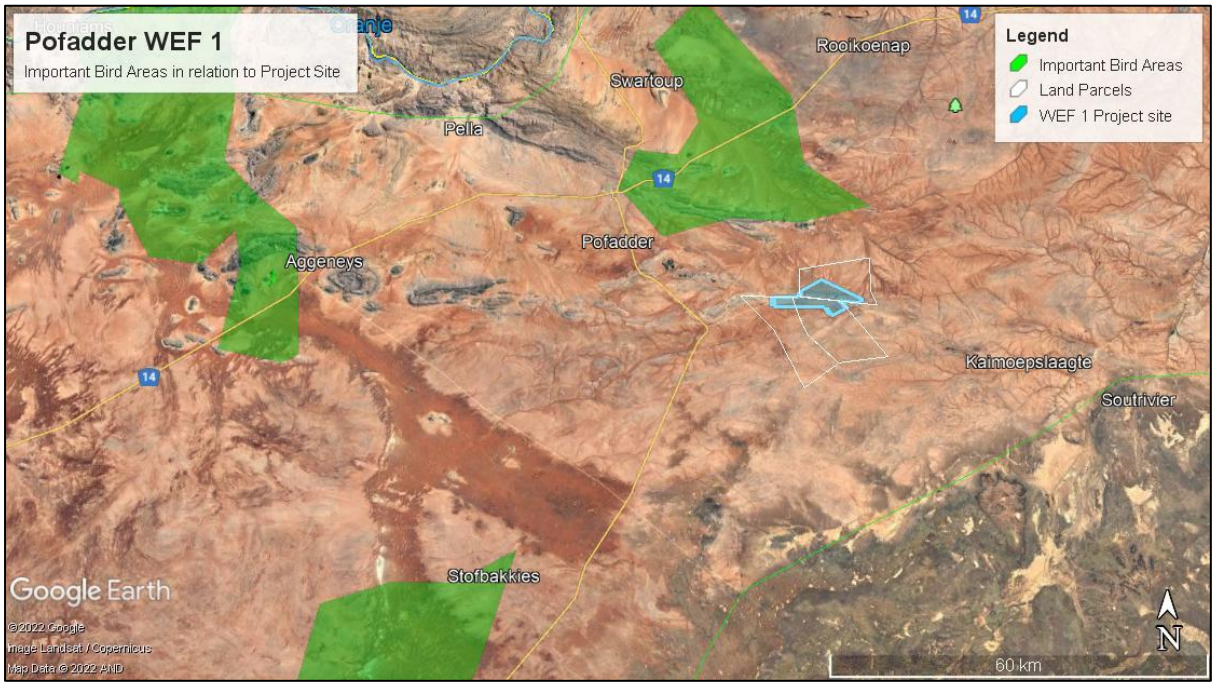

Figure 23: Regional map detailing location of the proposed Pofadder WEF 1 in relation to Protected and Important Bird Areas

8.9.2 DFFE National Screening Tool

The Project Site and immediate environment is classified as Medium and High sensitivity for terrestrial animals according to the Terrestrial Animal Species Theme. The High and Medium sensitivity classifications are linked to Burchell's Courser *Cursorius rufus*, Ludwig's Bustard *Neotis ludwigii* and Secretarybird *Sagittarius serpentarius*. The Project Site contains confirmed habitat for species of conservation concern (SCC) as defined in the Protocol. The classification of high sensitivity is confirmed based on the presence of species of conservation concern (SCC) recorded during onsite surveys and pre-construction monitoring at the project site, namely *Verreaux's* Eagle *Aquila verreauxii* (SA status: Vulnerable), Lanner Falcon *Falco biarmicus* (SA status: Vulnerable), Ludwig's Bustard (SA status: Endangered), Lappet-faced Vulture *Torgos tracheliotis* (SA status: Endangered), Karoo Korhaan *Eupodotis vigorsii* (SA status: Near-threatened) and Sclater's Lark *Spizocorys sclater* (SA status: Near-threatened). Furthermore, the development area contains habitat for other SCCs which could potentially occur, namely Martial Eagle *Polemaetus bellicosus* (SA status: Endangered), White-backed Vulture *Gyps africanus* (SA status: Endangered) and Burchell's Courser *Cursorius rufus* (SA status: Vulnerable).

Based on the available SABAP2 data, the Site Sensitivity Verification survey conducted in June 2020, and the four pre-construction monitoring surveys conducted in 2021 - 2022, the classification of High sensitivity for avifauna in the screening tool is confirmed for the Project Site and Development Area.

8.9.3 Avifauna in the Project Site

The Bird distribution data from the Southern African Bird Atlas Project 2 (SABAP2) data indicates that a total of 96 bird species could potentially occur within the broader area. Of these, 18 species are classified as priority species and 11 of these are South African Red List species. Of the priority species, 15 are likely to occur regularly in the development area.

8.9.4 Results of pre-construction bird monitoring

A number of vantage points were established, including drive transects, walk transects and focal points. The image below (**Figure 24**) represents the locations where priority species were recorded at the project site during transects counts and incidental sightings.

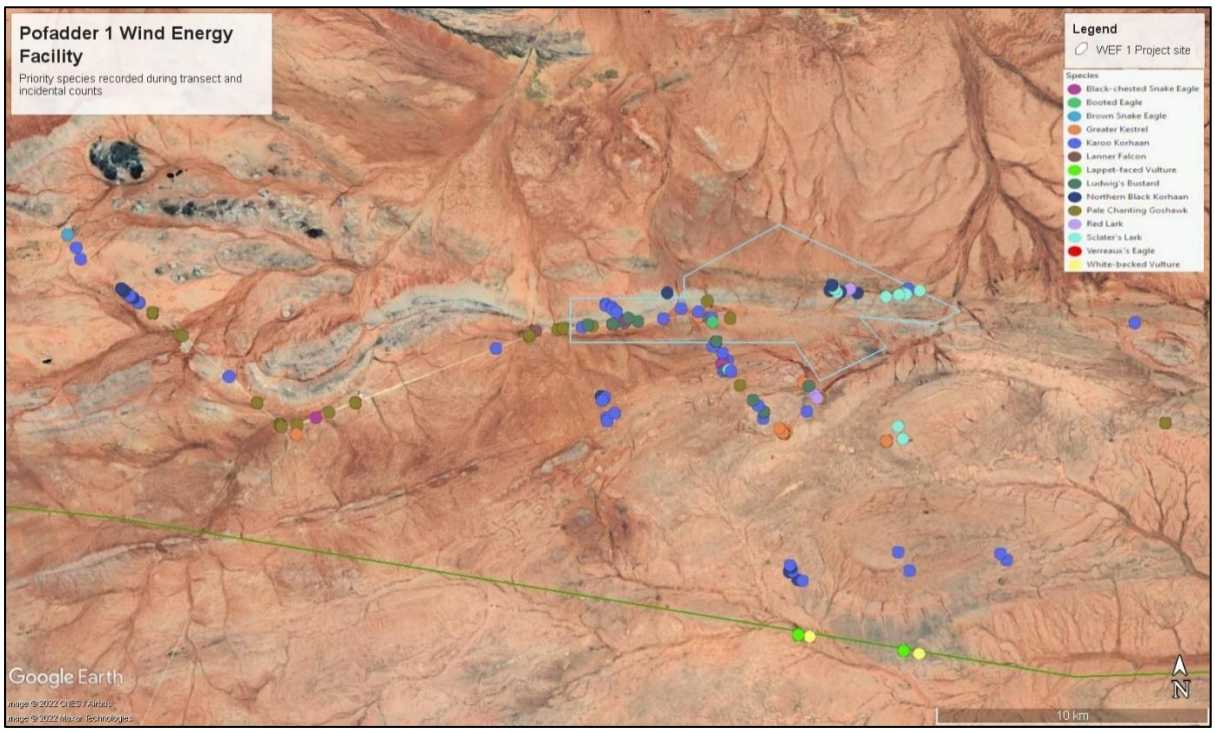

Figure 24: The locations of priority species recorded at the proposed WEF

Focal Points

No focal points of bird activity were identified during the first two surveys. The closest Martial Eagle nest is located on Tower 166 of the Aggeneis – Aries 1 400 kV line, approximately 22.8 km west from the closest planned turbine position. The closest Verreaux's Eagle nest is located approximately 12.8 km north of the closest planned turbine position. However, during the third survey, a total of 24 White-backed Vulture and 22 Lappet-faced Vultures were recorded roosting on the Aggeneys – Aries 1 400 kV transmission line to the south of the development areas. This area was identified as a focal point and was monitored during subsequent surveys.

8.9.5 Findings and Impact Assessment

The proposed Pofadder WEF 1 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.

It is inevitable that a measure of displacement will take place for all priority species during the construction phase, due to the disturbance factor associated with the construction activities. This is likely to affect ground nesting species the most, as this could temporarily disrupt their reproductive cycle. Species which fall in this category are Ludwig's Bustard, Kori Bustard, Karoo Korhaan, Northern Black Korhaan, Burchell's Courser, Double-banded Courser, Spotted Eagle-Owl, Sclater's Lark and Red Lark. The impact is rated as **medium** but could be mitigated to **low** levels.

- Displacement due to habitat transformation in the construction phase.

The network of roads is likely to result in significant habitat fragmentation, and it could have an effect on the density of several species, particularly larger terrestrial species such as Ludwig's Bustard, Kori Bustard, Northern Black Korhaan and Karoo Korhaan. Red Lark and Sclater's Lark could also potentially be impacted. However, given the expected density of the proposed turbine layout and associated road infrastructure, it is not expected that any priority species will be permanently displaced from the development site. The building infrastructure and substations will all be situated in the same habitat, i.e., Karoo scrub. The habitat is not particularly sensitive, as far as avifauna is concerned, therefore the impact of the habitat transformation will be low given the extent of available habitat and the small size of the physical footprint. The following species are likely to be most affected by habitat transformation: Karoo Korhaan, Northern Black Korhaan, Kori Bustard, Ludwig's Bustard, Sclater's Lark, Red Lark and possibly raptors such as Pale Chanting Goshawk and Martial Eagle. The impact is rated as **low** both pre- and post-mitigation.

- Collision mortality caused by the wind turbines in the operational phase.

The proposed WEF will pose a potential collision risk to several priority species which could occur regularly at the site. Species exposed to this risk are large terrestrial species i.e. Ludwig's Bustard, Kori Bustard, Karoo Korhaan and Northern Black Korhaan. Soaring priority species, i.e. species such as Martial Eagle, Pale Chanting Goshawk, Booted Eagle, Verreaux's Eagle, Greater Kestrel, White-backed Vulture and Lappet-faced Vulture. The high voltage powerline to the south of the project site is a focal point for vulture flight activity. No vultures were recorded during surveys in June and October 2021, all the flight activity was recorded during the third and fourth surveys in February and March 2022. Indications are that this could a regular pattern, based on experiences at other proposed wind farms in the Northern Cape. The passage rate over the combined WEF areas during the February 2022 survey was 0.3 birds/hour, or just under 4 birds per day. By March 2022, the passage rate had dropped to 0.03 birds/hour, or one bird every 2.5 days. This points to a regular occurrence of vultures, but only during a specific time period, namely the non-breeding season from January to May, with an expected peak in February and tapering off towards May when the breeding starts. The majority of the flight activity (14 out of 16 flights or 87.5%) was recorded within 2.8km of the powerline roost. Red Larks could also potentially be at risk during display flights. In summary, the following priority species could be at risk of collisions with the turbines: Greater Kestrel, Karoo Korhaan, Ludwig's Bustard, Kori Bustard, Martial Eagle, Northern Black Korhaan, Pale Chanting Goshawk, Spotted Eagle-Owl, Verreaux's Eagle, White-backed Vulture, Lappet-faced Vulture, Burchell's Courser, Double-banded Courser, Red Lark and Sclater's Lark. 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 majority of medium voltage cables will be buried, but there may be sections where overhead lines may be used due to technical reasons. Raptors and vultures could use these poles as perches. Species most at risk of electrocution on the medium voltage network are Greater Kestrel, Martial Eagle, Pale Chanting Goshawk, Spotted Eagle-Owl, Verreaux's Eagle, Lappet-faced Vulture and White-backed Vulture. The impact is rated as **medium** pre-mitigation and **low** post-mitigation.

- Collisions with the 33kV MV overhead lines (if any) in the operational phase.

While the intention is to place the 33kV reticulation network underground where possible, there are areas where the lines might have to run above ground, for technical reasons. In these instances, the line could potentially pose a collision risk to various species, particularly large terrestrial species including Red Data species such as Ludwig's Bustard, Blue Crane, Karoo Korhaan and Secretarybird and various waterbirds when the dams are full, and the drainage lines contain water. The impact is rated as **medium** pre-mitigation and **low** post-mitigation.

8.9.6 Avifaunal Sensitivity

Very High Sensitivity Zones

The very high sensitivity zones are listed below. The construction of all infrastructure in these zones should be avoided completely:

- 500 m 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 500 m from the closest turbine.
- Newly identified breeding areas for Sclater's Lark.

High Sensitivity Zones

The construction of turbines in these zones should be avoided to eliminate the risk of turbine collisions. Other infrastructure is permitted:

- 2.8 km no-turbine buffer around the seasonal vulture roost on the Aries-Aggeneys 400 kV transmission line running through the south of the project site.

Medium Sensitivity Zones

The construction of turbines in these zones should be restricted to a minimum. 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 3 m/s (measured at ground level) during daylight hours when a rainfall event of 10 mm 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 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 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.

Figure 25 below is an avifaunal sensitivity map for the Pofadder WEF 1.

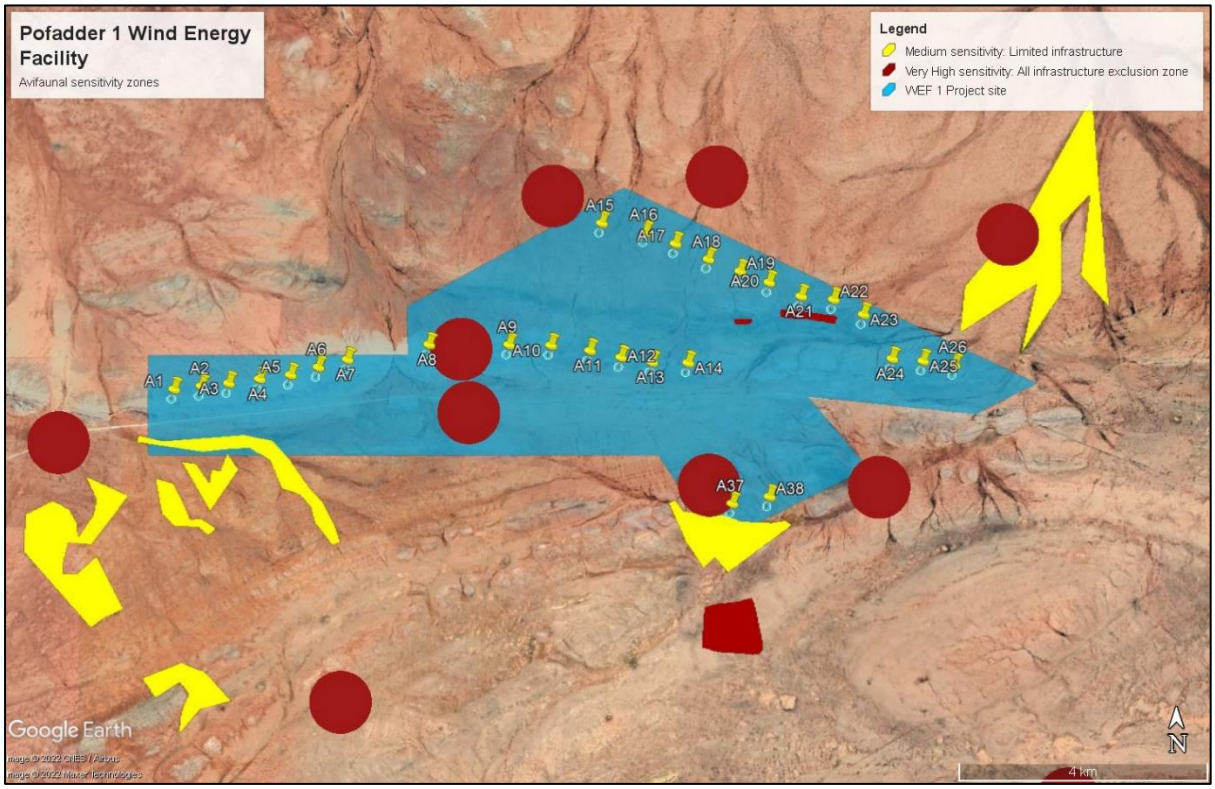

Figure 25: Avifaunal sensitivities within the project site and Pofadder WEF 1 Development area

PLEASE NOTE, ALL TURBINES AND ASSOCIATED INFRASTRUCTURE (SUBSTATION, BESS, LAYDOWN AREAS, O&M BUILDING ETC.) ARE LOCATED OUTSIDE OF ALL SENSITIVITES ZONES IDENTIFIED BY THE AVIFAUNAL SPECIALIST.

8.9.7 Conclusion and Impact Statement

Based on the pre-construction monitoring, it is envisaged that the proposed 224 MW Pofadder WEF 1 could potentially have a range of pre-mitigation negative impacts on priority avifauna ranging from low to medium, all of which could be reduced to acceptable levels with appropriate mitigation. No fatal flaws were discovered during the investigations.

8.10 Bat

A bat specialist study was undertaken by Camissa Sustainability Consulting (report dated July 2022).

Bat roosting sites in the study area are relatively limited and unlikely to support large congregations of bats. The closest known major bat roosts are approximately 120 km northeast of the Pofadder site. Rocky outcrops are present primarily in the north and northwest and these geological features may provide roosting spaces for Bat species. Bats are also likely to roost in buildings associated with farmsteads within and bordering the project especially Cape Serotine and Egyptian Free-tailed Bat. Trees growing at these farmsteads, and in limited places elsewhere on site usually at livestock water points, could also provide roosting spaces for bats although the extent of this is likely limited since these trees are typically not large and day-time temperatures may be too hot. The building inspections on site did not reveal any evidence of roosting bats.

The baseline was determined by using acoustic monitoring to record spatio-temporal bat activity patterns, and roost surveys to locate used or potentially used bat roosting sites. This assessment is based on the data collected between 29 June 2021 and 21 June 2022 (358 nights). Bat acoustic activity was sampled at five locations within the study area by recording bats at 50 m and 100 m at three locations, and at 10 m at two locations. The monitoring period spanned all four seasons therefore this assessment is based on a representative sample of annual bat activity.

Based on current taxonomic information and bat occurrence data, eight bat species could occur at the project, five of which have been confirmed based on the acoustic data recorded. No Threatened species were recorded or expected to occur on site but based on habitat suitability modelling (Monadjem et al. 2010), it is possible that the distribution of the nationally Near Threatened Angolan Wing-gland Bat (*Cistugo seabrae*) may overlap with the project although the project is at the southern extreme extent of its distribution.

Over the 358 nights of sampling, 68,104 bat passes were recorded from five species. Approximately 82 % of total activity was attributed to Egyptian free-tailed bat, while approximately 17 % was attributed to Roberts's flat-headed bat. Natal long-fingered bat, Cape serotine and Long-tailed serotine were seldomly recorded and together accounted for less than 1 % of total activity. Activity varied seasonally with highest activity in summer and autumn, and lower activity in spring and winter. Egyptian free-tailed bat activity peaked in summer at all heights, with the magnitude of activity suggesting high risk during this period as well as during autumn. For Roberts's flat-headed bat, activity was lower and hence risk is expected to be at medium risk during summer and autumn overall but with high risk during certain months.

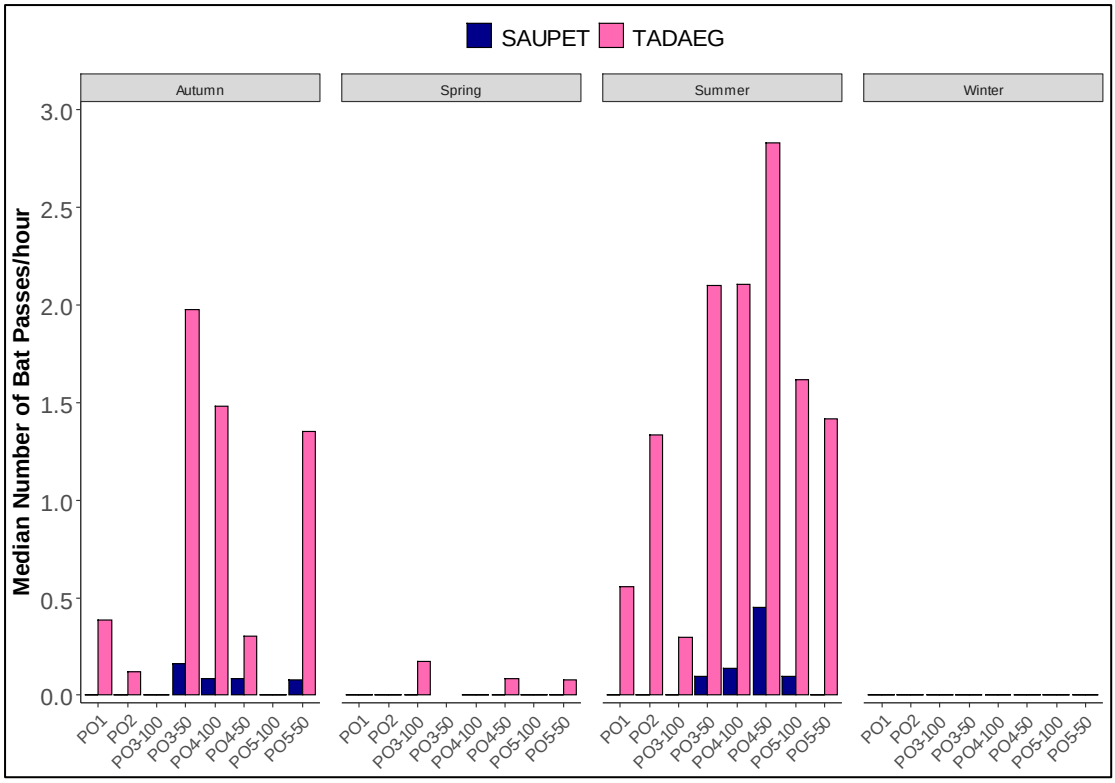

Figure 26: Median bat activity across monitoring locations per seasons for Roberts's flat-headed bat (SAUPET) and Egyptian free-tailed bat (TADAEG)

Spatially, median bat activity was highest at height (i.e., above 50 m) relative to ground level (**Figure 26**). Risk levels at PO3, PO4 and PO5 (where monitoring took place at 50 m and 100 m) are classified as high based on median bat activity when compared to reference values in MacEwan et al. (2020). This suggests that risk to bats may be high across the project area. Roberts's flat-headed bat and Egyptian free-tailed bat are open-air foragers based on their morphology and echolocation (Norberg and Rayner 1987) which means they tend to forage high in the air. Thus, high risk is also expected vertically, across the air space occupied by the turbine rotor blades. This high risk would be limited to temporal periods during which bat activity was higher.

Bat activity varied seasonally with highest activity in summer and autumn, and lower activity in spring and winter. Egyptian free-tailed bat activity peaked in February (summer) at all heights, with the magnitude of activity suggesting high risk during this period (**Table 14**). High risk is also predicted across all heights in January, while in March and April risk is high at 50 m only. For Roberts's flat-headed bat, activity was lower and hence risk is expected to be high only in February at 50 m. This species is predicted to be at medium risk during summer and autumn but only at 50 m and 100 m, with very little activity recorded at 10 m.

Table 14: Spatial and temporal risk profile based on median bat passes/night for Robert's flat-headed and Egyptian free-tailed bat

Month	Roberts's flat-headed bat			Egyptian free-tailed bat		
	10m	50m	100m	10m	50m	100m
Jan	0	0.2	0.1	1.2	3.5	1.6
Feb	0.1	1.1	0.3	3.8	11.1	1.7
Mar	0	0.3	0	0.7	3.3	0.3
Apr	0	0.1	0	0.12	0.6	0
May	0	0	0	0.08	0.3	0
Jun	0	0	0	0	0	0
Jul	0	0	0	0	0	0
Aug	0	0	0	0	0	0
Sep	0	0	0	0.04	0.2	0.1
Oct	0	0	0	0.09	0.1	0.1
Nov	0	0	0	0	0	0
Dec	0	0	0	0.2	0.5	0.5

Temporal risk to bats would vary further across nightly time periods. During winter, autumn and spring, risk to bats is expected to be low for all time periods for all species except Egyptian free-tailed bat (refer graph **Figure 26** below). During summer, at 50 m Roberts's flat-headed bat activity is expected to be high between 00:00 and 03:00, while at 10 m and 100 m activity is low for all time periods. For Egyptian free-tailed bat, activity in summer is predicted to be high between 22:00 and 05:00 at 100 m, between 21:00 and 05:00 at 50 m and between 22:00 and 04:00 at 10 m. In autumn, Egyptian free-tailed bat activity is predicted to be high between 21:00 and 01:00 at 100 m, between 19:00 and 03:00 at 50 m and between 22:00 and 01:00 at 10 m.

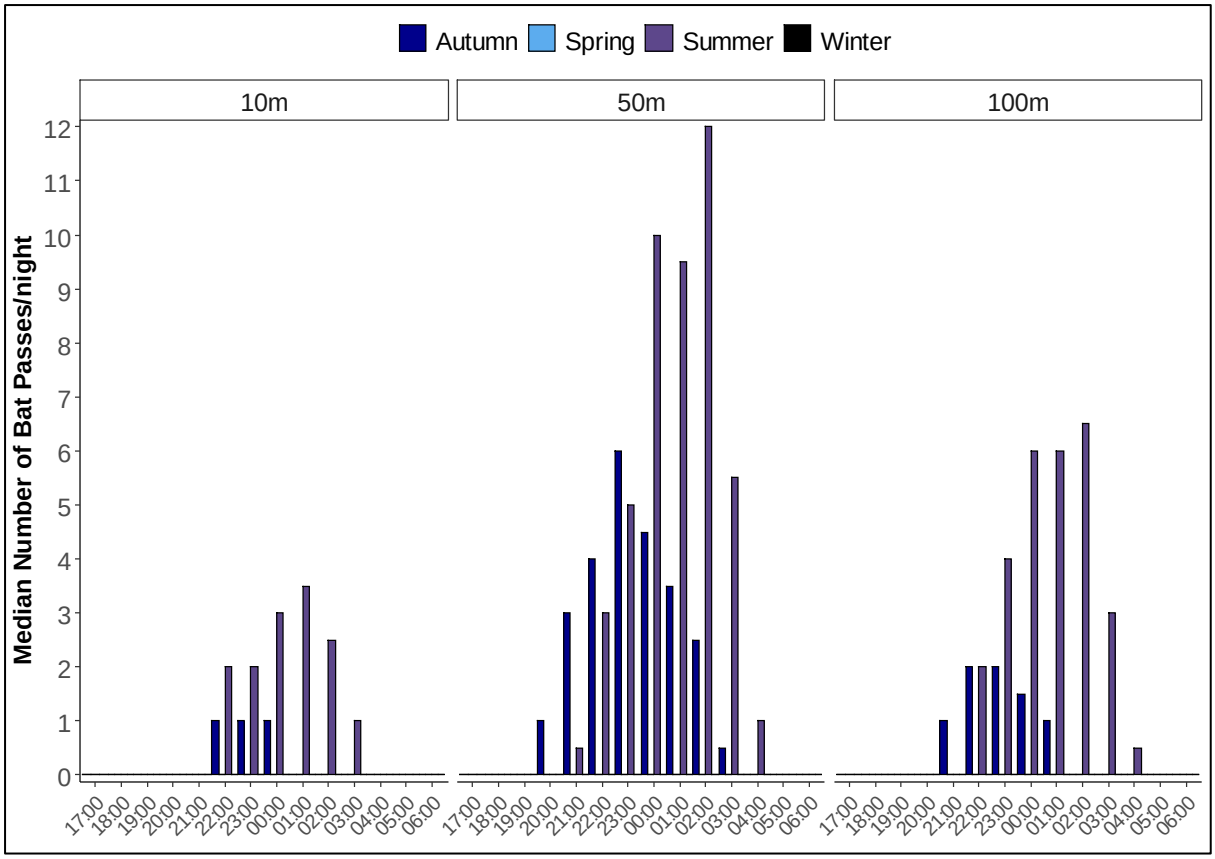

Figure 27: Median bat activity across time periods, by height and season for Egyptian free-tailed bat

To assist in avoiding impacts to bats, buffers have been placed around key habitat features as per best practice resulting in the identification of several No-Go areas for turbine placement. Habitat features present in the landscape that have been buffered by 200 m include rivers, livestock water points, wetlands, farms dams, buildings and rocky outcrops. Small streams and drainage lines have been buffered by 50 m. All buffers are then further adjusted to blade tip to account for the blad length and hub height of the assessed turbines. No turbines in the proposed layout are located within No-Go Areas (**Figure 28** below) and as such the current layout is acceptable in terms of risk to bats based on the specific dimensions of the turbines assessed. Should the turbine size change, the adjusted/blade tip buffers must be updated to account for any changes in hub height or blade length.

The turbines have been designed to reduce impacts to lower flying bat species by maintaining a minimum blade sweep of 35 m. For high flying bat species, blade feathering will be used to prevent free-wheeling of turbine blades below the turbine cut-in speed. Once operational, bat fatality monitoring must be undertaken to search for bat carcasses beneath wind turbines to measure the observed impact of the WEF on bats for a minimum of two years. Mitigation measures that are known to reduce bat fatality if needed based on the fatality monitoring results include curtailment and acoustic deterrents. These techniques must be used if post-construction fatality monitoring indicates that species fatality thresholds have been exceeded to reduce the impacts to bats to within acceptable limits of change and prevent declines in the impacted bat population. If these are adhered to, the Pofadder WEF 1 can be authorized without unacceptable levels of impacts to bats.

The turbine layout adheres to the bat constraints as no project infrastructure (except roads) are located in bat buffers (refer Figure 28 below). Road infrastructure and cabling is allowed/acceptable within these buffer areas.

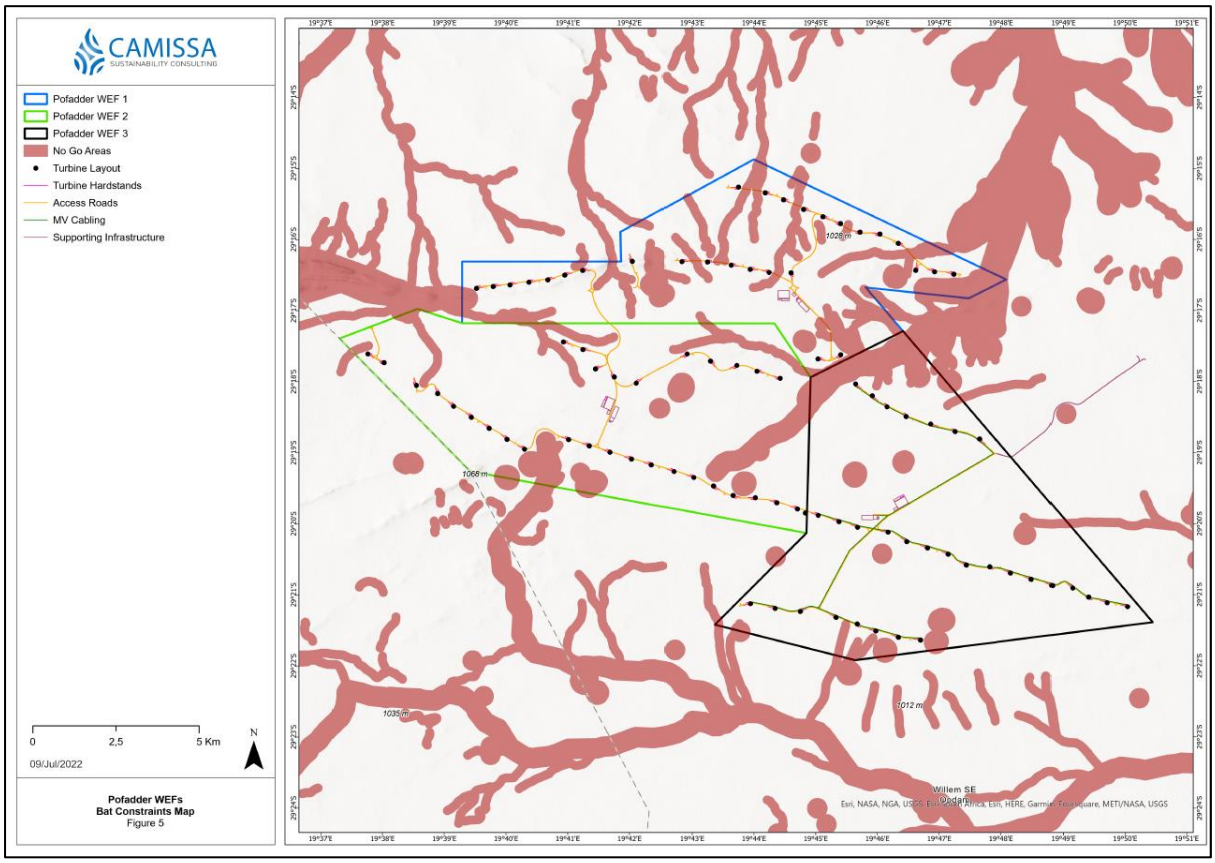

Figure 28: Bat constraints map for Pofadder WEF 1 (with blue boundary)

9. DESCRIPTION OF THE SOCIO- ECONOMIC ENVIRONMENT

A Socio-economic Impact Assessment was undertaken by Savannah Environmental (report dated July 2022). The Pofadder WEF 1 project area is located in the ZF Mgcawu District Municipality and the Kai !Garib Local Municipality.

9.1.1 Z F Mgcawu District Municipality

The ZF Mgcawu District Municipality (ZFMDM) consists of five local Municipalities. These include the following:

- Dawid Kruiper Local Municipality;
- Kai !Garib Local Municipality;
- Tsantsabane Local Municipality;
- !Kheis Local Municipality; and
- Kgatelopele Local Municipality.

The District covers an area of more than 100 000 km² (almost 30 % of the Northern Cape Province). Of this total, 65% (65 000 km²) is made up of the Kalahari Desert, Kgalagadi Transfrntier Park and the

former Bushman Land. The largest town in the region is Upington, which also functions as the district municipal capital. Following the municipal elections in 2011, Riemvasmaak (Sending and Vredesvallei) were included within the Kai !Garib Local Municipality (KGLM) The Riemvasmaak Community is located approximately 60 km west of Kakamas. Based on the Household Community Survey data the population of the ZFMDM was 252 692 in 2016 compared to 236 763 in 2011, The DLKM and KGLM are home to approximately 70% of the ZFMDM population.

The ZFMDM accounts for approximately 30% of the Northern Cape economy. Agriculture plays a role in the local economy and is strongly linked to irrigation along the Gariep River (Orange River). The Orange River is perennial with a flow which varies between 50 and 1800 cubic meter per second (cum/s) depending on the season. The flow of the river is largely controlled by the releases of the dams upstream, like the Bloemhof, Gariep and van der Kloof dams. Agriculture in the ZFMDM is dominated by grape production for table grapes, which is mainly exported to Europe, as well as livestock and game farming.

Tourism represents one of the most important economic sectors in the Northern Cape as well as within the ZFMDM. In this regards the ZFMDM IDP indicates that tourism is the fastest growing component of the economy. Key tourism assets include the world renowned Kgalagadi Transfrontei Park, Augrabies National Park and Pitskop Nature Reserve near Upington.

9.1.2 Kai !Garib Local Municipality

The Kai !Garib LM is located in the south-western extent of the ZF Mgcawu DM. It is bordered by the Dawid Kruiper LM to the north, and north-east, the !Kheis LM to the east, the Hantam LM and Khai-Ma LM of the Namakwa DM to the south and south-west respectively, and Namibia to the north-west. The Kai !Garib LM is approximately 26 377 km² in extent, and is the second-largest LM in the ZF Mgcawu DM, accounting for approximately one quarter (25.7%) of the DM's geographical area. The Kai !Garib LM is characterised by its unique landscape, which includes the Kalahari Desert on one side, and the Orange River on the other.

The Kai !Garib LM is characterised by three main towns, namely: Kakamas, Keimoes, and Kenhardt. The main economic sectors within the LM include agriculture (51.8%), community and government services (15.9%), wholesale and retail trade (11.3%), finance services (7.6%), and manufacturing (5.1%)

The Orange River is the life vein of the area and forms the largest economic base of this area with large tracts of cultivated land occurring on both sides of the river. The Orange River is the biggest driving force behind the area, causing economic activities to have expanded greatly along the river over the last two decades. The main towns of Kakamas and Keimoes are situated in the midst of an intensive irrigation farming community stretching from Groblershoop in the east to Blouputs in the west. Farming includes crops like vineyards, pecan-nut, and citrus plantations. Local areas where these types of farming flourish include: Blouputs, Eksteenskuil, Riemvasmaak and Cannon Island, while Kenhardt is known for livestock farming.

9.1.3 Key Considerations/Impacts for Wind Energy Facilities

Health and social wellbeing – The health and social wellbeing impacts related to the project include air quality, noise, shadow flicker, blade glint, electromagnetic field and RF interference, increase in crime, increased risk of HIV infections, influx of construction workers and hazard exposure.

Quality of living environment – including disruption of daily living patterns, disruptions to social and community infrastructure, transformation of the sense of place

Economic – impacts related to job creation and skills development and socio-economic stimulation

Cultural – at a social level, it is likely that any cultural impact would be associated with sensitive archaeological and/or heritage sites

9.1.4 Key Findings and Recommendations

Considering the impacts discussed above, 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 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.

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 1. All negative impacts are low and can be effectively addressed through the mitigation measures provided.

9.2 Cultural/Historical Environment

A Heritage Impact Assessment was undertaken by Asha Consulting (report dated July 2022).

9.2.1 Archaeological

Archaeological materials were found to be widespread on the plains but poorly represented on the quartzite ridge. Most were scatters of Early and Middle Stone Age artefacts associated with the gravels and best considered background scatter. These are not significant. However, occasional scatters of Later Stone Age materials were found in the wider area, usually alongside pans, but none have yet been found within the Pofadder WEF 1 project area (**Figure 29**). Other archaeological materials were rare but a pair of small stone-walled features – one with some associated historical artefacts – was noted against a rock outcrop in the northeast but will not be impacted (**Figure 30**). Two small farm complexes with associated graveyards are near the footprint area but will not be impacted in any way. All these historical features are more than 0.7 km from turbines but a WEF road comes within 320 m of the Lovedale farm complex and a powerline would be 0.7 km from the Lovedale graveyard.

Figure 29: Stone artefacts found within the project area

Figure 30: Stone features

No isolated graves were seen anywhere in the greater study area. Some graveyards were recorded, with the farm graveyard on Lovedale 201 being in the Pofadder WEF 1 project area, some 1.2 km from the nearest road (**Figure 31**).

Figure 31: Lovadale Farm graveyard

9.2.2 Historical aspect and the Built Environment

Four historical features were recorded. One is a stone boundary beacon built on the quartzite ridge at the intersection of three farms (**Figure 32**). The second is a farm complex on Lovedale which consists of at least two historical buildings (**Figure 33**).

Figure 32: Stone boundary

Figure 33: Main farmhouse on Lovedale 201

The third is a farmstead that was only seen from a distance. It lies just beyond the eastern edge of the project area, but its structures lie some 700 m to 900 m away from the nearest project infrastructure and 800 m to 1 km from the nearest turbine.

The fourth is a farmstead lying 1.7 km to 2.0 km west of the nearest Pofadder WEF 1 turbine and seems to be in poor condition, although only those structures closest to the road were examined.

9.2.3 Cultural Landscape

The landscape is largely a natural one with only minimal anthropogenic inputs in the form of rare buildings and a scattering of fences, farm tracks, wind pumps and small earthen dams. Because of the flatness of the landscape, the quartzite ridge in the north of the project area is a prominent feature. The four farmsteads of the wider study area (two in the study area and one to the west and east) have all been placed along the southern side of the ridge. This is probably because of the drainage lines that lead northwards, penetrating the ridge in places. Farm dams are located at many of these spots.

The site lies in a remote location well away from commonly used roads that might be regarded as scenic routes. This aspect is thus of no further concern.

9.2.4 Palaeontological

A desktop Palaeontological Impact Assessment was undertaken by Marion Bamford of the Wits Evolutionary Studies Institute (report dated July 2022).

Most of the area is on non-fossiliferous rocks of the Namaqua-Natal Suite and the Quaternary sands but there are some areas of moderately palaeosensitivity. Most of the project area is of zero to insignificant palaeo sensitivity but there are parts that are moderately sensitive (refer **Figure 34** below). 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. 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.

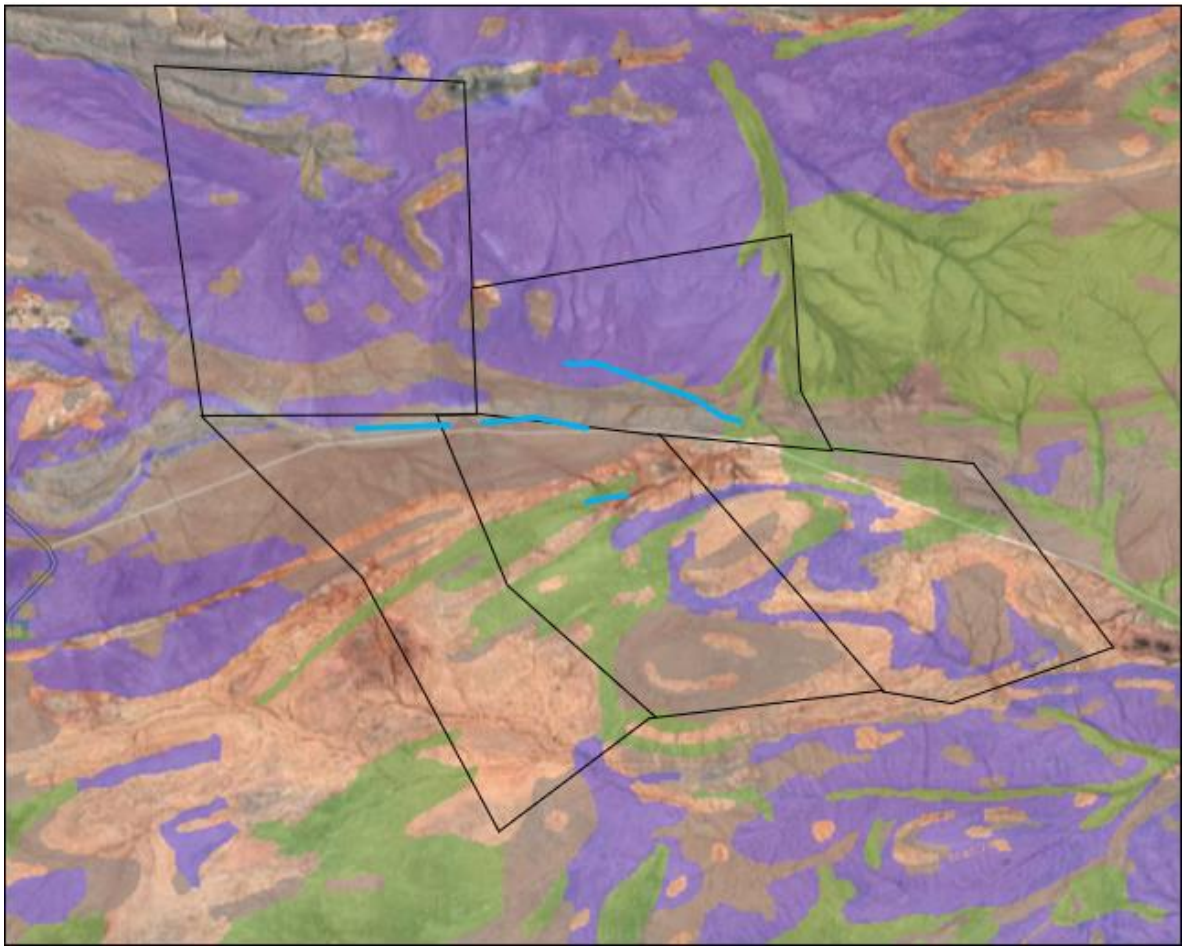

Figure 34: Extract from the SAHRIS Palaeosensitivity Map showing the site to be of variable sensitivity including very low (grey), low (blue) and medium (green). Some areas are unknown (clear). The black polygons are the farm portions involved in the project, while the turquoise lines indicate the proposed rows of turbines.

9.2.5 Overall significance of heritage resources found

The archaeological resources are deemed to have generally low cultural significance at the local level for their scientific value and at most can be graded GPC (low significance – requires no further action). However, a few sites – the historical ones – have slightly greater significance and have been rated GPB (medium significance – requires recording).

Graves are deemed to have high cultural significance at the local level for their social value. They are allocated a grade of IIIA.

The built heritage features have medium to high cultural significance at the local level for their aesthetic, architectural, historical and social values.

The cultural landscape is largely a natural landscape with aesthetic value and is rated as having medium cultural significance at the local level.

Figure 35 below shows the distribution of heritage resources graded GPB or higher.

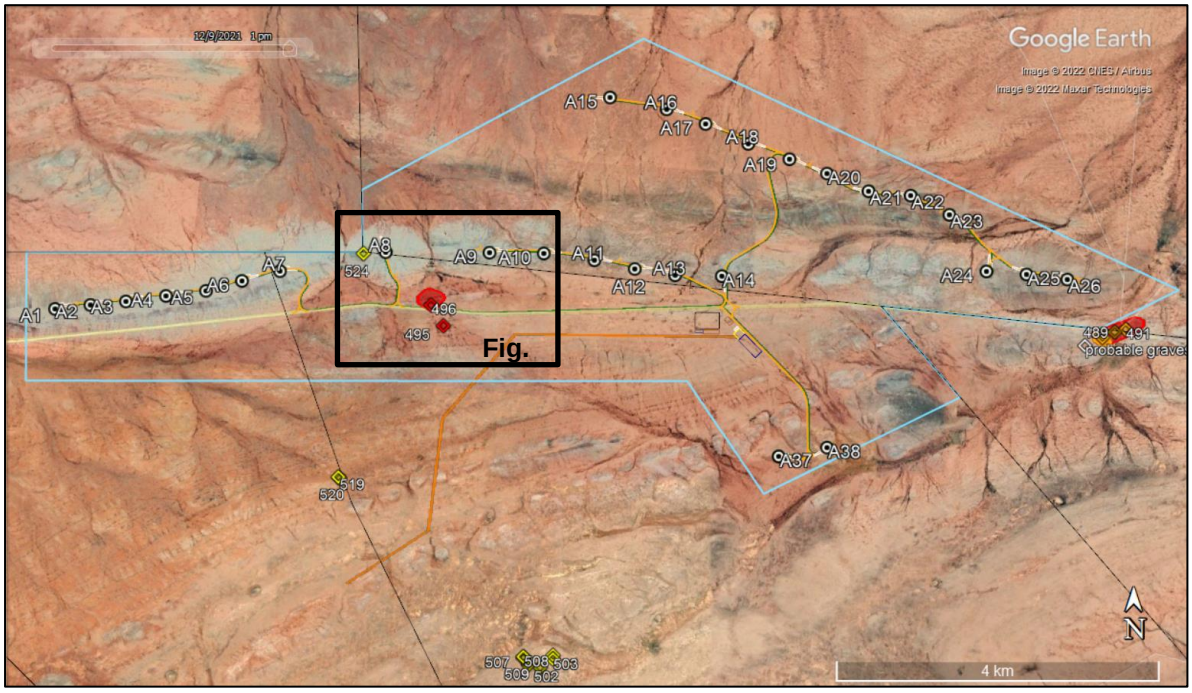

Figure 35: Aerial view of the Pofadder WEF 1 layout showing the locations of all heritage resources graded GPB and above. Yellow polygons are GPB/low-medium, orange are IIIB/medium-high and red are IIIA/high. The one location where the layout comes close to heritage resources is labelled and enlarged below.

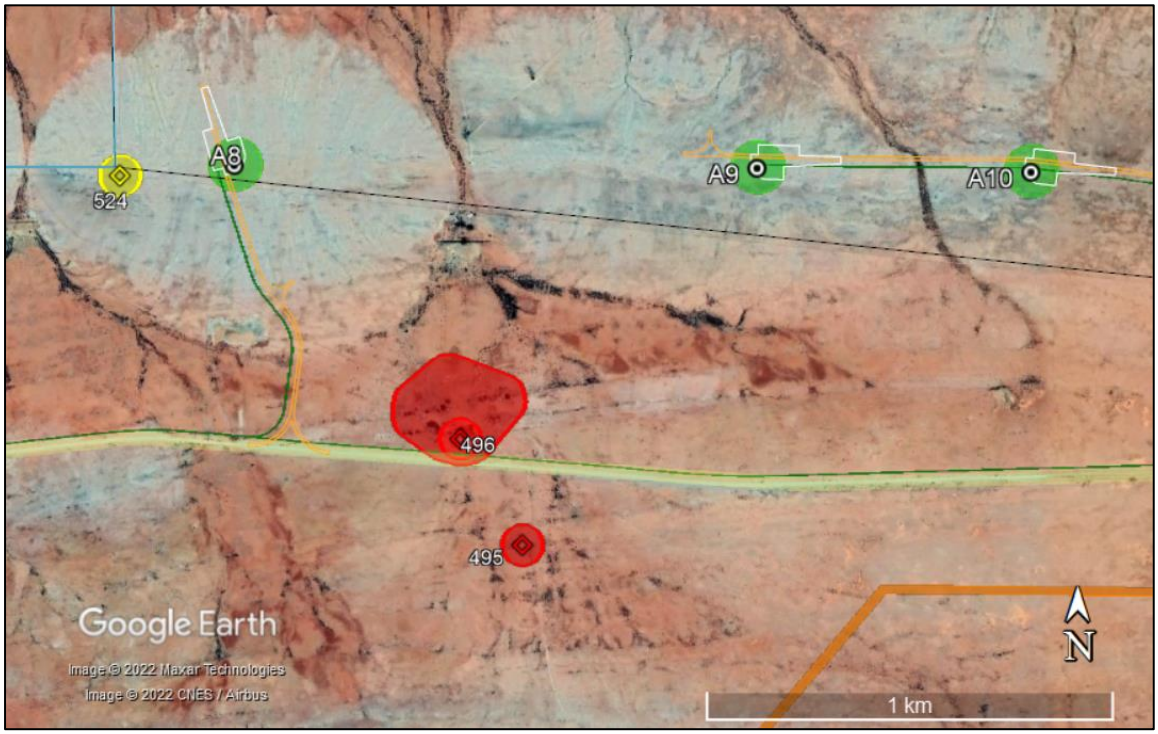

Figure 36: Aerial view showing the location of the stone boundary cairn at waypoint 524 and the Lovedale farmstead at waypoint 496

9.2.6 Heritage conclusions

The main heritage concerns for this project are archaeological sites and the cultural landscape. Some archaeological sites are within the current layout but none of these are highly significant sites and none require in situ conservation. It is, of course, always best to avoid any sites that have some research value and hence cultural significance, but excavation within a commercial mitigation context would be completely acceptable for all of the sites concerned here. 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.

Given that (1) all the expected impacts after mitigation are in the low to medium range (with those rated medium perhaps better rated as low), (2) direct impacts to archaeology can generally be easily mitigated if it is found during the preconstruction survey that impacts would occur, and (3) there are no highly significant landscapes or scenic routes in the vicinity of the site, it is the opinion of the heritage specialist that the proposed project may be authorised in full, but subject to the recommendations below.

- 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.

9.3 Noise

A Noise Impact Assessment was undertaken by Safetech (report dated July 2022).

The sources of sounds emitted from operating wind turbines can be divided into both mechanical sounds from the interaction of components as well as aerodynamic sounds produced by the sound of air flow over the blades. These sounds are modelled to determine anticipated impacts to households living in close proximity to wind turbines.

The field study validated the classification of the study area as a rural district. The table below shows the SANS 10103:2008 guidelines for day and night noise limits of a rural district. National and provincial standards classify noise levels exceeding 7 dB(A) above the residual noise levels as a disturbing noise.

Table 15: Noise limits for rural districts

Type of District	Equivalent Continuous Rating Level, LReq.T for Noise					
	Outdoors (dB(A))			Indoors, with open windows (dB(A))		
	Day-night	Daytime	Night-time	Day-night	Daytime	Night-time
Rural Districts	45	45	35	35	35	25

The initial identification of potential noise sensitive areas was conducted through a visual scan of satellite imagery of the area. A total of 64 Noise Sensitive Areas (NSA's) were identified. These NSAs are a combination of farmer's houses, staff houses, remote homesteads and possibly "Shepherd's Huts". Of the 64 NSAs that were identified, one is situated on the development site and two are situated directly adjacent to the site (**Figure 37**).

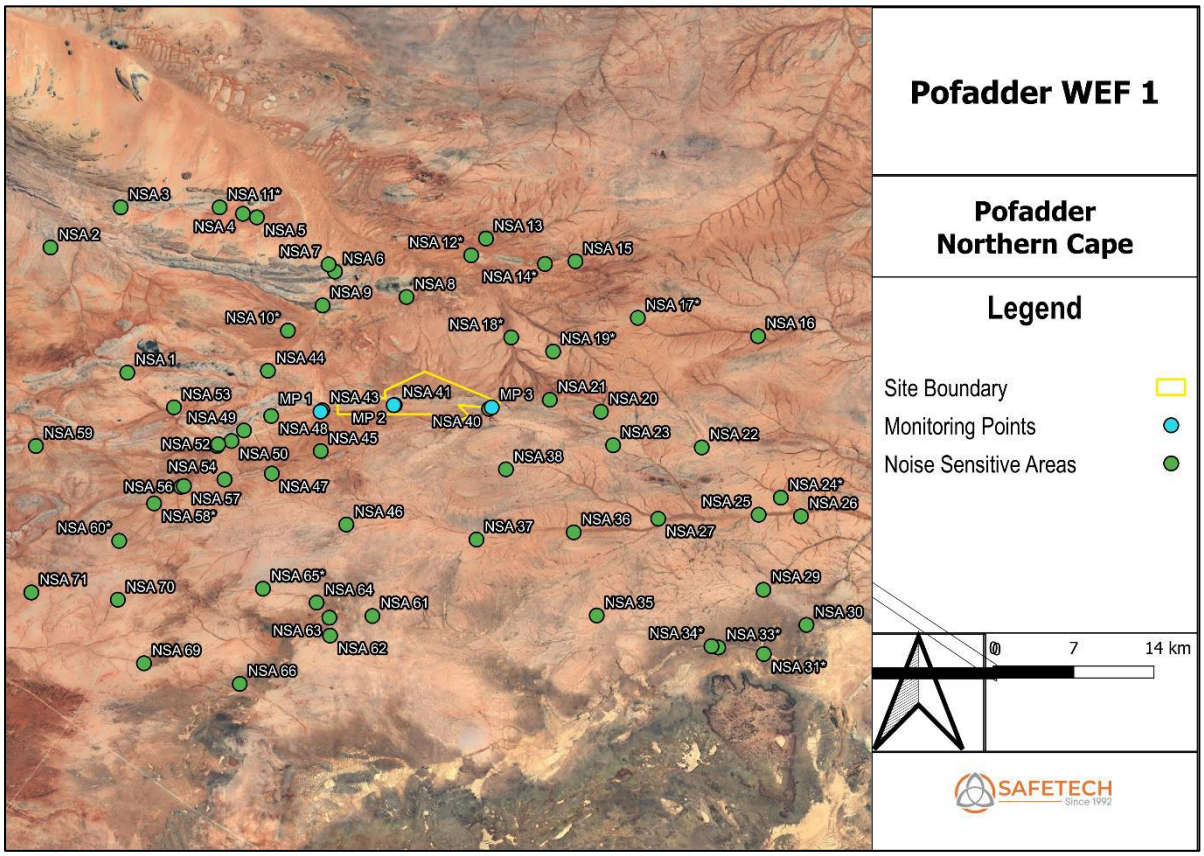

Figure 37: Location of noise sensitive areas and monitoring points

The construction noise at the various sites will have a local impact. In all likelihood, the construction noise will have little impact on the surrounding community as it will most likely occur during the day when the residual noise is louder and there are unstable atmospheric conditions.

In terms of operational phase impacts, the noise modelling indicates that the noise levels from the turbines will be below the SANS 10103:2008 daytime limits for rural areas at all NSA's. The noise levels during the daytime at the closest receptors (NSA 40 and NSA 41) will be between 37.8 and 42.9 dBA and will therefore not exceed the 45dBA threshold. However, exceedances of the SANS 10103:2008 nighttime limits of 35dBA may occur at NSA 40 and NSA 41 (above 5m/s wind speed at hub height). It is however expected that there may be wind noise masking at this windspeed which will mitigate the impact such that complaints may not be received.

From a cumulative perspective, due to the nature of noise attenuation and the distance between the Pofadder WEF 1 site and the majority of the developments within 35k of the project site, it is unlikely that these facilities will contribute to the cumulative noise impacts. The exception to this is the facilities situated directly adjacent to the site of Pofadder WEF 1. These sites include Pofadder WEF 2 and Pofadder WEF 3.

The results of the cumulative noise levels indicate that at no time will the noise levels experienced at the relevant NSAs be above the SANS 10103 daytime limits as a result of all three Pofadder WEFs being in operation simultaneously. However, the SANS Nighttime Rating will be exceeded at NSA 38, NSA 43, and NSA 45, in addition to NSA 40 and NSA 41 that will be exceeded when assessing both

the cumulative impacts and the impacts from Pofadder WEF 1 alone. The exceedances are likely to have little impact as the wind will create a masking effect.

The cumulative impacts can therefore be expected to be of low significance.

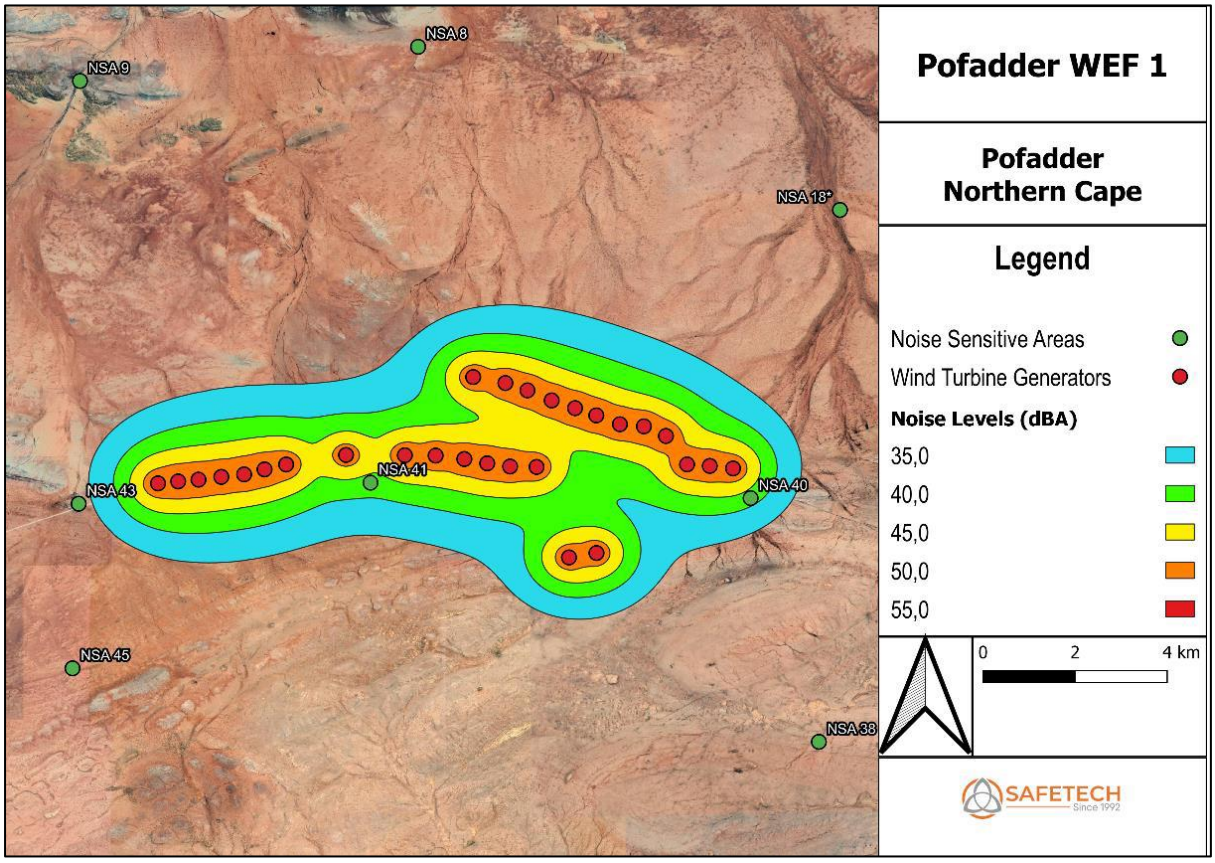

Figure 38: Predicted noise level from wind turbines

Based on the modelling results undertaken by the noise specialist, the impact will be low from a noise perspective, and it is recommended that the development receive environmental authorisation.

9.4 Visual

A Visual Impact Assessment was undertaken by VRM Africa (report dated July 2022).

Landscape character is defined as the 'distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and how this is perceived by people. Regional and local topography has the potential to strongly influence landscape character, as well as the extent of the Zone of Visual Influence. In order to better understand these aspects of the study, a Digital Elevation Model was generated making use of the NASA STRM digital elevation model.

9.4.1 Zone of Visual Influence

Due to the relatively flat nature of the terrain, the Zone of Visual Influence (ZVI) is likely to be widespread across the region. This is due to the large height of the turbines that are positioned on a local high point in the landscape, surrounded by terrain at a relatively uniform elevation. For these reasons, the viewshed is rated as Regional and Extent High as the landscape will extent across a wide landscape

area. The Zone of Visual Influence, however, is likely to be localised in extent with clearer visibility of the wind turbines contained with the 12 km distance area (refer **Figure 39** below). Due to the topography that does include some undulating and hill features, there will be localised pockets where limited views of the turbines will take place. Within the 6 km distance zone, the visual impacts are probable with Medium to High Exposure. Outside of this distance zone, visual impacts are possible, but unlikely to be experienced as dominating in the Medium to Low Visual Exposure areas beyond 12 km.

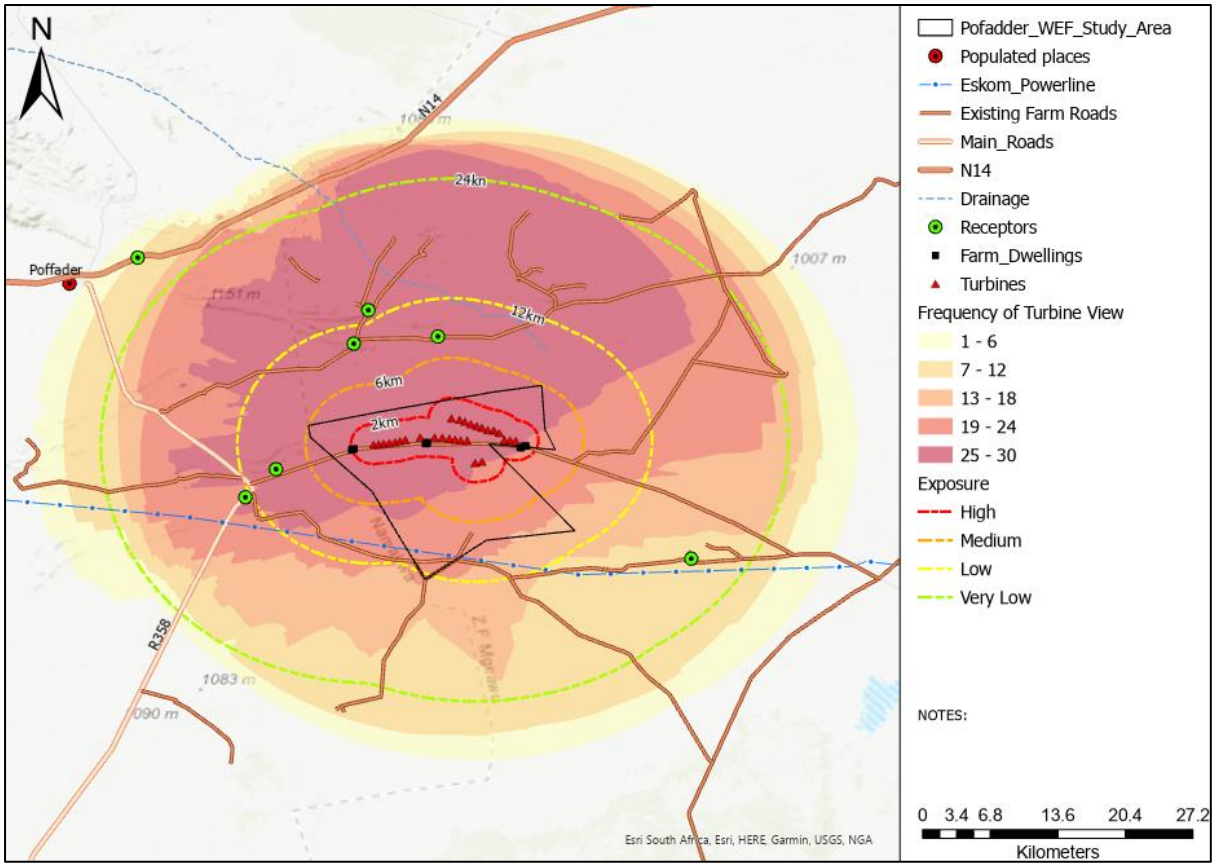

Figure 39: Expected WEF1 project viewshed and exposure generated from 300m height above ground from turbine points

9.4.2 Key Observation Points

Key Observation Points (KOPs) are defined by the Bureau of Land Management as the people (receptors) located in strategic locations surrounding the property that make consistent use of the views associated with the site where the landscape modifications are proposed. The table below lists the receptors identified within the ZVI and motivates if they are significance and should be defined as a KOP. The receptors located within the ZVI and KOPs view lines are mapped in the **Figure 39** below.

Table 16: Receptor and key observation points

Name	Exposure	Distance	KOP	POINT_X	POINT_Y	Motivation
Farmstead 1	Medium	8.3km	Yes	19.57031	-29.301	Medium Exposure with clear views of the proposed wind farm. Although this dwelling appears un-occupied, it

Name	Exposure	Distance	KOP	POINT_X	POINT_Y	Motivation
						could be used as a dwelling in the future.
Farmstead 2	Medium	10.2km	No	19.71729	-29.1808	Medium Exposure with clear views of the proposed wind farm.
Farmstead 3	Low	10.3km	No	19.64113	-29.1875	Low Exposure.
Farmstead 4	Low	13.3km	No	19.65377	-29.157	Low Exposure.
R358 District Road	Medium	10.5km	Yes	19.54258	-29.3263	Regional access route.
N14 National Highway	Very Low	27.5km	No	19.44507	-29.1094	Important scenic view corridor but with very Low Exposure
Kenhardt Farm Road	High	Less than 1km	Yes	19.84722	-29.2979	High Exposure to road users (very low traffic frequency)
Grappies Farm	Low	22km	No	19.94558	-29.3816	Low Exposure.

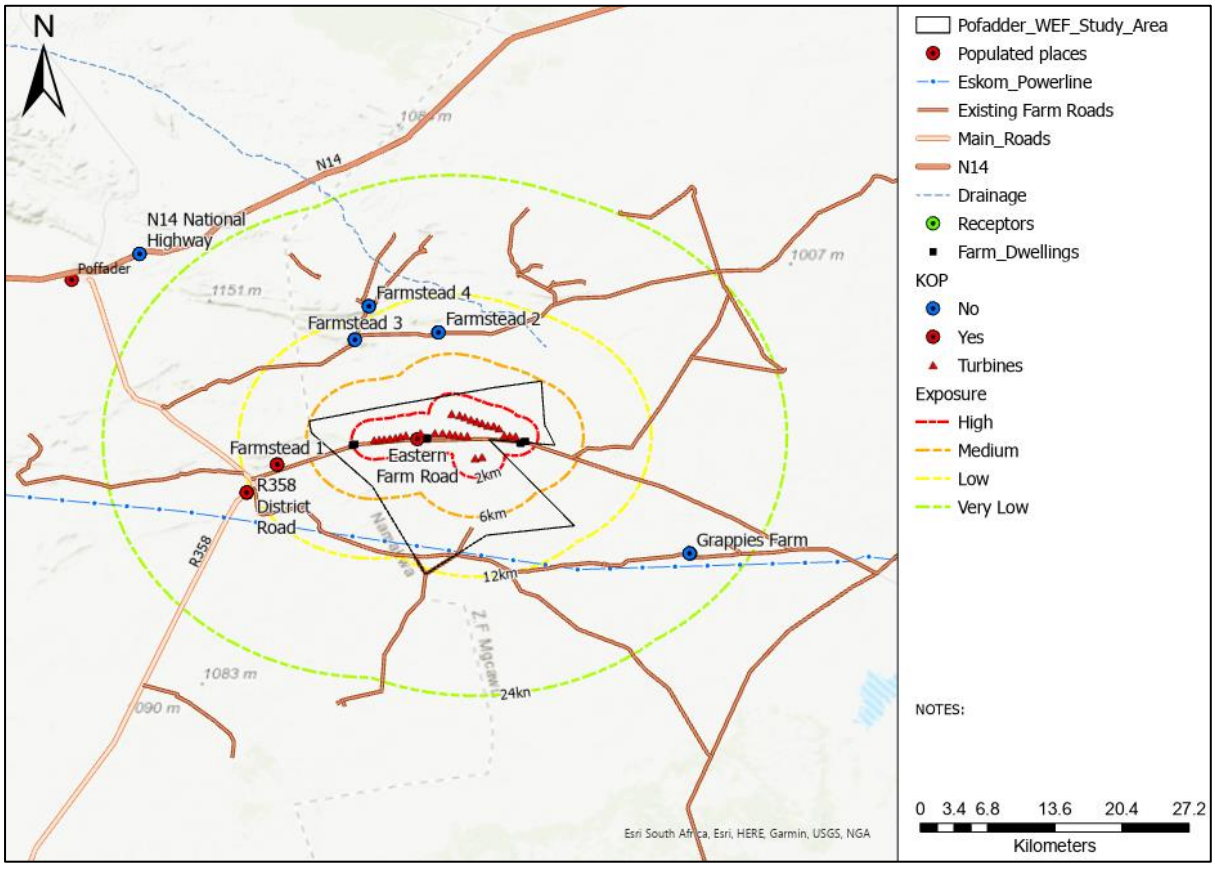

Figure 40: Receptors and KOP locality map

9.4.3 Visual Resource Management Classes

The Bureau of Land Management has defined four classes (Visual Resource Management (VRM) Classes) that represent the relative value of the visual resources of an area and are defined making use of the VRM Matrix below:

- **Classes I** and **II** are the most valued
- **Class III** represent a moderate value
- **Class IV** is of least value

The various classes are represented graphically in **Figure 41** below.

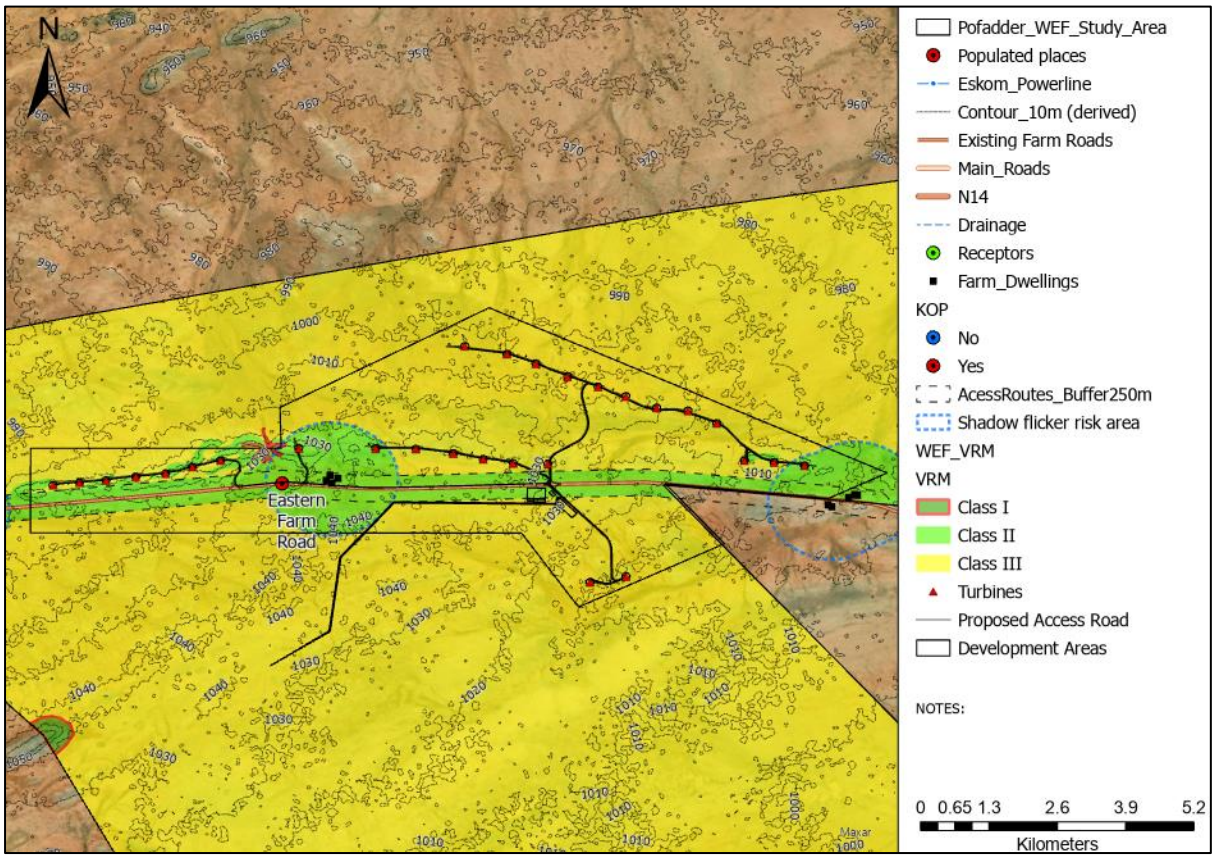

Figure 41: VRM Class overlay onto Pofadder WEF 1 layout (no turbines are located within Class I No-go areas)

9.4.4 Photomontages and Model Proof

Photomontages were generated for each KOP. Photographs taken during the field survey were modified to reflect the expected landscape, making use of a 3D model generated for the proposed mining landscape modifications.

Figure 42: Local farm access road from entrance to project area (existing and proposed view)

Figure 43: Main access roads view east (existing and proposed view)

Figure 44: Main access road view east at night time with aircraft warning lights (existing and proposed view)

As there are limited receptors in the remote locality, the photomontage views were used to provide generalised reference points form which to assess the close proximity receptors.

Table 17: Key observation points (KOP)

	Exposure			Landscape Elements					
Key Observation Point	**Distance**	**Exposure**	**Mitigation**	**Form**	**Line**	**Colour**	**Texture**	**Degree of Contrast**	**Visual Objectives Met?**
Proximity views from the farm road.	380m	Very High	W/Out	W	S	S	S	S	**No**
			With	W	S	S	S	S	**No**
Middle distance views from farmstead receptors.	Avg. 8km	Medium to Low	W/Out	N	M	S	M	MS	**No**
			With	N	M	M	M	M	**Yes**

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.

9.4.5 Shadow Flicker Findings

'Shadow flicker' (SF) refers to the shadows that a wind turbine casts over structures and local observers at times of the day when the sun is directly behind the turbine rotor from an observer's position. The primary concern with shadow flicker is the annoyance it can cause for adjacent homeowners. Annoyance can trigger physiological reactions of the autonomic nervous and/or endocrine systems that increase the risk of cardiovascular disorders.

A Shadow Flicker assessment was undertaken for Pofadder WEF 1 to determine the impact that the turbine would have in people living in close proximity to the turbines.

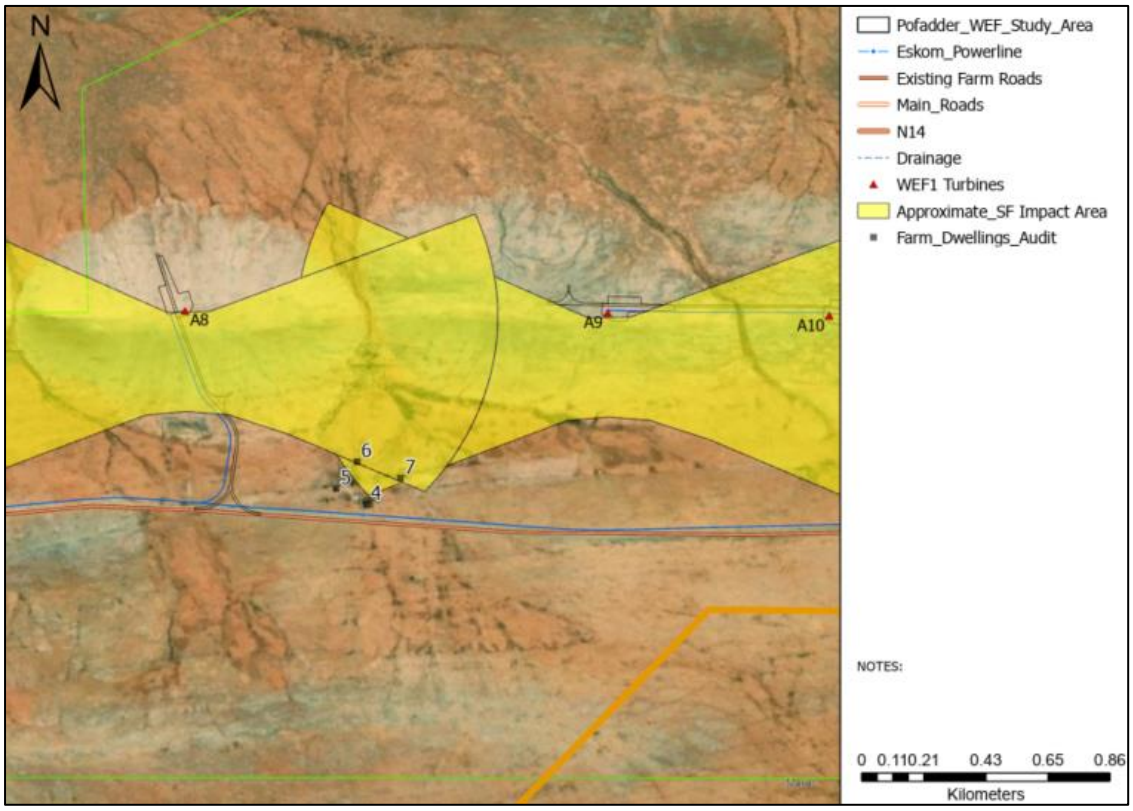

Figure 45: Shadow Flicker map for Turbines A8 and A9 showing approximate shadow flicker impact area

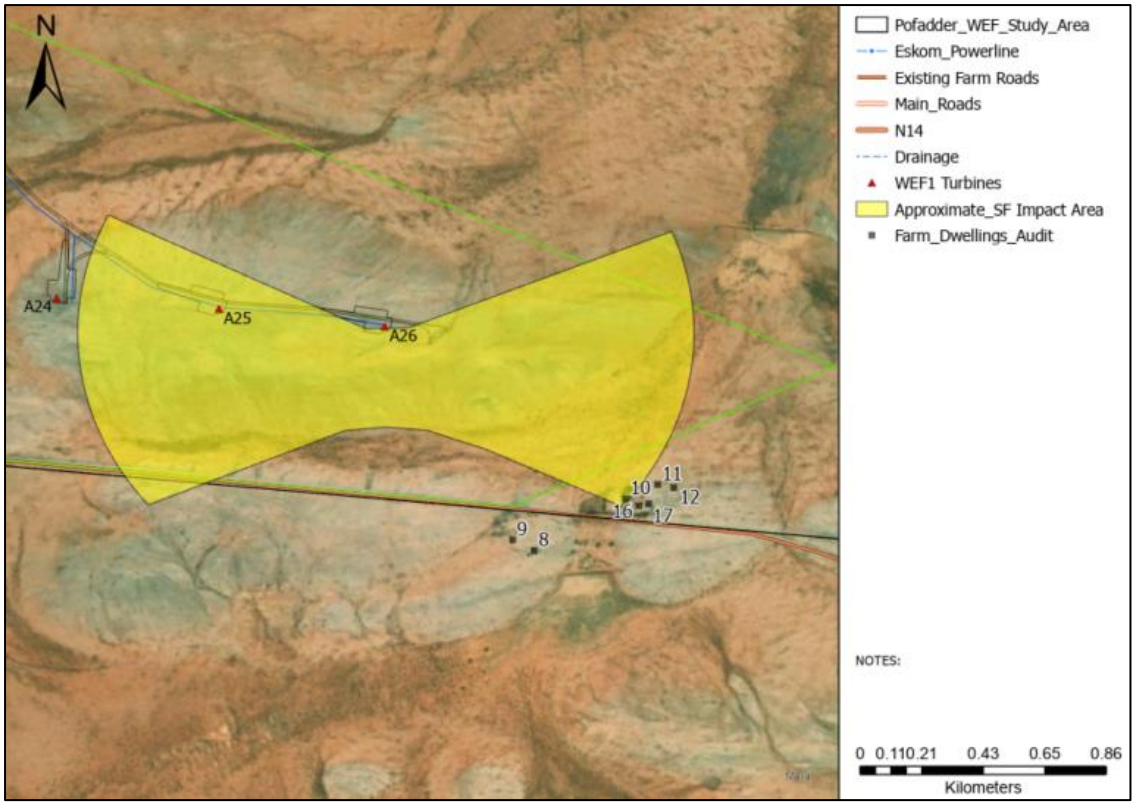

Figure 46: Shadow Flicker map for turbines A26 showing approximate shadow flicker impact area

Two dwellings (Structure 4 and 7) were found to fall marginally within the SF impact areas for Turbines A8 and A9. Of the two, Structure 4 was found to be the property owners dwelling that is occupied on a non-permanent basis. Structure 7 was found to house the farm labourer. As this structure could experience SF effects, impacts were undertaken with mitigation measures defined to reduce the SF effect should it be found to take place at this marginal SF flicker impact locality. As Structure 4 was the property owner, the structure was not included in the SF impact assessment.

For the SF impact area for Turbine A26, two potentially occupied dwellings were in close proximity to the SF impact area (Structures 11 and 12). As this is a screening exercise, the precautionary principle should prevail, and the two structures were included in the impact assessment with mitigations proposed should SF impact occur at this low probability locality. The remaining structures located in close proximity to the A26 SF impact area were either used by the property owner, or ancillary structures for agricultural usage.

Impact Assessment of the SF effect was undertaken, and the expected SF Impact without mitigation was rated Low. This was based on the low probability of the SF impact occurring due to the location of the dwellings on the outer edge of the potential SF Impact Area. Mitigation was proposed, where the SF Impact could be reduced to a Negligible effect with simple mitigations. This would require an on-site survey to the dwellings once Operation Phase has commenced to determine if the SF effect was applicable and has the potential to incur a nuisance factor to the occupants.

9.4.6 Conclusion

- The area is remote, and only four farmstead receptors were located within the project 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 30km 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.
- Shadow Flicker impacts are unlikely to occur, and if they did, they would be low intensity and suitably addressed with mitigation.

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.

10. POLICY AND LEGISLATIVE CONTEXT

The relationship between the project and certain key pieces of environmental legislation is discussed in the subsections to follow.

10.1 The Constitution

The Constitution of the Republic of South Africa, Act 108 of 1996 sets the legal context in which environmental law in South Africa occurs and was formulated. All environmental aspects should be interpreted within the context of the Constitution, National Environmental Management Act 107 of 1998 and the Environment Conservation Act 73 of 1989.

The Constitution has enhanced the status of the environment by virtue of the fact that an environmental right has been established (Section 24) and because other rights created in the Bill of Rights may impact on environmental management through, for example, access to health care, food and water and social security (Section 27). An objective of local government is to provide a safe and healthy environment (Section 152) and public administration must be accountable, transparent and encourage participation (Section 195(1) (e) to (g)).

Section 24 of the Constitution states that:

"Everyone has the right –

- *To an environment that is not harmful to their health or well-being; and*
- To *have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:*
    - Prevent pollution and ecological degradation;
    - Promote conservation and
    - Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."

The Constitution is the overarching legislation for South Africa. Although it provides for certain rights and obligations, the NEMA has been promulgated in order to manage the various spheres of both the social and natural environment.

10.2 National Environmental Management Act (107 of 1998)

The National Environmental Management Act (Act No. 107 of 1998) was promulgated in 1998 but has since been amended on several occasions from this date. The act intends to provide for:

- co-operative environmental governance by establishing principles for decision-making on matters affecting the environment;
- institutions that will promote co-operative governance and procedures for coordinating environmental functions exercised by organs of state;
- to provide for the prohibition, restriction or control of activities which are likely to have a detrimental effect on the environment; and
- to provide for matters connected therewith.

NEMA is the overarching legislation which governs the EIA process and environmental management in South Africa. Sections 24 and 44 of NEMA make provision for the promulgation of regulations that identify activities which may not commence without an EA. Activities that may significantly affect the environment must be considered, investigated and assessed prior to implementation.

According to Section 2(3) of the National Environmental Management Act (NEMA) (Act No. 107 of 1998), "development must be socially, environmentally and economically sustainable", which means the integration of these three factors into planning, implementation and decision-making so as to ensure that development serves present and future generations.

The EIA Regulations, 2014 (as amended) identify lists of activities which have the potential to result in detrimental environmental impacts and thus require EA, subject to either "Basic Assessment" or "Scoping and Environmental Impact Assessment". The Regulations prescribe the procedural and substantive requirements for the undertaking of EIAs and the issue of EA's.

The proposed project triggers listed activities under Listing Notice 1, 2 and 3 (as detailed in Section 6 above), and thus requires an EA subject to an Environmental Impact Assessment (EIA) Process.

10.3 Environmental Impact Assessment (EIA) Guideline for Renewable Energy Projects, DFFE Notice 989 of 2015

The purpose of this document is primarily to provide guidance on the environmental management legal framework applicable to renewable energy operations and all the role players in the sector. The guideline is principally intended for use by the following stakeholder groups:

- Public Sector Authorities (as regulator and/or competent authority);
- Joint public sector authorities and project funders (e.g., Eskom, IDC, etc.);
- Private Sector Entities (as project funder / developer / consultant); and
- Other interested and affected parties (as determined by the project location and/or scope).

This guideline seeks to identify activities requiring authorisation prior to commencement of that activity and provide an interface between national EIA Regulations and other legislative requirements of various authorities.

The guidelines are applicable for the construction, installation and/or development of the following renewable energy projects:

- Concentrating Solar Power (CSP) Plant;
- Wind Energy Facility (WEF);
- Hydropower Station; and
- Photovoltaic (PV) Power Plant.

10.4 National Water Act (Act 36 of 1998)

The National Water Act (NWA) No 36 of 1998 was promulgated on the 20th of August 1998. This Act is important in that it provides a framework to protect water resources against over exploitation and to ensure that there is water for socio-economic and economic development, human needs and to meet the needs of the aquatic environment. The Act also recognises that water belongs to the whole nation for the benefit of all people.

Water resources as defined include a watercourse, surface water, estuary or aquifer. Specifically, a watercourse is defined as (inter alia):

- A river or spring;
- A natural channel in which water flows regularly or intermittently; and
- A wetland, lake or dam into which, or from which water flows.

Due to the possible encroachment into the wetland areas, the following Section 21 water uses in terms of the NWA may be triggered and require licensing:

- (c) impeding or diverting the flow of water in a watercourse; and
- (i) altering the bed, banks, course or characteristics of a watercourse.

In light of the above, there are a number of stipulations within the NWA that are relevant to the potential impacts on rivers, streams and wetlands that may be associated with the proposed development. An Aquatic / Freshwater Impact Assessment (**Appendix 6**) has been conducted to explore how the proposed development may impact on identified water resources as protected by the Act. Should the proposed development require a General Authorisation (GA) or Water Use Licence (WUL), it will be determined and applied for separately prior to construction**.**

10.5 The National Heritage Resources Act 1999 (25 of 1999)

The National Heritage Resources Act promotes good management of the heritage resources of South Africa which are deemed to have cultural significance and to enable and encourage communities to ensure that these resources are maintained for future generations.

The aim of the Act is to introduce an integrated, three-tier system for the identification, assessment and management of national heritage resources (operating at a national, provincial and local level). This legislation makes provision for a grading system for the evaluation of heritage resources on three levels which broadly coincide with their national, provincial and local significance.

This Act requires investigation to determine the impact of heritage resources when developments exceed the thresholds list in section 38 (1) of the act:

a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
b) the construction of a bridge or similar structure exceeding 50 m in length;
c) any development or other activity which will change the character of a site—
   (i) exceeding 5 000 m^2 in extent; or
   (ii) involving three or more existing erven or subdivisions thereof; or
   (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
   (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
d) the re-zoning of a site exceeding 10 000 m2 in extent; or
e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,

The proposed development would involve; (c) the development of a WEF and associated infrastructure that will change the character of more than 0.5 ha, and (d), the rezoning of a site that will exceed 1ha.

Under the legislation the South African Heritage Resources Agency (SAHRA), was established, which replaced the National Monuments Council. SAHRA is responsible for the preservation of heritage resources with exceptional qualities of special national significance (Grade I sites). A Provincial Heritage Resources Authority, established in each province, will protect Grade II heritage resources which are significance within the context of a province or region. Buildings and sites of local interest (Grade III sites) is the responsibility of local authorities as part of their planning functions. In this case, the Heritage Western Cape (HWC) will need to be consulted with extensively throughout the process.

Within the scope of this project, Section 38 of the NHRA (25 of 1999), states that, as described above, an assessment of potential heritage resources in the development area needs to be done. A Heritage Impact Assessment (HIA), Archaeological Impact Assessment (AIA), Paleontological Impact Assessment (PIA) and Cultural Landscape Assessment (CLA) was commissioned to explore how the proposed development may impact on heritage resources and potential cultural artefacts as protected by the Act.

10.6 National Environmental Management: Biodiversity Act (NEM:BA) (Act No. 10 of 2004, as amended)

As the principal national act regulating biodiversity protection, the National Environmental Management: Biodiversity Act (NEM:BA) (Act No. 10 of 2004), which is administered by the DFFE, is concerned with the management and conservation of biological diversity, as well as the use of indigenous biological resources in a sustainable manner.

The overarching aim of the NEM:BA, within the framework of the NEMA, is to provide for:

- The management and conservation of biological diversity within South Africa, and of the components of such biological diversity;
- The use of indigenous biological resources in a sustainable manner; and
- The fair and equitable sharing among stakeholders of benefits arising from bio-prospecting involving indigenous biological resources.

In terms of this Act, the developer has a responsibility to:

- Conserve endangered ecosystems and restriction of activities according to the categorisation of the area (not just by listed activity as specified in the EIA regulations);
- Promote the application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all development within the area are in line with ecological sustainable development and protection of biodiversity; and
- Limit further loss of biodiversity and conserve endangered ecosystems.

The South African National Biodiversity Institute (SANBI) was established in terms of the NEM:BA, its purpose being (inter alia) to report on the status of the country's biodiversity and the conservation status of all listed threatened or protected species and ecosystems.

The NEM:BA provides for a range of measures to protect ecosystems and for the protection of species that are threatened or in need of protection to ensure their survival in the wild, including a prohibition on carrying out a 'restricted activity' involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7 of the Act. According to Section 57 of the Act, 'Restricted activities involving listed threatened or protected species':

A Terrestrial Biodiversity Assessment (**Appendix 6**) has been conducted to explore how the proposed development may impact on biodiversity as protected by the Act.

In addition, all relevant conservation departments (such as the SANBI and DENC) will be invited to provide comments with regards to the proposed development.

10.7 National Environmental Management: Protected Areas Act, 2003 (Act No.57 of 2003 as amended)

The overarching aim of the National Environmental Management: Protected Areas Act (NEMPAA) Act No. 57 of 2003, within the framework of NEMA, is to provide for:

- the declaration and management of protected areas;
- co-operative governance in the declaration and management of protected areas;
- effect a national system of protected areas in South Africa as part of a strategy to manage and conserve its biodiversity;
- a representative network of protected areas on state land, private land and communal land;
- promote sustainable utilisation of protected areas for the benefit of people, in a manner that would preserve the ecological character of such areas;
- promote participation of local communities in the management of protected areas, where appropriate; and
- the continued existence of South African National Parks.

The proposed project is not located in close proximity to any protected areas.

10.8 National Forests Act (NFA) (Act No. 84 of 1998)

The National Forest Act (NFA) (Act No. 24 of 1998) was enacted to:

- Provide for the protection, management and utilisation of forests;
- The protection of certain plant and animal life;
- The regulation of trade in forest produce; and
- The control and management of a national hiking way system and National Botanic Gardens.

The NFA enforces the necessity for a license to be obtained prior to destroying any indigenous tree in a natural forest and, subject to certain exemptions, cutting, disturbing, damaging, destroying or removing any protected tree. The list of protected trees is currently contained in GN 908 of 21 November 2014. Licenses are issued by the Minister and are subject to periods and conditions as may be stipulated.

Protected trees
According to this act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that 'no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister'.

Forests
Prohibits the destruction of indigenous trees in any natural forest without a licence.

The NFA is relevant to the proposed development as the removal and/or disturbance and/or clearance of indigenous vegetation will be required and a license in terms of the NFA may be required for this to be done.

A Terrestrial Biodiversity Assessment (**Appendix 6**) has been conducted to explore how the proposed development may impact on vegetation as protected by the Act.

In addition, all relevant conservation departments (such as the SANBI and DENC) will be invited to provide comments with regards to the proposed development.

10.9 National Veld and Forest Fire Act (Act No. 101 of 1998)

Provides requirements for veldfire prevention through firebreaks and required measures for firefighting. Chapter 4 of the Act places a duty on landowners to prepare and maintain firebreaks. Chapter 5 of the Act places a duty on all landowners to acquire equipment and have available personnel to fight fires.

10.10 Conservation of Agricultural Resources Act (CARA) (Act No. 43 of 1983)

The Conservation of Agricultural Resources Act (CARA) (Act No. 43 of 1983) controls the utilisation of natural agricultural resources in South Africa. The Act promotes the conservation of soil, water sources and vegetation as well as the combating weeds and invader plants. The Act requires the protection of land against soil erosion and the prevention of water logging and salinization of soils by means of suitable soil conservation works to be constructed and maintained. The utilisation of marshes, water sponges and watercourses are also addressed.

The primary objective of the Act is to conserve natural agricultural resources by:

- maintaining the production potential of land;
- combating and preventing erosion and weakening or destruction of the water resources;
- protecting vegetation; and

- combating weeds and invaders plants.

In terms of this Act, no degradation of natural land is permitted. Rehabilitation after disturbance to agricultural land is also managed by this Act. The CARA is relevant to the proposed development as the construction of a WEF as well as other components (such as the on-site switching substation and permanent guard house) may impact on agricultural resources and vegetation on the site. The Act prohibits the spreading of weeds and prescribes control measures that need to be complied with in order to achieve this. As such, measures will need to be taken to protect agricultural resources and prevent weeds and exotic plants from invading the site as a result of the proposed development.

Declared Weeds and Invaders in South Africa are categorised according to one (1) of the following categories:

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

An Agricultural and Soils Site Verification (**Appendix 6**) has been conducted to explore how the proposed development may impact on the agricultural production potential of the proposed site.

10.11 National Road Traffic Act (NRTA) (Act No. 93 of 1996, as amended)

The National Road Traffic Act (NRTA) (Act No. 93 of 1996, as amended) provides for all road traffic matters and is applied uniformly throughout South Africa. The Act enforces the necessity of registering and licensing motor vehicles. It also stipulates requirements regarding fitness of drivers and vehicles as well as making provision for the transportation of dangerous goods.

All the requirements stipulated in the NRTA will need to be complied with during the construction and operational phases of the proposed development.

10.12 Civil Aviation Act (CAA) (Act No. 13 of 2009)

The Civil Aviation Act (CAA) (Act No. 13 of 2009) controls and regulates aviation within South Africa. It provides for the establishment of a South African Civil Aviation Authority (SACAA) and independent Aviation Safety Investigation Board in compliance with Annexure 13 of the Chicago Convention. It gives effect to various conventions related to aircraft offences, civil aviation safety and security, and provides for additional measures directed at more effective control of the safety and security of aircrafts, airports and matters connected thereto.

Although the Act is not directly relevant to the proposed development, it should be considered as the establishment of electricity distribution infrastructure (such as a substation and powerlines) may impact on aviation and air traffic safety, if located directly within aircraft flight paths.

The Air Traffic and Navigation Services Company Limited (ATNS) and the SACAA will be consulted throughout the EIA process, however the screening assessment identified low sensitivity for civil aviation and no significant impacts on civil aviation is expected. No additional requirements were identified in this regard.

10.13 Astronomy Geographic Advantage Act (Act No. 21 of 2007)

The Astronomy Geographic Advantage Act (Act No. 21 of 2007) provides for:

- The preservation and protection of areas that are uniquely suited for optical and radio astronomy; and
- Intergovernmental cooperation and public consultation on matters concerning nationally significant astronomy advantage areas and matters connected therewith.

Under Section 22(1) of the Act, the Minister has the authority to protect the radio frequency spectrum for astronomy observations within a core or central astronomy advantage area. As such, the Minister may under section 23(1) of the Act, declare that no person may undertake certain activities within a core or central Astronomy Advantage Area (AAA). These activities include the construction, expansion or operation; of any fixed radio frequency interference source, facilities for the generation, transmission or distribution of electricity, or any activity capable of causing radio frequency interference or which may detrimentally influence the astronomy and scientific endeavours.

In terms of section 7(1) and 7(2) of this Act, national government established the following AAAs:

- Karoo Central AAA (GN 198 of 2014) – proposed development falls inside of this AAA
- Sutherland Central AAA – proposed development falls outside this AAA
- Northern Cape AAA (GN 115 of 2010) – proposed development falls outside of this AAA

The proposed site falls within the Square Kilometre Array (SKA) Karoo Central Radio Astronomy Advantage Area (KCAAA) 1 buffer (refer **Figure 47** below). The main impacts of renewable energy developments on the SKA is RFI. RFI is a part of the Electromagnetic Compatibility (EMC) discipline that includes Electromagnetic emissions and Electromagnetic immunity. The location of the proposed project could pose an EMI or RFI risk to the SKA, as the proposed project is located within the KCAAA 1 buffer.

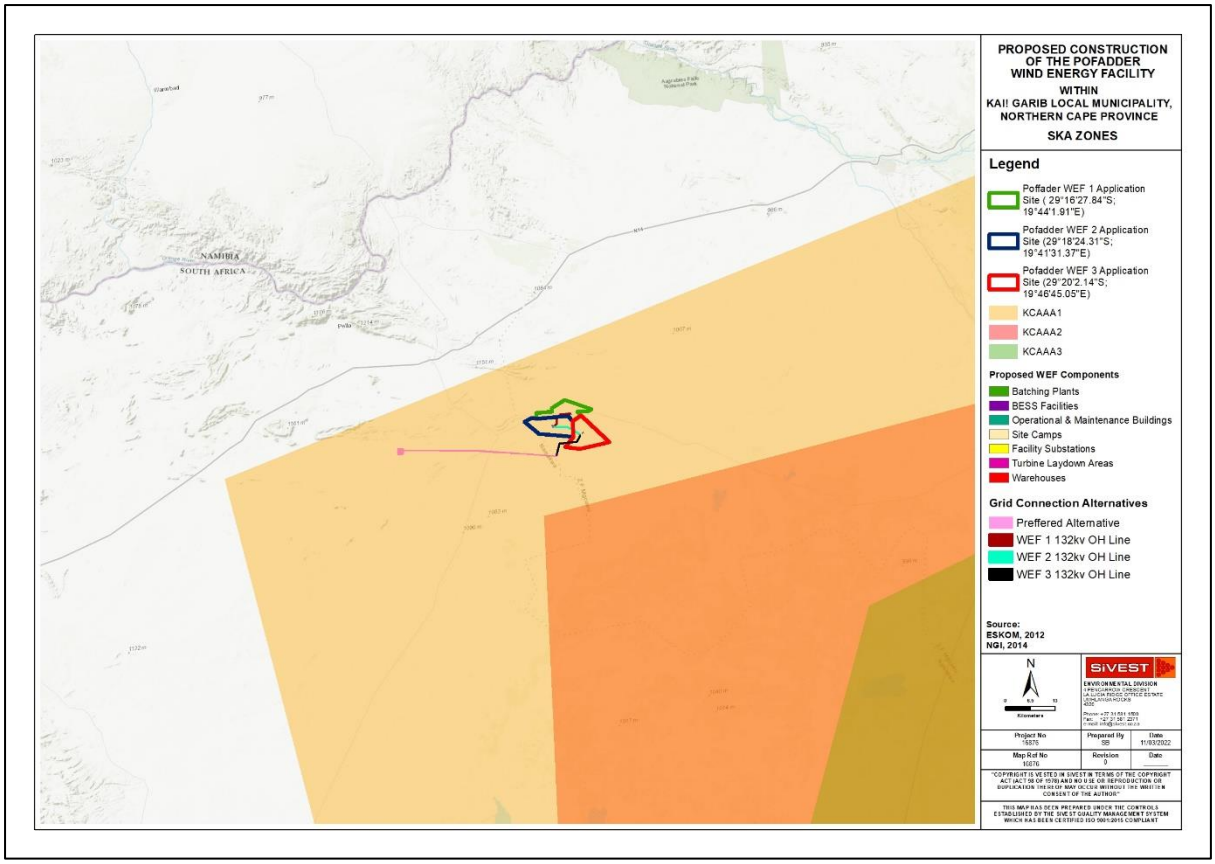

Figure 47: Location of the project in relation to the KCAAA

As such, an Electromagnetic Interference (EMI) Path Loss and Risk Assessment Report (SKA Requirement) was undertaken. The report is included in **Appendix 6**. The intension of the evaluation was to ensure that the Pofadder WEF 1 would not pose a risk to the SKA. Four separate wind turbines in Pofadder Wind Energy Facility 1 were identified for this study. The closest turbine, the turbine with the highest elevation above sea level, the turbine with the lowest pathloss to the SKA infrastructure in the spiral and the turbine with the lowest pathloss to a core SKA telescope. Each of these four points were subjected to two scenarios for the risk analysis desktop study. Scenario 1 where a hub height of 200 m was used and Scenario 2 where a hub height of 120 m was used. The pathloss between the points for each scenario are tabulated below.

Table 18: Pofader WEF 1 Layout distance from SKA infrastructure

SKA ID	Turbine ID	Description	Distance (km)
SKA 008	P55	Closest point	141.38
SKA 008	P9	Turbine with the highest elevation	146.80
SKA 008	P53	Turbine with the lowest pathloss to the SKA site	141.85
M049 (core)	P55	Turbine with the lowest pathloss to the SKA core site	223.79

The SARAO office reviewed the EMI Path Loss and Risk Assessment Report and conducted their own internal high-level impact assessment. Their internal findings determined that the project represents a low risk of interference to the SKA radio telescope with a compliance surplus of 11.80 dBm/Hz. As such, SARAO do not object to the proposed Pofadder WEF 1 development. Confirmation/consent from SARAO is included in **Appendix 5**.

10.14 National Energy Act (Act No. 34 of 2008)

South Africa has two (2) acts that direct the planning and development of the country's electricity sector, namely:

i. The National Energy Act of 2008 (Act No. 34 of 2008); and
ii. The Electricity Regulation Act (ERA) of 2006 (Act No. 4 of 2006).

The National Energy Act (Act No. 34 of 2008), promulgated in 2008, has, as one (1) of its key objectives, the promotion of diversity of supply of energy and its sources. From this standpoint, the Act directly references the importance of the renewable energy (RE) sector, with a mention of the solar energy sector included. The aim is to ensure that the South African economy is able to grow and develop, fast-tracking poverty alleviation, through the availability of a sustainable, diverse energy mix. Moreover, the goal is to provide for the increased generation and consumption of RE (Republic of South Africa, 2008).

10.15 Electricity Regulation Act (Act No. 4 of 2006)

In 2011, the electricity regulation on new generation capacity was published under Section 35(4) of the Electricity Regulation Act (ERA) (Act No. 4 of 2006). These regulations apply to the procurement of new generation capacity by organs of state.

The objectives of the regulations include:

- To facilitate planning for the establishment of new generation capacity;
- The regulation of entry by a buyer and a generator into a Power Purchase Agreement (PPA);
- To set minimum standards or requirements for PPAs;
- The facilitation of the full recovery by the buyer of all costs efficiently incurred by it under, or in connection with, a PPA including a reasonable return based on the risks assumed by the buyer thereunder and to ensure transparency and cost reflectivity in the determination of electricity tariffs; and
- The provision of a framework for implementation of an Independent Power Producer (IPP) procurement programme and the relevant agreements concluded.

The Act establishes a National Energy Regulator as the custodian and enforcer of the National Electricity Regulatory Framework. The Act also provides for licenses and registration as the manner in which generation, transmission, distribution, trading and the import and export of electricity are regulated.

10.16 Protection of Public Information Act (Act No. 4 of 2013)

The Protection of Public Information Act (Act No. 4 of 2013) (POPIA) recognises the Constitutional requirement that everyone has a right to privacy.

Ultimately the Act promotes "the protection of personal information processed by public and private bodies; to introduce certain conditions so as to establish minimum requirements for the processing of personal information; to provide for the establishment of an Information Regulator to exercise certain powers and to perform certain duties and functions in terms of this Act and the Promotion of Access to Information Act, 2000 (PAIA); to provide for the issuing of codes of conduct; to provide for the rights of persons regarding unsolicited electronic communications and automated decision making; to regulate

the flow of personal information across the borders of the Republic; and to provide for matters connected therewith".

Due to the requirements around the Public Participation Process, SIVEST will process and capture information aligned to the POPIA and always obtain consent for I&APs information to be gathered, stored and distributed for the purpose of this project.

10.17 Renewable Energy Development Zones (REDZs) and Strategic Transmission Corridors

The Strategic Environmental Assessment (SEA) for Wind and Solar PV Energy in South Africa (CSIR, 2015) originally identified eight (8) formally gazetted Renewable Energy Development Zones (REDZs) that are of strategic importance for large-scale wind and solar PV development in terms of Strategic Integrated Project 8: Green Energy in Support of the South African Economy, as well as associated strategic transmission corridors, including the rollout of its supporting transmission and distribution infrastructure, in terms of Strategic Integrated Project 10: Electricity Transmission and Distribution.

- REDZs for large-scale wind and solar photovoltaic development;
- associated Strategic Transmission Corridors which support areas where long-term electricity grid will be developed;
- process of basic assessment to be followed and reduced decision-making timeframe for processing of applications for environmental authorisation in terms of the NEMA; and
- acceptance of routes which have been pre-negotiated with all landowners as part of applications for environmental authorisations for power lines and substations.

In addition to the eight (8) formally gazetted REDZs mentioned above, the Phase 2 SEA for Wind and Solar Photovoltaic Energy in South Africa (2019) identified three (3) additional REDZs (namely REDZ 9, REDZ 10 and REDZ 11) that are of strategic importance for large scale wind and solar photovoltaic energy development. These REDZs were published under Government Notice No. 786, Government Gazette No. 43528 of 17 July of 2020, and were officially gazetted under Government Notice No. 144, Government Gazette No. 44191 of 26 February 2021.

Table 19: The SEA for Wind and Solar PV Energy in South Africa (Phase 1 and Phase 2) (CSIR, 2015; CSIR, 2019) identified the following eleven (11) geographic areas for REDZs

REDZ Number	Name	Applicability of REDZ
REDZ 1	Overberg	Large-scale wind and solar photovoltaic energy facilities
REDZ 2	Komsberg	Large-scale wind and solar photovoltaic energy facilities
REDZ 3	Cookhouse	Large-scale wind and solar photovoltaic energy facilities
REDZ 4	Stormberg	Large-scale wind and solar photovoltaic energy facilities
REDZ 5	Kimberley	Large-scale solar photovoltaic energy facilities
REDZ 6	Vryburg	Large-scale solar photovoltaic energy facilities
REDZ 7	Upington	Large-scale solar photovoltaic energy facilities
REDZ 8	Springbok	Large-scale wind and solar photovoltaic energy facilities
REDZ 9	Emalahieni	Large scale solar photovoltaic energy facilities
REDZ 10	Klerksdorp	Large scale solar photovoltaic energy facilities
REDZ 11	Beaufort West	Large scale wind and solar photovoltaic energy facilities

It should be noted that the powerline and proposed 400kV MTS (to be assessed under a separate application) are located within the Northern Corridor of the Strategic Transmission Corridors, as defined and in terms of the procedures laid out in Government Gazette No. 41445 and No. 44191.

The proposed development will be subject to an EIA process in terms of the NEMA, as amended, and the EIA Regulations, 2014 (as amended). Since the proposed project falls within one (1) of the Strategic Transmission Corridors, it is expected to contribute towards the requirement of renewable energy highlighted by the development of these zones. A map of the development in relation to the nearest REDZ has been included in **Appendix 2**.

10.18 Additional Relevant Legislation

- White Paper on the Energy Policy of the Republic of South Africa (1998)
- Occupational Health and Safety Act (Act No. 85 of 1993) [OHSA];
- Environment Conservation Act (Act 73 of 1989) [ECA]
- Road Safety Act (Act No. 93 of 1996) [RSA];
- National Environmental Management: Air Quality Act (Act No. 39 of 2004) [NEM:AQA];
- National Environmental Management: Waste Act (Act No. 59 of 2008, as amended) [NEM;WA];
- Development Facilitation Act (Act No. 67 of 1995) [DFA];
- Promotion of Access to Information Act, (Act No. 2 of 2000); [PAIA]
- The Hazardous Substances Act (Act No. 15 of 1973) [HSA];
- Water Services Act (Act No. 108 of 1998) [WSA];
- Municipal Systems Act (Act No. 32 of 2000) [MSA];
- Subdivision of Agricultural Land Act, 70 of 1970, and
- Mineral and Petroleum Resource Development Act (Act No. 28 of 2002, as amended) [MPRDA].

11. KEY DEVELOPMENT STRATEGIES AND GUIDELINES

In his 2021 State of the Nation Address, President Cyril Rhamaposa announced government are taking the following measures to rapidly and significantly increase generation capacity outside of Eskom:

- *One of the priority investment areas is to rapidly expand energy generation capacity.*
- *Restoring Eskom to operational and financial health and accelerating its restructuring process is central to achieving this objective. Eskom has been restructured into three separate entities for generation, transmission and distribution.*
- *A Section 34 Ministerial Determination will be issued shortly to give effect to the Integrated Resource Plan 2019, enabling the development of additional grid capacity from renewable energy, natural gas, hydro power, battery storage and coal.*
- *We will initiate the procurement of emergency power from projects that can deliver electricity into the grid within 3 to 12 months from approval.*
- *The Department of Mineral Resources and Energy gazetted the Amended Schedule 2 of the Electricity Regulation Act 4 of 2006 on 12 August 2021, for 100 Megawatts of embedded electricity generation as approved by Minister Gwede Mantashe.*
- *We will negotiate supplementary power purchase agreements to acquire additional capacity from existing wind and solar plants.*
- *We will also put in place measures to enable municipalities in good financial standing to procure their own power from independent power producers.*

Policy decisions taken in the next decade will largely determine the dimension of the impact of climate change. Local government is in the front line of implementation and service delivery, and thus needs to pursue adequate mitigation and adaptation strategies which should include participation from the public sector, the private sector and NGOs.

The DoE gazetted its White Paper on Renewable Energy in 2003 and introduced it as a 'policy that envisages a range of measures to bring about integration of renewable energies into the mainstream energy economy.' At that time, the national target was fixed at 10 000 GWh (0.8 Mtoe) renewable energy contribution to final energy consumption by 2013. The White Paper proposed that this would be produced mainly from biomass, wind, solar and small-scale hydropower. It went on to recommend that this renewable energy should be utilised for power generation and non-electric technologies such as solar water heating and biofuels. Since the White Paper was gazetted, South Africa's primary and secondary energy requirements have remained heavily fossil-fuel dependent, both in terms of indigenous coal production and use, as well as the use of imported oil resources. Alongside this, the projected electricity demand of the country has led the National utility Eskom, to embark upon an intensive build programme to secure South Africa's longer-term energy needs, together with an adequate reserve margin.

The National Development Plan (NDP), 2011 – 2030, aims to address parts of the South African triple development challenges of poverty and inequality by 2030. In order to achieve this, numerous enabling milestones and critical actions have been formulated. One (1) of the critical actions is the formulation and implementation of interventions that aim to ensure environmental sustainability and resilience to future shocks.

The emphasis is on South African investment and assistance in the exploitation of various opportunities for low-carbon energy in the clean energy sources of Southern Africa (National Planning Commission, 2011).

A more efficient and competitive infrastructure is envisaged, particularly infrastructure that facilitates economic activity and is conducive to growth and job creation. The plan identifies key services that need strengthening; namely commercial transport, energy, telecommunications and water, while ensuring their long-term affordability and sustainability. The National Planning Commission maintains that South Africa has missed a generation of capital investment in many infrastructure opportunities including electricity. Therefore, one (1) infrastructure investment priority is in the procurement of at least 20,000 MW of renewable energy-efficiency (National Planning Commission, 2011).

The proposed project is thus well aligned with the aims of the NDP which is further detailed in the following national and provincial plans:

- National Integrated Resource Plan for Electricity (2010-2030);
- Integrated Resource Plan (IRP 2019)
- National Infrastructure Plan 2012, as amended;
- Northern Cape Provincial Spatial Development Framework;
- Northern Cape Province Strategic Plan 2020-2025 (refer section 8)
- Z F Mgcawu District Municipality Integrated Development Plan, 2017 – 2022

The proposed project is also well aligned with the Kai !Garib Municipality IDP 2020/2021 (discussed further below) which has identified renewable energy as a way of diversifying the economy within the municipality.

11.1 Northern Cape Province Strategic Plan 2020 - 2025

The Northern Cape Province Strategic Plan 2020-2025, highlights the need for energy security and the finalization of the draft Northern Cape Renewable Energy Strategy was identified as a key focus area. The Northern Cape province not only supports this sector but are identifying wats to tap into and draw benefit from the endless opportunities that the renewable energy sector holds for the economic development of the Province.

11.2 Z F Mgcawu Integrated Development Plan, 2020 – 2021

The Z F Mgcawu District Municipality has identified a number of development priority areas, one of them being Energy and Electricity and the need to ensure that there is adequate energy to supply households.

The vision set out in the ZFMDM is “Quality support to deliver quality services”. The mission is a “Centre of excellence in providing quality basic services through support to local municipalities”.

In terms of the National Spatial Development Perspective, the ZF Mgcawu District area has been classified as a ‘medium’ importance area which means that no significant investment is concentrated in the region, in terms of the National Spatial Development Perspective, the ZF Mgcawu District area has been classified as a ‘medium’ importance area which means that no significant investment is concentrated in the region.

The IDP lists a number of strategic objectives and development objectives. The relevant objectives include:

Strategic objective:

To Facilitate the Development of Sustainable regional land use, economic, spatial and environmental planning frameworks that will support and guide the development of a diversified, resilient and sustainable district economy, the associated development objective is to:

- Establish a vehicle to ensure all businesses are co-operating (i.e. District LED Forum)
- Create investment opportunities in sectorial development (i.e. investment activities; Entrepreneurial business support programme)
- Enable an environment for business establishment and support initiatives (i.e. increase the number of businesses; entrepreneurial support)

Development objective

To market, develop and co-ordinate tourism in the ZFMDM. The associated development objective is to:

- Promote the Green Kalahari tourism brand in the ZF Mgcawu district

The IDP identifies several key challenges. The following are relevant to the proposed development

- High rate of unemployment
- Inadequate human capital
- Youth development

- Access to health care facilities

The IDP also notes that the ZF Mgcawu District Municipality acknowledged that climate change poses a threat to the environment, its residents, and future development. Actions are required to reduce carbon emissions (mitigation), and prepare for the changes that are projected to take place (adaptation in the District, ZF Mgcawu District Municipality has therefore prioritised the development of a Climate Change Vulnerability Assessment and Climate Change Response Report

11.2.1 Kai !Garib Local Municipality Integrated Development Plan (2020/21 Draft Review)

The municipality has identified renewable energy as a way of diversifying the economy within the municipality. New opportunities have opened up for Kai !Garib municipal area since the need to facilitate the generation of sustainable energy was introduced in South Africa by Eskom and the South African government.

South Africa has embarked in a process of diversifying its energy-mix to enhance energy security while also lowering green-house gas emissions. The country is blessed with a climate that allows Renewable Energy (RE) technologies like solar photovoltaic (PV) and Wind generation to be installed almost anywhere in the country. According to the IDP, the Northern Cape has attracted 66% of the total IPPPP investments to date and has secured a substantial share of the equity for local communities with benefits materializing over the project life construction.

There is potential for further IPPs to become operational in the municipality with several being in the planning stages. Kai !Garib Municipality is also a participant in the ZF Mgcawu Development Forum, an initiative coordinated by the Industrial Development Corporation which aims to ensure that integrated development planning and implementation of regional projects take place. This includes the renewable energy. Kai !Garib Municipality recognizes the importance of participating in this forum to provide a platform for partnerships for regional socio-economic growth.

The proposed project is also well aligned with the Kai !Garib Municipality IDP 2020/2021 which has identified renewable energy as a way of diversifying the economy within the municipality. Furthermore the implementation of Pofadder WEF 1 would contribute towards addressing the Kai !Garib local municipality key issue regarding high levels of poverty and unemployment, skills shortage, and inequalities through the creation of employment opportunities, the provision of skills training opportunities, and local economic growth, including growth in personal income levels of those community members who would be employed on the project.

12. NEED AND DESIRABILITY

12.1 National Renewable Energy Requirement

In 2010, South Africa had 44,157 MW of power generation capacity installed. Current forecasts indicate that by 2025, the expected growth in demand will require the current installed power generation capacity to be almost doubled to approximately 74,000 MW (SAWEA, 2010).

This growing demand, fuelled by increasing economic growth and social development within Southern Africa, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of environmental impact, climate change and the need for sustainable development. Despite the worldwide concern regarding Greenhouse Gas (GHG) emissions

and climate change, South Africa continues to rely heavily on coal as its primary source of energy, while most of the countries renewable energy resources remain largely untapped (DME, 2003). There is therefore an increasing need to establish a new source of generating power in SA within the next decade.

The use of renewable energy technologies, as one (1)10 of a mix of technologies needed to meet future energy consumption requirements is being investigated as part of Eskom's long-term strategic planning and research process. It must be remembered that wind energy is plentiful, renewable, widely distributed, clean and reduces GHG emissions when it displaces fossil-fuel derived from electricity. In this light, renewable wind energy can be seen as desirable.

The REIPPP programme and the competitive nature of the bidding process has resulted in significant lowering of solar and wind tariff prices since 2011. Further projects will increase the competitive nature of the REIPPP program and further result in cost savings to South African consumers.

12.2 National Renewable Energy Commitment

In support of the need to find solutions for the current electricity shortages, the increasing demand for energy, as well as the need to find more sustainable and environmentally friendly energy resources, South Africa has embarked on an infrastructure growth programme supported by various government initiatives. These include the National Development Plan (NDP), the Presidential Infrastructure Coordinating Commission (PICC), the DoE's IRP, the National Strategy for Sustainable Development, the National Climate Change Response White Paper, the Presidency of the Republic of South Africa's Medium-Term Framework, and the National Treasury's Carbon Tax Policy Paper.

The Government's commitment to growing the renewable energy industry in South Africa is also supported by the White Paper on Renewable Energy (2003) which sets out the Government's principals, goals and objectives for promoting and implementing renewable energy in South Africa. In order to achieve the long term goal of achieving a sustainable renewable energy industry, the DoE has set a target of contributing 17,8 GW of renewable energy to the final energy consumption by 2030. This target is to be produced mainly through, wind and solar; but also through biomass and small scale hydro (DME, 2003; IRP, 2010). Further renewable energy targets have been proposed within the latest IRP, which was gazetted in 2019.

The 2019 Integrated Resource Plan (2019) (IRP2019) was released on 18 October 2019 and includes the following capacity allocation:

- 1 500 MW of new coal power (noting that there will be decommissioning of coal capacity over the period);
- 2 50 0MW of hydro power;
- 6 000 MW solar;
- 14 400 MW wind;
- 2 000 MW of storage;
- 3 000 MW from gas.

12.3 Wind Power Potential in South Africa and Internationally

Onshore wind energy technology is the most commonly used and commercially developed renewable energy technology in South Africa as wind is abundant and inexhaustible (DEA Guideline for Renewable

Energy, 2015). Wind energy is one (1) of the lowest-priced renewable energy sources and is economically competitive (www.wasaproject.info).

12.4 Site Suitability

The location of the proposed Pofadder WEF 1 (this application) and proposed on-site Switching / Collector Substation included several key aspects including wind resource, grid connection suitability/infrastructure as well as environmental and social constraints, proximity to various planning units and strategic areas and topography and access.

12.4.1 Wind Resource

The Applicant followed an in-house wind farm site identification protocol involving the application of a number of data sets and variables. Having applied the different data sets such as wind presence and speed, as well as other meteorological information and geographical factors, a consensus emerged confirming the suitability of the project site for the Pofadder WEF 1. A wind measurement mast was installed on the Pofadder WEF 1 site in June 2021 which confirms that the wind resource at the site is deemed to be suitable for the development of a wind farm (wind resource map included below).

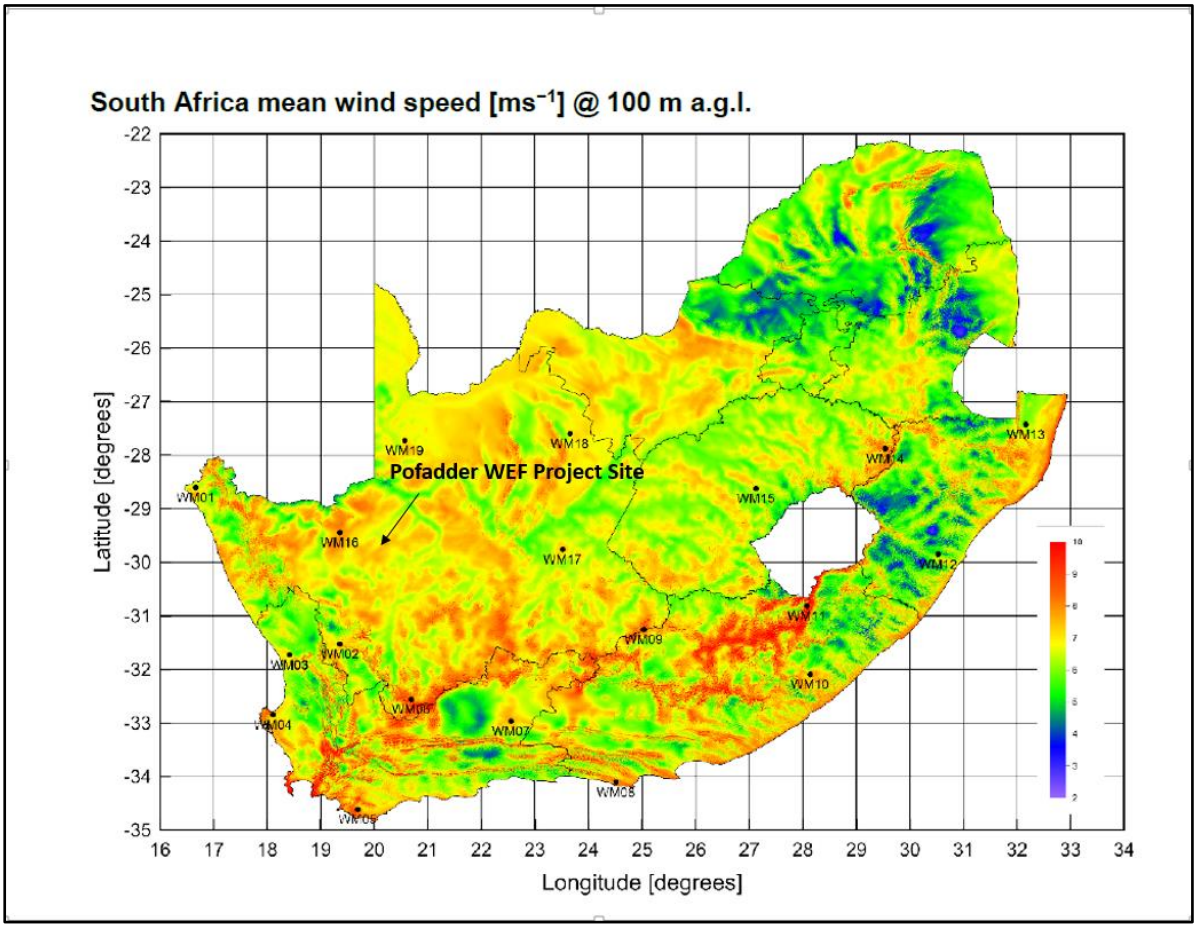

Figure 48: WASA High Resolution Wind Resource Map: mean wind speed [ms-1] @ 100 m a.g.l (2020).

12.4.2 Site Access

The main access route to the proposed Pofadder WEF 1 is the N14 national road up until the Pofadder town which is located approximately 35 km North West of the project site. The project site is accessible via the R358 gravel access road that traverses the northern section of the project site. In addition to the existing internal service 'farm' roads on site, which will be extended to a maximum width of 12 m, where necessary, additional internal service roads are planned to be constructed on the project site of which the width will not exceed 12 m. The length of the internal service road network for the proposed Pofadder WEF1 will be approximately 48 km.

These roads are for farming access and are gravel, usually unsuited for tourist related traffic.

A Traffic Impact Assessment (included in **Appendix 6**) was undertaken for the Pofadder WEF 1. The specialist advised that there were no 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 250m between the chosen access positions.

The construction phase for the development will typically generate the highest number of additional vehicles. However, it will be temporary, and impacts are considered nominal. The specialist confirmed that the Pofadder WEF 1 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.

12.4.3 Topography and Land Use

According to the South African National Biodiversity Institute (SANBI) 2012 Vegetation Map of South Africa, Lesotho and Swaziland (South African National Biodiversity Institute, 2012) the vegetation biome is described as Nama-Karoo. The Nama-Karoo Biome "occurs on the central plateau of the western half of South Africa, at altitudes between 500 m and 2000 m, with most of the biome falling between 1000 m and 1400 m. The general topography of the proposed study area is flat with a gentle slope of 10%. The topography is characterised by mostly gravel plains in the southern half of the site while the northern half of the project site constitutes mostly sandy plains. The flat plains that make up the project area make it a good site to establish a WEF from a technical perspective.

The farm is located in a sheep farming agricultural region, and this is the only land use on the site and surrounds. Grazing capacity of the site is low at 36 hectares per large stock unit. Due to the extreme aridity constraints as well as the poor soils, agricultural land use is restricted to low intensity grazing only. The proposed development poses zero threat to arable land and almost zero threat to grazing land. There are two reasons for this. The first is that the small and widely distributed nature of the footprint of a wind energy facility means that the loss of potential agricultural land is insignificantly small. The second is that only land of very limited agricultural potential, that is not suitable for crop production, occurs on the site.

12.4.4 Policy

From a strategic renewable energy development perspective, the Pofadder WEF 1 site is located approximately 65 km east of the Springbok Wind Renewable Energy Development Zone (REDZ) 8. The associated grid route is also located within the Electrical Grid Infrastructure (EGI) Northern corridor.

The proposed project site is therefore linked to the national planning vision for wind and solar development in South Africa.

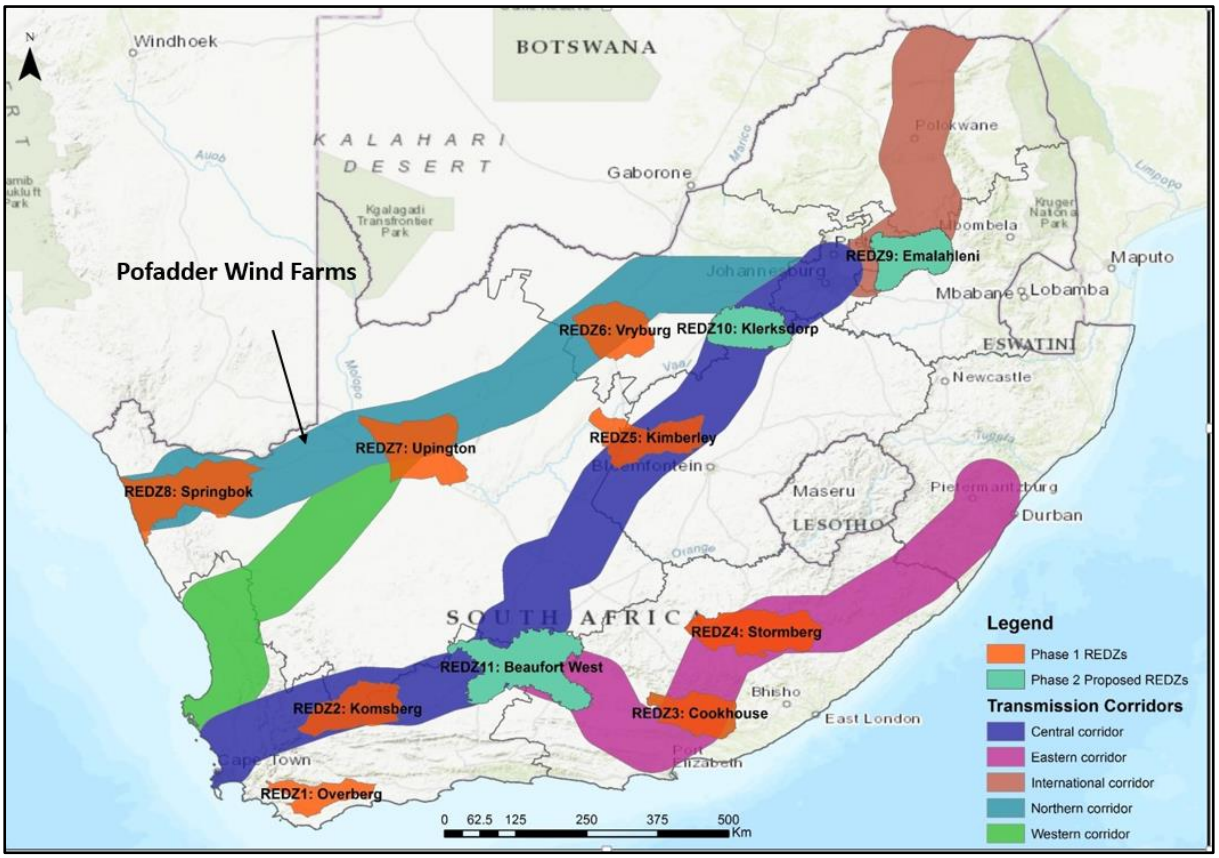

Figure 49: Location of 8 existing Renewable Energy Development Zones (REDZs) and 3 proposed additional zones, overlaid onto the electricity grid infrastructure corridors where investment in transmission infrastructure is planned (CSIR, n.d.).

12.4.5 Environmental

The applicant conducted an extensive environmental screening process using various available desktop data and tools to determine the suitability of the site. An avifaunal specialist was appointed to conduct a site sensitivity screening visit and report to identify key priority species nesting within the project or neighbouring properties which may require buffering out of large portions of the proposed project site. A Verreaux's eagle nest which required a 5.2 km no go buffer was identified in the northern section of the initial project area, during the screening study. This no-go buffer resulted in the proposed WEF development being shifted to the current location south of the Verreaux's eagle nest outside of regulated 5.2k m buffer.

Subsequent consultation with the affected landowners was also undertaken in order to identify possible areas within the proposed project site boundary that should be excluded from development. Furthermore, key environmental specialists and stakeholders familiar with the Pofadder area were consulted to identify any potential impacts which may be associated with a proposed WEF at the selected site. The National Department of Environmental Affairs (DEA) screening tool was also utilized to generate a site sensitivity report for the proposed Pofadder WEF Cluster. The outcome of the site selection process was the identification of a ±24,000 ha potentially developable area on which three wind farm projects are being proposed, one of which it the Pofadder WEF 1.

There are a number of proposed WEF's located approximately 40 km west of Pofadder WEF 1 which have received environmental authorisation. The proponent consulted the various EIA reports and the associated specialist studies for the authorised WEF's to determine the environmental, economic and social risks associated for WEF's within the wider area.

12.4.6 Land Availability

Availability of land is a key feasibility criterion in the site selection process. Large portions of farmland within the Northern Cape Province and Pofadder region has been secured by renewable energy Independent Power Producers for the purpose of developing, constructing and operating wind and solar PV projects.

The identified project site for the Pofadder WEF 1 is of a suitable land size for the proposed development. Pofadder Wind Facility 1 (Pty) Ltd has entered into an option to lease agreements with the respective landowners of the properties within the project site. All affected landowners have given their consent and have signed letters of consent for the undertaking of the Scoping and EIA Process and the subsequent development of the proposed Pofadder WEF 1 should EA be granted.

12.4.7 Access to Grid

The Applicant has consulted with Eskom network planners to understand their future load centres as well as strategic plans to upgrade and strengthen any local networks. Eskom has confirmed that they are proceeding with the development of the newly established Korana 400/132 kV MTS which is located approximately 60 km west of the project. These plans have been corroborated in the most recent Eskom Transmission Development Plan (TDP) 2022 – 2031, presented by Eskom on 26 October 2021.

Notwithstanding the fact that the wind farm will contribute to meeting the electrical demand on the distribution network, close proximity to the planned 400 kV infrastructure means that in due course, surplus power can be evacuated into Eskom's Transmission System and conveyed at very high voltage for consumption elsewhere in the country. The placement of the Pofadder WEF 1 power line in parallel to the planned 400 kV Transmission powerline reduces disturbance on the ground and limits the visual intrusion.

The site is considered suitable for the reasons provided above. The investigation of an alternative site has therefore not been proposed. There is therefore no Site alternative for the Pofadder WEF.

12.5 Reduce dependency on fossil fuels

At present, more than 90% of South Africa's energy is generated by coal-fired power stations. Apart from the fact that these are finite resources that will eventually run out, fossil fuels are also harmful to the environment when used to produce electricity. During combustion, fossil fuels such as coal emit many by-products into the atmosphere, two (2) of which are carbon dioxide (CO_2) and sulphur dioxide (SO_2). Both these gases have been shown to contribute to the worsening climate crisis. Wind is a free and infinite resource that occurs naturally in the environment. Converting wind energy into electricity releases no harmful by-products into the environment and will reduce the dependency on fossil fuels.

12.6 Stimulate the economy

A significant portion of the capital expenditure envisaged for the project will be spent on procurement of goods and services within South Africa and specifically within the Northern Cape Province. If goods and services are procured locally (i.e. within South Africa), it increases the production of the respective industries. This has a positive impact on the national economy and economies of the municipalities where inputs are procured.

The proposed development has the potential to stimulate the demand for other industries, among others construction services, engineering service, transport services, steel structures, cement and other aggregates, and electrical equipment. At the local level, increase in demand for accommodation, personal services, perishable and non-perishable goods is expected, which will stimulate the local economies of the towns and settlements, where labour will be procured from or where migrant workers will be temporarily located.

Some of the local businesses could benefit from sub-contracting opportunities, if the construction companies appointed by the developer implement a local community procurement policy, and consumer expenditure of the construction crew. Furthermore, the demand for hospitality services (including accommodation and catering in the Pofadder town and other nearby towns) is expected to increase and provide for much-needed stimulus for the local economy.

According to the Social Impact Assessment, the development of this project will create both direct and indirect jobs which will have a positive economic benefit within the region. Job opportunities will be available and many of the low and semi-skilled employment opportunities will be available to residents in the area. Many of the beneficiaries are likely to be historically disadvantaged members of the community and the project will provide opportunities to develop skills for the local people. Even more the project will stimulate the local economy, which is likely to be most significant at a cumulative level. The socio-economic stimulation will contribute in the form of disposable salaries and the purchases of services and supplies from the local communities in and around the towns of Pofadder. The developer would need to ensure that there is a corporate social responsibility plan in place, the intention is ensure that it falls in line with the Renewable Energy Independent Power Producer Procurement (REIPPP) BID guidelines or to put an equivalent plan in place.

The construction phase for the Pofadder WEF 1 will extend over a period of 18 to 24 months. The total estimated wage bill for the construction phase is ± R 54 million, where total capital expenditure estimate for construction phase is ± R 2.4 billion. The construction phase will employ 300 - 400 employees. The number of employment opportunities in terms of low skilled, semi-skilled and skilled is Low skilled: ± 165 - 220 (± 55%); Semi-skilled: ± 90 - 120 (± 30%) and Skilled: ± 45 - 60 (± 15%).

The typical lifespan of WEFs is 20 to 25 years, during the operational phase there will be a significant decrease in employment opportunities, hence the potential socio-economic benefits will be limited. The total number of people employed in the operational phase is ± 40 – 50. Typical employees that might be required include Technicians, electricians, engineers, IT specialists, environmental specialists, health and safety managers, and administrators (skilled); drivers and equipment operators (semi-skilled); construction workers and security staff (low-skilled). It should be noted that the majority of the semi- and low-skilled employment opportunities are likely to be available to the local communities of Pofadder and Kakamas, which will present a positive social benefit to these communities due to the low availability of employment opportunities in these areas.

12.7 Job opportunities and household livelihoods

Wind energy projects create both temporary and permanent job opportunities in South Africa for both skilled and unskilled workers. The project will lead to the creation of both direct and indirect jobs which will have a positive economic benefit within the region. In this regard, and as indicated above, there are 300 - 400 jobs associated with the construction phase of the project and 40 - 50 with the operational phase. Of the construction phase jobs approximately 165 - 220 (55%) of the employment opportunities will be available to low-skilled workers (construction labourers, security staff etc.), 90 - 120 (30%) to semi-skilled workers (drivers, equipment operators etc.), and 45 - 60 (15%) for skilled personnel (engineers, land surveyors, project managers etc.). Many of the low and semi-skilled employment opportunities will be available to residents in the area, specifically residents from Pofadder and Kakamas. Many of the beneficiaries are likely to be historically disadvantaged members of the community and the project will provide opportunities to develop skills amongst these people. The operational phase will employ approximately 40 - 50 people full time for a period of 20 - 25 years. Of this, approximately 20 - 25 are low skilled, 10 - 12 are semi-skilled and 5 - 6 are skilled.

In addition to those benefitting from direct employment created at the project, various multiplier effects will assist in temporarily supporting existing jobs in the businesses offering services and goods that will be procured during construction activities. The increased temporary income earned by these businesses will, in turn, stimulate consumer spending, creating another round of multiplier effect, positively impacting on the employment situation in the area. There will be opportunities for skills development and training.

Household earnings are linked closely with trends in employment and, as such, will be affected positively by the creation of jobs as discussed above. The creation of temporary jobs during the construction period will temporarily increase affected households' income. A temporary increase in living standards based on additional monthly income will thus ensue. Employees working for local businesses that will be sub-contracted to supply goods and services to the WEF during construction are also expected to benefit indirectly.

According to the Socio-Economic Report, the implementation of Pofadder WEF 1 would contribute towards addressing the Kai !Garib local municipality key issue regarding high levels of poverty and unemployment, skills shortage (described below), and inequalities through the creation of employment opportunities, the provision of skills training opportunities, and local economic growth, including growth in personal income levels of those community members who would be employed on the project.

12.8 Skills development

In addition to the job creation, there is valuable opportunities for skills enhancement/development/training and knowledge transfer as quite often input from experts are required in this field. Therefore, opportunities for guiding and training of local workers is created. A variation of skill sets is required ranging from semi-skilled construction workers to highly skilled engineers. The skill set of the majority of the municipality's residents comprises of low-skills, which means that with proper planning and recruitment strategies, many of the local unemployed residents could be hired as temporary construction workers on site provided they satisfy any other recruitment criteria.

Those employed will either develop new skills or enhance current skills. This insinuates that inexperienced workers will have the opportunity to attain and develop new skills, while experienced workers will further improve their existing skills. Albeit the employment is temporary, the skills attained

will be of long-term benefit to employees. However, as any skills set it will need to be supported and practised on a regular basis to maintain its currency.

13. MOTIVATION FOR THE PREFERRED DEVELOPMENT FOOTPRINT WITHIN THE APPROVED SITE AS CONTEMPLATED IN THE SCOPING REPORT

The layout that was included in the Scoping Phase reporting has been refined based on updated wind data and specialist input and a final proposed layout has been compiled for approval (refer **Figure 51 and 52** below). The proposed layout / preferred development footprint that is being put forward is the most feasible layout configuration. The layout has been refined based on information from the pre-screening phase through to the impact assessment phase which has resulted in a layout where all turbine and supporting infrastructure (except for certain roads) avoids all sensitivities identified.

All constraints identified to date as indicated in the sensitivity mapping below have been taken into account and the turbines and supporting infrastructure shifted where necessary to inform the proposed turbine layout for the Pofadder WEF 1. All turbines and associated infrastructure (including the substation, BESS, O&M Building, batching plant, site camp, warehouse and the turbine laydown area) are placed outside of the no-go areas (which are inclusive of the associated buffers) identified by specialists. Refer **Figure 50** below of the turbine and supporting infrastructure layout.

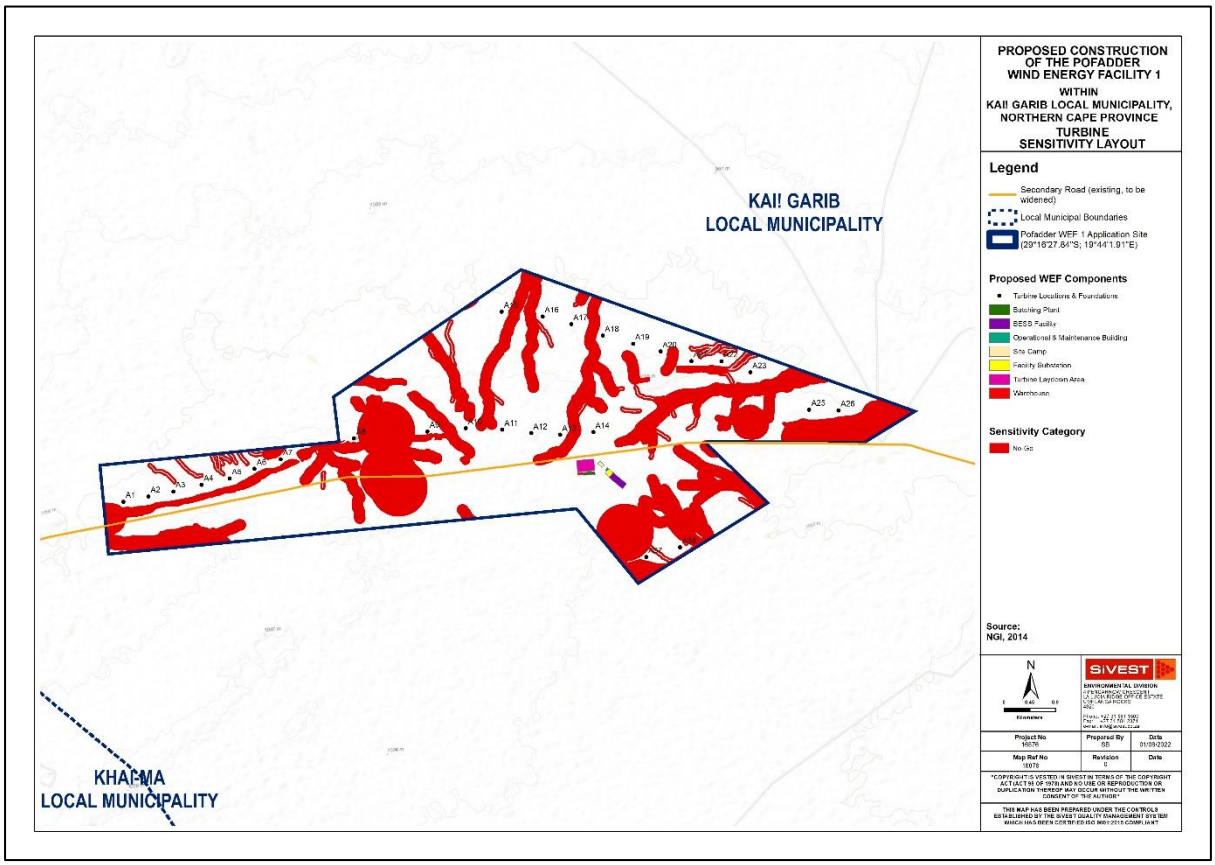

Figure 50: Turbine and supporting infrastructure sensitivity layout

Certain roads and MV cables are located within sensitive areas however the applicant has avoided these areas as far as practically possible. Based on the proposed layout one minor ephemeral wash

and nine small drainage lines will be crossed by access roads and MV cabling. A localised short- and longer-term impact of low significance is expected (as assessed by the Aquatic specialist) on the identified freshwater resource ecosystems in the area at the points at which the infrastructure will need to cross of rivers/drainage lines. This is deemed acceptable by the specialist as these crossings will not impact the more important downstream freshwater resource features. In terms of the depression wetland, this feature will be avoided by the proposed development.

While roads will result in some habitat fragmentation, the Avifaunal specialist has confirmed that, given the expected density of the proposed turbine layout and associated road infrastructure, it is not expected that any priority species will be permanently displaced from the development site. The habitat is not particularly sensitive, as far as avifauna is concerned, therefore the impact of the habitat transformation will be low given the extent of available habitat and the small size of the physical footprint.

The bat specialist has stated that, while road infrastructure and MV cabling avoids most buffer areas, roads are acceptable where they cross the bat sensitivity buffer areas in line with the final layout.

No fatal flaws have been identified by any of the specialists and all impacts can be mitigated to acceptable levels. During the construction phase, almost all of the post-mitigation scores are low, except for the increased risk of HIV infections from a social perspective. The mitigation measures recommended by the social specialist will be implemented in this regard. From a heritage resource perspective, a post-mitigation impact of medium significance was identified for impacts on graves during the construction phase. However, as identified by the heritage specialist, the nearest grave is located approximately 3-4 km away and is unlikely to be disturbed. As recommended, a pre-construction survey and micro-siting of infrastructure will be undertaken prior to construction to ensure any heritage resources are identified and avoided. In terms of job creation and socio-economic stimulation, a medium positive rating was identified from a social perspective during the construction phase.

Similarly, during the operation phase almost all of the post-mitigation scores were identified as low. A medium negative rating was identified by the social specialist with regards to the transformation of sense of place as wind farms can disrupt the landscape. While it is acknowledged that wind farm infrastructure will have an impact on the sense of place within a landscape, the heritage specialist has confirmed that the site lies in a remote location well away from commonly used roads that might be regarded as scenic routes and has therefore identified the post-mitigation score as low. This aspect was there not identified as a major concern. The other rating that was identified as a medium negative impact was the AWL lights at night and the potential they may have to significantly detract from the 'dark-sky' sense of place of the rural landscape. The heritage specialist also identified this and recommended the use of a warning system designed to minimise use of the red aviation warning lights to reduce night-time impacts. While such a system is not currently approved by the South African Civil Aviation Authority, should it be approved, it will be investigated by the applicant for use on site. In terms of job creation and socio-economic stimulation, a medium positive rating was identified from a social perspective during the operational phase.

For the decommissioning phase, the only impacts identified as negative medium was the increased risk of HIV infections. The mitigation measures recommended by the social specialist will be implemented in this regard. From a social perspective, in terms of job creation and socio-economic stimulation, a medium positive rating was identified during the decommissioning phase.

Cumulatively, most impacts were low, except for a medium negative impact for bats across multiple wind energy project, a high negative impact for heritage in terms of alteration of the landscape and a medium negative impact for increase in traffic and incidents on the roads.

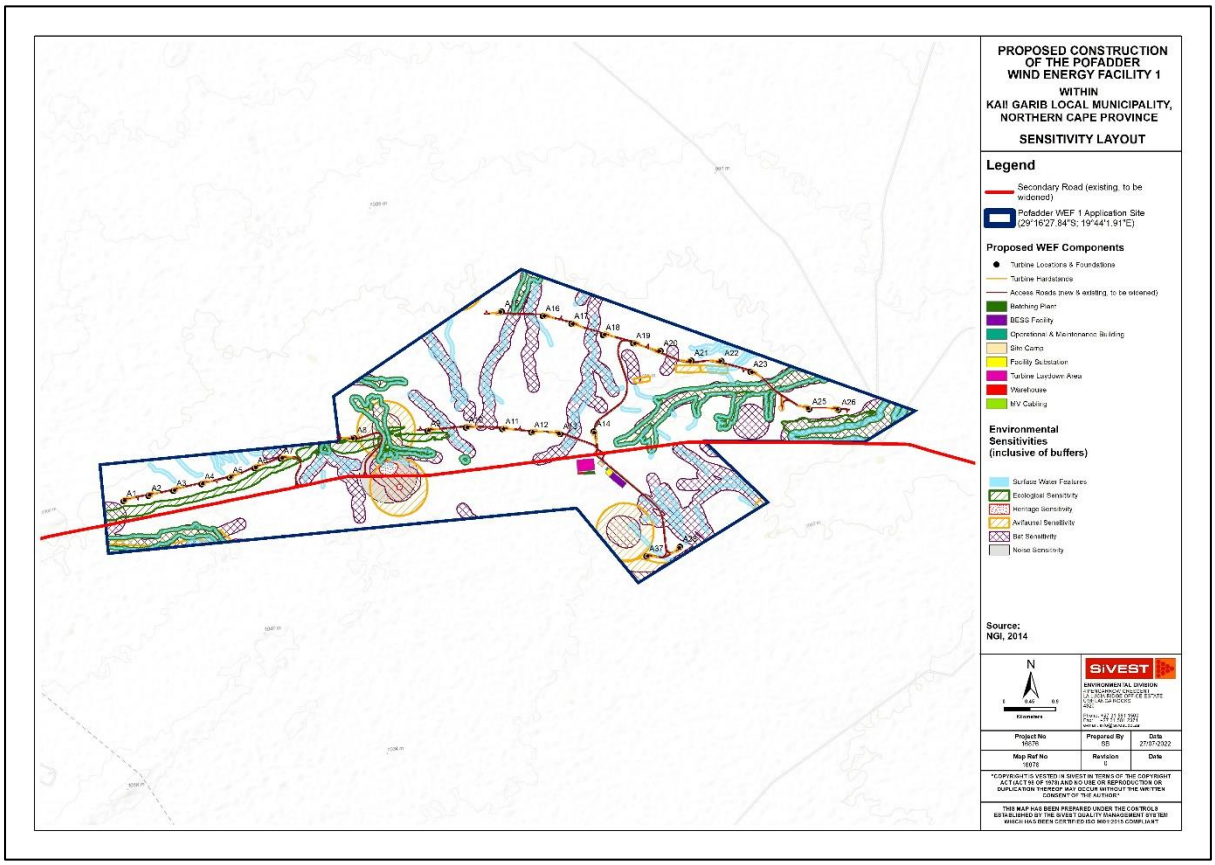

Figure 51: Final proposed layout / development footprint with site sensitivities

The following updates have been made to the layout:

- All turbines are placed outside of the no-go areas identified by specialists.
- The substation, BESS, O&M Building, batching plant, site camp, warehouse and turbine laydown area have been placed in areas not constrained by any sensitivities;
- Some associated roads and MV cables do cross drainage lines in some instances, however existing crossings will be used as far as possible. Specialist recommendations and mitigations will be applied in areas where crossing of drainage lines / watercourses is required.

The proposed final layout (included below) has therefore considered the sensitivities identified throughout the process and has informed the final proposed development footprint and layout put forward for authorisation.

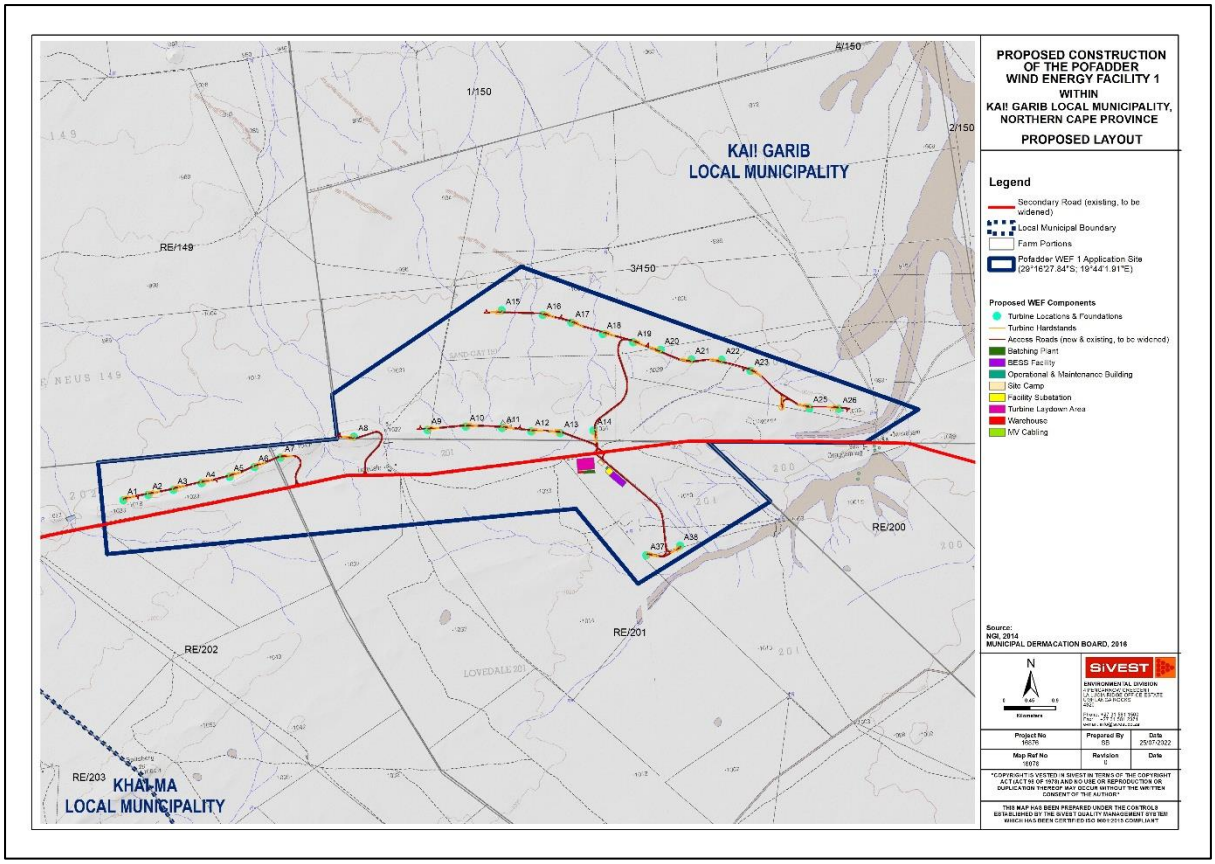

Figure 52: Final proposed layout / development footprint for approval

14. DETAILS OF PROCESS FOLLOWED TO REACH THE PREFERRED OPTION

14.1 Details of alternatives

As per Chapter 1 of the EIA regulations (2014), as amended, feasible and reasonable alternatives are required to be considered during the EIA process. Alternatives are defined as "*different means of meeting the general purpose and requirements of the activity*". These alternatives may include:

(a) The property on which or location where it is proposed to undertake the activity;
(b) The type of activity to be undertaken;
(c) The design or layout of the activity;
(d) The technology to be used in the activity;
(e) The operational aspects of the activity; and
(f) The option of not implementing the activity.

Each of these alternatives are discussed in relation to the proposed development in the sections below. The EIA Regulations, 2010 guideline document stipulates that the environmental investigation needs to consider feasible alternatives for the proposed development. The developer should be encouraged to consider alternatives that would meet the objective of the original proposal and which could have an acceptable impact on the environment. The role of alternatives in the EIA process is therefore to find the most effective way of meeting the need and purpose of the proposal, either through enhancing the environmental benefits of the proposed activity, and/or through reducing or avoiding potentially significant negative impacts.

14.1.1 Location/Site alternatives

Prior to the initiation of the EIA, alternative properties / sites were considered and pre-screened for the location of the proposed development. As discussed in **Section 12** above, the selection of a potential wind farm site includes several key aspects including wind resource, grid connection suitability/infrastructure as well as environmental and social constraints, proximity to various planning units and strategic areas and topography and access. The high voltage powerline associated with the Pofadder WEF 1 coincides with South Africa's Northern Electrical Grid Infrastructure (EGI) corridor which runs through the region and provides a strategic tie in point for new generation. This serves to show that the project is well placed and in line with key national strategic plans and imperatives. The proposed project site was selected based on the above criteria ahead of other regional properties / sites due to the cumulative assessment of all criteria.

Based on the reasons above no site alternatives have been considered during the EIA process for this proposed development. The placement of wind energy facilities is dependent on the factors discussed above, all of which are favourable at the proposed site location. A met mast was installed on the project site and the proposed site has been deemed suitable in terms of wind resource. The proposed project site has topography which is suitable for the development of a WEF. In addition, the proposed project site also has a low agricultural intensity and is easily accessible off the N14 national road and the R358 gravel access road. The site is therefore considered highly suitable for the proposed development of a WEF and no other site locations have been considered during the EIA process.

14.1.2 The type of activity to be undertaken

No other activity alternatives have been considered. Renewable Energy developments in South Africa are highly desirable from a social, environmental and development perspectives respectively. The importance of renewable energy has been outlined in **Section 10** and **11** above highlighting national, district and local support. Wind energy installations are also more suitable for the proposed site because of the high wind resource.

South Africa is under immense pressure to provide clean sources of electricity generating capacity in order to reduce the current electricity demand from aging and polluting coal-fired power stations. With the global focus on climate change, the government is under severe pressure to explore alternative energy sources in addition to coal-fired power stations. Although wind energy is not the only solution to solving the energy crisis in South Africa, it is a suitable sustainable solution to the energy crisis and this project could contribute to addressing the problem. This project will thus aid in achieving South Africa's goals in terms of sustainability, energy security, mitigating energy cost risks, local economic development and national job creation.

14.1.3 The technology to be used in the activity

The importance of renewable energy has been outlined in **Section 10** and **11** above highlighting national, district and local support. Wind energy installations are also more suitable for the proposed site because of the high wind resource.

The generation of electricity from Solar PV within the proposed site is feasible in terms of the resources high Global Horizontal Irradiation (GHI) resource relevant to PV installations as well as the operational PV facilities within the greater area. However, the associated grid connection costs associated with establishing a new 400/132 kV Main Transmission Substation (MTS) located south of the WEF and adjacent to the Aggeneis – Aries 400 kV line would be not economically feasible for a solar PV

development. The area in which the proposed WEF is to be developed is also relatively water scarce. It is therefore proposed that water be trucked to the proposed project site from the local municipality for consumptive and construction purposes, due to the scarcity of water in the greater Central Karoo area. Solar panels require regular cleaning in order to function optimally and therefore this would not be cost effective.

Wind turbine technology is developing at a rapid pace and could evolve by the time the project reached the construction phase. Therefore, various wind turbine designs and layouts have been considered for the site in order to maximise the electricity generation capacity and efficiency, whilst taking into account the environmental constraints. The turbine manufacturer and turbine model has not yet been determined and will not be decided upon until the completion of further wind analysis and competitive tendering.

Furthermore, from a policy perspective the 2019 IRP indicated a higher allocation target to wind energy compared to solar energy for new additional capacity from 2022 to 2030 (i.e. 14 400 MW as opposed to 6 000 MW) which further supports the development of a WEF at this location. Based on the above, a WEF at the proposed location is considered to be reasonable and feasible and therefore is selected as the preferred technology alternative as it would be able to generate sufficient energy to support an economically viable wind energy project.

14.1.4 Design or layout of the activity

Site layouts will not be comparatively assessed against each other in the EIA process, but different permutations have been considered and then discarded one after the other, with each refinement leading to the layout being updated to reduce the potential impact and the new layout used in the next assessment. This is due to the fact that the project is pursuing an 'iterative design' approach to the project layout as additional information became available throughout the EIA process (e.g. specialist input, additional site surveys, and ongoing stakeholder engagement).

The current layout has been amended based on specialist input and wind data and is being assessed during the EIR phase. This iterative design approach will continue throughout the EIA process as further inputs are obtained from stakeholders and I&APs.

The development area presented in the Final EIA Report has been selected as a practicable option for the Pofadder WEF 1 considering technical preference and constraints, as well as initial No-Go layers informed by the relevant specialists during their site investigations. This iterative design approach will continue throughout the EIA process as inputs are obtained from stakeholders and I&APs.

14.1.5 No – go option

The option of not implementing the activity, or the "no-go" alternative, has been considered in the EIA process. South Africa is under immense pressure to provide clean sources of electricity generating capacity in order to reduce the current electricity demand from aging and polluting coal-fired power stations. With the global focus on climate change, the government is under severe pressure to explore alternative energy sources in addition to coal-fired power stations. Although wind energy is not the only solution to solving the energy crisis in South Africa, not establishing the proposed WEF and associated infrastructure would be detrimental to the mandate that the government has set to promote the implementation of renewable energy. It is a suitable sustainable solution to the energy crisis and this project could contribute to addressing the problem. This project will thus aid in achieving South Africa's goals in terms of sustainability, energy security, mitigating energy cost risks, local economic development and national job creation.

The no-go alternative assumes that the proposed project will not go ahead i.e. it is the option of not developing the proposed Pofadder WEF 1. This alternative would result in no environmental, social or economic impacts (positive or negative) from the proposed project on the site or surrounding local area.

The following implications will occur if the no-go alternative is implemented (i.e. the proposed project does not proceed):

- No benefits will be realised from the implementation of an additional land-use being energy generation and livestock farming;
- No additional power will be generated or supplied through means of renewable energy wind resources at this project at this location;
- There will be lost opportunity for skills transfer and education/training of local communities;
- The positive socio-economic impacts likely to result from the project such as increased local spending and the creation of local employment opportunities will not be realized;
- There will be a loss of job creation opportunities from the construction and operation phases, where job creation is identified as a key priority;
- Not contributing to future demand for additional power generation in a most economic and rapid manner.
- Loss of economic benefit to participating landowners due to the revenue that will be gained from leasing the land to the developer. The landowners have been subjected to a severe drought severe drought over the past 7 years;
- No contribution to assist the government in addressing climate change, energy security and economic development.

Contrary to the above, the following could occur if the no-go alternative is implemented, as identified in the specialist assessment:

- **Bats**: The No-Go alternative assumes that the proposed development will not go ahead and status quo at the site would therefore persist. There would therefore be no positive or negative impact on bats or their environment.
- **Avifauna**: The No-Go option would result in no wind farm and associated infrastructure being built on site. As a result, none of the impacts on birds described within the avifauna assessment would take place.
- **Socio-Economic**: The option of not having this project go ahead means that the social environment is not affected as the status quo remains. On a negative basis, it also means that all positive aspects associated with the project would not materialise. This would mean that there is no job creation, no revenue streams into the local economy and no opportunity to enhance the National Grid with renewable source of energy.
- **Terrestrial Ecology**: No biodiversity (fauna and flora) will be removed or disturbed during the development of this proposed facility;
- **Aquatic Ecology**: No aquatic resources will be impacted upon during the construction of the proposed WEF and associated infrastructure;
- **Visual**: No additional visual intrusion on the rural landscape and on settlements in the area by wind turbines and related infrastructure;
- **Traffic**: If the proposed development does not materialise the increase in the traffic volume will not transpire and the status quo will persist;
- **Heritage**: If the project were not implemented then the site would stay as it currently is (impact significance of neutral). Although the heritage impacts with implementation would be greater than

the existing impacts, the loss of socio-economic benefits is more significant and suggests that the No-Go option is less desirable in heritage terms.
- **Noise**: No noise or shadow flicker impacts will occur either during the construction phase or during the operational phase when wind turbines are rotating;

The no- go alternative is not currently the preferred alternative.

14.2 Details of Public Participation Process undertaken

Public participation is the cornerstone of any EIA. The principles of the National Environmental Management Act (NEMA) as well as the EIA Regulations (as amended 2017) govern the EIA process, including public participation. These include provision of sufficient and transparent information on an ongoing basis to stakeholders to allow them to comment, and ensuring the participation of previously disadvantaged people, women and the youth. All documents relating to the PP process have been included in **Appendix 5**.

14.2.1 Public Participation Process completed for the Scoping Phase

The aim of the Scoping phase was to collect the issues, concerns and queries of interested and affected parties (I&APs) and determine the scope of the following phase of the EIA. The main objective of the Scoping phase is to:

- Inform the stakeholders about the proposed project and the environmental assessment process to be followed;
- Provide opportunity to all parties to exchange information and express their views and concerns;
- Obtain contributions from stakeholders (including the client, consultants, relevant authorities and the public) and ensure that all issues, concerns and queries raised are fully documented;
- Evaluate the issues raised and identify the significant issues; and
- Provide comment on how these issues are to be assessed as part of the Environmental Impact Assessment Process.

The comment periods during the scoping phase were implemented according to the EIA Regulations, 2014 (as amended). The comment periods that were implemented during the scoping phase (as set out by the EIA Regulations, 2014) were as follows:

Comment and review period for the Draft Scoping Report (DSR)

- The DSR underwent a 30-day comment and review period that ran from Thursday 31st of March 2022 until Tuesday 3rd May 2022 (excluding public holidays).
- An I&AP database was compiled which includes all affected landowners, adjacent landowners, occupiers of affected and adjacent land, other I&APs, key stakeholders (such as OoS) and other surrounding project developers. The I&AP database is included in **Appendix 5**.
- Issuing of the notifications and initial landowner consultation were circulated to all I&APs on the 31st of March 2022 respectively as part of the Draft Scoping Report (proof included in **Appendix 5**).
- Placement of site notices in English and Afrikaans (as per regulations) were placed along the entrance road to the application site and around the site itself on 8 March 2022 (proof included in **Appendix 5**).
- Notification letters were sent via E-mail or sms (if cellphone number / email is available, it is assumed that the I&AP have an email or cellphone).

- Public notification of the EIA process was advertised in a local newspaper, and provincial newspaper as required according to Regulation 41(2) (c) of the EIA Regulations (2014), as amended. Proof included in **Appendix 5** of the Final Scoping Report.
- Reminder notifications of the closing of the DSR comment period were sent out on the 19th of April 2022 and 3rd of May 2022 respectively in order to ensure that comments and/or concerns were received from the OoS and/or registered I&APs.

Availability of report for review:

- The draft Scoping report was made available on SiVESTs website for download.
- Electronic copies were made available to parties upon request for the documentation.
- The Draft Scoping Report was available for review at the following location:
  - Pofadder Library, Loop Street, Pofadder, Northern Cape, South Africa

Summary of issues raised

Issues, comments and concerns raised during the scoping phase public participation process have been captured in the Comments and Response Report (C&RR). The C&RR provides a summary of the comments received and issues raised by I&APs and key stakeholders, as well as the responses provided. This information has been used to feed into the evaluation of environmental and social impacts and has also been taken into consideration when compiling this report. All comments received to date have been included in the C&RR and attached in **Appendix 5**.

The Final Scoping Report was accepted by DFFE on the 9th of June 2022.

14.2.2 Public Participation Process to be undertaken for the EIA Phase

Public participation forms a critical component of the EIA process, as it provides all interested and affected parties with an opportunity to learn about a project, but more importantly to understand how a project will impact on them. The following was undertaken during the EIA Phase (as per the approved Final Scoping and Plan of Study):

- The I&AP database was updated as and when necessary during the execution of the EIA.
- The DEIAR underwent a 30-day comment and review period that ran from the 12th of August until the 12th of September 2022.
- All parties on the IA&P database were notified via email or sms of the opportunity to review the Draft EIA Report, the review period and the process for submitting comments on the report (proof included in Appendix 5).
- The availability of the draft report for review and comment was advertised on Die Gemsbok newspaper on the 12th of August 2022.
- Reminder notifications of the closing of the DEIR comment period were sent out on the 29th of August 2022, the 5th of September 2022, and the 12th of September 2022 to ensure that comments and/or concerns were received from the OoS and/or registered I&APs.
- All comments received from I&APs and the responses thereto have been included in the final EIA Report submitted to DFFE.
- A copy of the Draft EIA Report was made available at the Khai-Ma Local Municipality, Nuwe Street 21, Pofadder, 88900.
- A Comments and Response Report has been updated and included in the Final EIA Report, which records the date that issues were raised, a summary of each issue, and the response of the team

to address the issue. The Final EIA report with all comments included has been submitted to DFFE for review and approval.

- All I&APs will be notified via email or sms after having received written notice from DFFE on the final decision on the application. These notifications will include the process required to lodge an appeal, as well as the prescribed timeframes in which documentation should be submitted.

14.3 Impact Assessment

The potential impacts for the identified environmental aspects have been assessed and mitigation measures identified below (refer **Appendix 6**).

14.3.1 Planning

None identified

14.3.2 Construction Phase

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Aquatic / Freshwater																				
Direct physical destruction or disturbance of aquatic habitat caused by vegetation clearing, disturbance of riparian habitat, encroachment/colonisation of habitat by invasive alien plants and alteration of river geomorphological profiles (including stream beds and banks).	Possible ecological consequences may include: » Reduction in representation and conservation of freshwater ecosystem/habitat types; » Reduction in the supply of ecosystem goods & services; » Reduction/loss of habitat for aquatic dependent flora & fauna; and » Reduction in and/or loss of species of conservation concern (i.e. rare, threatened/endangered species). As already mentioned, » Internal roads and the underground cabling option are the only two aspects that will directly impact aquatic habitats through the direct disturbance and replacement of the of riparian/aquatic zones along the crossing points These disturbances will be the greatest during the construction and again in the decommissioning phases as the related disturbances could result in the loss and/or damage to vegetation and alteration of natural geomorphological and hydrological processes within the freshwater resource features. Compacted soils are also not ideal for supporting vegetation growth as they inhibit seed germination.	2	4	3	2	4	3	45	-	High	<u>Wind Turbines and supporting infrastructure (excluding roads and mv cabling)</u> » The recommended buffer areas between the delineated freshwater resource features and proposed project activities should be maintained. » Vegetation clearing should occur in in a phased manner to minimise erosion and/or run-off. Any areas disturbed during the construction phase should be encouraged to rehabilitate as fast and effective as possible and where 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 rehabilitation process in critical areas (e.g. steep slopes and unstable soils). <u>Internal Access Roads</u> » Existing crossings should be utilized/upgraded; » Where no existing crossings are available the construction of new crossings can be considered. o Where new water course crossings are required, the engineering team must provide an effective means to minimise the potential upstream and downstream effects of sedimentation and erosion (erosion protection) as well minimise the loss of riparian vegetation (reduce footprint as much as possible). o 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. o Where new roads need to be constructed, the existing road infrastructure should be rationalised and any unnecessary roads decommissioned and rehabilitated to reduce the disturbance of the area within the river beds.	1	4	3	2	4	1	14	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											○ During the construction phases, monitor culverts to see if erosion issues arise and if any erosion control is required. ○ 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. ○ Vegetation clearing should occur in a phased manner to minimise erosion and/or run-off. ○ 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 rehabilitation process in critical areas (e.g. steep slopes and unstable soils). ○ All alien plant re-growth must be monitored, and should it occur, these plants should be eradicated. » Road infrastructure and cable alignments should coincide as far as possible to minimise the impact. » Any disturbed areas should be rehabilitated and monitored to ensure that these areas do not become subject to erosion or invasive alien plant growth. » During construction, disturbance to the freshwater ecosystems should be limited as far as possible. ○ Disturbed areas may need to be rehabilitated and revegetated. Mitigation and follow up monitoring of residual impacts (alien vegetation growth and erosion) may be required. <u>Underground Grid Line Option</u> » The underground grid line, where crossing watercourses, can be laid within the access roads (existing), or if not possible, within the shoulder or at least within 3m of the road shoulder. » Ideally the construction disturbance footprint should be kept to an area no wider than 5 m. » 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								

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											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. » The areas where vegetation is destroyed and disturbed will however need to be monitored against invasion by alien vegetation and, if encountered, will need to be removed. » If natural re-vegetation is unsuccessful, seeding and planting of the area will need to be implemented. » 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 disturbed areas should be rehabilitated and monitored to ensure that these areas do not become subject to erosion. » During decommissioning, disturbance to the freshwater ecosystems should be limited as far as possible. Disturbed areas may need to be rehabilitated and revegetated.									
Alteration in the physical characteristics of freshwater resource features as a result of increased turbidity and sediment deposition	Caused by soil erosion and earthworks that are associated with construction activities. Possible ecological consequences associated with this impact may include: » Deterioration in freshwater ecosystem integrity; and » Reduction/loss of habitat for aquatic dependent flora & fauna. This may furthermore, influence water quality downstream	2	3	3	2	4	3	42	-	Medium	<u>Wind Turbines and supporting infrastructure (excluding roads and mv cabling)</u> » The recommended buffer areas between the delineated freshwater resource features and proposed project activities should be maintained. » 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. » All bare areas, as a result of the development, should be revegetated with locally occurring species, to bind the soil and limit erosion potential. » 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 Stormwater from hardstand areas, buildings and the substation must be managed using appropriate channels and swales when located within steep areas.	1	2	2	1	1	2	14	-	Low

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											Internal Access Roads » The duration of construction work within the watercourses must be minimised as far as practically possible through proper planning and phasing. » Vegetation clearing should occur in a phased manner to minimise erosion and/or run-off. » 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 rehabilitation process in critical areas (e.g. steep slopes and unstable soils). » 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. » Silt traps should be used where there is a danger of topsoil eroding and entering streams and other sensitive areas. o These silt traps must be regularly monitored and maintained and replaced / repaired immediately 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 » 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. » 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. » Existing crossings should be utilized/upgraded; » Where no existing crossings are available the construction of new crossings can be considered. o Where new water course crossings are required, the engineering team must provide an effective means to minimise the potential upstream and downstream								

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											effects of sedimentation and erosion (erosion protection) as well minimise the loss of riparian vegetation (reduce footprint as much as possible). o 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. o During the construction phase, monitor culverts to see if erosion issues arise and if any erosion control is required. o 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. o Vegetation clearing should occur in a phased manner to minimise erosion and/or run-off. » 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 rehabilitation process in critical areas (e.g. steep slopes and unstable soils). <u>Underground Grid Line Option</u> » The underground grid line, where crossing watercourses, can be laid within the access roads (existing), or if not possible, within the shoulder or at least within 3m of the road shoulder. » All construction activities occurring directly within the watercourses to take place within the dry season. » Ideally the construction disturbance footprint should be kept to an area no wider than 5 m. » Regular monitoring for erosion. o Any erosion problems observed, to be associated with the relating activity, should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. o Silt traps should be used where there is a danger of topsoil or material stockpiles eroding and entering streams and other sensitive areas. o Construction of gabions and other stabilisation features to prevent erosion, if deemed necessary. » Closure and rehabilitation of the disturbed areas should commence as soon as the laying of underground cable has been completed.								

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											○ Soils should be landscaped to the natural landscape profile with care taken to ensure that no preferential flow paths or berms remain. » The areas where vegetation is destroyed and disturbed will however need to be monitored against invasion by alien vegetation and, if encountered, will need to be removed. » If natural re-vegetation is unsuccessful, seeding and planting of the area will need to be implemented. » 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. » Watercourse areas other than the immediate areas of crossing are to be demarcated as no-go areas for vehicles and construction personnel. The immediate crossings within a watercourse area is therefore permissible for trenching as well as the associated machinery, vehicles and construction personnel. » 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).									
Alteration or deterioration in the physical, chemical and biological characteristics of water resources (i.e. water quality) such as wetlands & rivers as a result of water/soil pollution. The term 'water quality' must be viewed in terms of the fitness or suitability of water for a specific use (DWAF, 2001). In the context of this	During preconstruction and construction, chemical pollutants (hydrocarbons from equipment and vehicles, cleaning fluids, cement powder, wet concrete, shutter-oil, etc.) associated with site-clearing machinery, construction and maintenance activities could be washed downslope via the ephemeral systems.	2	2	2	2	1	3	27	-	Medium	<u>Wind Turbines and all other supporting infrastructure</u> » Implement appropriate measures to ensure strict use and management of all hazardous materials used on site » 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. » 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.	1	1	1	2	1	1	6	-	Low

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
impact assessment, water quality refers to its fitness for maintaining the health of aquatic ecosystems. Possible ecological consequences associated with this impact may include: » Deterioration in freshwater ecosystem integrity; and » Reduction in and/or loss of species of conservation concern (i.e. rare, threatened/endangered species).											Appropriate ablution facilities should be provided for construction workers during construction and on-site staff during the operation of the substation and WEF.									
Terrestrial Ecology																				
Vegetation and protected plant species	Vegetation clearing for access roads, turbines and their service areas and other infrastructure will impact on vegetation and protected plant species. Impacts on vegetation and protected plant species would occur due to the construction of the facility and associated infrastructure. This impact is regarded as the most likely and significant impact and will lead to direct loss of vegetation including protected species. The most likely consequences include: » local loss of habitat (to an extent as a natural ground covering will be maintained where possible); » very small and local disturbance to processes maintaining local biodiversity and ecosystem goods and services; and	1	4	2	2	3	3	33	-	Medium	» Preconstruction walk-through of the final development footprint for protected species that would be affected and that can be translocated. » Since a large proportion of the identified protected species at the site are succulents and geophytes, the potential for successful translocation is high. Before construction commences individuals of listed species within the development footprint that would be affected, should be counted and marked and translocated where deemed necessary by the ecologist conducting the pre-construction walk-through survey, and according to the recommended ratios. Permits from the relevant provincial authorities, will be required to relocate and/or disturb listed plant species. » Any individuals of protected species affected by and observed within the development footprint during construction should be translocated under the supervision of the ECO and/or Contractor's Environmental Officer (EO).	1	4	2	1	3	2	20	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
	a potential loss of a few local protected species.										» Pre-construction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimising wildlife interactions, remaining within demarcated construction areas etc. » 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. » 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. » 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. » 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 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. » No fires should be allowed on-site.									
Faunal impacts due to construction activities	Increased levels of noise, pollution, disturbance and human presence during construction will be detrimental to fauna. Sensitive and shy fauna would move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed. Some impact on fauna is highly likely to occur during construction.	2	3	2	2	4	3	39	-	Medium	» 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.	2	2	2	1	2	2	18	-	Low

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											» Construction vehicles limited to a minimal footprint on site (no movement outside of the earmarked footprint).									
Agricultural – compliance statement – none identified																				
Avifaunal																				
Avifauna	Displacement due to disturbance associated with the construction of the wind turbines and associated infrastructure.	1	4	2	3	1	3	33	-	Medium	» 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.	1	4	2	3	1	2	22	-	Low
Avifauna	Displacement due to habitat transformation associated with the construction of the wind turbines and associated infrastructure.	1	3	2	2	3	2	22	-	Low	» Removal of vegetation must be restricted to a minimum and must be rehabilitated to its former state where possible after construction. » Construction of new roads should only be considered if existing roads cannot be upgraded. » The recommendations of the ecological and botanical specialist studies must be strictly implemented, especially as far as limitation of the activity footprint is concerned.	1	2	2	2	3	2	20	-	Low
Bat																				
Bat habitat features (foraging/commuting habitat)	Vegetation clearing for access roads, turbines and their service areas and other infrastructure, as well as noise and dust generated during the construction phase, will indirectly impact bats by removing habitat used for foraging/commuting and through disturbance.	2	2	1	2	2	2	18	-	Low	» Minimise clearing of vegetation, rehabilitate all areas disturbed during construction (including aquatic habitat), avoid construction activities at night. » No infrastructure in No-Go areas (except roads)	1	1	1	2	1	1	6	-	Low
Bat habitat features (roost habitats)	Construction of WEF infrastructure could result in destruction (direct impact) of bat roosts (trees, rock crevices) and disturbance (indirect impact) of bat roosts (trees, buildings, rock crevices) potentially resulting in roost abandonment. Bats may also roost in project infrastructure (e.g., buildings, turbines, road culverts) potentially attracting them to risky locations.	2	2	3	2	2	2	22	-	Low	» Minimise disturbance and destruction of farm buildings on site, minimise removal of trees, minimise blasting and removal of rocky habitat on site, and where this is required, these features should be examined for roosting bats. » Limit potential for bats to roost in project infrastructure (e.g., buildings, turbines, road culverts).	1	1	1	1	1	1	5	-	Low
Social																				
	Noise	1	1	1	1	3	1	6	-	Low	» Refer to mitigation measures suggested by noise specialist	1	1	1	1	1	1	6	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
	Increased in crime	2	2	3	2	2	2	18	-	Low	» Ensure that construction workers are clearly identifiable. All workers should carry identification cards and wear identifiable clothing. » Fence off the construction sites and control access to these sites. » Appoint an independent security company to monitor the site; » Encourage local people to report any suspicious activity associated with the construction sites through the establishment of a community liaison forum. » Prevent loitering within the vicinity of the construction camp as well as construction sites	2	2	3	2	2	2	18	-	Low
	Increased risk of HIV infections	3	4	3	3	3	3	48	-	High	» Ensure that an onsite HIV Infections Policy is in place and that construction workers have easy access to condoms. » Expose workers to a health and HIV/AIDS awareness educational program. » Extend the HIV/AIDS program into the community with a specific focus on schools and youth clubs.	3	3	2	2	3	2	16	-	Medium
	Influx of construction workers	1	4	1	1	1	2	16	-	Low	» Communicate the limitation of opportunities created by the project through Community Leaders and Ward Councillors. Draw up a recruitment policy in consultation with the Community Leaders and Ward Councillors of the area and ensure compliance with this policy.	1	4	1	1	1	2	16	-	Low
	Hazard exposure	2	4	2	2	1	2	22	-	Low	» Ensure that all construction equipment and vehicles are » properly maintained at all times. » Ensure that operators 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 dangers of fire during regular toolbox talks.	2	2	2	2	1	2	18	-	Low
Quality of the living environment	Disruption of daily living patterns	2	4	2	2	1	2	22	-	Low	» Ensure that, at all times, people have access to their properties as well as to social facilities	2	3	2	2	1	2	20	-	Low

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	Disruptions to social and community infrastructure	2	4	2	2	1	2	22	-	Low	» Regularly monitor the effect that construction is having on infrastructure and immediately report any damage to infrastructure to the appropriate authority. » Ensure that where communities' access is obstructed that this access is restored to an acceptable state	2	3	2	2	1	2	20	-	Low
Economic	Job creation and skills development	2	4	2	3	1	2	24	+	Medium	» Wherever feasible, local residents should be recruited to fill semi and unskilled jobs. » Women should be given equal employment opportunities and encouraged to apply for positions. » A skills transfer plan should be put in place at an early stage and workers should be given the opportunity to develop skills which they can use to secure jobs elsewhere postconstruction.	2	4	2	3	1	2	24	+	Medium
	Socio-economic stimulation	3	4	2	3	1	2	26	+	Medium	» A procurement policy promoting the use of local business should, where possible, be put in place to be applied throughout the construction phase.	3	4	2	3	1	2	26	+	Medium
Heritage																				
Archaeological resources	Grubbing and excavations for roads, turbines and other infrastructure will directly impact on archaeological sites and artefacts	1	2	4	4	4	1	15	-	Low	» Survey all unsurveyed parts of the approved layout. » Record and sample/excavate any affected archaeological sites	1	2	4	2	4	1	13	-	Low
Graves	Grubbing and excavations for roads, turbines and other infrastructure may directly impact on graves	1	1	4	4	4	4	56	-	High	» Report graves found accidentally and follow required exhumation procedure	1	1	4	2	4	2	30	-	Medium
Cultural landscape and structures	Introduction of construction equipment and turbines directly alters landscape quality, sense of place and context of structures	2	4	1	2	1	3	30	-	Medium	» Keep construction duration as short as possible. » Minimise landscape scarring. » Rehabilitate any areas not required during operation.	2	4	1	2	1	2	20	-	Low
Heritage (Palaeontology)																				
Paleontology	If fossils of scientific value (rare, complete, index fossils) are present they might be destroyed when excavations for foundations commence	1	2	1	2	1	1	7	-	Low	» Follow the Fossil Chance Find Protocol and remove important fossils during excavations. These measures will be detailed in the EMPr.	1	2	1	1	1	1	6	-	Low
Noise																				
Noise emissions during the Construction Phase	Noise pollution due to construction activities (equipment and vehicle noise)	2	1	1	1	1	1	6	-	Low	» Staff to receive training on noise sensitivity. » Monitoring of noise during the construction phase to confirm noise levels are within limits. » Limit construction to daytime in order to take advantage of unstable weather conditions.	2	1	1	1	1	1	6	-	Low

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											» Regularly service equipment to ensure no unnecessary noise is emitted.									
Visual																				
Wind blown dust	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.	1	4	1	2	1	2	18	-	Low	» 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.	1	2	1	1	1	1	6	-	Low
Topsoil loss	Topsoil loss can reduce the viability of rehabilitation measures and needs to be carefully managed if available.	1	2	2	2	3	2	20	-	Low	» Topsoil excavated from the site should be stockpiled and utilised for rehabilitation of the site after construction.	1	1	1	1	1	1	5	-	Low
Dust from moving vehicles	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.	2	4	2	2	1	3	33	-	Medium	» 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. 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.	2	2	1	2	1	1	8	-	Low
Buildings, structures and finishings	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.	1	3	1	2	1	2	16	-	Low	» 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.	1	2	1	1	1	1	6	-	Low
Litter	Litter has the potential to degrade landscape character and can be contained by fencing around the construction camp/ laydown.	1	2	1	2	1	1	7	-	Low	» 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.	1	1	1	1	1	1	5	-	Low
Fencing	Long fencing lines has the potential to be visually dominating, degarding the rural landscape sense of place.	2	3	2	2	3	2	24	-	Medium	» Fencing should be simple and appear transparent from a distance and located around the construction camp, not encircle the total project area.	1	1	1	1	1	1	5	-	Low
Soil erosion	Soil erosion can result in visual scarring on prominent areas.	1	2	2	2	3	2	20	-	Low	» In areas where construction has taken place on steeper slopes, soil erosion measures need to be implemented.	1	1	1	1	1	1	5	-	Low
Cut and Fills	Cut and Fill areas can generate visual scarring in the landscape beyond the locality.	2	3	2	2	3	2	24	-	Medium	» 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.	1	2	2	2	2	1	9	-	Low

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Security Light Spillage at night	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.	2	3	1	2	1	2	18	-	Low	» 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.	1	2	1	1	1	1	6	-	Low
Un-necessary roads	Un-necessary roads have the potential to create a visual disturbance long after the usage as past.	1	3	2	2	2	2	20	-	Low	» Limit road access to an efficient minimum by coordinated planning between the project management and the environmental control officer. » 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.	1	1	1	1	1	1	5	-	Low
Traffic																				
Additional Traffic Generation	Increase in Traffic	2	4	1	2	1	3	30	-	Medium	» Ensure staff transport is done in the 'off peak' periods and by bus, if possible » Stagger material, component, and abnormal loads delivery. » Construction of an on-site batching plant and tower construction to reduce trips.	2	4	1	2	1	2	20	-	Low
	Increase of Incidents with pedestrians and livestock	2	3	2	4	1	2	24	-	Medium	» Upgrade of existing / new access points. » 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 an on-site batching plant and tower construction to reduce trips.	2	3	2	4	1	1	12	-	Low
	Increase in dust from gravel roads	2	3	2	2	1	2	20	-	Low	» 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.	2	3	2	2	1	2	20	-	Low
	Increase in Road Maintenance	2	3	2	2	2	2	22	-	Low	» Implement a road maintenance program under the auspices of the respective transport department. » Construction of an on-site batching plant to reduce trips.	2	3	2	2	1	2	20	-	Low
Abnormal Loads	Additional Abnormal Loads	3	3	1	2	1	1	10	-	Low	» Ensure abnormal vehicles travel to and from the proposed development in the 'off peak' periods or stagger delivery. » Adequate enforcement of the law.	3	2	1	2	1	1	9	-	Low

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Internal Access Roads	Increase in dust from gravel roads	1	4	1	1	1	2	16	-	Low	» 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.	1	3	1	1	1	2	14	-	Low
	New / Larger Access points	1	4	1	2	1	1	9	-	Low	» Adequate road signage according to the SARTSM » Approval from the respective roads department.	1	4	1	2	1	1	9	-	Low

14.3.3 Operational Phase

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Aquatic / Freshwater																				
Alteration to the hydrological character of the freshwater resource features	This might occur during the operation phase, when hard or compacted surfaces (hard engineered surfaces, roads etc.) increase the volume and velocity of the surface runoff. This could impact the hydrological regime through the increase in flows that are concentrated in certain areas. If flows are too concentrated with high velocities, scour and erosion may occur, with a complete reduction or disturbance of riparian habitat.	2	3	3	2	4	3	42	-	Medium	<u>Wind Turbines and supporting infrastructure (excluding roads and mv cabling)</u> » Any storm-water 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. » No stormwater runoff must be allowed to discharge directly into the watercourses. o The runoff should rather be dissipated over a broad area covered by natural vegetation or managed using appropriate channels and swales when located within steep embankments. Stormwater run-off infrastructure must be maintained to mitigate both the flow and water quality impacts of any stormwater leaving the WEF site. <u>Internal Access Roads</u>	1	3	1	1	4	2	20	-	Low

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											» 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. o 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): o Engineering team must provide an effective means to allow/simulate natural flow patterns without the consecration/modification of flow through the culverts. o Culverts should be sized to transport not only water, but other materials that might be mobilized (i.e. debris) and cause blockages to flow. o 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. <u>Underground Grid Line Option</u> » The underground grid line, where crossing watercourses, can be laid within the access roads (existing), or if not possible, within the shoulder or at least within 3m of the road shoulder. Refer to the mitigation measures provided below addressing sedimentation and erosion.									
Alteration in the physical characteristics of freshwater resource features as a result of increased turbidity	For the operation phase, this refers to the alteration in the physical characteristics of freshwater resource features as a result of increased turbidity and sediment deposition, caused by soil erosion, as well as instability and collapse of unstable soils during project operation. Possible ecological	2	4	2	2	4	3	42	-	Medium	<u>Wind Turbines, Substation, Laydown Areas, Batching Plant</u> » 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.	2	3	2	1	1	2	18	-	Low

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and sediment deposition	consequences associated with this impact may include: » Deterioration in freshwater ecosystem integrity; and Reduction/loss of habitat for aquatic dependent flora & fauna.										» All bare areas, as a result of the development, should be revegetated with locally occurring species, to bind the soil and limit erosion potential. » 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. » Stormwater run-off infrastructure must be maintained to mitigate both the flow and water quality impacts of any storm water leaving the WEF site. <u>Access Roads</u> » Any disturbed areas 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 rehabilitation process in critical areas (e.g. steep slopes and unstable soils). » Any erosion problems observed should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. » 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 measures should be regularly checked, maintained and repaired when required to ensure that they are effective <u>Underground Grid Line Option</u> » Regular monitoring for erosion. o Any erosion problems observed, to be associated with the relating activity, should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. o Silt traps should be used where there is a danger of topsoil or material stockpiles eroding and entering streams and other sensitive areas. » The areas where vegetation is destroyed and disturbed will need to be monitored against invasion by alien vegetation and, if encountered, will need to be removed.								

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											» If natural re-vegetation is unsuccessful, seeding and planting of the area will need to be implemented.									
Terrestrial Ecology																				
Ecosystem integrity and the delivery of ecosystem services such as grazing and clean water.	Following construction, there will be a lot of disturbed and loose soil at the site which will render the area vulnerable to erosion. Erosion is one of the greater risk factors associated with the development and it is therefore critically important that proper erosion control structures are built and maintained over the lifespan of the project.	2	3	2	2	4	3	39	-	» Medium	» 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. » All bare areas (excluding agricultural land and the development footprint), affected by the development, should be re-vegetated with locally occurring species, to bind the soil and limit erosion potential where applicable. » 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. » 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. » Topsoil must be removed and stored separately from subsoil. 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. » Practical phased development and vegetation clearing must be practiced so that cleared areas are not left un-vegetated and vulnerable to erosion for extended periods of time.	1	2	1	1	1	2	12	-	Low
Biodiversity, ecosystem integrity and the delivery of ecosystem services such as forage	Increased alien plant invasion is one of the greatest risk factors associated with this development following the construction phase. The disturbed and bare ground that is likely to be present at the site during and after construction would leave the site vulnerable to alien plant invasion for some time if not managed. Furthermore, the National Environmental Management Biodiversity Act (Act No. 10 of 2004), as well as the Conservation of Agricultural Resources Act, (Act No. 43 of 1983) requires that listed alien species are controlled in accordance with the Act.	2	4	2	2	4	3	42	-	Medium	» The successful reduction in the treat (significance) posed by Alien Invasive Plants relies on a detailed; ○ Site-specific eradication and management programme for alien invasive plants; ○ Site-specific Vegetation Rehabilitation Management Plan; and ○ The meticulous implementation of this Management Plan. » Such an Alien Invasive and Vegetation Rehabilitation Management Plans must subsequently be included in the Environmental Management Programme (EMPr). » Regular monitoring by the operation and maintenance team for alien plants must occur and could be conducted simultaneously with erosion monitoring.	1	3	1	1	2	1	8	-	Low

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											» When alien plants are detected, these must be controlled and cleared using the recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur 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.									
Agricultural – compliance statement – none identified																				
Avifaunal																				
Avifauna	Mortality of priority species due to collisions with the wind turbines.	2	3	1	3	3	3	36	-	Medium	» A procedure for the prompt 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. » Based on the results of the pre-construction monitoring, a 2.8kmturbine exclusion zone must be implemented around the vulture roost on the Aries – Aggeneys 1 400kV high voltage line. » All infilling for road construction should be compacted and all lose rock piles at the base or periphery of such infilling should be covered and packed down so as to eliminate all potential crevices and shelter for small mammals such as Rock Hyraxes (the primary source of food for the Verreaux's Eagles). » Live-bird monitoring and carcass searches should be implemented in 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. » 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 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. » 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	2	2	1	2	3	2	20	-	Low

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											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.									
Avifauna	Mortality of priority species due to electrocutions on the overhead sections of the internal 33kV cables.	2	3	1	3	3	2	24	-	Medium	» Underground cabling should be used as much as practically possible. » If the use of overhead lines is unavoidable due to technical reasons, the Avifaunal Specialist must be consulted timeously to ensure that a raptor friendly pole design is used, and that appropriate mitigation is implemented pro-actively for complicated pole structures e.g., insulation of live components to prevent electrocutions on terminal structures and pole transformers. » Bi-monthly inspections of the overhead sections of the internal reticulation network must be conducted during the operational phase to look for carcasses, as per the most recent edition of the Best Practice Guidelines at the time (Jenkins et al. 2015).	2	2	1	2	3	1	10	-	Low
Avifauna	Mortality due to collisions with the overhead sections of the internal 33kV cables.	2	3	2	3	3	2	26	-	Medium	» Bird flight diverters should be installed on all the overhead line sections for the full span length according to the applicable Eskom Engineering Instruction (Eskom Unique Identifier 240 – 93563150: The utilisation of Bird Flight Diverters on Eskom Overhead Lines). These devices must be installed as soon as the conductors are strung.	2	1	1	2	3	1	9	-	Low
Bat																				
Bat species	Bat mortality (direct impact) through collisions and/or barotrauma with wind turbine blades	2	4	2	3	3	3	42	-	Medium	» No placement of turbines within No-Go areas, minimum blade sweep of 35 m, feather blades to prevent free-wheeling below the turbine cut-in speed, implement post-construction fatality monitoring, and apply curtailment or deterrents if fatality thresholds are exceeded.	1	3	1	3	3	1	11	-	Low
Bat and insect species	The installation of lighting in the landscape at non-turbine project infrastructure can attract insects and in turn foraging bats, bringing them into the vicinity of wind turbines. Insects can also die at lighting infrastructure, removing bat prey resources.	2	2	2	2	3	2	22	-	Low	» Use as little lighting as possible, maximise use of motion-sensor lighting, avoid sky-glow by using hoods, use low pressure sodium and warm white lights. No infrastructure in No-Go areas (except roads).	1	1	1	1	3	1	7	-	Low
Social																				

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
	Noise	1	1	1	1	3	1	6	-	Low	» Refer to mitigation measures suggested by noise specialist	1	1	1	1	1	1	6	-	Low
	Increased in crime	2	2	3	2	2	2	18	-	Low	» Ensure that construction workers are clearly identifiable. All workers should carry identification cards and wear identifiable clothing. » Fence off the construction sites and control access to these sites. » Appoint an independent security company to monitor the site; » Encourage local people to report any suspicious activity associated with the construction sites through the establishment of a community liaison forum. » Prevent loitering within the vicinity of the construction camp as well as construction sites	2	2	3	2	2	2	18	-	Low
	Increased risk of HIV infections	3	4	3	3	3	3	48	-	High	» Ensure that an onsite HIV Infections Policy is in place and that construction workers have easy access to condoms. » Expose workers to a health and HIV/AIDS awareness educational program. » Extend the HIV/AIDS program into the community with a specific focus on schools and youth clubs.	3	3	2	2	3	2	16	-	Medium
	Influx of construction workers	1	4	1	1	1	2	16	-	Low	» Communicate the limitation of opportunities created by the project through Community Leaders and Ward Councillors. Draw up a recruitment policy in consultation with the Community Leaders and Ward Councillors of the area and ensure compliance with this policy.	1	4	1	1	1	2	16	-	Low
Quality of Living environment	Transformation of sense of place	2	3	2	1	4	3	36	-	Medium	» 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 grievances should be dealt with transparently. » The mitigation measures recommended in the Heritage and Palaeontology Impact Assessment should be followed.	2	2	2	1	4	2	22	-	Low
Economic	Job creation and skills development	2	4	2	2	3	2	26	+	Medium	» Implement a training and skills development programme for » locals. » Work closely with the appropriate municipal structures regarding establishing a social responsibility programme.	2	4	2	2	3	2	26	+	Medium

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
	Socio-economic stimulation	4	4	2	3	3	2	32	+	Medium	» 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. » Ensure that any trusts or funds are strictly managed in respect of outcomes and funds.	4	4	2	3	3	2	32	+	Medium
Heritage																				
Cultural landscape and structures	Existence of the WEF in a rural/natural landscape directly alters landscape quality, sense of place and context of structures, including night time impacts from red flashing lights	2	3	2	1	4	3	36	-	Medium	» No maintenance activities to take place outside of the authorised footprint and all vehicles to remain on authorised roads and tracks. » If approved by SACAA at the time, use a warning system in which the red lights stay off at night until needed	2	2	2	1	4	2	22	-	Low
Heritage (Palaeontology) – none identified																				
Noise																				
Noise emissions during Operational Phase (Day time)	Mechanical and aerodynamic noise from the operation of the wind turbine components.	2	1	1	1	3	1	8	-	Low	» Conduct noise monitoring during the operational phase to determine actual noise impact and whether further mitigation measures need to be implemented such as running the turbines in low power mode at certain wind speeds at night. » Implement a 500m “no-go” buffer around all noise sensitive areas to ensure no wind turbines impact these noise sensitive areas.	2	1	1	1	3	1	8	-	Low
Noise emissions during Operational Phase (Night time)	Mechanical and aerodynamic noise from the operation of the wind turbine components.	2	1	1	1	3	2	16	-	Low		2	1	1	1	3	1	8	-	Low
Visual																				
Soil sterilisation by compaction	Compaction of larger areas can result in soil sterilisation and landscape degradation.	1	4	3	2	3	2	26	-	Medium	» Laydown areas and other construction areas no longer needed post construction for operational management, should be ripped (0.5m depth) to restore compacted top-soil, and then rehabilitated to natural vegetation under the supervision of the rehabilitation specialist.	1	2	2	2	2	1	9	-	Low
Aircraft Warning Lights at Night	AWL lights at night have the potential to significantly detract from the ‘dark-sky’ sense of place of the rural landscape.	3	4	2	3	3	4	60	-	High	» Strategic placement of AWL at total project corner turbines. Placement of the AWL in shallow cups such that ground flash incidence is limited.	2	3	2	2	3	2	24	-	Medium
Security Light Spillage at night	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.	2	3	1	2	1	2	18	-	Low	» Light spillage mitigation from security lighting should be implemented and monitored by the ECO during operational phase 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.	1	2	1	1	1	1	6	-	Low

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Old blade dumping	The dumping of old turbine blades on site have the potential to significantly degrade the local landscape character.	1	2	1	2	3	1	9	-	Low	» 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.	1	1	1	1	1	1	5	-	Low
Windblown dust and dust from moving vehicles	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.	2	4	2	2	1	3	33	-	Medium	» 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. 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.	2	2	1	2	1	1	8	-	Low
Soil erosion	Soil erosion can result in visual scarring on prominent areas.	1	2	2	2	3	2	20	-	Low	» In areas where construction has taken place on steeper slopes, soil erosion measures need to be implemented.	1	1	1	1	1	1	5	-	Low
Shadow Flicker	Shadow Flicker from the turning turbine blades has the potential to be strong annoyance factor.	1	2	2	2	4	1	11	-	Low	» At commencement of operational phase, the occupants of the structures (Structures 7, 11 & 12) would need to be informed of the potential for SF Impacts and provide an explanation of the possible annoyance factor to the occupants. » At a time when SF impacts are likely to occur, a routine survey needs to be undertaken by the EPC to determine if SF impacts are applicable to the relevant dwellings, and to ascertain if the SF effect is an annoyance to the occupants. » If SF impacts occur such that they are an annoyance to the occupants, the following mitigations should be implemented as per the international best practice recommendations: • Planting vegetation or tree lines, which will block the line of sight to the turbines causing flicker (in locations conducive to tree growth). • Installation of window blinds or awnings at the receptors.	1	1	1	1	1	1	5	-	Low
Traffic																				
Additional Traffic Generation	Increase in Traffic	2	1	1	2	3	1	9	-	Low	» The increase in traffic for this phase of the development is negligible and will not have a significant impact.	2	1	1	2	3	1	9	-	Low

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	Increase of Incidents with pedestrians and livestock	2	1	1	2	3	1	9	-	Low	» The increase in traffic for this phase of the development is negligible and will not have a significant impact.	2	1	1	2	3	1	9	-	Low
	Increase in dust from gravel roads	2	1	1	2	3	1	9	-	Low	» The increase in traffic for this phase of the development is negligible and will not have a significant impact.	2	1	1	2	3	1	9	-	Low
	Increase in Road Maintenance	2	1	1	2	3	1	9	-	Low	» The increase in traffic for this phase of the development is negligible and will not have a significant impact.	2	1	1	2	3	1	9	-	Low
Abnormal Loads	Additional Abnormal Loads	3	1	1	2	3	1	10	-	Low	» The increase in traffic for this phase of the development is negligible and will not have a significant impact.	3	1	1	2	3	1	10	-	Low
Internal Access Roads	New / Larger Access points	1	1	1	2	3	1	8	-	Low	» Adequate road signage according to the SARTSM. » Approval from the respective roads department.	1	1	1	2	3	1	8	-	Low

14.3.4 Decommissioning

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Aquatic / Freshwater																				
Direct physical destruction or disturbance of aquatic habitat caused by vegetation disturbance of riparian habitat,	Possible ecological consequences may include: » Reduction in representation and conservation of freshwater ecosystem/habitat types; » Reduction in the supply of ecosystem goods & services; » Reduction/loss of habitat for aquatic dependent flora & fauna; and	2	4	3	2	4	3	45	-	High	<u>Wind Turbines and supporting infrastructure (excluding roads and mv cabling)</u> » Any areas disturbed during the decommissioning phase should be encouraged to rehabilitate as fast and effective as possible and where deemed necessary by the ECO or Contractor's EO, artificial rehabilitation (e.g. re-seeding with collected or commercial indigenous seed mixes) should be	1	4	3	2	4	1	14	-	Low

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
encroachment/colonisation of habitat by invasive alien plants and alteration of river geomorphological profiles (including stream beds and banks).	» Reduction in and/or loss of species of conservation concern (i.e. rare, threatened/endangered species). As already mentioned, » Internal roads and the underground cabling option are the only two aspects that will directly impact aquatic habitats through the direct disturbance and replacement of the of riparian/aquatic zones along the crossing points, These disturbances will be the greatest during the construction and again in the decommissioning phases as the related disturbances could result in the loss and/or damage to vegetation and alteration of natural geomorphological and hydrological processes within the freshwater resource features. Compacted soils are also not ideal for supporting vegetation growth as they inhibit seed germination.										applied in order to speed up the rehabilitation process in critical areas (e.g. steep slopes and unstable soils). <u>Internal Access Roads & Underground Grid Line Option</u> » During decommissioning, disturbance to the freshwater ecosystems should be limited as far as possible. ▪ Disturbed areas will need to be rehabilitated and revegetated Mitigation and follow up monitoring of residual impacts (alien vegetation growth and erosion) will be required.									
Alteration in the physical characteristics of freshwater resource features as a result of increased turbidity and sediment deposition	Caused by soil erosion and earthworks that are associated with decommissioning activities. Possible ecological consequences associated with this impact may include: » Deterioration in freshwater ecosystem integrity; and » Reduction/loss of habitat for aquatic dependent flora & fauna. This may furthermore, influence water quality downstream	2	3	3	2	4	3	42	-	Medium	<u>Wind Turbines and supporting infrastructure (excluding roads and mv cabling)</u> » Any erosion problems observed should be rectified immediately and monitored thereafter to ensure that they do not re-occur. » There should be regular monitoring for erosion for at least 2 years after decommissioning by the applicant to ensure that no erosion problems develop as a result of the disturbance, and if they do, to immediately implement erosion control measures. » All bare areas, affected by the development, should be re-vegetated with locally occurring species, to bind the soil and limit erosion potential where applicable. » 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. <u>Internal Access Roads & Underground Grid Line Option</u> » The duration of decommissioning work within the watercourses must be minimised as far as practically possible through proper planning and phasing. » Watercourse areas other than the immediate impact areas are to be demarcated as no-go areas for vehicles and	1	2	2	1	1	2	14	-	Low

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											construction personnel. The immediate decommissioning site within a watercourse area is therefore permissible for activities associated with the decommissioning phase. » 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 rehabilitation process in critical areas (e.g. steep slopes and unstable soils). » Any erosion problems observed during the construction and operational phases should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. » There should be regular monitoring for erosion for at least 2 years after decommissioning by the applicant to ensure that no erosion problems develop as a result of the disturbance, and if they do, to immediately implement erosion control measures. » Silt traps should be used where there is a danger of topsoil eroding and entering streams and other sensitive areas. o These silt traps must be regularly monitored and maintained and replaced / repaired immediately as and when required. These measures should be regularly checked, maintained and repaired when required to ensure that they are effective » 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). » There should be reduced activity during the decommissioning 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.								
Alteration or deterioration in the physical, chemical and biological characteristics of water resources (i.e. water quality)	During decommissioning, chemical pollutants (hydrocarbons from equipment and vehicles, cleaning fluids, cement powder, wet concrete, shutter-oil, etc.) associated with site-clearing machinery, construction and maintenance activities could be washed downslope via the ephemeral systems.	2	2	2	2	1	3	27	-	Medium	» Implement appropriate measures to ensure strict use and management of all hazardous materials used on site » Implement appropriate measures to ensure Strict management of potential sources of pollutants (e.g. litter, hydrocarbons from vehicles and machinery, cement during construction etc.)	1	1	1	2	1	1	6	-	Low

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
such as wetlands & rivers as a result of water/soil pollution. The term 'water quality' must be viewed in terms of the fitness or suitability of water for a specific use (DWAF, 2001). In the context of this impact assessment, water quality refers to its fitness for maintaining the health of aquatic ecosystems. Possible ecological consequences associated with this impact may include: » Deterioration in freshwater ecosystem integrity; and » Reduction in and/or loss of species of conservation concern (i.e. rare, threatened/endangered species).											» 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. » 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. » Appropriate ablution facilities should be provided for construction workers during construction and on-site staff during the operation of the substation and WEF.									
Terrestrial Ecology																				
Faunal impacts due to decommissioning activities	Increased levels of noise, pollution, disturbance and human presence during decommissioning will be detrimental to fauna. Sensitive and shy fauna would move away from the area during this phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be	2	3	2	1	2	3	30	-	Medium	» 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.	2	2	2	1	2	2	18	-	Low

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
	killed. Some impact on fauna is highly likely to occur during construction.										» 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 vehicles should adhere to a low speed limit (30km/h) to avoid collisions with susceptible species such as snakes and tortoises. Vehicles limited to a minimal footprint on site (no movement outside of the earmarked footprint).									
Ecosystem integrity and the delivery of ecosystem services such as grazing and clean water.	Following decommission, there will be a lot of disturbed and loose soil at the site which will render the area vulnerable to erosion.	2	4	2	2	4	3	42	-	Medium	» Any erosion problems observed should be rectified immediately and monitored thereafter to ensure that they do not re-occur. » There should be regular monitoring for erosion for at least 2 years after decommissioning by the applicant to ensure that no erosion problems develop as a result of the disturbance, and if they do, to immediately implement erosion control measures. » All bare areas, affected by the development, should be re-vegetated with locally occurring species, to bind the soil and limit erosion potential where applicable. » 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.	1	2	1	1	1	2	12	-	Low
Biodiversity, ecosystem integrity and the delivery of ecosystem services such as forage.	Increased alien plant invasion is one of the greatest risk factors associated with this development following the decommission phase. The disturbed and bare ground that is likely to be present at the site during and after decommission would leave the site vulnerable to alien plant invasion for some time if not managed. Furthermore, the National Environmental Management Biodiversity Act (Act No. 10 of 2004), as well as the Conservation of Agricultural Resources Act, (Act No. 43 of 1983) requires that listed alien species are controlled in accordance with the Act.	2	4	2	2	4	3	42	-	Medium	» The successful reduction in the treat (significance) posed by Alien Invasive Plants relies on a detailed; ○ Site-specific eradication and management programme for alien invasive plants; ○ Site-specific Vegetation Rehabilitation Management Plan; and ○ The meticulous implementation of this Management Plan. » Such an Alien Invasive and Vegetation Rehabilitation Management Plans must subsequently be included in the Environmental Management Programme (EMPr). » Due to the disturbance at the site alien plant species are likely to be a long-term problem at the site following decommissioning and regular control will need to be implemented until a cover of indigenous species has returned. » When alien plants are detected, these must be controlled and cleared using the recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur and increase to problematic levels.	1	3	1	1	2	1	8	-	Low

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											» 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.									
Agricultural – compliance statement – none identified																				
Avifaunal																				
Avifauna	Displacement due to disturbance associated with the dismantling of the wind turbines and associated infrastructure.	1	4	1	2	1	2	18	-	Low	» Dismantling 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.	1	3	1	2	1	2	16	-	Low
Bat																				
Bat species	Disturbance to bats due to decommissioning activities through noise and dust, and damage to vegetation	2	2	1	2	2	1	9	-	Low	» Avoid decommissioning activities at nights, rehabilitate vegetation once project infrastructure removed.	1	1	1	2	1	1	6	-	Low
Social																				
	Noise	1	1	1	1	3	1	6	-	Low	» Refer to mitigation measures suggested by noise specialist	1	1	1	1	1	1	6	-	Low
	Increased in crime	2	2	3	2	2	2	18	-	Low	» Ensure that construction workers are clearly identifiable. All workers should carry identification cards and wear identifiable clothing. » Fence off the construction sites and control access to these sites. » Appoint an independent security company to monitor the site; » Encourage local people to report any suspicious activity associated with the construction sites through the establishment of a community liaison forum. » Prevent loitering within the vicinity of the construction camp as well as construction sites	2	2	3	2	2	2	18	-	Low
	Increased risk of HIV infections	3	4	3	3	3	3	48	-	High	» Ensure that an onsite HIV Infections Policy is in place and that construction workers have easy access to condoms. » Expose workers to a health and HIV/AIDS awareness educational program.	3	3	2	2	3	2	16	-	Medium

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											» Extend the HIV/AIDS program into the community with a specific focus on schools and youth clubs.									
	Influx of construction workers	1	4	1	1	1	2	16	-	Low	» Communicate the limitation of opportunities created by the project through Community Leaders and Ward Councillors. Draw up a recruitment policy in consultation with the Community Leaders and Ward Councillors of the area and ensure compliance with this policy.	1	4	1	1	1	2	16	-	Low
	Hazard exposure	2	4	2	2	1	2	22	-	Low	» Ensure that all construction equipment and vehicles are properly maintained at all times. » Ensure that operators 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 dangers of fire during regular toolbox talks.	2	2	2	2	1	2	18	-	Low
Quality of the living environment	Disruption of daily living patterns	2	4	2	2	1	2	22	-	Low	» Ensure that, at all times, people have access to their properties as well as to social facilities	2	3	2	2	1	2	20	-	Low
	Disruptions to social and community infrastructure	2	4	2	2	1	2	22	-	Low	» Regularly monitor the effect that construction is having on infrastructure and immediately report any damage to infrastructure to the appropriate authority. » Ensure that where communities' access is obstructed that this access is restored to an acceptable state	2	3	2	2	1	2	20	-	Low
Economic	Job creation and skills development	2	4	2	3	1	2	24	+	Medium	» Wherever feasible, local residents should be recruited to fill semi and unskilled jobs. » Women should be given equal employment opportunities and encouraged to apply for positions. » A skills transfer plan should be put in place at an early stage and workers should be given the opportunity to develop skills which they can use to secure jobs elsewhere postconstruction.	2	4	2	3	1	2	24	+	Medium

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	Socio-economic stimulation	3	4	2	3	1	2	26	+	Medium	» A procurement policy promoting the use of local business should, where possible, be put in place to be applied throughout the construction phase.	3	4	2	3	1	2	26	+	Medium
Heritage																				
Cultural landscape and structures	Introduction of construction equipment directly alters landscape quality, sense of place and context of structures	2	4	1	2	1	3	30	-	Medium	» Keep decommissioning duration as short as possible. Ensure effective rehabilitation of all areas.	2	4	1	2	1	2	20	-	Low
Heritage (Palaeontology) – none identified																				
Noise																				
Noise emissions during Decommissioning Phase	Noise pollution due to construction activities (equipment and vehicle noise)	2	1	1	1	1	1	6	-	Low	» Staff to receive training on noise sensitivity. » Monitoring of noise during the construction phase to confirm noise levels are within limits. » Limit construction to daytime in order to take advantage of unstable weather conditions. » Regularly service equipment to ensure no unnecessary noise is emitted.	2	1	1	1	1	1	6	-	Low
Visual																				
Abandoning of old structures	Old, unused structures have the potential to significantly degrade the landscape character.	1	2	2	3	3	3	33	-	Medium	» 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.	1	2	2	2	1	1	8	-	Low
Windblown dust and dust from moving vehicles	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.	2	4	2	2	1	3	33	-	Medium	» 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. Set up a liaison committee to engage with local farmsteads located within 500m of a access road, with monthly communication with the farm owners on the effectiveness of the dust management procedures.	2	2	1	2	1	1	8	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Abandoning of old towers and blades.	Old towers have the potential to significantly degrade the landscape character.	3	4	3	3	4	3	51	-	High	» 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 low, natural dome. The pit areas would need to be rehabilitated to nature veld vegetation within input from a rehabilitation specialist. 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.	1	3	2	2	4	1	12	-	Low
Traffic																				
Additional Traffic Generation	Increase in Traffic	2	4	1	2	1	3	30	-	Medium	» Ensure staff transport is done in the 'off peak' periods and by bus. » Stagger material, component, and abnormal loads removal. » Construction of an on-site sorter and pressing machine to reduce trips.	2	4	1	2	1	2	20	-	Low
	Increase of Incidents with pedestrians and livestock	2	3	2	4	1	2	24	-	Medium	» Reduction in the speed of vehicles. » Adequate enforcement of the law. » Implementation of pedestrian safety initiatives Regular maintenance of farm fences & access cattle grids.	2	3	2	4	1	1	12	-	Low
	Increase in dust from gravel roads	2	3	2	2	1	2	20	-	Low	» 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.	2	3	2	2	1	2	20	-	Low
	Increase in Road Maintenance	2	3	2	2	2	2	22	-	Low	» Implement a road maintenance program under the auspices of the respective transport department.	2	3	2	2	1	2	20	-	Low
Abnormal Loads	Additional Abnormal Loads	3	2	1	2	1	1	9	-	Low	» Ensure abnormal vehicles travel to and from the proposed development in the 'off peak' periods or stagger delivery. » Adequate enforcement of the law.	3	2	1	2	1	1	9	-	Low
Internal Access Roads	Increase in dust from gravel roads	1	4	1	1	1	1	8	-	Low	» 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.	1	3	1	1	1	2	14	-	Low
	New / Larger Access points	1	4	1	2	1	1	9	-	Low	» Adequate road signage according to the SARTSM. Approval from the respective roads department.	1	4	1	2	1	1	9	-	Low

14.3.5 Cumulative

The proposed WEF is located adjacent to several other WEFs within 35 km of Pofadder WEF 1. The information that could be obtained for the surrounding planned renewable energy developments was taken into account as part of the cumulative impact assessment.

The WEFs that were considered are indicated in the figure below:

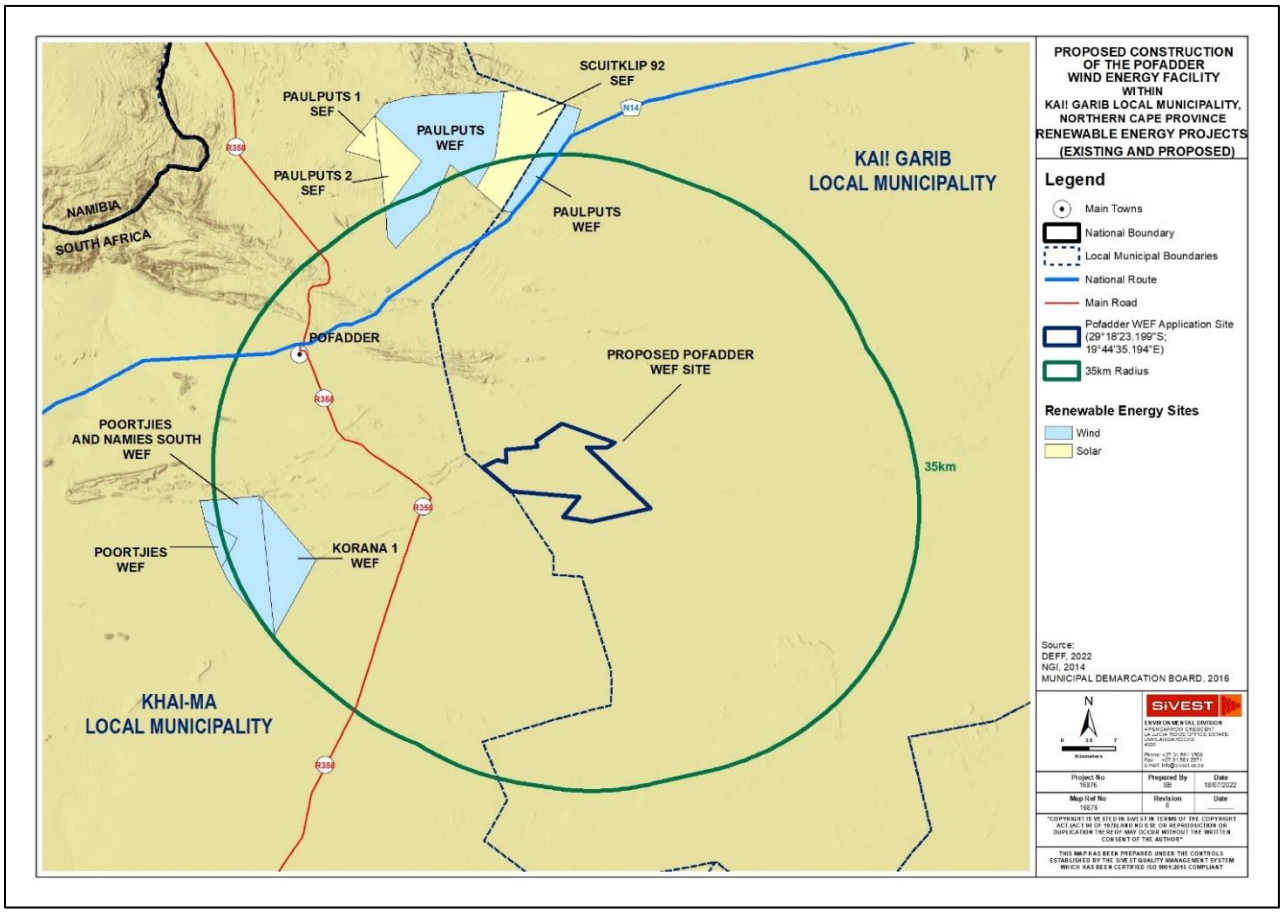

Figure 53: Renewable Energy Projects within 35km of the Pofadder projects

In terms of wake effect, the closest operational wind energy facilities is the Kagnas Wind Farm which is located approximately 80km south east from nearest turbine within the Pofadder WEF 1. There are three proposed wind energy facilities being Poorties and Namies South, Korana and wind energy facilities which have received environmental authorisation within a 35km radius of the proposed Pofadder WEF 1.

The wind measurement resource campaign which is currently being undertaken by the applicant indicates that that the prevailing wind direction is from the north and north easterly direction. Given the extensive distances between Pofadder WEF 1 and the operational and proposed wind energy facilities and the prevailing wind direction, it can be concluded that the Pofadder WEF will not pose a wake risk to the surrounding operational and proposed wind farms. The need to conduct a wake effects study is not deemed applicable as described above.

Cumulative Impacts

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Aquatic / Freshwater																				
Compromised ecological processes as well as ecological functioning of important habitats associated with the Kaboep River	Transformation of intact freshwater resource habitat could potentially compromise ecological processes as well as ecological functioning of important habitats and would contribute to habitat fragmentation and potential disruption of habitat connectivity and furthermore impair their ability to respond to environmental fluctuations. This is especially of relevance for larger watercourses and wetlands serving as important groundwater recharge and floodwater attenuation zones, important microhabitats for various organisms and important corridor zones for faunal movement	2	2	2	2	4	3	36	-	Medium	<u>Wind Turbines and supporting infrastructure (excluding roads and mv cabling)</u> » The potential stormwater impacts of the proposed developments should be mitigated on-site to address any erosion or water quality impacts. » Good housekeeping measures as stipulated in the EMPr for the project should be in place where construction activities take place to prevent contamination of any freshwater features. » Where possible, infrastructure should coincide with existing infrastructure or areas of disturbance (such as existing roads). Disturbed areas should be rehabilitated through reshaping of the surface to resemble that prior to the disturbance and vegetated with suitable local indigenous vegetation. <u>Internal Access Roads & Underground Grid Line Option</u> » Existing crossings should be utilized/upgraded » The construction of new crossings should may only be considered where no other viable option exists. » Where new water course crossings are required, the engineering team must provide an effective means to minimise the potential upstream and downstream effects of sedimentation and erosion (erosion protection) as well minimise the loss of riparian vegetation (reduce footprint as much as possible). » 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, » Where new roads need to be constructed, the existing road infrastructure should be rationalised and any unnecessary roads decommissioned and rehabilitated to reduce the disturbance of the area within the river beds. » During the construction and operation /decommissioning phases, monitor culverts to see if erosion issues arise and if any erosion control is required. » Where possible culvert bases must be placed as close as possible with natural levels in mind so that these don't from additional steps / barriers. » Vegetation clearing should occur in a phased manner to minimise erosion and/or run-off.	2	1	2	1	3	2	18	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											» 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 rehabilitation process in critical areas (e.g. steep slopes and unstable soils). » All alien plant re-growth must be monitored and should it occur these plants should be eradicated. » For new internal roads to the turbines, these should be located, as far as possible, outside of the recommended freshwater resource buffer areas. » Road infrastructure and cable alignments should coincide as far as possible to minimise the impact. » Any disturbed areas should be rehabilitated and monitored to ensure that these areas do not become subject to erosion or invasive alien plant growth. » During decommissioning, disturbance to the freshwater ecosystems should be limited as far as possible. o Disturbed areas may need to be rehabilitated and revegetated. Mitigation and follow up monitoring of residual impacts (alien vegetation growth and erosion) may be required.									
Terrestrial Ecology																				
Broad-scale ecological processes, especially habitat fragmentation.	Transformation of intact habitats could potentially compromise ecological processes as well as ecological functioning of important habitats and would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations.	2	2	2	2	4	3	36	-	Medium	» The development footprint should be kept to a minimum and natural vegetation should be encouraged to return to disturbed areas. » An open space management plan should be developed for the site, which should include management of biodiversity within the fenced area, as well as that in the adjacent rangeland. » Reduce the footprint of the facility within sensitive habitat types as much as possible.	2	1	2	1	3	2	18	-	Low
Agricultural – compliance statement																				
Avifaunal																				
Avifauna	1. Mortality due to collisions with the wind turbines 2. Displacement due to disturbance during construction and operation of the wind farm 3. Displacement due to habitat change and loss at the wind farm Mortality due to electrocution on the electrical infrastructure	2	3	1	2	3	2	22	-	Low	» All the mitigation measures listed in the various bird specialist studies compiled for the nine renewable energy facilities within a 35km radius around the project.	2	2	1	2	3	2	20	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Bat																				
Bat Species and their populations	Cumulative impacts to bats across multiple wind energy projects	3	4	2	3	3	3	45	-	High	• Buffering key habitats used by bats, use of appropriate lighting technology, and using curtailment and/or acoustic deterrents.	3	4	2	3	3	2	30	-	Medium
Social																				
Health and social wellbeing	Noise	1	3	2	2	3	2	22	-	Low										
	Shadow Flicker	1	3	2	2	3	2	22	-	Low										
	Blade glint	2	3	2	2	3	2	24	-	Low										
	Risk of HIV and AIDS	4	3	4	3	4	3	54	-	High										
Quality of the living environment	Sense of place	2	4	4	3	4	3	51	-	High										
	Service supplies and infrastructure	2	3	2	2	2	2	22	-	Low										
Economic	Job creation and skills development4	4	4	3	3	3	4	68	+	Very high										
	Socio-economic stimulation	2	4	2	2	3	2	26	+	Medium										

With regard to the cumulative impacts, mitigation can only be considered implemented through a readiness action plan at a regional level and will driven on a provincial and municipal basis; underpinned by national government, private sector and public support. In this regard the Draft Consolidated Intergovernmental Readiness Report for large development scenarios Karoo (Western Cape Government Environmental Affairs and Development Planning, 2019) acknowledges the need to prepare for large-scale, or development proposals and to enlist national government, private sector participation.

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Heritage																				
All heritage resources	Grubbing of surface and introduction of WEF to the landscape directly impacts archaeology and alters landscape	2	4	2	2	4	3	45	-	High	» As per individual impacts above but with the addition of pre-construction surveys where there is any uncertainty or where layouts have changed since the original surveys	2	4	3	2	4	2	30	-	Medium
Heritage (Palaeontology)																				
Palaeontology	If fossils of scientific value (rare, complete, index fossils) are present they might be destroyed when excavations for foundations commence	1	2	1	2	1	1	7	-	Low	» Follow the Fossil Chance Find Protocol and remove important fossils during excavations. These measures will be detailed in the EMPr.	1	2	1	1	1	1	6	-	Low
Noise																				
Noise emissions from the cumulative effect of Renewable Energy projects in a 35km radius.	Mechanical and aerodynamic noise from the operation of the wind turbine components of all three Pofadder WEFs.	2	1	1	1	3	2	16	-	Low	» Conduct noise monitoring during the operational phase to determine actual noise impact and whether further mitigation measures need to be implemented such as running the turbines in low power mode at certain wind speeds at night. » Implement a 500m “no-go” buffer around all noise sensitive areas to ensure no wind turbines impact these noise sensitive areas.	2	1	1	1	3	1	8	-	Low
Visual																				
Intervisibility of Wind Farms	AWL at night intervisibility of the Pofadder Wind Farm with the proposed Namies Wind Farm located approximately 30km to the west.	3	2	2	2	3	2	24	-	Low	Strategic placement of AWL at total project corner turbines. Placement of the AWL in shallow cups such that ground flash incidence is limited.	2	1	1	2	3	1	9	-	Low
Traffic																				
Additional Traffic Generation	Increase in Traffic	2	4	1	2	1	4	40	-	Medium	» Ensure a large portion of vehicles travelling to and from the proposed development travels in the 'off peak' periods or by bus. » Construction of an on-site batching plant and tower construction to reduce trips. » Coordination between all developers in the area.	2	4	1	2	1	3	30	-	Medium
	Increase of Incidents with pedestrians and livestock	2	3	2	4	1	3	36	-	Medium	» Reduction in the speed of vehicles. » Adequate enforcement of the law. » Implementation of pedestrian safety initiatives. » Regular maintenance of farm fences, and access cattle grids. » Construction of an on-site batching plant and tower construction to reduce trips. » Coordination between all developers in the area.	2	3	2	4	1	2	24	-	Medium

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
	Increase in dust from gravel roads	2	3	2	2	1	4	40	-	Medium	» 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. » Coordination between all developers in the area.	2	3	2	2	1	2	20	-	Low
	Increase in Road Maintenance	2	3	2	2	2	2	22	-	Low	» Implement a road maintenance program under the auspices of the respective transport department » Construction of an on-site batching plant and tower construction to reduce trips. » Coordination between all developers in the area.	2	3	2	2	2	2	22	-	Low
Abnormal Loads	Additional Abnormal Loads	3	3	1	2	1	4	40	-	Medium	» Ensure abnormal vehicles travel to and from the proposed development in the 'off peak' periods. » Adequate enforcement of the law. » Coordination between all developers in the area.	3	2	1	2	1	2	18	-	Low
Internal Access Roads	Increase in dust from gravel roads	1	4	1	1	1	3	24	-	Medium	» 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.	1	3	1	1	1	2	14	-	Low
	New / Larger Access points	1	4	1	2	1	2	18	-	Low	» Adequate road signage according to the SARTSM. » Approval from the respective roads department.	1	4	1	2	1	1	9	-	Low

14.3.6 Comparative Assessment of Alternatives

Site layout alternatives have not been comparatively assessed, but rather a single layout has been refined as additional information becomes available throughout the EIA process (e.g. specialist input, additional site surveys, and ongoing stakeholder engagement). As a result, the layout provided in the Scoping Phase has been updated and all turbines and supporting infrastructure (i.e. substation, BESS, O&M Building, batching plant, site camp, warehouse and turbine laydown area) are situated outside of any and all sensitive areas and buffers.

The development area presented in the Final Environmental Impact Assessment Report has been selected as a practicable option for the Pofadder WEF 1 considering technical preference and constraints, as well as full infield impact assessments informed by the relevant specialist during their investigations.

14.4 Concluding statement for preferred alternative

No activity alternatives are being considered. Renewable Energy development in South Africa is highly desirable from a social, environmental and development point of view. Wind energy installations are more suitable for the site because of the high wind resource. The generation of electricity from Solar PV within the proposed site is feasible in terms of the resources high Global Horizontal Irradiation (GHI) resource relevant to PV installations as well as the operational PV facilities within the greater area. However, the associated grid connection costs associated with establishing a new 400/132 kV Main Transmission Substation (MTS) located south of the WEF and adjacent to the Aggeneis – Aries 400 kV line would be not economically feasible for a solar PV development. Therefore, there are no activity alternatives.

Site layout alternatives have not been comparatively assessed, but rather a single layout has been refined as additional information become available throughout the EIA process. The layout has therefore been refined throughout the process from the pre-screening phase through to the impact assessment phase which has resulted in a layout where all turbine and supporting infrastructure avoids all sensitivities identified. The proposed layout has been assessed by the specialists in their respective specialist studies. All constraints identified to date as indicated in the sensitivity mapping have been taken into account and the turbines and supporting infrastructure shifted where necessary to inform the proposed turbine layout for the Pofadder WEF 1 (**Figure 54** below). This is the layout being put forward for environmental authorisation.

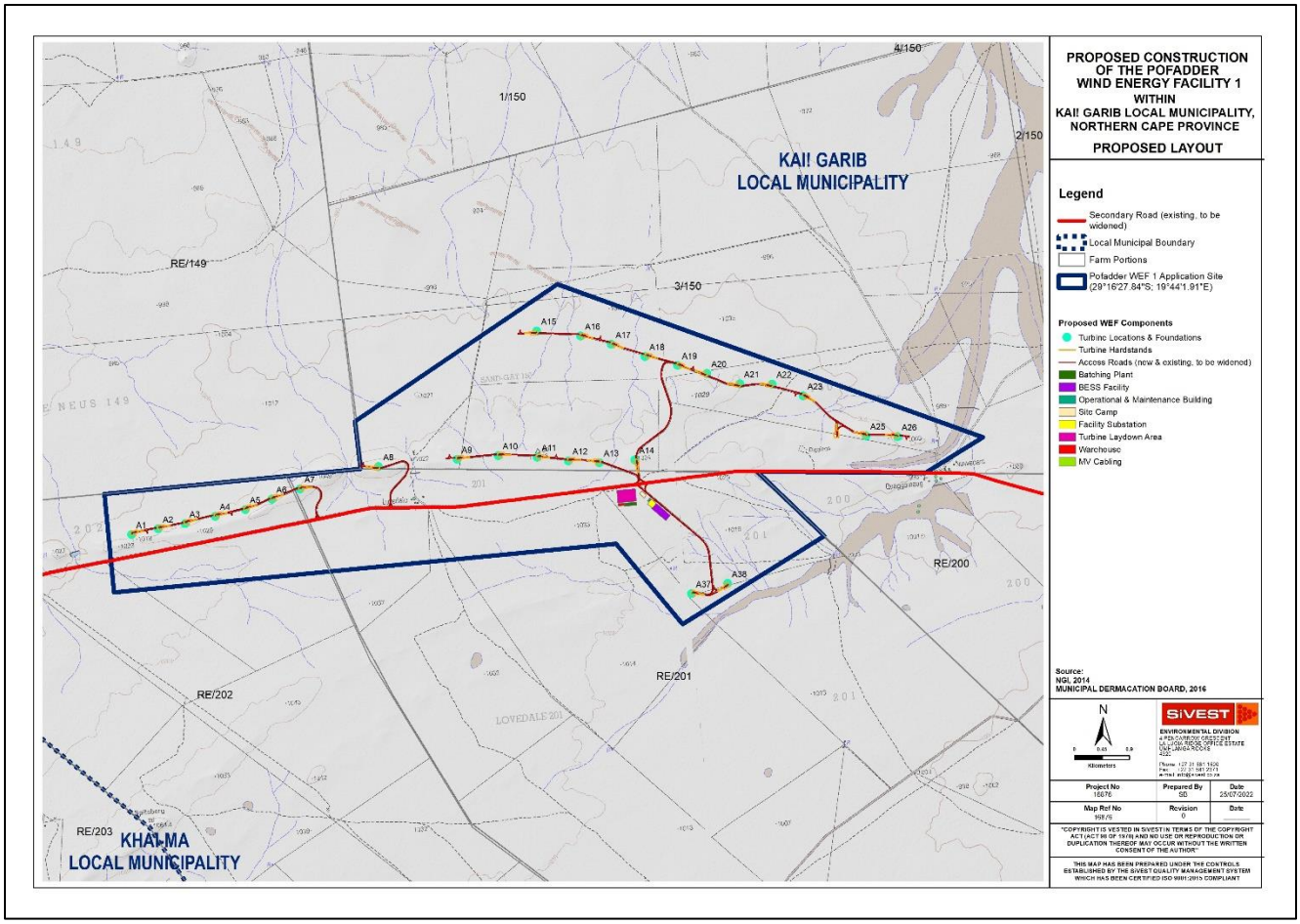

Figure 54: Proposed layout put forward for authorisation

15. POSITIVE AND NEGATIVE IMPACTS OF THE PROJECT

A summary of the impacts pre-mitigation and post-mitigation are provided below:

Table 20: Pre and post mitigation impact ratings

Impact	Pre-mitigation	Post-mitigation
PLANNING		
None identified		
CONSTRUCTION		
Impacts to Biophysical Systems		
Aquatic / Freshwater		
Direct physical destruction or disturbance of aquatic habitat caused by vegetation clearing, disturbance of riparian habitat, encroachment/colonisation of habitat by invasive alien plants and alteration of river geomorphological profiles (including stream beds and banks).	High	Low

Impact	Pre-mitigation	Post-mitigation
Alteration in the physical characteristics of freshwater resource features as a result of increased turbidity and sediment deposition - Caused by soil erosion and earthworks that are associated with construction activities.	Medium	Low
During preconstruction and construction, chemical pollutants (hydrocarbons from equipment and vehicles, cleaning fluids, cement powder, wet concrete, shutter-oil, etc.) associated with site-clearing machinery, construction and maintenance activities could be washed downslope via the ephemeral systems.	Medium	Low
Terrestrial Ecology		
Vegetation clearing for access roads, turbines and their service areas and other infrastructure will impact on vegetation and protected plant species. Impacts on vegetation and protected plant species would occur due to the construction of the facility and associated infrastructure.	Medium	Low
Increased levels of noise, pollution, disturbance and human presence during construction will be detrimental to fauna. Sensitive and shy fauna would move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed. Some impact on fauna is highly likely to occur during construction.	Medium	Low
Agricultural – compliance statement – none identified		
Avifaunal		
Displacement due to disturbance associated with the construction of the wind turbines and associated infrastructure.	Medium	Low
Displacement due to habitat transformation associated with the construction of the wind turbines and associated infrastructure.	Low	Low
Bat		
Vegetation clearing for access roads, turbines and their service areas and other infrastructure, as well as noise and dust generated during the construction phase, will indirectly impact bats by removing habitat used for foraging/commuting and through disturbance.	Low	Low
Construction of WEF infrastructure could result in destruction (direct impact) of bat roosts (trees, rock crevices) and disturbance (indirect impact) of bat roosts (trees, building, rock crevices) potentially resulting in roost abandonment. Bats may also roost in project infrastructure (e.g., buildings, turbines, road culverts) potentially attracting them to risky locations.	Low	Low
Impacts to Socio-Economic Component		
Social		
Noise	Low	Low
Increase in crime	Low	Low
Increase risk of HV infections	High	Medium
An influx of construction workers	Low	Low
Hazard exposure	Low	Low
Quality of the living environment - Disruption of daily living patterns	Low	Low
Quality of the living environment - Disruption to social and community infrastructure	Low	Low
Economic - Job creation and skills development	Medium	Medium
Economic - Socio-economic stimulation	Medium	Medium
Heritage		
Archaeological Resources - Grubbing and excavations for roads, turbines and other infrastructure will impact on archaeological sites and artefacts	Low	Low

Impact	Pre-mitigation	Post-mitigation
Graves - Grubbing and excavations for roads, turbines and other infrastructure may directly impact on graves	High	Medium
Cultural landscape and structures - Introduction of construction equipment and turbines directly alters landscape quality, sense of place and context of structures	Low	Low
Heritage (Palaeontology)		
If fossils of scientific value (rare, complete, index fossils) are present they might be destroyed when excavations for foundations commence	Low	Low
Noise		
Noise pollution due to construction activities (equipment and vehicle noise)	Low	Low
Visual		
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.	Low	Low
Topsoil loss can reduce the viability of rehabilitation measures and needs to be carefully managed if available.	Low	Low
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.	Medium	Low
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.	Low	Low
Litter has the potential to degrade landscape character and can be contained by fencing around the construction camp/ laydown.	Low	Low
Long fencing lines has the potential to be visually dominating, degarding the rural landscape sense of place.	Medium	Low
Soil erosion can result in visual scarring on prominent areas.	Low	Low
Cut and Fill areas can generate visual scarring in the landscape beyond the locality.	Medium	Low
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.	Low	Low
Un-necessary roads have the potential to create a visual disturbance long after the usage as past.	Low	Low
Traffic		
Increase in traffic	Medium	Low
Increase of Incidents with pedestrians and livestock	Medium	Low
Increase in dust from gravel roads	Low	Low
Increase in Road Maintenance	Low	Low
Additional Abnormal Loads	Low	Low
Increase in dust from gravel roads	Low	Low
New / Larger Access points	Low	Low
OPERATIONAL		
Impacts to Biophysical Systems		
Aquatic / Freshwater		
Alteration to the hydrological character of the freshwater resource features	Medium	Low
Alteration in the physical characteristics of freshwater resource features as a result of increased turbidity and sediment deposition	Medium	Low
Terrestrial Ecology		
Ecosystem integrity and the delivery of ecosystem services such as grazing and clean water.	Medium	Low
Biodiversity, ecosystem integrity and the delivery of ecosystem services such as forage - Increased alien plant invasion is one of the greatest risk factors associated with this development following the construction phase	Medium	Low

Impact	Pre-mitigation	Post-mitigation
Agricultural - compliance statement – none identified		
Avifaunal		
Mortality of priority species due to collisions with the wind turbines.	Medium	Low
Mortality of priority species due to electrocutions on the overhead sections of the internal 33kV cables.	Medium	Low
Mortality due to collisions with the overhead sections of the internal 33kV cables.	Medium	Low
Bat		
Bat mortality (direct impact) through collisions and/or barotrauma with wind turbine blades.	Medium	Low
The installation of lighting in the landscape at project infrastructure can attract insects and in turn foraging bats, bringing them into the vicinity of wind turbines. Insects can also die at lighting infrastructure, removing bat prey resources.	Low	Low
Impacts to Socio-Economic Component		
Social		
Noise	Low	Low
Increase in crime	Low	Low
Increased risk of HIV infections	High	Medium
Influx of construction workers	Low	Low
Quality of living environment – Transformation of sense of place	Medium	Low
Economic - Job creation and skills development	Medium	Medium
Economic - Socio-economic stimulation	Medium	Medium
Heritage		
Existence of the WEF in a rural/natural landscape directly alters landscape quality, sense of place and context of structures, including night time impacts from red flashing lights	Medium	Low
Heritage (Palaeontology) – none identified		
Noise		
Mechanical and aerodynamic noise from the operation of the wind turbine components. (Day time)	Low	Low
Mechanical and aerodynamic noise from the operation of the wind turbine components. (Night time)	Low	Low
Visual		
Compaction of larger areas can result in soil sterilisation and landscape degradation.	Medium	Low
AWL lights at night have the potential to significantly detract from the 'dark-sky' sense of place of the rural landscape.	High	Medium
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.	Low	Low
The dumping of old turbine blades on site have the potential to significantly degrade the local landscape character.	Low	Low
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.	Medium	Low
Soil erosion can result in visual scarring on prominent areas.	Low	Low
Shadow Flicker from the turning turbine blades has the potential to be strong annoyance factor.	Low	Low
Traffic		
Increase in traffic	Low	Low
Increase of incidents with pedestrians and livestock	Low	Low
Increase in dust from gravel roads	Low	Low
Increase in road maintenance	Low	Low

Impact	Pre-mitigation	Post-mitigation
Additional abnormal loads	Low	Low
New / Larger access points	Low	Low
DECOMMISSIONING		
Impacts to Biophysical Systems		
Aquatic / Freshwater		
Direct physical destruction or disturbance of aquatic habitat caused by vegetation disturbance of riparian habitat, encroachment/colonisation of habitat by invasive alien plants and alteration of river geomorphological profiles (including stream beds and banks).	High	Low
Alteration in the physical characteristics of freshwater resource features as a result of increased turbidity and sediment deposition	Medium	Low
Alteration or deterioration in the physical, chemical and biological characteristics of water resources (i.e. water quality) such as wetlands & rivers as a result of water/soil pollution. The term 'water quality' must be viewed in terms of the fitness or suitability of water for a specific use (DWAF, 2001). In the context of this impact assessment, water quality refers to its fitness for maintaining the health of aquatic ecosystems.	Medium	Low
Terrestrial Ecology		
Faunal impacts due to decommissioning activities	Medium	Low
Ecosystem integrity and the delivery of ecosystem services such as grazing and clean water.	Medium	Low
Biodiversity, ecosystem integrity and the delivery of ecosystem services such as forage.	Medium	Low
Agricultural – none identified		
Avifaunal		
Displacement due to disturbance associated with the dismantling of the wind turbines and associated infrastructure.	Medium	Low
Bat		
Disturbance to bats due to decommissioning activities through noise and dust, and damage to vegetation.	Low	Low
Impacts to Socio-Economic Component		
Social		
Noise	Low	Low
Increased in crime	Low	Low
Increased risk of HIV infections	High	Medium
Influx of construction workers	Low	Low
Hazard exposure	Low	Low
Disruption of daily living patterns	Low	Low
Disruptions to social and community infrastructure	Low	Low
Job creation and skills development	Medium	Medium
Socio-economic stimulation	Medium	Medium
Heritage		
Introduction of construction equipment directly alters landscape quality, sense of place and context of structures	Medium	Low
Heritage (Palaeontology) – none identified		
Noise		
Noise pollution due to construction activities (equipment and vehicle noise)	Low	Low
Visual		
Abandoning of old structures - Old, unused structures have the potential to significantly degrade the landscape character.	Medium	Low

Impact	Pre-mitigation	Post-mitigation
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.	Medium	Low
Abandoning of old towers and blades - Old towers have the potential to significantly degrade the landscape character.	High	Low
Traffic		
Increase in Traffic	Medium	Low
Increase of Incidents with pedestrians and livestock	Medium	Low
Increase in dust from gravel roads	Low	Low
Increase in Road Maintenance	Low	Low
Additional Abnormal Loads	Low	Low
Increase in dust from gravel roads	Low	Low
New / Larger Access points	Low	Low
CUMULATIVE		
Impacts to Biophysical Systems		
Aquatic / Freshwater		
Compromised ecological processes as well as ecological functioning of important habitats associated with the Kaboep River	Medium	Low
Terrestrial Ecology		
Broad-scale ecological processes, especially habitat fragmentation - Transformation of intact habitats could potentially compromise ecological processes as well as ecological functioning of important habitats and would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations.	Medium	Low
Agricultural – compliance statement - none identified		
Avifaunal		
Mortality due to collisions with the wind turbines Displacement due to disturbance during construction and operation of the wind farm Displacement due to habitat change and loss at the wind farm Mortality due to electrocution on the electrical infrastructure	Low	Low
Bat		
Cumulative impacts to bats across multiple wind energy projects	High	Medium
Impacts to Socio-Economic Component		
Social		
Noise	Low	Mitigation can only be considered implemented through a readiness action plan at a regional level and will driven on a provincial and municipal basis;
Shadow Flicker	Low	
Blade glint	Low	
Risk of HIV and AIDS	High	
Sense of place	High	
Service supplies and infrastructure	Low	
Job creation and skills development	Very high	
Socio-economic stimulation	Medium	

Impact	Pre-mitigation	Post-mitigation
		underpinned by national government, private sector and public support
Heritage		
Grubbing of surface and introduction of WEF to the landscape directly impacts archaeology and alters landscape	High	Medium
Heritage (Palaeontology)		
If fossils of scientific value (rare, complete, index fossils) are present they might be destroyed when excavations for foundations commence.	Low	Low
Noise		
Mechanical and aerodynamic noise from the operation of the wind turbine components of all three Pofadder WEFs.	Low	Low
Visual		
AWL at night intervisibility of the Pofadder Wind Farm with the proposed Namies Wind Farm located approximately 30km to the west.	Low	Low
Traffic		
Increase in Traffic	Medium	Medium
Increase of Incidents with pedestrians and livestock	Medium	Medium
Increase in dust from gravel roads	Medium	Low
Increase in Road Maintenance	Low	Low
Additional Abnormal Loads	Medium	Low
Increase in dust from gravel roads	Medium	Low
New / Larger Access points	Low	Low

16. SUMMARY OF SPECIALIST FINDINGS AND RECOMMENDATIONS

Table 21: 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 71 freshwater resource features were identified and delineated and include: • One (1) large primary/major ephemeral wash namely the Kaboet River; • Twelve (12) smaller ephemeral washes (mainly third order streams); and • Fifty-eight (58) drainage channels.	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).

Specialist Study	Findings	Recommendations
	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.	• 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 all three vegetation types and the fact that only a very small extent of these vegetation types are located 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 impact on the status and conservation targets set out for these vegetation types. The linear ridge system and the rocky outcrops are characterised by higher spatial heterogeneity due to the range of differing aspects (north, south, and variations thereof), slopes and altitudes all resulting in differing soil (e.g. depth, moisture, temperature, drainage, nutrient content), light and hydrological conditions. The structurally more complex, upper slopes of the linear ridge, are regarded as more sensitive and it is recommended that this portion of the ridge be avoided as much as possible.	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 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.

Specialist Study	Findings	Recommendations
	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.	
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 1 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. • Collisions with the 33 kV 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.	<u>Very High Sensitivity Zones</u> The construction of all infrastructure in these zones should be avoided completely: • 500 m 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 500 m 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: • 2.8 km turbine exclusion zone around the vulture roost on the Aries – Aggeneys 400 kV powerline. <u>Medium Sensitivity Zones</u> The construction of turbines in these zones should be restricted to a minimum to reduce the risk of

Specialist Study	Findings	Recommendations
		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 3 m/s (measured at ground level) during daylight hours when a rainfall event of 10 mm 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 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 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,

Specialist Study	Findings	Recommendations
		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 1 which indicates that during the construction and the operational phase of the proposed 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.	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 1. All negative impacts are low and can be effectively addressed through the mitigation measures provided.

Specialist Study	Findings	Recommendations
Heritage	The main heritage concerns for this project are archaeological sites and the cultural landscape. Some archaeological sites are within the current layout but none of these are highly significant sites and none require in situ conservation. It is, of course, always best to avoid any sites that have some research value and hence cultural significance, but excavation within a commercial mitigation context would be completely acceptable for all of the sites concerned here. 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 1 be authorised, but subject to the following: • 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 and the Quaternary sands but there are some areas of moderately palaeosensitivity. Most of the project area is of zero to insignificant palaeo sensitivity but there are parts that are moderately sensitive (refer Figure 21 below). 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,	On site monitoring at the two noise sensitive areas (40 and 41) 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

Specialist Study	Findings	Recommendations
	except at two noise sensitive areas (40 and 41) when the windspeed is above 5 m/s. 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.	receive Environmental Authorisation, from a noise impact perspective.
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 ZVI, with Medium to Low Exposure (approximately 8 km). • No significant landscape resources were identified within the Zone of Visual Influence, 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 30 km 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. • Shadow Flicker impacts are unlikely to occur, and if they did, they would be low intensity and suitably addressed with mitigation. 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

Specialist Study	Findings	Recommendations
		rehabilitation, should concrete towers be utilised. On condition the above mitigation measures are implemented, the proposed development is acceptable from a visual and landscape perspective and there is no objection to its authorisation.
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 1 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.

17. ENVIRONMENTAL IMPACT STATEMENT

Pofadder Wind Facility 1 (Pty) Ltd is proposing to develop, construct and operate the Pofadder WEF 1 and associated infrastructure on a site located approximately 20 km South East of Pofadder within the Kai !Garib Local Municipality and the ZF Mgcawu District Municipality in the Northern Cape Province.

The overall objective of the proposed development is to generate much needed electricity by means of renewable energy technologies capturing wind energy to feed into the national grid. The use of renewable energy to provide power to South Africa is supported at international, national, provincial and local level. Given South Africa's need for additional electricity generation and the need to decrease the country's dependency on coal-based power, renewable energy has been identified as a national priority, with wind energy identified as one of the readily available, technically viable and commercially cost-effective sources of renewable energy.

Taking into consideration the findings of the EIA process for the proposed development and the fact that specialist recommendations have been used to inform the project design and layout of the facility, it is the opinion of the Environmental Assessment Practitioner (EAP) that the majority of the negative impacts associated with the implementation of the proposed project can be mitigated to acceptable levels. While there are potential negative environmental impacts associated with the proposed development, the extent of the positive benefits associated with the implementation of the project in terms of renewable energy supply and positive local and regional economic impact are considered to outweigh the negative impacts.

After consideration of the findings presented in the EIR and based on the preferred layout presented within this report, it is the reasoned opinion of the EAP that the proposed Pofadder Wind Energy Facility 1 is acceptable and Environmental Authorisation could be granted.

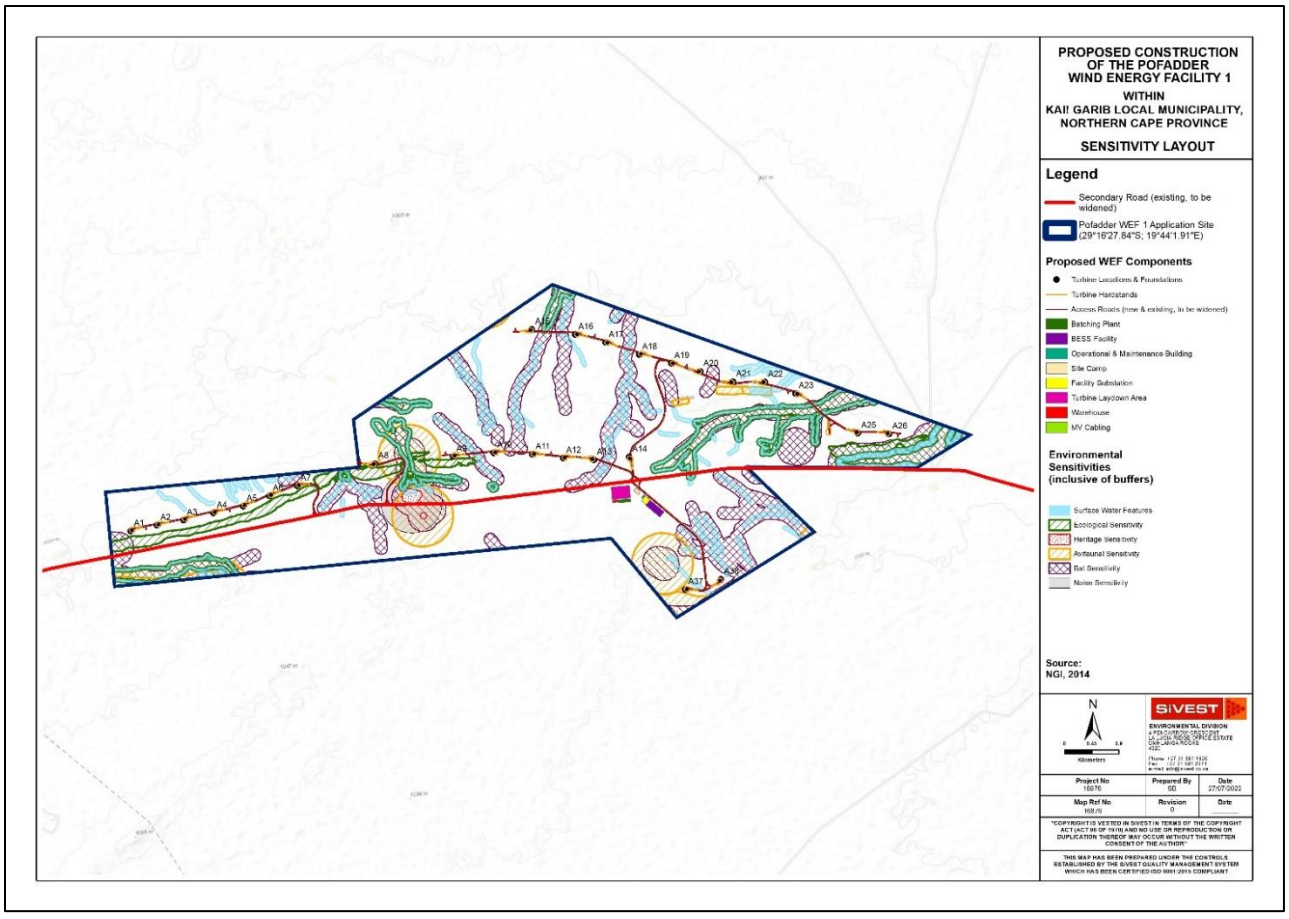

Figure 55: Final proposed layout with site sensitivities

The Pofadder WEF 1 will assist by converting wind energy into electricity, thereby releasing no harmful by-products into the environment which will in turn reduce the dependency on fossil fuels.

The following specialist studies have been undertaken for the project:

- Agriculture and Soils Impact Assessment
- Avifaunal Impact Assessment
- Bat Impact Assessment
- Ecological Impact Assessment
- Heritage Impact Assessment (including Paleontology, Archaeology and Cultural Landscapes)
- Desktop Geotechnical Investigation
- Noise Impact Assessment
- Social Impact Assessment
- Freshwater Impact Assessment
- Transportation Impact Assessment
- Visual Impact Assessment

The specialist assessments were conducted to address the potential impacts relating to the proposed development in order to ascertain the level of each identified impact, as well as mitigation measures which may be required. A summary of the main findings of the specialists are included in **Section 16** above.

The agricultural assessment (refer to **Appendix 6**) concluded that the proposed development will not have an unacceptable negative impact on the agricultural production capability of the site and is therefore acceptable. This is substantiated by the facts that the land is of very limited land capability and is not suitable for crop production, the amount of agricultural land loss is well within the allowable development limits, the proposed development poses a low risk in terms of causing soil degradation, and the development offers some positive impact on agriculture as well as wider, societal benefits.

The avifaunal assessment (refer to **Appendix 6**) concluded that the proposed Pofadder WEF 1 could potentially have a range of pre-mitigation negative impacts on priority avifauna ranging from low to medium, all of which could be reduced to acceptable levels with appropriate mitigation. No fatal flaws were discovered during the investigations.

The bat assessment (refer to **Appendix 6)** concluded that the turbine layout adheres to the bat constraints as no project infrastructure (except roads) are located in bat buffers. Once operational, bat fatality monitoring must be undertaken to search for bat carcasses beneath wind turbines to measure the observed impact of the WEF on bats for a minimum of two years. Mitigation measures that are known to reduce bat fatality if needed based on the fatality monitoring results include curtailment and acoustic deterrents. If these are adhered to, the Pofadder WEF 1 can be authorized without unacceptable levels of impacts to bats.

The ecological impact assessment (refer to **Appendix 6**) concluded that 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 and 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 the specialists considered opinion that the proposed project could be authorised from a terrestrial ecological perspective.

The heritage impact assessment (refer to **Appendix 6**) concluded that 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. Given that (1) all the expected impacts after mitigation are in the low to medium range (with those rated medium perhaps better rated as low), (2) direct impacts to archaeology can generally be easily mitigated if it is found during the preconstruction survey that impacts would occur, and (3) there are no highly significant landscapes or scenic routes in the vicinity of the site, it is the opinion of the heritage specialist that the proposed project may be authorised in full.

The palaeontology assessment (refer to **Appendix 6**) concluded that 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.

The noise assessment (refer to **Appendix 6**) concluded that, based on the modelling results, the impact will be low from a noise perspective. It is recommended that the development receive environmental authorisation.

The social impact assessment (refer to **Appendix 6**) stated that 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.

The aquatic impact assessment (refer to **Appendix 6**) concluded that 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 the study it is the aquatic specialists considered opinion that the proposed project could be authorised from a freshwater resource perspective.

The transportation impact assessment (refer to **Appendix 6**) concluded that the Pofadder WEF 1 and associated grid infrastructure will have a nominal impact on the existing traffic network. The project is therefore deemed acceptable from a transport perspective, provided the recommendations and mitigation measures in the report are implemented. Hence, Environmental Authorisations (EAs) should be granted for the EIA applications.

The visual impact assessment (refer to **Appendix 6**) concluded that the proposed development is acceptable from a visual and landscape perspective and there is no objection to its authorisation, provided the mitigation measures as contained in the draft EMP are implemented.

No location alternatives are being considered for the Pofadder WEF 1 as these sites were selected prior to the commencement of the EIA Process. The layout that was prepared for the Pofadder WEF 1 has been assessed by specialists to identify potential impacts that may arise from the development. Based on the findings of the specialists, the potential impacts identified and the outcomes of the public participation process of the Scoping Phase, the layout has been updated to avoid environmental sensitivities (except for a few roads and MV cabling) to produce a final layout. This final layout has been further assessed by all specialists (refer to Impact Tables in **Section 13.3** and findings and recommendations in **Section 15**). No further layout alternatives have been considered as part of the EIA process. Impact assessments have been undertaken on the revised layout. No technology alternatives will be considered. The choice of turbine to be used will ultimately be determined by technological and economic factors at a later stage. The no-go alternative has not been assessed as part of the EIA phase.

Section 16 provides a summary of the positive and negative impacts associated with the proposed project.

18. ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR) AND CONDITIONS TO BE INCLUDED IN THE ENVIRONMENTAL AUTHORISATION

In accordance with Appendix 4 of the EIA Regulations, 2014 (as amended), an EMPr has been included within the EIA. The EMPr includes the impact management measures formulated by the various specialists and the recording of the proposed impact management outcomes for the development have also been included in the EMPr (**Appendix 8**).

The EMPr provides suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored. The relevant management plans have also been incorporated into the EMPr (where required), which will assist in this regard. Taking into account the potential negative and significant positive impacts that the proposed development could have on the biophysical and social environment, it is the opinion of the EAP that the proposed development should be authorised subject to the following conditions of authorisation:

- All of the mitigation measures identified in this EIA Report (**Section 14.3**) must be made conditions of the authorisation.
- It is important that all of the listed mitigation measures are costed for in the construction phase financial planning and budget so that the contractor and/or developer cannot give financial budget constraints as reasons for non-compliance.
- All feasible and practical mitigation measures recommended by the various specialists must be incorporated into the Final Environmental Management Programme (EMPr) and implemented, where applicable;
- All key stakeholder requirements must be taken into account, as applicable;
- The specialist recommendations included in Section 16 must be made conditions of the authorisation.
- Where applicable, monitoring should be undertaken to evaluate the success of the mitigation measures recommended by the various specialists.
- The activity-specific construction EMPr must be adhered to.
- An independent Environmental Control Officer (ECO) must be appointed by the applicant to monitor the implementation of the construction EMP. The ECO should undertake regular site inspections and compile an environmental audit report.

<u>Specific conditions proposed to be included in the EA:</u>

Micro-siting

- The expertise of a Terrestrial Ecologist, an Aquatic Ecologist, an Archaeologist, a Palaeontologist, and an Avifaunal Specialist are to be enlisted to conduct post-authorisation micro-siting of the wind farm infrastructure with the design engineers to reduce potential impacts relating to these specialist fields.
- Final adjustments to the layouts must be made once the specialist micro-siting recommendations from the walkthrough process have been provided. Any No-Go Areas (areas that shall be excluded from any construction activity or general access by the construction team) within the development sites or servitudes shall be clearly indicated on maps and included with the micro-siting reports or attached to the EMPr.

Bats

- A minimum of 2 years of operational bat mortality monitoring should be conducted from the start of the operation of the facility. The monitoring will enable a detailed mitigation schedule to be implemented as needed.

Avifauna

Shut Down on Demand (SDoD) must be 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.

19. FINAL PROPOSED ALTERNATIVE WHICH RESPOND TO THE IMPACT MANAGEMENT MEASURES, AVOIDANCE, AND MITIGATION MEASURES IDENTIFIED THROUGH THE ASSESSMENT

The final proposed alternative is the layout that has been assessed in this report.

20. ASPECTS WHICH WERE CONDITIONAL TO THE FINDINGS OF THE ASSESSMENT EITHER BY THE EAP OR SPECIALIST WHICH ARE TO BE INCLUDED AS CONDITIONS OF AUTHORISATION

None identified.

21. UNCERTAINTIES, ASSUMPTIONS AND GAPS IN KNOWLEDGE

The assessment has been based by SiVEST on information sourced and provided by the Applicant, site visits conducted, specialist findings and the application of the SiVEST assessment criteria. The EAP is of the opinion that the assessment method applied is acceptable. SiVEST assumes that:

- All the information provided by the Applicant is accurate and unbiased.
- The available data, including Topocadastral maps, Orthophotographs, geological maps and Google Earth images, are reasonably accurate.
- All information contained in the specialist studies provided is accurate and unbiased.

- Refer to specialist studies (**Appendix 6**) for their specific assumptions and limitations.
- It is not always possible to involve all Interested and/or Affected Parties (I&APs) individually, however, every effort has/will be made to involve as many interested parties as possible. It is also assumed that individuals representing various associations or parties convey the necessary information to these associations / parties.
- It is not possible to determine the actual degree of the impact that the development will have on the immediate environment without some level of uncertainties. Actual impacts can only be determined following construction and/or operation commences.

22. AUTHORISATION OF THE PROPOSED POFADDER WEF 1 PROJECT

The final layout for the Pofadder WEF 1 has been designed to avoid no-go features on site that have been identified through the various specialist studies that have been undertaken. No fatal flaws were identified by the specialists who have undertaken their respective assessment for the project. Whilst it is acknowledged that the project will result in negative impacts, these can be mitigated to acceptable levels.

Based on the findings of the specialist studies and this assessment, provided further comments and concerns are not raised during the pending public participation process, the EAP has no reason to recommend that the project not be authorised, provided that the mitigation measures are adhered to. The conditions to be included in the Environmental Authorisation for the construction phase are listed in **Section 18** above.

The environmental authorization should be valid for a period of 10 years.

23. EAP DECLARATION

The EAP declarations, CV's and qualifications for the EAP's responsible for the preparation of this report have been attached in **Appendix 1**.

24. DEVIATIONS FROM THE APPROVED SCOPING REPORT

24.1 Battery Energy Storage Facility (BESS)

Following the submission of the Scoping Report, and the acceptance thereafter, the client recognised the need for a Battery Energy Storage Facility (BESS) to be added to the wind farm application. This infrastructure was not included in the Scoping Phase report. As the draft EIA Report had not yet gone out for comment, the applicant included the BESS infrastructure which was subject to a 30-day PPP. During this time the additional information was available for review by stakeholders, I&APs and commenting authorities.

Similarly with the other supporting infrastructure, the BESS facility has being placed in an area that is well outside of any and all sensitivities and has been assessed by all specialists.

As discussed in **Section 6** above, installations, facilities or infrastructure related to the development and operation (or expansion and operation) of battery energy storage will not trigger any of these listed activities. Batteries are

not regarded as facilities or infrastructure for the storage or storage and handling of a dangerous good, considering that its inherent purpose or objective is not to store, or store and handle a dangerous good. Furthermore, a battery is not deemed to be a “container”.

In the case of this application, while other listed activities are triggered, no electrolyte nor dangerous good will be stored in a container on site in volumes that may meet or exceed the thresholds specified in EIA regulations. Therefore, activities relating to the storage and handling of a dangerous good, where such storage occurs in containers, will not be triggered.

Nonetheless, I&APs were notified that the inclusion of the BESS is new information that was not included in the Scoping Phase and stakeholders, I&APs and commenting authorities were invited to comment on the inclusion of this new information.

24.2 NEMA Listed Activities

The application form has been updated to reflect the applicable activities associated with the final proposed layout. Triggers associated with development within Critical Biodiversity Areas (CBA) have been removed as the final proposed layout will not impact on any CBA. The triggers removed are as follows: Listing Notice 3, Activities 4, 12, and 23. The updated application form is included in the final submission.

25. INFORMATION REQUIRED BY CA (IF APPLICABLE)

Currently n/a.

26. CONCLUSION

This EIA Report has covered activities and findings related to the scoping and EIA process for the proposed Pofadder WEF 1 Project. Professional experience, specialist knowledge, relevant literature and local knowledge of the area have all been used to identify the potential issues associated with the proposed project. No fatal flaws were identified during the EIA Phase. In conclusion, SiVEST, as the independent EAP, is therefore of the view that:

- The site location and project description can be authorised based on the findings of the suite of specialist assessments;
- A cumulative impact assessment of similar developments in the area was undertaken by the respective specialists. Based on their findings, majority of the cumulative impacts associated with the proposed development can be kept either low or medium after the implementation of mitigation measures. In addition, the Social specialist found that the project will result in several positive cumulative effects on the socio-economic environment and that these cumulative impacts will be positive medium, before and after the implementation of mitigation measures; and
- Through the implementation of mitigation measures, together with adequate compliance monitoring, auditing and enforcement thereof by the appointed Environmental Control Officer (ECO) as well as the competent authority, the potential detrimental negative impacts associated with the proposed development can be mitigated to acceptable levels.

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