ENVIRONMENTAL IMPACT REPORT

PROPOSED DE RUST SOUTH WIND ENERGY FACILITY AND ASSOCIATED INFRASTRUCTURE ON THE REMAINING EXTENT OF THE FARM HOUMOED 206, NORTHERN CAPE

May 2023

NAME OF APPLICANT: FE De Rust (PTY) LTD

PREPARED BY: Enviro-Insight CC

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PROJECT DETAILS

REPORT TITLE:	PROPOSED DE RUST SOUTH WIND ENERGY FACILITY AND ASSOCIATED INFRASTRUCTURE ON THE REMAINING EXTENT OF THE FARM HOUMOED 206, NEAR POFADDER IN THE NORTHERN CAPE
REPORT STATUS:	ENVIRONMENTAL IMPACT REPORT
DEA REFERENCE NO.:	14-12-16-3-3-2-2261
APPLICANT:	FE DE RUST PTY LTD
ENVIRONMENTAL CONSULTANT:	ENVIRO-INSIGHT CC MARVIN GRIMITT EAPASA REGISTERED
ENVIRONMENTAL CONSULTANT:	ENVIRO-INSIGHT CC RONELL KUPPEN BSC (HONORS) GEOGRAPHY IAIASA MEMBER
DATE	MAY 2023

When referenced this report should be cited as: Enviro-Insight CC. (2023). Environmental Impact Report for the Proposed De Rust South Wind Energy Facility and associated infrastructure on the Remaining Extent of the Farm Houmoed 206 near Pofadder in the Northern Cape.

EXECUTIVE SUMMARY

Details of the proposed De Rust South Wind Energy Facility

Component	**Description / Dimensions**
Project Name	De Rust South Wind Energy Facility
Province	Northern Cape
Farm portion	Remaining Extent of the Farm Houmoed 206
Development Extent (ha)	approximately 6 919 hectares
21-digit Surveyor General code	C03600000000020600000
Number of turbines	Up to 32
Hub height	Up to150M
Rotor diameter	Up to 175 m
Turbine capacity (MW)	Up to 7.5 MW
Contracted capacity of the facility (MW)	240 MW (Maximum)
Length of blade	Up to 87.5 m
Dimensions of the turbine foundations	20X20X8m
Cabling	Underground up to 1m deep
Capacity of onsite substation	240 MW (33/132kV (100mX100M))
Grid connection	Proposed Korana Substation
Width of internal roads	Construction phase: up to 10m Operational phase: up to 8 m
Proximity to grid connection	+-10km approximately
Height of Fencing	1.8m – 2.1m
Laydown areas	Construction period laydown footprint (temporary): ± 6 ha Temporary hardstand area (boom erection, storage and assembly area): ± 12 ha O&M Area: 1.1ha

PROJECT OVERVIEW

Background

The proposed study area for the renewable energy developments is located approximately 13 km south of Pofadder within the Khâi-Ma Local Municipality, in the Northern Cape. The site can be reached via the R358 off the N14.

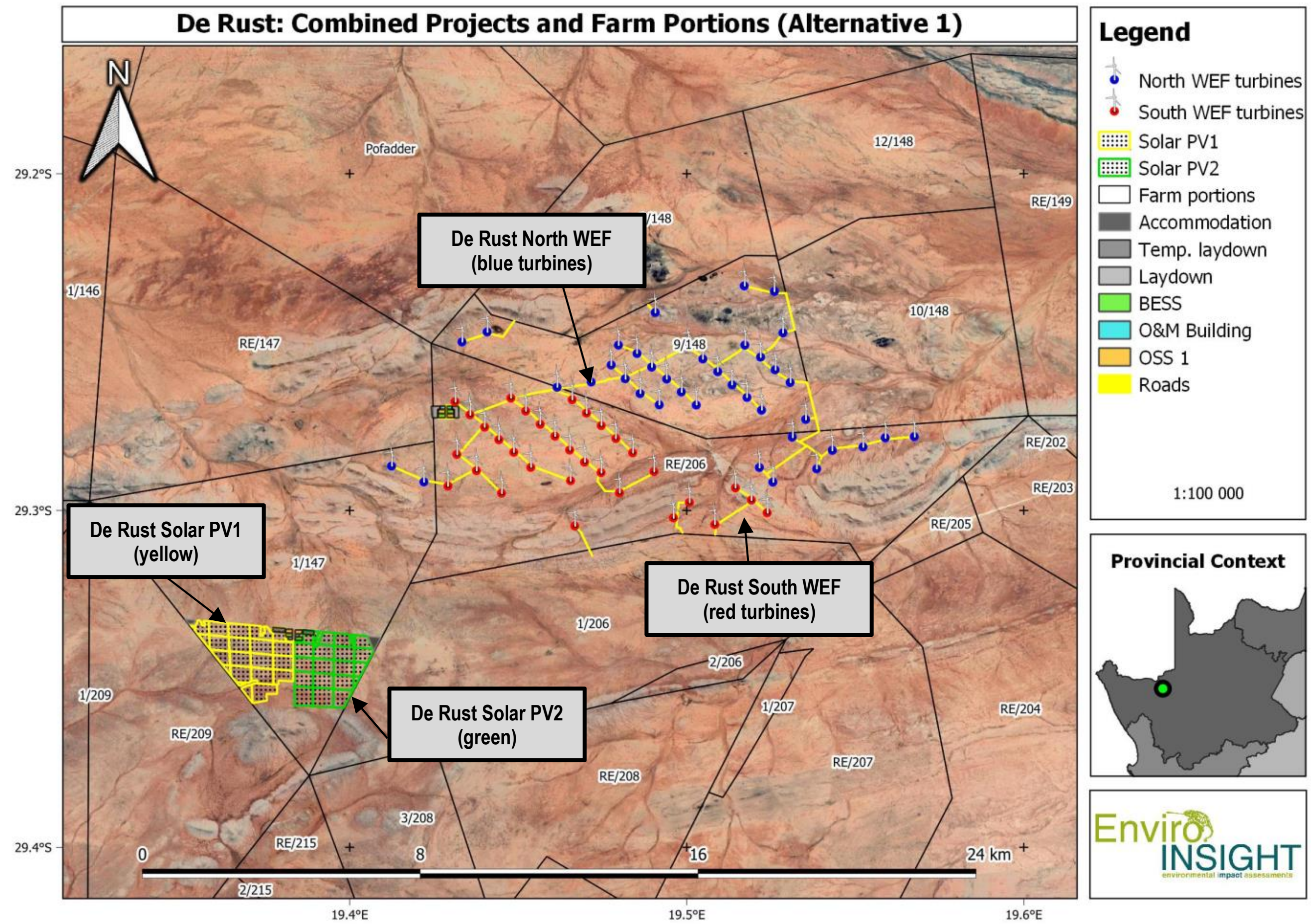
The developer is planning on developing two wind energy facilities (WEFs) and two solar energy facilities (SEFs) to be known as the FE De Rust WEFs & SEFs. The project areas for all four renewable energy developments are located on Portion 1 of the Farm Samoep 147 (a portion will be used for the proposed Solar Energy Facilities), Portion 9 of the Farm Nouzees 148 and the Remaining Extent of the Farm Houmoed 206, within the Khâi-Ma Local Municipality.

The proposed renewable energy facilities are separated as follows:

- **FE De Rust South WEF (this EIR report)**
- FE De Rust North WEF
- FE De Rust Solar PV1
- FE De Rust Solar PV2

Each turbine will have a generation capacity of up to 7.5 MW. Each turbine will have a hub height of up to 150m and a rotor diameter of up to 175m. The final turbine model to be utilised will only be determined closer to the time of construction, depending on the technology available at the time. Additional ancillary infrastructure would include underground and above-ground cabling between project components, onsite substation/s, Battery Energy Storage System (BESS), foundations to support turbine towers, internal/ access roads (up to 10 m in width during the construction phase) linking the wind turbines and other infrastructure on the site, and permanent workshop area and office for control, maintenance and storage. As far as possible, existing roads will be utilised and upgraded (where needed) with the relevant stormwater infrastructure and gates constructed as required. The perimeter of the proposed WEF may be enclosed with suitable fencing. A formal laydown area for the construction period, containing a temporary maintenance and storage building along with a guard cabin will also be established.

Additionally, the Applicant is proposing to construct a power line, with a capacity of 132kV-400kV that will facilitate the developments by feeding into the existing national electricity grid. This associated electrical infrastructure will require a separate Environmental Authorisation and will be conducted as a part of a separate Basic Assessment (BA) process.



The four proposed renewable energy projects in relation to one another. This report for environmental authorisation will only focus on the De Rust South WEF.

Project Introduction

FE De Rust (Pty) Ltd (hereafter the Applicant) is proposing the development of a wind energy facility (WEF) and associated infrastructure on a site located approximately 18 kilometers (km) south of Pofadder in the Northern Cape province of South Africa. The proposed development will have a generation capacity of up to 240MW which will feed into the National Grid.

The proposed study area for the WEF located approximately 18km south of the town of Pofadder within the Khâi-Ma Local Municipality, in the Northern Cape Province of South Africa. The site can be reached via the R358, which branches off the N14. The De Rust South WEF footprint is approximately 6 919 hectares (ha) and will be located on the Remaining Extent of the Farm Houmoed 206.

The De Rust South WEF will consist of up to 32 wind turbines, with a generation capacity of between up to 7.5 MW per turbine, depending on the available technology at the time. Each turbine will have a hub height of up to 150m and a rotor diameter of up to 175m. The final turbine model to be utilised will only be determined closer to the time of construction, depending on the technology available at the time. Additional ancillary infrastructure to the WEF would include underground and above-ground cabling between project components, onsite substation/s, Battery Energy Storage Systems (BESS), foundations to support turbine towers, internal/ access roads linking the wind turbines and other infrastructure on the site, and permanent workshop area and office for control, maintenance and storage. As far as possible, existing roads will be utilised and upgraded (where needed) with the relevant stormwater infrastructure and gates constructed as required. The perimeter of the proposed WEF may be enclosed with suitable fencing. A formal laydown area for the construction period, containing a temporary maintenance and storage building along with a guard cabin will also be established.

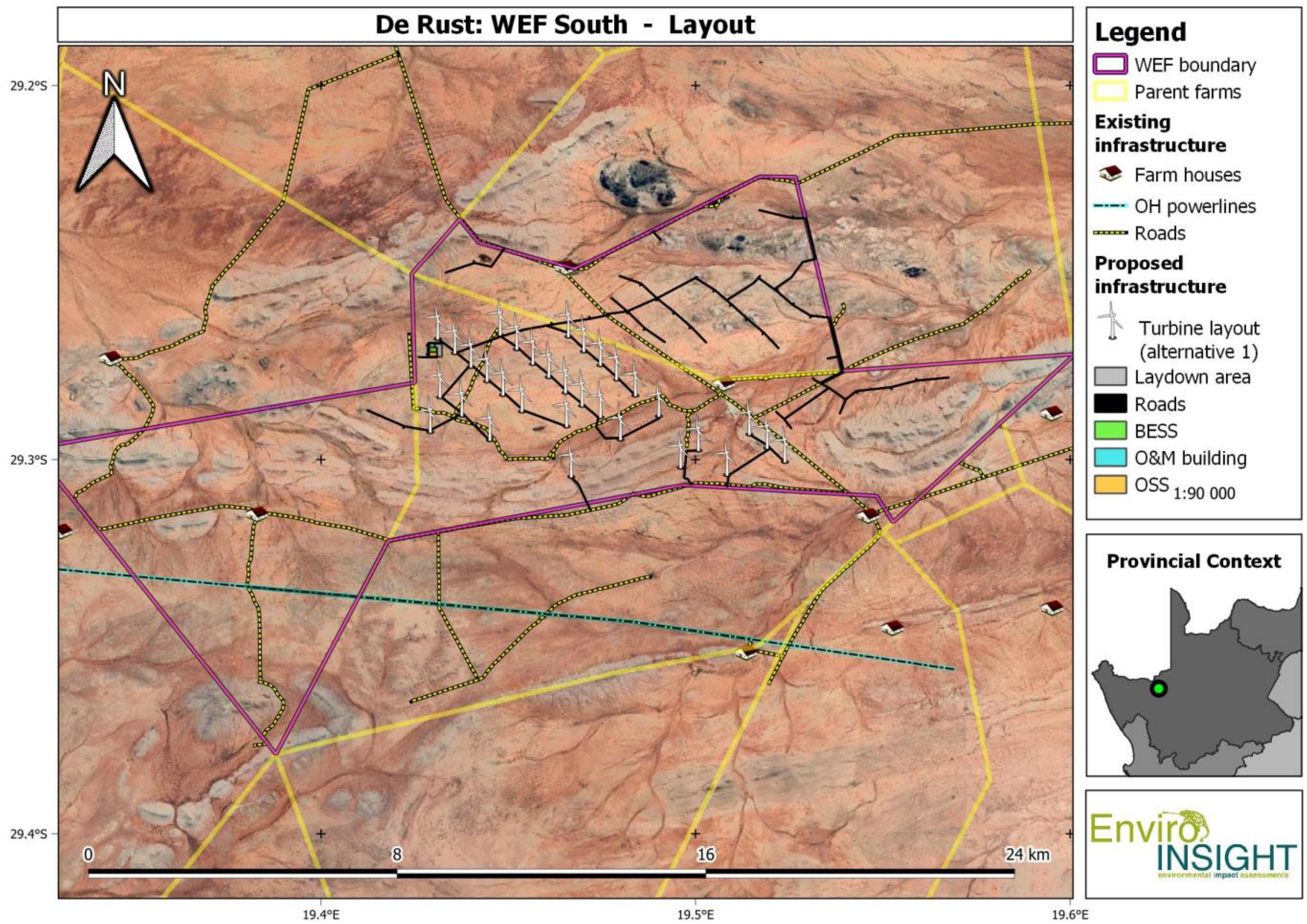
Additionally, a power line with a capacity of up to 132kV-400kV is required. At this stage, options are still being considered for either the construction of a new line to feed into the Korana substation or connect with existing lines. This associated electrical infrastructure will require a separate Environmental Authorisation and is being conducted as a part of a separate Basic Assessment (BA) process.

Wind turbine and associated infrastructure coordinates for Preferred Layout for the proposed De Rust South WEF project.

Wind Turbine layout number	Latitude (S)	Longitude (E)
WT01	29°17'33.78"S	19°25'44.95"E
WT02	29°16'59.97"S	19°25'54.31"E
WT03	29°17'17.37"S	19°26'15.28"E
WT04	29°17'41.42"S	19°26'42.06"E
WT05	29°16'3.65"S	19°25'52.38"E
WT06	29°16'17.69"S	19°26'8.40"E
WT07	29°16'30.81"S	19°26'24.06"E
WT08	29°16'44.29"S	19°26'39.25"E
WT09	29°16'57.64"S	19°26'55.17"E
WT10	29°17'13.86"S	19°27'13.32"E
WT11	29°17'28.07"S	19°27'55.80"E
WT12	29°18'16.41"S	19°28'0.26"E
WT13	29°15'59.82"S	19°26'52.07"E

WT14	29°16'13.62"S	19°27'7.88"E
WT15	29°16'27.79"S	19°27'23.47"E
WT16	29°16'40.47"S	19°27'39.16"E
WT17	29°16'55.31"S	19°27'54.82"E
WT18	29°17'8.30"S	19°28'10.65"E
WT19	29°17'19.44"S	19°28'28.37"E
WT20	29°17'40.94"S	19°28'47.96"E
WT21	29°16'1.50"S	19°27'57.50"E
WT22	29°16'15.85"S	19°28'12.79"E
WT23	29°16'29.19"S	19°28'28.55"E
WT24	29°16'42.96"S	19°28'44.18"E
WT25	29°16'58.23"S	19°29'2.09"E
WT26	29°17'18.36"S	19°29'24.89"E
WT27	29°17'51.30"S	19°30'2.71"E
WT28	29°18'7.77"S	19°29'45.62"E
WT29	29°18'14.87"S	19°30'29.88"E
WT30	29°17'35.74"S	19°30'51.85"E
WT31	29°17'48.79"S	19°31'8.91"E
WT32	29°18'2.36"S	19°31'25.70"E
Laydown area	29°16'8.60"S	19°25'49.53"E
	29°16'8.65"S	19°25'56.21"E
	29°16'20.99"S	19°25'56.49"E
	29°16'20.83"S	19°25'51.64"E
	29°16'12.03"S	19°25'51.50"E
	29°16'11.86"S	19°25'49.47"E
	5.46ha	
BESS	29°16'12.42"S	19°25'43.86"E
	29°16'16.35"S	19°25'44.04"E
	29°16'16.32"S	19°25'51.03"E
	29°16'12.08"S	19°25'51.12"E
	2.64ha	
Onsite Substation	29°16'16.90"S	19°25'43.91"E
	29°16'20.79"S	19°25'43.94"E
	29°16'20.83"S	19°25'51.08"E
	29°16'16.80"S	19°25'51.00"E

	2.67ha	
O&M Building	29°16'8.51"S	19°25'43.92"E
	29°16'11.92"S	19°25'36.59"E
	29°16'11.92"S	19°25'41.76"E
	29°16'8.57"S	19°25'41.80"E
	1.50ha	



In terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) and the Environmental Impact Assessment (EIA) Regulations (2014, as amended), promulgated in Government Gazette 40772 and Government Notice (GN) R326, R327, R325 and R324 on 7 April 2017, a full Scoping and EIA Process is required for the construction of the proposed. Enviro-Insight CC (hereafter Enviro-Insight) has been appointed to undertake the Scoping & EIA (S&EIA) process for the WEF, on behalf of the Applicant. The S&EIA process will determine the biophysical, social and economic impacts associated with undertaking the proposed activities. Given that energy related projects have been elevated to national strategic importance in terms of the S&EIA process, the proposed WEF requires authorisation from the National Department of Forestry, Fisheries and the Environment (DFFE) as the Competent Authority (CA), acting in consultation with other spheres of government

Based on the generated screening report, all environmental theme sensitivities are indicated below. Based on the Site Sensitivity Verification (SSV), the EAP and relevant specialists however do not agree with the outcome of the following themes:

- Avian (Wind) Theme – it is indicated as low but should be Very High (refer to relevant avifauna section in Chapter 5).
- Civil Aviation (Wind) Theme – indicated as high but should be low (comments from CAA was sought).
- Noise Theme – indicated as high but should be low (refer to relevant noise section in Chapter 5).
- Flicker Theme – indicated as very high but should be medium (refer to relevant visual section in Chapter 5).

Environmental themes from Screening Tool which needs to adhere to in the Environmental Authorisation process.

Theme	Very High sensitivity*	High sensitivity*	Medium sensitivity	Low sensitivity
Agriculture Theme				X
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Avian (Wind) Theme				X
Bats (Wind) Theme		X		
Civil Aviation (Wind) Theme			X	
Defence (Wind) Theme				X
Flicker Theme	X			
Landscape (Wind) Theme	X			
Paleontology Theme			X	
Noise Theme	X			
Plant Species Theme			X	
RFI (Wind) Theme	X			
Terrestrial Biodiversity Theme	X			

* Require full assessments based on 2020 Protocols.

Environmental themes from Screening Tool compared to Site Sensitivity Verification (SSV) and indicating whether a Full Assessment or Compliance Statement is required.

Theme	Sensitivity before SSV	Sensitivity after SSV	Full Assessment or Compliance Statement
Agriculture Theme	Low	Low	Compliance Statement
Animal Species Theme	High	Low	Compliance Statement (excludes avifauna)
Aquatic Biodiversity Theme	Very High	Very High	Full Assessment
Archaeological and Cultural Heritage Theme	Low	High	Full Assessment
Avian (Wind) Theme	Low	Very High	Full Assessment
Bats (Wind) Theme	High	Very High	Full Assessment
Civil Aviation (Wind) Theme	Medium	Medium	Comments from relevant stakeholders
Defence (Wind) Theme	Low	Low	Comments from relevant stakeholders
Flicker Theme	Very High	High	Full Assessment
Landscape (Wind) Theme	Very High	High	Full Assessment
Noise Theme	Very High	High	Full Assessment
Paleontology Theme	Medium	Medium	Full Assessment
Plant Species Theme	Medium	High	Full Assessment
RFI (Wind) Theme	Very High	Medium	Comments from relevant stakeholders
Terrestrial Biodiversity Theme	Very High	Very High	Full Assessment

All the environmental themes followed the relevant protocols (20 March 2020; 30 October 2020) and accompanied guidelines (SANBI 2020) to assess and verify the sensitivities.

Based on the above SSV outcome, specialist studies were undertaken to address the key issues that require further investigation to address the impacts of the development on the receiving environment. The specialist studies involve the gathering of data relevant to identifying and assessing impacts that may occur as a result of the proposed project. The specialists will also recommend appropriate mitigation or optimisation measures to minimise potential negative impacts or enhance potential benefits, respectively.

Enviro-Insight has selected a team of highly experienced specialists in order to execute this in a professional and impartial manner. The project team, specifically the sub-consultants, is indicated below:

Specialist Assessment	Company	Professional Specialist
Terrestrial Biodiversity	Enviro-Insight CC	Corné Niemandt *Pr.Sci.Nat.* Samuel Laurence *Pr.Sci.Nat.* Alex Rebelo *Cand.Sci.Nat.*

Sensitive Plant Species	Enviro-Insight CC	Corné Niemandt *Pr.Sci.Nat.*
Avifauna	Enviro-Insight CC	Samuel Laurence *Pr.Sci.Nat.* AE Van Wyk Cand.Sci.Nat.
Bats	Enviro-Insight CC	Alex Rebelo *Cand.Sci.Nat.* Luke Verburgt *Pr.Sci.Nat.* AE Van Wyk Cand.Sci.Nat.
Aquatic Biodiversity	Tate Environmental	Russell Tate *Pr.Sci.Nat.*
Socio-economic	Independent social sciences consultant	Tony Barbour
Noise	Enviro Acoustic Resources (EAR)	Morné de Jager
Traffic	Innovative Transport Solutions Global	Pieter Arangie
Visual and Flicker	EcoElementum	Nakéla Naidoo Neel Breitenbach
Heritage and Paleontological	HCAC	Jaco van der Walt
Agriculture Compliance Statement	Independent Consultant	Johann Lanz

Neither Enviro-Insight nor any of its sub-consultants are subsidiaries of *FE De Rust Pty Ltd,* nor is *FE De Rust Pty Ltd* a subsidiary to Enviro-Insight. Enviro-Insight, its sub-consulting specialists, do not have any interests in secondary or downstream developments that may arise out of the authorisation of the proposed project.

The potential impacts associated with the proposed De Rust South WEF and associated infrastructure are summarised below in Table 8-1. Should the mitigation provided in the tables in Section 7 and detailed in the Environmental Management Programme (EMPr) be implemented, post-migration impacts are anticipated to range between very low to medium negative significance, and up to highly positive.

Summary of Impact Assessment

Aspect	Impact	Post Mitigation
	Planning and Construction	
Terrestrial Biodiversity	Habitat Loss and Fragmentation	Low – Medium
	Loss of species of conservation concern	Low
	Alien and invasive plant species	Low
	Increased risk of erosion and flash floods.	Low
Avifauna	Habitat destruction	Low
	Destruction or disturbance of bird roosts	Low
Bats	Habitat destruction	Low

Aquatic	Operation of equipment and machinery	Low
	Clearing vegetation	Low
	Stockpiling of and placement construction materials	Low
	Excavating/shaping landscape	Low
	Final landscaping, backfilling and postconstruction rehabilitation	Low
Agricultural	Loss of agricultural potential by occupation of land	Medium
	Loss of agricultural potential by soil degradation	Low
	Dust impact	Low
	Enhanced agricultural potential through increased financial security for farming operations	High Positive
	Improved security against stock theft and other crime	High Positive
Visual	Visual intrusion due to the removal of vegetation, movement of construction vehicles and heavy machinery, presence of laydown areas and site clearance	Low
	Light pollution due to night lighting	Low
	Dust pollution due to site clearance and movement of construction vehicles and heavy machinery	Low
Heritage	Impact on the cemetery at PD002	Low
Noise	Daytime WTG construction activities	Low
	Night-time WTG construction activities	Low
Social	Employment, business opportunities and skills development impact rating	High Positive
	Construction workers on site and in local area impact rating	Low
	Risk to safety, livestock, and damage to farm infrastructure	Low
	Increased risk of grass fires	Low
	Nuisance impacts associated with construction related activities	Low
Traffic	Increase in traffic volumes on the surrounding road network as a result of construction traffic	Low
	Heavy Loads during the construction phase	Low
General	Stormwater Management	Low
	Hunting / Fishing by construction workers.	Low
	Degradation and contamination of the surrounding environment by construction activities, cement, hydrocarbons and other hazardous materials.	Low
	Potential disturbance or unearthing of graves or disturbance to other heritage resources during the construction phase.	Low
	Improper storage and disposal of solid waste.	Low
	Littering around the site.	Low
	Improper disposal of rubble i.e.: burying or neglecting building rubble resulting in direct mechanical damage to surrounding vegetation and untidiness of the site.	Low

	Lack of toilet facilities resulting in unsanitary conditions.	Low
	Improper disposal of toilet waste from chemical toilets resulting in contamination of the surrounding environment	Low
	Increase waste to landfill site.	Low
	Risk of spills from construction equipment (oils, fuels, cement etc.) contaminating soil and the watercourse.	Low
	Dust Generation and control	Low
	Degradation of existing service infrastructure, e.g. roads, electricity.	Low
	Operation	
Terrestrial Biodiversity	Direct faunal impacts due to operation.	Low
	Alien and invasive plant species	Low
Avifauna	Bird mortalities (turbine collision)	Medium-High
	Bird Mortalities powerline and fence collision	Low-Medium
	Disruption of bird migratory pathways	Low-Medium
	The attraction of some bird species	Low-Medium
Bats	Bat mortalities due to collision or barotrauma	Medium-High
	Artificial light	Low
Aquatic	Alteration of drainage	Low
	Alteration of surface water flow dynamics	Low
	Establishment of alien plants on disturbed areas	Low
	Alt 3	Medium
Visual	Change in visual/landscape character and sense of place due to the presence of the wind turbines and ancillary infrastructure	Medium
	Visual intrusion from the wind turbines dominating the skyline in a largely natural area	Medium
	Visual intrusion from the movement of construction vehicles and heavy machinery	Medium
	Light pollution due to night lighting, security lighting and navigational lighting	Medium
	Dust pollution from operation and maintenance vehicles..	Medium
	Light pollution due to night lighting, security lighting and navigational lighting	Medium
	Visual impact on the identified sensitive receptors	Medium
Noise	Daytime operation of WTG considering the worst-case SPL	Low
	Night-time operation of WTG considering the worst-case SPL	Low
Social	Renewable energy infrastructure and clean renewable energy	High Positive
	Creation of employment and business opportunities	High Positive
	Generation of income for landowner	Medium Positive
	Social Economic Development and Enterprise Development	High Positive
	Visual impacts and associated impact on sense of place	Low-Medium

	Impact on property values	Low
	Impact on tourism	Low
Traffic	Increase in traffic volumes on the surrounding road network	Low
	Decommissioning	
Terrestrial Biodiversity	The ecological impacts associated with the decommissioning phase will be similar to those listed in the construction phase and the associated mitigations measures must be updated and implemented to reduce potential adverse impacts	
Agriculture	Protection of soil resources	Low
Visual	Visual intrusion and dust creation from the movement of construction vehicles and heavy machinery	Low
	Change in landscape character due to the removal of infrastructure	Low
	Light pollution due to night lighting.	Low
	Dust pollution due to infrastructure removal and movement of construction vehicles and heavy machinery.	Low
Social	Social impacts associated with decommissioning	Low
Traffic	Gravel loss and possible damage to the road layer works. as a result of additional truck traffic and heavy load truck traffic during the decommissioning phase	Low

Summary of Cumulative Impact Assessment

Aspect	Impact	Post Mitigation
	Planning and Construction	
Terrestrial Biodiversity	Vegetation and habitat loss	Low – Medium
	Increased habitat fragmentation	Low - Medium
	Loss of critical habitat for flora SCC as well as endemic species	Low - Medium
	Loss of provincially protected species which require a permit.	Low - Medium
	Surface water impacts and associated ecological processes.	Low - Medium
	Increased erosion due to flooding (not a yearly event but longer term)	Low - Medium
	Increased alien flora and fauna species	Low - Medium
Avifauna	Habitat loss	High
	Road-kills	High
	Regional saturation of turbines	High
	Powerlines	High
Bats	Loss or destruction of foraging and roosting habitat	Low
	Bat fatality due to collision	Medium-High
	Artificial lighting	Low
Aquatic	Operation of equipment and machinery	Low

Aspect	Impact	Post Mitigation
	Clearing vegetation	Low
	Stockpiling of and placement construction materials	Low
	Excavating/shaping landscape	Low
	Final landscaping, backfilling and postconstruction rehabilitation	Low
Agricultural	Regional loss (including by degradation) of future agricultural production potential	Low-Medium
Heritage	Increasing as a result of the expansion of renewable energy facilities in the surrounding area	Low
Social	Impact on Sense of Place	Moderate
	Pressure on local services and accommodation	Medium/Low Negative
	Job Creation, Skills Development, training opportunities and creation of downstream business opportunities	High Positive
Noise	Increased Noise Levels for the nearest Noise sensitive receptors	Low
Visual	Change in visual/landscape character and sense of place, due to the presence of additional renewable energy facilities, from a largely undeveloped landscape to a more industrial type of landscape.	Moderate
	Additional levels of visual intrusion due to the presence of additional renewable energy facilities and from the movement of additional maintenance vehicles and heavy machinery.	Moderate
	Additional dust pollution due to increased traffic.	Moderate
	Additional light pollution due to additional night lighting, security lighting and navigational lighting.	Moderate
	Increased visual impact on the identified sensitive receptors.	Moderate
Traffic	Increase in traffic volumes on the surrounding road network as a result of construction traffic	Low
	Gravel loss and possible damage to the road layer works as a result of additional truck traffic and heavy load truck traffic	Low
	Operation	
Avifauna	Road-kills	High
	Regional saturation of turbines	High
	Powerlines	High
Bats	Bat mortalities	Low Medium
	Artificial light	Low
Aquatic	Alteration of drainage	Low
	Alteration of surface water flow dynamics	Low

Aspect	Impact	Post Mitigation
	Establishment of alien plants on disturbed areas	Low
Traffic	Increase in traffic volumes on the surrounding road network during the operational phase.	Low
	Decommissioning	
Traffic	Gravel loss and possible damage to the road layer works. as a result of additional truck traffic and heavy load truck traffic during the decommissioning phase	Low

Summary of specialist opinions and recommendations

Summary of Specialist Recommendations.

Specialist	Recommendation	Opinion
Terrestrial Biodiversity	No fatal flaws are evident for the proposed project should the latest layout be incorporated which has taken sensitivities into account. It is the opinions of the specialists that the project, may be considered for authorisation, on condition all prescribed mitigation measures and supporting recommendations are implemented. Should the layout be amended and significant changes occur which impacts on sensitive features, all necessary protocols need to be followed to ensure all highly sensitive areas are avoided.	Project can proceed with the implementation of the recommended mitigation measures
Avifauna	The presence of nesting and breeding Ludwig's Bustard, Martial Eagles and Red Lark within the PAOI are of particular concern. Avoidance mitigation must be implemented in conjunction with the aforementioned micro siting as well as technological applications such as Shutdown on Demand. Thus, the author will look to support Environmental Authorisation (EA) based upon the following conditions: • Shutdown on Demand (both automated and human-mediated) will be required to mitigate negative impacts on Ludwig's Bustard and Martial Eagle; • All recommended No-Go buffering must be strictly adhered to; • Micro siting of turbine placement must occur prior to construction and should be supervised by a specialist zoologist in order to mitigate habitat loss and collision risks for Red Lark; • All recommended mitigation measures described above must be applied;. • The EMPr must be updated every three years in order to revaluate the potential distributional population changes of species such as Martial Eagles and Vultures. Thus, technological mitigations such as AI, radar and camera technology may have to be re-positioned, re-calibrated and updated.	Project can proceed with the implementation of the recommended mitigation measures
Bat Assessment	Based on the available data collected, the construction of a WEF on the proposed WEF boundary will have a Low-Medium Risk of impacting the bat population in the	Project can proceed with the implementation of the

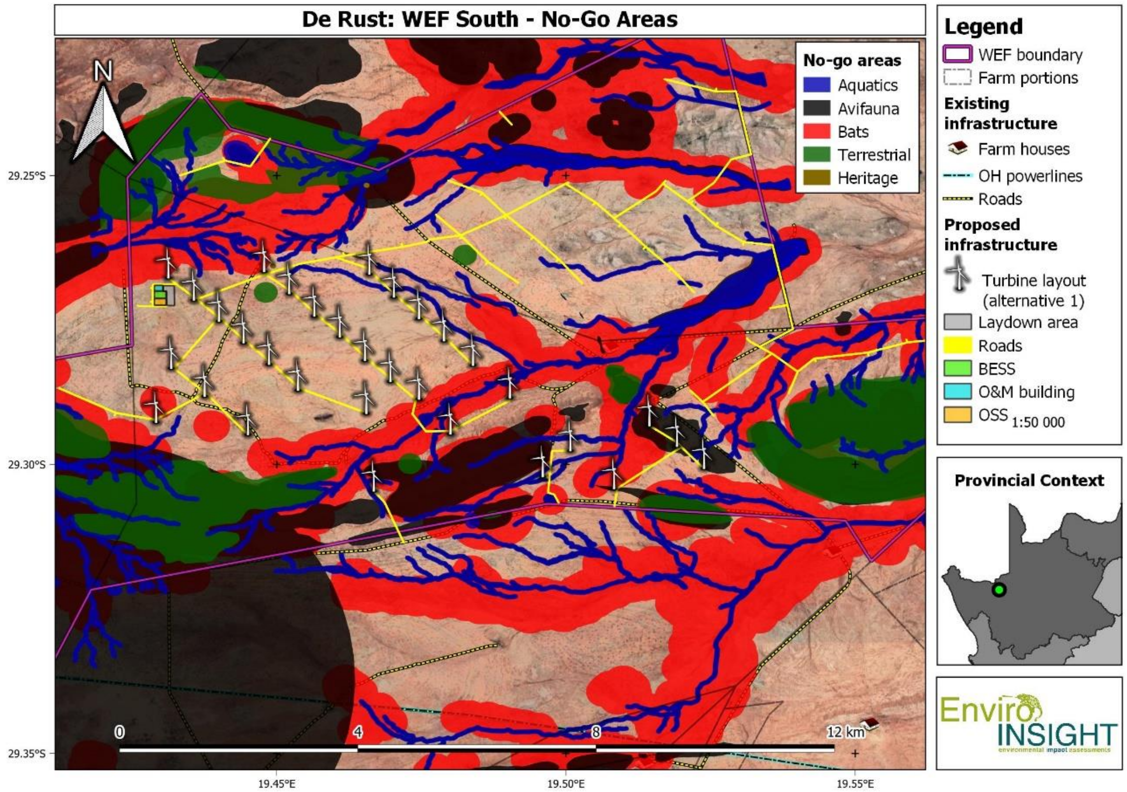
	area before mitigation measures have been applied. Currently, after mitigation measures have been implemented this risk will be reduced to Low.	recommended mitigation measures
Aquatic Biodiversity	Considering the type of development proposed, a WEF, and the implementation of the recommendations and mitigation measures, the development is not likely to impact on the FEPA catchment classification associate with the study area.	Project can proceed with the implementation of the recommended mitigation measures
Agriculture	The proposed development will not have substantial 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 low agricultural potential, the amount of agricultural land loss is within the allowable development limits, and that the proposed development poses a low risk in terms of causing soil degradation, if the recommended mitigation measures are implemented.	Project can proceed with the implementation of the recommended mitigation measures
Noise	there exists a low potential for a noise impact and that no further Scoping or other acoustical studies would be required for the proposed WEF. No specific mitigation measures regarding noise or additional noise measurements are recommended. No additional conditions regarding noise are recommended for inclusion in the EMPr. It is therefore recommended that the development of the WEF be approved from a noise perspective.	Project can proceed with the implementation of the recommended mitigation measures
Visual	Overall, the proposed WEF is expected to alter the study areas current sense of place. However, considering the municipality's objectives and the surrounding approved wind and solar projects, an alteration to the area's current sense of place is expected. Therefore, the proposed WEF is expected to blend in with the areas future sense of place, which is expected to include additional renewable energy projects. Considering the analysis, including the results of the viewshed and visual exposure analysis, shadow flicker analysis, impact assessments, future land use trends and low density of identified sensitive receptors, the proposed De Rust South WEF project can proceed from a visual and shadow flicker perspective provided that the recommended mitigation measures are adhered to.	Project can proceed with the implementation of the recommended mitigation measures
Heritage	The alternatives are all considered to be acceptable since the turbines avoid significant heritage sites and the impact of the proposed project on heritage resources can be mitigated to an acceptable level. The socio-economic benefits also outweigh the possible impacts of the development if the correct mitigation measures are implemented for the project. It is recommended that the proposed project can commence on the condition that the recommendations are implemented as part of the EMPr and based on approval from SAHRA.	Project can proceed with the implementation of the recommended mitigation measures

Social	The development of the proposed WEF will create employment, training and business opportunities during both the construction and operation phases of the project. The potential negative impacts associated with the construction phase can be mitigated. The proposed WEF is an investment in clean, renewable energy infrastructure for the country which will go some way to offset the negative environmental and socio-economic impacts associated with a coal-based fossil fuel energy generation. Renewable energy, including WEF, also addresses climate change and assists the country in meeting climate change reduction goals. The development of the WEF is supported as the project will have significant positive impacts. These positive impacts relate to the economy by providing clean energy which will reduce South Africa's carbon footprint.	Project can proceed with the implementation of the recommended mitigation measures
Traffic	The existing road network has sufficient spare capacity to accommodate the proposed WEF, without any road upgrades required to the existing road infrastructure. It is recommended that the proposed WEF be approved from a transport impact perspective.	Project can proceed with the implementation of the recommended mitigation measures

The combined sensitivity map was based on the findings from all specialist assessments and inputs from all stakeholders. The following relevant features were included, which are considered "no-go" areas (i.e. no development make occur in these areas):

- Avifauna: 4.6 and 5 km nest buffers, 200 m buffer around seasonally inundated watercourses
- Watercourses: 40m buffer for Washes and 100m buffer on Depressions
- Bats: Sensitive and important habitats, including a 200m buffer, 500m buffer for potential Bat Roosts
- Plants: 200m buffer around sensitive species.

This report is based on a project description and site plan, provided to by the applicant, which has not been approved by DFFE at this stage of the project. The project description and site plan may undergo refinements before being regarded as final. A project description based on the final design is concluded based on all stakeholder feedback on the layout provided.



It was determined during the EIA that the proposed project will result in limited potential negative impacts and certain positive impacts. A preferred site layout has been identified which is less environmentally sensitive and will result in the least environmental impact.

A detailed public participation process was followed during the EIA process which conforms to the public consultation requirements as stipulated in the EIA Regulations. In addition, all issues raised by I&APs are captured in this FEIR and where possible, mitigation measures provided in the EMPr to address these concerns.

The 2 proposed site alternatives were assessed based on the viability and impact to the environment. Alternative 1 and Alternative 2 were under consideration, with Alternative 1 considered as the Preferred Alternative based on the Specialist recommendations. Kindly refer to Figure 8-1 and Figure 8-2 for the sensitivity analysis in regard to the various alternatives.

It is the opinion of the EAP that the information and data provided in this Environmental Impact Assessment report (EIR) is sufficient to enable the DFFE to consider all identified potentially significant impacts and to make an informed decision on the application. Furthermore, once the layout has considered all sensitive features by avoiding no-go areas, and based on the findings of the impact assessment, the proposed project should be granted an EA and allowed to proceed provided the conditions are adhered to and appropriate mitigation measures as suggested by each specialist are addressed.

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ABBREVIATIONS

BID	Background Information Document
CARA	Conservation of Agricultural Resources Act
CBA	Critical Biodiversity Area
DWS	Department of Water and Sanitation
EA	Environmental Authorisation

EAP	Environmental Assessment Practitioner
EIR	Environmental Impact Report
EMFs	Environmental Management Framework
EMPr	Environmental Management Programme
ESA	Ecological Support Area
FEIR	Final Environmental Impact Report
GIS	Geographical Information System
GNR	Government Notice Regulation
ha	Hectare
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IUCN	International Union for Conservation of Nature
NEM: BA	National Environment Management: Biodiversity Act (Act 10 of 2004)
NEM: WMA	National Environmental Management: Waste Management Act (Act No. 59 of 2008)
NEMA	National Environmental Management Act (Act 107 of 1998) (as amended)
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NWA	National Water Act
PPP	Public Participation Process
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Framework
SDP	Spatial Development Plan
SCC	Species of Conservation Concern

DEFINITIONS AND TERMINOLOGY

Activity: means an activity identified in any notice published by the Minister or MEC in terms of section 24D(1)(a) of the NEMA as a listed activity or specified activity

Alternatives: in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to the—

(a) property on which or location where the activity is proposed to be undertaken;

(b) type of activity to be undertaken;

(c) design or layout of the activity;

(d) technology to be used in the activity; or

(e) operational aspects of the activity;

and includes the option of not implementing the activity;

Application: an application for an environmental authorisation in terms of Chapter 4 of the EIA Regulations (2014 as amended).

Biodiversity: Variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems.

Cumulative impact: in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

Development: the building, erection, construction or establishment of a facility, structure or infrastructure, including associated earthworks or borrow pits, that is necessary for the undertaking of a listed or specified activity, but excludes any modification, alteration or expansion of such a facility, structure or infrastructure, including associated earthworks or borrow pits, and excluding the redevelopment of the same facility in the same location, with the same capacity and footprint.

Development footprint: any evidence of physical alteration as a result of the undertaking of any activity.

Environmental authorisation: The Competent Authority's grant or denial of permission to undertake the proposed activity. Previously referred to as the Record of Decision (RoD).

EAP: an environmental assessment practitioner as defined in section 1 of the NEMA.

EMPr: an environmental management programme contemplated in regulation 23 of the EIA Regulations (2014 as amended).

Environmental Impact Assessment: a systematic process of identifying, assessing and reporting environmental impacts associated with an activity and includes basic assessment and S&EIR.

Mitigation: to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.

Registered interested and affected party: in relation to an application, means an interested and affected party whose name is recorded in the register opened for that application in terms of regulation 42 of the EIA Regulations (2014 as amended).

Significant Impact: an impact that may have a notable effect on one or more aspects of the environment or may result in noncompliance with accepted environmental quality standards, thresholds or targets and is determined through rating the positive and negative effects of an impact on the environment based on criteria such as duration, magnitude, intensity and probability of occurrence.

Specialist*:* a person that is generally recognised within the scientific community as having the capability of undertaking, in conformance with generally recognised scientific principles, specialist studies or preparing specialist reports, including due diligence studies and socio-economic studies. A specialist needs to be professionally registered (e.g. with the South African Council for Natural Scientific Professions).

1 INTRODUCTION

FE De Rust (Pty) Ltd (hereafter the Applicant) is proposing the development of a wind energy facility (WEF) and associated infrastructure on a site located approximately 13 kilometers (km) south of Pofadder in the Northern Cape province of South Africa. The proposed development, to be known as De Rust South WEF, will have a generation capacity of up to 240MW which will feed into the National Grid. Enviro-Insight CC (hereafter Enviro-Insight) has been appointed to undertake the requisite environmental impact assessment (EIA) process for the WEF as required in terms of the National Environmental Management Act (No. 107 of 1998) (NEMA), as amended, on behalf of the Applicant.

The proposed study area for the WEF development is located approximately 18km south of Pofadder within the Khâi-Ma Local Municipality, in the Northern Cape. The site can be reached via the R358 which branches off the N14. The De Rust South WEF footprint is approximately 6 919 hectares (ha) and will be located on the Remaining Extent of the Farm Houmoed 206 (21-digit Surveyor General code: C03600000000020600000).

The De Rust South WEF will consist of up to 32 wind turbines, with a generation capacity of between up to 7.5 MW per turbine, depending on the available technology at the time. Each turbine will have a hub height of up to 150m and a rotor diameter of up to 175m. The final turbine model to be utilised will only be determined closer to the time of construction, depending on the technology available at the time. Additional ancillary infrastructure to the WEF would include underground and above-ground cabling between project components, onsite substation/s, Battery Energy Storage Systems (BESS), foundations to support turbine towers, internal/ access roads linking the wind turbines and other infrastructure on the site, and permanent workshop area and office for control, maintenance and storage. As far as possible, existing roads will be utilised and upgraded (where needed) with the relevant stormwater infrastructure and gates constructed as required. The perimeter of the proposed WEF may be enclosed with suitable fencing. A formal laydown area for the construction period, containing a temporary maintenance and storage building along with a guard cabin will also be established.

Additionally, a power line with a capacity of up to 132kV-400kV is required. At this stage, options are still being considered for either the construction of a new line to feed into the proposed Korana substation or connect with existing lines. This associated electrical infrastructure will require a separate Environmental Authorisation and is being conducted as a part of a separate Basic Assessment (BA) process. More details will be provided in the Final Environmental Impact Assessment Report (FEIAr).

1.1 APPLICANT DETAILS

Table 1-1: Applicant Contact Details.

Applicant	FE DE RUST PTY LTD
Contact Person	Thomas Condesse
Address	Ground Floor, Sable Corner, 15 Bridgeway Road, Bridgeways Precinct, Century City, 7441
Telephone	+33622665932 / 0845484264
Email	thomas.condesse@energyteam.co.za / millard.kotze@energyteam.co.za

1.2 THE ENVIRONMENTAL IMPACT ASSESSMENT PROJECT TEAM

1.2.1 Environmental Assessment Practitioner (EAP)

Client has appointed Enviro-Insight CC as an independent Environmental Assessment Practitioner (EAP) to undertake an environmental authorisation process for the proposed De Rust South WEF. Enviro-Insight CC has no vested interest in the proposed project and hereby declares its independence as required by the EIA Regulations (2014, as amended). For purposes of this report, the following person may be contacted at Enviro-Insight CC:

Table 1-2: Enviro-Insight contact details.

Company	Enviro-Insight CC
Contact Person	Marvin Ryan Grimett / Ronell Kuppen
Purpose	Environmental Assessment Practitioner and Environmental Consultant
Address:	Unit 8 Oppidraai Office Park, 862 Wapadrand Road, Wapadrand Security Village, Pretoria, 0081
Telephone:	012 807 0637
Email:	info@enviro-insight.co.za

1.2.1.1 Qualifications and Memberships (Appendix F)

Mr. Grimett holds a Bachelor of Social Science (Honours)- Geography and Environmental Management and is registered as an EAP (2019/1713.) with EPASA. He has more than 7 years' experience as an environmental assessment practitioner.

Ms. Kuppen has an BSc (Honours) degree in Geography, with approximately 10 years' experience in the environmental consulting field, ranging from EIA's, WULAS and Public Participation..

1.2.1.2 Summary of past experience (Appendix F)

Mr. Grimett has over seven years' experience as an environmental consultant, compiling and managing several environmental authorisation reports, including Environmental Management Programmes (EMPr), rehabilitation plans and environmental auditing. This included fieldwork, data collection, preparation of permits and licensing studies, compliance monitoring and community engagement, and project managing interdisciplinary teams and contractors.

Ms. Kuppen has approximately 10 years' experience in the environmental consulting field, ranging from EIA's, WULAS and Public Participation and ECO's

1.2.2 Specialists

Specialist studies will be undertaken to address the key issues that require further investigation based on the screening report generated (Appendix D). The specialist studies involve the gathering of data relevant to identifying and assessing impacts that may occur as a result of the proposed project. The specialists will also recommend appropriate mitigation or optimisation measures to minimise potential negative impacts or enhance potential benefits, respectively.

Enviro-Insight has selected a team of highly experienced specialists in order to execute this S&EIA in a professional and impartial manner. The project team, specifically the sub-consultants, is indicated in Table 1-3

Table 1-3: EIA Project Team.

Specialist Assessment	Company	Professional Specialist
Terrestrial Biodiversity	Enviro-Insight CC	Corné Niemandt *Pr.Sci.Nat.* Samuel Laurence *Pr.Sci.Nat.* Alex Rebelo *Cand.Sci.Nat.*
Sensitive Plant Species	Enviro-Insight CC	Corné Niemandt *Pr.Sci.Nat.*
Avifauna	Enviro-Insight CC	Samuel Laurence *Pr.Sci.Nat.* AE Van Wyk Cand.Sci.Nat.
Bats	Enviro-Insight CC	Alex Rebelo *Cand.Sci.Nat.* Luke Verburgt *Pr.Sci.Nat.* AE Van Wyk Cand.Sci.Nat.
Aquatic Biodiversity	Tate Environmental	Russell Tate *Pr.Sci.Nat.*
Socio-economic	Independent social sciences consultant	Tony Barbour
Noise	Enviro Acoustic Resources (EAR)	Morné de Jager
Traffic	Innovative Transport Solutions Global	Pieter Arangie
Visual and Flicker	EcoElementum	Nakéla Naidoo Neel Breitenbach
Heritage and Paleontological	HCAC	Jaco van der Walt
Agriculture Compliance Statement	Independent Consultant	Johann Lanz

In addition to the S&EIR process, Enviro-Insight has provided a Terrestrial Biodiversity team that has conducted the avifauna, bats, sensitive plant species and terrestrial biodiversity assessments for this project.

Neither Enviro-Insight nor any of its sub-consultants are subsidiaries of *FE De Rust,* nor is *FE De Rust* a subsidiary to Enviro-Insight. Enviro-Insight, its sub-consulting specialists, and external reviewers, do not have any interests in secondary or downstream developments that may arise out of the authorisation of the proposed project.

1.3 ASSUMPTIONS AND LIMITATIONS

Certain assumptions, limitations, and uncertainties are associated with the EIR Phase. This report is based on information that is currently available and, as a result, the following limitations and assumptions are applicable:

- This report is based on project information provided by the Applicant, the initial layout design and the updated screening report dated November 2022;
- This report is based on a project description taken from client meetings, preliminary drawings and design specifications for the proposed WEF that have not yet been finalised and which are likely to undergo a number of iterations and refinements before they can be regarded as definitive and proposed methodology for the operations. Detailed information will be provided in the EIA Phase;
- The description of the baseline environment and where possible the up-to-date information has been obtained from various sources. More detailed information will be provided in the EIA phase based on the outcomes of the specialist studies, and the finalisation of the design layout;
- A detailed impact assessment cannot be done at present as the levels of confidence are considered low until detailed specialist input and comments from the I&APs are obtained which will be presented and discussed in more detail during the EIA phase;
- Public Participation is a continuous process and will continue throughout the EIA process. I&APs can register at any time and contact the EAP regarding comments, issues or concerns throughout the process. I&APs should not wait until an opportunity arises such as when the draft reports are released for review and comment to raise their concerns or interact with the EAP.

2 DESCRIPTION OF THE PROPOSED PROJECT

2.1 NATURE AND EXTENT OF PROPOSED PROJECT

The proposed study area for the WEF located approximately 18km south of the town of Pofadder within the Khâi-Ma Local Municipality, in the Northern Cape Province of South Africa. The site can be reached via the R358, which branches off the N14. The De Rust South WEF footprint is approximately 6 919 hectares (ha) and will be located on the Remaining Extent of the Farm Houmoed 206.

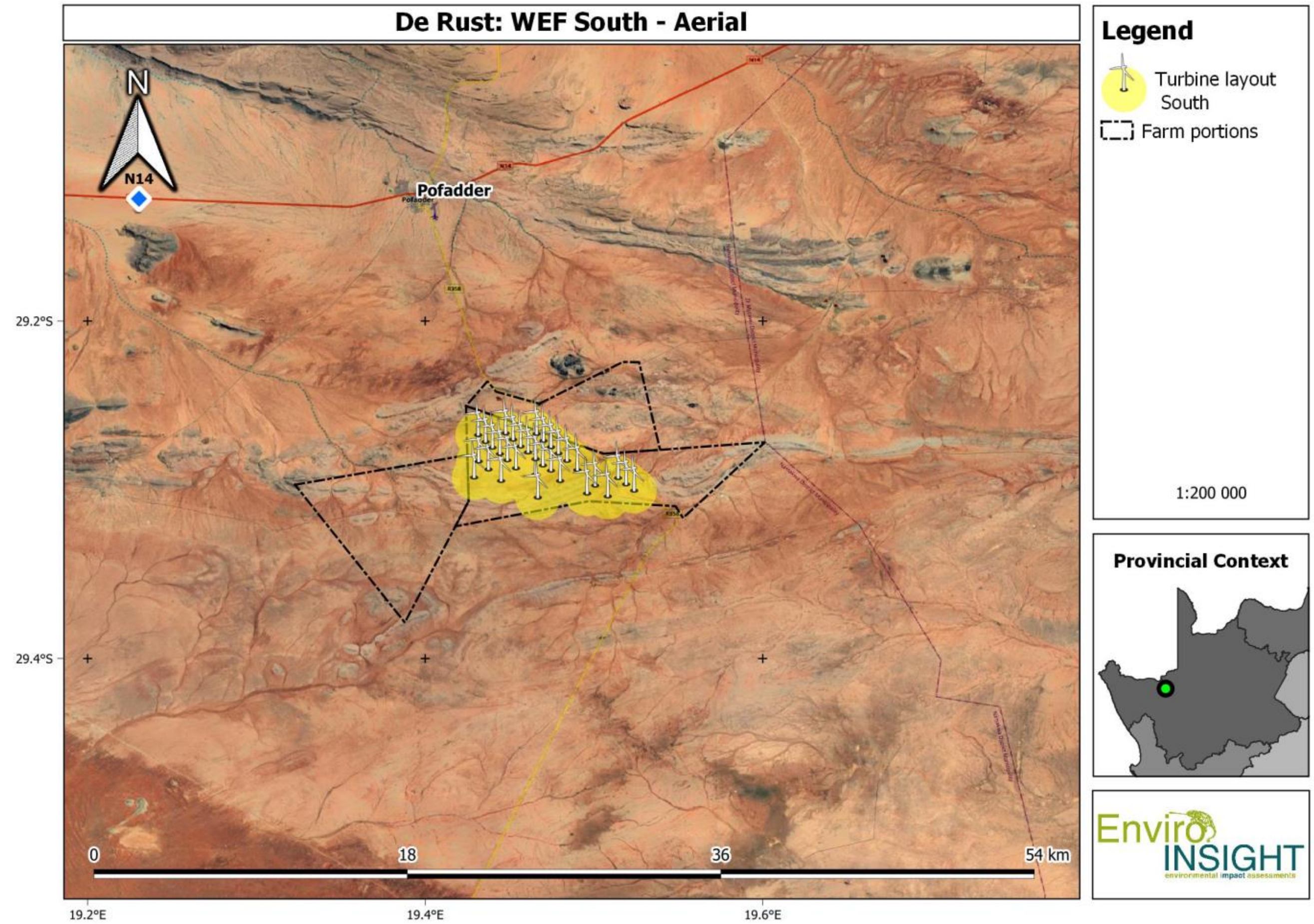


Figure 2-1: Locality map of the proposed study area.

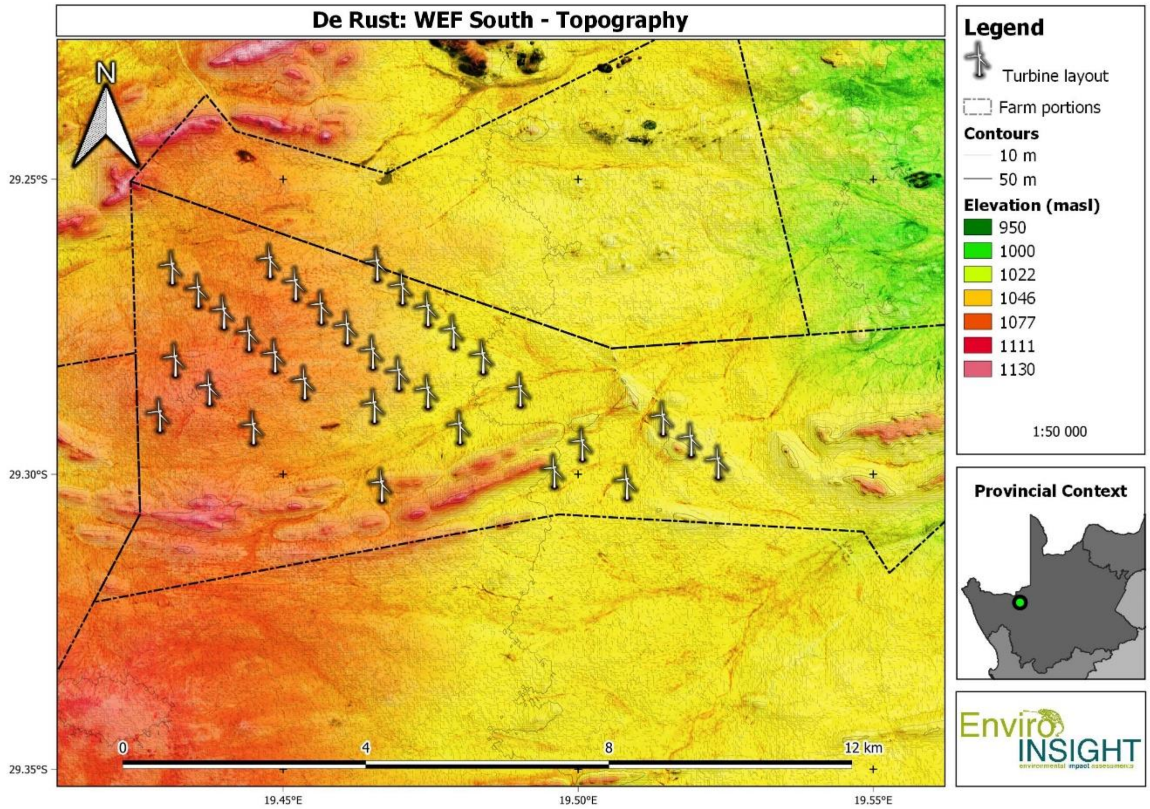


Figure 2-2: Topographical Map of the study area.

The development footprint proposed for the De Rust WEF has been placed in the preferred development area as identified in the Scoping Phase and Draft EIA report where the location was informed by specialist inputs, stakeholder engagement and comments from the competent authority. Subsequent to this, several turbines were micro-sited to avoid sensitive bat and avifauna features, including the martial eagle nest.

Table 2-1: Project Location Details.

De Rust South WEF		
Farm name(s)/ Erf No	Remaining Extent of the Farm Houmoed 206	
21-digit Surveyor General code	C03600000000020600000	
Number of Turbines	Up to 32	
Ward	6	
Local Municipality	Khâi-Ma Local Municipality	
District Municipality	Namakwa District Municipality	
Co-ordinates of the proposed site/s (DDMMSS)	Latitude (S)	Longitude (E)
Point A	29°15'5.20"S	19°25'22.82"E
Point B	29°14'10.05"S	19°26'13.74"E

Point C	29°14'32.69"S	19°26'34.03"E
Point D	29°14'57.57"S	19°28'6.39"E
Point E	29°13'25.59"S	19°30'57.44"E
Point F	29°13'29.13"S	19°31'38.70"E
Point G	29°16'32.17"S	19°32'24.56"E
Point H	29°16'16.83"S	19°36'6.81"E
Point I	29°19'1.28"S	19°33'12.44"E
Point J	29°18'35.50"S	19°32'52.81"E
Point K	29°18'23.95"S	19°29'48.17"E
Point L	29°19'20.71"S	19°25'5.28"E
Point M	29°22'42.95"S	19°23'18.93"E
Point N	29°17'50.60"S	19°19'26.26"E
Point O	29°16'44.13"S	19°25'26.55"E
Mid-Point	29°15'45.57"S	19°29'18.81"E
State the extent of proposed development	Approximately 6 919ha	
What is the current zoning and current land use of the site(s)?	Agricultural	

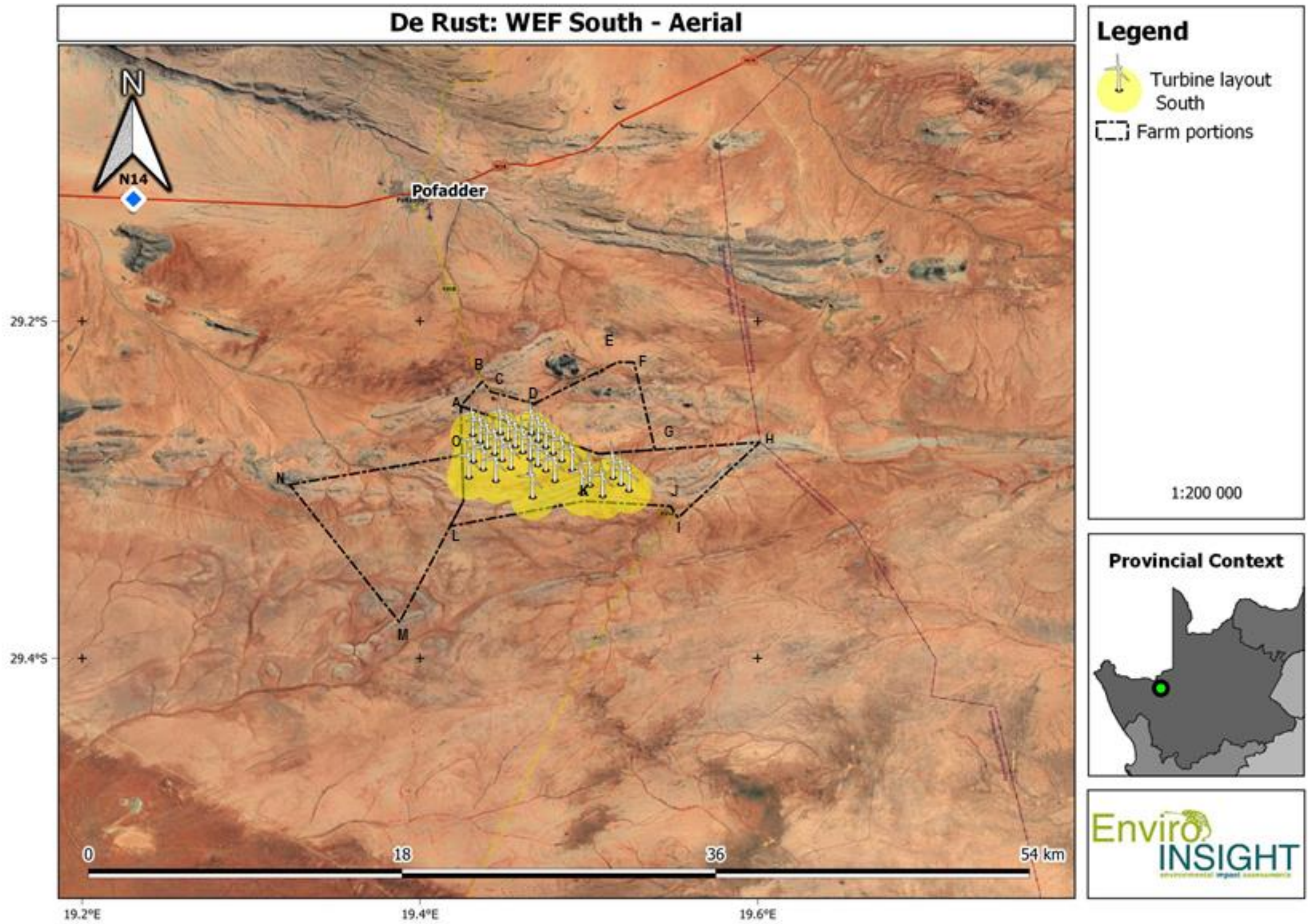


Figure 2-3: Locality map indicating the coordinates of the site

2.2 PROJECT DESCRIPTION

The Applicant is responding to the growing electricity demand within South Africa, the current infrastructure failure which disrupts sufficient electricity supply, and the increasing pressure on countries to reduce their reliance on fossil fuels, by addressing the need for sustainable renewable energy in the country. Accordingly, the Applicant is proposing the development of a commercial WEF and associated infrastructure to add new capacity to the national electricity grid.

The proposed De Rust South WEF will consist of up to 32 wind turbines. The proposed WEF will have a generation capacity of between up to 7.5 MW per turbine, depending on the available technology at the time. Each turbine will have a hub height of up to 150m and a rotor diameter of up to 175m. The final turbine model to be utilised will only be determined closer to the time of construction, depending on the technology available at the time. The optimal positioning (taking into account the energy generating potential) for each turbine will be determined once all the environmental sensitivities have been determined in the EIA phase. The final layout design and development footprint will be included in the EIA report.

The components of the WEF and associated infrastructure are as follows:

- up to 32 wind turbines, with a generation capacity of up to 7.5 MW per turbine (depending on the available technology at the time),
- turbines will have a hub height of up to 150m and a rotor diameter of up to 175m. The final turbine model to be utilised will only be determined closer to the time of construction (depending on the technology available at the time),
- onsite substation/s of 100mX100m (33/132kV) to facilitate the connection between the WEF and proposed Korana substation,
- a Battery Energy Storage System (BESS),
- concrete foundations to support turbine towers,
- cabling between turbines, to be laid underground where practical,
- internal/ access roads (up to 10 m in width during the construction phase) linking the wind turbines and other infrastructure on the site,
- permanent workshop area and office for control, maintenance and storage, and
- temporary laydown areas during the construction phase (which will be rehabilitated).

The components of a typical wind turbine subsystem, which entails:

- **Rotor (consisting of hub and blades)**, which are the portion of the wind turbine that collect energy from the wind and convert the wind's energy into rotational shaft energy to turn the generator. The speed of rotation of the blades is controlled by the nacelle, which has the ability to turn the blades to face into the wind and change the angle of the blades to make the most use of the available wind. The proposed rotor diameter for the De Rust South WEF will be up to 175m.
- **Nacelle –** The nacelle contains a set of gears and a generator. The generator converts the turning motion of a wind turbines blade (mechanical energy) into electricity. The nacelle is also fitted with brakes, so that the turbine can be switched off during very high winds, such as during storm events, which prevents the turbine from being damaged
- **Tower –** The rotor and nacelle are mounted on top of a tower. The tower (either steel or concrete) is constructed to hold the rotor blades off the ground (structural support) and also raises the hub so that its blades safely clear the ground and can reach the stronger winds at higher elevations. The tower must also be strong enough to support the wind turbine and to sustain vibration, wind loading, and the overall weather elements for the lifetime of the turbine. The maximum hub height of the De Rust South WEF turbines is proposed up to 150m.
- Electronic equipment such as controls, electrical cables, ground support equipment, and interconnection equipment.

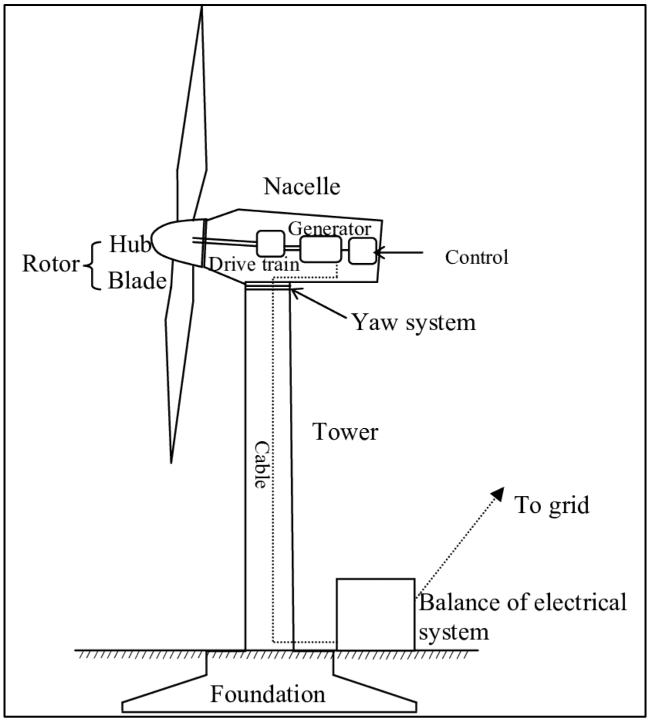


Figure 2-4: Simplified diagram of the main components of a horizontal axis wind turbine. Source: Albadi (2010).

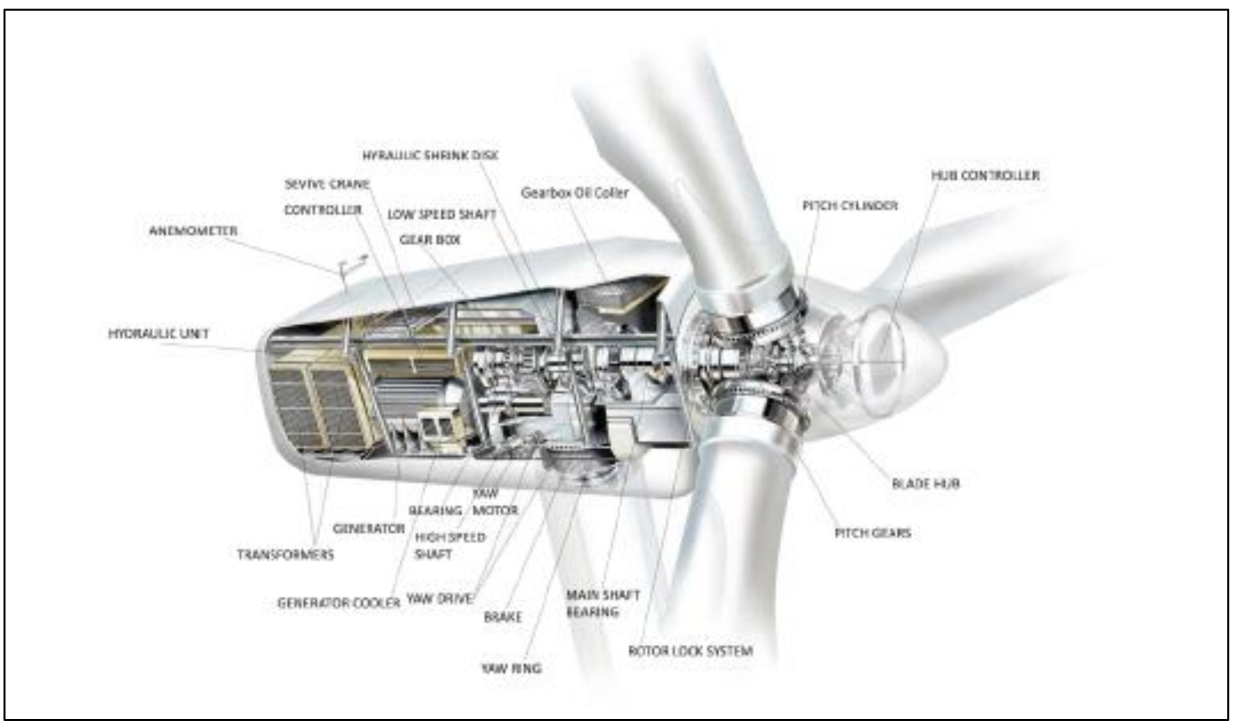


Figure 2-5: Industrial Wind turbine components diagram. Source: The Renewable energy Hub[1].

[1] https://www.renewableenergyhub.co.uk/main/wind-turbines/how-does-a-wind-turbine-work/

2.3 PROJECT DEVELOPMENT PHASES

The following section describes the details the different phases of the proposed De Rust South WEF:

- Pre-construction;
- Construction;
- Operation; and
- Decommission.

Pre-construction

Prior to the commencement of the main construction works, the Contractor will undertake vegetation clearance and site establishment works. This phase ensures that all design layouts are finalised, that risks associated with the construction phase is discussed and mitigated prior to commencement, to do a final walkdown of the study area and to apply and secure the necessary permits. The 'search and rescue' procedure with regards to plants, animals and heritage features must be done, and all sensitive areas with their buffers must be demarcated prior to commencement with construction activities.

Construction

The construction phase is temporary in nature (usually up to 24 months) with a development footprint for the construction of:

- compounds and laydown areas;
- platforms, or "crane pads", required to construct the wind turbines;
- establishment and laying of foundations for turbines;
- new or upgraded access and internal roads (some roads may be temporary during the construction phase);
- storage areas and site office;
- substation and BESS;
- underground cables to connect the turbines to the on-site substation

Even though not a physical construction activity, the construction phase includes the transport of components and equipment to and within the site. After the construction phase is completed, rehabilitation of temporary construction areas will commence. Any area that does not form part of the operational phase of the project (this can include internal roads and access points) must be rehabilitated as per a compiled rehabilitation plan.

Other works during the construction phase include:

- Geotechnical studies and foundation work for safety purposes which comprises of drilling, penetration and pressure assessments.
- Electrical cables are laid approximately 1 m below ground level in trenches which run alongside the access roads, where possible.
- Establishment of hard standing surfaces and laydown areas will be required for the contractor's construction equipment and turbine components on site.

- A laydown area for building materials and equipment associated with these buildings will also be required. These will require the clearing of vegetation and levelling of the development site and the excavation of foundations prior to construction

Facility Component	De Rust South WEF
Estimated number of turbines	32
Dimensions of turbine foundations (m^2)	102400
BESS footprint (m^2)	22000
Crane stands (m^2)	124800
Compound (m^2)	22500
Temporary laydown areas (m^2)	960
Switchgear / transformer (m^2)	800
Internal roads (m^2)	326542
Upgrade existing roads (m^2)	0
Rehabilitation - 4m of road (m^2)	108847
Total Development Footprint (m^2)	600002
Total Development Footprint (ha)	60
Rehabilitation post-construction (m^2)	257107
Rehabilitation post-construction (ha)	**25.7**

Operational phase

The operational phase of the WEF has an approximate lifespan of 20-25 years, and mainly consists of operation and maintenance. All the turbines will be operational except under circumstances of mechanical breakdown, inclement weather conditions or for maintenance purposes.

Decommissioning

Wind farm components have an expected end of life, whereby the components need to be dismantled and transported off site, or by replacing the existing infrastructure with the latest technology based on the relevant legislation at the time. The infrastructure would only be decommissioned once it has reached the end of its economic or technological life of about 20-25 years.

Decommissioning requires a temporary laydown area and associated access to accommodate the required equipment and lifting cranes. Prior to the transportation off site, the components need to be evaluated based on reuse, recycle or permanent disposal in accordance with regulatory requirements at that time. The area needs to be rehabilitated based on the rehabilitation plan, by returning the soil, landscape features and vegetation back to its original state prior to the construction phase in order for the land to be used for agricultural purposes again, or as determined by the landowner and competent authorities.

Figure 2-6: Photographs depicting the construction phase of a wind farm similar to De Rust South WEF.

2.4 ALTERNATIVES

2.4.1 Types of Alternatives

The NEMA requires that alternatives are considered during the EIA process. An alternative can be defined as a possible course of action, in place of another, that would meet the same purpose and need (DEAT, 2004).

The 2014 EIA Regulations (as amended) provide the following definition:

> ***"alternatives"***, in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to the —
>
> (a) property on which or location where the activity is proposed to be undertaken;
>
> (b) type of activity to be undertaken;

(c) design or layout of the activity;

(d) technology to be used in the activity; or

(e) operational aspects of the activity;

and includes the option of not implementing the activity;

The following types of alternatives are most pertinent to the proposed project and are detailed further below:

- Location alternatives;
- Layout alternatives;
- Technology alternatives; and
- The “no-go” alternative.

2.4.2 Location Alternatives

The location for the proposed De Rust South WEF was considered based on the following:

- Good wind resource. The average wind speed measured at a height of 100m is estimated to be between 6-8 m/s;
- Relatively flat site, which makes construction easier and less expensive than on an undulating site.
- Distance from existing towns or populated areas (anticipated lower visual, noise and dust impacts).
- Landowners support and favour for the proposed WEF.
- Other WEFs have been constructed in the area, and existing transport routes can be utilised;
- The land has a low agricultural potential, lease of the site contributes to landowner and potentially to other profitable agricultural endeavours;

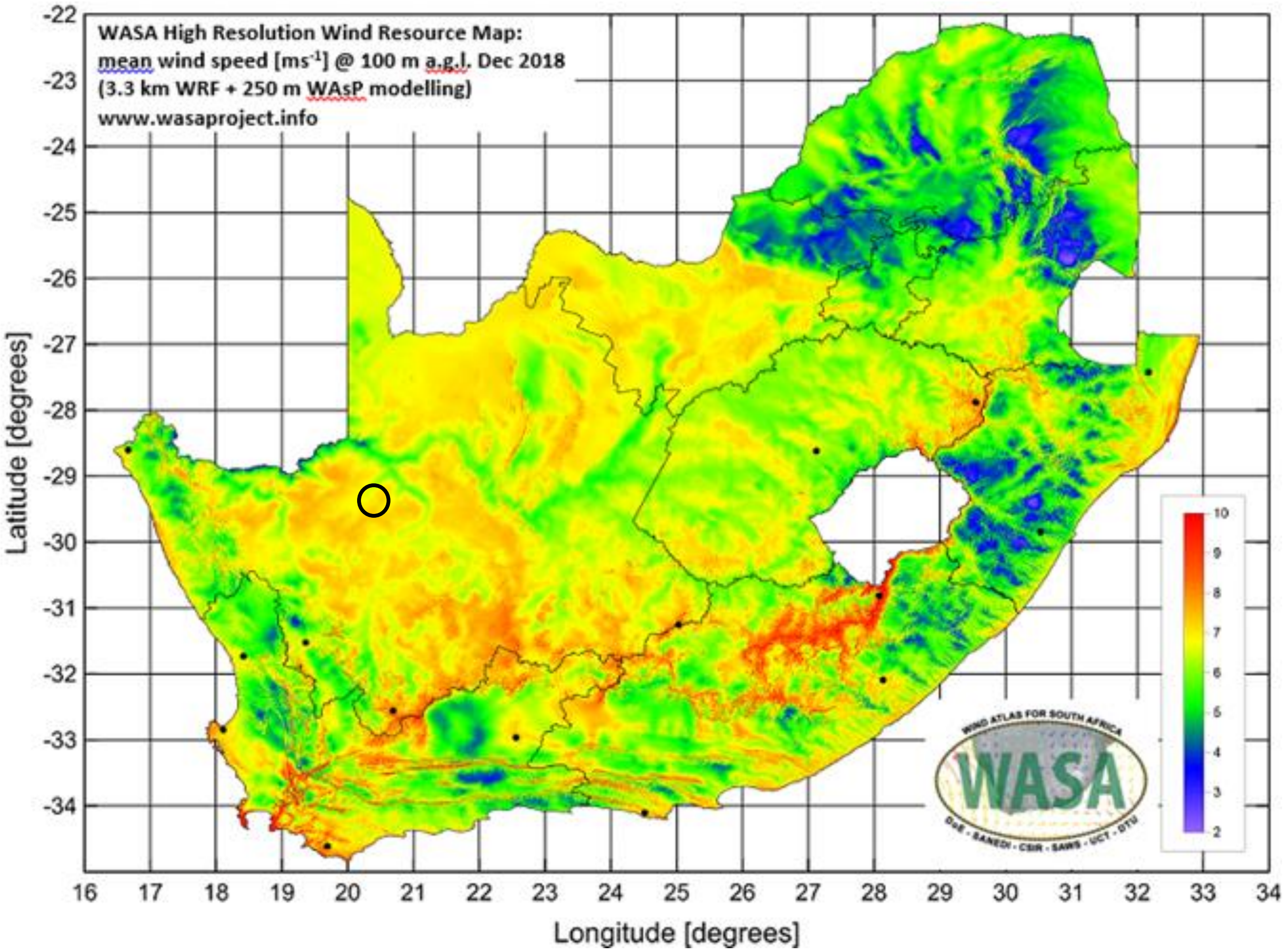


Figure 2-7: Wind resource map: average wind speed as measured at a height of 100m. The general area of the project is indicated by the black circle.

Based on the above, the location of the proposed De Rust South WEF site was selected due to the favourable factors listed above.

2.4.3 Type of Activity Alternative

The Applicant is responding to the growing electricity demand within South Africa, the current infrastructure failure which disrupts sufficient electricity supply, and the increasing pressure on countries to reduce their reliance on fossil fuels, by addressing the need for sustainable renewable energy in the country. The Applicant motivations are towards solar and wind technologies, they cooperate with landowners, technology providers and investors to source and develop renewable energy projects within South Africa.

Other sources of renewable energy, such as Hydropower and Biomass were not considered viable options for the project due to the location of the site. The site is located far from large water bodies for Hydropower and it is also located far from a constant, abundant or sustainable source of Biomass. The site is however located in an area that does have high wind energy potential (Figure 2-7); accordingly, the Applicant is proposing the development of a commercial WEF and associated infrastructure to add new capacity to the national electricity grid.

2.4.4 Layout Alternatives

An initial site layout has been compiled based on *inter alia* the following criteria:

- Spatial orientation requirements of turbines and associated infrastructure (e.g. roads);
- Layout relative to other existing infrastructure, such as powerlines and the Korana substation;
- Wind resource profile (this could have significant technical constraints);
- Topographical constraints, including surface water and steep slopes of hills; and
- Required setbacks from property boundaries for noise, visual and flicker impacts.
- Based on the above, the location of the proposed De Rust South WEF site was selected due to the favourable factors listed above.

Based on the findings of the EIR and specialist studies undertaken, the layout was updated to include biophysical constraints of sensitive flora, avifauna, and bats, surface water features, sensitive heritage areas, and associated buffer areas. Input from all specialists, stakeholders, and the competent authority was considered in the final layout design and selection of the preferred alternative.

Two (2) layout alternatives are being considered for the project.

- **Alternative 1 (Preferred Alternative)** – 32 Turbines. The specific GPS coordinates for each turbine is shown in Table 2-2 below.

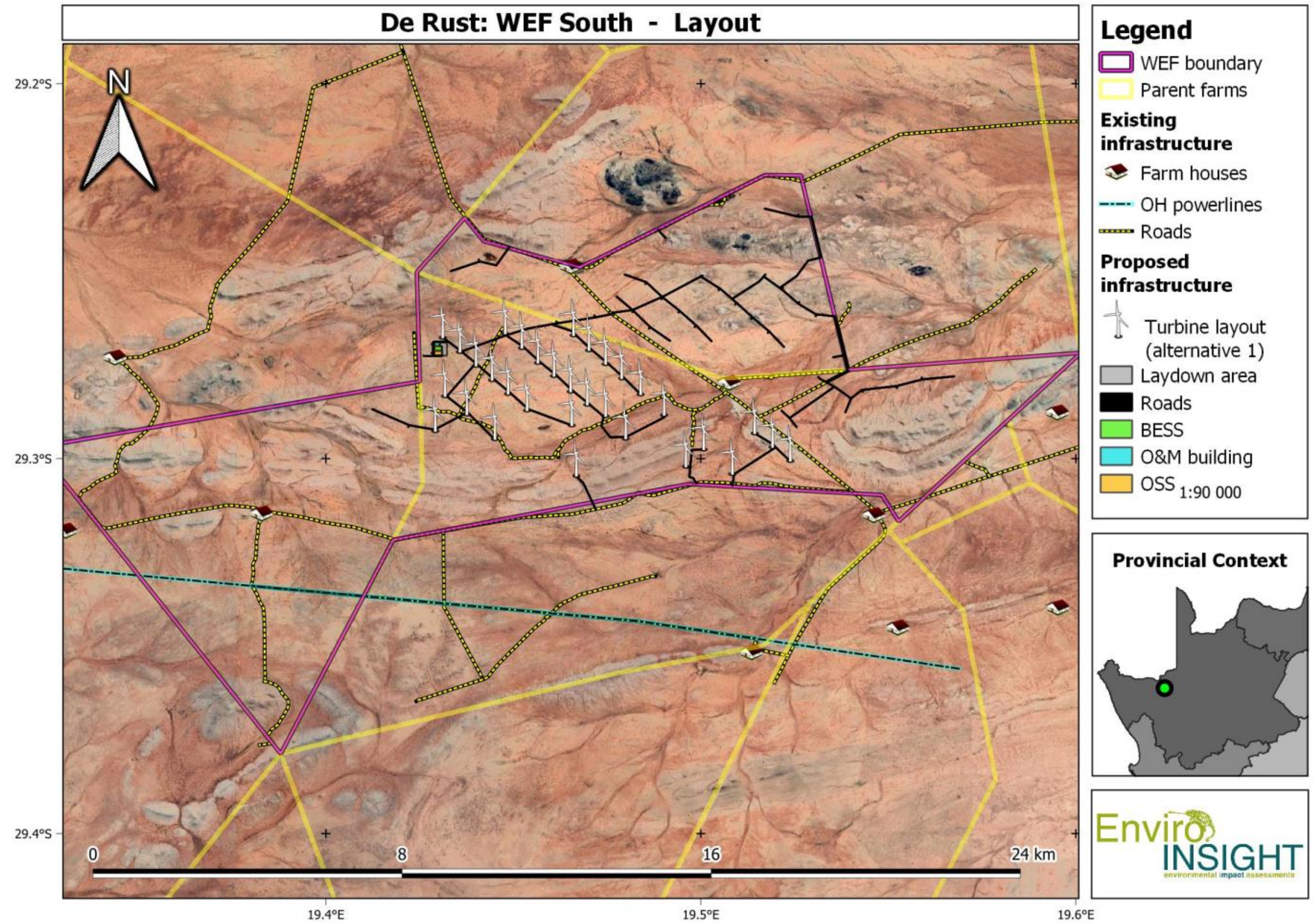


Figure 2-8: Proposed Alternative 1 for Turbines.

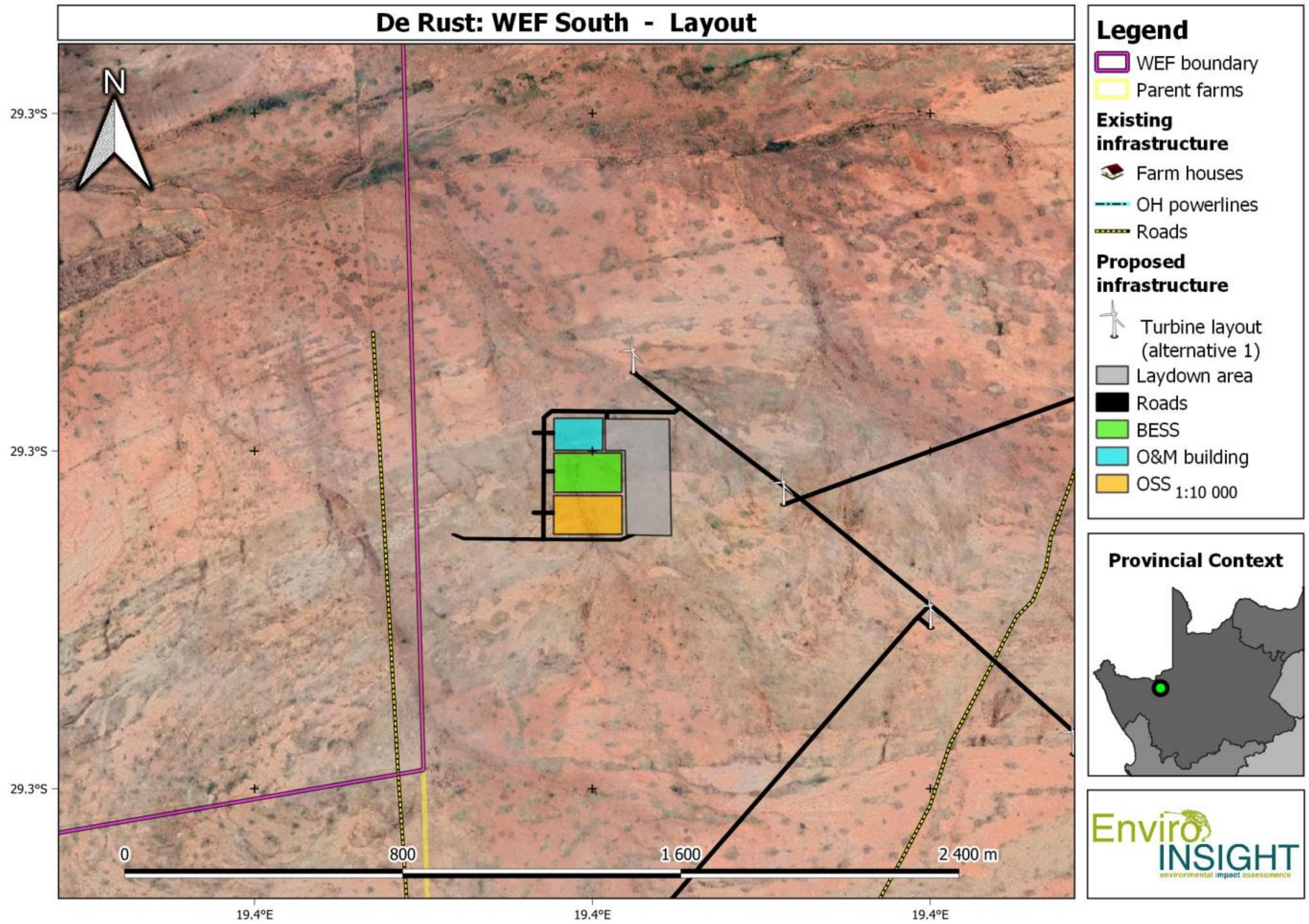


Figure 2-9: Infrastructure Location for Alternative 1

Table 2-2: Wind turbine coordinates for Layout Alternative 1 for the proposed De Rust South WEF project.

Wind Turbine layout number	Latitude (S)	Longitude (E)
WT01	29°17'33.78"S	19°25'44.95"E
WT02	29°16'59.97"S	19°25'54.31"E
WT03	29°17'17.37"S	19°26'15.28"E
WT04	29°17'41.42"S	19°26'42.06"E
WT05	29°16'3.65"S	19°25'52.38"E
WT06	29°16'17.69"S	19°26'8.40"E
WT07	29°16'30.81"S	19°26'24.06"E
WT08	29°16'44.29"S	19°26'39.25"E
WT09	29°16'57.64"S	19°26'55.17"E
WT10	29°17'13.86"S	19°27'13.32"E

WT11	29°17'28.07"S	19°27'55.80"E
WT12	29°18'16.41"S	19°28'0.26"E
WT13	29°15'59.82"S	19°26'52.07"E
WT14	29°16'13.62"S	19°27'7.88"E
WT15	29°16'27.79"S	19°27'23.47"E
WT16	29°16'40.47"S	19°27'39.16"E
WT17	29°16'55.31"S	19°27'54.82"E
WT18	29°17'8.30"S	19°28'10.65"E
WT19	29°17'19.44"S	19°28'28.37"E
WT20	29°17'40.94"S	19°28'47.96"E
WT21	29°16'1.50"S	19°27'57.50"E
WT22	29°16'15.85"S	19°28'12.79"E
WT23	29°16'29.19"S	19°28'28.55"E
WT24	29°16'42.96"S	19°28'44.18"E
WT25	29°16'58.23"S	19°29'2.09"E
WT26	29°17'18.36"S	19°29'24.89"E
WT27	29°17'51.30"S	19°30'2.71"E
WT28	29°18'7.77"S	19°29'45.62"E
WT29	29°18'14.87"S	19°30'29.88"E
WT30	29°17'35.74"S	19°30'51.85"E
WT31	29°17'48.79"S	19°31'8.91"E
WT32	29°18'2.36"S	19°31'25.70"E
Laydown area	29°16'8.60"S	19°25'49.53"E
	29°16'8.65"S	19°25'56.21"E
	29°16'20.99"S	19°25'56.49"E
	29°16'20.83"S	19°25'51.64"E
	29°16'12.03"S	19°25'51.50"E
	29°16'11.86"S	19°25'49.47"E
	5.46ha	
BESS	29°16'12.42"S	19°25'43.86"E
	29°16'16.35"S	19°25'44.04"E
	29°16'16.32"S	19°25'51.03"E
	29°16'12.08"S	19°25'51.12"E
	2.64ha	
Onsite Substation	29°16'16.90"S	19°25'43.91"E

	29°16'20.79"S	19°25'43.94"E
	29°16'20.83"S	19°25'51.08"E
	29°16'16.80"S	19°25'51.00"E
	2.67ha	
O&M Building	29°16'8.51"S	19°25'43.92"E
	29°16'11.92"S	19°25'36.59"E
	29°16'11.92"S	19°25'41.76"E
	29°16'8.57"S	19°25'41.80"E
	1.50ha	

- **Alternative 2 -** Alternative 2 was considered for the maximum number of turbines for the property but was disregarded due to sensitivities and setbacks identified early in the process.

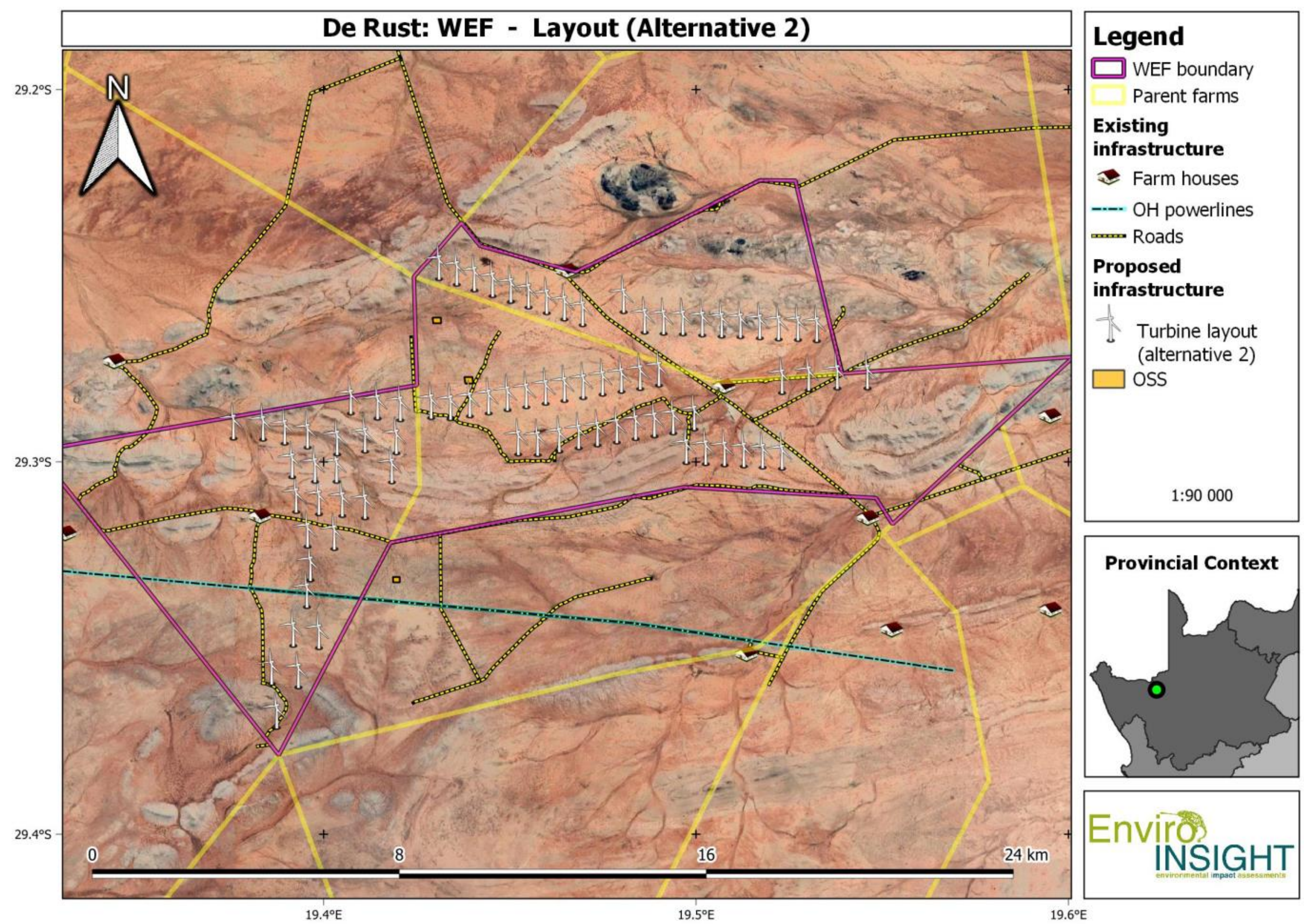


Figure 2-10: Proposed Alternative 2 for Turbines.

2.4.5 Technology Alternatives

Turbines

The most important factors that are considered when selecting a turbine for any site, are the annual average wind speed, reference wind speed, wind shear and turbulence, the return period for extreme wind conditions and wind direction (i.e. wind resource profile). The ongoing monitoring of the wind resource on site was used to inform the final turbine layout.

Other determining factors when selecting the preferred turbine are efficiency, full load hours and the capacity factor. The pricing of relevant technology at the time of construction is also a key factor, as well as the exchange rate for imported components. The turbine technology will be determined closer to development. No turbines should be located in sensitive areas. Micro-siting may be implemented if required.

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. The developer has been evaluating several turbine models, however the selection will only be finalised at a later stage once a most optimal wind turbine are identified (factors such as meteorological data, price and financing options, guarantees and maintenance costs, etc.). As the noise and visual propagation modelling requires the details of a wind turbine, it was selected to use the sound and visual levels of the Nordex N163 5.X WTG which would represent a worst-case scenario.

BESS Technology

A Lithium-Ion BESS and Vanadium Redox Flow (VRF) BESS are possible technologies utilised for renewable energy projects.

- Lithium-Ion BESS: Lithium-Ion batteries are sealed systems, these systems are pre-assembled off site and then delivered to site for placement. This BESS system comprises of numerous battery cells that are assembled together to form modules. A module may consist of several cells working in conjunction. Each cell contains a positive electrode, a negative electrode, and an electrolyte. The negative electrode for a lithium-ion cell is typically carbon. The positive electrode can be lithium iron phosphate or a lithium metal oxide. The electrolyte is usually a lithium salt dissolved in an organic solvent.
- Vanadium Redox Flow (VRF) BESS: Redox Flow BESS is a class of electrochemical energy storage devices. The term “redox” refers to chemical reduction and oxidation reactions occur in the in the flow batteries to store energy in liquid electrolyte solutions which flow through a battery of electrochemical cells during charge and discharge. The BESS will be pre-assembled off site, delivered to site for placement and will remain sealed during operations.

No BESS should be located in a sensitive area. Accordingly, the necessary measures need to be put in place to limit potential fires, including a fire break around each De Rust BESS facility (this is a worst-case scenario). If a containerised approach including the usual good practice of separation between containers are applied for this project, the impacts are likely restricted to events to one container at a time, the main risks being close to the containers i.e., to transport drivers, employees at the facilities and first responders to incidents. Should the appropriate preventative measures be applied during the design, transportation and construction phase of the project, both could be considered viable options.

2.4.6 The "No-Go" Alternatives

It is required to consider the "no-go" option in the EIA process. The "no-go" alternative refers to the current status quo and the risks and impacts associated with it. Some existing activities may carry risks and may be undesirable (e.g. an existing contaminated site earmarked for a development). The no-go is the continuation of the existing land use, i.e. maintain the status quo.

The no-go option has various positive and negative impacts associated with this alternative. All baseline information provided in this report relates to the current situation on site and can be considered the no-go alternative. Impacts are limited to the status quo. Positive and negative impacts are as follows:

Positive:

- Potential livestock activities will remain undisturbed. Currently, there are no livestock on the property but it has been utilised in the past for this purpose;
- Ecological processes will continue as is;
- The potential impact on sensitive features will not occur;
- The opportunity for the proposed project to contribute significantly to greenhouse gas emission reductions and climate change mitigation, will be lost;
- All negative impacts, specifically related to the development of the wind farm, discussed in this report will not materialise.

Negative:

- The economic impact of the local community will not be achieved;
- The country will not have an opportunity to expand on renewable energy sources, which it is in dire need of achieving within the short and medium terms;
- All positive impacts, specifically related to the development of the wind farm, discussed in this report will not materialise.

The 'No-Go Alternative' would not assist the government in addressing climate change, energy security and economic development. Implementing this option would also not allow for any beneficial socio-economic and environmental impacts as outlined above.

Based on the above, the 'No Development' alternative is not a preferred alternative

2.5 NEED AND DESIRABILITY

As part of the EIA process, the need and desirability for the development of the proposed De Rust South WEF needs to be considered and discussed in order to provide context regarding the realistic economical and social benefits the proposed development will add on all spheres of government (local, provincial and national).

Reference is made to the Department of Environmental Affairs (DEA) 2017 Guideline on Need and Desirability which states that while the "concept of need and desirability relates to the type of development being proposed, essentially, the concept of need and desirability can be explained in terms of the general meaning of its two components in which need refers to time and desirability to place – i.e. is this the right time and is it the right place for locating the type of land-use/activity being proposed? Need and desirability can be equated to wise use of land – i.e. the question of what is the most sustainable use of land."

Table 2-3: Need and Desirability

<table>
<tr><th colspan="2">Question</th><th>Answer</th></tr>
<tr><td colspan="3">"securing ecological sustainable development and use of natural resources"</td></tr>
<tr><td colspan="2">1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?</td><td></td></tr>
<tr><td rowspan="9">1.1. How were the following ecological integrity considerations taken into account?:</td><td>1.1.1. Threatened Ecosystems</td><td>No Threatened Ecosystems</td></tr>
<tr><td>1.1.2. Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure</td><td>Various specialist studies were assessed for the proposed project. Refer to Section 5.4-Section 5.16 and Appendix D for the specialist studies undertaken. These specialists have taken inconsideration all impacts relating to the proposed development and provided the appropriate mitigation measures, which the applicant is committed to following.</td></tr>
<tr><td>1.1.3. Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs")</td><td>Refer to Section 5.6</td></tr>
<tr><td>1.1.4. Conservation targets</td><td>Refer to Section 5.6</td></tr>
<tr><td>1.1.5. Ecological drivers of the ecosystem</td><td>Refer to Section 5.6</td></tr>
<tr><td>1.1.6. Environmental Management Framework</td><td>Refer to Section 5.6</td></tr>
<tr><td>1.1.7. Spatial Development Framework</td><td>Refer to Section 5.6</td></tr>
<tr><td>1.1.1. Threatened Ecosystems</td><td>Refer to Section 5.6</td></tr>
<tr><td>1.1.8. Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.)</td><td>All global responsibilities to which South Africa is signatory or party to were considered, the proposed development complies with all international responsibilities.</td></tr>
<tr><td colspan="2">1.2. How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided</td><td>The proposed WEF can disturb plant and species and vegetation from clearing of the development footprint, soil erosion and alien plant invasion. Increased levels of pollution, noise, disturbance and human presence can impact negatively on faunal communities.</td></tr>
</table>

altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	As a result of these preliminary assessments a proposed development layout has been produced that avoids sensitive areas and identified constraints. Detailed specialist reports will be complied and included in the Environmental Impact Assessment Report (EIAr) that will include proposed mitigation measures to further reduce risks or enhance opportunities during construction, operation and decommissioning phases of the development. With implementation of these mitigation measures, all identified negative impacts are expected to be reduced to acceptable levels of medium or low negative significance. All mitigation measures proposed by the specialists are included in the EMPr for the project.
1.3. How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	On a national level the development will lessen the country's dependency on coal, and contribute to lowering water consumption, pollution and environmental degradation per kW of electricity produced.
1.4. What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?	The generation of waste will largely be restricted to the construction phase of the project and consist of normal construction phase solid waste streams. The EMPr which will be included in the EIAr will detail specific mitigation measures that must be implemented for the appropriate management and minimisation of waste, during all phases of the project. Registered service providers will be utilised to transport solid waste to registered landfills.
1.5. How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	Visual assessments will be conducted during the EIA phase of the development and the relevant buffers will be applied to cultural landscapes / heritage sites. The proposed development layout is produced by avoiding turbine placement within sensitive areas based on the preliminary assessment. A Heritage Impact Assessment and a Visual Impact Assessment will be conducted during the EIA phase to assess the proposed layout.
1.6. How will this development use and/or impact on non-renewable natural resources? What measures were explored to	Wind is a renewable resource and will be the 'fuel' for the WEF to generate electricity.

<table>
<tr><td colspan="2">ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?</td><td>Therefore, the development will have a minimal impact on non-renewable resources.</td></tr>
<tr><td rowspan="3">1.7. How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What</td><td colspan="2">The WEF will use the renewable energy resource of wind to generate power.
Construction of the WEF will require use of water, a renewable natural resource.
Operation of the WEF will consume relatively small quantities of water when compared to alternative energy technologies such as coal.
Impacts on the ecosystem caused by use of these renewable energy resources has been evaluated.</td></tr>
<tr><td>1.7.1. Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life)</td><td>The proposed WEF will reduce South Africa's dependency on non-renewable resources, particularly coal, as an energy source.
Wind as an energy source is not dependent on water, as compared to the massive water requirements of conventional power stations, has a limited footprint and does not impact on large tracts of land, and poses limited pollution and health risks, specifically when compared to coal and nuclear energy plants.</td></tr>
<tr><td>1.7.2. Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources this the proposed development alternative?)</td><td>The current land use is low-intensity grazing and the land is not suitable for other agricultural uses.
The proposed development will increase yield as the landowners will be paid for the use of their land. This will improve cash flow and financial sustainability of farming enterprises on site.
The proposed development itself will not cause a significant change in land use, as the development site is primarily low intensity agriculture (grazing), which can still proceed once the development is constructed.
Wind is a renewable resource and a wind energy facility is the best use thereof.</td></tr>
</table>

measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?		The WEF site would also be suitable for a solar facility, however the current land use would not be able to continue.
	1.7.3. Do the proposed location, type and scale of development promote a reduced dependency on resources?	The proposed WEF is predicted to reduce dependency on coal as an energy source. Wind as an energy source is not dependent on water, as compared to the massive water requirements of conventional coal fired power stations, has a limited footprint and does not impact on large tracts of land, and poses limited pollution and health risks, specifically when compared to coal and nuclear energy plants.
1.8. How were a risk-averse and cautious approach applied in terms of ecological impacts?	1.8.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	This report is based on a project description and site plan, provided to by the applicant, which has not been approved by DFFE at this stage of the project. The project description and site plan may undergo refinements before being regarded as final. A project description based on the final design will be concluded once DFFE has provided feedback on the layout provided in this report. Descriptions of the natural and social environments are based on limited fieldwork and available literature. It should be emphasised that information, as presented in this document, only has reference to the study area as indicated on the accompanying maps. Therefore, this information cannot be applied to any other area without a detailed investigation being undertaken.
	1.8.2. What is the level of risk associated with the limits of current knowledge?	The risk associated with assumptions and limits of current knowledge is the potential for information being assessed to be incorrect. This would translate to erroneous impact identification and mitigation measures. However, due to the amount of site work conducted the risk associated with this is considered to be low.
	1.8.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	The project description and site plan will undergo refinements before being regarded as final. A project description based on the final design will be concluded once DFFE has provided feedback on the layout provided in this report.
1.9. How will the ecological impacts resulting from this development impact on people's	1.9.1. Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly	Preliminarily assessments were conducted and identified and assessed by the specialists. Detailed impact assessments and specialist studies will be conducted during the EIA phase of the project and will take into consideration all impact and mitigation measures proposed by the specialists.

environmental right in terms following	avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	Based on preliminary assessments undertaken the proposed development attempts to avoid sensitive areas and where there is an impact the mitigation measures provided by the specialists during the EIA phase will be implemented.
	1.9.2. Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	Renewable energy has fewer negative health effects than other forms of non-renewable energy generation and will have overall positive health benefits.
1.10. Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?		The preliminary findings of this SIA conducted for the proposed WEF indicates that during the construction and the operational phase of the proposed development project, various employment opportunities, with different levels of skills will be created. In addition, this will also create local business opportunities benefitting the socioeconomic development of the local communities. The proposed WEF also represents an investment in clean, renewable energy infrastructure, which, given the negative environmental and socio-economic impacts associated with a coal based energy economy and the challenges created by climate change, represents a significant positive social benefit for society as a whole.
1.11. Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?		The preliminary assessment of the potential impacts on ecology, avifauna, bat and aquatic have indicated that the proposed development does not have unacceptable negative impacts. These however will be updated and detailed during the EIA phase when detailed specialist studies will be included.
1.12. Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?		Specialist recommendations, buffers and no-go areas will influence mapping. These will identify the most suitable areas for development for which a development layout was then produced for assessment. The results of the specialist's studies further informed the development of the updated site layout.
1.13. Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?		The cumulative impacts will be assessed during the EIA phase.

"promoting justifiable economic and social development"

2.1. What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?	2.1.1. The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area	Namakwa District municipality Integrated Development Plan (IDP): The 2020/2021 IDP indicates that it aligns with the 17 United Nations development goals, ranging from alleviating poverty and reducing inequality through job creation and economic growth, as well as ensuring access to affordable, reliable, sustainable and modern energy for all. The IDP states that local economic development will include the construction of renewable energy projects in the area. Khai Ma Local Municipality Integrated Development Plan (IDP) 2017-2022: The IDP indicates five Key Performance Areas (KPAs) of which Infrastructure Development and Basic Service Delivery (KPA1) and Economic Development (KPA 3) are relevant and applicable to the proposed WEF. In summary the proposed De Rust South WEF is in congruence with national provincial and local policies and frameworks and is supported by policy.
	2.1.2. Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),	Northern Cape Spatial Development Framework, 2018 The interior parts of the Province and the Namaqualand coast have been identified as having potential for renewable energy production and targets have been put in place for 25% of the provinces' energy generation capacity to be acquired from renewable energy projects such as wind, solar, thermal, biomass and hydroelectricity by the year 2020.
	2.1.3. Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.)	The current zoning of the property is agricultural. An application will be submitted to the municipality for approval. The proposed WEF will fit into the current landscape as this is evolving to accommodate WEFs in the area.
	2.1.4. Municipal Economic Development Strategy ("LED Strategy")	Khai Ma Local Municipality Integrated Development Plan (IDP) 2017-2022: The IDP indicates five Key Performance Areas (KPAs) of which Infrastructure Development and Basic Service Delivery (KPA1) and Economic Development (KPA 3) are relevant and applicable to the proposed WEF. KPA3 will lead to Local Economic Development (LED), food security, social infrastructure, health, environment, education, and skills development.
2.2. Considering the socio-economic context, what will	2.2.1. Will the development complement the local socio-economic initiatives (such as local economic development	The proposed development will contribute towards local economic development and skills development programs of the local and district municipalities through the support and co-operation between public

the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?	(LED) initiatives), or skills development programs?	and private sectors, creation of employment and business opportunities, and the opportunity for skills development and on-site training during both construction and operation phases.
2.3. How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities		The proposed development will contribute towards the local economic development strategies of the municipalities through the creation of employment and business opportunities, and the opportunity for skills development and on-site training during both construction and operation phases. In addition, the proposed development will also create local business opportunities benefitting the socio-economic development of the local communities.
2.4. Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term?29 Will the impact be socially and economically sustainable in the short- and long-term?		Wind energy facilities are socially and economically sustainable in the short and long term. Social economic development contributions are concentrated in the immediate vicinity of the WEF benefiting the local community.
2.5. In terms of location, describe how the placement of the proposed development will:	2.5.1. result in the creation of residential and employment opportunities in close proximity to or integrated with each other	During the construction phase of the proposed WEF employment opportunities will be created, for low-skilled workers, semi-skilled and for skilled personnel. Members from the local communities are likely to be in a position to qualify for the majority of the low skilled and a proportion of the semi-skilled positions. The typical lifespan of WEFs is 20 to 25 years. During the operational phase there will be a significant decrease in employment opportunities. It should be noted that the majority of the semi- and low skilled employment opportunities are likely to be available to the local communities, which will present a positive social benefit to these communities due to the low availability of employment opportunities in these areas. The recruitment process and the requirements for each skill level and each employment opportunity need to be clearly

		communicated to local communities to ensure that no unrealistic expectations are created.
	2.5.2. reduce the need for transport of people and goods	The need for transport of people and goods will be increased during the construction phase. Most staff employed will live within the local community or surrounding areas thereby lowering carbon footprints are predicted due to the commercial forms of transport that will be employed to move the workforce (e.g. public transport, contractor buses).
	2.5.3. result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport)	N/A
	2.5.4. compliment other uses in the area	Local communities and their service providers will benefit from the socio-economic development provided by the WEF and current land use will be able to continue.
	2.5.5. be in line with the planning for the area	The proposed WEF is in line with applicable international, national, provincial and local planning strategies.
	2.5.6. for urban related development, make use of underutilised land available with the urban edge	The proposed development occurs away from the urban edge and within rural portion of the geographical area.
	2.5.7. optimise the use of existing resources and infrastructure	Wind energy is a renewable, clean resource and reduces pollution and the reliance on non-renewable fossil fuels and water for electricity generation. Existing access roads will be utilised wherever possible. The existing Eskom substation has the capacity to support this development. It is expected that any construction water required will be delivered by tankers. Waste removal will be in accordance with best practice by qualified waste removal contractors to the nearest registered landfill. Portable sanitation facilities will be utilised during construction, so that no connection to the local sewerage system will be required. Any additional infrastructure required will be constructed by the developer.

	2.5.8. opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement)	Wind energy is a renewable, clean resource and reduces pollution and the reliance on non-renewable fossil fuels and water for electricity generation, this will contribute to the electrical bulk services for the region.
	2.5.9. discourage "urban sprawl" and contribute to compaction/densification	Not applicable as the proposed development site lies within rural areas.
	2.5.10. contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs	The existing Korana substation has capacity for additional energy generation. The proposed development will utilise this existing capacity. The project will contribute to economic and infrastructure development in the Northern Cape Province, in line with the Provincial Development and Resource Management Plan.
	2.5.11. encourage environmentally sustainable land development practices and processes	Construction of the renewable energy WEF project will assist South Africa in transitioning from a carbon-intensive resource use economy to a sustainable low carbon footprint economy. Sustainable land development is an overarching aspect of the proposed project development.
	2.5.12. take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.)	Feasibility of access for wind turbine delivery, the site is easily accessible from the main roads; Close proximity to the Eskom grid with available evacuation capacity; Viable wind resource, therefore suited to wind farm development; The proposed site is agricultural land with low agricultural potential and willingness of landowners to host a wind farm on their properties.
	2.5.13. the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential)	The proposed development will create jobs and contribute towards socio-economic development in an area that does not have high economic potential. The WEF is likely to result in positive socio-economic opportunities. Refer to section 5.15
	2.5.14. impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area	Impacts to the cultural landscape are unavoidable but may be of a medium to low significance and no other aspects of heritage are expected to be impacted significantly, if identified. The area is currently being developed to accommodate various wind farms, therefore the sense of place is currently changing and the proposed WEF will fit into the change in sense of place.

	2.5.15. in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	The proposed development is predicted to support the creation of a more integrated settlement.
2.6. How were a risk-averse and cautious approach applied in terms of socio-economic impacts?	2.6.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	Please refer to section 1.3 for a detailed list of Assumptions and Limitations. This report is based on a project description and site plan, provided by the applicant, which has not been approved by DFFE at the current stage of the project. The project description and site plan will undergo refinements before being regarded as final. A project description based on the final design will be concluded once DFFE has provided feedback on the layout provided in this report. Descriptions of the natural and social environments are based on fieldwork, available literature and desktop analysis. It should be emphasised that information, as presented in this document, only has reference to the study area as indicated on the accompanying maps. Therefore, this information cannot be applied to any other area without a detailed investigation being undertaken.
	2.6.2. What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	The risk due to limits of current knowledge is considered to be low due to the positive socioeconomic impact expected from the proposed WEF.
	2.6.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	A risk-averse and cautious approach was utilised throughout the impact assessment process by all specialists.
2.7. How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:	2.7.1. Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	Negative social impacts relating to the proposed WEF will be assessed in detail by the specialist. Appropriate mitigation measures will be provided during the EIA Phase. Please refer to Section 5.15.
	2.7.2. Positive impacts. What measures were taken to enhance positive impacts?	Positive impacts were identified by the Social Specialist, refer to Section 5.15

2.8. Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socio-economic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?		There is a potential that the proposed WEF will place a strain on services and the ecological environment. The relevant specialist have accounted for these impacts during their preliminary assessments and will provide mitigation measures during the EIA Phase.
2.9. What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?		The site sensitivity map identified the most suitable areas for development for which a development layout was then produced for assessment. The results of the preliminary specialist's studies.
2.10. What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)?34 Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?		The proposed development aligns with a variety of planning policies that consider environmental and spatial justice.
2.11. What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?		The proposed development will contribute to equitable access by supplying electricity to the national grid, and by providing local and regional socioeconomic benefits in terms of the REIPPPP Economic Development requirements, which includes a BBBEE scorecard on which wind projects are evaluated.
2.12. What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?		Construction, operation and decommissioning of the proposed development will be done according to environmental health and safety legislative requirements and applicable guidelines.
2.13. What measures were taken to:	2.13.1. ensure the participation of all interested and affected parties	Public participation is being undertaken according to NEMA: EIA Regulations (2014) as amended and DEA (2017) Public Participation Guidelines.
	2.13.2. provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation	The PPP is being undertaken in terms of legislative requirements and best practise guidelines. All notifications are provided in English.

	2.13.3. ensure participation by vulnerable and disadvantaged persons,	The PPP is being undertaken according to best practise guidelines; Notification of initiation of the PPP was provided in all required channels, i.e. newspaper adverts, site notices, local posters and written notifications.
	2.13.4. promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,	The proposed development fits into the various planning policies
	2.13.5. ensure openness and transparency, and access to information in terms of the process	Legislative requirements and best practise guidelines are followed throughout the process. The PPP is being undertaken in terms of legislative requirements and best practise guidelines.
	2.13.6. ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge	A PPP is being undertaken in terms of legislative requirements and best practise guidelines. A Social Impact Assessment forms part of the process.
	2.13.7. ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein were be promoted	The PPP that are conducted according to legislation and guidelines ensure that women and youth are recognised and involved in the process.
2.14. Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g.. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?		The proposed WEF has a good planning fit with all applicable policies and will result in substantial local socio-economic opportunities. The key challenges facing the region are poverty and inequality and a shortage of skills. As such the proposed development will be of benefit to the local area by creating job and business opportunities, particularly for unskilled and semi-skilled local workers.
2.15. What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have		Future workers on the proposed development will be educated on their rights to refuse work.

been taken to ensure that the right of workers to refuse such work will be respected and protected?		
2.16. Describe how the development will impact on job creation in terms of, amongst other aspects:	2.16.1. the number of temporary versus permanent jobs that will be created,	Temporary employment opportunities will be created during the construction phase and permanent employment opportunities will be created for the operational phase of the proposed development for skilled and unskilled workers
	2.16.2. whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),	The majority of the semi- and low-skilled employment opportunities are likely to be available to the local communities, which will present a positive social benefit to these communities due to the low availability of employment opportunities in these areas.
	2.16.3. the distance from where labourers will have to travel,	It is expected that most workers will reside in the nearby towns.
	2.16.4. the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits),	The majority of employment opportunities associated with the operational phase is likely to benefit the community. It will also be possible to increase the number of local employment opportunities through the implementation of a skills development and training programme linked to the operational phase. The local hospitality industry is likely to benefit from the operational phase. These benefits are associated with site visits by company staff members and other professionals (engineers, technicians etc.) who are involved in the company and the project but who are not linked to the day-to-day operations. Procurement during the operational phase will also create opportunities for the local economy and businesses.
	2.16.5. the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	The creation of jobs associated with the proposed WEF represents a high opportunity cost, as the employment by current agriculture operations is very low, and could continue.
2.17. What measures were taken to ensure:	2.17.1. that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment	All applicable planning policies and legislation were considered. The proposed development fits with all planning policies. Organs of State were pre-identified and registered on the I&AP database.
	2.17.2. that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	As registered I&APs all public correspondence including notifications of reports availability are provided.

2.18. What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	The proposed development aims to uphold the principles of sustainable development. The project team consists of suitably qualified individuals that comply with all legal requirements.
2.19. Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	Detailed Specialist mitigation measures will be included during the EIA phase of the project.
2.20. What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	An EMPr will submitted with EIAr. The EMPr is a legally binding document, which when enforced during construction, operational or decommissioning phases, hold the applicant or their representative liable for any remedial actions as a result of negligence.
2.21. Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	The alternative selection process includes the assessment of the No Development alternative, site alternatives, design layout alternatives and technology alternatives.
2.22. Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	Specialist will identify cumulative impacts during the EIA process and provided in the EIAr.

3 LEGAL CONTEXT

The DFFE is Competent Authority for this project. The legislative and policy context of the Report is described in detail below.

3.1 NATIONAL ENVIRONMENTAL SCREENING TOOL AND ENVIRONMENTAL THEME PROTOCOLS

3.1.1 Screening Report

The Minister of Environment, Forestry and Fisheries, gave notice that the submission of a report generated from the national web-based environmental screening tool[2], as contemplated in Regulation 16(1)(b)(v) of the Environmental Impact Assessment Regulations, 2014, published under Government Notice No. R982 in Government Gazette No. 38282 of 4 December 2014, as

[2] https://screening.environment.gov.za/screeningtool/#/pages/welcome

amended, will be compulsory from 4 October 2019 when submitting an application for environmental authorisation in terms of regulation 19 and regulation 21 of the Environmental Impact Assessment Regulations, 2014.

In addition, a set of protocols that an applicant needs to adhere to in the Environmental Authorisation (EA) process were developed and on 20 March 2020 the Minister of Forestry, Fisheries and the Environment gazetted the Protocols for national implementation purposes. The gazette '*Procedures to be followed for the Assessment and Minimum Criteria for Reporting of Identified Environmental Themes in terms of Section 24(5)(a) and (h) of the National Environmental Management Act (1998) when Applying for Environmental Authorisation*', has protocols that have been developed for environmental themes which include agriculture, avifauna, biodiversity (Terrestrial and Aquatic Biodiversity), noise, defence and civil aviation.

The protocols set requirements for the assessment and reporting of environmental impacts of activities requiring EA. The higher the sensitivity rating of the features on the proposed site as identified by the screening tool report, the more rigorous the assessment and reporting requirements.

Based on the generated screening report, all environmental theme sensitivities are indicated in Table 3-1 below. Based on the Site Sensitivity Verification (SSV), the EAP and relevant specialists however do not agree with the outcome of the following themes (Table 3-2):

- Avian (Wind) Theme – it is indicated as low but should be Very High (refer to relevant avifauna section in Chapter 5).
- Civil Aviation (Wind) Theme – indicated as high but should be low (comments from CAA was sought).
- Noise Theme – indicated as high but should be low (refer to relevant noise section in Chapter 5).
- Flicker Theme – indicated as very high but should be medium (refer to relevant visual section in Chapter 5).

All the environmental themes followed the relevant protocols (20 March 2020; 30 October 2020) and accompanied guidelines (SANBI 2020) to assess and verify the sensitivities.

Table 3-1: Environmental themes from Screening Tool which needs to adhere to in the Environmental Authorisation process.

Theme	**Very High sensitivity***	**High sensitivity***	**Medium sensitivity**	**Low sensitivity**
Agriculture Theme				
Animal Species Theme				
Aquatic Biodiversity Theme				
Archaeological and Cultural Heritage Theme				
Avian (Wind) Theme				
Bats (Wind) Theme				
Civil Aviation (Wind) Theme				
Defence (Wind) Theme				
Flicker Theme				

Landscape (Wind) Theme				
Paleontology Theme				
Noise Theme				
Plant Species Theme				
RFI (Wind) Theme				
Terrestrial Biodiversity Theme				

* Require full assessments based on 2020 Protocols.

Table 3-2: Environmental themes from Screening Tool compared to Site Sensitivity Verification (SSV) and indicating whether a Full Assessment or Compliance Statement is required.

Theme	Sensitivity before SSV	Sensitivity after SSV	Full Assessment or Compliance Statement
Agriculture Theme	Low	Low	Compliance Statement
Animal Species Theme	High	Low	Full Assessment
Aquatic Biodiversity Theme	Very High	Very High	Full Assessment
Archaeological and Cultural Heritage Theme	Low	High	Full Assessment
Avian (Wind) Theme	Low	Very High	Full Assessment
Bats (Wind) Theme	High	Very High	Full Assessment
Civil Aviation (Wind) Theme	Medium	Medium	Comments from relevant stakeholders
Defence (Wind) Theme	Low	Low	Comments from relevant stakeholders
Flicker Theme	Very High	High	Full Assessment
Landscape (Wind) Theme	Very High	High	Full Assessment
Noise Theme	Very High	High	Full Assessment
Paleontology Theme	Medium	Medium	Full Assessment
Plant Species Theme	Medium	High	Full Assessment
RFI (Wind) Theme	Very High	Medium	Comments from relevant stakeholders
Terrestrial Biodiversity Theme	Very High	Very High	Full Assessment

RENEWABLE ENERGY AUTHORISATION REQUIREMENTS

The legislative and policy context of this Report is detailed below.

Constitution of the Republic of South Africa, Act 108 of 1996

The Constitution of the Republic of South Africa is the supreme law of the country and underpins all environmental legislation. As such, any law or conduct that is inconsistent with the Constitution is invalid (Constitution, 1996). The Constitutional environmental right is included in section 24, which states:

"Everyone has the right—

(a) to an environment that is not harmful to their health or well-being; and

(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that—

(i) prevent pollution and ecological degradation;

(ii) promote conservation; and

secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development".

The constitution also gives provision in section 27(1)(b) which states that everyone has the right to have accesses to sufficient water and section 27(2) requires the state to take reasonable and other measures, within its available resources, to achieve the progressive realization of each of these rights.

The Constitution of the Republic of South Africa forms the foundation of all environmental principles and management in the country and it is enshrined in all legislation. Such legislation is discussed below with specific reference to the environment.

National Environmental Management Act (Act 107 of 1998 as amended) and EIA Regulations (2014, as amended)

The National Environmental Management Act (NEMA; No. 107 of 1998, as amended) gives effect to the Constitution of the Republic of South Africa by providing a framework for cooperative environmental governance and environmental principles that enable and facilitate decision-making on matters affecting the environment.

Chapter one of the NEMA outlines national environmental management principles that must be incorporated into all decisions regarding the environment, throughout the country by all organs of state. Central to these principles is the concept of sustainability, which entails meeting the needs of the present generation without compromising the ability of future generations to meet their own needs. Chapters two to three of the NEMA outline government and non-government institutions and their responsibilities for ensuring co-operative governance and making decisions.

Chapter 5 of NEMA provides for integrated environmental management. The purpose of this Chapter is to promote the application of appropriate environmental management tools in order to ensure the integrated environmental management of activities. Section 24 (1) specifically states:

"In order to give effect to the general objectives of integrated environmental management laid down in this Chapter. the potential impact on—

(a) the environment;

(b) socio-economic conditions: and

(c) the cultural heritage,

of activities that require authorisation or permission by law and which may significantly affect the environment, must be considered, investigated and assessed prior to their implementation and reported to the organ of state charged by law with authorizing, permitting, or otherwise allowing the implementation of an activity."

NEMA requires that an environmental authorisation be issued by a competent authority (CA) before the commencement of a listed activity in terms of the Environmental Impact Assessment Regulations Listing Notices for Basic Assessment or scoping & Environmental Impact Assessment (S&EIA).

Legal Requirements as per the EIA Regulations, 2014 (as Amended)

In South Africa, EIA became a legal requirement in 1997 with the promulgation of regulations under the Environment Conservation Act (ECA). Subsequently, NEMA was passed in 1998. Section 24(2) of NEMA empowers the Minister and any MEC, with the concurrence of the Minister, to identify activities which must be considered, investigated, assessed and reported on to the competent authority responsible for granting the relevant environmental authorisation. On 21 April 2006 the Minister of Environmental Affairs and Tourism promulgated the first EIA regulations in terms of Section 24 of NEMA. These EIA regulations, under sections 24(5) and 44 of NEMA, were updated in June 2010 and again in December 2014. In April 2017, the 2014 EIA regulations were amended. Environmental authorisation for an activity may only be issued by the competent authority (CA) after the developer has complied with the procedural requirements as set out in the 2014 EIA regulations of NEMA.

NEMA, as amended, establishes the principles for decision-making on matters affecting the environment. Section 2 sets out the National Environmental Management Principles which apply to the actions of organs of state that may significantly affect the environment. Accordingly, NEMA identifies activities that require authorisation prior to commencement. Such activities listed in the 2014 EIA Regulations (GN R982) are detailed in Table 3-3 below.

Table 3-3: Listed activities triggered by the proposed De Rust South WEF.

Government Notice	Activity Number	Description	Aspect of the Project
Listing Notice 1: R.327 as amended on 7 April 2017	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;	The proposed project will entail the construction of a 33/132 kV on-site substation that will facilitate the proposed De Rust South WEF. The proposed project will take place outside of an urban area. Take note that the grid connection to the Korana substation is not included in this application and a separate basic assessment process will be followed for the Grid Connection. This activity would therefore be triggered based on the onsite substation.

Government Notice	Activity Number	Description	Aspect of the Project
	12	The development of – (ii) infrastructure or structures with a physical footprint of 100 square meters or more; where such development occurs- (a) within a watercourse; or (c) within 32 meters of a watercourse, measured from the edge of a watercourse	The proposed turbines and associated infrastructure including access roads and laydown areas during the construction phase located within a watercourse or the 32m buffer area. The final placement of all infrastructures will be refined during the process, and avoid the watercourse and indicated buffer as far as possible.
	14	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	Storage of fuel, oil and other chemicals on site could trigger this activity. The volumes are not known but will have a combined capacity of between 80 and 500 m^3.
	19	The infilling or depositing of any material of more than 10 m3 into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 m3 from a watercourse;	The infilling or depositing of any material of more than 10 m^3 into a watercourse may be triggered with the construction of internal service roads or cables across drainage lines.
	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.	Roads are required throughout the construction and operational stages of the project. during the construction phase, roads will be approximately 10m wide for the delivery of turbine parts and other equipment, and approximately 8m wide during the operational phase for maintenance purposes.
	28	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes of 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.	The current land use of the proposed farm on which the project is proposed is agriculture. The development is outside an urban area and the development footprint is > 1 ha.
	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	The widening of portions of existing roads or the lengthening of roads will be required to accommodate the logistical construction

Government Notice	Activity Number	Description	Aspect of the Project
			requirements to access the site and associated infrastructure.
Listing Notice 2: R.325 as amended on 7 April 2017	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 De Rust South WEF will consist of up to 32 turbines with a capacity of up to 7.5MW each, depending on the available technology at the time of construction. The overall capacity of the facility will be about 240MW.
	15	The clearance of an area of 20 hectares or more of indigenous vegetation.	The total area to be cleared is expected to be greater than 20 ha, depending on the final layout. This includes turbine placement, roads, and other permanent infrastructure. During the construction phase, some areas will be cleared for the laydown, storage and assembly areas which will be rehabilitated post construction.
Listing Notice 3: R.324 as amended on 7 April 2017	4	The development of a road wider than 4 metres with a reserve less than 13,5 metres. g. Northern Cape ii. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	The proposed project involves the construction of a road wider than 4m. A CBA is located on the Eastern portion of the site, which cannot be avoided by the construction of the internal roads connecting the turbines to one another. Where possible, roads will be rehabilitated after the construction phase.
	12	The clearance of an area of 300 square metres or more of indigenous vegetation. g. Northern Cape ii. Within critical biodiversity areas identified in bioregional plans;	The proposed project will clear indigenous vegetation of more than 300m^2 within the CBA for the development and expansion of internal roads.
	14	The development of- (ii) infrastructure or structures with a physical footprint of 10 square meters or more; where such development occurs – (a) within a watercourse; or (c) within 32 meters of a watercourse, measured form the edge of a watercourse. g. Northern Cape	The proposed turbines and associated infrastructure including access roads and laydown areas during the construction phase located within a watercourse or the 32m buffer area. The final placement of all infrastructures will be refined during the process and avoid the watercourse and indicated buffer as far as possible within the CBA.

Government Notice	Activity Number	Description	Aspect of the Project
		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	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. g. Northern Cape ii. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ii) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland	Upgrades of existing roads are to take place within a watercourse. The existing roads, including the access roads, need to be expanded by >4m.

The Environmental Authorisation is recommended to be valid for a period of 10 years.

National Environmental Management: Biodiversity Act (Act 10 of 2004 as amended)

The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004 as amended) (“NEMBA”) aims to provide for the management and conservation of South Africa’s biodiversity within the framework of the NEMA, the protection of species and ecosystems that warrant national protection, the sustainable use of indigenous biological resources and the fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources. The Act places severe restrictions on activities that could have adverse effects on threatened or protected species.
The purpose of the NEMBA includes:

- the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998;
- the protection of species and ecosystems that warrant national protection; and
- the sustainable use of indigenous biological resources and the fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources.

Provision is made for protection of threatened or protected ecosystems and species as well as provisions guarding against the introduction of alien and invasive species. The Act identifies restricted activities involving listed threatened, protected or alien species. These activities include picking parts of, or cutting, chopping off, uprooting, damaging or destroying, any specimen of a listed threatened or protected species. As stipulated in Section 57 of the Act, a person may not carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7. Lists of critically endangered, endangered, vulnerable and protected species in GNR 151 of 23 February 2007 and List of threatened ecosystem 2011 have been published under NEMBA. Regulations have also been promulgated on Threatened and Protected Species in GNR 324 (29 April 2014). These lists and associated restricted activities as well as the regulations need to be taken into account during the implementation of any renewable energy development activities as well as during assessments for authorisations associated with these activities in terms of other legislation.

Application may be made for a permit to engage in restricted activities, which application may be subject to various stringent requirements as set out in Section 88 of the NEMBA. The CA responsible for administrating the NEMBA is dependent on the province in which the activity is taking place.

Environmental Conservation Act, Act No. 73 of 1989 (ECA)

In terms of section 25 of the ECA, the national Noise Control Regulations (GN R154 in Government Gazette No. 13717 dated 10 January 1992) (NCR) was promulgated. The NCRs were revised under Government Notice Number R55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations. Currently, no provincial or local regulations exist in the Northern Cape and no approval is required. A noise assessment forms part of this EIR and the impact assessment and identified mitigation measures are included with requirements included in the EMPr.

National Environmental Management: Air Quality Act (Act 39 of 2004 as amended)

The National Environment Management: Air Quality Act (NEMAQA) serves to repeal the Atmospheric Pollution Prevention Act (45 of 1965) and various other laws dealing with air pollution. According to the Act, the DEA, the provincial environmental departments and local authorities are separately and jointly responsible for the implementation and enforcement of various aspects of the Air Quality Act. Although no major air quality issues are expected, the Applicant needs to be mindful of the Act as it also relates to potential dust generation during construction.

National Environmental Management: Waste Act (Act 59 of 2008 as amended)

The National Environmental Management: Waste Act (NEMWA) came into effect on 1 July 2009. Section 19 of the NEMWA provides for listed waste management activities and states in Section 19(1) that the Minister may publish a list of waste management activities that have or are likely to have a detrimental effect on the environment. Such a list was published in GN 921 of 29 November 2013, identifying those waste management activities that require a Waste Management Licence in terms of the Act. Activities are defined within Category A (non-hazardous) and Category B (hazardous) Category C (lower threshold in terms of waste volumes) wastes.

There are no listed activities which require authorisation. The Applicant must ensure that all activities associated with the project address waste related matters in compliance with the requirements of the Act and must consult with the local municipality to ensure that all waste is disposed of at a registered landfill site.

National Water Act (Act 36 of 1998 as amended)

The National Water Act (NWA) includes provisions requiring that a water use license be issued by the Department of Water & Sanitation (DWS) before a project developer engages in any activity defined as a water use in terms of the NWA. Water use definitions considered probably or possibly relevant to Renewable Energy projects in terms of the NWA, section 21 includes:

- Taking of water from a water resource;
- Storing of water;
- Impeding or diverting the flow of water in a water course;
- Engaging in a stream flow reduction activity;
- Engaging in a controlled activity (this includes the use of water for power generation purposes);
- Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
- Altering the bed, banks, course, or characteristics of a watercourse. This includes altering the course of a watercourse (previously referred to as a river diversion).

Water will be required during the construction and operational phases of the project. During the construction phase, water is required primarily for the purpose of concrete production (batching plant), roads and earthworks.

Specific quantities will be provided in the Water Use License Application (WULA). As an indication, total quantities could be in the order of:

- 60,000 kL total for construction
- 5,000 kL for batching plant
- 35,000 kL for roads and earthworks.

Water required during operation will be primarily for drinking and sanitation purposes. This water might be sourced from boreholes on site, or from surrounding properties.

In addition, infrastructure will be constructed within 500m of watercourses, and accordingly the flow of water can be impeded or diverted, and/ or altering the bed, banks, course, or characteristics of the watercourses.

An authorisation will be required in terms of Section 21 (b), (c) and (i). A WULA has been submitted to the DWS in May 2022 (WULA reference: WU25028) and is currently in the process of submitting the final documents.

National Heritage Resources Act (No. 25 of 1999)

National Heritage Sites in South Africa are places that that are of historic or cultural importance and which are for this reason declared in terms of Section 27 of the National Heritage Resources Act (NHRA). The designation was a new one that came into effect with the introduction of the Act on 1 April 2000 when all former National Monuments declared by the former National Monuments Council and its predecessors became provincial heritage sites as provided for in Section 58 of the Act.

Both national and provincial heritage sites are protected under the terms of Section 27 of the NHRA and a permit is required to work on them. National Heritage Sites are declared and administered by the national Heritage Resources Authority, SAHRA whilst provincial heritage sites fall within the domain of the various provincial heritage resources authorities. Heritage resources are protected by the Act and may not be disturbed in any way without a permit issued by the South African Heritage Resources Agency or the relevant Provincial Heritage Resources Authority. Section 38(1) of the NHRA stipulates the triggers which would require a Heritage Impact Assessment (HIA) to become part of an EIA submitted for consideration by the relevant state department. Please refer to Appendix D8 for the HIA report findings.

Conservation of Agricultural Resources Act (CARA; Act 43 of 1983)

The purpose of this Act is to ensure that natural agricultural resources of South Africa are conserved through maintaining the production potential of land, combating and preventing erosion, preventing the weakening or destruction of water sources, protecting vegetation, and combating weeds and invader plants.

As per the Screening Tool generated, the Agricultural Potential is considered low. There are currently no agricultural activities, not even grazing, taking place on the property. Where required, measures for addressing erosion, protection of vegetation and water sources and managing alien plants are included in the EMPr.

Spatial Planning and Land Use Management Act (SPLUMA; Act 16 of 2013)

SPLUMA aims to confirm and regulate the role of municipalities in land-use planning and land-use management. Two of the most relevant objectives of the SPLUMA are to ensure that the system of spatial planning and land use management promotes social and economic inclusion and to provide for the sustainable and efficient use of land.
The Act provides that spatial planning consists of:

- Spatial development frameworks adopted at each level of government;
- Development principles, norms and standards;
- The management and facilitation of land use through land-use schemes; and
- Procedures to deal with and decide on development applications provided for in national and provincial legislation.

The national, provincial and local governments are instructed to adopt spatial development frameworks (SDFs). SDFs must 'guide planning and development decisions across all sectors'. At different levels of government the SDFs intended to guide some of the following:

- National Spatial Development Framework (NSDF) - must indicate the desired patterns of land use in South Africa;
- Provincial Spatial Development Framework (PSDF) - must provide a spatial representation of the province's land development policies, strategies and objectives and must indicate desired and intended patterns of land use and, importantly, delineate areas in which development would not be appropriate;
- Regional Spatial Development Framework (RSDF) – will be imposed if when a municipality fails to adopt or amend an MSDF the Minister may step in, declare a region and adopt an RSDF for that region and when it is 'necessary to give effect to national land-use policies or priorities' the Minister may do the same; and
- Municipal Spatial Development Framework (MSDF) - identify current and future significant structuring and restructuring elements of the spatial form of the municipality, including development corridors, activity spines and economic nodes where public and private investment will be prioritised and facilitated.

The proposed development needs to comply with the surrounding landscape and must apply for a land use change with the relevant municipality since the land is classified as agricultural use.

National Roads Act (Act. 93 of 1996)

This Act provide for co-operative and co-ordinated strategic planning, regulation, facilitation and law enforcement in respect of road traffic matters by the national, provincial and local spheres of government. The National Roads Act 93 of 1996 makes provision for regulating the transportation of dangerous goods and substances by road. Section 275 states that, no person shall operate on a public road any vehicle in or on which dangerous goods is transported, unless such dangerous goods are transported in accordance with Chapter VIII of the Act. Chapter VIII also incorporates the SABS standard specifications relating the transportation of dangerous goods and substances. Section 279 indicates the availability of an authority for classification and certification of dangerous goods should there be any doubt as to the appropriate classification of dangerous goods. Certain vehicles and loads cannot be moved on public roads without exceeding the limitations in terms of the dimensions and/or mass as prescribed in the Regulations.

Civil Aviation Act (Act 13 of 2009)

Civil aviation in South Africa is governed by the Civil Aviation Act, 2009 (Act 13 of 2009). This Act provides for the establishment of a stand-alone authority mandated with controlling, promoting, regulating, supporting, developing, enforcing and continuously improving levels of safety and security throughout the civil aviation industry. This mandate is fulfilled by the South African Civil Aviation Authority (SA CAA) as an agency of the Department of Transport (DoT). The SA CAA achieves the objectives set out in the Act by complying with the Standards and Recommended Practices (SARPs) of the International Civil Aviation Organisation (ICAO), while considering the local context when issuing the South African Civil Aviation Regulations (SA CARs). All proposed developments or activities in South Africa that potentially could affect civil aviation must thus be assessed by SACAA in terms of the SA CARs and South African Civil Aviation Technical Standards (SA CATS) in order to ensure aviation safety.

The Obstacle Evaluation Committee (OEC) which consists of members from both the SA CAA and South African Air Force (SAAF) fulfils the role of streamlining and coordinating the assessment and approvals of proposed developments or activities that have the potential to affect civil aviation, military aviation, or military areas of interest. With both being national and international priorities, the OEC is responsible for facilitating the coexistence of aviation and renewable energy development, without compromising aviation safety. Comments from the OEC are required to ensure the safety of aircrafts. No Comments have been received to date, follow ups have been made during the EIR comment period. It should however be noted that there are no airways

3.2 RENEWABLE ENERGY DEVELOPMENT ZONE

On 17 February 2016, Cabinet approved the Renewable Energy Development Zones (REDZs) for large scale wind and solar photovoltaic development and associated Strategic Transmission Corridors (STC) which support areas where long term electricity grid will be developed. The procedure to be followed in applying for EA for a large-scale project in a REDZ or in a Power Corridor was formally gazetted on 16 February 2018 in GN113 and GN114. New wind or PV projects located within one of the eight REDZ areas, and new electricity grid expansion within the 5 Strategic Transmission Corridors are subject to a Basic Assessment and not a full EIA process, as well as a shortened timeframe of 147 days (90 day BA process and 57 decision-making process). The proposed De Rust South WEF is not located in a REDZ but is located in the Western Strategic Transmission Corridor. Accordingly, a S&EIR is required for the WEF, and a BA process is required for the grid connection.

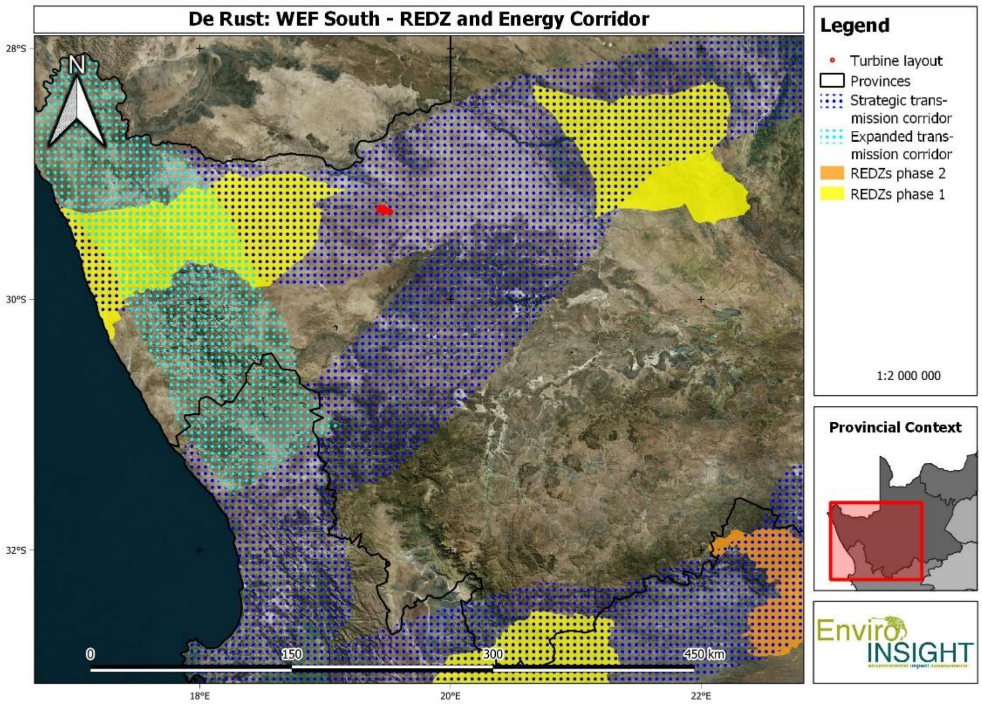


Figure 3-1: Location of eight existing Renewable Energy Development Zones (REDZs) overlayed onto the electricity grid infrastructure corridors (Source: CSIR). The proposed project area is circled in red.

4 SCOPING AND EIR PROCESS

A S&EIR is conducted in two phases. The first phase is scoping and the second phase is the EIR. The scoping phase will commence once the environmental authorisation application has been submitted with the competent authority (in this case Department of Forestry, Fisheries and the Environment - DFFE). The following tasks was undertaken for the scoping phase: identify stakeholders and interested and affected parties (I&APs); identify relevant policies and legislation; consider the need and desirability of the project; consider alternative technologies and sites; identify the potential environmental issues; determine the level of assessment and public participation process required for the EIA phase; and identify preliminary measures to avoid, mitigate or manage potential impacts.

The requirements for the submission of the scoping report to competent authority is specifically contained in Chapter 4 Part 3 of the NEMA Reg No 326 (amended on 7 April 2017). The S&EIR process can take up to 300 days to complete (87 days for scoping phase, 106 days for EIA phase, and 107 days for competent authority to review). The applicant must, within 44 days of receipt of the application by the competent authority, submit to the competent authority a scoping report which has been subjected to a public participation process of at least 30 days and which reflects the incorporation of comments received, including any comments of the competent authority. The competent authority must, within 43 days of receipt of a scoping report, make a decision

The purpose of the scoping report is to identify and evaluate the main issues and potential impacts of the proposed development at a detailed desktop level based on existing information. There are two distinct phases in the S&EIR process namely the

Scoping Phase and the EIR Phase, as outlined in Figure 4-1. This report deals with the scoping phase. The requirements for the S&EIA process are specifically contained in Chapter 4 Part 3 of the EIA Regulations 2014 (as amended).

The scoping phase is conducted as the precursor to the Environmental Impact Assessment (EIA) process during which:

- Project and baseline environmental information is collated. Baseline information for the scoping report is gathered through visual inspections during field visits of the proposed project area and surroundings, desktop studies which include GIS mapping, and review of existing reports, guidelines and legislation.
- Landowners, adjacent landowners, local authorities, environmental authorities, as well as other stakeholders which may be affected by the project, or that may have an interest in the environmental impacts of the project are identified.
- Interested and affected parties (I&APs) are informed about the proposed project.
- Competent authority (CA) is consulted to confirm legal and administrative requirements.
- Environmental issues and impacts are identified and described.
- Development alternatives are identified and evaluated, and non-feasible development alternatives are eliminated.
- The nature and extent for further investigations and specialist input required in the EIA phase is identified.
- The draft and final scoping reports are submitted for review by authorities, relevant organs of state and I&APs.
- Key I&AP issues and concerns are collated into an issues and response report for consideration in the EIA phase.

Issues raised in response to the Draft Scoping Report were captured in a Comments and Response Report as an appendix to the Final Scoping Report (FSR), which was submitted to the CA for decision-making. The approval of the Scoping Report was signed on the 29 March 2023.

The Environmental Impact Assessment (EIA) phase is conducted after the Scoping Phase, the EIA phase entails:

- Competent authority (CA) is consulted to confirm legal and administrative requirements. Requirements are also provided in the scoping approval;
- Development alternatives are identified and evaluated, and non-feasible development alternatives are eliminated, finalised layout, development area are analysed;
- Specialist studies are finalised;
- Environmental issues and impacts are identified and described.
- The draft and final EIA reports and environmental management programme (EMPr) submitted for review by authorities, relevant organs of state and I&APs.
- Key I&AP issues and concerns are collated into an issues and response report for consideration in the EIA phase.

The Draft EIR was released for comment from 26 May 2023 to 26 June 2023 for 30 days. Issues raised in response to the Draft EIR is captured in a Comments and Response Report as an appendix to this Final EIR, which will be submitted to the CA for decision-making.

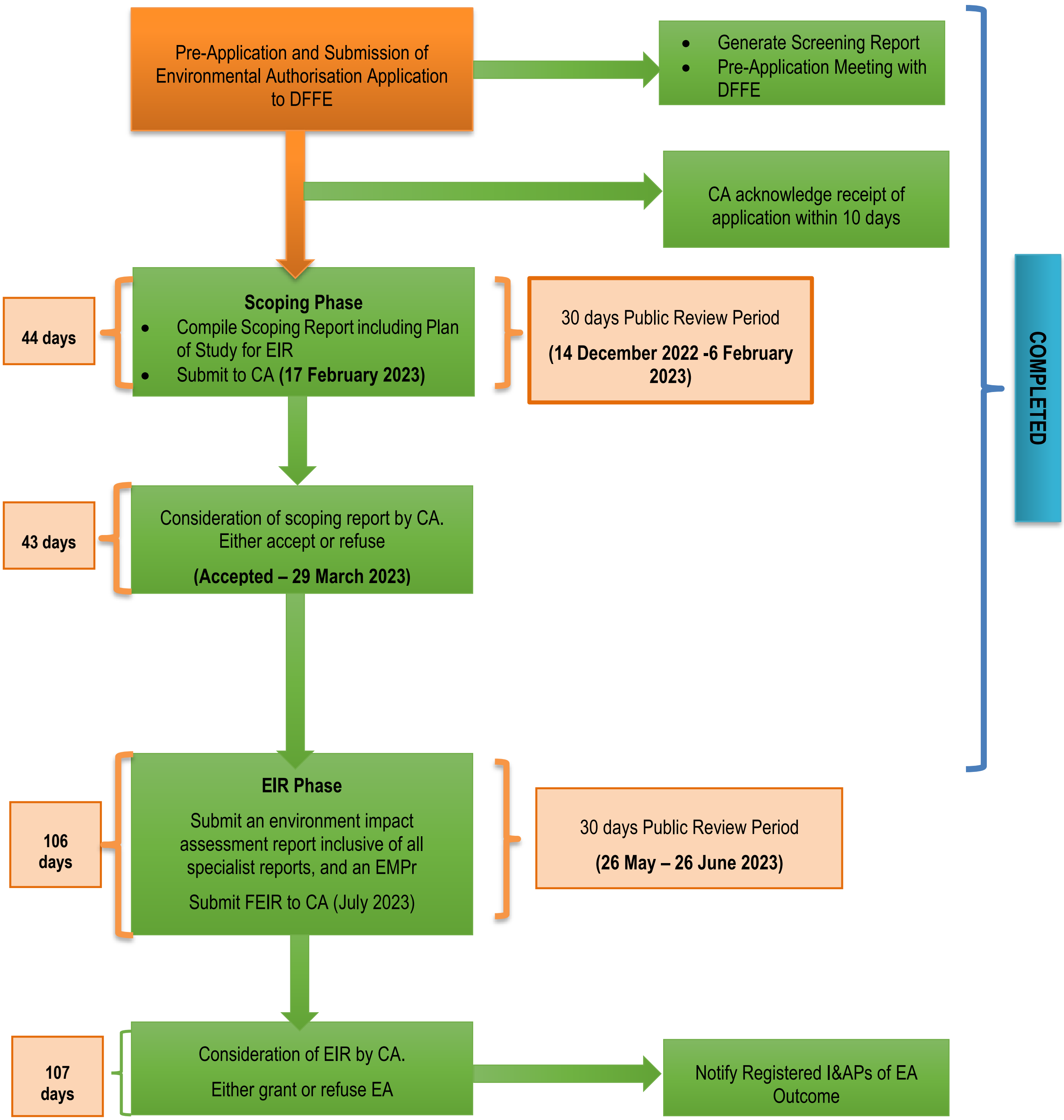


Figure 4-1: The S&EIR process in terms of the EIA Regulations (2014, as amended).

5 PUBLIC PARTICIPATION

The Public Participation Process (PPP) was developed to ensure compliance with environmental regulatory requirements and to provide I&APs with an opportunity to evaluate the proposed project. During this process stakeholders are able to provide inputs and to receive feedback from the environmental specialists, other stakeholders and the competent authority. Please refer to Appendix E for the Public Participation Report.

The current EIA process for the proposed De Rust South WEF has been subjected to a rigorous PPP both during the Scoping and EIA Phases of the project.

5.1. OBJECTIVES OF PUBLIC PARTICIPATION

- Provide Stakeholders and Interested and Affected parties (I&APs) with an opportunity to voice their support or concerns and raise questions regarding the project, application or decision made by the CA;
- Provides an opportunity for I&APs, EAP and the CA to obtain clear, accurate and understandable information about the environmental, social and economic impacts of the proposed activity or implications of a decision;
- Provide Stakeholders, I&APs, and the CA with the opportunity of suggesting ways of reducing or mitigating negative impacts of an activity and for enhancing positive impacts;
- Enable the applicant / EAP to incorporate the needs, preferences and values of affected parties into the process and submitted reports for review.

5.2. LEGISLATION

The PPP must comply with the several important sets of legislation that require public participation as part of an application for authorisation or approval, namely:

- The National Environmental Management Act (Act No. 107 of 1998 - NEMA);
- The EIA Regulations (2014, as amended);

Adherence to the requirements of the above-mentioned Acts will allow for an Integrated PPP to be conducted, and in so doing, satisfy the requirement for public participation referenced in the Acts. The details of the Integrated PPP are provided below.

5.3. IDENTIFICATION OF I&APS

An I&AP database was compiled of key stakeholders and I&AP's identified for notification of the Environmental Authorisation Application. The I&AP database includes, amongst others; landowners, affected communities, regulatory authorities and other specialist interest groups. A list of key stakeholders was identified:

- Competent Authority: Department of Forestry, Fisheries and the Environment (DFFE)
- Northern Cape Department: Agriculture, Environmental Affairs, Rural Development and Land Reform
- Department of Water & Sanitation (DWS)
- Department of Mineral Resources and Energy (DMRE)

- Department of Agriculture, Rural Development and Land Reform (DARDLR)
- Eskom
- South African Heritage Resource Authority (SAHRA)
- Namakwa District Municipality
- Hantam Local Municipality
- Civil Aviation Authority (CAA)
- BirdLife South Africa
- South African Bat Assessment Association (SABAA)
- Square Kilometre Array (SKA)
- Endangered Wildlife Trust (EWT)

5.4. PUBLIC PARTICIPATION PROCESS

The Public Participation Process (PPP) continued on 11 June 2022 with the site notices to notify and inform the public of the proposed project and invite I&APs to register, who has not already done so in the previous process. All individuals who register for this project were added to the I&AP list, provided that they have given the correct and complete contact details in order to receive communications for this project. The notification procedure included (Appendix E):

- Newspaper advertisement: published in the Blesbok on 11 November 2022;
- Site Notices: erected at prominent points along the property boundaries and noticeable places on 2 November 2022; and
- Emails were composed and sent to the identified authorities, adjacent landowners, and I&APs that have registered thus far.
- The Background Information Document (BID) was released to I&APs on the 1 December 2022.

This draft EIR (DEIR) was released for a 30-day commenting period from **26 May 2023 – 26 June 2023**. Comments received on the DEIR will be included in the FEIR which will be submitted to DFFE for decision-making

5.5. BACKGROUND INFORMATION DOCUMENT

Included in the I&AP notification letters and e-mails sent out was a Background Information Document (BID). The BID includes the following information:

- Locality map and description;
- Project description and background;
- Legal framework;
- Explanation of the Scoping and EIR Process to be followed; and
- Provide opportunity to get involve and comment on the proposed project.

5.6. NOTIFICATION OF AVAILABILITY OF DRAFT REPORTS

Scoping: All registered I&APs and stakeholders have been notified via email of the availability of the Draft Scoping Report for review for a period of 30 days from **14 December 2022 – 6 February 2023**. The report was made available on Enviro-Insight's website at http://www.enviro-insight.co.za/download-it/project-downloads/. CD electronic copies are also available on request from Enviro-Insight.

EIR: All registered I&APs and stakeholders have been notified via email of the availability of the Draft EIR for review for a period of 30 days from **26 May 2023 – 26 June 2023**. The report was made available on Enviro-Insight's website at http://www.enviro-insight.co.za/download-it/project-downloads/. CD electronic copies are also available on request from Enviro-Insight.

5.7. FEEDBACK FROM I&APS

All comments received from I&APs were recorded and responded to accordingly in Appendix C. Limited comments were received at this stage of the EIA process.

All comments received throughout the process will be collated and included in the comments and response report included in Appendix E.

6. DESCRIPTION OF THE RECEIVING ENVIRONMENT

A description of the study area is outlined in the section below. The receiving environment in relation to each specialist study is also provided.

The following environmental aspects further described in the following subsections:

- Terrestrial Biodiversity;
- Sensitive Animal Species;
- Sensitive Plant Species;
- Bats (wind);
- Avifauna (wind);
- Aquatic Biodiversity;
- Cultural Heritage and Archaeology;
- Agriculture;
- Socio-economic;
- Noise;
- Visual landscape including Flicker;
- Traffic and Transportation;
- Wake effect; and

- Electromagnetic and radio frequency interference.

6.1. REGIONAL AREA

The proposed development will be located approximately 18km south of Pofadder, within the Khâi-Ma Local Municipality in the Northern Cape Province (Figure 5 1). The proposed wind farm can be accessed via the R358 regional road. The centre point and corner co-ordinates for the development site are included in Table 5 1. The Project has a total footprint of approximately 6 919 ha situated on the Remaining Extent of the Farm Houmoed 206 (21-digit Surveyor General code: C03600000000020600000).

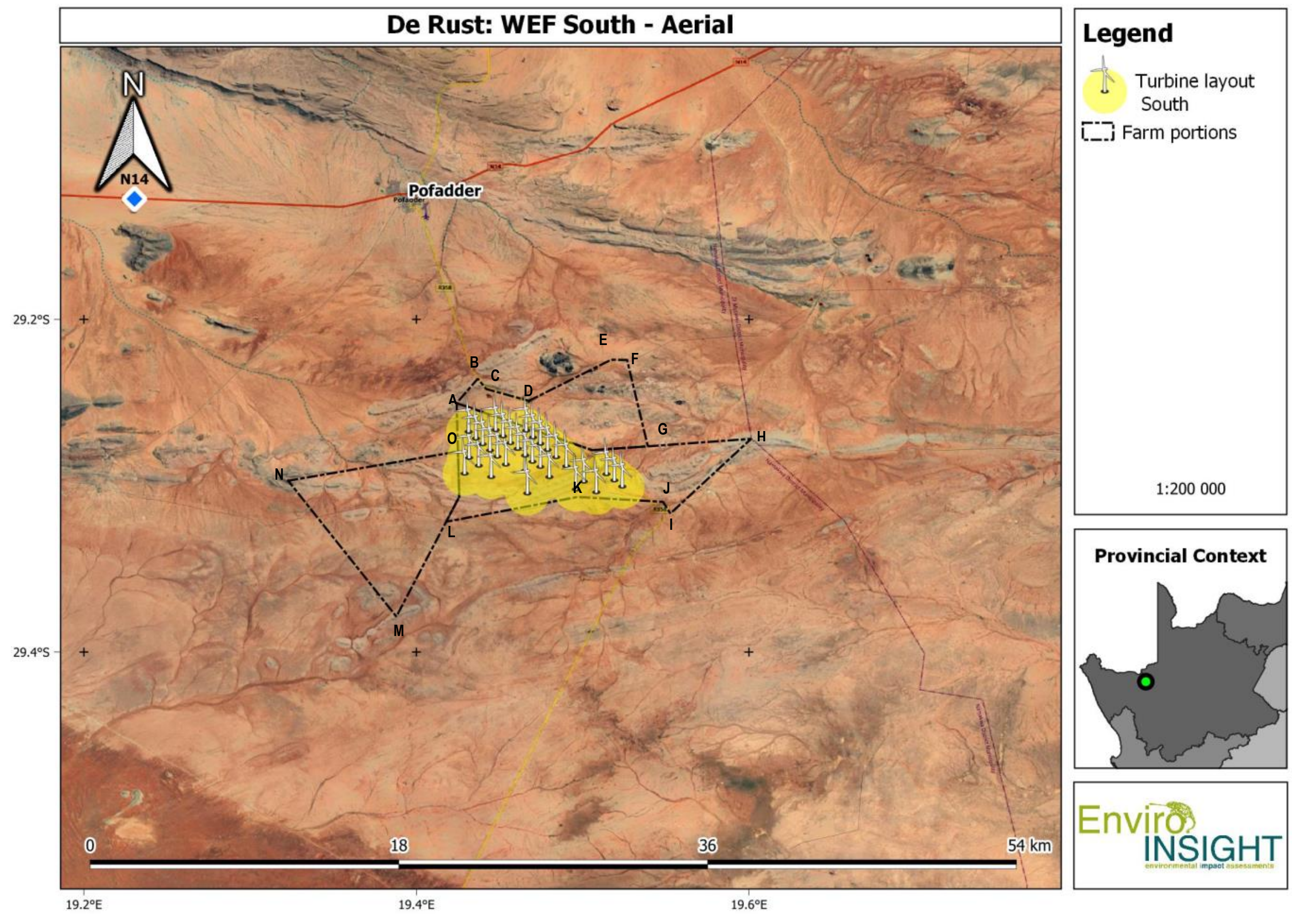


Figure 6-1: De Rust South WEF.

Table 6-1: Application Farm Boundaries of the Proposed De Rust South WEF Location.

De Rust South WEF		
Co-ordinates of the proposed site/s (DDMMSS)	Latitude (S)	Longitude (E)
Point A	29°15'5.20"S	19°25'22.82"E
Point B	29°14'10.05"S	19°26'13.74"E
Point C	29°14'32.69"S	19°26'34.03"E
Point D	29°14'57.57"S	19°28'6.39"E
Point E	29°13'25.59"S	19°30'57.44"E
Point F	29°13'29.13"S	19°31'38.70"E
Point G	29°16'32.17"S	19°32'24.56"E
Point H	29°16'16.83"S	19°36'6.81"E
Point I	29°19'1.28"S	19°33'12.44"E
Point J	29°18'35.50"S	19°32'52.81"E
Point K	29°18'23.95"S	19°29'48.17"E
Point L	29°19'20.71"S	19°25'5.28"E
Point M	29°22'42.95"S	19°23'18.93"E
Point N	29°17'50.60"S	19°19'26.26"E
Point O	29°16'44.13"S	19°25'26.55"E
Mid-Point	29°15'45.57"S	19°29'18.81"E

6.2. CLIMATE

The nearby town of Pofadder, the site is approximately 13km south of the town, receives most of its rainfall between February and April (data from 1985; https://www.meteoblue.com/), and recent data (2009-2021) indicates that most rainfall occurs from October to March, with a mean annual rainfall of 135 mm (https://wapor.apps.fao.org/). The warmest months are October through to April with a mean daily maximum of 33 °C and minimum of 17°C (February) and winter maximum temperatures of 18 °C and minimum 2 °C (July; https://www.meteoblue.com/).

6.3. TOPOGRAPHY

The site has varied terrain, consisting of a relatively flat plain with small quartzite ridges and koppies that form linear hilly regions across the properties, with especially large hills in the southeast, and dolerite outcrops forming small to large conical koppies in the northeast. There are some rocky areas on the flats that are not associated with higher terrain, located in the northern central portion of the PA.

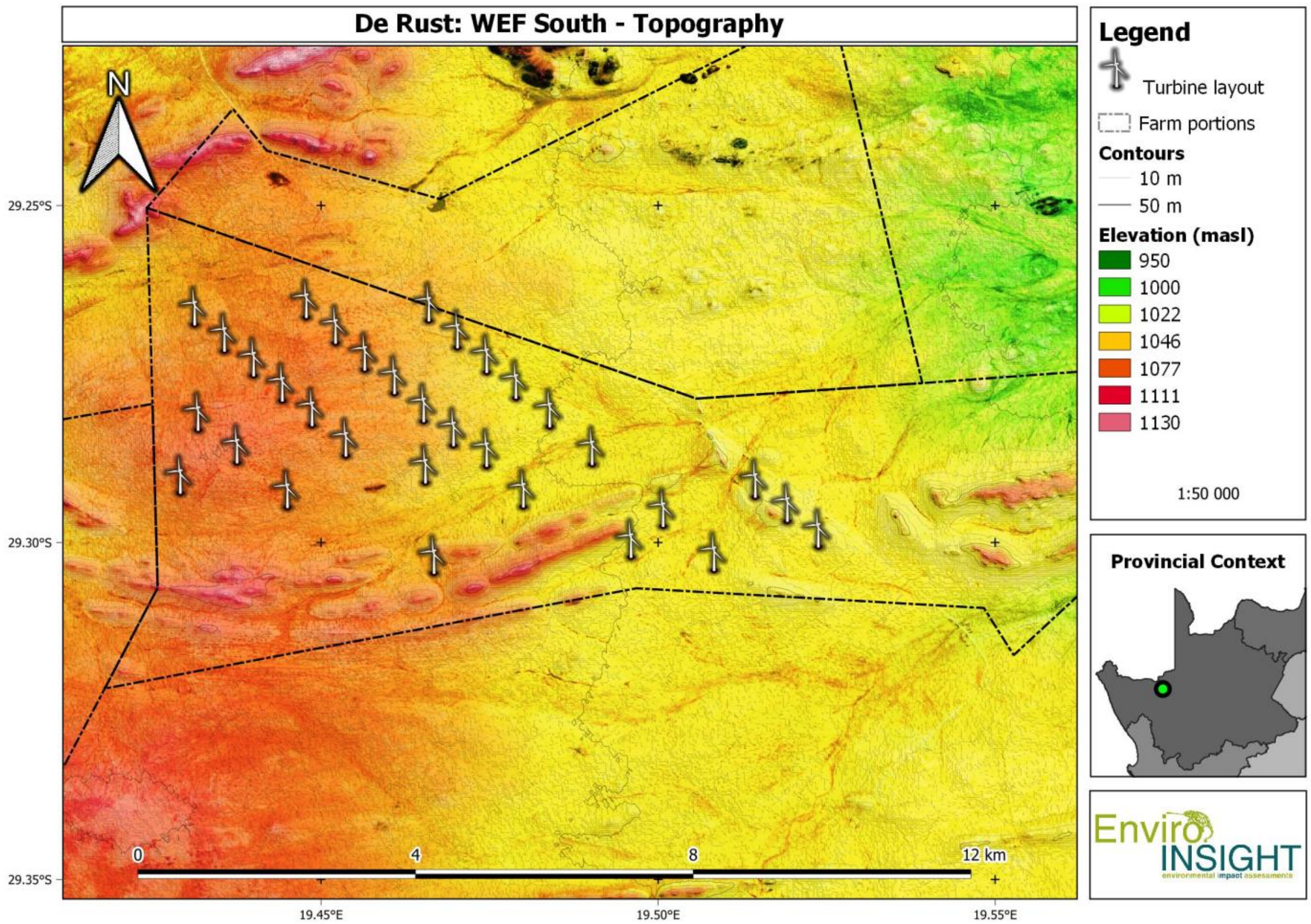


Figure 6-2: Slope Percentage Class. (Source: Stellenbosch University, WCDOA, accessed from CapeFarmMapper ver 2.6).

6.4. TERRESTRIAL BIODIVERSITY

The Terrestrial Biodiversity Report was undertaken by Enviro-Insight, kindly refer to Appendix D1.

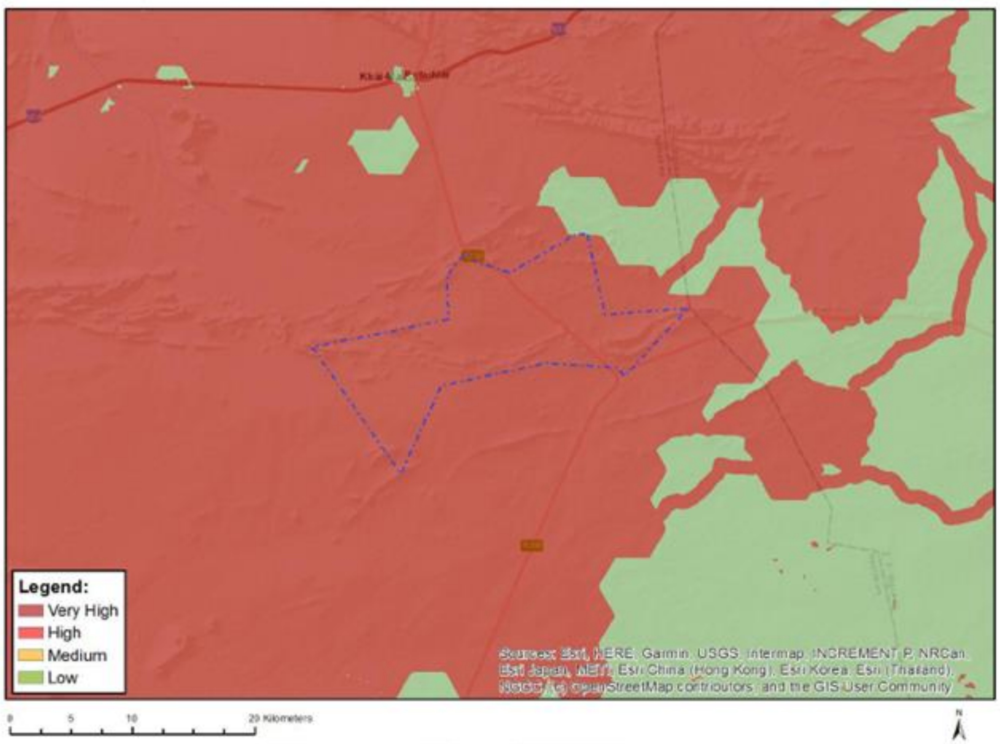
Site Sensitivity Verification

Site verification was undertaken in March 2021 by a SACNASP registered ecologist and candidate zoologist. The peak rain period for this area is from February to April, so this was considered optimal when the site survey was planned. However, due to the ongoing drought the region, rain was very limited that season (the first sufficient rains arrived in October 2021 only).

Sensitive plant species could not be confirmed due to the lack of rains in the region which produced poor vegetation cover for several years (Figure 6-3: Screening Tool map of relative terrestrial biodiversity theme sensitivity.Figure 6-3). The initial desktop review focused mainly on the BRAHMS Online Botanical Database of Southern Africa (BODATSA) database, producing a species list of 122 species recorder for the greater area. The species lists generated from existing botanical reports for the surrounding wind farms were also scrutinised and included in the expected species list.

Sensitive species 144 occurs in the wider area but was recorded on the study area during the site verification survey, and suitable habitat was present throughout the site. Sensitive species 425, 854 and *Cephalophyllum fulleri* were not confirmed during the SSV, however, suitable habitat was present and accordingly the species were included in the surveys. Suitable habitat was also present for other species of conservation concern (SSC) and was included in the assessment.

The findings of the site verification, which included a desktop assessment and site survey, confirmed the Very High environmental sensitivity of the Terrestrial Biodiversity and Terrestrial Sensitive Plant Species themes. Accordingly full assessments were conducted for both themes.



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Very High	Critical biodiveristy area 1
Very High	Critical biodiveristy area 2
Very High	Ecological support area
Very High	FEPA Subcatchments
Very High	Protected Areas Expansion Strategy

Figure 6-3: Screening Tool map of relative terrestrial biodiversity theme sensitivity.

Regional Vegetation

The study area is situated within the Nama-Karoo Biome, a landlocked region in the central plateau of the western half of South Africa that represents the second largest biome, comprising approximately 248,284km². It is essentially a grassy, dwarf shrubland, dotted with characteristic koppies, most of which lies between 1,000 and 1,400 meters above sea level.

The following vegetation types (Mucina & Rutherford, 2006, as amended) will be affected by the proposed development:

- Aggeneys Gravel Vygieveld;
- Bushmanland Arid Grassland;
- Bushmanland Basin Shrubland; and
- Bushmanland Inselberg Shrubland.
-

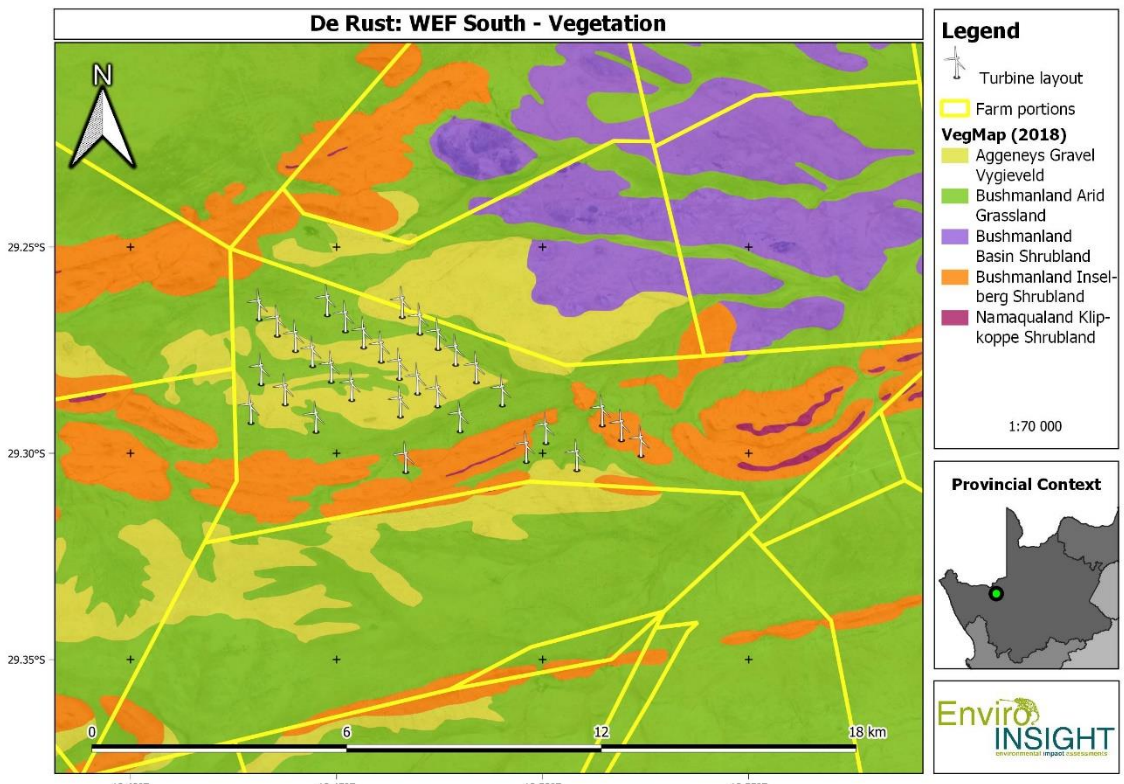


Figure 6-4: Regional vegetation types in relation to the study area (SANBI, 2018).

Aggeneys Gravel Vygieveld

This vegetation type is situated on flat or slightly sloping plains (appearing as distinctly white surface quartz layers against the background of red sand or reddish soil), supporting sparse, low growing vegetation dominated by small to dwarf lead-succulents of the families Aizoaceae, Crassulaceae, Euphorbiaceae, Portulacaceae and Zygophyllaceae, with some perennial components.

Eragrostis nindensis (resurrection grass) is the dominant perennial graminoid. It is strongly associated with Gneisses and Quartzites, which are the primary determinants of the location of the different types of gravel patches usually found on summits or foothills of inselbergs or on open plains associated with the base of inselbergs or low ridges amongst the gently undulating plains.

Table 6-2: Attributes of the Aggeneys Gravel Vygieveld vegetation type (Mucina and Rutherford, 2006 as amended).

Name of vegetation type	Aggeneys Gravel Vygieveld
Code as used in the Book	SKr19
Conservation Target (percent of area) from NSBA	18%
Protected (percent of area) from NSBA	-
Remaining (percent of area) from NSBA	99.1%
Description of conservation status from NSBA	Least threatened
Description of the Protection Status from NSBA	Not protected
Area (sqkm) of the full extent of the Vegetation Type	62.22
Name of the Biome	Succulent Karoo
Name of Group and Bioregion	Richtersveld

The conservation status is set as Least Threatened and none is conserved in statutory conservation areas. The conservation target was set at 18%. Due to low vegetation cover, the gravel patches are not targeted for grazing and no serious alien plant incursions are observed. These gravel patches are not well defined in the landscape and there are probably more gravel patches of considerable extent ion the region of Pofadder and Aggeneys that are currently featured. The low precipitation explains why the biomass of plants occurring on the gravel patches is low, but can be considered a true Succulent Karoo vegetation type and forms the easternmost extent of the Succulent Karoo Biome in Bushmanland.

Common species occurring in the region include *Boscia albitrunca, Ruschia divaricata, Euphorbia gariepina, E. gregaria, E. mauritanica, Hypertelis salsoloides, Kleinia longiflora, Lycium cinereum, Psilocaulon subnodosum, Sarcocaulon crassicaule, Senecio sarcoides, Titanopsis hugo-schlechteri, Pegolettia retrofracta, Aptosimum spinescens, Eriocephalus ambiguus, Euphorbia spinea, Fagonia capensis, Galenia fruticosa, Helichrysum pumilio subsp. pumilio, Hermannia spinosa, Microloma incanum, Monechma spartioides, Crassula coralline subsp. macrorrhiza, C. deltoidea* and *Stipagrostis ciliata*.

Biogeographically important species occurring in this vegetation type include the following: *Antimima vanzylii, Ceraria fruticulosa, C. namaquensis, Stomatium alboroseum, Berkheya canescens, Anacampseros filamentosa subsp. namaquensis, Avonia papyracea subsp. namaensis, A. papyracea subsp. papyracea, Crassula sericea var. sericea, Mesembryanthemum inachabense, Phyllobolus latipetalus* and *Adenoglossa decurens.*

Endemic taxa occurring in this vegetation *Adromischus nanus, Dintherus puberulus, D. vanzylii, Lapidaria margaretae, Anacampseros bayeriana, Conophytum achabense, C. angelicae subsp. angelicae, C. burgeri, C. maughamii, C. praesectum, C. ratum, Lithops dorotheae and L. julii subsp. fulleri.*

Bushmanland Arid Grassland

The southern border of the unit is formed by edges of the Bushmanland Basin while in the northwest this vegetation unit borders on desert vegetation (northwest of Aggeneys and Pofadder). The northern border (in the vicinity of Upington) and the eastern border (between Upington and Prieska) are formed with often intermingling units of Lower Gariep Broken Veld, Kalahari Karroid Shrubland and Gordonia Duneveld.

It is the second most extensive vegetation type in South Africa and occupies an area of 45 478 km^2. This vegetation type comprises extensive to irregular plains on a slightly slope plateau. Sparse grassland vegetation is dominated by white grasses (*Stipagrostis* species) giving this vegetation type the character of semidesert „steppe". In places low shrubs of Salsola change the vegetation structure. In abundant rainfall years rich displays of annual herbs can be expected. A Least Threatened status is ascribed to this vegetation type and only small patches is statutorily conserved in the Augrabies Falls National Parks and Goegap Nature Reserve, very little of the area has been transformed and erosion is very low.

Important taxa include:

Graminoids: *Aristida adscensionis, A. congesta, Enneapogon desvauxii, Eragrostis nindensis, Schmidtia kalahariensis, Stipagrostis ciliata, S. obtusa, Cenchrus ciliaris, Enneapogon scaber, Eragrostis annulata, E. porosa, E. procumbens, Panicum lanipes, Setaria verticillata, Sporobolus nervosus, Stipagrostis brevifolia, S. uniplumis, Tragus berteronianus and T. racemosus.*

Small Trees: *Acacia mellifera subsp. detinens and Boscia foetida subsp. foetida.*

Tall Shrubs*: Lycium cinereum, Rhigozum trichotomum, Cadaba aphylla* and *Parkinsonia africana*.

Low Shrubs: *Aptosimum spinescens, Hermannia spinosa, Pentzia spinescens, Aizoon asbestinum, A. schellenbergii, Aptosimum elongatum, A. lineare, A. marlothii, Barleria rigida, Berkheya annectens, Blepharis mitrata, Eriocephalus ambiguus, E. spinescens, Limeum aethiopicum, Lophiocarpus polystachyus, Monechma incanum, M. spartioides, Pentzia pinnatisecta, Phaeoptilum spinosum, Polygala seminuda, Pteronia leucoclada, P mucronata, P sordida, Rosenia humilis, Senecio niveus, Sericocoma avolans, Solanum capense, Talinum arnotii, Tetragonia arbuscula* and *Zygophyllum microphyllum.*

Succulent Shrubs: *Kleinia longiflora, Lycium bosciifolium, Salsola tuberculata and S. glabrescens.*

Herbs*: Acanthopsis hoffmannseggiana, Aizoon canariense, Amaranthus praetermissus, Barleria lichtensteiniana, Chamaesyce inaequilatera, Dicoma capensis, Indigastrum argyraeum, Lotononis platycarpa, Sesamum capense, Tribulus pterophorus, T terrestris, Vahlia capensis, Gisekia pharnacioides, Psilocaulon coriarium* and *Trianthema parvifolia.*

Geophytic Herb: *Moraea venenata.*

Biogeographically important taxa include *Tridentea dwequensis.*

Endemic species include *Dinteranthus pole-evansii, Larryleachia dinteri, L. marlothii, Ruschia kenhardtensis, Lotononis oligocephala* and *Nemesia maxii*.

Table 6-3: Attributes of the Aggeneys Gravel Vygieveld vegetation type (Mucina and Rutherford, 2006 as amended).

Name of vegetation type	Bushmanland Arid Grassland
Code as used in the Book	NKb3
Conservation Target (percent of area) from NSBA	21%
Protected (percent of area) from NSBA	0.4%
Remaining (percent of area) from NSBA	99.4%
Description of conservation status from NSBA	Least threatened
Description of the Protection Status from NSBA	Hardly protected

Area (sqkm) of the full extent of the Vegetation Type	45478.96
Name of the Biome	Nama-Karoo Biome
Name of Group and Bioregion	Bushmanland Bioregion

Bushmanland Basin Shrubland

A section of De Rust South WEF is embedded in the Bushmanland Basin Shrubland. Bushmanland Basin Shrubland occurs on the extensive basin centered on Brandvlei and Van Wyksvlei, spanning Granaatboskolk in the west to Copperton in the east, and Kenhardt in the north to around Williston in the south (Table 6-4). The area is characterised by slightly irregular plains dominated by a dwarf shrubland, with succulent shrubs or perennial grasses in places. The geology consists largely of mudstones and shales of the Ecca group and Dwyka tillites with occasional dolerite intrusions. Soils are largely shallow to non-existent, with calcrete present in most areas. Rainfall ranges from 100-200 mm and falls mostly during the summer months as thunderstorms. As a result of the arid nature of the area, very little of this vegetation type has been affected by intensive agriculture and it is classified as Least Threatened. None of the unit is conserved in statutory conservation areas. According to Mucina and Rutherford no signs of serious transformation are present for the vegetation type, but scattered individuals of *Prosopis* sp. occur in some areas (e.g. in the vicinity of the Sak River drainage system), and some localised dense infestations form closed ‘woodlands’ along the eastern border of the unit with Northern Upper Karoo (east of Van Wyksvlei) (Mucina & Rutherford, 2006 as amended).

There are few endemic and biogeographically important species present at the site and only *Tridentea dwequensis* is listed by Mucina and Rutherford as biogeographically important while *Cromidon minimum*, *Ornithogalum bicornutum* and *O. ovatum* subsp. *oliverorum* are listed as being endemic to the vegetation type (Mucina & Rutherford, 2006 as amended).

Table 6-4: Attributes of the Bushmanland Basin Shrubland vegetation type (Mucina and Rutherford, 2006 as amended).

Name of vegetation type	Bushmanland Basin Shrubland
Code as used in the Book	NKb6
Conservation Target (percent of area) from NSBA	21%
Protected (percent of area) from NSBA	
Remaining (percent of area) from NSBA	99.5%
Description of conservation status from NSBA	Least threatened
Description of the Protection Status from NSBA	Not protected
Area (km^2) of the full extent of the Vegetation Type	34690.68
Name of the Biome	Nama-Karoo
Name of Group and Bioregion	Bushmanland Bioregion

Bushmanland Inselberg Shrubland

Regional Distribution: Northern Cape Province: system of prominent "inselbergs" (solitary mountains) and smaller koppies exposed over surrounding flat plains between 850 and 1150 m alt. centred on the town of Aggeneys. Most important inselbergs include (from east to west) Namies, Achab, Gamsberg, Aggeneysseberg, Witberg, Haramoep, and Naip. Total area covered by the vegetation type is approximately 78 000ha of which 2545ha occurs in the study area or 3.2% of the regional extent.

Study Area Distribution and habitats: This vegetation unit occurs on the slopes of the inselbergs and koppies within the study area. The vegetation of the Gamsberg plateau is considered as Aggeneys Gravel Vygieveld. The upper south-facing slope of the Gamsberg on quartzite scree (above approximately 900m) is considered here as Namaqualand Klipkoppe Shrubland. This unit is mapped in the Anderson (2000) but not the Desmet et al. (2005) map. Two main habitats can be distinguished: Mountains slopes and Rocky Plains.

Table 6-5: Attributes of the Bushmanland Inselberg Shrubland vegetation type (Mucina and Rutherford, 2006 as amended).

Name of vegetation type	Bushmanland Inselberg Shrubland
Code as used in the Book	SKr18
Conservation Target (percent of area) from NSBA	34%
Protected (percent of area) from NSBA	-
Remaining (percent of area) from NSBA	99.8%
Description of conservation status from NSBA	Least threatened
Description of the Protection Status from NSBA	Not protected
Area (km^2) of the full extent of the Vegetation Type	637.52
Name of the Biome	Succulent Karoo
Name of Group and Bioregion	Richtersveld

Vegetation characteristics: Sparse to dense vegetation of variable composition; mixture of lowgrowing grasses (*Eragrostis, Aristida, Digitaria, Enneapogon and Panicum*); leaf-succulent karoo shrubs (*Ruschia, Antimima, Drosanthemum, Psilocaulon*), microphyllous and spinescent karoo shrubs (Acanthaceae, Asteraceae), succulent trees (*Aloe, Ceraria, Euphorbia*).

Common Taxa: *Eragrostis nindensis, Enneapogon desvauxii, Aristida congesta subsp. congesta, Oropetium capense, Digitaria eriantha, Aristida adscensionis, Chascanum garipense, Hermannia stricta, Aptosimum spinescens, Pappea capensis, Ceraria namaquensis, Ceraria fruticulosa, Dyerophytum africanum, Rogeria longiflora, Ficus ilicina, Ruschia robusta, Hereroa puttkameriana, Drosanthemum godmaniae, Nymania capensis, Hibiscus elliottiae, Pelargonium xerophyton, Pelargonium spinosum, Euphorbia spinea, Euphorbia gregaria, Euphorbia gariepina, Euphorbia avasmontana, Cucumis rigidus, Tylecodon rubrovenosus, Crassula sericea var. sericea, Crassula namaquensis var. namaquensis, Crassula garibina, Cotyledon orbiculata var. orbiculata, Adromischus trigynus, Salsola aphylla, Boscia foetida subsp. foetida, Boscia albitrunca var. albitrunca, Commiphora gracilifrondosa, Ehretia rigida, Rhigozum trichotomum, Helichrysum tomentosum subsp. aromaticum, Osteospermum armatum, Lopholaena cneorifolia, Kleinia longiflora, Hirpicium alienatum, Helichrysum herniarioides, Geigeria vigintisquamea, Eriocephalus scariosus, Eriocephalus pauperrimus, Eriocephalus microphyllus var. pubescens, Eriocephalus ambiguus, Dicoma capensis, Aloe gariepensis, Aloe dichotoma, Hoodia gordonii, Rhus undulata, Ozoroa dispar, Hermbstaedtia glauca, Tetragonia reduplicata, Galenia fruticosa, Galenia cf. meziana, Aizoon asbestinum, Monechma spartioides, Blepharis pruinosa, Blepharis mitrata, Blepharis micra, Acanthopsis hoffmannseggiana*.

Important Taxa: *Brunsvigia comptonii, Pachypodium namaquanum* (not present in the study area), *Euphorbia virosa* (not preset in the study area).

Endemic Taxa: *Avonia recurvata subsp. minuta, Conophytum friedrichiae* (not present in the study area), *Conophytum fulleri, Conophytum marginatum var. karamoepense, Conophytum praesectum, Dinteranthus vanzylii var. vanzylii* (not present in study area), *Schwantesia pillansii*.

Notes: This unit shows intermediate floristic similarities between the Succulent and Nama Karoo biomes and the Gariep Stony Desert. With the removal the upper south-facing slopes and plateau communities from this vegetation unit many important and endemic taxa have been removed from this vegetation unit. Generally, all the species of conservation concern that occur on the Gamsberg are associated with the Aggeneys Gravel Vygieveld, Namaqualand Klipkoppe Shrubland and Azonal (Kloof) vegetation units.

Inselbergs have long been known to harbour unique plant species, which is why the Leslie Hill Succulent Karoo Trust (LHSKT) first identified these solitary mountains as a top priority for conservation. The reserves fall within the Succulent Karoo biome in the arid western part of South Africa which was recently described by UNESCO as the "most biologically diverse arid area in the world".

But until March 2020, these Bushmanland Inselbergs of the Northern Cape were unprotected. Now, with the declaration of four new provincial reserves this is no longer the case. The four new reserves – Areb, Karas, Marietjie van Niekerk and Smorgenskadu Nature Reserves – adjoin each other and form the greater "Karrasberge Protected Area". Combined, they represent around 5 700 hectares of two previously unprotected vegetation types: Bushmanland Inselberg Shrubland and "Aggeneys Gravel Vygieveld, in addition to another poorly protected vegetation type, Bushmanland Arid Grassland, thus contributing to national and international conservation targets.

Northern Cape Critical Biodiversity Areas

The Northern Cape CBA Map (2016) identifies biodiversity priority areas, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), which, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of landscape as a whole (Holness & Oosthuysen, 2016). Priorities from existing plans such as the Namakwa District Biodiversity Plan, the Succulent Karoo Ecosystem Plan, National Estuary Priorities, and the National Freshwater Ecosystem Priority Areas (NFEPA) were incorporated.

CBA's and ESA's are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services. The primary purpose of CBA's is to inform land-use planning in order to promote sustainable development and protection of important natural habitat and landscapes. Biodiversity priority areas are described as follows:

- CBA's are areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near-natural state then biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity-compatible land uses and resource uses. For CBA's the impact on biodiversity of a change in land-use that results in a change from the desired ecological state is most significant locally at the point of impact through the direct loss of a biodiversity feature (e.g. loss of a populations or habitat). All FEPA prioritized wetlands and rivers have a minimum category of CBA1, while all FEPA prioritised wetland clusters have a minimum category of CBA2.
- ESA's are areas that are not essential for meeting biodiversity representation targets/thresholds but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon

sequestration. The degree of restriction on land use and resource use in these areas may be lower than that recommended for critical biodiversity areas. For ESA's a change from the desired ecological state is most significant elsewhere in the landscape through the indirect loss of biodiversity due to a breakdown, interruption or loss of an ecological process pathway (e.g. removing a corridor results in a population going extinct elsewhere). All natural non-FEPA wetlands and larger rivers have a minimum category of ESA.

According to the CBA Map, the study area is mainly located in the category "Other Natural Areas". CBA2 and ESA is located on De Rust South WEF (Figure 6-5). Four and eight turbines for North WEF and South WEF, respectively, are located within the CBA2 area. The CBA2 is listed due to recorded presence of threatened species, which was highlighted in the screening report, desktop studies and SSV. Some sections of the area are considered having a high biodiversity value, especially the Inselbergs and sections of the Vygieveld. The ESA are due to the large rivers running through the site and other natural non-FEPA Wetlands.

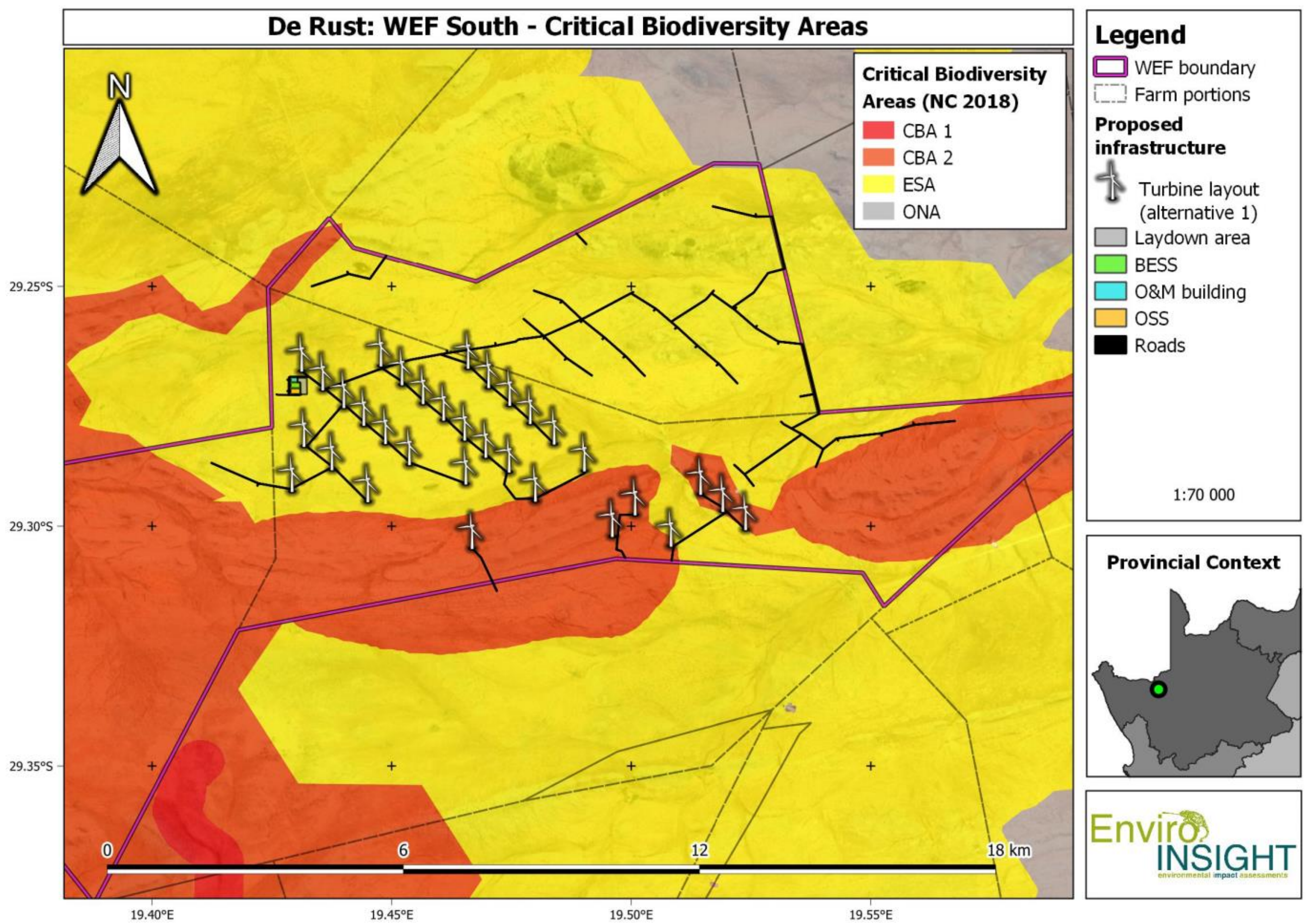


Figure 6-5: Regional vegetation types in relation to the study area (SANBI, 2018).

Protected Areas and Expansion Areas

The study area is not located in a protected area but is within a protected area expansion. The closest protected area is the Gamsberg Nature Reserve located west of the Project Area.

Focus areas for land-based protected area expansion are large, intact and unfragmented areas of high importance for biodiversity representation and ecological persistence, suitable for the creation or expansion of large, protected areas. The national focus areas were identified through a systematic biodiversity planning process undertaken as part of the development of the National Protected Area Expansion Strategy 20089 (NPAES). They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with strong emphasis on climate change resilience and requirements for freshwater ecosystems. These areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for fine-scale planning which may identify a range of different priority sites based on local requirements, constraints and opportunities. The common set of targets and spatial priorities provided by the NPAES enable co-ordination between the many role players involved in protected area expansion.

As landscapes become fragmented, we are rapidly losing the ability to create large protected areas, which are especially important from the point of view of adaptation to climate change. It is important to grasp opportunities to create viable large protected areas in currently intact landscapes.

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In the NPAES, an area is considered important for the expansion of the land-based protected area network if it contributes to one or more of the following:

- meeting biodiversity thresholds for terrestrial or freshwater ecosystems,
- maintaining ecological processes,
- resilience to climate change

The NPAES identifies 42 focus areas for land-based protected area expansion. These are large, intact and unfragmented areas suitable for the creation or expansion of large, protected areas. The study area intersects the Kamiesberg Bushmanland Augrabies (KBA) focus area (#15) in the Northern Cape, which represents the largest remaining natural area for the expansion of the protected area network. Specifically, the full extent of De Rust PV1 and PV2 are located in the KBA, while two turbines of De Rust South WEF are also located in the KBA (Figure 3-9). This represents <0.2% of the KBA extent, which is not considered significant. KBA provides an opportunity to protect 22 Desert, Nama Karoo and Succulent Karoo vegetation types, mostly completely unprotected, several river types that are still intact but not protected, and important ecological gradients and centres of endemism. These renewable energy projects further assist by protecting the land cover from being transformed due to mining operations.

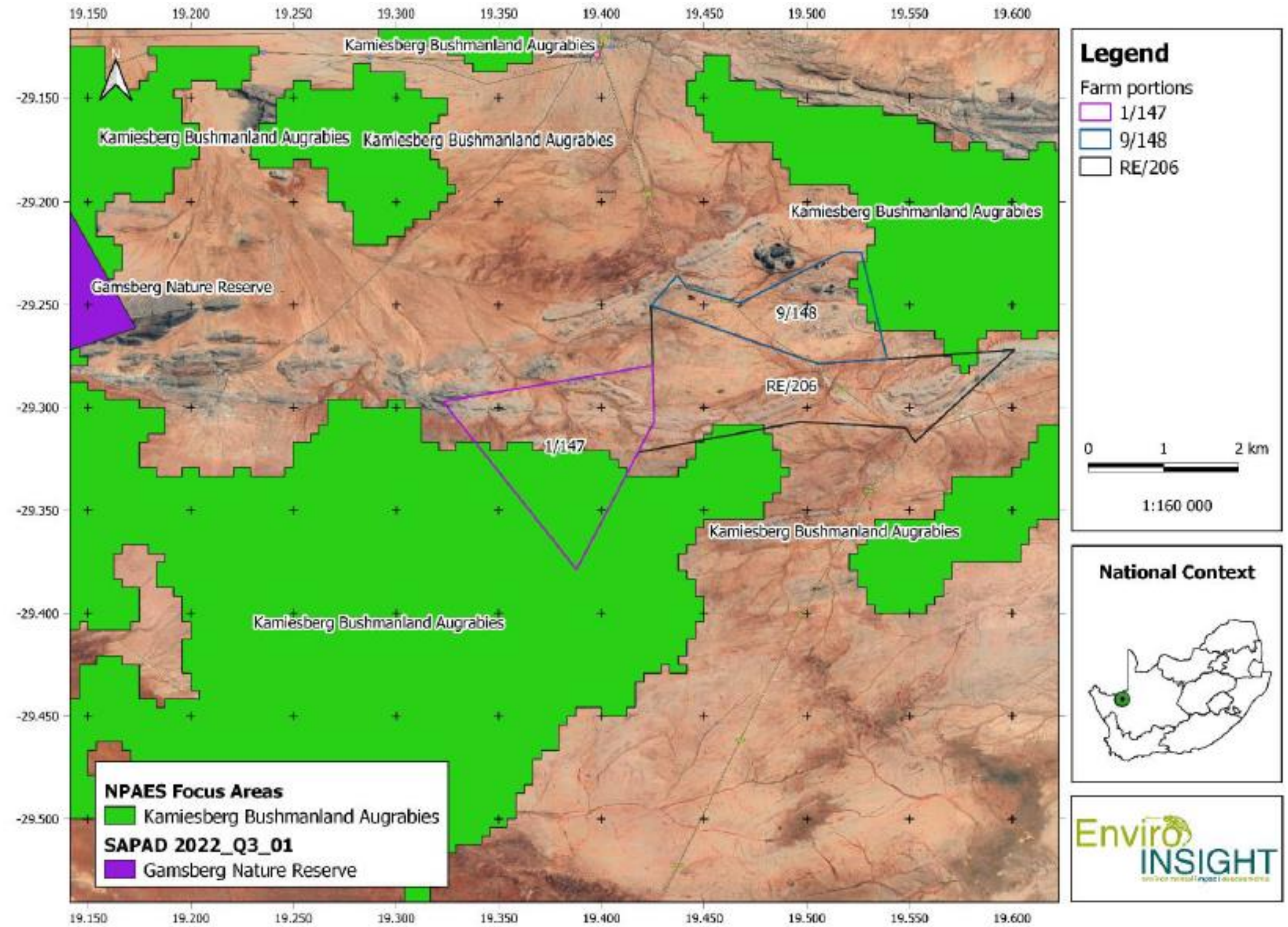


Figure 6-6: The four projects in relation to Protected Areas and Expansion Areas.

Ecology of the system

Ecological drivers and significant terrestrial landscape features

The hydrological setting of the project is within the D81G and D82B quaternary catchments of the Orange River water management area. Several depressions and rivers exist within this region which attracts multiple fauna species.

Changes in vegetation structure and composition are mainly driven by overgrazing and the introduction of alien invasive species such as Prosopis sp. Transformation in the vegetation types are minimal and has increased mainly due to mining activities in the area and the construction of renewable energy facilities, both wind and solar since 2012. Information with regards to this is unfortunately limited.

National Freshwater Ecosystem Priority Areas (NFEPA), 2011

The National Freshwater Ecosystem Priority Areas (NFEPA) project provides strategic spatial priorities for conserving South Africa's freshwater ecosystems and supports sustainable use of water resources. These priority areas are called Freshwater Ecosystem Priority Areas, or 'FEPAs'.

FEPAs were identified based on:

- Representation of ecosystem types and flagship free-flowing rivers
- Maintenance of water supply areas in areas with high water yield
- Identification of connected ecosystems
- Representation of threatened and near-threatened fish species and associated migration corridors
- Preferential identification of FEPAs that overlapped with:
  - Any free-flowing river
  - Priority estuaries identified in the National Biodiversity Assessment 2018
  - Existing protected and focus areas for expansion identified in the National Protected Area Expansion Strategy.

The assessment revealed the presence of multiple depression systems as well as the identified river systems as defined by the SQR database. The specific Area of Interest (AoI) for this project was drainage within the D81G-03996, D81G-03813 and D82B-04162 Sub Quaternary Reaches (SQR). The watercourses do not reach the Orange River and typically terminate before reaching the river. Only under significant rainfall is the D81G-03996 SQR expected to reach the Orange River via the Goob se Laagte non-perennial watercourse. In addition, the NBA (2018) dataset indicated the presence of a Channelled Valley Bottom (CVB) wetland unit which was associated with the D81G-03996 SQR.

Ecological functioning and processes

The Watercourses, Vygieveld and Inselbergs represent the most important ecological features in the region, and if not protected it could lead to reduced ecosystem services and could impact negatively on important terrestrial biodiversity features. Not one of the vegetation units are considered threatened, but there are sensitive or important landscape features that, if disturbed or transformed, could result in a catastrophic collapse of the system. (Note: Please refer to the Aquatic Biodiversity, Avifauna and Bat Assessments for more information).

The two proposed De Rust WEFs do not represent a significant impact on the ecosystem processes and services due to their small development footprint and by avoiding sensitive features. The main river courses, wetland pans and inselbergs located on the study area will be excluded from construction activities, and where linear infrastructure such as roads and powerlines need to cross, the appropriate mitigation measures need to be applied.

Ecological corridors and connectivity

An ecological corridor is a clearly defined geographical space that is governed and managed over the long-term to maintain or restore effective ecological connectivity.

The main watercourses and inselbergs act as corridors for the movement of fauna across the landscape. The proposed turbine layout will not impact on connectivity within the landscape if the turbines and associated infrastructure is located outside main watercourses. Where roads and powerlines cross watercourses, the necessary mitigation measures need to be implemented to reduce fauna mortality, and not restrict movement of fauna.

Species, distribution, and important habitats

This area generally receives very limited rain, sporadic rainfall. Accordingly, plant diversity is generally low. Five main habitats were identified based on species composition and structure (Figure 3-10; Figure 3-11). The main driver of vegetation pattern in the area is substrate. Georeferenced photographs were taken to assist in both the site characterisation as well as the sensitivity analysis and provide lasting evidence for future queries. The specialist coverage is considered optimal as every habitat was surveyed, taking into consideration the large study area. Furthermore, all areas of the study area were clearly visible, but not completely accessible due to the extent of the study area and road access limitations.

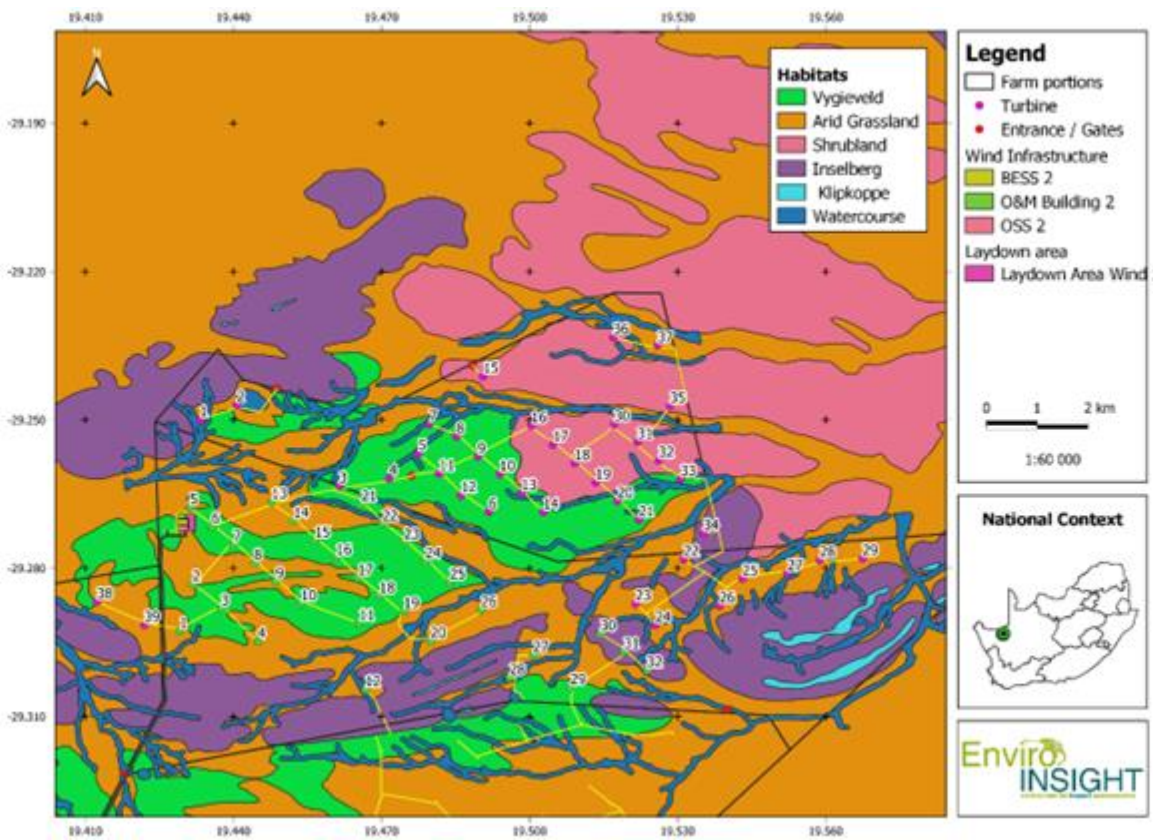


Figure 6-7: Habitats identified for the two De Rust WEFs.

- Arid Grassland

The major habitat for all four projects is the Arid Grassland, where perennial grasses with scattered shrubs occur on shallow, relatively coarse open plain. The grassland has a highly distinctive appearance due to the dominance of white grasses, namely *Stipagrostis* spp.

Dominant species recorded include: *Aristida adscenionis*, *A. congesta*, *Eragrostis nindensis, Stipagrostis ciliate, S. obtusa, S. uniplumis, Aptosimum spinescens, Cadaba aphylla, Lycium cinereum, Pentzia spinescens, Pteronia sordida, Plinthus karooicus, Rhigozum trichotomum, Salsola tuberculate, Solanum capense, Zygophyllum microphyllum, Acanthopsis hoffmannseggiana*, *Amaranthus praetermissus*, *Dicoma capensis*, *Sesamum capense, Tribulis terrestris,* Sensitive species 144 (nationally and provincially protected), *Hoodia gordonii* (provincially protected), *Euphorbia cf. lignose* (provincially protected).

The abundance of listed or protected species within this habitat is moderate with confirmed records of two SCC. As the habitat is not listed as threatened and is widely available in the area, it is however considered sensitive owing to the presence of endemic species, confirmed records of two SCC and important ecosystem services. The impacts of the WEF are considered to be medium to low, however the transformation due to the SEF and permanent infrastructure will be high. Vegetation clearing will be localised to the turbine sites, expanded roads and associated infrastructure, as well as the limited clearing during the construction phase, which will be rehabilitated post-construction activities.

- Shrubland

This habitat is situated to the east of the PAOI and only De Rust South WEF is located within it. The shrubland habitat is characterised by shrubs, forbs and succulent's characteristic of the Bushmanland Basin Shrubland, while tussock-grass-dominate areas on sandy soils (Figure 3-13). Overall diversity within this vegetation type at the site is considered medium to low, which can be ascribed to the aridity of the area and the poorly developed soils. Dominant species include *Lycium cinereum, Rhigozum trichotomum, Stripagrostis uniplumis, S. ciliata, S. obtusa, Oncosiphon grandiflorum, Oxalis sp., Aptosimum spinescens, Pentzia incana, Ruschia intricata, Monsonia sp.* and *Salsola tuberculata*.
Provincially protected species (for which a permit for removal will be required) include *Aloe claviflora, Hoodia gordonii, Euphorbia dregeana, Oxalis sp*., and *Mesembryanthemum crystallinum*.

- Vygieveld

The habitat can be characterised as sparse, low-growing vegetation with the perennial component dominated by small to very small succulent plants, including *Lithops* spp. Trees and grasses are generally absent or have low abundance and are confined to drainage lines. Gravel patches are characterised by a fairly uniform and dense layer (lag) of small quartz pebbles with rock and boulders absent or in low density.
Dominant species recorded include:

Acanthopsis hoffmannseggiana, Albuca spiralis, Sensitive species 144, Aptosimum spinescens, Aristida adscensionis, Avonia papyracea, Boscia foetida, Brunsvigia comptonii, Conophytum sp., Conophytum friedrichiae, Cotyledon orbiculata, Crassula corallina, Digitaria eriantha, Dinteranthus puberulus, Drosanthemum cf. hispidum, Eriocephalus ambiguus, Euphorbia gariepina, Felicia muricata, Galenia fruticosa, Gazania lichtensteinii, Helichrysum pumilio, Kleinia longiflora, Lithops julii subsp. fulleri, Mesembryanthemum sp., Microloma incanum, Ornithogalum sp., Osteospermum sp., Othonna cf. protecta, Oxalis sp., Pteronia mucronate, Ruschia sp., Salsola aphylla, Sarcocaulon crassicaule, Sericocoma avolans.

- Inselbergs

A group of prominent inselbergs and smaller koppies. The vegetation comprises shrubland with both succulent and non-succulent elements and with sparse grassy undergrowth on steep slopes of the inselbergs. In terms of physical habitat and floristic composition and structure the plateau and rocky slopes are similar (Figure 3-15). There are, however, several species that are restricted to the cooler plateau habitat that are not encountered elsewhere in the landscape. These species point to the important “climate refuge” role that the plateau plays locally and hence very high conservation importance by providing an edaphically similar habitat to the rocky plains but with a moderated climate allowing species to persist locally where they could not do so on the plains below the plateau.

Plateau “climate refuge” species include: *Adromischus diabolicus, Avonia recurvata, Conophytum fulleri, Crassula sericea, Euphorbia spinea, Haworthiopsis tessellata, Sarcostemma pearsonii, Stapelia similis, Sarcocaulon salmoniflorum. At the base of the inselbergs on the pebble plains, Dinteranthus vanzylii* occurs.

Watercourses

The Watercourse habitat is not well defined due to limited active channels which limits the presentation of defined zonation typically present in riparian zones. It is largely associated with the Bushmanland Arid Grassland vegetation type, which include typical grasses of *Stripagrostis* and *Schmidtia* species (Figure 3-16). Larger specimens of *Rhigozum trichotomum* were noted to occur in denser stands within the valley bottom and within depression systems, while *Stripagrostis uniplumis, S. ciliata* and *S. obtusa* grew in dense stands in the riparian zones. Dominant species include *Rhigozum trichotomum, Stripagrostis uniplumis, S. ciliata, S. obtusa, Prosopis glandulosa, Salsola aphylla.*

Sensitive Plant Species

National Sensitive Species

The plant species theme indicated Medium sensitive due to the possible presence of sensitive species 144, sensitive species 854, sensitive species 425 and Cephalophyllum fulleri (Table 4-1) owing to suitable habitat. Sensitive species 144 as well as three data deficient species were recorded during the site sensitivity verification and subsequent seasonal surveys. Accordingly, a full assessment was incorporated for this theme to account for all possible sensitive species likely to occur on site.

Table 6-6: Expected and Observed list of Sensitive Plant Species for De Rust WEF. Species highlighted in bold were recorded during this survey.

Species	National Status	Provincially Protected	Endemic (1) RSA or (2) Northern Cape	Observed or likely to occur within the study area
Sensitive species 144	**Vulnerable A3ce**	**Yes**	**No**	**Several individuals were recorded on site.**
Cephalophyllum fulleri L.Bolus	Rare[3]	Yes	Yes (1) & (2)	Not recorded. Suboptimal habitat on site. Moderate probability of occurrence.
Sensitive species 425	Vulnerable A4cd[4]	Yes	Yes (1) & (2)	Not recorded. Suitable habitat on site. High probability of occurrence.
Sensitive species 854	Vulnerable D2[5]	Yes	Yes (1) & (2)	Not recorded. Suitable habitat on site. High probability of occurrence.
Dinteranthus vanzylii (L.Bolus) Schwantes	**Data Deficient - Taxonomically Problematic[6]**	**Yes**	**Yes (1) & (2)**	**Two individuals observed at two separate locations**
***Hoodia gordonii* (Masson) Sweet ex Decne.**	**Data Deficient – Insufficient Information[7]**	**Yes**	**No**	**Observed within the study area and on neighbouring properties. Refer to section below for more details.**
Adromischus diabolicus Toelken	**Data Deficient - Taxonomically Problematic**	**Yes**	**Yes (1) & (2)**	**Observed within the study area.**

Sensitive species 144 – Vulnerable A3ce

This species occurs from Nieuwoudtville east to Olifantsfontein and northwards to the Brandberg in Namibia and is therefore not endemic to South Africa. It is known to occur on north-facing rocky slopes (particularly dolomite) in the south, and any slopes and sandy flats in the central and northern parts of its range. The main threats to this species include climate change, harvesting and trampling by livestock. Damage by baboons, scale insects and fungus has been observed, but none of these seem to cause mortality. Some social birds make large nest on the species, sometimes causing it to fall over due to the weight of the nests and

[3] The species is likely to have a restricted range, or be highly habitat specific, or have small numbers of individuals, all of which makes it vulnerable to extinction should it lose habitat. Recommend no loss of habitat.
[4] If the species has a restricted range, EOO < 2 000 km^2, recommend no further loss of habitat. If range size is larger, the species is possibly long-lived but widespread, and limited habitat loss may be considered under certain circumstances.
[5] This species either constitutes less than 1 000 individuals or is known from a very restricted range. No further loss of habitat should be permitted as the species' status will immediately become either Critically Endangered or Endangered, should habitat be lost.
[6] There is uncertainty regarding the taxonomic status of this species, but it is likely to be threatened.
[7] This species is very poorly known, with insufficient information on its habitat, population status, or distribution to assess it. However, it is highly likely to be threatened. If a Data Deficient species will be affected by a proposed activity, the subpopulation should be well surveyed.

its owners. Climate change models project a 36% decline in its range in 100 years, assuming dispersal into newly suitable areas. Patterns of modelled declines have been supported by field and repeat photo studies. However, no colonization of newly suitable areas has yet happened (Foden 2018). Without dispersal, the models predict a 73% decline in 100 years, qualifying the species as EN.

Several individuals were recorded within the study area and should be excluded from the proposed development and a 200 m will be implemented as per the SEA Guideline (SANBI 2022). The species will be protected in situ as per the Provincial gazette No 968 of 1 April 2005 in terms of the Nature and Environmental Conservation Ordinance, 1974 (Ordinance No. 19 of 1974) which prohibits the harvesting of this species

Dinteranthus vanzylii (L.Bolus) Schwantes – DDT

The species was recorded at two locations within the PAOI with only one individual recorded at each site. The species is taxonomically problematic (Raimondo et al., 2009) and has been listed as data deficient.

The species grow in fine sand and gravel among quartz stones, in a very dry area with sporadic rain. They both in colour and shape, resemble the stones and pebbles found in their natural habitat (see Figure 4-2). The form and colour of the Dinteranthus have developed in order to allow them to live in the harsh conditions of their natural environment where they are able to stand extended periods of drought.

D. vanzylii is an intriguing solitary or clumping plant with attractive bodies and flowers that is very similar to Lithops in shape and colours but with no apparent dormant period. Its sunken growth form is understood as a development parallel to that in Lithops. The leaf pair forming a cone or a funnel with the leaf tips broad, flat, but sometime with a thin horny keel near the fissure. It is smooth, chalky white to clear paste or greyish (rarely yellowish green) with obscure brownish patterning and irregular red or dark brown dots which coalesce into distinct lines similar to that of a Lithops. The intensity of marking varies greatly from plant to plant and comprises both completely chalky white plant without any marking and plant with brown markings and lines. It has a solitary, bright yellow to orange flower which blooms in autumn.

The species and suitable habitat have been excluded from development.

Hoodia gordonii (Masson) Sweet ex Decne.

Within and surrounding the PAOI, the species is abundant. Where the proposed development requires the removal or destruction of the species, the necessary permit from the Provincial Department for its relocation is required.

Individuals were recorded throughout the De Rust proposed development. Prior to commencement of construction activities, a walk through the site needs where the final infrastructure will be located is required. Only individuals impacted on by development activities requires a permit for relocation.

The species occurs in a wide variety of arid habitats from coastal to mountainous, also on gentle to steep shale ridges, found from dry, rocky places to sandy spots in riverbeds. It is a widespread species (EOO 850,000 km²) but has undergone decline since 2001 as a result of indiscriminate harvesting for its appetite suppressant properties. International and national demand was particularly high between 2004 and 2006 and as a result of the high economic value of this species (price range between

R500 and R1200 per kilogram at this time); even remote areas of its distribution range are suspected to have been harvested. Unfortunately, data do not exist to quantify the degree of decline to the population and as this species is widespread and can be locally common it is not possible to estimate overall population decline. Research on population recovery post harvesting and degree of impact of the harvesting over the past 10 years is required before this species can be accurately assessed. As a result of a decrease in demand for Hoodia internationally and the strict enforcement of new legislation to protect this species wild harvesting has declined in South Africa (Raimondo et al., 2008).

Sensitive species 425 – Vulnerable A4cd

This taxon is endemic to western Bushmanland in South Africa and has an extent of occurrence (EOO) of 3726 km². It is known from between 15 and 20 small, scattered subpopulations. It occurs in quartz patches within Succulent Karoo and Nama Karoo, often on Bushmanland Inselbergs. This habitat is present within the PAOI and has been excluded from development. This slow growing taxon is under heavy demand by succulent collectors. A 30 to 40% decline over a moving three generation time period of thirty years starting from 2010 is projected based on observed loss of habitat and degradation of habitat at certain subpopulations and as a result of the marked increase in illegal collecting taking place since 2016. With this taxon being highly popular with collectors, ongoing declines are predicted to continue. Furthermore, there are scattered mines within this taxon's range, and prospecting and mining expansion is ongoing affecting a number of subpopulations. It is also vulnerable to habitat degradation, particularly trampling by livestock when rangelands are overstocked. Some parts of its range, particularly low-lying flats, are heavily grazed (Young & Raimondo, 2020).

Even though not recorded, care must be taken to avoid suitable habitat and areas where the species has been observed. Prior to the construction phase and once the layout has been finalised, a walk down must be done for all planned infrastructure to ensure no individuals are recorded. If recorded, the necessary mitigation measures must be applied.

Sensitive species 854 – Vulnerable D2

A habitat specialist (AOO <20 km²) occurring on quartzite gravel in Aggeneys Gravel Vygieveld and Bushmanland Inselberg Shrubland. It is potentially threatened by grazing and trampling by livestock and possibly by harvesting for the specialist succulent horticultural trade.

The species has been recorded within a 10 km radius from the nearest infrastructure, and the screening report has highlighted suitable habitat for the species, which was confirmed during the SSV. The species is generally associated with the Aggeneys Gravel Vygieveld, which occurs in the PAOI.

Even though not recorded, care must be taken to avoid suitable habitat and areas where the species has been observed. Prior to the construction phase and once the layout has been finalised, a walk down must be done for all planned infrastructure to ensure no individuals are recorded. If recorded, the necessary mitigation measures must be applied.

Cephalophyllum fulleri L.Bolus – Rare

A habitat specialist known from three subpopulations but is not threatened (Klak & Raimondo 2008). It occurs in Quartz pebble fields overlaying sandstone or dolomite. The species has not been recorded in close proximity to the study area but the screening report has highlighted suitable habitat within the PAOI. During the SSV, no individuals were recorded and accordingly the species has not been confirmed on site.

Even though not recorded, care must be taken to avoid suitable habitat and areas where the species has been observed. Prior to the construction phase and once the layout has been finalised, a walk down must be done for all planned infrastructure to ensure no individuals are recorded. If recorded, the necessary mitigation measures must be applied.

Provincially Protected Species

In addition to the above species, there are several provincially protected species under the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) that occur on the study area which require permits for their removal from the Provincial Department. Prior to construction activities, all individuals of these species that will be directly impacted on by the proposed development, needs to be enumerated and marked with a GPS. A permit application for their relocation needs to be submitted to the Northern Cape Department Agriculture, Environmental Affairs, Rural Development and Land Reform and the necessary species needs to be removed or relocated prior to the commencement of construction activities.

The following family groups include provincially protected species recorded within the PAOI::

Schedule 1 species:

- *Hoodia gordonii*
- *Sutherlandia spp.*

Schedule 2 species:

- All species within the Aizoaceae family, which includes *Ruschia, Drosanthemum spp.*
- All Euphorbia spp.
- All Mesembryanthemum sp.
- All Crassulaceae spp.
- All Colchicaceae spp.
- All species within the Anacampserotaceae family, including Anacampseros spp.
- All species within the Oxalidaceae family, including Oxalis spp.
- All species within the Apocynaceae family
- All species within the Asphodelaceae family

SITE ECOLOGICAL IMPORTANCE (SEI)

The results of the SEI are indicated in the Tables below for each habitat. While most of the features that will be included in the conservation importance (CI) will be provided by the screening tool, it is important to note that CI is evaluated at a much finer spatial scale and based on fieldwork data collection and comprehensive desktop analyses performed by the specialist during the Environmental Authorisation (EA) process. The reasons indicated below are based on the criteria in the guidelines selected for each relevant habitat.

Conservation importance (CI)

Habitat	Criteria	CI
Watercourse	> 50% of receptor contains natural habitat with potential to support SCC including Rare and DDT species.	Medium
Arid Grassland	Confirmed occurrence in development footprint of sensitive species 144 listed as VU, however, does not trigger High as it is listed under criterion A and has more than 10 locations remaining. > 50% of receptor contains natural habitat with potential to support SCC including Rare and DDT species	Medium
Shrubland	> 50% of receptor contains natural habitat with potential to support SCC including Rare and DDT species. Suitable habitat for sensitive species 144.	Medium
Vygieveld	Confirmed occurrence in development footprint of sensitive species 144 listed as VU, however, does not trigger High as it is listed under criterion A and has more than 10 locations remaining. > 50% of receptor contains natural habitat with potential to support SCC including Rare and DDT species.	Medium
Inselbergs	Confirmed occurrence in development footprint of sensitive species 144 listed as VU, however, does not trigger High as it is listed under criterion A and has more than 10 locations remaining. > 50% of receptor contains natural habitat with potential to support SCC including Rare and DDT species. Sensitive species recorded within development footprint.	Medium

Functional integrity (FI)

Habitat	Criteria	FI
Watercourse	Good habitat connectivity with functional ecological corridors. Mostly minor current negative ecological impacts with some major impacts (e.g. established population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.	Medium
Arid Grassland	Good habitat connectivity with functional ecological corridors and a regularly used road network between intact habitat patches. Only minor current negative ecological impacts (e.g. few livestock utilising area) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential.	High
Shrubland	Good habitat connectivity with functional ecological corridors and a regularly used road network between intact habitat patches. Only minor current negative ecological impacts (e.g. few livestock utilising area) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential.	High
Vygieveld	Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches. Only minor current negative ecological impacts (e.g. few livestock utilising area) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential.	High
Inselbergs	Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches. Only minor current negative ecological impacts (e.g. few livestock utilising area) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential.	High

Receptor Resilience (RR)

Habitat	Criteria	RR
Watercourse	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.	Medium
Arid Grassland	Grassland is prone to rapid invasion by alien and invasive flora that prevents the restoration of this habitat following major disturbance. It requires active management and restoration attempts are not always successful. Flora endemic to this vegetation type is unlikely to adapt to major change, even after a long period. Certain species, mostly succulents, have a low likelihood of returning to a site when a disturbance or impact is occurring and once the disturbance or impact has been removed.	Low
Shrubland	Has the potential to be restored over time, and most flora species have a moderate likelihood of returning to a site once the disturbance or impact has been removed.	Medium
Vygieveld	This is a unique habitat which harbours many endemic and range restricted species, which cannot survive elsewhere. Most flora species have a low likelihood of remaining at a site even when a disturbance or impact is occurring or have a low likelihood of returning to a site once the disturbance or impact has been removed.	Low
Inselbergs	This habitat harbours many endemic and range restricted species, which cannot survive elsewhere. Most flora species have a low likelihood of remaining at a site even when a disturbance or impact is occurring or have a low likelihood of returning to a site once the disturbance or impact has been removed.	Low

Determination of Site Ecological Importance (SEI).

Habitat	CI	FI	BI = CI+FI	RR	SEI= BI+RR
Watercourse	Medium	Medium	Medium	Medium	Medium
Arid Grassland	Medium	High	Medium	Low	High
Shrubland	Medium	High	Medium	Medium	Medium
Vygieveld	Medium	High	Medium	Low	High
Inselbergs	Medium	High	Medium	Low	High

It is very important to note that SEI is specific to the proposed development activities and cannot be meaningfully compared between different proposed projects with different associated activities on the same spatial location.

Impacts

- Habitat loss due to placement of infrastructure,
- Habitat fragmentation,
- Reduced connectivity within the landscape,

- Loss of sensitive flora including SCC and provincially protected species,
- Increased alien invasive plant species due to soil disturbance and movement during the construction phase,
- Reduced ecosystem functioning due to construction within watercourse, pans and other sensitive features,
- Animal mortality due to construction phase activities,
- Fire and explosion hazard due to BESS, and
- Increased erosion due to removal of vegetation.

Decommissioning

When the wind farm reaches the end of its lifespan, all machinery and related installations must be dismantled and removed, and the site should, as far as is reasonably possible, be restored to its original condition. It is only if the developer decides to extend the life of the wind farm and repowering the site, that only the top section of the turbines (mainly the blades and operating mechanism) must be replaced. As decommissioning of large-scale wind farms in South Africa are new, the regulatory framework and impacts associated with this phase are based on assumptions. Perhaps the most important assumption is that decommissioning a wind farm is straight forward and simple, compared to the problems associated with decommissioning a nuclear power station, or a coal or gas fired plant. The major issue is not the physical removal but rather the disposal of the used parts. Where possible, all recyclable materials must be repurposed in an environmentally friendly way.

It is expected that the dismantling of turbines and associated infrastructure can lead to disturbance of fauna community, in all ways similar to that resulting from the construction phase. The dismantling of the project will eventually contribute to the removal of all the implemented structures; accordingly, this may be considered a positive impact.

Cumulative

- Habitat loss due to placement of infrastructure,
- Habitat fragmentation,
- Reduced connectivity within the landscape,
- Loss of sensitive flora including SCC and provincially protected species,
- Increased alien invasive plant species due to soil disturbance and movement during the construction phase,
- Reduced ecosystem functioning due to construction within watercourse, pans and other sensitive features,
- Animal mortality due to construction phase activities, and
- Increased erosion due to removal of vegetation.

Mitigation

Construction

- Placement of turbines within the High Sensitivity areas and drainage lines should be avoided.

- Placement of turbines within the High Sensitivity areas, including Inselbergs should be avoided.
- Ensure that lay-down and other temporary infrastructure is within low and medium sensitivity areas, preferably previously transformed areas if possible.
- This impact can also be greatly mitigated if the development in natural vegetated areas do not completely remove the existing vegetation and natural cover, with the removal of vegetation to be restricted to the minimum as possible. For the WEFs this is possible, but for the SEFs vegetation clearing and soil disturbance is more significant. Even though species can continue to exist between and underneath PV arrays, the layout of the arrays need to take this into consideration.
- The number of roads should be reduced to the minimum possible and routes should also be adjusted to avoid areas of high sensitivity as far as possible. Where possible, existing roads must be used to avoid additional habitat loss and fragmentation.
- Movements of machinery, vehicles and persons should be restricted to the existing roads and avoid the existing natural areas.
- Demarcate all areas to be cleared with construction tape or other appropriate and effective means. However, caution should be exercised to avoid using material that might entangle fauna.
- Rehabilitate disturbed areas that are no longer required by the operational phase of the development. Inadequate rehabilitation could result in limited revegetation and/or an invasion of alien vegetation which will result in long term ecological degradation and damage.
- Temporary infrastructure will be rehabilitated post-construction as these sections were only required during the construction phase. This includes laydown areas and the widening of internal roads.
- A Rehabilitation Management Plan must be developed and implemented during the construction phase as construction is complete at each site.
- An Environmental Control Officer (ECO) must be employed to monitor the clearing of vegetation for the construction of roads and hardstands.
- Sensitive species 144 needs to be protected in situ and requires a 200m buffer for WEF and 100m buffer for SEF.
- Three data deficient species were recorded on site. Even though no specific buffers are required as per the SEA Guidelines (SANBI 2020), *D. vanzyllii* and *A. diabolicus* should ideally be protected in situ and accordingly the layout should avoid the habitats where these species occur. *Hoodia gordonii* can be relocated and require a permit from the provincial government.
- A comprehensive Plant Search and Rescue must be undertaken by a suitably qualified botanical specialist prior to vegetation clearance. This is applicable for provincially protected species which could be removed from site with the relevant permit.
- Avoidance of drainage lines is necessary for the protection of suitable habitat for sensitive species 12.

- All relevant plant permits must be obtained from the provincial authority prior to the removal or relocation of SCC, including provincially protected species.
- Plant SCC found within the proposed site must either be housed in an onsite nursery for use during rehabilitation or be relocated to suitable areas where vegetation clearance will not occur.
- A site-specific Alien Invasive Species (AIS) Management Plan must be implemented during the construction phase and continued monitoring and eradication needs to take place throughout the life of the project.
- Alien vegetation, within the development footprints, should be removed from the site and disposed of at a registered waste disposal site.
- The development footprints and immediate surroundings should be monitored for the growth/regrowth of alien vegetation throughout the construction and operation phases of the project.
- Soil erosion and Rehabilitation Plan to be part of the EMPr.
- The clearance of vegetation, at any given time, must be kept to a minimum to reduce the possibility of soil erosion.
- Rehabilitation of eroded areas on a regular basis during the construction period.
- All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk.
- Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance.
- Ground clearing and the digging of trenches should ideally take place at the end of the dry season, prior to the first rains in order to minimise the impacts of dust.
- Newly cleared and exposed areas must be managed for dust and landscaped with indigenous vegetation to avoid soil erosion. Where necessary, temporary stabilisation measures must be used until vegetation establishes.
- Avoid the presence of people and vehicles in highly sensitive areas, including riverine areas and natural vegetation, as far as possible.
- Stormwater management plan is required.
- Avoid construction within watercourses, and where roads crossing occur, the appropriate mitigation measures as indicated by the aquatic specialist must be implemented.

Operational

- Reduce the presence of human activity on the project area as far as possible by only focusing on the areas where operational tasks are required,
- avoid the presence of people and vehicles in highly sensitive areas as far as possible,
- no unauthorised persons should be allowed onto the operational sites,
- any potentially dangerous fauna such snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location,

- lower the levels of noise whenever possible and avoid the destruction or disturbance of identified important features,
- illegal collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden by anyone except by individuals with the appropriate permits,
- 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,
- fences should be constructed in such a way so that burrowing animals can still gain access, which will allow other animals to also utilise the holes dug under fences to increase connectivity in the area.
- The site-specific AIS Management Plan must be implemented for the first year of the operational phase. Thereafter, alien vegetation must continue to be monitored and eradicated annually throughout the life of the project.
- Due to the disturbance at the site as well as the increased runoff generated by the hard infrastructure, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented. Problem woody species such as Prosopis are already present in the area and are likely to increase rapidly if not controlled,
- No BESS should be located in a sensitive area;
- Employ Fire Mitigation Measure,
- Emergency Spill Kits should be present onsite at all times;
- Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible.
- Alien vegetation, within the development footprints, should be removed from the site and disposed of at a registered waste disposal site.

Decommissioning

The ecological impacts associated with the decommissioning phase will be similar to those listed in the construction phase and the associated mitigations measures must be updated and implemented to reduce potential adverse impacts.

Sensitive features

The sensitivity map generated for the study area is indicated in Figure 6-8, where medium sensitivity (indicated in orange) can be considered for development with appropriate mitigation measures applied and highly sensitive areas (indicated in red) must be avoided (i.e. No-Go areas). The development footprint has moderate flora diversity, with three confirmed observations of plant SCC, and suitable habitat for at least two more species.

The final development footprint must take the overall sensitivity into account, with the aim of avoiding areas with high conservation value, including areas where ecosystem services and processes require protection. There are several highly significant biodiversity features within the development footprint, and impacts associated with the development activities that cannot be appropriately mitigated to an acceptable level. Avoidance is therefore the best option for the Inselbergs, as well as recorded plant SCC, suitable habitat and their associated buffers. The following buffers have been applied and incorporated into the sensitivity maps ():

- Sensitive species 144 (must be protected in situ): 200m buffer for WEF, and 100m buffer for SEF.
- *D. vanzylii*: suitable habitat mapped which must be excluded from development. No buffer was applied as it is a DDT species; however, the WEF does not impact on it and all infrastructure has avoided these areas.

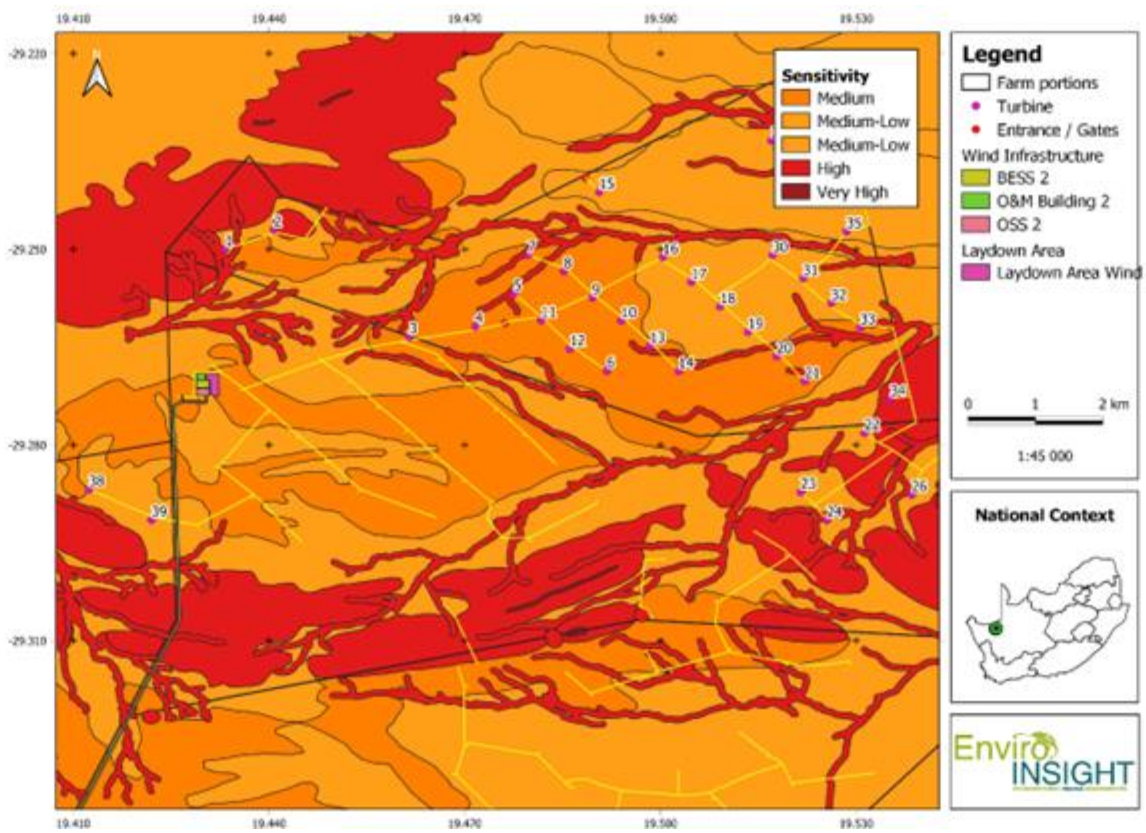


Figure 6-8: Sensitivity features for De Rust South WEF

Conclusion

The study areas for the two wind facilities and two solar facilities are located within five vegetation types, namely the Aggeneys Gravel Vygieveld, Bushmanland Arid Grassland, Bushmanland Basin Shrubland, Namaqualand Klipkoppe Shrubland, and Bushmanland Inselberg Shrubland vegetation types, all listed as Least Threatened. None of the facilities are located in a threatened ecosystem or protected area, but both SEFs and a portion of North WEF is located in a national protected expansion area.

Based on the SSV and further surveys, the Terrestrial Biodiversity theme was confirmed to have Very High sensitivity, while the Sensitive Plant Species theme was confirmed to have High sensitivity owing to presence of protected species. The Sensitive

Animal Species theme was confirmed to have Low sensitivity for all taxa groups except for avifauna, which is addressed in a sperate report.

All four De Rust projects intersect a CBA2 while both De Rust WEFs intersect an ESA. The CBA2 is mainly triggered for threatened species. Sensitive species 144 was recorded on site, along with three data deficient plant SCC and suitable habitat for two additional SCC. As long as the development of De Rust WEF project ensures that the overall functioning of the CBA2 is not compromised and the proposed development avoids the recorded SCC, development can continue. It is not anticipated that the development will lead to a significant loss of a population or habitat, as SCC are avoided by the development and appropriately buffered. The ESAs are mainly due to watercourses on site and should be avoided as far as possible and the appropriate mitigation measures should be in place to reduce impacts to acceptable levels.

Most of the De Rust WEFs and SEFs consist of grasslands on flat plains and gently sloping hills that are considered moderately sensitive. The watercourses and inselbergs are considered sensitive and should be avoided during the construction period for placement of turbines, PV arrays, laydown areas and associated infrastructure. Roads and cables will cross watercourses, and the impacts can be mitigated by reducing it to acceptable levels since avoidance is not possible.

Large sections of the PAOI are considered sensitive due to the Inselbergs and Klipkoppe habitats. There are specific features of the affected area which indicate that it is of broad-scale significance for faunal movement or landscape connectivity. For other provincially listed species which are affected by the proposed development, a permit application for their removal must be applied for with the provincial authority prior to the commencement of construction activities.

Considering the above-mentioned information, no fatal flaws are evident for the proposed project should the latest layout be incorporated which has taken sensitivities into account. It is the opinions of the specialists that the project, may be considered for authorisation, on condition all prescribed mitigation measures and supporting recommendations are implemented. Should the layout be amended and significant changes occur which impacts on sensitive features, all necessary protocols need to be followed to ensure all highly sensitive areas are avoided.

6.5. AVIFAUNA

An Avifaunal Preconstruction Monitoring Assessment was conducted by Enviro-Insight. Please refer to Appendix D2 for the report.

- **Preconstruction Bird monitoring Survey**

The field surveys were arranged so that the study area and control sites were surveyed for a total of 12 months (covering four seasons) and were completed in September 2022. This complies with the requirements of the Best Practice Guidelines available at the time (Jenkins et al. 2015). However, further supplementary data collection took place in January 2023 which yielded more data regarding avifauna within the PA and PAOI. This complies with the requirements of the Best Practice Guidelines available at the time (Jenkins et al. 2015). The preconstruction monitoring programme has included a total of five visits to the PA, with a further two surveys within an immediately adjoining survey area for another application, resulting in seven (7) surveys undertaken within the PAOI, covering the study area through a fourteen-month period that included the spring, summer, autumn and winter seasons of the (non-calendar) year. The surveys conducted per season/ dates are summarised in Table 6-7 below:

Table 6-7: Avifauna monitoring sampling period for the proposed De Rust WEF.

Date	Season	Methodology applied
October 2021	Spring	VP, DT, WT, WB, NE
January 2022	Summer	VP, DT, WT, WB, NE
May 2022	Autumn	VP, DT, WT, WB, NE
August 2022	Winter	VP, DT, WT, WB, NE
January 2023	Summer	Supplementary data collection

*** VP – Vantage points; WT – Walked transects; DT – Drive transects; NE – Nest searches, inspection and monitoring; WB – Water body inspections.**

<u>Vantage Points</u>

Six vantage points (VPs) within the PA were identified based on the preliminary desktop and scoping survey for the proposed De Rust WEF, and one identified as the control area outside of the PA, to record the flight altitude and patterns of priority species (totalling seven VPs). These sampling points were positioned at strategic locations within the PA and set up to allow the visual coverage of the PA (placing special emphasis on the proposed turbine locations) and its immediate surroundings. VP surveys were conducted accordingly to the most recent recommendation from the best practice guidelines at the time (Jenkins et al. 2015). Each location was surveyed for a minimum of 12 hours of observation per season divided through the early morning, midday and late afternoon times of day (Jenkins et al. 2015). For more information on each VP. The Vantage Point data collection provided the richest observations of priority species during the surveys. To gain understanding of the risk to each priority species, observed flight heights were divided into three categories: Low 0-50 m, Medium 50-150 m and High >150 m. For more information on each VP, refer to Table 6-8.

Table 6-8: Description of the Vantage Points surveyed

Vantage Point	Location	
	Latitude	Longitude
1	29°15'00.3"S	19°30'30.2"E
2	29°16'58.2"S	19°33'42.3"E
3	29°15'36.9"S	19°26'53.0"E
4	29°17'26.4"S	19°28'23.8"E
5	29°20'18.8"S	19°23'27.2"E

6	29°18'00.0"S	19°25'17.3"E
Control	29°13'36.0"S	19°33'18.6"E

Walked Transects

Seven linear transects ranging from 2 km to 3.4 km in length (14 km total), six located in the PA and one within the control area, were walked in order to characterize the passerine and small bird communities. These transects are representative of the biotopes present within the study area. To avoid pseudo-replication, transects were located at a minimum distance of 400 m apart from one another (Sutherland, 2006). Each transect was conducted by one expert bird observer at a time (more than one observer for all transects were used), who recorded all bird contacts (both seen and heard) by walking slowly along the predetermined transect. Observations were made on both the left and right side of the predetermined transect. Birds were only recorded (seen or heard) within a fixed maximum width of between 150 to 200 m on either side if the transect line. The same transects were repeated in every season. Surveys started after sunrise and were performed throughout the day to account for temporal variation in bird activity.

As a general rule, transects were not walked in adverse conditions, such as heavy rain, strong winds or thick mist. During the surveys, no adverse conditions were recorded that precluded successful analysis. The combined (across season) Index of Kilometric Abundance (IKA = birds/km) was calculated for each priority species observed.

Driven Transects

Large terrestrial birds (e.g., korhaans, bustards) and most raptors cannot be adequately surveyed using walked transects. Populations of such birds should be estimated on each visit to the PA by means of road counts (vehicle-based sampling; best applied for relatively large proposed WEFs, especially those with good networks of roads and tracks).

Road counts of large terrestrial birds and raptors require that one or a number of driven transects be executed (depending on site size, terrain and infrastructure), comprising one or a number of set routes, limited by the existing roadways but as far as possible directed to include a representative cross section of habitats within the PAOI.

These transects were driven at a constant and slow speed (± 15 km/h), and all sightings of large terrestrial birds and raptors were recorded in terms of the same data-capture protocols used for walked transects (above), and in general compliance with the road-count protocols described for large terrestrial species (Young et al., 2003) and raptors (Malan, 2009). Seven drive transects were identified in the PA and one drive transect in the control area with a combined total length of 26.984 km. One observer travelling slowly in a vehicle recorded all species on both sides of the drive transect. The observer stopped at regular intervals (every 100 to 300 m) to scan the surrounding environment with binoculars. The combined (across season) Index of Kilometric Abundance (IKA = birds/km) was calculated for each priority species observed.

Wetlands

Prior to the initiation of the preconstruction monitoring campaign, the main water bodies (including wetlands) present within the PA were identified on a Geographical Information System (GIS) by using 1:50 000 topographic maps and aerial photos. Several significant water bodies were identified on and surrounding the PA. These identified and mapped water bodies were surveyed to determine their level of utilisation by water birds. Due to seasonality, the birds were only surveyed during periods with some prevailing inundation or rainfall. Some drainage lines within the greater PAOI were inundated during the 2021 spring surveys and were observed accordingly.

Specialist Nest Survey

Any habitats within the PAOI of the proposed WEF, or equivalent habitats around the PA, deemed likely to support nest sites of key raptor and other species of conservation concern (SCC), including power lines, stands of large trees, marshes and drainage lines, were surveyed. All potential breeding sites, once identified fully, were mapped, and checked during each survey to confirm occupancy, and all evidence of breeding and the outcomes of such activity, where possible, recorded.

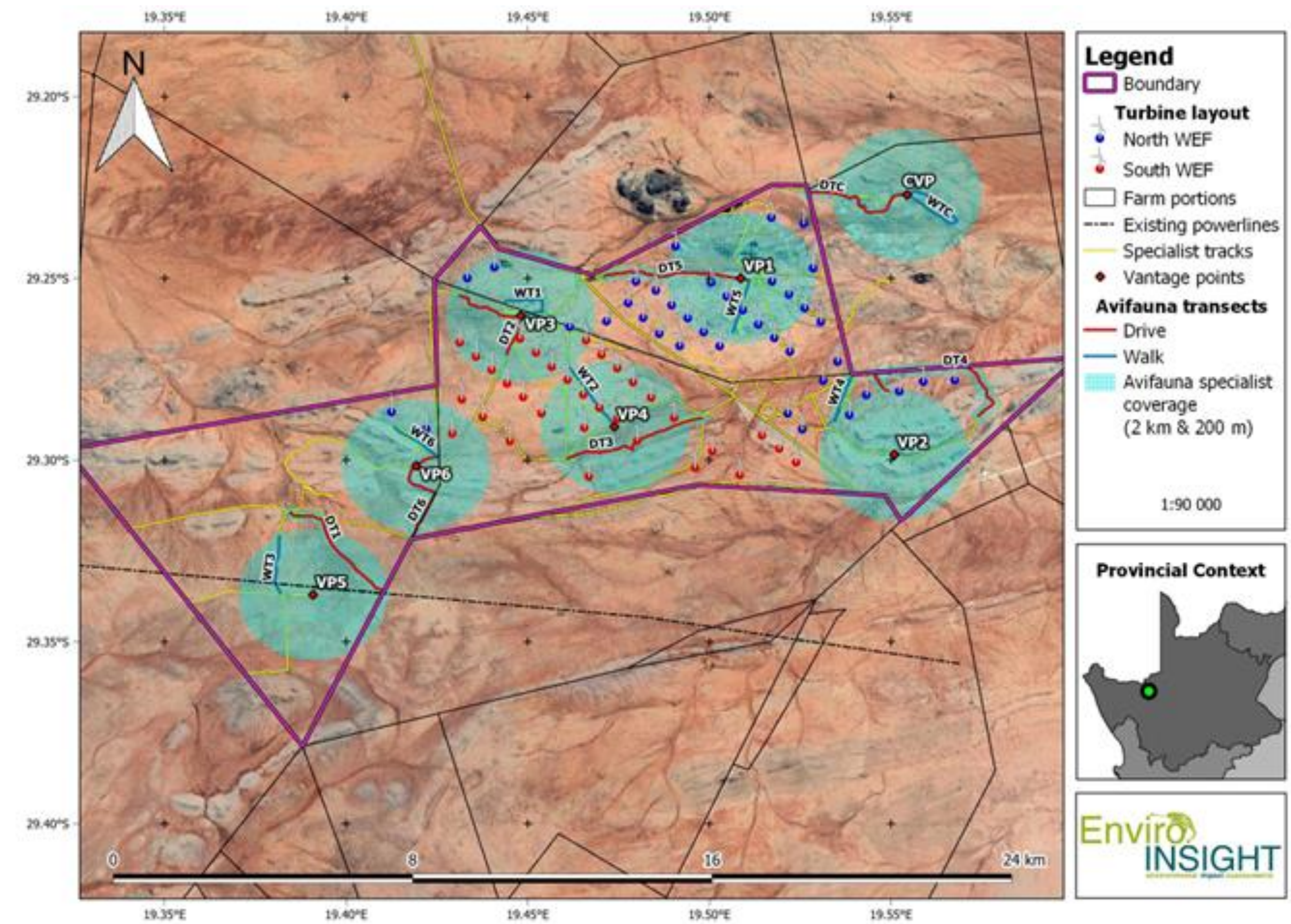


Figure 6-9: Avifauna survey sites and specialist coverage (GPS tracks as well as field of view) for the proposed De Rust WEF.

Incidental Observations of Priority Species

All other sightings of priority species (and particularly those suggestive of breeding or important feeding or roosting sites or flight paths) in the PA and control site as well as within the PAOI were recorded, along with additional relevant information such as habitat type, abundance, habits and weather data. These observations were used as complementary data to characterise the bird community and its utilisation of the PA, as recommended by the Best Practice Guidelines (Jenkins et al., 2015).

Species Collision Risk and Bird Passage Rate

For pre-construction surveys of this nature, Collision Risks are usually calculated using the following equation (adapted by Smallie and Strugnell 2020 in order to account for undulations and terrain):

Duration of medium and high-altitude flights x collision susceptibility calculated as the sum of morphology and behaviour ratings x number of planned turbines ÷100

Therefore, collision risk was calculated based on a measurement of the three assumed variations of crude passage rates as described by Smallie and Strugnell (2020), primarily focusing on passage rate, flight height and total surface area of turbines. These calculations were used to inform this EIA.

Species Of Conservation Concern

The Red List of threatened species generated by the IUCN (http://www.iucnredlist.org/) provided the global conservation status of avifauna. However, Taylor et al. (2015) produced a regional conservation status assessment following the IUCN criteria which was used for this report. The first three categories i.e., Critically Endangered, Endangered and Vulnerable, are collectively called 'threatened' species or Species of Conservation Concern (SCC).

Flagship species for the region: The Northern Cape is home to the South African (and Northern Cape Province) endemic Red Lark. This province hosts significant populations of arid-adapted large terrestrial birds which have been recorded (and are expected) within the PAOI such as Kori Bustard, Ludwig's Bustard and Karoo Korhaan. Additional "flagship" bird species include Martial Eagle, Verreaux's Eagle, Secretary Bird, with occasional incursions within the PAOI such as White-backed and Lappet-faced Vulture (incidental sightings).

Results

Regional Vegetation

The project area (PA) consists various vegetation types, with Bushmanland Arid Grassland and Aggeneys Gravel Vygieveld, covering the most area in the low-lying parts of the PA, Bushmanland Inselberg Shrubland and Namaqualand Klipkloppe Shrubland on the quartzite ridges/hills, and Bushmanland Basin Shrubland to the northwest near the dolerite outcrops. The PA has varied terrain, consisting of a relatively flat plain with small quartzite ridges and koppies that form linear hilly regions across the PA, with especially large hills in the southeast, and dolerite outcrops forming small to large conical koppies in the northeast. There are some rocky areas on the flats that are not associated with higher terrain, located in the northern central portion of the PA.

Protected Areas and Important Bird Areas

The proposed De Rust WEF is not located in an Important Bird Area (IBA) or protected area but is situated in-between the Gamsberg and the Mattheus Cat Conservation Area. Also situated near to the PAOI are the Haramoep Black Mountain IBA, the Bitterputs Conservation Area and the Marietjie van Niekerk Nature Reserve all being situated within a 90 km radius. Currently no part of these IBAs are formally conserved and no conservation actions have been implemented. Bitterputs falls within the Central Astronomy Advantage Area, which has restrictions on activities that can take place in it. This could result in some protection for the IBA.

Critical Biodiversity Areas

According to the CBA Map, the PA is mainly located in the category “CBA 2 and ESA”. The CBA2 is listed due to recorded presence of SCC as well as potential habitat for listed unknown threatened species. The ESA is due to the large expanses of sandy habitat (suitable for Red Larks) and other natural non-FEPA Wetlands.

Description of Major Bird Habitats

The primary avifaunal habitats are described in tabular formats below with accompanying representative photographs. It must be noted that the habitats have been delineated in accordance with the ecology of the prevailing avifaunal assemblages which may merge botanically divergent habitats and subsequently converted to sensitivity mapping. It is apparent throughout the PA that most of the habitats are capable of supporting a wide range of general avifaunal species and Red-Listed / SCC although some habitats are more generic in nature and therefore the presence/ absence of SCC is less easily predicted. The PAOI as a whole is an area of avifaunal importance, and the impact assessment that follows prioritises avoidance mitigation and the monitoring of avifaunal SCC.

Table 6-9: Description of Major Bird Habitats

Major Bird Habitats	
Pans and Drainage Lines	
Photographs	**Description**
	**Classification:** Ephemeral and endorheic drainage lines **Hydrology:** With avoidance, limited major hydrological impacts are expected from the development. **Geomorphology:** Channels varying in width and depth from large multi-channelled sandy gullies to shallow narrow channels with seasonally inundated pans with large surface areas. **Vegetation:** Vegetation varies depending on current levels of disturbance (especially biosphere effects around pans), channel width and depth, where larger deep-rooted trees line larger channels with lower shrub layers characterising smaller drainage line systems. **Avifaunal Characteristics:** Avifaunal assemblages differed depending on the classification of the pan and drainage line systems as well as the season. Most of the drainage line systems are seasonally ephemeral or dry while the pans inundate seasonally. Thus, most of the bird associations are linked to the prevailing vegetation and soil types within the delineated drainage line habitats or standing water. In summary, drainage lines with taller shrub and tree layers showed a much higher diversity of passerine species as well as sand-associates and ground-dwelling birds. SCC such as Ludwig’s Bustard (*Neotis ludwigii*) can occur in varying but potentially great densities depending on the prevailing ecological conditions. The seasonal drainage lines and accompanying riparian shrubs act as linear dispersal corridors for terrestrial bird species. Much greater species

	diversity (as well as a unique composition) was observed in this habitat and therefore, these systems are classified to be of high avifaunal importance. The drainage lines, especially in association with ridges act as important flight corridors for bustards, passerines and raptors between foraging and roosting sites.

Sandy Grassland

Photographs	**Description**
	**Classification:** Sandy Grassland **Hydrology:** No major hydrological impacts are expected from the development. **Geomorphology:** Undulating sandy grassy habitat with fewer flat areas and variable basal layer. **Vegetation:** Vegetation varies depending on slope and depth of topsoil and is characterized by grassland dominated and interspersed by negligible succulent/ Nama scrub (in varying ratios) karroid vegetation **Avifaunal Characteristics:** The sandy grassland habitats show a reduced structural complexity and vegetation which provides for a more generic species diversity albeit often at high densities of individuals. The habitat contains features that provide suitable foraging habitat for Red Lark (*Calendulauda burra*), Ludwig's Bustard (*Neotis ludwigii*), Kori Bustard (*Ardeotis kori*) and Secretary bird (*Sagittarius serpentarius*). Secifically, the habitat is characterised by a much-reduced rocky substrate and a higher prevalence of grassed red sand infusions which provides highly localized portions of optimal habitat for Red Larks.

Shrubland

Photographs	**Description**
	**Classification:** Shrubland **Hydrology:** No major hydrological impacts are expected from the development **Geomorphology:** Undulating semi-succulent karroid habitat with large extents of flat terrain. **Vegetation:** Vegetation varies depending on soil quality but is mostly comprised of karroid shrub interspersed with grassy patches **Avifaunal Characteristics:** There is a localised high population density of small mammals/ ground birds such as rodents, springhares, hares and korhaans within the PAOI as well as the regional linkage to the drainage line habitats. The absence of these animals in high densities reduces the ecological importance of this habitat for avifauna. The shrubland habitats do not provide structural complexity allowing for a higher species diversity and often showed lower densities of avifauna due to the lack of specific prey species that are found within. However, the habitat vegetation provides suitable foraging habitat for the Ludwig's Bustard (*Neotis ludwigii*), Kori Bustard (*Ardeotis kori*) and Secretary bird (*Sagittarius serpentarius*) and thus maintains a medium sensitivity. .

Koppies and Ridges

Photographs	**Description**

 	**Classification:** Koppies and Ridges **Hydrology:** No major hydrological impacts are expected from the development although some ridges are associated with non-perennial watercourses and facultative wetlands. **Geomorphology:** Undulating semi-succulent karroid habitat with large extents of connected and isolated ridges. The ridges are divided into quartz and dolerite based. **Vegetation:** Vegetation varies depending on soil quality but is mostly comprised of karroid shrub interspersed with grassy patches **Avifaunal Characteristics:** The localised high population densities of small mammals such as rodents, springhares and hares within the PAOI as well as the local linkage to the drainage line habitats, elevates the overall ecological importance of this habitat for avifauna. The rocky habitats provide structural complexity which often showed higher diversity and densities of avifauna due to the abundance of prey species that are found in this habitat. The habitat vegetation provides suitable foraging, roosting and breeding habitat for the Ludwig's Bustard (*Neotis ludwigii*), Karoo Korhaan, Kori and Secretary bird (*Sagittarius serpentarius*).
Powerline Infrastructure	
Photographs	**Description**

Classification: Powerline Infrastructure
Hydrology: No major hydrological impacts are expected from the development
Geomorphology: The large powerline pylons have been placed on undulating vegetated habitat with large extents of flat terrain.
Vegetation: Vegetation varies depending on soil quality but is mostly comprised of sandy grassland and karroid shrub.

Avifaunal Characteristics:

The Powerlines have proven to be important habitat for large raptors, especially Martial Eagle, which nest frequently on the powerline pylon infrastructure and utilise the pylons to launch hunts from.

Observed and Expected Avifauna

Total species composition and abundance

The PA supports a medium to high diversity and abundance of avifauna, which is to be expected in an arid area with a high habitat diversity such as the Pofadder region. A total of 83 species were observed during the surveys, as shown in Appendix 1. This medium to high diversity is predominantly due to a number of factors including:

- High regional aridity which shows a high temporal variability (turnover) in species diversity between seasons;
- Diverse habitat types (with some highly sensitive habitat such as drainage lines and temporary pans within the PAOI);
- Climate change which is characterised by lower rainfall and increased temperatures but with stochastic high rainfall events (La Niña) as occurred during 2022;
- Powerline infrastructure bisecting the PA (raptor nesting habitat).

It must be noted that stochastic high rainfall events caused by the La Niña weather phenomenon (especially after the prolonged drought periods) and other atypical prevailing influences (persistent mild weather) may have influenced the local avifaunal assemblage densities which were often recorded as being very high

Priority species list

A total of 19 priority species are expected to occur on and surrounding the PA, of which sixteen (16) were recorded during the surveys (Table 6-10). numerous priority avifauna species occur within the PAOI and can be expected to interact with the proposed development. It is vital to consider the context within which these species were observed in the current study, as congregatory behaviour, nesting behaviour and foraging behaviour may differ from that at the adjacent existing WEF facility. Indeed, Van Rooyen (2020) suggests that displacement effects of a WEF can be more significant than direct fatality for certain species, especially for habitat specific species such as Red Lark and Ludwig's Bustard. Consequently, all applicable data of priority species observed across monitoring seasons allowed for careful evaluation of potential impacts and application of suitable mitigation measures to reduce these impacts where possible. According to the literature, 14 IUCN threatened, and near-threatened species are known to occur in the region with nine species highly likely and six species confirmed during the completed surveys, representing a very high success rate given a single year study period. Of the expected species and according to Taylor et al. (2015), two of the species are Endangered, four of the species are Vulnerable and three are Near-Threatened. All relevant SCC are described in brief. Three selected relevant species that are possibly susceptible to the proposed development were discussed below in greater detail, which include specific (Guideline-based) recommendations for monitoring and mitigation.

Table 6-10: Priority avifauna species list (both expected and recorded as defined by Retief et al. 2012) for the study area.

Common name	Scientific name	Priority species rank	Global Status	Regional Status	South African Endemic	Current pre-construction monitoring
Bustard, Ludwig's	*Neotis ludwigii*	14	EN	EN		X
Buzzard, Jackal	*Buteo rufofuscus*	43	LC	LC	X	X
Courser,	*Cursorius*	69	LC	VU	X	X

Burchell's	*rufus*					
Courser, Double-banded	*Rhinoptilus africanus*	72	LC	NT		X
Eagle, Booted	*Aquila pennatus*	59	LC	LC		X
Eagle, Martial	*Polemaetus bellicosus*	4	EN	EN		X
Eagle, Verreaux's	*Aquila verreauxii*	2	LC	VU		
Eagle-owl, Spotted	*Bubo africanus*	98	LC	LC		X
Falcon, Lanner	*Falco biarmicus*	24	LC	VU		X
Goshawk, Southern Pale Chanting	*Melierax canorus*	75	LC	LC	X	X
Kestrel, Greater	*Falco rupicoloides*	95	LC	LC		X
Kite, Black-winged	*Elanus caeruleus*	94	LC	LC		X
Korhaan, Karoo	*Eupodotis vigorsii*	51	LC	NT	X	X
Korhaan, Southern Black	*Afrotis afa*	37	VU	VU		X
Korhaan, Northern Black	*Afrotis afraoides*	90	LC	LC		X
Lark, Red	*Calendulauda burra*	40	VU	VU		X
Lark, Sclater's	*Spizocorys sclateri*	50	NT	NT		
Secretarybird	*Sagittarius serpentarius*	13	EN	VU		
Snake- Eagle, Black-chested	*Circaetus pectoralis*	60	LC	LC		X
Vulture, White-backed	*Gyps africanus*	23	CR	CR		
23					4	16

Nest Survey

Nest sites were searched for during the surveys on all suitable sites which included windmills, trees, pylons, bridges and masts, representing the most potential roost and nesting sites for raptors. Water bodies and drainage lines showed potential for roost and nesting sites for multiple species, but the high degree of seasonality in the area may not guarantee successful breeding every year. During the survey and above average rainfall conditions was representative of optimal breeding habitat for water associated species. Highly significant breeding habitat was recorded during the survey and Ludwig's Bustard is considered a resident and likely to be breeding on site. This has been confirmed by the local resident who state that in optimal seasons, Ludwig's Bustard temporarily colonise and breed within the PAOI/ PA. Power line pylons were examined for raptor nesting sites to be discussed for Martial Eagles below. However, it is vital to understand that the abandoned large raptor (Martial Eagle) nests driving the site sensitivity analysis still hold significance given the potential for recolonisation as well the use of the nests by other priority species such as Lanner Falcons.

Preconstruction Monitoring main results

Walked and Driven Transects

During the walked transects, the total number of individual birds (per species) were recorded regardless of their priority status. Notable Priority Species recorded during walked transects included Martial Eagle, Ludwig's Bustards that were often flushed from foraging positions as well as Namaqua Sandgrouse, Double-banded Coursers, Lesser Kestrel, Northern Black Korhaans and Karoo Korhaans. The main focus of drive transects were the recording of large birds and raptors. Ludwig's Bustards, large to medium-sized raptors, korhaans and Red Lark were the most frequently recorded priority species. On some sample days, the observers returned at night and nocturnal priority species were recorded (such as owls, coursers and thick knees). In addition, avifauna data was collected concurrently by specialists during bat surveys.

For walked transects, a total of 590 individual bird contacts were recorded of which nine contacts and three species are classified as priority. For driven transects, a total of 554 individual bird contacts were recorded of which 15 contacts and 6 species are classified as priority. The combined priority and non-priority (1170 contacts over 41.1 km) IKA is 28.5 birds/km which is a moderate risk value. and represents the sparse, ecologically sub optimal habitat of the PAOI which can be affected through seasonal ecological changes caused by events such as drought or high rainfall events.

Vantage Points

The Vantage Point data collection provide the richest avifaunal observations with 5959 total contacts of which 149 were priority species (10 species in total).

A total of 189 hours of bird flight observation were completed at the seven Vantage Points in the PA during the year. Ten (10) priority species were recorded during VP watches in the WEF.

Focal Sites

The pan, drainage line and sandy grassland systems scattered throughout much of the PA contained a relatively high density (and higher diversity) of passerines, Ludwig's Bustards and Red Larks. All pylon infrastructure warranted special attention regarding foraging and breeding of priority species. Due to the fact that focal sites yielded data related to SCC, they are discussed specifically under Species Specific Risk Analysis and Recommendations.

Combined Species Summary

Ludwig's Bustards were recorded on 15 occasions with a total of 33 random contacts of which 0 sightings were above 40 metres, well below rotor height. In total, they were recorded on 48 occasions (55 individuals) Due to its relative abundance and Endangered extinction risk status, the Ludwig's Bustard is a priority species of concern since it may be prone to collision at certain times (e.g., when commuting between roosting and feeding sites, following rainfall events, invertebrate outbreaks (locusts) or commuting after farming activities (such as provision of fodder) which increase food availability). This species was not observed flying at rotor height during the survey period. For the majority of observations, Ludwig's Bustards were mostly observed close to drainage lines, adjacent to roadsides, and in adjacent livestock camps. On multiple occasions, the observers' presence flushed some birds (presumably breeding pairs). Flights were most often generally very low (less than 50 m height) and short distanced although on numerous occasions, individuals would take flight and leave the vicinity (+/- 2 km).

Red Larks were recorded 6 times (7 specimens although this is not an absolute count) of which only two display flights at 20 m height were recorded. The species is discussed in further detail below, but the presence of this species is potentially of significant concern with the implications to be discussed within the Impact Analysis below.

Martial Eagles were observed on nine occasions during the survey period with a further two times during supplementary data collection, totalling 11 observations. A maximum of four individuals were observed with one having perished. Observations were recorded at or above 50 metres, especially given the existing nests and propensity of the local eagles to roost on pylons. Given the absence of an active nest within the PA, this species is considered to be a low density (foraging flights only) and the species is of lesser concern than for other developments in close proximity to an active nest. In the PAOI, it is a resident (high risk).

Collision Risk Summary

All heights above ground for contacts with priority species were recorded for this analysis. The majority of all flight observations were recorded well below the anticipated rotor sweep height of 62.5 metres with only 9 species (1 priority species) observed to have flown at heights greater than 62.5 m. Only a single flight of height >150 m was observed (Black-chested Snake Eagle). Overall, the majority of species observed above rotor sweep height was considered to non-priority species. It was possible that a significant number of species are temporary foraging visitors (hence the frequent observations at lower heights) due to the highly unusual amount of rainfall that fell in 2022. However, the precautionary principle would suggest that all priority species be allocated a higher significance in regard to mitigation measures for the WEF. Using the measurement of a 175 m rotor diameter, and the current proposed layout of 74 turbines, this equals a wind farm collision risk area of 7,119,634.4 m² (7.12 km²).

The calculations yielded an overall predicted facility collision fatality of 23 birds based on the actual observational data and 39 birds based on a 20% predicted fatality rate assumption. It is important to repeat that this is a collision risk model replicated in other surveys, and its value is mostly in comparison with other sites and projects. The absolute numbers of predicted fatalities should be used in context. Despite some species such as Martial Eagle, Ludwig's Bustard being highly susceptible to powerline collisions, caution must be exercised when comparing the relative risks related to solar and/or wind farms with risks associated with power lines. However, and conversely, due to its resident status, one martial eagle fatality yearly (although low as an absolute number) is considered completely unacceptable (given the conservation status of the species and its ecology as a breeding resident) and thus the activation of strict mitigation measures is warranted. Therefore, and depending on the terrain and pylon placements, Martial Eagles may be highly susceptible to collision risk. Indications are that Ludwig's Bustards are not prone to wind turbine collisions and overall, given the very large size of the WEF and large numbers of turbines, these fatality numbers may fall within acceptable limits, especially when compared to the alarming number of fatalities recorded underneath the existing Homoud powerlines.

Avifauna Sensitivity

Delineated habitats and other important features for avifauna (e.g. eagle nests and powerline infrastructure) were evaluated in relation to the risk to priority species occurring in these habitats/features from the placement of wind turbines. There is an important presence of a number (mainly seven) SCC in the PA (namely Martial Eagle, Lanner Falcon, Ludwig's Bustard, Red Lark, Karoo Korhaan, Double-banded Courser and Burchell's Courser), recorded regularly and occurring relatively widespread through the proposed WEF area. In addition, there are several raptors utilising the PAOI, some of them priority species and/or of conservation concern, such as the Martial Eagle, Lanner Falcon, Pale-chanting Goshawk and Black-winged Kite.

The placement of wind turbines on rocky ridges, in drainage lines and in patches of natural vegetation, which are vital to maintaining populations of habitat obligate sensitive species (such as Red Lark), would result in a high probability of collision fatalities for such SCC. Consequently, avoidance mitigation is required for such habitats when siting turbines. A 50 m buffer was applied around these habitat features and must be considered NO-GO where no turbines and associated infrastructure may be located. A 200 m buffer was also applied around seasonally inundated watercourses in the PAOI, as these features function as flyways and attract birds under certain conditions and could be the only locations were certain sensitive species such as ducks, herons, storks and water birds are likely to occur. Buffered high sensitivity areas must be avoided by the developer where no turbines and associated infrastructure may be located.

Several of the proposed turbine positions and associated infrastructure coincide with areas currently demarcated as Medium sensitive features and consequently were subjected to the mitigation hierarchy. The layout was carefully re-evaluated in order to firstly avoid and secondly minimise negative interaction between wind turbines and priority species such as Red Lark and Ludwig's Bustard. Finally, the presence of the Houmoed Distribution line is a highly significant attractant for SCC and other priority species, with particular concern for the Martial Eagles which have been present and breeding within the PAOI for at least 30 years.

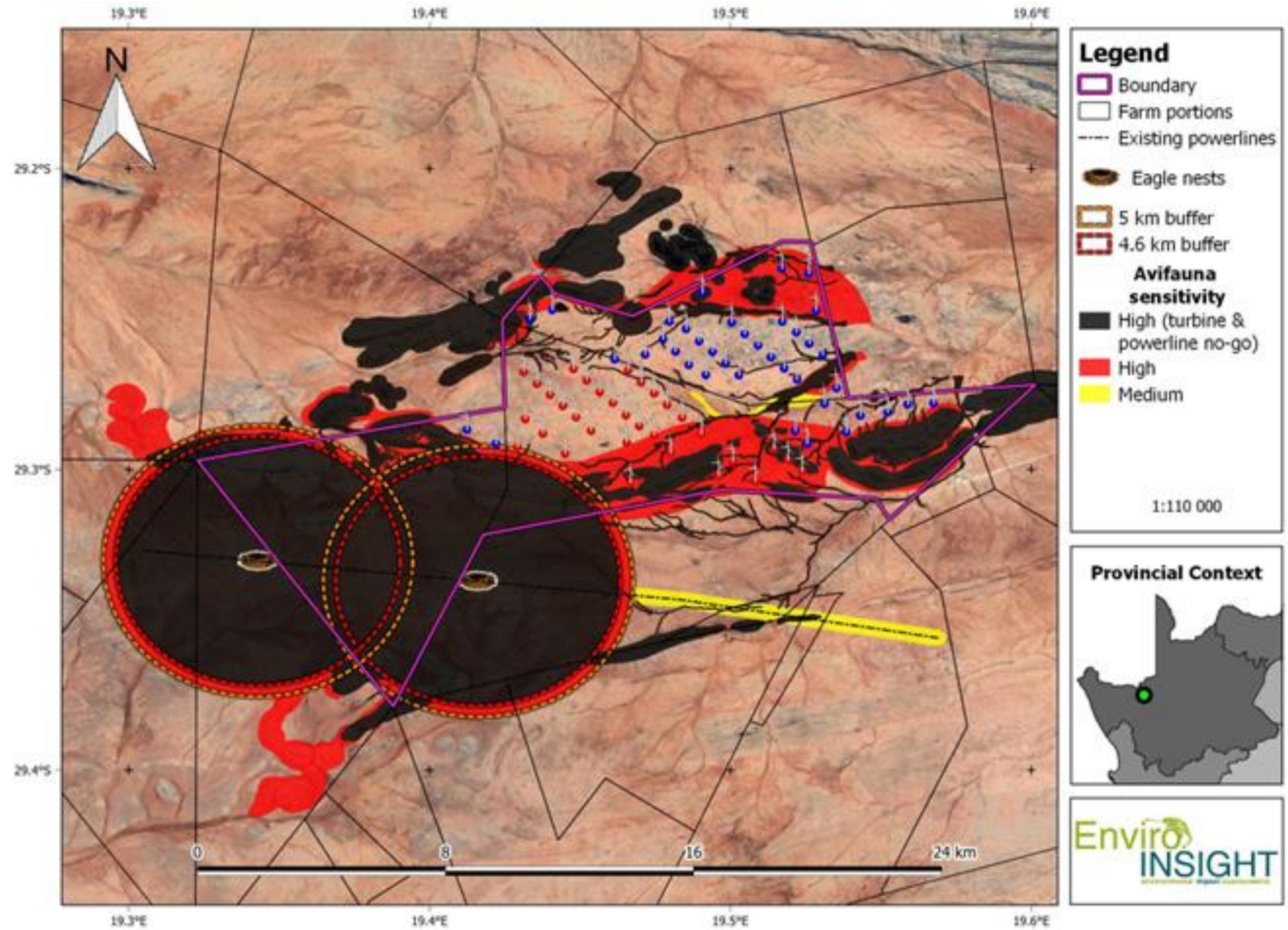


Figure 6-10: Overall avifauna sensitivity and associated buffers.

<u>Martial Eagle Nest Site</u>

Utilising the interpretations stipulated above and in the absence of any mitigation measures, a preliminary buffer of 5 km is recommended as an exclusion area around the two active Martial Eagle nests, which were confirmed after the completion of the 12-month pre-construction monitoring. The only published recommended buffer to implement around raptor nests in South Africa is for the Verreauxs' Eagle (Ralston-Paton, 2017), which dictates that a precautionary buffer of 3 km is recommended and may be reduced or increased based on the results of rigorous avifaunal surveys, but nest buffers should never be less than 1.5 km. This buffer is deemed inadequate for Martial Eagles, therefore a 5 and 4.6 km (unmitigated) being recommended. Based on the data collected during the pre-construction monitoring (see above), the Martial Eagles (including the newly arrived pair) within the PAOI appeared to be foraging regularly over the proposed WEF development area (seen a total of 6 times, 3 times of which were of pairs). At the conclusion of the survey and with data acquired from supplementary surveying in January, one of the nesting resident Martial Eagles has subsequently perished. In addition and during this period, two Martial Eagles have (possibly) colonised the area, frequently roosting on the power line pylon infrastructure and foraging as far as VP 1. Although this will not affect turbine layout and the mitigation measures to be applied, the Cumulative Impact Assessment is significantly affected and there exists an ecological risk that this pair, or new pairs of eagles may come to occupy the territorial vacuum left as a result of this fatality, given the loss of territorial exclusion between the individuals.

It is strongly recommended mitigation measures be coupled with a robust radar/ AI based monitoring program directed by a recognised Martial Eagle specialist (we propose Dr. Gareth Tate of the EWT) in order to automate Shutdown on Demand (SoD) and to collect data on the movement patterns of the resident eagles. It is suggested that the Shutdown on Demand (SoD) radar system combined with the AI be used in order to more accurately monitor not only Martial Eagle movements, but all species over 3 to 3.5 kg (including Ludwig's Bustard). The 5 km nest buffers (with the 4.6 km sub buffer) and the proposed position of the radar system.

Alternatively, the commercially available and cheaper BIOSECO system is recommended as it is capable of detecting large birds >500 m but not with 100% accuracy. Currently the system is very reliable within 300 m (Szurlej-Kielanska, 2022) although the manufacturing company is specifically looking to design systems with a range that exceeds beyond 500 m. In this case, because the main mitigation target is a Martial Eagle, which is a very large bird, a 400 m detection range is highly plausible for the current commercially available system meaning that placement of the unit on a specific turbine would cover detections for 2-3 adjacent turbines too, depending on the spatial configuration.

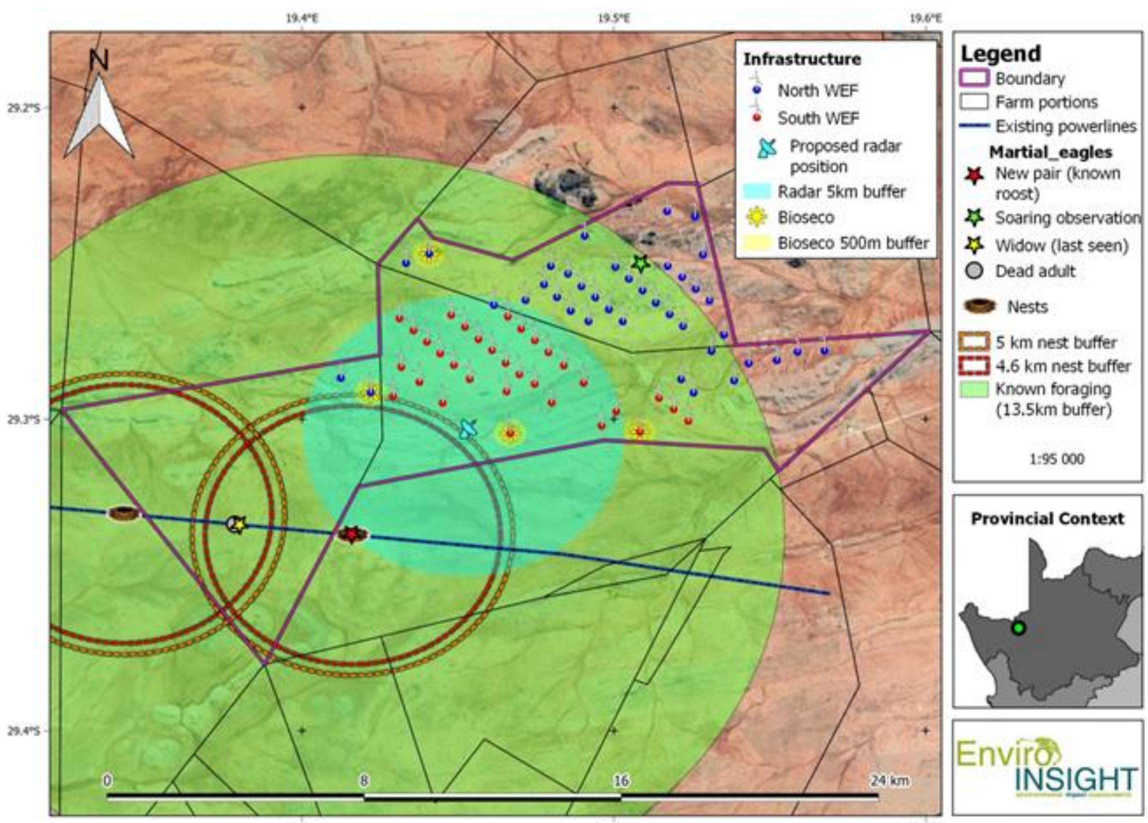


Figure 6-11: Martial Eagle Nest Buffers

Site Ecological Importance (SEI)

Avifaunal importance relates to species diversity, endemism and the presence of topographical features or primary habitat units with the intrinsic ability to sustain avifaunal assemblages, their food supply as well as the density and diversity of SCC. Throughout the PA, much of the habitat is generic in their ability to support a high diversity of general avifaunal species, Red-Listed species and SCC. However, unique geographical or topographical features exist in significant proportions which would cause the areas targeted for development to be classified as a "No Go" development in regard to avifauna. Due to the high diversity of the above mentioned, Red-Listed species recorded during the survey, (including regionally and globally listed Endangered and Vulnerable birds), the region as a whole is considered to be an area of high avifaunal importance and activities should be managed in a holistic manner, prioritising mitigation and monitoring of avifauna SCC.

High SEI

Habitats with high avifauna sensitivities include the seasonal drainage lines and water sources:

- The seasonal drainage lines and accompanying vegetation are linear dispersal corridors for terrestrial and wetland associated bird species. A significantly high species diversity (as well as a unique composition) was observed in this habitat and therefore, these systems are assigned high avifaunal importance. The drainage lines act as important flight corridors for passerines and raptors between foraging and roosting sites. Ludwig's Bustard utilise the habitat on the upslopes of drainage lines for foraging and lekking (breeding).
- The surface water habitats (artificial dams) are vital in the landscape, primarily due to the very arid conditions prevailing within the region. Avifaunal species depend on an interconnected system of water features (artificial or otherwise) and, based on seasonality and prevailing climatic conditions, it is anticipated that these systems experience a frequent turnover of species over time (seasonally and long term). They often provide essential breeding habitat, foraging habitat and water resources for avifaunal species including large, bodied SCC such as korhaans and bustards.
- The rocky ridges, specifically the steeper koppies, act as prominent landmarks and foraging habitat for diurnal birds of prey. It also provides potential hunting habitat for all SCC eagles (especially Martial) which hunt prey common in these habitats.

<u>Medium SEI</u>

Areas with medium avifaunal sensitivities include the Open Scrub Habitat and Sandy Grasslands:

- The open karoo habitats and Sandy grassland areas provide suitable foraging habitat for, Ludwig's Bustard and Red Larks but are very common in the landscape and are not a specific attractant for most SCC.
- The habitats are fairly resilient despite current disturbance and recovery is likely with adequate management and avoidance.

Table 6-11: Evaluation of Site Ecological Importance (SEI) of avifauna habitats in the project area. BI = Biodiversity Importance

Habitat	Conservation Importance (CI)	Functional Integrity (FI)	Receptor Resilience (RR)	Site Ecological Importance (SEI)	WEF Site Sensitivity
Open Shrubland	**Low/ Medium** – Multiple confirmed or highly likely populations of SCC albeit relatively generic and where SCC of IUCN Vulnerable or Endangered are not necessarily dependent on the habitat.	**High** – Despite disturbance from livestock agriculture, this large habitat exhibits high ecological functionality.	**High** – Habitat that can recover relatively rapidly.	**MEDIUM (BI = Medium)**	**LOW**
Koppies and Ridges	**High** – Multiple confirmed or highly likely populations of SCC and where SCC of IUCN Vulnerable or Endangered are relatively dependent on the habitat for foraging and breeding (e.g. breeding leks for Ludwig's bustard).	**High** – Cumulatively lower area for any conservation status of SCC and as a foraging and breeding habitat, the ecosystem type is crucial with currently only minimal current negative ecological impacts.	**Medium** – Associated vegetation will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality. Alteration to the physical rock structure cannot recover.	**HIGH (BI = High)**	**HIGH (No Go)**
Pans and Drainage Lines	**High** – Multiple confirmed or highly likely populations of SCC and where SCC of IUCN Near Threatened, Vulnerable or Endangered are relatively dependent on the habitat for migration. foraging and possibly breeding (Ludwig's Bustard Leks especially in association with Ridge Habitat).	**High** – Cumulatively medium (>100 ha) intact area for any conservation status of SCC. Currently only minimal negative ecological impacts.	**Medium** – Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality.	**HIGH (BI = High)**	**HIGH (No Go)**
Sandy Grassland	**Medium** – Confirmed or highly likely populations of SCC and where SCC of IUCN Near Threatened, Vulnerable or Endangered are relatively dependent on the habitat for migration. foraging and possibly breeding. Habitat specific to Red Lark (IUCN VU).	**Medium** – Connected and classified as natural although not unmodified with relatively moderate level of current negative ecological impacts.	**Medium** – Will recover relatively rapidly, especially with "resting" and some minor ecological rehabilitation (~ more than 5 years) to restore > 75% of the original species composition and functionality.	**MEDIUM (BI = Medium)**	**MEDIUM**

Habitat	Conservation Importance (CI)	Functional Integrity (FI)	Receptor Resilience (RR)	Site Ecological Importance (SEI)	WEF Site Sensitivity
Powerline Infrastructure (300 metre corridor either side)	**High** – Multiple confirmed or highly likely populations of SCC and where SCC of IUCN Near Threatened, Vulnerable or Endangered are relatively dependent on the habitat for breeding.	**High** – The linear transect traverses multiple habitat types and assuming a "corridor" or 100 metres either side of the powerlines, can be considered of high functional integrity as a breeding site for raptors. Although the pylon structure itself is considered to be artificial, the breeding habitat is highly functional.	**Medium** – Does not apply to the actual powerline infrastructure. Assuming a neutral evaluation.	**HIGH (BI = High)**	**MEDIUM**

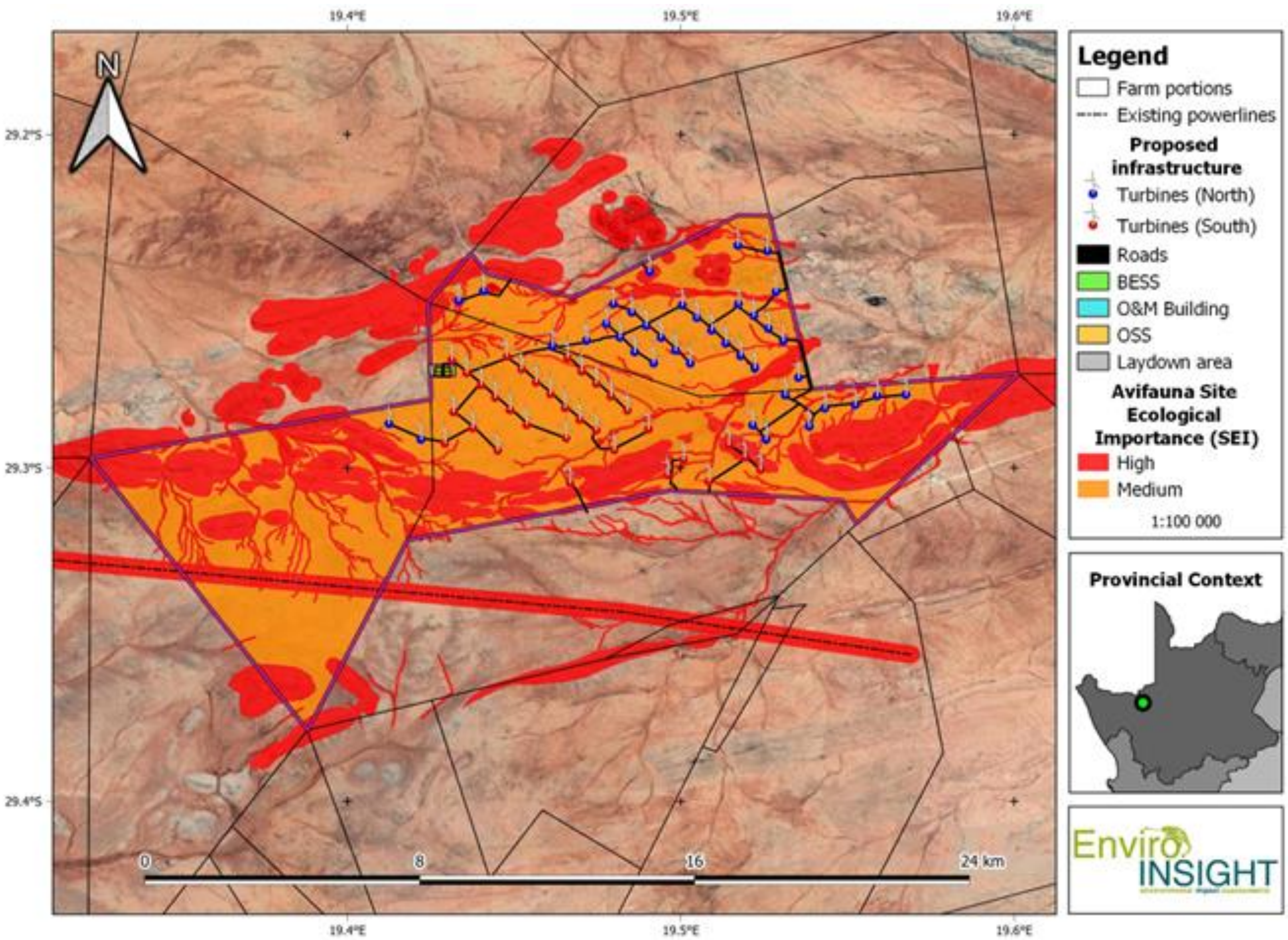


Figure 6-12: The De Rust Combined Project Area Site Ecological Importance (SEI)

Impacts

Construction:

- Habitat destruction
- The destruction or disturbance of bird roosts

Operation:

- Bird mortalities
- Disruption of bird migratory pathways
- The attraction of some bird species

Cumulative:

- Habitat loss: The destruction of highly sensitive habitat (for example sandy substrates for Red Lark) will potentially increase. The Red Lark exists within a narrow ecological and distributional belt and loss of its ecologically specific habitat may be significant;
- Road-kills: Many birds are commonly killed on roads, especially nocturnal species such as Spotted Eagle-Owl. Increased traffic to WEFs are likely to exacerbate this impact;
- Regional saturation of turbines: This has implications for several priority species, both in terms of collision fatality for some species, especially Bustards and Raptors, and displacement due to transformation of habitats and flyways;
- Powerlines: Numerous existing and new power lines are significant threats to large terrestrial priority species in the region as powerlines may kill significant numbers of all large terrestrial bird species, mostly through collision but also occasionally through electrocutions.

Mitigation

- Habitat destruction: Apply necessary buffers for roost and foraging sites and other sensitive bird habitat features, avoiding the construction of turbines and access roads in these areas. Roads must utilise or upgrade existing farm roads as far as possible.
- Bird fatality: Avoid placement of turbines near sensitive bird breeding and roosting habitats. The application of adaptive mitigation measures (e.g., shutdown on demand retrofitting), according to post-construction monitoring results (counted strikes of threatened species) must be informed by environmental correlates of avifaunal activity and/or strikes.
- Bird collisions with turbines: Increase turbine cut in speed as this has been shown to reduce collisions. The risk is not considered to be high, and the annual collision risk is estimated at less than 39 birds per year. The fatality rates post-construction will provide additional data and the risk model can be adjusted accordingly. Advanced Radar-based shutdown on demand must be applied where turbines transcend recommended buffers in permanent populations of Martial Eagles in the PAOI.
- Avoidance: It is recommended that no development (including the full rotor swept zone of wind turbines) takes place in High sensitivity areas, except for access roads. Avoid impacts to natural and artificial wetlands and water bodies by

implementing the appropriate buffer areas where no development may take place. This includes a buffer proposed around water points as they serve as focal points for bird activity.

General mitigation:

- Formal post construction monitoring must be resumed once the turbines have been activated, as per the most recent edition of the best practice guidelines (Jenkins et al. 2015). The exact scope and nature of the post-construction monitoring will be informed on an ongoing basis by the result of the monitoring through a process of an establishment of available new technology and adaptive management. The purpose of this would be to establish if and to what extent displacement of priority species has occurred through the altering of flight patterns post-construction, and to search for and identify carcasses at turbines (fatalities).
- High value target species such as Martial Eagles and Ludwig's Bustards can be tracked using the Shutdown on Demand Radar Technology and/ or telemetry systems in order to more accurately monitor movement patterns, especially in conjunction with turbines. These programs should be implemented during and post construction.
- Post-construction monitoring should be undertaken as per Jenkins et al. (2015). The exact scope, nature and frequency of the post-construction monitoring will be informed on an ongoing basis by the results of the monitoring through a process of adaptive management.
- If turbines are to be lit at night, lighting should be kept to a minimum and should preferably not be white light. Flashing strobe lights should be used where possible (provided this complies with Civil Aviation Authority regulations).
- Lighting of the wind farm (for example security lights) should be kept to a minimum. Lights should be directed downwards (provided this complies with Civil Aviation Authority regulations).

<u>Species Specific Mitigations</u>

<u>Martial Eagle</u>

- Human Monitors: General raptor monitors should be employed to monitor general movements and behaviours of target species, which may serve to both ensure local job creation as well as supplement the radar-based, shutdown on demand mitigation measures. Permanent observers can be assigned to both the nest sites as well as the affected WEF areas.
- Nest Buffering and Potential Removal: Removal of nest are not recommended however a 5km buffer is to be implemented.

<u>Ludwig's Bustard (*Neotis ludwigii*)</u>

- Comprehensive and continuous data collection is required to monitor the situation on site and apply appropriate mitigation measures and far more significant weighting and value should be applied to the Cumulative Impact Assessment.

<u>Large and Medium Raptors</u>

- Avoidance based mitigation is the primary mitigation measure and must be based upon the aforementioned delineated sensitivity.
- Human Monitors: General raptor monitors should be employed to monitor general movements and behaviours of target species, which may serve to both ensure local job creation as well as supplement the radar-based, shutdown on demand mitigation measures. Permanent observers can be assigned to both the nest sites as well as the affected WEF areas.
- Automated monitoring systems (radar detection systems) will greatly improve efficacy of informed curtailment, especially when considered in conjunction with other mitigation actions.

Red Lark

- Avoidance based mitigation is the primary mitigation measure and must be based upon the aforementioned delineated sensitivity. However some turbines fall within the delineated high sensitivity area for Red Lark and large-scale avoidance may not be possible. Micro sighting is required.

Monitoring

SCC community monitoring:

Sampling Method

- Drive Transects (species lists) – all species seen to be recorded along set transects to be driven during dawn till pre 10 am; and
- Walked Transects (species lists) – all species heard and seen to be recorded along set transects to be walked at dawn chorus

Frequency

- Annual wet and dry season surveys; and
- Continuous observations by ECO

Reporting

- Annual reporting presenting data analysis results and mapping indicating locations of change.

Fatality monitoring:

Sampling Method:

- For powerlines: Weekly surveys before dawn (prior to scavenger activity) by driving slowly along the servitudes and documenting each collision kill location and species (a georeferenced photograph as evidence is required).
- For turbine: weekly inspection on foot of cleared areas for birds killed during the operation process. Location and species must be recorded (a georeferenced photograph as evidence is also required).

Frequency:

- Weekly for powerlines, daily for turbines

Reporting

- Bi-annual reporting of faunal avifaunal mortalities associated with collision data highlighting locations where corrective measures are to be taken (if necessary).

Carcass monitoring

Sampling Method:

- Monitoring of livestock herds, especially during lambing/ birthing season
- A thermal drone with a large radius must patrol target areas during the night in order to pick up the heat signature of large-bodied animals in a state of decomposition.

Frequency:

- Three-times weekly for herds, daily during birthing season

Reporting

- Annual reporting of faunal livestock mortalities and numbers of carcasses located (including locations) associated with presence of vultures and large raptors.

Conclusion

The PA is located in a region dominated by natural and diverse koppies/ ridge, drainage line, karroid and sandy grassland and shrubland karoo vegetation types. Several drainage lines and small farm dams as well as small to large natural pans can be found scattered across the PA with most being mostly dry with some seasonal flow/ inundation. The powerline infrastructure that traverses the PAOI is a significant habitat for Martial Eagles and other raptors.

Sixteen (16) priority species were recorded during the initial surveys, including Pale-chanted Goshawk, Martial Eagle, Karoo Korhaan, Ludwig's Bustard, Lanner Falcon and Red Lark. Of these, the Martial Eagle and Ludwig's Bustard were the most concerning large bird species. At the commencement of the survey, the PAOI was characterised by extremely atypical high rainfall in areas not normally associated with arid conditions. The onset of an extreme rainfall event (wet season) may have atypically transformed the PAOI where it is possible that increased densities (and perhaps diversity) of avifaunal assemblages may have been recorded due to an abundance of high forage value habitat that became temporarily available in the region. This increases the perceived concern regarding large nomadic species such as bustards, large wide-foraging raptors such as Martial Eagle and possibly Vultures seeking water sources within the PAOI, when typical arid conditions return over the next 12 months.

Professional Opinion

The addition of the proposed De Rust WEF does indicate potentially significant impacts (without mitigation) to the receiving environment via the risk to Priority Species (such as Martial Eagle, Red Lark and Ludwig's Bustard) and need to be considered with provision made within the EMPr for this development. Although previous impact assessments and monitoring programs for existing local WEFs indicated that not all impacts can be mitigated to acceptable levels, medium significance post-mitigation should be interpreted that more can be done to avoid critically important species-specific (especially Martial Eagle and Ludwig's Bustard impacts as is the case for the impacts discussed within this statement). This is mainly because impact assessments regarding wind energy developments have been poorly understood since their inception and the impacts (especially cumulative impacts) of wind developments may have highly significant consequences if mitigation and monitoring is not implemented correctly. Overall, it is still the opinion of the consultants that the impacts associated with WEF projects are far preferable (from an environmental impact perspective) to extractive and/ or non-renewable alternatives. It must be related that this report must be considered in context with the greater EIA process which factors in economic desirability etc. In addition, while striving to maintain the highest standards of mitigation and monitoring as well as the commissioning of a highly detailed pre-construction micro siting assessment, developments such as the De Rust WEF should be encouraged within designated areas. The presence of nesting and breeding Ludwig's Bustard, Martial Eagles and Red Lark within the PAOI are of particular concern. Avoidance mitigation must be implemented in conjunction with the aforementioned micro siting as well as technological applications such as Shutdown on Demand.

The specialist has therefore no reason why an EA should not be granted on the following conditions;

- All recommended buffering be strictly adhered to.
- Shutdown on demand must be implemented if 5 km nest buffers are to be breached.
- All recommended mitigation measures be applied preconstruction, post construction and operations.
- The EMPr be updated every three years in order to revaluate the advances in AI, radar and camera technology.
- Currently available Deterrent and Shutdown on demand technology is to be immediately applied to the identified turbines in the form of Artificial Intelligence Camera systems.

Cumulative Impact Summary

Since the immediate area comprising approved or pending WEFs are expected to cumulatively result in a High impact significance to avifauna after the application of the recommended mitigation measures, and since the combined area will likely contribute significantly to the total land area in the region transformed by renewable energy projects, it is recommended that the development may proceed on condition that:

- All mitigation measures stipulated above are adhered to and captured in an Environmental Management Plan (EMP);
- The EMP must include the necessity for post-construction avifauna monitoring as stipulated in Jenkins et al., (2015);
- All updated mitigation recommendations issued post-construction (informed by monitoring) must be adhered to

6.6. BATS

A Pre-construction Bat Monitoring Assessment was compiled for the site by Enviro-Insight. Please refer to Appendix D3

Affected Environment

The project area (PA) consists of various vegetation types, with Bushmanland Arid Grassland and Aggeneys Gravel Vygieveld covering the most area in the low-lying parts of the PA, Bushmanland Inselberg Shrubland and Namaqualand Klipkloppe Shrubland on the quartzite ridges/hills, and Bushmanland Basin Shrubland to the north west near the dolerite outcrops. However, structural differences of vegetation between these vegetation types was not always obvious during site visits, except for the vegetation associated with the quartzite ridges/hills. Watercourses are typically poorly defined but usually have denser and larger bushes than the surrounding landscapes. There are no large/perennial streams or rivers close to the PA, but there are numerous small ephemeral watercourses, some with extensive alluvial plains, that drain towards the west, north and east. These systems do not form deep valleys or in-cut banks. The PA has varied terrain, consisting of a relatively flat plain with small quartzite ridges and koppies that form linear hilly regions across the PA, with especially large hills in the south east, and dolerite outcrops forming small to large conical koppies in the north east. There are some rocky areas on the flats that are not associated with higher terrain, located in the northern central portion of the PA.

Field surveys

All methods used for field surveys were performed in accordance with SABAA's document on best practice guidelines for pre-construction monitoring of bats at wind energy facilities in South Africa (MacEwan et al., 2020b).

<u>Site visits</u>

Several site visits have been completed to date spanning a full year encompassing all seasons.

Table 6-12: Summary of site visits and work conducted

Season and Dates	Methods	Weather and veld conditions
Autumn: 9-12th March 2021	Walkdown; rapid roost inspection	Dry, warm conditions, veld parched and appearing lifeless.
Spring: 11-14th October 2021	Deployment of bat detectors, transect drives, farmstead roost inspections.	Moderate temperatures with some cloudy days and first rains in a long time, veld still parched and appearing lifeless.
Summer: 13-19th January 2022	Passive detector data retrieval, transect drives, farmstead roost inspections.	Warm temperatures with sporadic cloudy days and rainfall events throughout the visit (on/off from October through to February). Veld with some green growth beginning on shrubs, but limited grass.
Autumn: 25-31th May 2022	Passive detector data retrieval, transect drives, farmstead roost inspections.	Cool temperatures, veld green and abundant new grass cover.
Winter: 5-7th August 2022	Passive detector data retrieval, transect drives, targeted roost inspections.	Clear skies and warm temperatures. Shrubs still green and grasses present.

Walkover survey

A survey was performed by walking and driving across the project area as a ground truthing exercise to identify suitable areas for the placement of bat detectors, identify potential bat roosting sites and other sensitive areas, and evaluate the level of monitoring that would be required. This was performed prior to the deployment of the bat detectors.

Passive Bat Detectors

Twelve months of Pre-Construction Monitoring are required for => 20 MW WEFs both inside and outside of a REDz. As the proposed De Rust WEF exceeds 20 MW, bat detectors were deployed for the full 12 months. Nightly recordings of bats from dusk to dawn were captured using the Wildlife Acoustics Song Meter SM4BAT FS Ultrasonic Recorders (hereafter referred to as "bat detectors"). As per the SABPG (MacEwan et al., 2020b), one bat detector must be deployed at a height of 7 - 10 m per 5 000 ha or for every significant biotope on the PA and one detector must be deployed at a height of 50 – 80 m per 10 000 ha for masts that are 80 m tall. If a mast is taller than 80 m an additional bat detector must be deployed as close to the top of the mast as possible. As described above, the proposed WEF (including the proposed Houmoed WEF) has a turbine development area of less than 20 000 ha and therefore 4 bat detectors at 7-10 m and 2 bat detector stations at a height of 50 – 80 m are sufficient. Five bat detectors were deployed with microphones positioned at 10 m above ground level (two of these at meteorological masts- only two meteorological masts were constructed for the site), each meteorological mast with a 10 m, 65 m and 110 m microphone. All devices were scheduled to record from 30 min before sunset to 30 min after sunrise at the location of the bat detector. During this time, the device is 'armed' and will begin a recording if a 'trigger' is detected. A trigger is defined as a sound within the set frequency range (Default: >16 kHz) amplitude (Default: 18 dB) for a minimum duration (Default: 1.5 ms). The recording then continues for the duration of the Trigger Window (Default: 3 second) after the last Trigger, and then saves the recorded data. If there are constant Triggers, the recording will save and close after the maximum length of a recording file (Default: 00m:15s). The bat detectors were connected to a 12 V (7.2 A) battery and a 20 W solar panel. On the meteorological masts all three bat detectors were connected to the same battery and solar panel. The bat detectors were serviced on a quarterly (seasonal) basis where all data were copied from the SD cards and backed up before formatting and replacing the SD cards. The equipment was also checked for faults and repaired if necessary. A total of eight bat detectors were therefore deployed across the PA, triplets at two meteorological masts and two singletons on individual 10 m masts (Figure 2-1). The two meteorological masts were constructed at locations predefined by the client, but the 10 m masts were spatially arranged within the proposed PA to represent the major habitat types. The major habitats include flat gravel or sandy plains, raised quartzite ridges with outcrop crests of quartzite and smaller plants and more succulents on their slopes, and stacked dolerite boulder outcrops and cones. Some bedrock is present within low-lying parts of the PA, appearing to be of igneous origin and having weathered extensively, but still forming outcrops, stacked boulders and crevices in some locations. Watercourses are ephemeral and typically have larger bushes or small trees within their drainage lines, with denser vegetation than in the surrounding landscape. One of the watercourses near the main farmstead has been dammed and maintains some level of water for an extended period after rain.

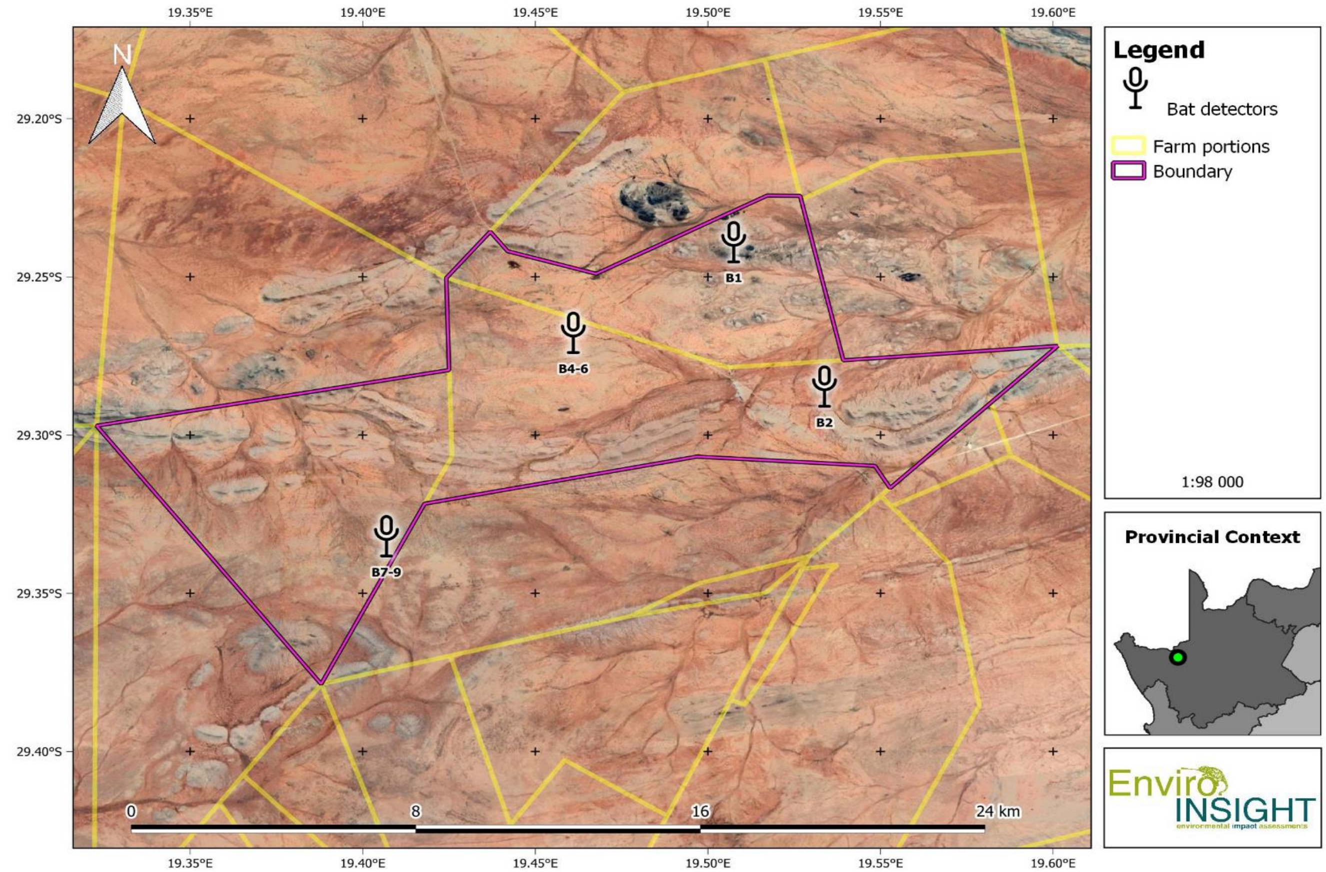


Figure 6-13: Locations for the eight passive bat detectors deployed within the proposed De Rust WEF boundary.

<u>Active transects</u>

Transects were driven for a minimum of two nights per season across the PA, no additional walk transects were conducted as the road network was extensive and intersected with all major habitats within the PA. The transect durations satisfied the requirements outlined in the SABPG (MacEwan et al., 2020b), with at least 2.5 hours duration per night and a total transect duration of at least 5 h per season over 2 nights. Transects were only conducted under fair weather conditions where possible (nights with rain or strong winds were avoided, some transects did have moderate winds but no rain). Three different transect routes were driven each night per season due to the large size of the study area. Bats were recorded using a bat detector with the microphone attached to a pole held outside the vehicle approximately 3 m above the ground, while driving at an average speed of 20 km/h (maximum < 30 km/h) along the same transect routes between survey periods. All transects were tracked using a handheld GPS.

<u>Bat roosts</u>

Potential bat roosts, including rocky outcrops, buildings, trees and other infrastructure, were visited and visually inspected during the day for signs of bats, which included searching for faecal material and conducting acoustic monitoring with a handheld bat detector (if considered necessary). No caves were found on or near the site. There are also small mountains present ~18 km to the north, which may also have potential for caves and small bat colonies, but no caves have been reported nearby from other studies.

Three sites were selected for short-term passive acoustic activity monitoring to ascertain if bats were using these habitats for roosting sites. This was necessary as the habitats could not be adequately surveyed using visual inspections due to deep cracks or inaccessible spaces between rocks and boulders. Bat detectors and microphones were deployed at ground level (~ 1 m high) for at least 2 nights close to the potential roost habitat. Recordings were identified and plotted against time to determine if activity patterns indicated resident bats using the features as roosts, such as a spike in activity at dusk and dawn when bats emerge or retreat to their roosts.

Results

Basic Habitat Description

Quartz hills and ridges

These are the most prominent habitat features within the PA, comprising hills and ridges of varied sizes and often an exposed solid quartz outcrop at the crest. The slopes are typically gentle and are strewn with medium to small quartz rocks and pebbles, often with an expansive flat base made up of small quartz pebbles and few plants. This habitat is easy to distinguish using satellite imagery due to the lighter ('white') colouration of the quartz rocks, which contrasts with the redder sands in the lowlands, and the change in elevation associated with the hills. However, eroded quartz hills may be flat and begin to mix with other surrounding substrate. These areas were excluded from the habitat delineation as the structure of the habitat is no longer present. No buffer was given to this habitat to assess bat activity, due to the expansive area that the ridge bases covered. Bat activity does not indicate that these general habitat features require buffering in terms of habitat sensitivity.

Brown bedrock

Exposed bedrock is present within parts of the PA, with a brown colouration and igneous properties, often showing advanced stages of weathering. These rocks are not associated with hills in the PA, but may form some small koppies where boulders are stacked. This habitat is difficult to distinguish using satellite imagery, as it is similar in colour to the surrounding landscape and because exposed bedrock can also occur in flat expanses which lack the structural components assigned to this habitat. Extensive surveys of the rocks were undertaken on foot to identify areas that possess potential cracks and crevices suitable for bat roosting sites and these delineations were used to define this habitat. The habitat was buffered by 200 m for the purposes of assessing bat activity associated with this habitat. However, because bats were shown to roost in this habitat a buffer of 500 m should be applied (MacEwan et al., 2020b).

Dolerite koppies

These rocky features are immediately recognisable by the black colouration of the dolerite boulders. They consist of large piles, outcrops or even large conical hills consisting of large, stacked boulders. Some areas have boulders with a browner colouration, but the boulders are similar, which are large and rounded, and often with expansive cavities between the boulders that extend into the centre of the feature. While these outcrops are easily recognised in satellite imagery from their dark colouration, site verification was also necessary as some areas have boulders embedded in the substrate, rather than forming deep cavities when boulders are stacked in a large pile. These outcrops (with cavities) were buffered by 200 m for the purposes of assessing bat activity associated with this habitat. Because bats (Rhinolophus damarensis) were shown to roost in this habitat they should be buffered by 500 m (MacEwan et al., 2020b).

Vegetated watercourses

Watercourses often form an important habitat feature for bats, which use them for movement corridors as well as foraging areas as the lush vegetation and moisture often associated with these areas increases the insect abundance and therefore the foraging potential for bats.

Dense vegetation was calculated using a median NDVI value from Sentinel 2 imagery (between July 2017- July 2022). The median was taken due to the pronounced effect of patchy and isolated rainfall events on vegetation growth, and low NDVI values over the dry seasons. The NDVI values were manually inspected against Google satellite imagery to select cut-off values to indicate a high density of vegetation, and cells with values above 0.121 were reclassified into a high NDVI category. A Sieve filter (threshold: 10; 8-connectedness: true) was applied to the output raster to remove small slivers and spots of dense vegetation and this resulting raster was then vectorised.

Watercourses, as delineated by the aquatic ecologist, were utilised to delineate potential foraging habitat for bats by clipping all dense vegetation (calculated above) within a 500 m buffer of the watercourses. This dense riparian vegetation was then buffered by 200 m. We chose a relatively wide buffer of the watercourse to select riparian associated vegetation because the drainage line vegetation was sometimes indistinct within the PA, and this reduced the potential for watercourses that may have been overlooked or too small for delineation. All other watercourses between sections of dense vegetation were considered as potential flyways and buffered by 200 m, and combined together forming part of the vegetated watercourses habitat feature. Watercourses with no dense vegetation in their upper catchments were not included or buffered.

Literature review

All nearby existing and proposed WEFs were searched for online to find additional data regarding important bat findings that might be of importance to the proposed De Rust WEF. Some EIA reports and bat specialist reports were available online, but despite requesting additional reports from SABAA, bat appendices and some additional reports were not available. Specialist reports from the Kangnas WEF, Korana WEF, Khai-Ma WEF, Poortjies WEF, Sol Invictus Overhead Powerline and the Paulputs WEF were reviewed for the literature review.

Based on the Monadjem et al. (2020), the ACR (2021) and previous surveys conducted for WEFs in the region, 13 bat species could potentially occur on the PA. However, only 10 species are considered to have a medium to high probability of occurrence given their roost requirements and known distribution, all of which are classified as Least Concern by the IUCN and not of conservation importance, with the exception of C. seabrae which is poorly known (few locations) and was previously considered to be Vulnerable (but is now Least Concern). The likely risk of fatality from turbines is high for the open-air foragers (Sauromys petrophilus & T. aegyptiaca), medium / high for clutter-edge foragers (E. hottentotus, L. capensis & M. natalensis) and low for the clutter foragers and species with restricted ranges (remaining spp.). Roosting requirements for species requiring caves, rocky outcrops and large trees are absent from the PA and only species known to utilise man-made infrastructure, such as buildings and walls are likely to roost in the area, including: Cistugo seabrae, L. capensis, Nycteris thebaica, Rhinolophus clivosus and T. aegyptiaca.

The nearby Gamsberg Nature Reserve is divided into two areas and is located 15 km to the west and 45 km to the west-north-west, Augrabies Falls National Park is located 85 km to the north-east of the proposed WEF, and Kara and Marietjie van Niekerk Nature Reserve to the west-south-west of the proposed WEF. Known caves are located in the Marietjie van Niekerk Nature Reserve.

Acoustic Monitoring

Passive Monitoring

Eight static bat detectors were deployed for the pre-construction monitoring, two stand-alone detectors with microphones at 10 m and three bat detectors for each meteorological mast, each including microphones at 10 m, 65 m, and 110 m respectively. The bat detectors recorded data for a total of 29 870 hours and captured 168 161 bat passes. This represents an average of approximately 86 % acoustic coverage across the current monitoring period, which is above the minimum requirements of 75 % (MacEwan et al., 2020b).

Nightly bat activity started off low in October 2021, and began to increase in mid-December and reached the highest activity at the start of February 2022, and high activity was maintained until mid-March after which a moderate level of bat activity persisted until June before dropping back down (similar to activity recorded in October 2021) for August, and increasing in September and October. A few notable activity spikes were detected across all recording data, taking place predominantly in Summer and Autumn, but also to a lesser extent from August to September. Large activity spikes (>40 bp/h) took place on 1, 4, 16, 22 February 2022, 6, 27 March 2022, and smaller spikes (>5 bp/h) on 19 December 2021, 8, 15, 19 January 2022, 12, 17 April 2022, 12, 25 May 2022, 23, 24 August 2022, 1, 9, 14, 15, 28 September 2022, and 1 October 2022.

Five potential bat species were recorded during static acoustic monitoring, L. capensis, M. natalensis and T. aegyptiaca were identified with certainty, while E. hottentotus and S. petrophilus were only tentatively identified. The majority of bat activity was represented by T. aegyptiaca and/or S. petrophilus, open-air foragers, and few clutter-edge foragers and very few clutter-foragers, as can be expected from the low vegetation and the flat terrain where the masts were erected. Bat activity at ground level was markedly highest at recorder B2 (median of 1.34 bp/h) and was roughly comparable between the other bat detectors (0.63-0.88 bp/h). Although B2 had more downtime during periods of low bat activity and will be biased toward higher values, the activity was still higher than other detectors at ground level during high activity periods where all detectors were recording, with the exception of B7.

No signs of large bat roosts were detected from patterns in the passive acoustic data. There was no evidence of bat migrations, but large and regular activity spikes of T. aegyptiaca and/or S. petrophilus during summer and autumn suggest that these open-air foragers are foraging widely during these seasons and appear to congregate on isolated nights.

Passes by Bat Detector

Hourly:

Hourly activity is only depicted as an average because the median values were mostly zero at this fine temporal resolution. Bat activity steadily increased from sunset and reached a plateau (21:00 - 04:00), decreasing dramatically from 04:00-05:00, with almost no activity thereafter.

Across all detectors, bat activity stays consistently high for a prolonged period (21:00-03:00), but then drops off. There are no obvious morning and evening spikes in activity which may indicate that the majority of bats are not roosting nearby if they forage until dawn, similar to the findings at the nearby Red Sands proposed WEF (Enviro-Insight 2023).

There were seasonal differences in relative bat activity:

- summer activity was more restricted, as expected from the longer daylight hours in this season.
- spring and autumn activity showed a peak in the middle of the night, while summer reaches a plateau of activity through much of the night.
- winter activity is greatest early in the night (19:00) and declines throughout the night., This is particularly evident for the recorders at height (B5, B6, B8, B9) but less so for those at ground level.

Yearly:

Bat detectors ranged from a median of 0.29 to 1.35 bp/h for the entire monitoring period. Detectors recorded similar median bp/h with B2 recording the highest median values, with average values greatest for B2, B4 and B7, indicating the greatest activity, followed closely by B1. However, detector downtime in B2 and B7 during some of the peak activity period is likely to have resulted in an underestimate of activity for these detectors, and their maximum activity values indicate that bat activity was likely higher at these sites than the others, where B7 has the greatest activity when considering bat activity from the main activity peak period, which had good recording coverage for all recorders.

Monthly/Seasonally:

Monthly activity is very congruent between bat detectors, showing very low bat activity from October to December 2021, which then increases from mid December 2022 and reaches the annual maximum in early February and March, before decreasing slightly to moderate activity levels for April and May, returning to very low activity for June to July 2022 and increasing slightly in August and September 2022. Seasonal patterns of bat activity in the PA are starkly contrasted and follows the same trend between detectors: bat activity increases drastically in late summer and stays high in early autumn before decreasing to very low levels over winter and spring.

<u>Passes by species</u>

Calls from potentially five species of bats were recorded and confirmed on the passive bat detectors, namely: L. capensis, E. hottentotus, M. natalensis, S. petrophilus and T. aegyptiaca. Rhinolophus damarensis was only detected during the additional roost acoustic surveys (Figure 3-10). As mentioned above, some calls from E. hottentotus and S. petrophilus, and S. petrophilus and T. aegyptiaca were grouped due to similarities between them.

From the total of 168 161 bat passes recorded during the survey period to date, most passes were identified as T. aegyptiaca (72 640), T. aegyptiaca or S. petrophilus (56 545), S. petrophilus (32 959), S. petrophilus or E. hottentotus (5 183), E. hottentotus (697), and lastly M. natalensis (137; Table 3-3; Figure 3-15). Laephotis capensis calls were infrequent, and did not form a distinct cluster, being grouped with E. hottentotus in the cluster analysis. All of these species are listed as Least Concern on the IUCN Red Data List and are not regarded as ToPS species. Some species have a high risk of turbine fatality, such as T. aegyptiaca, S. petrophilus, M. natalensis and L. capensis, while E. hottentotus is medium risk and Rhinolophus is low risk. Species are at greater risk if they fly within the rotor sweep area (open-air foragers) or are known to migrate. It is clear that the open-air foragers are by far the most abundant bat species in the PA, representing at least 96 % of all bat passes, and this indicates that fatality due to turbines is highly likely to occur due to the foraging behaviour of these species.

Passes by height

The proposed turbines have a hub height of 150 m with a rotor diameter of up to 175 m (blade length of up to 87.5 m), and the rotor swept heights are thus within the range 62.5 – 237.5 m above ground. Therefore, bats recorded by detectors with microphones at 65 m and 110 m above ground are considered to be within the rotor sweep area. Bat activity decreased as a function of height above ground for both meteorological mast stations, both showing similar changes in activity, with a reduction in average bat activity of ~56 % at 65 m and ~77 % at 110 m.

Hourly bat activity indicates that bats are slightly more active earlier in the night at height (65 or 110 m) than at ground level (Figure 3-4). Species-specific patterns show that T. aegyptiaca flies proportionally most within the rotor sweep heights (~67% of ground level activity at 65 m; ~38% at 110 m), followed by S. petrophilus (~18-43% at 65 m; ~8-21% at 110 m), E. hottentotus (5-12% at 65 m; 3-8% at 110 m), and M. natalensis (5% at 65 m; 4% at 110 m). This pattern is expected based on the foraging habits of these species. The lack of bat activity at height at specific times of the year suggests that there is no major migratory pathway within the PA.

Environmental variables and bat activity

Rainfall data, wind speed, wind direction, temperature, relative humidity and barometric pressure were measured and could be used as environmental variables. The moon cycle was also incorporated as the percentage of its surface illuminated by the sun. The client provided the data on condition that certain variables were not disclosed as raw values, and these have been converted to relative measures for the purposes of this report.

To better understand environmental cues for activity spikes, all nights with nightly median bat activity exceeding 20 bp/h were extracted, along with environmental data for the previous four nights (excluding the night immediately preceding the activity spike and any nights with an activity exceeding 20 bp/h). The average for each preceding period was calculated for each environmental variable and subtracted from that during the night of the peak activity. These are plotted below along with the overall averaged across all paired ‘non-spike’ and ‘spike’ data.

There were no consistent differences between the period preceding the activity spike and the conditions on the day of the spike for any of the environmental variables. Although, increased temperatures and more rainfall were slightly associated with spikes in activity, while reduced wind speed and moon illumination were moderately associated with activity spikes. Barometric pressure was slightly reduced on average during activity spikes. Activity spikes tended to occur when temperatures increase after rainfall with reduced moon illumination and wind speeds, but not to the extent that it can be easily predicted to allow for precise mitigation.

Active Monitoring

A total of 665 bats vocalisation from only three species/group (T. aegyptiaca or S. petrophilus; S. petrophilus or E. hottentotus; and M. natalensis) were recorded during active monitoring (including calls duplicated where more than one bat was vocalising; Table 3-4, Figure 3-29). Tadarida aegyptiaca or S. petrophilus were by far the most dominant group detected during active acoustic monitoring, representing about 94% of all bat passes, similar to the passive acoustic monitoring. Sauromys. petrophilus or E. hottentotus appeared to be far less abundant, with a total of only 40 passes, 33 of which were detected during Summer. Miniopterus natalensis was only detected once during active surveys, which was during autumn. Seasonal activity was highest in summer, with less than half the activity in autumn and winter, and lowest activity in spring. In the static acoustic monitoring analysis, late summer and early autumn had the highest bat activity, and spring and winter had the lowest bat activity.

Roosting sites

Twenty-nine potential roosting sites/habitats were investigated for the presence of bats during the survey period. No cave systems were identified within or close to the PA during the desktop or site visits, but rocky outcrops were present in some parts of the PA and these are addressed below. These rocky outcrops are natural roosting sites, but man-made infrastructure is likely to offer the best roosting opportunities for bats in the PA. Storerooms and abandoned farm houses are ideal as they have many access points and refugia within. Inhabited farmhouses also have opportunities in the rooves and walls. Bats were confirmed to be roosting at an inhabited farmhouse (Figure 3-31; R4) and short-term acoustic monitoring suggests that bats are using rocky habitats as roosts, but no signs of bats were detected at any site during day inspections. The recording of only a single Rhinolophus damarensis (which is known to roost in rocky outcrops, not just caves) during roost inspections but no recordings from passive bat detectors or transects on the PA and very low numbers of M. natalensis further substantiates the conclusion that cave roosts are not present within or in close proximity to the PA.

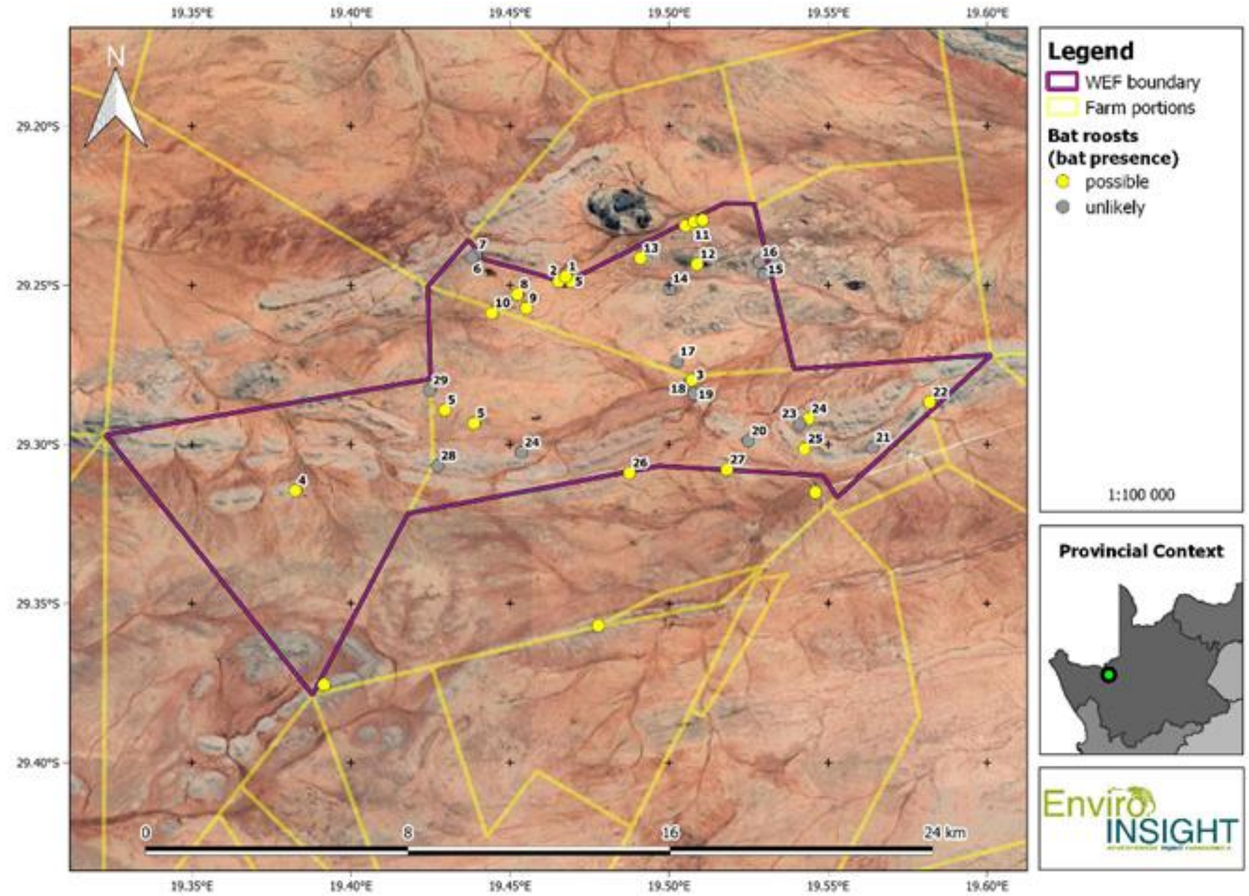


Figure 6-14: Locations for the eight passive bat detectors deployed within the proposed De Rust WEF boundary.

Table 6-13: The details of bat roost inspections.

Site Name, location, dates inspected, bat evidence, habitat and likelihood of roosting bats.	Site Photos and any evidence of bats
R1 Latitude: -29.247262° Longitude: 19.467489° **Dates inspected, recordings & signs of bats:** 14/10/2021 – rec., no bat evidence **Habitat Description:** Oom Gert's resident house. Garage has tin roof with no ceiling, buildings are cleanly plastered with limited cracks and crevices in building material. Other structures around the house have openings and cracks. **Bat likelihood:** No evidence of bats was found during inspections and there are limited roost opportunities, but it is possible that a few bat individuals are roosting in some of the infrastructure.	   
R2 Latitude: -29.248835° Longitude: 19.465222° **Dates inspected, recordings & signs of bats:** 11/10/2021 – rec., no bat evidence 19/01/2022 – rec., no bat evidence	 

31/05/2022 – rec., bat dropping seen in garage

Habitat Description:

Main house (Thys). Storerooms have tin rooves with iron girders or wooden poles and no ceiling. Most walls are cleanly plastered but some walls are old bricks with spaces between. Storerooms are full of items that don't get moved often, with lots of refugia available. There are multiple other structures around the house and debris lying around.

Bat likelihood:

The are ample roosting opportunities for bats. Bat droppings were observed below the cracks of the iron girders in May 2022.

R3

Latitude: -29.279796°

Longitude: 19.507154°

Dates inspected, recordings & signs of bats:

11/10/2021 – rec., no bat evidence

19/01/2022 – rec., no bat evidence

31/05/2022 – rec., no bat evidence

Habitat Description:

Witkoppies farmhouse. The buildings have tin rooves, and the main house has a ceiling with degrading awnings while other structures do not. The walls are cleanly plastered. There are various other small structures with openings and stored items, and debris lying on the ground.

Bat likelihood:

No evidence of bats was found during the inspection. However, there are ample roosting opportunities for bats, especially within the closed ceilings and

awnings and bats are expected to roost at this site.	
R4 Latitude: -29.314524° Longitude: 19.382506° **Dates inspected, recordings & signs of bats:** 11/10/2021 – rec., no bat evidence 18/01/2022 – rec., no bat evidence 31/05/2022 – rec., no bat evidence **Habitat Description:** Western Farmhouse (Gert Kruger). Most buildings have tin rooves and wooden beams with no awnings or ceilings, but one structure does have a degraded awning. The walls are cleanly plastered or bricks without gaps, but some walls have cracks. There are various small structures with openings or cracks and stored equipment and debris lying on the ground.	   
Bat likelihood: No evidence of bats was found during the inspection. However, there are some roosting opportunities for bats, such as in cracks in the walls and between walls and wooden beams. The farmer reported and photographed bats (*N. thebaica*) roosting inside the store.	
R5 Latitudes: -29.289215°; -29.293389° Longitudes: 19.429482°; 19.438685° **Dates inspected, recordings & signs of bats:**	 

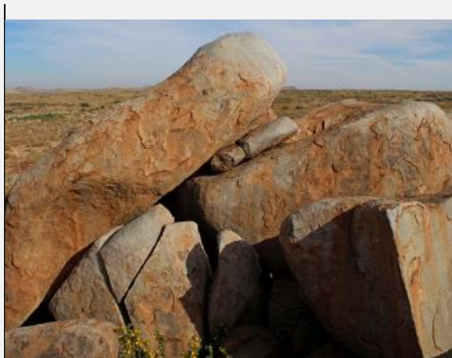
05/08/2022 – no signs of bats, no vocalisations detected.

Habitat Description:

Two similar isolated koppies of large igneous boulders. The boulders are rounded and stacked, sometimes with large cracks and fissures. Cavities are formed between stacked boulders and appear to be relatively deep in places.

Bat likelihood:

Although no signs of bats were found, many spaces and cracks were inaccessible during inspection – being too confined and also one containing a beehive. It is likely that a few bats use these koppies as roosts for at least some time during the year, especially in deep crevices hidden in cavities between boulders.



R6

Latitude: -29.241246°

Longitude: 19.437968°

Dates inspected, recordings & signs of bats:

09/03/2021 – photographed from distance

Habitat Description:

Large quartzite outcrop on top of hill, large angular boulders with various cracks and crevices.

Bat likelihood:

The site was not searched, only photographed from a distance. The rock is very broken and unlikely to be suitable for bat roosts.

R7 Latitude: -29.240434° Longitude: 19.439175° **Dates inspected, recordings & signs of bats:** 09/03/2021 – no bat evidence **Habitat Description:** Quartzite outcrop on top of hill, small rocks and boulders lying on or embedded in a stony soil matrix with few or only shallow cracks and crevices. **Bat likelihood:** No bats or evidence of bats were observed in or around any rock cracks and the habitat was not considered to be suitable for bat roosts, the few rock cracks present being too shallow and exposed.	
R8 – 'Brown Bedrock' Latitude: -29.252859° Longitude: 19.452296° **Dates inspected, recordings & signs of bats:** 12/03/2021 – no bat evidence 16&17/08/2022 – roost recordings taken **Habitat Description:** Large expanse of exposed bedrock (brown and grainy texture). The larger exposed outcrops have small-medium sized cracks and crevices between rocks. **Bat likelihood:** see R10.	

R9 – 'Brown Bedrock'

Latitude: -29.257206°

Longitude: 19.455121°

Dates inspected, recordings & signs of bats:

11/03/2021 – no bat evidence

16&17/08/2022 – roost recordings taken

Habitat Description:

Large expanse of exposed bedrock (brown and grainy texture). The larger exposed outcrops have small-medium sized cracks and crevices between rocks.

Bat likelihood: see R10.

R10 – 'Brown Bedrock'

Latitude: -29.258717°

Longitude: 19.444309°

Dates inspected, recordings & signs of bats:

12/03/2021 – no bat evidence

16&17/08/2022 – roost recordings taken

Habitat Description:

Large expanse of exposed bedrock (brown and grainy texture). The larger exposed outcrops have small-medium sized cracks and crevices between rocks. Difficult to inspect visually.

Bat likelihood:

The entire bedrock area was surveyed in August 2022 to identify outcrops with suitable crevices for roosts. Short-time acoustic monitoring was conducted and the results indicate that some bats are using these features for roosting: **3.4.1.1.**

R11 – 'Dolerite Outcrops'

Latitude: -29.230838°

Longitude: 19.507059°

Dates inspected, recordings & signs of bats:

08/08/2022 – bat droppings found and roost recordings taken.

Habitat Description:

Group of large conical hills of exposed outcrops of black rounded dolerite boulders and rocks, embedded in sand on the edges but stacked boulders with many spaces and gaps in-between which appear to form deeper cavities in the centre of the outcrops go deep into the centre.

Bat likelihood:

Due to the small size of the gaps and cavities between the rounded boulders it is not possible to adequately visually assess whether any bats are roosting within these outcrops. However, these cavities appear to be some of the most suitable natural roosting habitats in landscape with limited alternative roosting habitats and it is likely that bats and possibly even small colonies are roosting in these outcrops. Bat droppings were found deep in some of the gaps between boulders.

See additional surveys confirming roosting bats: **3.4.1.2**

R12 – 'Dolerite Outcrops'

Latitude: -29.243394°

Longitude: 19.508776°

Dates inspected, recordings & signs of bats:

09/03/2021 – no bat evidence

Habitat Description:

Medium-sized exposed outcrops of black rounded dolerite boulders and rocks, embedded in sand on the edges but stacked boulders with many spaces and gaps in-between which appear to form deeper cavities in the center of the outcrops go deep into the centre.

Bat likelihood:

Due to the small size of the gaps and cavities between the rounded boulders it is not possible to adequately visually assess whether any bats are roosting within these outcrops. However, these cavities appear to be some of the most suitable natural roosting habitats in landscape with limited alternative roosting habitats and it is likely that bats and possibly even small colonies are roosting in these outcrops.

R13 – Dolerite Koppies

Latitude: -29.241489°

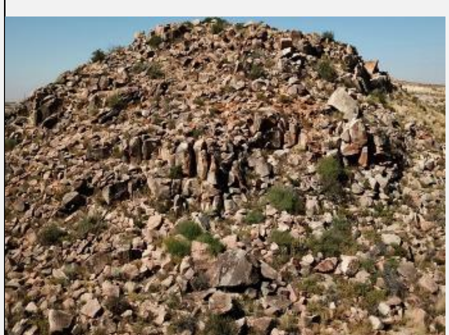
Longitude: 19.490975°

Dates inspected, recordings & signs of bats:

07/08/2022 – no bat evidence

Habitat Description:

Group of medium conical hills of exposed outcrops of light brown dolerite boulders and rocks, embedded in sand on the edges but stacked in places and exposed bedrock near the crest with many deep cracks and crevices.



Bat likelihood:

Due to the extensive rocky habitat and difficulty in searching deep or internal cracks in the rock, the lack of bat evidence during visual surveys is not sufficient to rule out bat roosts. The habitat appears suitable for bat roosts

and there is likely to be a few roosting bats in this habitat.	
R14 Latitude: -29.251118° Longitude: 19.500211° **Dates inspected, recordings & signs of bats:** 12/03/2021 – no bat evidence **Habitat Description:** A small white quartz outcrop which is surrounded by small rocks and pebbles of quartz lying on a sandy matrix. The exposed outcrop is blocky and solid with few cracks or crevices. The few cracks present are often very shallow and narrow. **Bat likelihood:** No bats or evidence of bats were observed in or around the small outcrop and the habitat is unsuitable for bat roosts.	
R15 Latitude: -29.246680° Longitude: 19.529712° **Dates inspected, recordings & signs of bats:** 12/03/2021 – no bat evidence	

Habitat Description:

Small hill with ridge of quartz outcrops, the scree slope and surroundings are covered in small rocks and pebbles of quartz lying on a sandy matrix. The exposed outcrops are blocky and solid with few cracks. Crevices between blocks in the outcrops are usually quite exposed and do not form consistent narrow widths.

Bat likelihood:

No bats or evidence of bats were observed in or around the small outcrop and the habitat is mostly unsuitable for bat roosts.


R16

Latitude: -29.242799°

Longitude: 19.528292°

Dates inspected, recordings & signs of bats:

12/03/2021 – no bat evidence

Habitat Description:

Slight hill with heavily eroded ridge of quartz outcrops, the surroundings are covered in small rocks and pebbles of quartz lying on a sandy matrix. The small, exposed outcrops are blocky and solid with few cracks and no notable crevices.

Bat likelihood:

No bats or evidence of bats were observed in or around the small outcrops and the habitat is unsuitable for bat roosts.




R17 Latitude: -29.273977° Longitude: 19.502466° **Dates inspected, recordings & signs of bats:** 10/03/2021 – no bat evidence **Habitat Description:** Small, eroded quartz ridge with bedrock quartz exposed above red sands and smaller quartz rocks and pebbles lying on the surface. The exposed boulders are blocky and have no small cracks or fissures and the gaps between them are exposed and not of consistent widths. **Bat likelihood:** No bats or evidence of bats were observed around the small outcrops and the habitat is unsuitable for bat roosts.	   
R18 Latitude: -29.280777° Longitude: 19.506519° **Dates inspected, recordings & signs of bats:** 10/03/2021 – no bat evidence **Habitat Description:** Small hill with a prominent quartz outcrop ridge with very large blocky boulders, the steep scree slope has large quartz boulders and rocks embedded in a very sandy matrix. The quartz outcrops have no cracks or fissures in the boulders, but some large crevices are formed where the boulders contact one another, but these crevices do not have consistent and narrow widths and are usually quite exposed. Most crevices at ground level have been filled by sand or other debris.	   

Bat likelihood:

No bats or evidence of bats were observed in or around the outcrop. The habitat is unsuitable for bat roosts.

R19

Latitude: -29. 284252°

Longitude: 19. 507798°

Dates inspected, recordings & signs of bats:

07/08/2022 – no bat evidence

Habitat Description:

Small hill with a prominent quartz outcrop ridge with very large blocky boulders, the steep scree slope has large quartz boulders and rocks embedded in a very sandy matrix. The quartz outcrops have few cracks or fissures in the boulders, but these are limited, usually very shallow, and quite exposed.

Bat likelihood:

No bats or evidence of bats were observed in or around the outcrop. The habitat is not considered to be suitable for bat roosts.

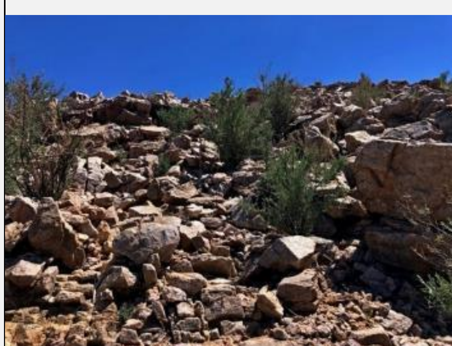
R20

Latitude: -29.298907°

Longitude: 19.524865°

Dates inspected, recordings & signs of bats:

11/03/2021 – no bat evidence

Habitat Description: Series of small ridges with highly eroded quartz outcrops on the crest with slopes covered in small quartz rocks and pebbles on a sandy medium. The quarts crests have medium to small angular quarts rocks and some exposed bedrock. There are no cracks or fissures in the rocks and any crevices between rocks are very exposed and shallow. **Bat likelihood:** No bats or evidence of bats were observed around the ridges checked and the habitat is unsuitable for bat roosts.	
R21 Latitude: -29.300985° Longitude: 19.563907° **Dates inspected, recordings & signs of bats:** 12/03/2021 – no bat evidence **Habitat Description:** A large quartzite hill/ridge with steep slopes and various strata of exposed quartz sills at different positions along the slope. The slope is covered in medium to small quartz rocks and pebbles with a small amount of sand in-between. The exposed quartz intrusions have intact bedrock and medium to large boulders with some cracks and crevices, but these are limited and often filled in with debris and quite shallow. In general the quartz are blocky and solid. **Bat likelihood:** No bats or evidence of bats were observed around the quartz outcrops and boulders checked and the habitat is unsuitable for bat roosts.	   

R22

Latitude: -29.286565°

Longitude: 19.582869°

Dates inspected, recordings & signs of bats:

06/08/2022 – only photographed.

Habitat Description:

A large quartzite hill/ridge with steep slopes and a particularly large outcrop exposed quartzite on the east side. The outcrop has partially consolidated bedrock. The slope is covered in medium to small quartz rocks and pebbles. The exposed quartz outcrops have large vertical cracks and crevices . These crevices have not been observed up close but they appear to be quite deep, the quartz rocks themselves are blocky and solid.

Bat likelihood:

The outcrop has not been searched for evidence of bats, but the photographs suggest that habitat is ideal for bats to utilise as roost sites. Therefore, the Precautionary Principal is followed and it is assumed that some bat individuals are roosting in this habitat.

R23

Latitude: -29.293515°

Longitude: 19.541002°

Dates inspected, recordings & signs of bats:

10/03/2021 – no bat evidence

Habitat Description:

A large quartzite hill/ridge with steep slopes and a crest of eroded quartz intrusion. The slope is covered in medium to small quartz rocks and pebbles with a small amount of sand in-between. The exposed quartz intrusions consist of broken rocks and boulders of small to medium size. While cracks and crevices are quite abundant, especially under rocks, they are quite small or shallow and relatively exposed. In general the quartz rocks are blocky and solid.

Bat likelihood:

No bats or evidence of bats were observed around the quartz outcrops checked and the habitat is unsuitable for bat roosts.

R24

Latitude: -29.29194°

Longitude: 19.54378°

Dates inspected, recordings & signs of bats:

10/03/2021 – no bat evidence

Habitat Description:

A large quartzite outcrop with intact bedrock and large rocks and boulders situated along the top of a quartzite hill/ridge. There are numerous crevices between boulders and formed by the way the exposed bedrock has weathered. The outcrops are solid rock and the crevices are not filled by sand and other debris

Bat likelihood:

No bats or evidence of bats were observed around the outcrop, but the deeper crevices cannot be easily checked and it is possible that a few bats utilised the outcrop for roosting.

R25

Latitude: -29.306712°

Longitude: 19.427250°

Dates inspected, recordings & signs of bats:

not inspected

Habitat Description:

A quartz outcrop at the top of a large hill/ridge. The exposed outcrop has large, stacked quartz boulders and some of the rocks appear to have deep crevices and probably cavities been the boulders.

Bat likelihood:

The habitat was not surveyed on the ground but appears to have suitable roosting habitat from drone photographs and the precautionary approach is taken assuming that bats do roost here.

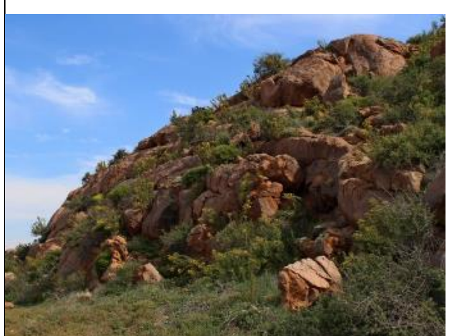
R26

Latitude: -29.308984°

Longitude: 19.487507°

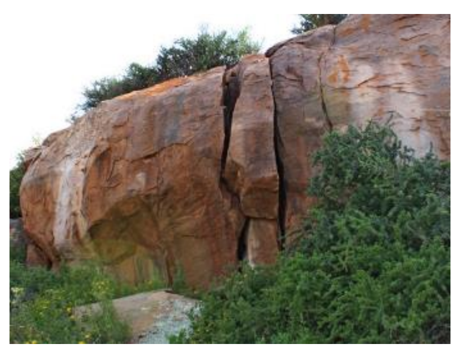
Dates inspected, recordings & signs of bats:

06/08/2022 – no bat evidence



Habitat Description:

Large expanse of exposed igneous rock exposed on the side of a small hill, with a small quartz ridge above. The rock forms large boulders with varying degrees of weathering. Some parts have small hollow caverns, while some large boulders are solid with deep crevices and other boulder outcrops are extensively fissured with internal cracks.



Bat likelihood:

Due to the difficulty in searching deep or internal cracks in the rock, the lack of bat evidence during visual surveys is not sufficient to rule out bat roosts. The habitat appears suitable for bat roosts and there is likely to be a few roosting bats in this habitat.

R27

Latitude: -29.307938°

Longitude: 19.518168°

Dates inspected, recordings & signs of bats:

07/08/2022 – no bat evidence

Habitat Description:

Large expanse of exposed igneous rock exposed on the side of a small hill. The rock forms large boulders with varying degrees of weathering. Large boulders are solid with deep crevices and other boulder outcrops are extensively fissured with internal cracks

Bat likelihood:

No bats or evidence of bats were observed around the outcrop, but the deeper crevices and cavities cannot be easily checked and it is possible that a few bats utilised the outcrop for roosting.

R28

Latitude: -29.306712°

Longitude: 19.427250°

Dates inspected, recordings & signs of bats:

09/03/2021 – no bat evidence

Habitat Description: A small quartzite hill/ridge with gentle slopes covered in medium to small quartz rocks and pebbles. The exposed quartz intrusions at the crest of the hill are small and have some cracks and crevices between rocks, but these are few and seem to be quite shallow. **Bat likelihood:** The cracks were not checked for evidence of bats as they were not considered to be suitable for bat roosts at the time they were photographed.	
R29 Latitude: -29.283057° Longitude: 19.424734° **Dates inspected, recordings & signs of bats:** 12/03/2021 – no bat evidence **Habitat Description:** Isolated patch of exposed doleritic bedrock with some larger boulders spaced widely apart from one another. The boulders have weathered in a round fashion, but a few have cracked forming deep crevices. **Bat likelihood:** No bats or evidence of bats were observed in cracks of the boulders and since all cracks could easily be checked it was confirmed that no bats appear to be using them as roost sites.	 

Short-term Passive Acoustic Monitoring

The exposed brown bedrock and dolerite outcrops were searched visually and no evidence of roosting bats were found. However, concealed cavities and crevices in the rocks could not be effectively searched using this method and bat detectors were deployed to provide a more robust assessment for roosting bats (Figure 3-32 & Figure 3-33). At the time sunset was 18:11 PM and sunrise and 07:26 AM

Bat sensitive features

The PA is very arid with ephemeral watercourses and one non-perennial dam, with a generally flat terrain with exposed dolerite koppies, bedrock and long chains of quartzite ridges, sometimes crested with quartz outcrops. Anthropogenic activities include sheep and some cattle ranching. Vegetation is limited, and when present is usually sparse and low to the ground, including grass clumps and low scrub bushes. Trees are very sparsely distributed, but occasionally Vachellia trees are present along dry watercourses, pans or dams and near to farmsteads and kraals, and larger bushes are often associated with the ephemeral watercourses. Bedrock pans are limited to the surface bedrock plains, but these are usually very small. The large dolerite outcrops that form conical stacks of large black rounded boulders are associated with species-specific bat roosts as well as general bat activity. Wetlands in arid areas are important foraging areas and drinking sites for bats and have higher activity levels than surrounding habitats (Loumassine et al., 2020). This is also likely to be true for the pans/rock pools and dams present in the PA. Man-made infrastructure is sparse and scattered throughout the site, and farmsteads especially are likely to support small numbers of roosting bats.

Watercourses are ephemeral and generally have denser vegetation owing to the greater/prolonged availability of moisture in the soil. Bats are known to forage along watercourses, as a greater abundance of insect activity is generally associated with plant growth and open water, and watercourses are natural corridors of vegetation where bats can maximise their foraging success. Transect data indicated that bat activity was only slightly higher in vegetated watercourses (outside of autumn), while passive monitoring stations share no obvious activity patterns with the transect data or for the different nearby habitats (such as rocks and watercourses). None of the passive detectors where placed close enough to rocky habitats to effectively record associated bat activity. Transect data appear to be quite volatile between nights, even within the same season, which may explain some of the discrepancies. In addition, the La Niña event and associated rainfall leading to the uncharacteristic presence of a widespread abundance of plant growth may have reduced bat reliance on vegetated watercourses. Consequently, it is strongly recommended that the applied buffers are maintained as these habitats are expected to be used more frequently under normal (non-La Niña) conditions, these sensitive bat features, grouped by the type of feature, are shown in Figure 3-37.

Passive acoustic monitoring showed evidence for higher bat activity and large spikes in activity over summer and autumn, with these spikes also occurring at rotor-sweep heights and across all detectors. It is hypothesised that widespread insect eruptions cause these spikes in bat activity as there appears to be no particular habitat type where this phenomenon is confined. Avoiding bat mortality through strategic turbine placement is therefore challenging and additional minimisation mitigation measures are likely to be required.

Features identified as attractants for foraging bats have been buffered by 200 m, and features with confirmed or high likelihood of supporting bat roosts have been buffered by 500 m, as per the minimum requirements of the SABPG (MacEwan et al., 2020b). These buffers should be considered as turbine-specific No-Go areas, where no part of the turbines should enter (including blade tips). Turbines intersecting with these buffers will need to be relocated outside of the buffer zones. Of the current layouts (1 and 2), layout 1 (which consists of the North and South WEFs shown in Figure 3-38 and Figure 3-39) is the preferred layout with 6 turbines (North: 15; 28; 34; 35; South: 29; 30) within the sensitive buffers (including turbine blades), while layout 2 has 44 turbines (#1: 2; 3; 4; 5; 6; 7; 20; #2: 1; 3; 4; 5; 6; 7; 8; 9; 10; 13; 14; 16; 17; 18; 21; 22; 33; #3: 1; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15; 17; 19; 20; 21; 22; 23; 24; 26; 27.) within the sensitive buffers. Consequently, layout 1 is preferred as there are fewer turbines which will need to be relocated outside of the bat sensitivity buffer.

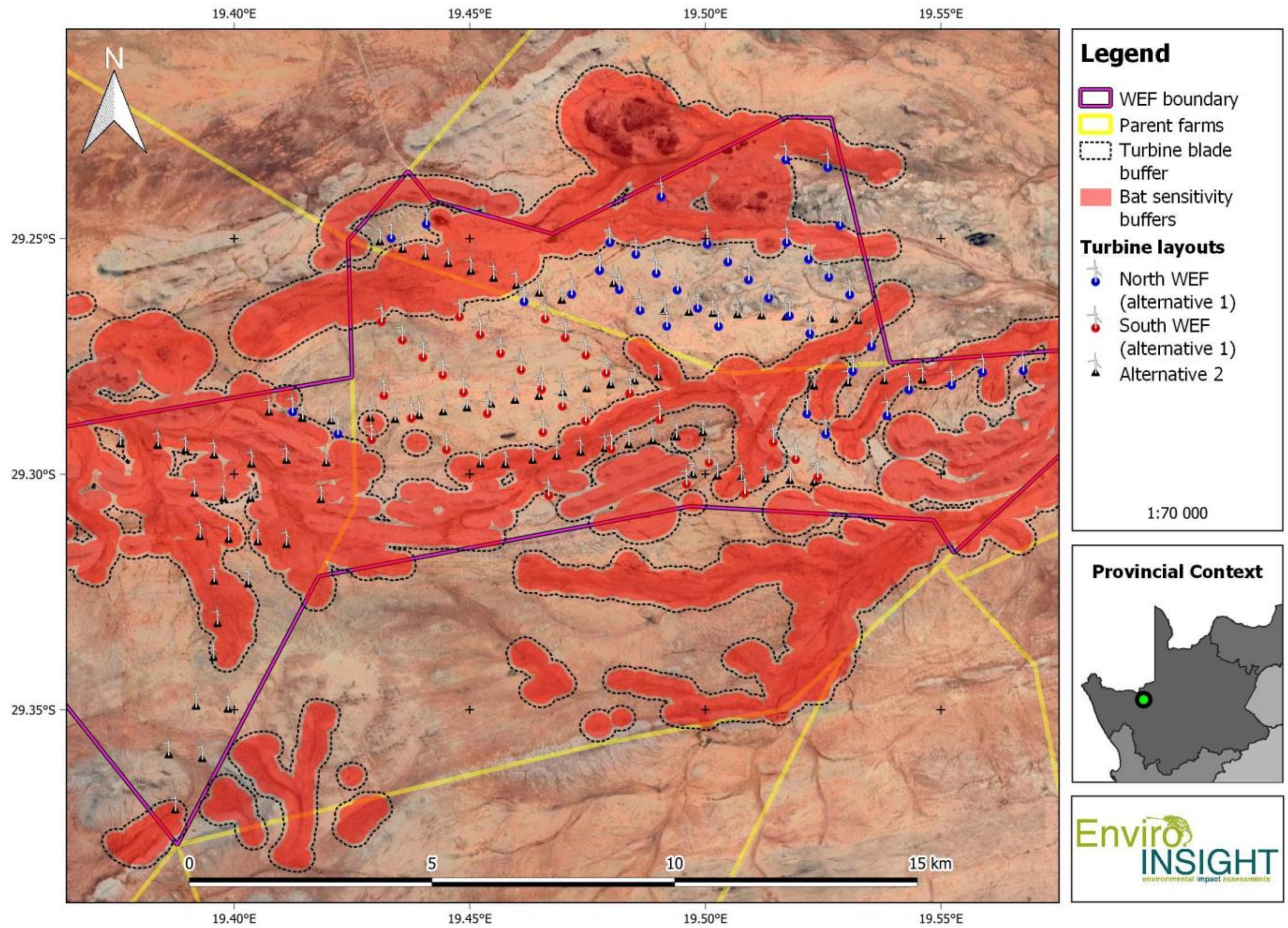


Figure 6-15: Sensitive bat features within the study area showing the appropriate buffers in relation to the turbine layouts. These are considered to be turbine specific No-Go areas.

Impacts

<u>Construction</u>

- Loss or destruction of foraging and roosting habitat: Access roads and other infrastructure construction (e.g. laydown areas, turbine crane platforms, buildings, etc.) may necessitate the removal/disturbance of foraging or roost habitat. Roost habitats include rocky outcrops and farmsteads, while sensitive foraging habitats include rocky ridges, water pools, pans and vegetated watercourse.
- Bat fatality: Turbines and their blades should be placed outside of the defined buffers for sensitive bat features where bat activity is expected to be higher. The number of fatalities is expected to increase with the number of active bats within the

rotor-sweep area, during peak foraging bouts (especially in summer and autumn), movement of bats along flyways or migratory routes, or when bats enter and exit nearby roosting sites.

- Artificial lighting: Artificial lights can have a negative effect on bat behaviour by affecting foraging activity and flight paths used. Artificial lights can attract insects which will entice bats to feed in the area leading to a higher likelihood of bat fatalities due to collision with infrastructure or barotrauma (if lighting is present at the turbines).

Table 6-14: Summary of potential negative impacts evaluated pre-mitigation and post-mitigation.

Impact	Pre-mitigation Significance	Post-mitigation Significance	Specialist Confidence	Residual impacts	Potential Fatal Flaw
Loss or destruction of habitat	Low - Medium	Low	High	No	No
Bat fatality	High	Medium-High	Low	Potentially	Unlikely
Artificial lighting	Medium - High	Low	Low	No	No

Cumulative

Several renewable energy development applications have been submitted and/or authorised within the immediate area of the REEA Q3 (2022) was used to assess the potential cumulative impacts. The De Rust WEF developments are surrounded by four other approved WEF projects within a 30 km radius, 'Paulputs' to the north, and 'Namies', 'Poortjies' and 'Korana' to the west. There are also two approved solar PV projects, 'Paulputs PV1&2' to the north and Khai-Ma to the west, in addition to the proposed Red Sands PV area

The main cumulative impact anticipated from WEFs is the increased mortality of bats resulting from turbine strikes. Assuming that the total areas represented by the WEFs developments shown in Figure 4-1 will contain turbines, which is a deliberate over-estimation, Table 5 shows that the maximum transformed area from the WEF development boundaries (REEA Q3, 2022) within a 30 km radius of the proposed development cluster is expected to amount to 9.2% (46 675 ha) of the total land area. The proposed De Rust WEF cluster itself only represents 2.1% of the 30 km radius area, indicating a small proportion of transformation in the regional context. The combined transformed area for all renewable energy projects (including the proposed De Rust WEF cluster) is expected to represent 13.0% of the 30 km radius area.

It is unlikely that any cumulative impact assessment will, under the current status quo, result in a fatal flaw for a proposed WEF. The best approach to address cumulative impacts is to consolidate available information and determine acceptable (predicted) fatalities for a given area and restrict the number of developments in that area, taking care to allow for unrestricted flyways between WEFs. In addition, a landscape scale approach should be taken, where large areas of bat sensitivity should be identified (perhaps by SABAA) and set aside as foraging and migration areas so that WEFs may not be constructed in these zones.

Table 6-15: Summary of potential negative impacts evaluated pre-mitigation and post-mitigation.

Impact	Pre-mitigation Significance	Post-mitigation Significance	Specialist Confidence	Residual impacts	Potential Fatal Flaw
Loss or destruction of habitat	Low - Medium	Low	Moderate	No	No
Bat fatality	High	Medium-High	Low	Potentially	Unlikely
Artificial lighting	Medium - High	Low	Low	No	No

Mitigation

- Habitat destruction: Apply the 500 m buffer to all potential bat roosts, avoiding the construction of turbines and access roads in these areas. Roads must follow existing farm roads as far as possible. The buffered sensitive areas must be excluded from all activities related to the WEF. Access roads may cross these however if required
- Bat Roosts: All potential bat roosts must be avoided by applying a 500 m buffer
- Bat mortality: Cut-in speeds, 6.5 m/s is implemented during the yearly peak activities (1 January to 14 April and 15 August to 1 October) and hourly activity peaks on these dates (21:00 to 03:59) for the first year of operation as a minimum, unless real-time bat detectors are implemented to automate this process. Corrected mortality estimates and appropriate adaptive mitigation thresholds and strategies will need to be determined during the post-construction monitoring. Operational and post-construction monitoring must continue to identify and mitigate such events
- Artificial lighting: All artificial lights should be kept at a minimum with only civil aviation lights being used if possible. In cases where lighting is needed close to buildings the use of these lights must be limited and directed only where needed. Non-UV emitting lights must be used.
- Automated peak period curtailment: Automated real-time bat monitoring and analysis systems have been shown to be successful in the USA, reducing bat fatalities by over 80% (Hayes et al., 2019). This option is available as the "Smart System" from Wildlife Acoustics (https://www.wildlifeacoustics.com/products/smart-system), and it is strongly recommended as the primary method for automated and near-real-time bat fatality mitigation, or,
- Blanket peak period curtailment: Implementing turbine cut-in wind speeds has been shown to significantly reduce bat fatalities (Arnett et al., 2009). Previous research has shown that bat activity drops below 5% at wind speeds between 5-6 m/s (Wellig et al., 2018), but the data from this study suggest that bat activity is affected far less drastically at these wind speeds, with a cut-in speed of 6.5 m/s expected to reduce bat mortality by roughly 50%. Therefore initial cut-in speed of 6.5 m/s is recommended as a starting point and should be implemented during the yearly peak activities (1 January to 14 April and 15 August to 1 October) and hourly activity peaks on these dates (21:00 to 03:59) for the first year of operation as a minimum, unless real-time bat detectors are implemented to automate this process.

Discussion and Conclusion

A total of six bat species were detected during the survey period, namely L. capensis, M. natalensis, E. hottentotus, R. damarensis, T. aegyptiaca and S. petrophilus, but N. thebaica is also expected to occur based on sightings nearby. Eptesicus hottentotus and S. petrophilus, and some T. aegyptiaca and S. petrophilus were analysed as single groups due to similarities in their calls. The project area falls within the Nama Karoo biome, and, based on the SABPG (MacEwan et al., 2020b), a median bat passes per hour greater than 1.01 bp/h at 'near ground' level is considered as a High Risk for bat fatalities, and above 0.18 as a Medium Risk.

Bat roosting sites are present and confirmed within the PA, such as rocky outcrops (especially dolerite outcrops) and farmsteads. The dolerite outcrops are unique in that they are confirmed to host R. damarensis roosts, a species that was not detected in any active or passive acoustic monitoring, indicating that they may restrict their foraging to the boulder fields and densely vegetated areas. In addition, there is some evidence that these outcrops may be used as maternal roosts by T. aegyptiaca. It is also likely that some bats are roosting outside of the PA but enter it during peak foraging activity. The most common species detected by far was T. aegyptiaca, a species known to forage widely and with activity patterns that peaked in the middle of the night, indicating that individuals may require some travel time before reaching the PA.

Due to the very high spikes in activity levels during certain times of the year, we recommend that a minimum cut-in speed of 6.5 m/s is implemented during the yearly peak activities (1 January to 14 April and 15 August to 1 October) and hourly activity peaks on these dates (21:00 to 03:59) for the first year of operation as a minimum, unless real-time bat detectors are implemented to automate this process. Post-construction monitoring will play a vital role in adjusting and implementing mitigation measures according to their effectiveness at reducing bat mortality to acceptable levels. Additional mitigation measures to consider include higher cut in speeds and temporary targeted turbine shutdowns if required. Sensitive bat features and their buffers have all been defined as turbine specific No-Go areas and turbine blades must not encroach within these buffers, which should assist in reducing bat mortality by roosting and foraging bats.

In summary, the current location of the project area falls in a High Risk area for bat fatalities, and sporadic peaks of bat activity in late summer and early autumn require specific and targeted mitigation. It is recommended that the development may proceed on condition that:

- All mitigation measures stipulated above are adhered to and captured in an Environmental Management Plan (EMP);
- The EMP must include the necessity for post-construction bat monitoring as stipulated in Aronson et al. (2020).

6.7. AQUATIC BIODIVERSITY

The Freshwater Biodiversity and Watercourse Delineation was undertaken by Tate Environmental Specialist Services (TESS), refer to Appendix D4.

The study area is 14 km south of Poffadder, Northern Cape Province, South Africa. The hydrological setting of the project is within the D81G and D82B quaternary catchments of the Orange River water management area. The specific Area of Interest (AoI) for this project was drainage within the D81G-03996, D81G-03813 and D82B-04162 Sub Quaternary Reaches (SQR). The watercourses do not reach the Orange River and typically terminate before reaching the river. Only under significant rainfall is the D81G-03996 SQR expected to reach the Orange River via the Goob se Laagte non-perennial watercourse.

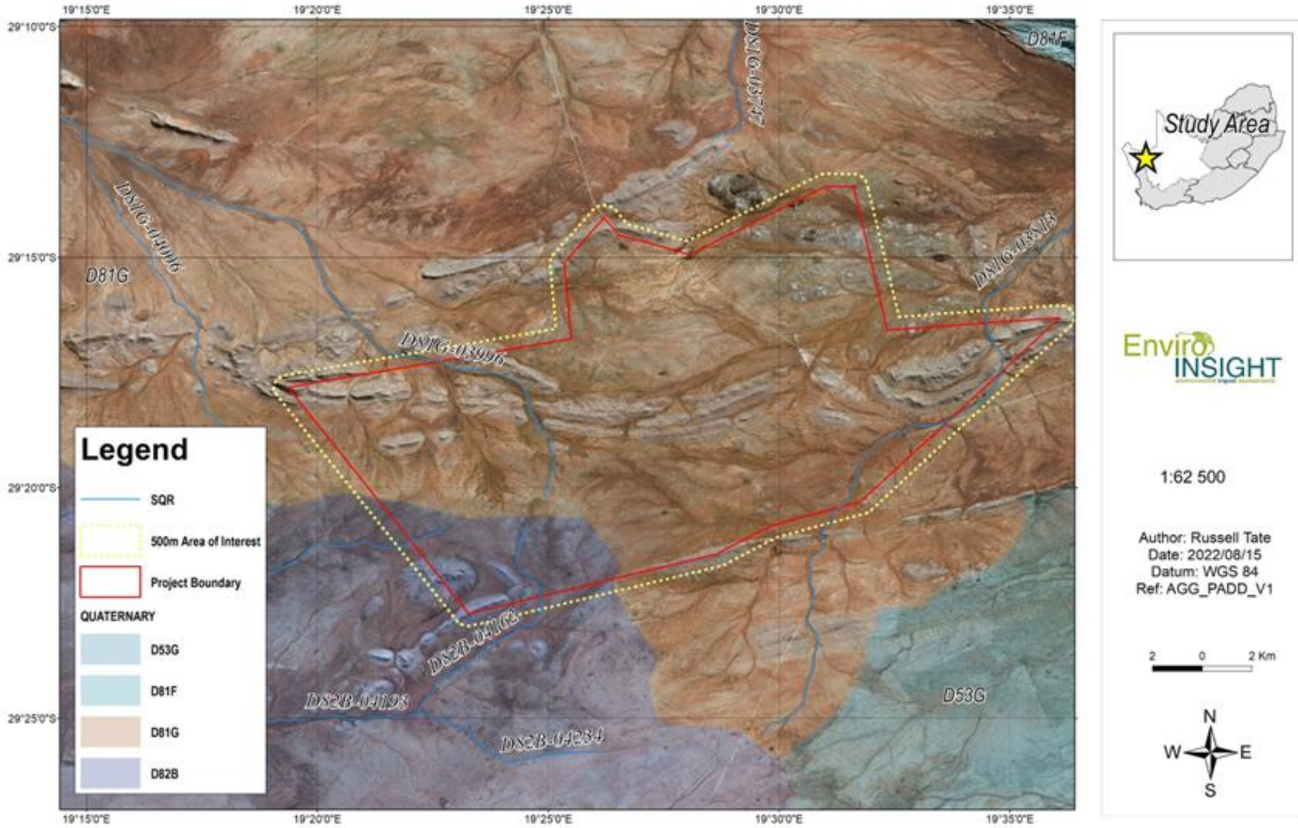


Figure 6-16: Hydrological setting of the Study Area

Watercourse Type and Classification

The watercourses classified in this study do not conform to standard wetland definitions and classifications provided in Ollis et al. (2013) where typical indicators such as redoximorphic and hydrophytic vegetation indicators were largely absent. Despite this, active inundation, landform indicators and at times hydrophytic vegetation indicators provided sufficient evidence to support the classification and delineation of the watercourses.

A total of 11 hydrogeomorphic (HGM) units were delineated in this study consisting of two watercourse types including depressions and non-perennial wash systems.

Table 6-16: Summary of potential negative impacts evaluated pre-mitigation and post-mitigation.

Wetland System Unit	Hectares	Level 1	Level 2		Level 3	Level 4		
		System	DWS Ecoregion/s	NFEPA Wet Veg Group/s	Landscape Unit	4A (HGM)	4B	4C
HGM1	205	Inland	Nama Karoo	Gariep Desert Bioregion	Plain	Wash	Not applicable	Not applicable
HGM2	45	Inland	Nama Karoo	Richtersveld Bioregion	Plain	Wash	Not applicable	Not applicable
HGM3	110	Inland	Nama Karoo	Richtersveld Bioregion	Plain	Wash	Not applicable	Not applicable
HGM4	209	Inland	Nama Karoo	Richtersveld Bioregion	Plain	Wash	Not applicable	Not applicable
HGM5	33	Inland	Nama Karoo	Richtersveld Bioregion	Plain	Wash	Not applicable	Not applicable
HGM6	52	Inland	Nama Karoo	Richtersveld Bioregion	Plain	Wash	Not applicable	Not applicable
HGM7	78	Inland	Nama Karoo	Richtersveld Bioregion	Plain	Wash	Not applicable	Not applicable
HGM8	0.4	Inland	Nama Karoo	Richtersveld Bioregion	Plain	Depression	Endorheic	Without channel inflow
HGM9	0.2	Inland	Nama Karoo	Richtersveld Bioregion	Plain	Depression	Endorheic	Without channel inflow
HGM10	0.1	Inland	Nama Karoo	Richtersveld Bioregion	Plain	Depression	Endorheic	Without channel inflow
HGM11	8.7	Inland	Nama Karoo	Richtersveld Bioregion	Plain	Depression	Endorheic	Without channel inflow

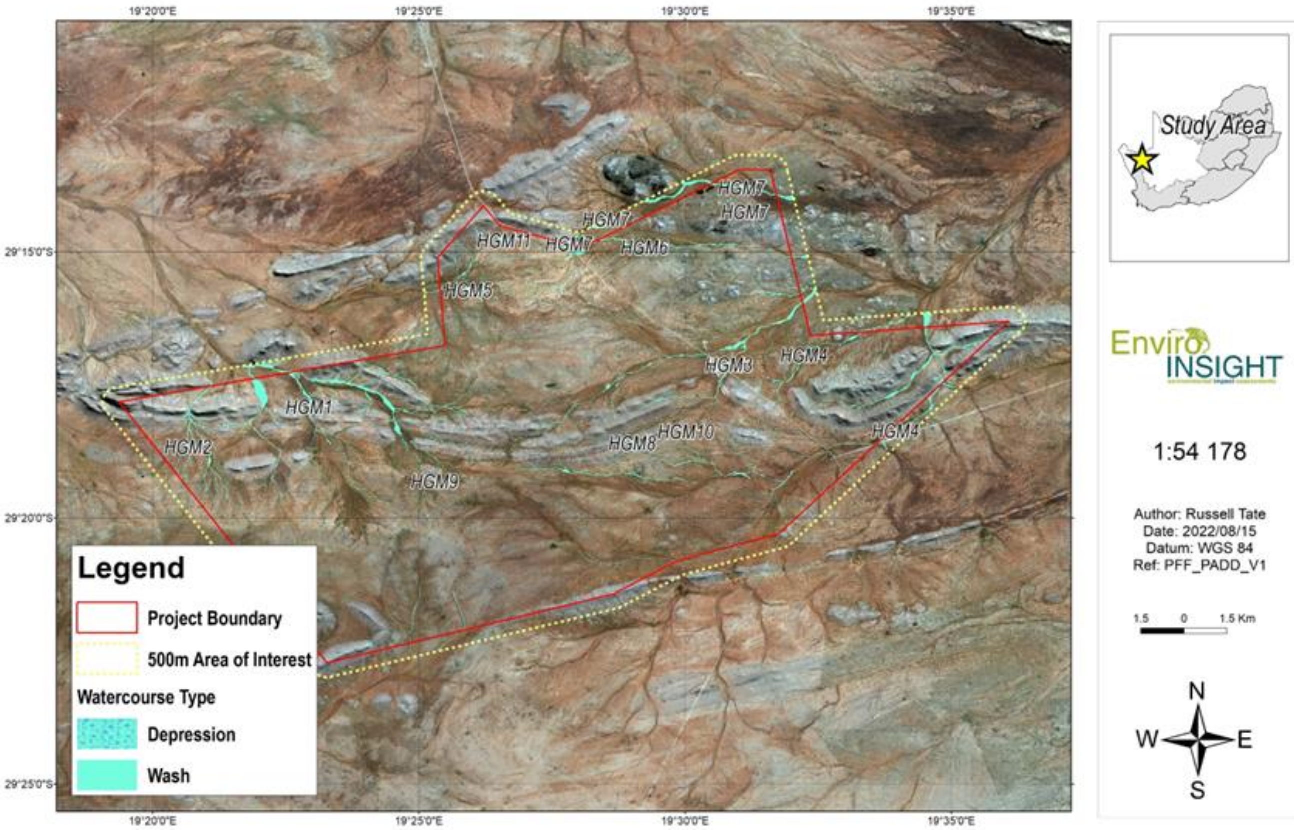


Figure 6-17: HGM Layout of the watercourses

Geomorphology

The AoI was located on the watershed between three separate catchments feeding each respective SQR to the north, east and south. There is an extensive flat plain in the south-west of the project area which is dissimilar to the rest of the study site which consisted of undulating plains with tall rocky outcrops.

Valley bottom landforms were present and were typically located between steep rocky outcrops. The wash systems typically flowed from a height proximate to 1150 metres above mean sea level (mamsl) down to 1014 mamsl where alluvial plains were observed.

The landforms associated with the project were such that alluvial processes have deposited substrates in valley bottom plains where anastomosed and multiple thread features are located. These features are dynamic and change according to rainfall patterns and the presence of obstructions. Many of the channels terminate in alluvial plains where infiltration rates reduce surface runoff.

It is anticipated that the channels within the alluvial plains change periodically. It was therefore deemed necessary to delineate these alluvial plain areas. It is however important to note that these alluvial plains are not considered to be watercourses or floodplains as active channels, vegetation and soil indicators were absent.

Soils

Two land types were associated with the project area and included the Ag25 and Ib131 land types. The Ag25 land type was the dominant form where watercourses are expected to be present in the valleys (terrain unit 5). The watercourse soil forms which would be represented are the Dundee soil forms. It is noted that out of the expected soils, only the expected Dundee soil form was likely harbour wetland/riparian characteristics. Based on the classifications the indicate SCS classes of A/B for the Ag25 and class B for the Ib131 land types respectively. These SCS classifications indicate that the soil types have low runoff potential and high infiltration rates even when thoroughly wetted

Soil forms observed during the survey were consistent with the desktop information where typical hydromorphic soil forms as indicated in DWAF (2005) were absent from the AoI. Soil forms observed included deep freely draining soils.

There were indications of the Dundee soil forms which were present in the lower reaches of the larger watercourses in the AoI. In terms of soil indicators, alluvial plains were lacking typical features and in the case of this project it is presented that the use of the valley bottom and watercourse centreline would suffice as the watercourse primary defining feature.

Within the depression systems, surface deposits of silts were noted to occur, however the soil forms present were not indicated to be Rensburg or Arcadia soils but rather Clovelly and Mispah soil forms. Despite this, the presence of the silts in the depressions indicates that the systems are temporarily inundated and would serve an important ecological function. This further supported the classification of the depression systems.

Vegetation

The vegetation types present in the AoI showed a diverse vegetation types. It is noted that the watercourses were largely associated with the Bushmanland Arid Grassland vegetation type. Common species in the vegetation types include grass typical of Stripagrostis and Schmidtia species (Mucina and Rutherford, 2006).

The active channels of watercourses showed typical watercourse zonation whereby active instream areas were denuded of vegetation, but channel edge and banktop vegetation included stands of Stripagrostis grasses including stands of Stipagrostis namaquensis. Larger specimens of Rhigozum obvatum were also noted to occur in denser stands within the valley bottom and within depression landforms. The riparian zone indicator species, Salsola aphylla was also found to be present in the valley bottom landforms within the AoI which supports classification of these watercourses. These species are considered to be obligate riparian taxa and are typically confined to alluvial soils such as the Dundee soil form (DWAF, 2005).

The conclusions drawn from the study indicates that soil and vegetation indicators were effective to inform watercourse extent. However, owing to a high degree of variability a greater confidence was placed on landform indicators such as direct inundation observations, silt deposits, and topography.

Watercourse Condition

Intermediate Habitat Integrity Assessment (IHIA): The Intermediate Habitat Integrity Assessment (IHIA) was used to define the ecological condition of the riparian/wash habitats of the considered areas. The IHIA was informed by the results of the land cover assessments and direct observations of changes to the washes. The IHIA considers both the riparian and instream habitat condition but for this report only the riparian habitat was considered. The method relies on the study of reference condition or natural watercourses within a similar setting. The IHIA for the Instream Habitat ranges between a Category B and C while the IHIA for the Riparian Habitat is a Category B. The ecological condition of the watercourses were not impacted to a significant degree. Where modifications were observed they were related to impoundments or crossings via linear infrastructure. It is noted that watercourse and roadway crossings across the alluvial plains have a significant impact on channel morphology which follows that of the road path. The PES Rating for the Depressions onsite were determined to be Class B indicating that it is largely natural with few modifications.

Wetland Functional Assessment and Ecosystem Services

Wetland functionality refers to the ability of wetlands to provide healthy conditions for the wide variety of organisms found in wetlands, as well as for humans. Ecosystem services serve as the main factor contributing to wetland functionality. The depression and wash HGM units provided primarily biodiversity and grazing related eco-services. The results indicated a moderately high importance for biodiversity maintenance for both depression and wash systems. The results also indicted a moderate importance rating for provisioning services, particularly relating to the use of the systems for grazing.

Ecological Importance and Sensitivity

The Northern Cape conservation plan indicates that the wash and depression habitats are located in Critical Biodiversity Areas one and two. Ecological Support Areas were also noted to be present. The depression pan systems were derived to have very high EIS, whilst the non-perennial washes were derived to be of moderate EIS. Due to the endorheic nature of the pans, they are more vulnerable to development. The presence of the invertebrates within the depression pan systems further supports their classification as important and sensitive landscape features which corroborates their assessment and classification as watercourses. No listed aquatic macroinvertebrates are associated with the proposed project.

Buffers and Regulated Areas

The buffer zones for the study area were defined based on the river and wetland ecosystems buffer tool as presented in Macfarlane et al. 2017 and Macfarlane et al. (2009). The buffer zone indicated a need of 15m from the washes, whilst a buffer zone of 20m was provided for depressions. It is however important to consider the dynamic nature of the washes as well as the ecological importance of the depression systems. For this reason it is proposed that buffer zones are increased from 15m to 40m for the wash systems. Whilst depression systems were provided with a buffer zone of 100m to protect the expected catchment of the systems. The provision of the wider buffers aligns with the precautionary approach particularly where indicators for the delineations were limited.

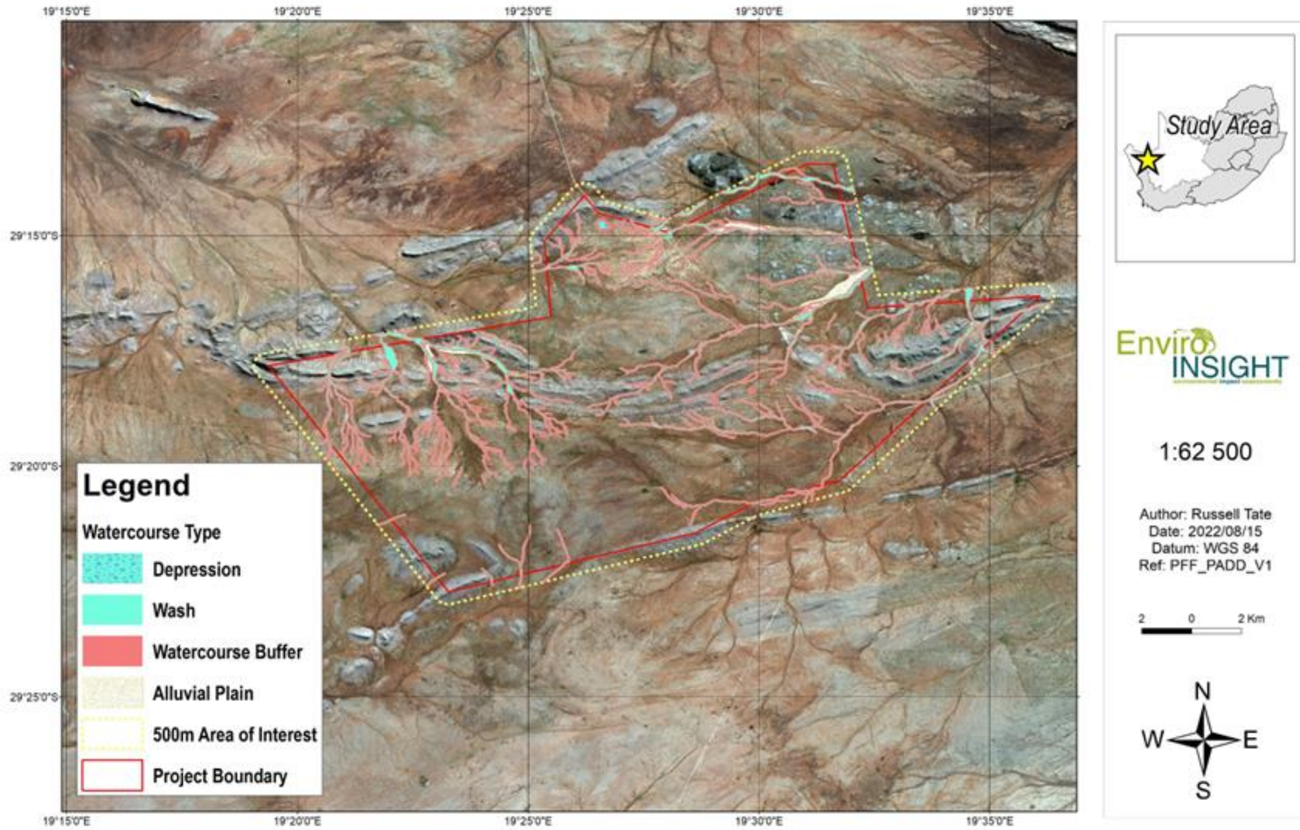


Figure 6-18: 40m and 100m buffer zone for the watercourses

Impacts and Mitigation Measures

The impact assessment identified destruction of water courses, sedimentation, erosion, invasive vegetation, surface water pollution as well as an altered hydrological regime as the major potential impacts during the construction and operational phase. Impacts have been separated into Construction and Operational Phases.

Construction Phase Impacts:

- Operation of equipment and machinery
- Clearing vegetation
- Stockpiling of and placement construction materials
- Excavating/shaping landscape
- Final landscaping, backfilling and postconstruction rehabilitation

Operation Phase Impacts

- Alteration of drainage
- Alteration of surface water flow dynamics

- Establishment of alien plants on disturbed areas

Mitigation Measures:

Construction:

- All contractors and staff are to be familiarised with the method statement and have undergone an induction / training on the location of sensitive No-Go areas and basic environmental awareness using the mitigation provided in this report.
- Access routes into or adjacent to the wash must make use of existing road ways and crossings where possible;
- Areas where construction is to take place must be clearly demarcated. Any areas not demarcated must be avoided;
- Storm-water generated from roadways must be captured and buffered, where flow velocities are to be significantly reduced before discharge into the environment.
- Storm-water verges as well as other denuded areas must be grassed (re-vegetated) with local indigenous grasses to protect against erosion;
- Any materials excavated must not be deposited in the river channel or valley slopes where it is prone to being washed downstream or impeding natural flow;
- The installation of sedimentation/erosion protection measures must be implemented before the start of construction, e.g., several rows of silt traps and fences (this is particularly important in the access roads leading or adjacent to the watercourse);
- Stockpiling or storage of materials and/or waste must be placed beyond the defined buffers in this report for each respective activity;
- No vehicles shall enter watercourse buffer zones outside of construction footprints;
- No vehicles shall be serviced on site; a suitable workshop with appropriate pollution control facilities should be utilised offsite;
- Hydrocarbons for refuelling purposes must be stored in a suitable storage device on an impermeable surface outside of the delineated wetland buffer zone;
- Disturbed areas must be re-vegetated after completion of the phase;
  - A one-month timeframe for the initiation of this action;
  - Ripping of the soils should occur in two directions; and
  - Removed vegetation and topsoil can be harvested and applied here.
- Drainage channels constructed for the access roads must be constructed so as not to result in erosion;
- An inspection of the drainage channels must be completed within 1 month following the end of activities and within a month after the first rainfall event which exceeds 5mm. Should excessive sediment be transported down the channels it is recommended that sediment screens are implemented;
- Sediment screens must be inspected, maintained and cleared every month or after significant rainfall (>30mm/24hrs);
- An alien vegetation removal and management plan must be implemented along the verges of the roads and crossing points;

- General storm-water management practices should be included in the design phase and implemented during the construction phase of this project; and
- Following the completion of the phase, all construction materials and debris should be removed and disposed of in a suitable off-site area. An inspection should be completed within a week after the phase is completed.
- The implementation of the buffer zone stipulated in this report;
- Clean and dirty surface water separation and a storm-water management plan must be put into place via standard best practice methods;
- A clear storm-water management plan for hardened surfaces must be implemented;
- The revegetation of disturbed non-active cleared areas must take place within the first growing season between September and March following completion of the activity;
- The above must be audited within 3 months of completing the phase;
- No discharge of domestic water must occur if possible. Domestic water must be reused for dust suppression.
- Spill kits must be always available on site with all incidents reported to the onsite Environmental Control Officer (ECO)
- Erosion control measures must be put in place
- It is recommended that floodlines are determined for the project.
- General authorisations are recommended for the proposed wash crossings where required.
- It is recommended that the avoidance actions proposed in this study are implemented where-after final road and turbine layouts must be re-assessed.

Operation:

- The implementation of a suitable storm-water management plan for the disturbance footprint must be in place and implemented by this phase;
- The access road and silt traps (if installed) must be inspected monthly for signs of erosion. When erosion is observed, the area should be rehabilitated within 7 days. In addition, inspections following a >80mm/24 hr rainfall event must occur within 7 days of the event;
- An annual audit of the roads for signs of environmental disturbance outside of the footprint area must be conducted; and
- Alien invasive management programmes should continue throughout the duration of the activity.
- Watercourse monitoring should take place annually as part of the environmental management plan.
- The implementation of the buffer zones provided in this report;
- Clean and dirty surface water separation and storm-water management plan must be put into place via standard best practice methods;
- An effective storm-water management plan for the solar farm must be implemented;
- The revegetation of disturbed non active cleared areas must take place within 1 month of completing the construction phase;
- The above must be audited within 3 months of completing the phase;
- No discharge of domestic water must occur if possible. Domestic water must be reused for dust suppression. Should domestic water be required to be discharge, the management of nitrogen concentrations is imperative.

- All stockpiles and hazardous waste storage areas must be bunded by either a cut-off trench directed to a Pollution Control Dam or via a berm.
- Spill kits must be always available on site with all incidents reported to the onsite Environmental Control Officer (ECO)

Cumulative Impact

The expected cumulative impacts for the proposed project on aquatic biodiversity are minimal should the avoidance and mitigation measures be implemented. The nature of the soils, gentle topography and aridity of the region has significant effects on the runoff potential during storm events whereby anticipated impacts are minimal

Conclusion and Recommendations

The outcome of this assessment delineated 11 watercourse units within the AoI. These watercourses were considered to be minimally modified and in a largely natural PES. The watercourses were classified as having Very High and Moderate EIS ratings. A scientific buffer was calculated for the watercourses, however inline with the precautionary principle, and given the highly variable nature of the washes, it was proposed that a 100m buffer for depressions and a 40m wash buffer was utilised to protect these sensitive environments.

The outcomes of the risk assessment indicate minor impacts from the proposed activities. The minor impacts can be attributed to low runoff potential, gentle topography and arid conditions. Should avoidance and basic mitigation actions be implemented, limited impacts to aquatic biodiversity can be expected.

In the view of the proposed new activities, should the proposed mitigation actions be implemented, no fatal flaw was identified. In line with the recommendations, avoidance must be implemented.

6.8. AGRICULTURAL POTENTIAL

The Agricultural Compliance Statement was conducted by Johann Lanz (the Compliance Statement is included in Appendix D5).

Site Sensitivity Verification

The screening tool classifies agricultural sensitivity according to only two independent criteria – the land capability rating and whether the land is used for cropland or not. All cropland is classified as at least high sensitivity, based on the logic that if it is under crop production, it is indeed suitable for it, irrespective of its land capability rating. The entire cadastral boundary of the development and the surrounding area is rated as low agricultural sensitivity because the land capability, predominantly due to the aridity limitations, is less than 6. This site sensitivity verification verifies the entire site as being of low agricultural sensitivity. The required level of agricultural assessment is therefore confirmed as an Agricultural Compliance Statement.

Agricultural Potential

The site has very low agricultural potential predominantly because of extreme climate constraints. As a result of the constraints, the land is limited to low capacity grazing. The entire site was verified in this assessment as being of low sensitivity for impacts on agricultural resources.

Agricultural Sensitivity

In terms of sensitivity, the land is regarded as low. During the site assessment there were three agricultural impacts identified that might have a potential negative impact. However, none of the impacts are of high significance. These include occupation of land resulting in loss of agricultural land use, land degradation and dust generation impact. The positive impacts that was identified is the increase of financial security and improved security. Figure 6-13 indicates the proposed development sight overlaid by the agricultural potential as per the Screening Tool, green = Low and yellow = Medium.

Impacts

- Occupation of Land resulting in Loss of agricultural potential by occupation of land: Agricultural land directly occupied by the development infrastructure will become restricted for agricultural use, with consequent potential loss of agricultural productivity for the duration of the project lifetime.
- Loss of agricultural potential by soil degradation: Erosion can occur as a result of the alteration of the land surface run-off characteristics, predominantly through the establishment of hard surface areas including roads. Soil erosion is completely preventable. The storm water management that will be an inherent part of the engineering on site and standard, best-practice erosion control measures recommended and included in the EMPr, are likely to be effective in preventing soil erosion. Loss of topsoil can result from poor topsoil management during construction related excavations.
- Dust impact: The disturbance of the soil surface, particularly during construction, will generate dust that can negatively impact surrounding veld and farm animals.
- Increased financial security for farming operations – Reliable and predictable income will be generated by the farming enterprises through the lease of the land to the energy facility. This is likely to increase their cash flow and financial security and could improve farming operations and productivity through increased investment into farming.
- Improved security against stock theft and other crime due to the presence of security infrastructure and security personnel at the energy facility.

Cumulative Impact:

- Regional Loss of Agricultural Land: This cumulative impact has been assessed using DFFE's criteria. The loss of land was quantified, and this was calculated to approximately 0.27% of the surface area that will be lost, taking into consideration the multiple renewable energy developments within a 30 km radius. This loss is justified in the sense that in order for South Africa to achieve its renewable energy generation goals, agriculturally zoned land will need to be used for renewable energy generation. The limits of acceptable agricultural land loss are far higher in this region than in regions with higher agricultural potential. The cumulative impact of loss of agricultural land use will not have an unacceptable negative impact on the agricultural production capability of the area. The cumulative impact of loss of future agricultural production potential is assessed as low. It will not have an unacceptable negative impact on the agricultural production capability of the area and it is therefore recommended that the development be approved.

Due to the low agricultural sensitivity of the site, and the effectively uniform agricultural conditions across the site, there will be absolutely no material difference between the agricultural impacts of any layout alternatives. Technology alternatives and the specifics of turbine size etc will also make absolutely no material difference to the significance of the agricultural impacts.

Mitigation Measures

The following mitigation measures are recommended for the proposed WEF:

- A system of storm water management, which will prevent erosion, will be an inherent part of the engineering on site. Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring there.
- Any excavations done during the construction phase, in areas that will be re-vegetated at the end of the construction phase, must separate the upper 20 cm of topsoil from the rest of the excavation spoils and store it in a separate stockpile. When the excavation is back-filled, the topsoil must be back-filled last, so that it is at the surface. Topsoil should only be stripped in areas that are excavated. Across the majority of the site, including construction lay down areas, it will be much more effective for rehabilitation, to retain the topsoil in place. If levelling requires significant cutting, topsoil should be temporarily stockpiled and then re-spread after cutting, so that there is a covering of topsoil over the entire cut surface. It will be advantageous to have topsoil and vegetation cover below the panels during the operational phase to control dust and erosion.

Conclusion

The proposed development will not have substantial 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 low agricultural potential, the amount of agricultural land loss is within the allowable development limits, and that the proposed development poses a low risk in terms of causing soil degradation, if the recommended mitigation measures are implemented.

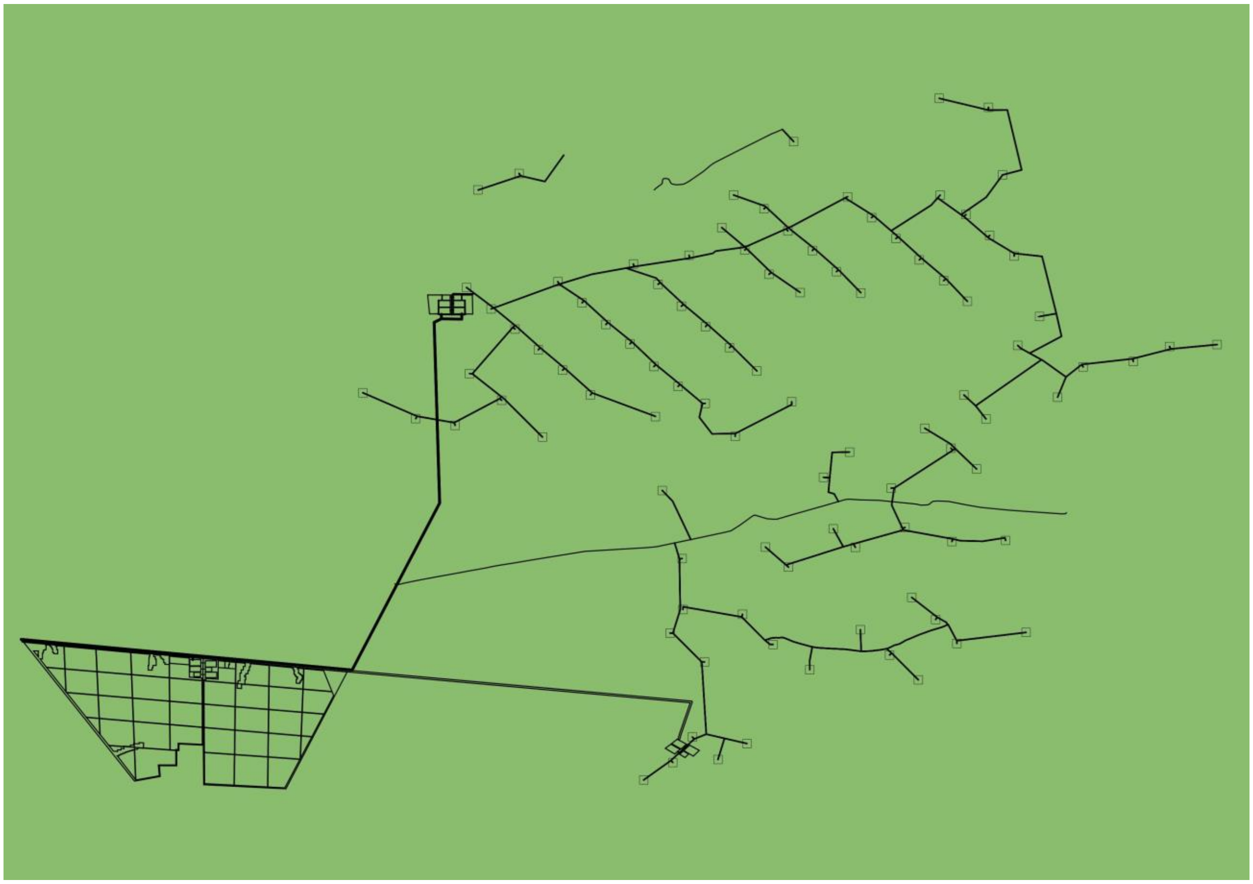


Figure 6-19: Agricultural Potential sensitivity (green = Low and yellow = Medium) as per the Screening Tool.

6.9. NOISE

The Noise Impact Assessment was conducted by Enviro Acoustic Research (EARES)). Refer to Appendix D6. The Noise Impact assessment was originally conducted on an older layout for the site, however an addendum to the report was provided by EARES to account for the current layout. The specialist determined that a full noise impact assessment with new modeling will not be required and the findings and recommendations as contained in the previous document (report EI-FEDRNWF/ENIA/202210-Rev) will still be valid. It is recommended that the applicant add noise monitoring at NSR02 the FE De Rust South WEF is authorized and constructed.

The area in the vicinity of the Project Focus Area ("PFA") are sparsely populated, with only two noise-sensitive developments, (each which could include a number of people and animals) identified within the PFA. Most of the area (including the area outside the PFA) can be considered wilderness, with animal husbandry (sheep) and ecotourism (game farms). None of these activities will influence the ambient sound levels in the PFA.

A site visit was conducted in June 2022 and the sound levels were measured over a period of two nights at three locations. Based on the ambient sound levels measured:

- approximately 628 10-minute measurements were collected during the day, with the highest fast-weighted sound level measured being 62.8 dBA, with the lowest sound level being less than 20 dBA;
- approximately 330 10-minute measurements were collected during the night-time period, with the highest fast-weighted sound level measured being 54.9 dBA, with the lowest sound level less than 20 dBA; and
- considering the average of the 10-minute equivalent sound levels at the four measurement locations, daytime fast-weighted sound levels are 37.5 dBA with night-time fast-weighted sound levels being 28.0 dBA.

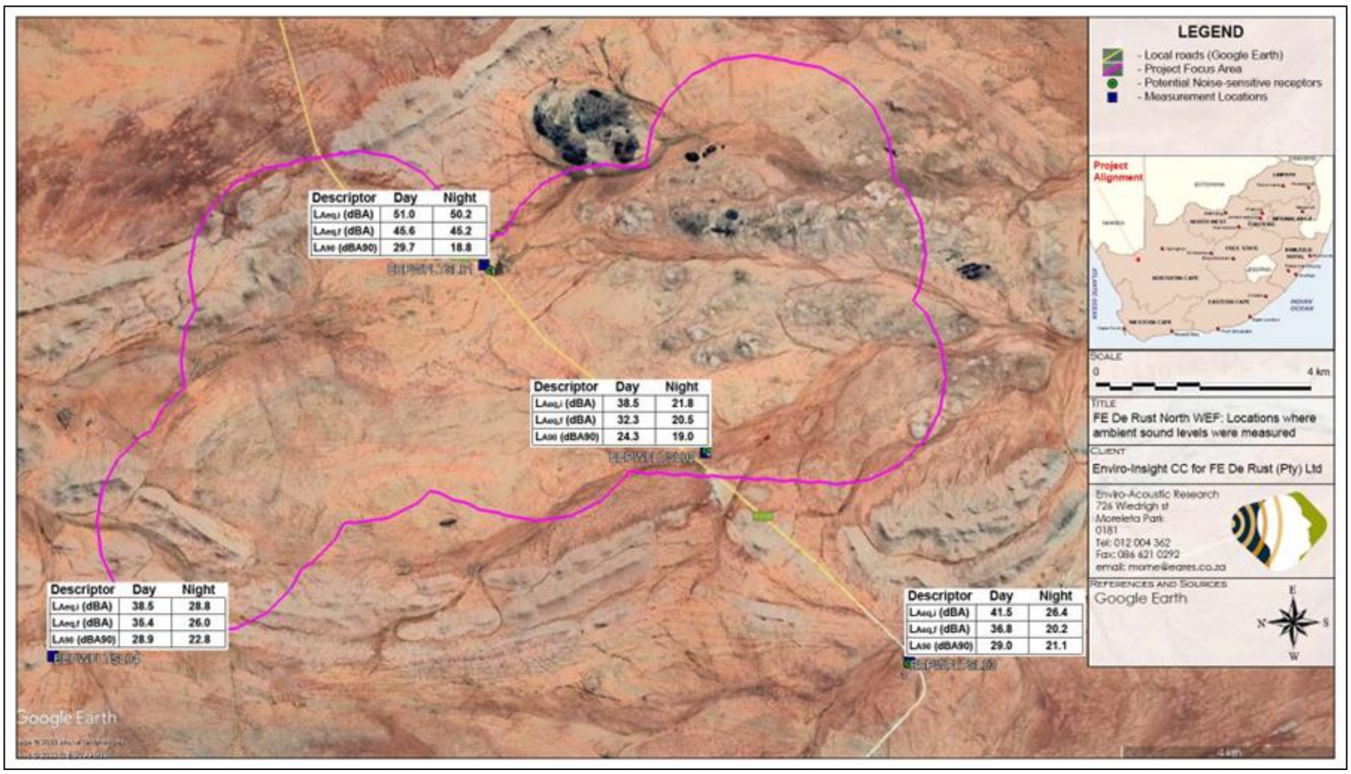


Figure 6-20: Localities where ambient sound levels were measured

Considering the results of the ambient sound levels and the developmental character of the area, ambient sound levels were typical of a quiet rural environment. The acceptable zone sound level (noise rating level) during low and no-wind conditions would be typical of a rural noise district, e.g.:

- 45 dBA for the daytime period; and,
- 35 dBA for the night-time period.

Because the National Noise Control Regulations (NCR) and SANS 10103 does not cater for instances when background noise levels change due to the impact of external forces (such as noises induced by higher wind speeds), this assessment used international guidelines and local regulations to recommend more appropriate noise limits for this project. This is important, as the wind turbines will only operate during periods of higher wind speeds, a period that may coincide with higher ambient sound levels. This assessment therefore recommends a night-time noise limit of 42 dBA (periods with low or no winds – with this limit relevant for the construction phase) and an upper limit of 45 dBA (periods that wind turbines may operate – the operational phase).

The assessment considers the potential noise impact on the surrounding environment due to the construction, operational and future decommissioning activities associated with the proposed development. Conceptual scenarios were used to develop the models to estimate the potential noise levels. Taking into consideration the ambient sound levels measured onsite, the proposed noise limits as well as the calculated noise levels, it was determined that the significance of the potential noise impacts would be:

- Low significance for the daytime construction activities (hard standing areas, excavation and concreting of foundations and the erection of the wind turbines and other infrastructure);
- Medium significance for the night-time construction activities. Mitigation is available to reduce the significance of the noise impact to low and were included in the October 2022 noise report. It should be noted that the medium significance mainly relates the low ambient sound levels measured onsite as well as the precautious approach in rating the potential noise impact;
- Low significance for daytime operational activities (noises from wind turbines) when considering the worst-case SPL; and
- Low significance for night-time operational activities (noises from wind turbines) when considering the worst-case SPL.

It is predicated that the noise impact will be of a low during the day, though night-time construction activities may have a medium significance. The medium significance impact relates to the worst-case scenario being investigated, with numerous simultaneous activities taking place at locations where WTGs are proposed. It is recommended that night time construction activities be minimised and most of the noisiest activities be conducted during the day. During the operational phase it is predicated that the noise impact will be low for day- and night-time operational activities. No mitigation measures are required or recommended for the operational phase.

The updated layout slightly increases the number of WTG located within 2,000m from NSR02 from six (6) to seven (7). The closest WTG is also slightly closer (from 1,450 m to 1,300 m) and, considering work done on other projects, this will slightly increase the noise level at NSR02, though the noise level will be less than 45 dBA (for a WTG with a sound power emission level less than 109.2 dBA re 1 pW). The updated layout also increases the number of WTG located within 2,000m from NSR01 from one (1) to four (4). The closest WTG is also closer (from 1,630 m to 1,250 m) and, considering work done on other projects, this will increase the noise level at NSR02, though the noise level will be less than 45 dBA (for a WTG with a sound power emission level less than 109.2 dBA re 1 pW). The significance of the noise impact would remain low.

Impacts:

- Daytime WTG construction activities: Daytime ambient sound levels could range between less than 20 dBA to more than 65 dBA, averaging at 32 dBA. Ambient sound levels are thus very low (during low wind conditions) and introduced noises will be audible over large distances. The significance of the noise impact is low for daytime construction activities.
- Night-time WTG construction activities: Night-time ambient sound levels could range between less than 20 dBA to more than 54 dBA, averaging at 28 dBA. Ambient sound levels are thus very low (during low wind conditions) and introduced

noises will be audible over significant distances at night, especially during quiet periods. The significance of the noise impact and cumulative impact is low with mitigation

- Daytime operation of WTG considering the worst-case SPL: WTG will only operate during period with increased winds, when ambient sound levels are higher than periods with no or low winds. Numerous WTG of the FE De Rust South WEF operating simultaneously during the day will increase ambient sound levels due to air-borne noise from the WTG. The significance of the noise impact and cumulative impact is low.
- Night-time operation of WTG considering the worst-case SPL: WTG will only operate during period with increased winds, when ambient sound levels are higher than periods with no or low winds. Numerous WTG of the FE De Rust South WEF operating simultaneously at night will increase ambient sound levels due to air-borne noise from the WTG. The significance of the noise impact and cumulative impact is low.

Cumulative Impact

- Potential Cumulative Noise Impacts: Numerous WTG from various WEFs operating simultaneously at night with increases in ambient sound levels due to air-borne noise from the WTG. Noise levels will be less than 45 dBA for the worst-case cumulative scenario. The significance of the noise impact is low.

Together with the WTG of the FE De Rust South WEF project, the updated layouts would reduce to total number of WTG from ten (10) to nine (9), though one of the WTG are located closer with the updated layout. There would be a slight potential for a cumulative noise impact if both the FE De Rust North WEF and FE De Rust South WEF are authorized and constructed.

The change would therefore likely result in higher cumulative noise level at NSR02 (both the construction and operational phases), but the change would not result in a change in the significance of the noise impact. There is no potential for a cumulative noise at NSR01.

Mitigation measures

Construction

- Minimizing night-time activities when working within 2,000m from any NSR. Work should only take place at one WTG location to minimize potential night-time cumulative noises (when working at night within 2,000m from NSR);
- The applicant must notify the NSR when night-time activities will be taking place within 1,000m from the NSR; and
- The applicant must plan the completion of noisiest activities (such a pile driving, rock breaking and excavation) during the daytime period.
- Ensure that equipment is well maintained and fitted with the correct and appropriate noise abatement measures. Engine bay covers over heavy equipment could be pre-fitted with sound absorbing material. Heavy equipment that fully encloses the engine bay should be considered, ensuring that the seam gap between the hood and vehicle body is minimised;
- Include a component covering environmental noise in the Health and Safety Induction to sensitize all employees and contractors about the potential impact from noise, especially those employees and contractors that have to travel past receptors at night, or might be required to do work close (within 1,000m) to NSR at night. This should include issues such as minimising the use of vehicle horns;

- Investigates any reasonable and valid noise complaint if registered by a receptor staying within 2,000 m from the location where construction activities are taking place, or where night-time construction activities are required, or where an operational WTG are located. A complaint register, keeping a full record of the complaint, must be kept by the applicant.
- With regard to unavoidable noisy night-time construction activities in the vicinity of NSR (closer than 1,500 m from any identified NSR), the contractor and Environmental Control Officer (ECO) must liaise with local NSR on how best to minimise impact and the NSR must be kept informed of the nature and duration of intended activities
- Where practicable, mobile equipment should be fitted with broadband (white-noise generators/alarms), rather than tonal reverse alarms.

Operation

- no new residential dwellings will be developed within areas enveloped by the 42 dBA noise level contour, and
- structures located within the 45 dBA noise level contour should not be used for residential use.
- re-evaluate the noise impact should the layout be revised where:
  - any WTG, located within 1,500 m from a confirmed NSR, are moved closer to the NSR;
  - any new WTG are introduced within 1,500m from an NSR;
  - the number of WTG within 2,000m from an NSR are increased;
- re-evaluate the noise impact should the applicant make use of a wind turbine with a maximum SPL exceeding 109.2 dBA re 1 pW;

Decommissioning

The potential significance of the noise impact would be similar as the construction phase (low significance) and no further mitigation is recommended or required for the decommissioning phase.

Cumulative

The cumulative noise impact is estimated to be low, therefore no mitigation measures are required.

Conclusion

Considering the Low significance during the operational phase (medium for night-time construction activities, which can be reduced to a low significance with the implementation of the recommended mitigation measures) it is recommended that the proposed FE De Rust South WEF (and associated infrastructure) be authorized in addition from a noise perspective, the proposed change in the layout would be acceptable.

6.10. VISUAL, LANDSCAPE AND FLICKER

The Visual Impact Assessment was conducted by Eco Elementum (Pty) Ltd (the report is included in Appendix D7).

Viewshed and Visual Exposure

Terrain Slope: The proposed project will be built on a flat surface, with an average slope of 1.21 degrees. Steeper slopes occur northwest and south of the site. Overall, the total study area has an average slope of 1.87 degrees. Due to the proposed project's position on a flat surface, it is expected that the structures may be less exposed to surrounding areas.

Aspect of the Slope: The average slope aspect of the site is a northeast facing slope. However, since the site is located on a flat surface, the proposed infrastructure is expected to be illuminated from sunrise to sunset and thus visible from all directions

Terrain Ruggedness: The overall total study area has a low level of ruggedness. This may have the tendency to decrease the VAC characteristics of the terrain. The terrain ruggedness is higher along the identified ridges, hills and koppies.

Relative Elevation: The relative elevation shows that most of the proposed wind turbines will be built on low-medium lying areas. Therefore, the structures are expected to be more visible to surrounding areas than if it were built on lower lying areas. The high lying areas located north and south of the site may assist in screening the proposed infrastructure from surrounding areas.

Landforms: Most of the proposed infrastructure will be built on plains. Mountain tops/high ridges are present northwest, south and further northeast of the site and may offer visual screening to the areas beyond these topographical features.

Slope Position: The surrounding area lies within valleys/cliff bases with flat areas, mid slopes, upper slopes and ridges. The majority of the proposed wind turbines will be constructed within valleys/cliff bases and a few on mid and upper slopes. The structures built within valleys/cliff bases are expected to be less visible than those built on mid and upper slopes.

Landcover Vac: The possible VAC of the study area calculated using the surrounding landcover. The study area has a low VAC therefore, the proposed infrastructure is expected not to blend in with the surroundings.

Viewshed Visibility: The visibility of the area, the number and location of the proposed wind turbines were used as the observer points. The ancillary infrastructure was also allocated 15 observer points. The viewshed shows the number of observer points that may be seen from any point within 15 km of the proposed WEF. All observer points will be visible from almost all areas within the total study area. The highest number of observer points will be visible from the west of the site. Overall, it is expected that the proposed infrastructure may be visible from approximately 99% of the total study area.

Viewshed Visibility – Distance Ranking: The visibility of the proposed infrastructure will be highest from the western area of the site. The visibility impact decreases as the distance from the site increases.

Visual Exposure Ranking: Approximately 99% of the total study area will experience some level of visual impact from the proposed WEF. The highest levels of visual exposure are expected from the ridges, hills and koppies located north, northwest, west, southwest, southeast and further north of the proposed site. The majority of the remaining areas are expected to experience low to medium levels of visual exposure.

Viewpoints: All identified sensitive receptors are expected to experience visual impacts from the proposed WEF. The identified homesteads and most of the road network users are expected to experience low levels of visual exposure. Higher levels of visual exposure are expected along a portion of the R358, directly northwest of the site.

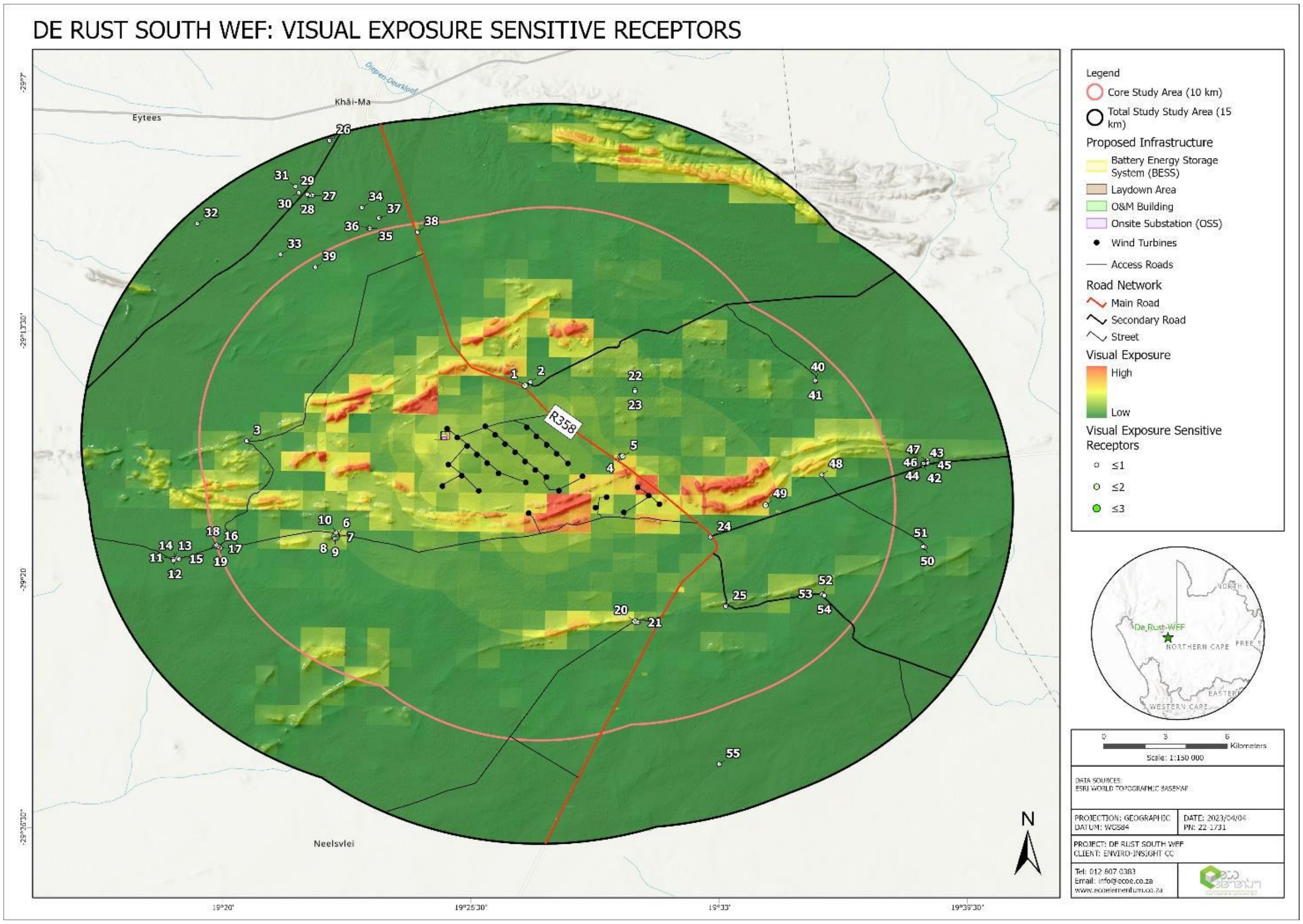


Figure 6-21: Visual exposure and sensitive receptors – showing the level of visual exposure potentially experienced by identified sensitive receptors

The proposed WEF is expected to have a low visual impact on the identified sensitive receptors however, the proposed WEF will be visible from the entire study area

Shadow Flicker Analysis

The maximum shadow flicker impact for a worst-case scenario at each sensitive/shadow receptor within the calculated maximum distance of influence (1 786 m). The results indicate that shadow receptors 1 and 2 will potentially experience shadow flicker impacts from wind turbine 7. Shadow receptor 1 is expected to experience 11 hours and 50 minutes of shadow flicker over 37 days per year, which implies a maximum of 26 minutes of shadow flicker per day. Shadow receptor 2 is expected to experience

29 hours and 50 minutes of shadow flicker over 78 days per year, which implies a maximum of 32 minutes of shadow flicker per day.

Motorists travelling on the road network may also experience momentary shadow flicker impacts. However, as there are no areas of tourism or protected areas present within the study area, the volume of traffic on the road network is expected to be low therefore, the level of shadow flicker impacts is expected to be minor/insignificant.

In terms of the EHS (2015) guidelines regarding the limits of shadow flicker impacts experienced at a sensitive receptor, the proposed WEF is below the limit of 30 hours of shadow flicker per year. However, the recommended limit of 30 minutes per day is exceeded for shadow receptor 2.

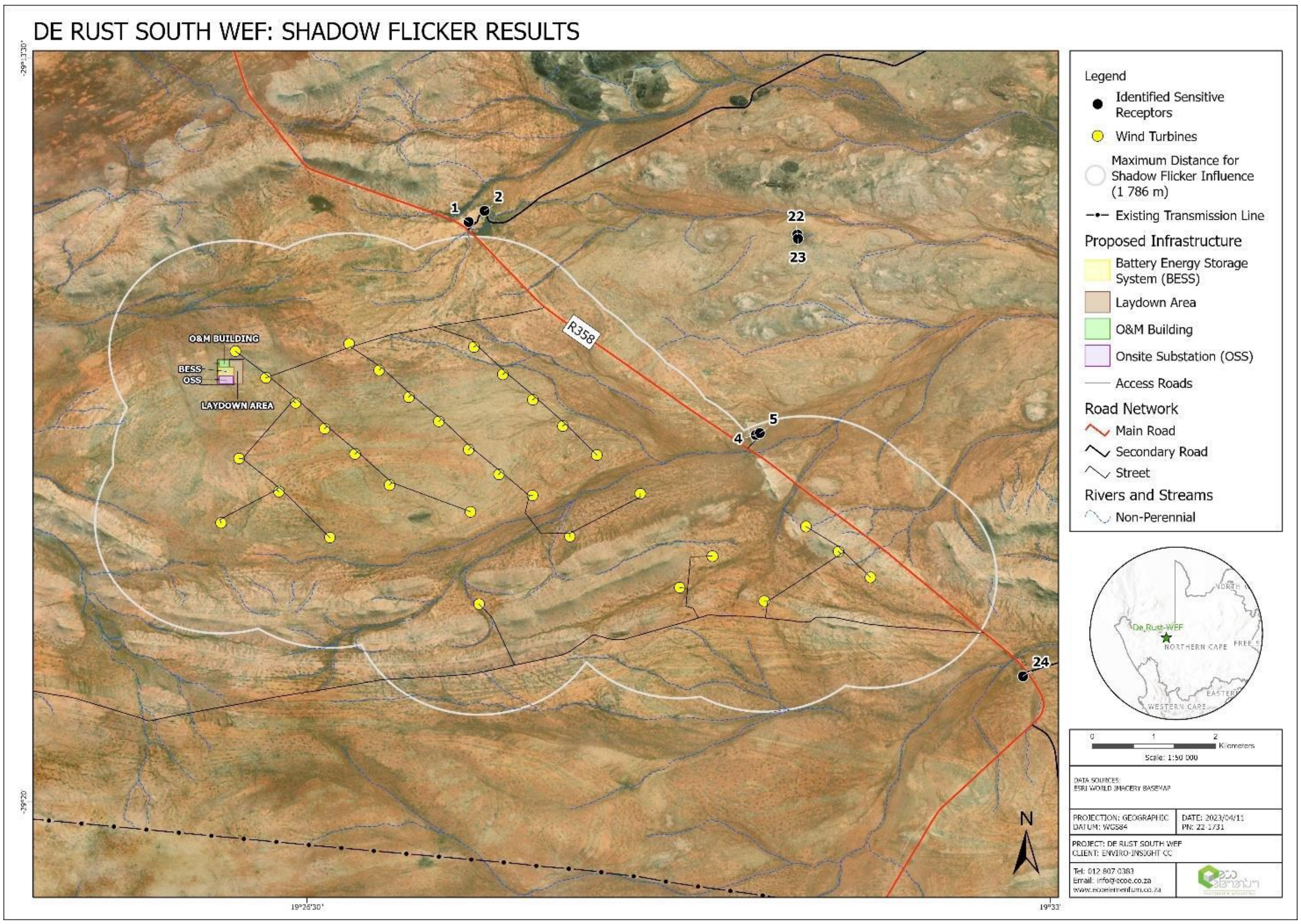


Figure 6-22: Shadow Flicker Analysis Main Result

Impacts

Construction:

- Visual intrusion due to the removal of vegetation, temporary soil stockpiling, movement of construction vehicles and heavy machinery, presence of laydown areas and site clearance.
- Light pollution due to night lighting.
- Dust pollution due to site clearance and movement of construction vehicles and heavy machinery.

Operation

Visual

- Change in visual/landscape character and sense of place due to the presence of the wind turbines and ancillary infrastructure.
- Visual intrusion from the wind turbines dominating the skyline in a largely natural area.
- Visual intrusion from the movement of construction vehicles and heavy machinery
- Dust pollution from operation and maintenance vehicles.
- Light pollution due to night lighting, security lighting and navigational lighting
- Visual impact on the identified sensitive receptors

Shadow Flicker

- Shadow flicker impact on shadow receptors 1 and 2

Decommissioning

- Change in landscape character due to the removal of infrastructure.
- Visual intrusion due to the removal of infrastructure, movement of construction vehicles and heavy machinery and presence of laydown areas.
- Light pollution due to night lighting.
- Dust pollution due to infrastructure removal and movement of construction vehicles and heavy machinery.

Cumulative

Visual

- Change in visual/landscape character and sense of place, due to the presence of additional renewable energy facilities, from a largely undeveloped landscape to a more industrial type of landscape.
- Additional levels of visual intrusion due to the presence of additional renewable energy facilities and from the movement of additional maintenance vehicles and heavy machinery.
- Additional dust pollution due to increased traffic.
- Additional light pollution due to additional night lighting, security lighting and navigational lighting.
- Increased visual impact on the identified sensitive receptors.

Shadow Flicker: A conservative maximum distance for shadow flicker influence of 2 km was applied for the surrounding approved WEF's. The figure indicates that no cumulative shadow flicker impacts are expected on the identified receptors. However, should there be future WEF's constructed in close proximately to shadow receptors 1 and 2, the receptors may experience cumulative shadow flicker impacts.

Mitigation:

Construction:

- Limit the construction footprint to only the development area.
- Ensure ongoing housekeeping.
- Carefully plan to minimize the construction duration.
- Inform receptors of the construction programme and schedule.
- Regulate the speed of vehicles on and off site.
- Use existing roads where possible.
- Limit the number of construction vehicles travelling to and from site.
- Implement dust suppression activities.
- Minimise vegetation clearing and rehabilitate cleared areas as soon as possible.
- Remove vegetation in a phased manner.
- Choose lighting types that reduce spill light and glare.
- Only focus light where it is needed.

Operation

Visual

- Change Retain and maintain natural vegetation within and around the development footprint where possible.
- Wind turbines should be painted plain white, and not brightly coloured with logos.
- Natural colours should be used on ancillary infrastructure so that they blend into the surrounding landscape.
- If a wind turbine/s needs replacement, it should be replaced with a turbine of the same model/height to maintain uniformity.
- Non-reflective surfaces should be utilized where possible.
- Implement dust suppression activities.
- All inoperable wind turbines should be repaired as soon as possible.
- All infrastructure should be always kept in a presentable condition.
- Regulate the speed of vehicles on and off site.
- Use existing roads where possible.
- Ensure ongoing housekeeping.

- Choose lighting types that reduce spill light and glare.
- Only focus light where it is needed

Shadow Flicker

- Engage with the impacted shadow receptors to mutually identify the most suitable measures to reduce shadow flicker impacts. This includes shielding the window/s using blinds, moving the affected window/s or any other measure found acceptable to the impacted shadow receptor, and/or
- During the construction phase, consult a botanist and plant suitable vegetation between wind turbine 7 and the impacted shadow receptors to diffuse the shadow flicker impact caused by the turbines.
- As a last resort, if the abovementioned mitigation measures are not suitable, programme wind turbine 7 to switch off during the respective times on the days when shadow flicker impacts are expected to exceed 30 minutes.

Decommissioning

- Change Limit the decommissioning footprint to only the development area.
- Carefully plan to minimize the decommissioning duration.
- Inform receptors of the decommissioning programme and schedule.
- Regulate the speed of vehicles on and off site.
- Use existing roads where possible.
- Limit the number of vehicles travelling to and from site.
- Implement dust suppression activities.
- Ensure ongoing housekeeping.
- Revegetate areas with suitable indigenous vegetation.
- Where possible, reshape the area so that the resembles the pre-construction landscape.
- Remove as much infrastructure as possible.
- Ensure that residual infrastructure remains in good condition.
- Choose lighting types that reduce spill light and glare.
- Only focus light where it is needed.
- Ensure monitoring of rehabilitated areas for at least a year after decommissioning activities are completed.

Cumulative

Visual

- Retain and maintain natural vegetation within and around the development footprint where possible.
- Wind turbines should be painted plain white, and not brightly coloured with logos.
- Natural colours should be used on ancillary infrastructure so that they blend into the surrounding landscape.
- If a wind turbine/s needs replacement, it should be replaced with a turbine of the same model/height to maintain uniformity.

- Non-reflective surfaces should be utilized where possible.
- Implement dust suppression activities.
- All inoperable wind turbines should be repaired as soon as possible.
- All infrastructure should be always kept in a presentable condition.
- Regulate the speed of vehicles on and off site.
- Use existing roads where possible.
- Ensure ongoing housekeeping.
- Choose lighting types that reduce spill light and glare.
- Only focus light where it is needed
- Where necessary, liaise with the neighbouring renewable energy facility's management to mutually decrease visual impacts on visually impacted sensitive receptors

Shadow Flicker: If required as the result of future developments

- Controlling the impact at the shadow receptor/s includes engaging with the receptor/s in order to determine suitable mitigation measures.
- Controlling the impact between the wind turbine and impacted shadow receptor/s includes planting suitable vegetation in attempt to diffuse the shadow flicker impacts
- If measures are not successful, it is recommended that the wind turbine/s causing the shadow flicker are programmed to switch off during the times of maximum shadow flicker impact as a last resort for mitigation.
- Suitable vegetation be planted and maintained between the wind turbine/s causing shadow flicker and the affected portion of the road network in attempt to diffuse the shadow flicker impacts.

Conclusion

The proposed WEF is expected to alter the study areas current sense of place. However, considering the municipality's objectives and the surrounding approved wind and solar projects, an alteration to the area's current sense of place is expected. Therefore, the proposed WEF is expected to blend in with the areas future sense of place, which is expected to include additional renewable energy projects.

Taking into consideration the analysis, including the results of the viewshed and visual exposure analysis, shadow flicker analysis, impact assessments, future land use trends and low density of identified sensitive receptors, the proposed De Rust South WEF project can proceed from a visual and shadow flicker perspective provided that the recommended mitigation measures are adhered to.

6.11. HERITAGE

The Heritage Impact Assessment was conducted by Jaco van der Walt from Beyond Heritage (the report is included in Appendix D8).

Findings

Heritage

A site survey was conducted in March 2023. Few and mostly localised heritage observations (mostly of low heritage significance) are on record near the Project area and is clustered around topographical focal points like rocky outcrops, hills, pans and drainage lines. Topographically the Project footprint lacks any of the aforementioned focal points apart from a drainage line and is characterised by undulating featureless plains and is considered to be of low heritage potential. Heritage observations within the study area were limited to a small packed stone wall with a small burial site to the North of the study area and were recorded as Waypoints. The recorded observations were numbered sequentially with the prefix PD for Pofadder Development. The small burial site at PD002 is situated within the De Rust WEF North project footprint and not further discussed here. On the current layout the small stone packed wall at PD001 is located more than 100 metres from the Project infrastructure and will not be impacted on. The burial site (PD002) situated within De Rust WEF North will not be impacted on by any roads or turbines

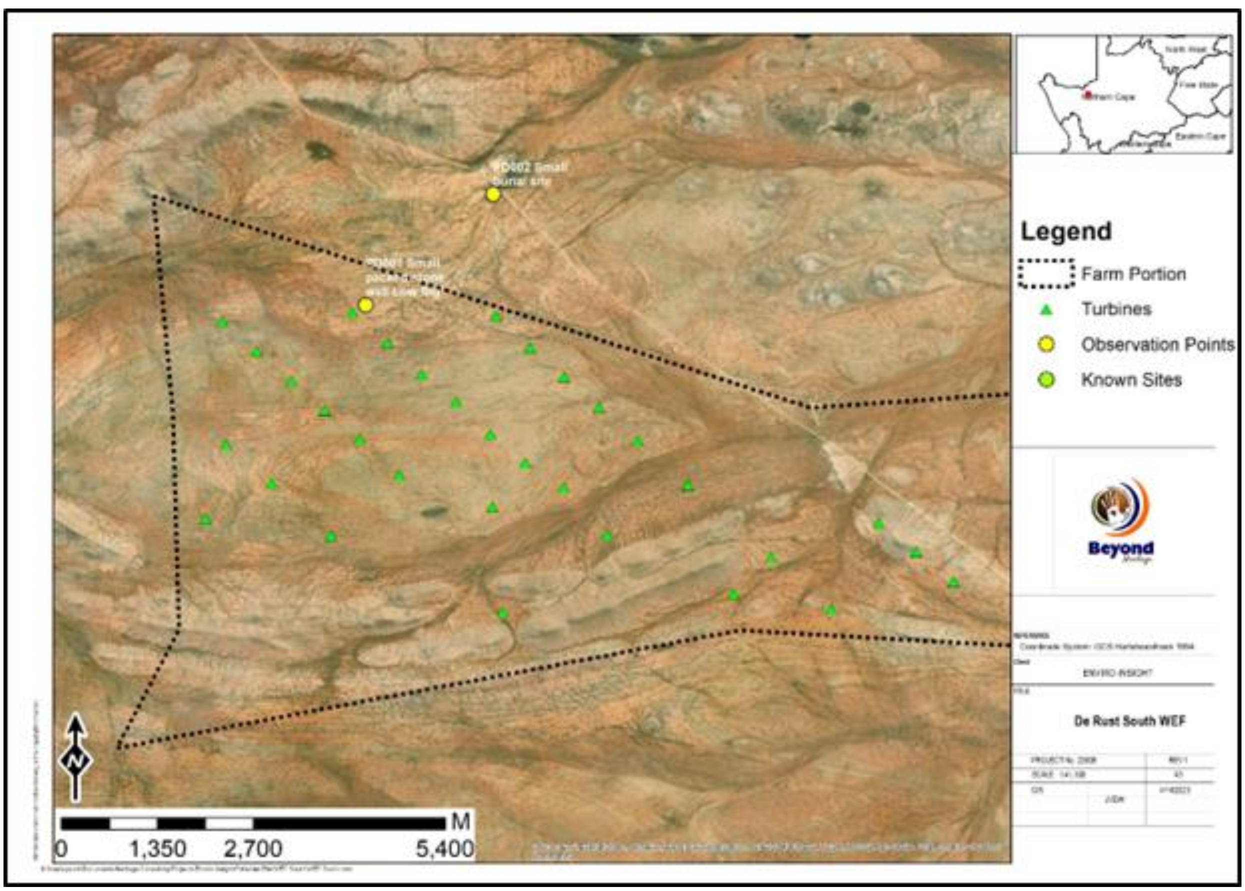


Figure 6-23: Site distribution map

Paleontological Heritage

The palaeontological sensitivity of the project area is indicated as unknown to insignificant/zero and low and an independent study was conducted for this aspect.

Chance Find Procedures

Heritage Resources

The possibility of the occurrence of subsurface finds cannot be excluded. Therefore, if during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped, and a qualified archaeologist must be contacted for an assessment of the find and therefor chance find procedures should be put in place as part of the EMP.

This procedure applies to the developer's permanent employees, its subsidiaries, contractors and subcontractors, and service providers. The aim of this procedure is to establish monitoring and reporting procedures to ensure compliance with this policy and its associated procedures. Construction crews must be properly inducted to ensure they are fully aware of the procedures regarding chance finds as discussed below.

- If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.
- It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area.
- The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA.

Monitoring Program for Paleontology – to commence once the excavations / drilling activities begin.

1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations commence.
2. When excavations begin the rocks must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (trace fossils, fossils of plants, insects, bone or coalified material) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
3. Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones. This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.

7. If no good fossil material is recovered, then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.
8. If no fossils are found and the excavations have finished then no further monitoring is required.

Impacts

Impacts to archaeological resources would mostly occur during the construction phase. On the current layout the small stone packed wall at PD001 is located more than 100 metres from the Project infrastructure and will not be impacted on. The burial site (PD002) situated within De Rust WEF North will not be impacted on by any roads or turbines

Construction

- Construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.

Cumulative: The proposed project will have a low cumulative impact as no significant heritage resources will be adversely affected. Cumulative impacts are deemed to be of low significance in this case because the broader landscape is extensive and is likely to hold many similar archaeological resources.

Mitigation

Construction

- Regular monitoring of the development footprint by the ECO to implement the Chance Find Procedure for heritage and palaeontology resources in case heritage resources are uncovered during the course of construction;
- Any changes to the layout should be subjected to a heritage walkdown prior to development.

Recommendations

- Regular monitoring of the development footprint by the ECO to implement the Chance Find Procedure for heritage and palaeontology resources in case heritage resources are uncovered during the course of construction;
- Any changes to the layout should be subjected to a heritage walkdown prior to development.

Conclusion

The overall impact of the project is considered to be low and residual impacts can be managed to an acceptable level through implementation of the recommendations made in this report. The socio-economic benefits also outweigh the possible impacts of the development if the correct mitigation measures are implemented for the project. The impact of the project on heritage resources is low, and it is recommended that the project can commence on the condition that the recommendations and mitigation measures are implemented as part of the EMPr and based on approval from SAHRA.

6.12. SOCIO-ECONOMIC

The Social Impact Assessment was conducted by Tony Barbour and the full report is included in Appendix D9.

The development of renewable energy and the associated energy infrastructure is strongly supported at a national, provincial, and local level. The development of and investment in renewable energy and associated energy distribution infrastructure is supported by the National Development Plan (NDP), New Growth Path Framework and National Infrastructure Plan, which all highlight the importance of energy security and investment in energy infrastructure. The development of the proposed WEF and associated infrastructure is therefore supported by key policy and planning documents.

Impacts

Construction

- Creation of employment and business opportunities, and the opportunity for skills development and on-site training. (positive)
- Impacts associated with the presence of construction workers on local communities.
- Increased risks safety, livestock and farming infrastructure associated with the construction related activities and presence of construction workers on the site.
- Increased risk of grass fires associated with construction related activities.
- Nuisance impacts, such as noise, dust, and safety, associated with construction related activities and vehicles.

Operation

- The establishment of infrastructure to improve energy security and support renewable sector. (positive)
- Creation of employment opportunities. (positive)
- Benefits for local landowners. (positive)
- Benefits associated with socio-economic contributions to community development. (positive)
- Noise impacts associated with the operation of the plant.
- Visual impacts and associated impacts on sense of place.
- Potential impact on property values.
- Potential impact on tourism.

Decommissioning

Given the relatively small number of people employed during the operational phase (~ 30), the potential negative social impact can be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative). Decommissioning will also create temporary employment opportunities. The significance was assessed to be Low (positive).

Cumulative

- Increased pressure on services in the local area
- Loss of sense of place
- Improvement to the local economy (positive)

Mitigation

Construction

- Where reasonable and practical, the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However, due to the low skills levels in the area, the majority of skilled posts are likely to be filled by people from outside the area.
- Where feasible, efforts should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria.
- Before the construction phase commences the proponent should meet with representatives from the KMM to establish the existence of a skills database for the area. If such as database exists it should be made available to the contractors appointed for the construction phase.
- The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that the proponent intends following for the construction phase of the project.
- Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase.
- The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.
- The proponent should liaise with the KMM with regards the establishment of a database of local companies, specifically BBBEE companies, which qualify as potential service providers (e.g., construction companies, catering companies, waste collection companies, security companies etc.) prior to the commencement of the tender process for construction service providers. These companies should be notified of the tender process and invited to bid for project-related work
- Where possible, the proponent should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories.
- The proponent and the contractor(s) should develop a code of conduct for the construction phase. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be subject to appropriate disciplinary action and/or dismissed. All dismissals must comply with the South African labour legislation.
- The proponent and the contractor should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase.

- The contractor should provide transport for workers to and from the site on a daily basis. This will enable the contactor to effectively manage and monitor the movement of construction workers on and off the site.
- The contractor must ensure that all construction workers from outside the area are transported back to their place of residence within 2 days for their contract coming to an end.
- No construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.
- The proponent should enter into an agreement with the local farmers in the area whereby damages to farm property etc. during the construction phase will be compensated for. The agreement should be signed before the construction phase commences.
- All farm gates must be closed after passing through.
- Contractors appointed by the proponent should provide daily transport for low and semi-skilled workers to and from the site.
- The proponent should consider the option of establishing a MF (see above) that includes local farmers and develop a Code of Conduct for construction workers. This committee should be established prior to commencement of the construction phase. The Code of Conduct should be signed by the proponent and the contractors before the contractors move onto site.
- The proponent should hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be contained in the Code of Conduct to be signed between the proponent, the contractors, and neighbouring landowners. The agreement should also cover loses and costs associated with fires caused by construction workers or construction related activities (see below).
- The Environmental Management Plan (EMP) must outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested.
- Contractors appointed by the proponent must ensure that all workers are informed at the outset of the construction phase of the conditions contained in the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms.
- Contractors appointed by the proponent must ensure that construction workers who are found guilty of stealing livestock and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation.
- It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.
- The proponent should enter into an agreement with the local farmers in the area whereby damages to farm property etc., during the construction phase will be compensated for. The agreement should be signed before the construction phase commences.

- Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas.
- Smoking on site should be confined to designated areas.
- Contractor should ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high-risk dry, windy winter months.
- Contractor should provide adequate fire-fighting equipment on-site, including a fire fighting vehicle.
- Contractor should provide fire-fighting training to selected construction staff.
- No construction staff, with the exception of security staff, to be accommodated on site overnight.
- As per the conditions of the Code of Conduct, in the advent of a fire being caused by construction workers and or construction activities, the appointed contractors must compensate farmers for any damage caused to their farms. The contractor should also compensate the fire-fighting costs borne by farmers and local authorities.
- The movement of construction vehicles on the site should be confined to agreed access road/s.
- Establishment of a Grievance Mechanism that provides local farmers and other road users with an effective and efficient mechanism to address issues related to construction related impacts, including damage to local gravel farm roads.
- The movement of heavy vehicles associated with the construction phase should be timed to avoid times days of the week, such as weekends, when the volume of traffic travelling along the access roads may be higher.
- Establishment of a Grievance Mechanism that provides local farmers and other road users with an effective and efficient mechanism to address issues related to construction related impacts, including damage to local gravel farm roads.
- Dust suppression measures should be implemented, such as wetting on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.
- All vehicles must be road worthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.

Operation

- Implement a skills development and training programme aimed at maximizing the number of employment opportunities for local community members.
- Maximise opportunities for local content, procurement, and community shareholding.
- Maximise opportunities for local content and procurement.
- Implement agreements with affected landowner.
- The proponents should liaise with the KMM to identify projects that can be supported by SED contributions.

- Clear criteria for identifying and funding community projects and initiatives in the area should be identified. The criteria should be aimed at maximising the benefits for the community as a whole and not individuals within the community.
- Strict financial management controls, including annual audits, should be instituted to manage the SED contributions.
- The proposed establishment of suitably sited renewable energy facilities and associated projects, such as the proposed WEF, within the KMM should be supported.
- The proponent should liaise with the KMM to address potential impacts on local services.
- Recommendations of VIA should be implemented.

Decommissioning

- The proponent should ensure that retrenchment packages are provided for all staff retrenched when the plant is decommissioned.
- All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning.

Cumulative

- Recommendations of VIA should be implemented.
- The proponent should liaise with the KMM to address potential impacts on local services.
- The proposed establishment of suitably sited renewable energy facilities and associated projects, such as the proposed WEF, within the KMM should be supported.
- The proposed WEF should be developed, and the mitigation and enhancement measures identified in the SIA and other specialist studies should be implemented.

Conclusion

The findings of the SIA study indicate that the proposed De Rust South WEF and associated infrastructure will create a number of social and socio-economic benefits, including creation of employment and business opportunities during both the construction and operational phase. The project will also create economic development opportunities for the local community. The enhancement measures listed in the report should be implemented in order to maximise the potential benefits. The significance of this impact is rated as High Positive. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the negative environmental and socio-economic impacts associated a coal-based energy economy and the challenges created by climate change, represents a significant positive social benefit for society as a whole. The Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) has resulted in significant socio-economic benefits, both at a national level and at a local, community level. These benefits are linked to foreign Direct Investment, local employment and procurement and investment in local community initiatives.

The findings also indicate that the potential negative impacts associated with both the construction and operational phase are likely to be Low Negative with mitigation. The potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented.

The establishment of the proposed De Rust South WEF and associated infrastructure is therefore supported by the findings of the SIA.

6.13. TRANSPORTATION IMPACT ASSESSMENT

A Transportation Impact Assessment Report was compiled by Innovative Transport Solutions (refer to Appendix D10).

The National Road (N14) and the R358 are the only major roads in the site vicinity. The N14 has a posted speed limit of 120 km/h. The section of the N14 in the vicinity of the site has a typical rural formation of a National Road, paved with one lane per direction of travel with shoulders along both sides of the road. The lanes are 3.7m wide with 2m shoulders. The R358 is 8m wide gravel road. The surface condition of the R358 in the site vicinity is poor condition.

Access to the site is proposed via new and existing farm accesses off the R358. The required shoulder sight distance (SSD) for heavy vehicles along roads with a posted speed limit of 60km/h is 220 metres, the available SSD is more than 300 metres in both directions from all accesses, which is acceptable and safe for the existing posted speed limits along the R358.

Components to be imported can be shipped to Saldanha or Cape Town harbours or the Atlantis industrial site and then transported by road depending on the different load restrictions.

Saldanha Route: It follows Trunk Road 8501 to the R27, then via the R27 to Velddrif, then the R399 to Piketberg, then the route

follows the N7 north to Springbok then via the N14 to Pofadder and via the R358 to the site.

Cape Town Route: It follows the R27 to Melkbosstrand and then the via the Melkbosstrand Road to the N7, then via the N7 north to Springbok, then via the N14 to Pofadder and via the R358 to the site.

Atlantis Industrial Site Route: The route from Atlantis to Pofadder can follow either of the two routes.

The final route will have to be checked for compliance during the final design stages of the project. Permits will need to be obtained from the relevant road authorities for all abnormal loads and the specific route will be specified based on the characteristics of each load type.

Year 2027 background traffic volumes were developed by applying a 3.0 percent annual traffic growth rate to the existing traffic volumes on the major links. Due to the low traffic volumes along the surrounding road network, it is expected that the road network will continue to operate at acceptable levels-of-service during the background conditions. The roads in the site vicinity are in a fair condition and no major maintenance will be required in the near future.

Impacts

Construction

- Increase in traffic volumes on the surrounding road network because of construction traffic. During the construction phase there will be an increase in traffic volumes on the surrounding road network that will impact on the general road users.

- Gravel loss and possible damage to the road surfaces because of additional truck traffic and heavy load truck traffic during the construction phase. During the construction phase there will be gravel loss and possible damage to the road layer works along the R358 as a result of additional truck traffic and heavy load truck traffic delivering equipment to the site.

Operation

The operational phase of this project is not expected to generate significant traffic volumes. The typical day-to-day activities will probably only be service vehicles undertaking general maintenance at the site.

- Increase in traffic volumes on the surrounding road network during the operational phase.

Decommissioning

The transport impact during the decommissioning phase will be similar or less than the transport impact during the construction phase. The surrounding road network has sufficient capacity to accommodate the expected traffic volumes associated with the decommissioning phase.

- Gravel loss and possible damage to the road layer works. as a result of additional truck traffic and heavy load truck traffic during the decommissioning phase.

Cumulative

To assess the cumulative impact, it will be assumed that all proposed and/or approved renewable energy projects within a 50km radius from the site will be constructed simultaneously, which is however extremely unlikely. There are other planned renewable energy projects within a 30km radius from the proposed WEF. The construction and decommissioning phases of these projects are the only significant traffic generators. These are short term phases and the impacts on the surrounding road network is temporary. Even if all projects are constructed and decommissioned simultaneously, the road authority will evaluate the applications for the abnormal loads associated with these projects and liaise with the developers to ensure that loads on the public roads are staggered to ensure that the traffic impact is acceptable.

- Increase in traffic volumes on the surrounding road network because of construction traffic. During the construction phase there will be an increase in traffic volumes on the surrounding road network that will impact on the general road users.
- Gravel loss and possible damage to the road surfaces because of additional truck traffic and heavy load truck traffic during the construction phase. During the construction phase there will be gravel loss and possible damage to the road layer works along the R358 as a result of additional truck traffic and heavy load truck traffic delivering equipment to the site.
- Increase in traffic volumes on the surrounding road network during the operational phase.
- Gravel loss and possible damage to the road layer works. as a result of additional truck traffic and heavy load truck traffic during the decommissioning phase.

Mitigation

Construction

- Construction traffic should not be allowed on the public road network during the typical weekday a.m. and p.m. peak hours in built up areas.
- These measures will be included in the Transport Management Plan.
- Resurfacing of sections along the R358, where required and regular road maintenance i.e. grading of the road once every two weeks during the construction phase.
- The road can also be sprayed with water (grey water if available) once a day to limit dust pollution and gravel loss.

Operation

- Routine road maintenance by the relevant Roads Authority.

Decommissioning

The transport impact during the decommissioning phase will be similar or less than the transport impact during the construction phase

- Resurfacing of sections along the R358, where required and regular road maintenance i.e. grading of the road once every two weeks during the decommissioning phase.
- The road can also be sprayed with water (grey water if available) once a day to limit dust pollution and gravel loss.

Cumulative

Cumulative impacts were considered to be low, therefore no additional mitigation measures were provided. Mitigation measure provided for the construction, operation and decommissioning phases should be implemented.

Traffic Management and Transportation Plan

- During the construction phase there will be an increase in truck traffic along the roads in the site vicinity, compared to the current truck traffic along these roads. However, the expected total traffic volumes along these roads will still be well within the function of the roads and no operational or safety issues are expected.
- It is recommended that construction and abnormal load traffic should be limited to outside the typical traffic peaks in build-up areas and through towns.
- Most of the equipment and construction material will be delivered to the site with heavy vehicles. The turbine components will be transported by abnormal load vehicles. It is expected that the delivery of the equipment can occur over a 18-month period and the impact of the delivery vehicles on the existing traffic along the road network in the site vicinity will be acceptable. All deliveries with abnormal loads will operate under an approved transportation plan with the necessary traffic routes and traffic accommodation plans in place.

Conclusion

The existing road network has sufficient spare capacity to accommodate the proposed WEF, without any road upgrades required to the existing road infrastructure. It is recommended that the proposed WEF be approved from a transport impact perspective.

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6.14. ELECTROMAGNETIC AND RADIO FREQUENCY INTERFERENCE

The South African Radio Astronomy Observatory (SARAO) is a National Facility managed by the National Research Foundation and incorporates all national radio astronomy telescopes and programmes.

The Square Kilometre Array (SKA) project is an international effort (co-hosted between South Africa and Australia) to build the world's largest radio telescope, with a square kilometre (one million square metres) of collecting area. It will have an unprecedented scope in observations, exceeding the image resolution quality of the Hubble Space Telescope by a factor of 50 times, whilst also having the ability to image huge areas of sky in parallel.9 The South African MeerKAT radio telescope, situated 90 km outside the small Northern Cape town of Carnarvon, is a precursor to the SKA telescope and will be integrated into the mid-frequency component of SKA Phase 1. The SKA is located in the Nama Karoo of South Africa, providing the perfect radio quiet backdrop for the high and medium frequency arrays that will form a critical part of the SKA's ground-breaking continent wide telescope. In an effort to protect this unique landscape in the country, the Minister of Science and Technology declared three Astronomy Advantage Areas in the Karoo in terms of the Astronomy Geographic Advantage Act (Act 21 of 2007).

The Applicant is committed to take all precautionary measures to limit the electromagnetic emissions (EMI) in all your electrical cable installations and equipment. The sensitivity with regards to telecommunications is considered low as there aren't any towers telecommunications towners within the vicinity of the site.

6.15. WAKE IMPACT ASSESSMENT

A Wake Impact Assessment Report was compiled by EnergieTEAM, refer to Appendix D11.1.

Wake effect and turbine turbulence occur when wind energy facilities are located in close proximity to one another. Both wake effect and turbine turbulence can occur when a new wind energy facility is established upwind of an existing wind energy facility. Wake effect is the phenomenon that can occur when the new upwind wind energy facility is first in line in receiving and capturing the available wind resource, thereby possibly reducing the quantity of wind available to the downwind facility and, concomitantly, the energy production capabilities of such a facility.

Wind turbines extract energy from the wind, and downstream there is a wake from the wind turbine where the wind speed is reduced. As the flow proceeds downstream, there is a spreading of the wake, and the wake recovers towards free stream conditions. The wake effect loss is the aggregated influence on the energy production of the wind farm which results from the changes in wind speed caused by the impact of the turbines on each other. These effects are calculated using the WindFarmer computational model.

The new upwind facility may also have an impact on the quality of the remaining wind available to the downwind facility to the extent that, as the wind passes through the turbine rotors of the upwind facility, the flow of the remaining wind becomes more turbulent. The more turbulent wind may result in mechanical wear and tear and, therefore, increased maintenance on the turbines of the downwind facility. The result may be possible additional downtime and may even result in a decrease in the expected longevity of the turbines.

While the impacts of wake effects and turbine turbulence have not yet been the subject matter of judicial consideration in the country, and despite the relatively limited number of wind energy facilities in the country, they are now being raised by the owners of downwind energy facilities in their legal opposition to the granting of environmental authorisations for the development of proposed new nearby and upwind facilities. These effects are calculated using the WindPro computational model. The wind flow modelling is calculated after processing of site data.

The purpose of this wake impact report is to provide an indication of the expected wake impact of the proposed De Rust Wind Energy facility (WEF) on seven surrounding WEFs. This assessment is based on work conducted by EnergieTEAM towards an energy production assessment based on:

- Data provided by two meteorological mast specifically erected for the De Rust WEF project. The wind campaigns started in October 2021 and they still in operation.
- A long-term correlation done between 12 months of the met mast data (February 2022-February 2023) and 20 years of data from ERA5 source (April 2003-April 2023).
- One preliminary layout on Pofadder project with 97 Nordex N163 5700 with 118 m hub height.
- The layouts communicated by developers of the neighbouring WEF projects.
- For these reasons the research of this wake effect study can't be considerate as a final energy production assessment, or a final wake effect calculation. This report indicates the wish to collaborate with EnergyTEAM on the matter of the wake effect between wind farms and must be updated once the wind campaign finishes and the final layout decided.

The Eddy Viscosity model with WindPro is employed in a scheme which, taking each wind speed and direction in turn calculates the wake loss and power production of a project. The important parameters used in the process are:

- Turbine layout and inter-turbine spacing;
- Adjusted wind speed rom site wind flow calculations;
- Ambien turbulence profile;
- Wind turbine thrust characteristic;
- Wind turbine power characteristic; and
- Rotor speed characteristic.

Any air density adjustments required due to differences between the hub-height air density at the turbine locations and at the reference mast location is applied and included in the array effect.

The configuration of three wind farms considered in the wake assessments are:

- Khai-Ma (proposed) - Turbine locations and turbine model are provided by Mainstream consisting of 71 Nordex N163 5700, with a hub height of 118 m.
- Korana (proposed) - Turbine locations and turbine model are provided by Mainstream consisting of 69 Nordex N163 5700, with a hub height of 118m.
- Poortjies (proposed) - Turbine locations and turbine model are provided by Mainstream consisting of 50 Nordex N163 5700, with a hub height of 118 m.
- A second scenario has been studied, in which it has been considered that Khai-Ma would only have 37 turbines because of the eagle nest.

The proposed De Rust WEF will be affected by Khai-Ma, Korana and Poortjies in terms of wake effect as it has a 3,20% wake loss. Meanwhile, Khai-Ma, Korana and Poortjies will be affected by De Rust WEF in terms of wake effect as it has a 0,80% wake loss.

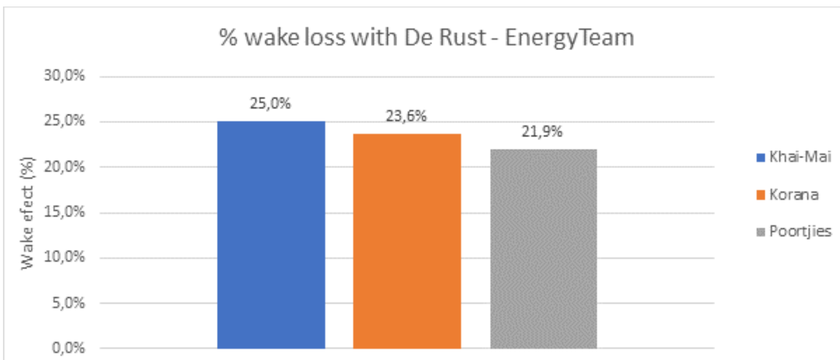

Figure 6-24: Wake Effect Analysis

7. IMPACT ASSESSMENT

7.1. METHODOLOGY

Direct, indirect and cumulative impacts of the issues that will be identified during the specialist investigations will assessed in terms of these standard rating scales to determine their significance. The rating system used for assessing impacts (or when specific impacts cannot be identified, the broader term issue should apply) is based on six criteria, namely:

- **Status** of impacts – determines whether the potential impact is positive (positive gain to the environment), negative (negative impact on the environment), or neutral (i.e. no perceived cost or benefit to the environment). Take note that a positive impact will have a low score value as the impact is considered favourable to the environment;
- **Spatial extent** of impacts – determines the spatial scale of the impact on a scale of localised to global effect. Many impacts are significant only within the immediate vicinity of the site or within the surrounding community, whilst others

may be significant at a local or regional level. Potential impact is expressed numerically on a scale of 1 (site-specific) to 5 (global);

- **Duration** of impacts – refers to the length of time that the aspect may cause a change either positively or negatively on the environment. Potential impact is expressed numerically on a scale of 1 (project duration) to 5 (permanent);
- **Frequency of the activity**– The frequency of the activity refers to how regularly the activity takes place. The more frequent an activity, the more potential there is for a related impact to occur.
- **Severity** of impacts – quantifies the impact in terms of the magnitude of the effect on the baseline environment, and includes consideration of the following factors:
  - The reversibility of the impact;
  - The sensitivity of the receptor to the stressor;
  - The impact duration, its permanency and whether it increases or decreases with time;
  - Whether the aspect is controversial or would set a precedent;
  - The threat to environmental and health standards and objectives;
- **Probability** of impacts –quantifies the impact in terms of the likelihood of the impact occurring on a percentage scale of <5% (improbable) to >95% (definite).
- **Confidence** – The degree of confidence in predictions based on available information and specialist knowledge:
  - Low;
  - Medium; or
  - High.

Determination of Impact Significance

The information presented above in terms of identifying and describing the aspects and impacts is summarised in below in and significance is assigned with supporting rational.

Table 7-1: Consolidated Table of Aspects and Impacts Scoring

Spatial Scale	Rating	Duration	Rating	Severity	Rating
Activity specific	1	One day to one month	1	Insignificant/non-harmful	1
Area specific	2	One month to one year	2	Small/potentially harmful	2
Whole site/plant/mine	3	One year to ten years	3	Significant/slightly harmful	3
Regional/neighbouring areas	4	Life of operation	4	Great/harmful	4
National	5	Post closure	5	Disastrous/extremely harmful	5

Frequency of Activity	Rating	Probability of Impact	Rating
Annually / Once-off	1	Almost never/almost impossible	1
6 monthly	2	Very seldom/highly unlikely	2
Monthly	3	Infrequent/unlikely/seldom	3
Weekly	4	Often/regularly/likely/possible	4

Spatial Scale	Rating	Duration	Rating	Severity	Rating
Daily / Regularly		5		Daily/highly likely/definitely	5

Significance Rating of Impacts	Timing
Very Low (1-25)	
Low (26-50)	Pre-construction
Low – Medium (51-75)	Construction
Medium – High (76-100)	Operation
High (101-125)	Decommissioning
Very High (126-150)	
Adjusted Significance Rating	

The environmental significance rating is an attempt to evaluate the importance of a particular impact, the consequence and likelihood of which is assessed by the relevant specialist. The description and assessment of the aspects and impacts is presented in a consolidated table with the significance of the impact assigned using the process and matrix detailed below.

The sum of the first three criteria (spatial scope, duration and severity) provides a collective score for the consequence of each impact. The sum of the last two criteria (frequency of activity and frequency of impact) determines the likelihood of the impact occurring. The product of consequence and likelihood leads to the assessment of the significance of the impact (Significance = Consequence X Likelihood), shown in the significance matrix below in Table 7-2

Table 7-2: Significance Assessment Matrix

	Consequence (Severity + Spatial Scope + Duration)														
Likelihood (Frequency of Activity + Probability of	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2	4	6	8	10	12	14	16	08	20	22	24	26	28	30
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

Table 7-3: Positive and Negative Impact Mitigation Ratings.

Colour Code	Significance Rating	Value	Negative Impact Management Recommendation	Positive Impact Management Recommendation
	Very High	126-150	Avoidance – consider alternatives	Optimal contribution from Project
	High	101-125	Avoidance as far as possible; implement strict mitigation measures to account for residual impacts	Positive contribution from Project with scope to improve
	Medium-High	76-100	Where avoidance is not possible, consider strict mitigation measures	Moderate contribution from Project with scope to improve
	Low-Medium	51-75	Mitigation measures to lower impacts and manage the project impacts appropriately	Improve on mitigation measures
	Low	26-50	Appropriate mitigation measures to manage the project impacts	Improve on mitigation measures; consider alternatives to improve on
	Very Low	1-25	Ensure impacts remain very low	Consider alternatives to improve on

In addition, each impact needs to be assessed in terms of reversibility and irreplaceability as indicated below:

- **Reversibility** of the Impacts - the extent to which the impacts/risks are reversible assuming that the project has reached the end of its life cycle (decommissioning phase):
    - High reversibility of impacts (impact is highly reversible at end of project life i.e. this is the most favourable assessment for the environment);
    - Moderate reversibility of impacts;
    - Low reversibility of impacts; or
    - Impacts are non-reversible (impact is permanent, i.e. this is the least favourable assessment for the environment).

7.2. IDENTIFICATION OF IMPACTS

Potential impacts resulting from the proposed De Rust South WEF were identified during the EIR phase using input from the following sectors:

- Existing information based on literature reviews and desktop assessments (EAP and specialist inputs);
- Site visit with the project team;

- Guidelines;
- Legislation; and
- Views of interested and affected parties (thus far).

The following broad impacts were identified:

- Socio-economic impacts;
- Sensitive Flora and Fauna;
- Terrestrial Biodiversity / Ecosystem services;
- Aquatic Impact;
- Agricultural;
- Heritage;
- Traffic;
- Dust;
- Noise;
- Transportation;
- Wake Impact Analysis;
- Visual; and
- Safety.

7.3. MITIGATION MEASURES

The Impact Mitigation Hierarchy (DEA 2013) will be followed to achieve no overall or limited negative impact on the receiving environment. The Impact Mitigation Hierarchy is a tool which is used reiteratively throughout the project lifecycle to limit negative impacts on the environment. There are four steps/tiers within the hierarchy, and include: Avoid/Prevent, Minimise, Rehabilitate and Offset (Figure 7-1).

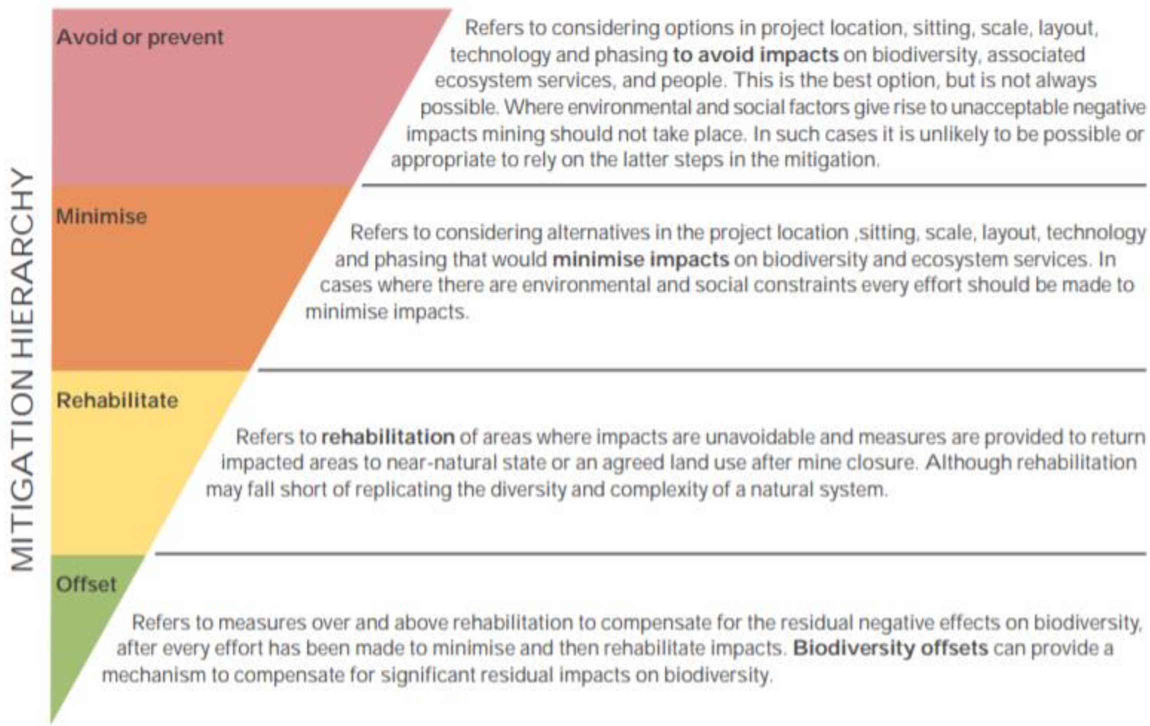

Figure 7-1: The Impact Mitigation Hierarchy (DEA et al., 2013).

Very High impacts should be avoided through alternative layout designs, technology alternatives etc. Where avoidance is not possible, the impacts that are generated by the development should be minimised if measures are implemented in order to reduce the impacts. The proposed mitigation measures should ensure that the development considers the environment and the predicted impacts in order to minimise impacts and achieve sustainable development. Where avoidance and/or minimisation are not possible, rehabilitation and possible offset will be considered. These last two options are rarely considered, and should only be done if the first two options could not be met.

7.4. POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

Table 7-4: Potential Impacts.

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
PLANNING & CONSTRUCTION										
Terrestrial Biodiversity										
Habitat Loss and Fragmentation.	Direct	Area specific	Post closure (WoM & WM)	• Non-reversible (WoM) • Low (WM)	• Moderate (WoM) • Low (WM)	Daily/highly likely/definitely	Partial	• Placement of turbines within the High Sensitivity areas, including Inselbergs should be avoided. • Ensure that lay-down and other temporary infrastructure is within low and medium sensitivity areas, preferably previously	Often/regularly/likely/possible	Low – Medium

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								transformed areas if possible. • This impact can also be greatly mitigated if the development in natural vegetated areas do not completely remove the existing vegetation and natural cover, with the removal of vegetation to be restricted to the minimum as possible. For the WEFs this is possible, but for the SEFs vegetation clearing and soil		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								disturbance is more significant. Even though species can continue to exist between and underneath PV arrays, the layout of the arrays need to take this into consideration. • The number of roads should be reduced to the minimum possible and routes should also be adjusted to avoid areas of high sensitivity as far as possible.		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								Where possible, existing roads must be used to avoid additional habitat loss and fragmentation. • Movements of machinery, vehicles and persons should be restricted to the existing roads and avoid the existing natural areas. • Solar panels placement can be the cause for the loss of areas with natural vegetation, so care should be taken to		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								limit the placement of solar panels to already disturbed areas or within medium sensitivity areas. • Demarcate all areas to be cleared with construction tape or other appropriate and effective means. However, caution should be exercised to avoid using material that might entangle fauna.		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• Rehabilitate disturbed areas that are no longer required by the operational phase of the development. Inadequate rehabilitation could result in limited revegetation and/or an invasion of alien vegetation which will result in long term ecological degradation and damage. • Temporary infrastructure will be		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								rehabilitated post-construction as these sections were only required during the construction phase. This includes laydown areas and the widening of internal roads. • A Rehabilitation Management Plan must be developed and implemented during the construction phase as construction is complete at each site.		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM**- With Mitigation	**WoM**-Without Mitigation **WM**- With Mitigation	**WoM**-Without Mitigation **WM**- With Mitigation					
								• An Environmental Control Officer (ECO) must be employed to monitor the clearing of vegetation for the construction of roads and hardstands.		
Loss of species of conservation concern.	Direct	Activity specific	• Post closure WoM • One year to ten years • WM	Non-reversible (WoM) • Moderate (WM)	• High (WoM) • Low (WM)	Infrequent/unlikely/seldom	Yes	• Sensitive species 144 needs to be protected in situ and requires a 200m buffer for WEF and 100m buffer for SEF. • Three data deficient species were recorded on site. Even though no	Very seldom/highly unlikely	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM**- With Mitigation	**WoM**- Without Mitigation **WM**- With Mitigation	**WoM**-Without Mitigation **WM**- With Mitigation					
								specific buffers are required as per the SEA Guidelines (SANBI 2020), D. vanzylli and A. diabolicus should ideally be protected in situ and accordingly the layout should avoid the habitats where these species occur. Hoodia gordonii can be relocated and require a permit from the provincial government. • A comprehensive Plant Search and Rescue		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM**- With Mitigation	**WoM**- Without Mitigation **WM**- With Mitigation	**WoM**-Without Mitigation **WM**- With Mitigation					
								must be undertaken by a suitably qualified botanical specialist prior to vegetation clearance. This is applicable for provincially protected species which could be removed from site with the relevant permit. • Avoidance of drainage lines is necessary for the protection of suitable habitat for sensitive species 12. • All relevant plant permits must be		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								obtained from the provincial authority prior to the removal or relocation of SCC, including provincially protected species. • Plant SCC found within the proposed site must either be housed in an onsite nursery for use during rehabilitation or be relocated to suitable areas where vegetation clearance will not occur.		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Alien and invasive plant species	Direct	Whole site/plant/mine (WoM) Area specific (WM)	Post closure (WoM &WM)	Low (WoM) Moderate (WM)	Moderate (WoM) Low (WM)	Infrequent/unlikely/seldom (WoM)	Yes	• A site-specific Alien Invasive Species (AIS) Management Plan must be implemented during the construction phase and continued monitoring and eradication needs to take place throughout the life of the project. • Alien vegetation, within the development footprints, should be removed from the site and disposed of at a	Very seldom/highly unlikely	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								registered waste disposal site. • The development footprints and immediate surroundings should be monitored for the growth/regrowth of alien vegetation throughout the construction and operation phases of the project.		
Increased risk of erosion and flash floods.	Direct and Indirect	Area specific	Post closure (WoM&WM)	Low (WoM) Moderate (WM)	Moderate (WoM) Low (WM)	Infrequent/unlikely/seldom	Yes	• Soil erosion and Rehabilitation Plan to be part of the EMPr.	Very seldom/highly unlikely	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• The clearance of vegetation, at any given time, must be kept to a minimum to reduce the possibility of soil erosion. • Rehabilitation of eroded areas on a regular basis during the construction period. • All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								the water which may pose an erosion risk. • Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance. • Ground clearing and the digging of trenches should ideally take place at the end of the dry season, prior to the first rains in order to		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM**- With Mitigation	**WoM**- Without Mitigation **WM**- With Mitigation	**WoM**-Without Mitigation **WM**- With Mitigation					
								minimise the impacts of dust. • Newly cleared and exposed areas must be managed for dust and landscaped with indigenous vegetation to avoid soil erosion. Where necessary, temporary stabilisation measures must be used until vegetation establishes. • Avoid the presence of people and vehicles in highly sensitive areas,		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								including riverine areas and natural vegetation, as far as possible. • Stormwater management plan is required. • Avoid construction within watercourses, and where roads crossing occur, the appropriate mitigation measures as indicated by the aquatic specialist must be implemented.		
Avifauna										

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Habitat destruction	Direct	Regional/neighbouring areas (WoM) Activity specific (WM)	One year to ten years (WoM) One month to one year (WM)	Medium (WoM) Low (WM)	No	Daily/highly likely/definitely	Yes	Impacts associated with the loss of bird foraging habitat due to operations can be mitigated by avoiding avifaunal specific sensitive areas and their associated buffers, such as the local drainage lines, impoundments, smaller watercourses, and pans. A green buffer should be maintained around all habitats with a SEI designated as High or above.	Often/regularly/likely/possible	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								Apply necessary buffers for roost and foraging sites and other sensitive bird habitat features, avoiding the construction of turbines and access roads in these areas. Roads must utilise or upgrade existing farm roads as far as possible.		
Destruction or disturbance of bird roosts	Direct	Area specific (WoM) Activity specific (WM)	One year to ten years (WoM&WM)	Yes (WoM & WM)	Potentially (WoM) No (WM)	Daily/highly likely/definitely	Yes	Apply necessary buffers for roost sites and other sensitive bird habitat features, avoiding the construction of turbines and access roads in these areas. Roads must utilise or	Infrequent/unlikely/seldom	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								upgrade existing farm roads as far as possible.		
Bat										
Loss or destruction of foraging and roosting habitat.	Direct	Area specific (WoM) Activity specific (WM)	One year to ten years (WoM&WM)	-	-	Definite	Yes	• All No-Go zone buffers must be adhered • Avoiding the construction of turbines and access roads in these areas. • Roads must follow existing farm roads as far as possible. • The buffered sensitive areas must be excluded from all activities related to the WEF. Access roads	Definite	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								may cross these however if required		
Aquatic										
Operation of equipment and machinery	Direct	Activity specific	One year to ten years (WoM) Short Term (WM)	-	-	Often/regularly/likely/possible	Yes	All contractors and staff are to be familiarised with the method statement and have undergone an induction / training on the location of sensitive No-Go areas and basic environmental awareness using the mitigation provided in this report. • Access routes into or adjacent to the washes must	Almost never/almost impossible	Low
Clearing vegetation	Direct	Activity specific	One year to ten years (WoM) Short Term (WM)	-	-	Often/regularly/likely/possible	Yes		Almost never/almost impossible	Low
Stockpiling of and placement	Direct		One year to ten years (WoM)	-	-	Often/regularly/likely/possible	Yes		Almost never/almost impossible	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
construction materials			Short Term (WM)					make use of existing road ways and crossings where possible; • Areas where construction is to take place must be clearly demarcated. Any areas not demarcated must be avoided; • Storm-water generated from roadways must be captured and buffered, where flow velocities are to be significantly reduced before discharge into the environment.		
Excavating/shaping landscape	Direct	Activity specific	One year to ten years (WoM)	-	-	Often/regularly/likely/possible	Yes		Almost never/almost impossible	Low
Final landscaping, backfilling and postconstruction rehabilitation	Direct	Activity specific	One year to ten years (WoM)	-	-	Often/regularly/likely/possible	Yes		Almost never/almost impossible	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• Storm-water verges as well as other denuded areas must be grassed (revegetated) with local indigenous grasses to protect against erosion; • Any materials excavated must not be deposited in the river channel or valley slopes where it is prone to being washed downstream or impeding natural flow; • The installation of sedimentation/erosion protection measures must be implemented before the		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								start of construction, e.g., several rows of silt traps and fences (this is particularly important in the access roads leading or adjacent to the watercourse); • Stockpiling or storage of materials and/or waste must be placed beyond the defined buffers in this report for each respective activity; • No vehicles shall enter watercourse buffer zones outside of construction footprints;		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM**- With Mitigation	**WoM**- Without Mitigation **WM**- With Mitigation	**WoM**-Without Mitigation **WM**- With Mitigation					
								• No vehicles shall be serviced on site; a suitable workshop with appropriate pollution control facilities should be utilised offsite; • Hydrocarbons for refuelling purposes must be stored in a suitable storage device on an impermeable surface outside of the delineated wetland buffer zone; • Disturbed areas must be re-vegetated after completion of the phase;		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM**- With Mitigation	**WoM**- Without Mitigation **WM**- With Mitigation	**WoM**-Without Mitigation **WM**- With Mitigation					
								o A one-month timeframe for the initiation of this action; o Ripping of the soils should occur in two directions; and o Removed vegetation and topsoil can be harvested and applied here. • Drainage channels constructed for the access roads must be constructed so as not to result in erosion; • An inspection of the drainage channels must be completed within 1 month		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								following the end of activities and within a month after the first rainfall event which exceeds 5mm. Should excessive sediment be transported down the channels it is recommended that sediment screens are implemented; • An alien vegetation removal and management plan must be implemented along the verges of the roads and crossing points; • General storm-water management practices		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								should be included in the design phase and implemented during the construction phase of this project; and • Following the completion of the phase, all construction materials and debris should be removed and disposed of in a suitable off-site area. An inspection should be completed within a week after the phase is completed.		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• The implementation of the buffer zone stipulated in this report; • Clean and dirty surface water separation and a storm-water management plan must be put into place via standard best practice methods; • A clear storm-water management plan for hardened surfaces must be implemented; • The revegetation of disturbed non-active cleared areas must take place within		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								the first growing season between September and March following completion of the activity; • The above must be audited within 3 months of completing the phase; • No discharge of domestic water must occur if possible. Domestic water must be reused for dust suppression. • All stockpiles and hazardous waste storage areas must be bunded by either a cut-off trench or berm directed to a Pollution		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								Control Dam inline with best practice surface water management guidelines.		
Agricultural										
Loss of agricultural potential by occupation of land	Direct	Local	Long term (WoM)	-	-	High	Yes	Increased financial security for farming operations by the leasing of the property	Medium	Medium
Loss of agricultural potential by soil degradation	Direct	Local	Medium term (WoM) Short Term (WM)	-	-	Medium	Yes	• Design an effective system of storm water runoff control, where it is required that is at any points where runoff water might accumulate. The system must effectively	Low	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								collect and safely disseminate any runoff water from all accumulation points and it must prevent any potential down slope erosion. • Maintain where possible all vegetation cover and facilitate revegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion. • If an activity will mechanically disturb the		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for respreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.		
Dust impact	Direct	Local	Medium term (WoM)	-	-	Medium	Yes	Implement dust control measure	Low	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
			Short Term (WM)							
Enhanced agricultural potential through increased financial security for farming operations	Positive Impact									
Improved security against stock theft and other crime	Positive Impact									
Visual										

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact **WoM-** Without Mitigation **WM-** With Mitigation	Can impact be prevented/ reversed or managed? **WoM-** Without Mitigation **WM-** With Mitigation	Will irreplaceable resources be lost? **WoM-**Without Mitigation **WM-** With Mitigation	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
Visual intrusion due to the removal of vegetation, movement of construction vehicles and heavy machinery, presence of laydown areas and site clearance	Direct	Whole site (WoM) Area specific (WM)	One month to one year (WoM & WM)	-	-	Significant / slightly harmful	Yes	• Limit the construction footprint to only the development area. • Ensure ongoing housekeeping. • Carefully plan to minimize the construction duration. • Inform receptors of the construction programme and schedule. • Regulate the speed of vehicles on and off site. • Use existing roads where possible.	Small / potentially harmful	Low
Light pollution due to night lighting	Direct	Local	-	-	-	Highly probable	Yes		Highly probable	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Dust pollution due to site clearance and movement of construction vehicles and heavy machinery	Direct	Local	-	-	-	Highly probable	Yes	• Limit the number of construction vehicles travelling to and from site. • Implement dust suppression activities. • Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. • Remove vegetation in a phased manner. • Choose lighting types that reduce spill light and glare.	Highly probable	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• Only focus light where it is needed.		
Heritage										
Impact on the cemetery at PD002	Direct	Local	Permanent (WoM&WM)	Not reversible	Yes	Improbable	N/A	• The small burial site at PD002 should be indicated on development plans and avoided (with a buffer zone of 30 m) by the development including access roads and associated infrastructure. • Regular monitoring of the development footprint by the ECO to	Improbable	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								implement the Chance Find Procedure for heritage and palaeontology resources (outlined in Section 10.2) in case heritage resources are uncovered during the course of construction; • Any changes to the layout should be subjected to a heritage walkdown prior to development.		
Noise										

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Daytime WTG construction activities	Direct	Regional (WoM & WM)	Short-term (WoM & WM)	High	No	Improbable	Yes	The significance of the noise impact is low for daytime construction activities and no additional mitigation is recommended.	Improbable	Low
Night-time WTG construction activities	Direct	Regional (WoM & WM)	Short-term (WoM & WM)	High	No	Possible	Yes	• Minimizing night-time activities when working within 2,000m from any NSR. Work should only take place at one WTG location to minimize potential night-time cumulative noises (when working at night within 2,000m from NSR); • The applicant must notify the NSR when night-time	Improbable	Low

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			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								activities will be taking place within 1,000m from the NSR; and • The applicant must plan the completion of noisiest		
Social										
Employment, business opportunities and skills development	Direct and Cumulative	Local (WoM&WM)	Short term (WoM) (WM)	-	-	Highly probable	Yes	• Where reasonable and practical, the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However, due to the low skills levels in the area, the majority of	Highly probable	High Positive

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM**- With Mitigation	**WoM**- Without Mitigation **WM**- With Mitigation	**WoM**-Without Mitigation **WM**- With Mitigation					
								skilled posts are likely to be filled by people from outside the area. • Where feasible, efforts should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria. • Before the construction phase commences the proponent should meet with representatives from the KMM to establish the existence of a skills		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								database for the area. If such as database exists it should be made available to the contractors appointed for the construction phase. • The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								and the employment procedures that the proponent intends following for the construction phase of the project. • Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase. • The recruitment selection process should seek to promote gender equality and the employment of		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								women wherever possible. • The proponent should liaise with the KMM with regards the establishment of a database of local companies, specifically BBBEE companies, which qualify as potential service providers (e.g., construction companies, catering companies, waste collection companies, security companies etc.) prior to the commencement of the		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								tender process for construction service providers. These companies should be notified of the tender process and invited to bid for project-related work.		
Construction workers on site and in local area	Direct	Local (WoM&WM)	Short term for community as a whole (WoM) (WM)	No in case of HIV and AIDS	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on	Probable	Yes	• Where possible, the proponent should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for semi and low skilled job categories. The proponent and the	Probable	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
					farming for their livelihoods			contractor(s) should develop a code of conduct for the construction phase. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be subject to appropriate disciplinary action and/or dismissed. All dismissals must comply with the South African labour legislation.		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• The proponent and the contractor should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase. • The contractor should provide transport for workers to and from the site on a daily basis. This will enable the contactor to effectively manage and monitor the movement of construction workers on and off the site.		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• The contractor must ensure that all construction workers from outside the area are transported back to their place of residence within 2 days for their contract coming to an end. • No construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact **WoM**- Without Mitigation **WM**- With Mitigation	Can impact be prevented/ reversed or managed? **WoM**- Without Mitigation **WM**- With Mitigation	Will irreplaceable resources be lost? **WoM**-Without Mitigation **WM**- With Mitigation	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
Risk to safety, livestock, and damage to farm infrastructure	Direct	Local (WoM&WM)	Short term (WoM&WM)	Yes, compensation paid for stock losses and damage to farm infrastructure etc.	No	Probable	Yes	• The proponent should enter into an agreement with the local farmers in the area whereby damages to farm property etc. during the construction phase will be compensated for. The agreement should be signed before the construction phase commences. • All farm gates must be closed after passing through.	Probable	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• Contractors appointed by the proponent should provide daily transport for low and semi-skilled workers to and from the site. • The proponent should consider the option of establishing a MF (see above) that includes local farmers and develop a Code of Conduct for construction workers. This committee should be established prior to commencement of the		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								construction phase. The Code of Conduct should be signed by the proponent and the contractors before the contractors move onto site. • The proponent should hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM**- With Mitigation	**WoM**- Without Mitigation **WM**- With Mitigation	**WoM**-Without Mitigation **WM**- With Mitigation					
								contained in the Code of Conduct to be signed between the proponent, the contractors, and neighbouring landowners. The agreement should also cover loses and costs associated with fires caused by construction workers or construction related activities (see below). • The Environmental Management Plan (EMP) must outline procedures for managing and storing		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								waste on site, specifically plastic waste that poses a threat to livestock if ingested. • Contractors appointed by the proponent must ensure that all workers are informed at the outset of the construction phase of the conditions contained in the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms.		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
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								• Contractors appointed by the proponent must ensure that construction workers who are found guilty of stealing livestock and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation. • It is recommended that no construction workers, with the exception of security		

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			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								personnel, should be permitted to stay over-night on the site.		
Increased risk of grass fires	Direct	Local (WoM&WM)	Short term (WoM&WM)	Yes, compensation paid for stock and crop losses etc.	No	Probable	Yes	• The proponent should enter into an agreement with the local farmers in the area whereby damages to farm property etc., during the construction phase will be compensated for. The agreement should be signed before the construction phase commences.	Probable	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas. • Smoking on site should be confined to designated areas. • Contractor should ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been		

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			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								reduced. Measures to reduce the risk of fires include avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high-risk dry, windy winter months. • Contractor should provide adequate fire-fighting equipment on-site, including a fire fighting vehicle. • Contractor should provide fire-fighting training to		

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			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								selected construction staff. • No construction staff, with the exception of security staff, to be accommodated on site overnight. • As per the conditions of the Code of Conduct, in the advent of a fire being caused by construction workers and or construction activities, the appointed contractors must compensate farmers for any damage		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								caused to their farms. The contractor should also compensate the fire-fighting costs borne by farmers and local authorities.		
Nuisance impacts associated with construction related activities	Direct	Local (WoM&WM)	Short Term (WoM&WM)	Yes	No	Probable	Yes	• The movement of construction vehicles on the site should be confined to agreed access road/s. • Establishment of a Grievance Mechanism that provides local farmers and other road users with an effective	Probable	Low

Nature of impact (potential)	**Direct or indirect or cumulative**	**Extent of impact**	**Duration of impact**	**Can impact be prevented/ reversed or managed?**	**Will irreplaceable resources be lost?**	**Probability before mitigation**	**Mitigatory potential**	**Mitigation measure**	**Probability after mitigation**	**Significance after mitigation**
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								and efficient mechanism to address issues related to construction related impacts, including damage to local gravel farm roads. The movement of heavy vehicles associated with the construction phase should be timed to avoid times days of the week, such as weekends, when the volume of traffic travelling along the access roads may be higher.		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• Establishment of a Grievance Mechanism that provides local farmers and other road users with an effective and efficient mechanism to address issues related to construction related impacts, including damage to local gravel farm roads. • Dust suppression measures should be implemented, such as wetting on a regular basis and ensuring that vehicles		

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			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								used to transport sand and building materials are fitted with tarpaulins or covers. • All vehicles must be road worthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.		
Traffic										
Increase in traffic volumes on the surrounding	Direct	Local	Short Term (WoM&WM)	-	-	Highly Probable	Yes	• Construction traffic should not be allowed on the public road network during the	Probable	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
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road network as a result of construction traffic								typical weekday a.m. and p.m. peak hours in built up areas. • These measures will be included in the Transport Management Plan		
Gravel loss and possible damage to the road layer works. as a result of additional truck traffic and heavy load truck traffic	Direct	Local	Short Term (WoM&WM)	-	-	Highly Probable	Yes	• Resurfacing of sections along the R358, where required and regular road maintenance i.e. grading of the road once every two weeks during the construction phase.	Probable	Low

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								• The road can also be sprayed with water (grey water if available) once a day to limit dust pollution and gravel loss.		
General										
Stormwater Management	Indirect	Local	Construction	Yes – can be prevented/ managed	No	Medium	High	Vegetation maintenance: regular watering, weed control, replacement of dead plants, pest monitoring and control and dirt removal. Vegetation maintenance should occur bi-weekly. Maintenance of infrastructure such as	Low	Low

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								concrete pipe and channels as well as grids and kerb inlets should occur monthly.		
Hunting / Fishing by construction workers.	Direct	Local	Construction phase (short-term)	Yes – can be prevented	No	Medium - Low	High	Hunting / poaching and fishing are prohibited. During construction, guidelines set out by the ECO will be followed to ensure no potential impacts occur and workers will be instructed that hunting and fishing is a non-compliance of the authorized activity.	Low	Low
Degradation and contamination	Direct	Local/ regional	Construction phase (short-term)	Yes – can be	No	High	High	Site workers will be trained in avoiding impacts in areas of potential concern.	Low	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact **WoM**- Without Mitigation **WM**- With Mitigation	Can impact be prevented/ reversed or managed? **WoM**- Without Mitigation **WM**- With Mitigation	Will irreplaceable resources be lost? **WoM**-Without Mitigation **WM**- With Mitigation	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
of the surrounding environment by construction activities, cement, hydrocarbons and other hazardous materials.				managed/ prevented				Designated concrete mixing areas and storage areas for any hazardous materials must be assigned; cement mixing is not permitted in any area where runoff can contaminate the surrounding environment. This must be strictly controlled through the site specific EMPr.		
Potential disturbance or unearthing of graves or	Direct	Local/ regional	Construction phase (short-term)	Yes – can be managed/ prevented	No	Low	Low	There is no evidence of any heritage resources. If any resources are discovered during construction, the	Low	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
disturbance to other heritage resources during the construction phase.								ECO must be notified immediately and construction around the resource must cease immediately. This must be strictly monitored by the ECO and controlled through the EMPr.		
Improper storage and disposal of solid waste.	Direct	Local/ regional	Constructio n phase (short-term)	Yes – can be managed/ prevented	No	High	High	Due to the nature of the activity, waste is anticipated to be minimal. All solid waste generated during the construction process must be placed in a designated waste collection area within the construction camp and	Low	Low

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								must not be allowed to blow around the site, be accessible by animals, or be placed in piles adjacent to the skips / bins. All solid waste must then be disposed of at the nearest licensed landfill and safe disposal certificates must be obtained and kept on site at all times during construction. Separate skips/ bins for the different waste streams must be available on site. The waste containers must be		

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								appropriate to the waste type contained therein and where necessary should be lined and covered.		
Littering around the site.	Direct	Local	Construction & Operation phase (short-term)	Yes – can be prevented	No	Medium - Low	High	Littering is not permitted on the site and general housekeeping must be enforced. General waste bins must be readily available for litter disposal and general housekeeping.	Low	Low
Improper disposal of rubble i.e.: burying or neglecting	Direct	Local (within construction site)	Construction phase (short-term)	Yes impact can be managed	No	Medium	High	All excess material and rubble must be removed from the site so not to restrict the rehabilitation process. All excess material	Low	Low

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building rubble resulting in direct mechanical damage to surrounding vegetation and untidiness of the site.								and rubble must go to an approved designated landfill and a safe disposal certificate must be obtained. Site workers will be trained in avoiding such impacts during induction training and regular toolbox talks.		
Lack of toilet facilities resulting in unsanitary conditions.	Direct	Local	Construction & Operation phase (short-term)	Yes – can be prevented	No	High	High	Adequate toilet facilities must be provided for all staff members as standard construction practice as well as during operational activities. Chemical toilets, if used, must be secured to	Low	Low

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								the ground and kept away from any sensitive areas. It should be regularly cleaned by a reputable company and maintained in a clean state. During operation toilet facilities provided by the venue must be used by staff and guests. This must be monitored in an EMPr.		
Improper disposal of toilet waste from chemical toilets resulting in contamination	Indirect	Local	Construction phase (short-term)	Yes – can be prevented	No	High	High	Chemical toilets must be placed onsite and not in close proximity to any sensitive areas. The chemical toilets must be provided by a registered	Low	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
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of the surrounding environment								company and all effluent must be regularly disposed of at a licenses facility. Safe disposal certificates must be obtained and kept on site.		
Increase waste to landfill site.	Indirect	Local	Construction & Operation phase (short-term)	Yes – can be managed	No	High	Medium	Due to the nature of the activity during construction and operational phases, waste is anticipated to be minimal. Where possible, waste streams will be separated and recycled to limit the amount of waste being added to the landfill site.	Medium	Low

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Risk of spills from construction equipment (oils, fuels, cement etc.) contaminating soil and the watercourse.	Direct	Local (within construction site)	Constructio n phase (short-term)	Yes impact can be managed	No	Medium	High	Any hazardous or dangerous goods utilised during the construction phase must be stored on an impermeable surface that is bunded, fenced, locked and covered. A spill kit must be clearly marked and visible when utilizing hazardous or dangerous materials to ensure that all spills are immediately cleaned. Spill kits must be regularly checked and maintained.	Low	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
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Dust Generation and control	Direct	Local	Construction & Operation phase	Yes impact can be managed	No	Medium	High	• The Developer and construction contractors must take all reasonable measures to minimise the generation of dust as a result of construction activities to the satisfaction of the ECO and the relevant regulatory authorities; • Removal of vegetation must be avoided until such time as soil stripping is required, and similarly exposed surfaces must be re-vegetated or	Low	Low

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								stabilised as soon as is practically possible; • Appropriate dust suppression measures must be used when dust generation is unavoidable, e.g. damping down of all exposed soil surfaces with a water bowser or hosepipe when necessary; • To reduce dust dampening with water, particularly during prolonged periods of dry		

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								weather appropriate chemical binders may be used. Such measures must also include the use of temporary stabilising measures (e.g. chemical soil binders, straw, brush packs, chipping etc.); • During high wind conditions, the Contractor during construction and the developer during operation, must evaluate the situation and make recommendations as to whether dust-damping		

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								measures are adequate, or whether working will cease altogether until the wind speed drops to an acceptable level; • Excavations and other clearing activities must only be done during agreed working times and permitting weather conditions to avoid sand and dust drifting into neighbouring areas; • The dust monitoring programme as per the National Dust Control		

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								Regulations, will be implemented and the necessary steps taken to ensure compliance with the relevant quality requirements; and • A complaints register will be implemented and any complaints related to dust will be investigated and appropriate measures taken to resolve the issue.		
Degradation of existing service infrastructure,	Direct	Local	Construction phase (short-term).	Yes impact can be managed	No	High	High	Any damage to existing infrastructure will result in the reinstating of that infrastructure to an	Low	Low

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e.g. roads, electricity.								acceptable state. The cost of which will be that of the applicant. The site currently is not dependent on municipal services.		
OPERATION										
Terrestrial Biodiversity										
Direct faunal impacts due to operation.	Direct	Area specific	Life of operation One year to ten years (WoM) WM)	Low (WoM) Moderate (WM)	Moderate (WoM) Low (WM)	Infrequent/unlikely/seldom	Yes	• reduce exterior lighting to that necessary for safe operation and implement operational strategies to reduce spill light. Use down-lighting from non-UV lights where possible, as light emitted at one wavelength has a low	Very seldom/highly unlikely	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
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								level of attraction to insects. This will reduce the likelihood of attracting insects and their predators. • illegal collection, hunting or harvesting of any plants or animals at the site by contractors should be strictly forbidden except by individuals (Project developer, Manager or ECO) with the appropriate permits, • all hazardous materials should be stored in the		

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								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, • driving should be limited to an acceptable speed limit by all employees and contractors, such as 40 km, to reduce collisions with fauna,		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• road kills need to be monitored and if required, a roadkill monitoring programme (inclusive of wildlife collisions record keeping) should be established. Where needed, Animex fences must be installed to direct animals to safe road crossings. Finally, mitigation should be adaptable to the onsite situation which may vary over time.		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• reduce direct mortalities by allowing for fauna to cross the roads. Where applicable, this can be achieved by constructing fauna underpasses under the roads (large culverts or large open-ended concrete pipes laid into the raised roads). These underpasses should be used in conjunction with "fauna barriers" which prevent the most susceptible small fauna from crossing the roads		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								on the surface by directing them towards the underpasses where they can cross under the roads safely. It is important to note that utilization of underpasses is strongly dependent on animal body size (larger culverts are more successful) and the surrounding habitat. • all staff operating motor vehicles must undergo an environmental induction training course that		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								includes instruction on the need to comply with speed limits, to respect all forms of wildlife and, wherever possible, prevent accidental road kills of fauna. Drivers not complying with speed limits should be subject to penalties. • all potential pitfalls (trenches, excavations) must have escape points with an angle of less than 45° to allow for trapped animals to escape.		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• fences should be constructed in such a way so that burrowing animals can still gain access, which will allow other animals to also utilise the holes dug under fences to increase connectivity in the area. Fences should have mesh size large enough to allow small animals to pass through, if not (e.g. EasyView), regular holes must be cut at the base to allow		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								movement of these animals.		
Alien and invasive plant species	Direct	Whole Site (WoM) Area specific (WM)	Post Closure (WoM&WM)	Low (WoM) Moderate (WM)	Moderate (WoM) Low (WM)	Infrequent/unlikely/seldom	Yes	• The site-specific AIS Management Plan must be implemented for the first year of the operational phase. Thereafter, alien vegetation must continue to be monitored and eradicated annually throughout the life of the project. • Due to the disturbance at the site as well as the increased runoff generated by the hard infrastructure,	Very seldom/highly unlikely	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented. Problem woody species such as Prosopis are already present in the area and are likely to increase rapidly if not controlled. • Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								should be avoided as far as possible. • Alien vegetation, within the development footprints, should be removed from the site and disposed of at a registered waste disposal site.		
BESS Impacts	-	-	-	-	-	-	-	• No BESS should be located in a sensitive area; • Employ Fire Mitigation Measure, Emergency Spill Kits should be present onsite at all times	-	-
Avifauna										

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Bird mortalities (turbine collision)	Direct	Regional/neighbouring areas	Life of operation (WoM&WM)	No	Yes (WoM) Potentially (WM)	Daily/highly likely/definitely	Yes	• Avoid placement of turbines near sensitive bird breeding and roosting habitats. The application of adaptive mitigation measures (e.g., shutdown on demand retrofitting), according to post-construction monitoring results (counted strikes of threatened species) must be informed by environmental correlates of avifaunal activity and/or strikes. It is vital to understand that significant bird mortality for ground	Infrequent/unlikely/seldom	Medium-High
Bird Mortalities powerline and fence collision		Whole site/plant/mine	Life of operation	No (WoM & WM)	Yes (WoM) Potentially (WM)	Daily/highly likely/definitely (WoM)	Yes		Infrequent/unlikely/seldom	Low- Medium

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								dwelling species such as Ludwig's Bustard and Karoo Korhaan will occur, not because of turbine collision, but as a result of collision with supporting infrastructure. Therefore, mitigation measures must be applied to powerlines and fences. • Application of a contingency-based shutdown on demand for collison Impacts on High value target species such		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM**- With Mitigation	**WoM**- Without Mitigation **WM**- With Mitigation	**WoM**-Without Mitigation **WM**- With Mitigation					
								as Vultures, Ludwig's Bustard and Martial Eagle • Lighting to be kept to a minimum • Post Construction Monitoring • Where service road intersect with semi natural or natural habitat, all fences must be set back at least (strictly) 75 metres from the edge of every service road in order to allow for vulnerable species such as cranes and korhaans to obtain adequate height after		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								being flushed by vehicle traffic. Alternatively, the fences must be placed completely adjacent to the roads with a maximum of 3 metres buffer and marked with fence flappers in order to reduce flush related collisions. • Raise the rotor sweep length to at least 62.5m metres by either raising the hub or reducing the turbine blade length		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact **WoM-** Without Mitigation **WM-** With Mitigation	Can impact be prevented/ reversed or managed? **WoM-** Without Mitigation **WM-** With Mitigation	Will irreplaceable resources be lost? **WoM-**Without Mitigation **WM-** With Mitigation	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
Disruption of bird migratory pathways	Indirect	Regional/neighbouring areas	Life of operation (WoM & WM)	No (WoM) Yes (WM)	Yes (WoM) No (WM)	Daily/highly likely/definitely	Yes	Increase turbine cut in speed as this has been shown to reduce collisions. The risk is not considered to be high. The linear drainage line habitats must be buffered by a minimum of 50 metres from the edge of the demarcated wetland.	Very seldom/highly unlikely	Low-Medium
The attraction of some bird species	Indirect	Regional/neighbouring areas (WoM)	Life of operation (WoM & WM)	No (WoM) Yes (WM)	Yes (WoM) No (WM)	Daily/highly likely/definitely	Yes		Very seldom/highly unlikely	Low-Medium

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
		Whole site/plant/mine (WM)								
Bats										
Bat mortalities due to collision or barotrauma	Direct	Regional (WoM&WM)	Life of operation (WoM&WM)	-	-	Highly likely	Yes	• Increased cut-in speeds (in general) and curtailment during periods of high bat activity-including targeted turbine shutdown if necessary. • An initial cut-in speed of 6 m/s is recommended as a starting point as it is expected to reduce bat mortality by over 50%, and should be implemented	Likely	Medium-High

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								during the peak activity season (1 January to 31 May) and activity period (21:00 to 03:00) for the first year of operation as a minimum. • Potential reduction on the turbine blade lengths. • Increase turbine cut in speed as this has been shown to reduce collisions • Continuous recording of environmental variables, such as temperature and rainfall will be required for operational bat activity data		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								analysis and implementation of adaptive mitigations measures (including curtailment if necessary) • Novel roosting opportunities associated with WEF infrastructure must be avoided by ensuring buildings are bat proof, as these bats will be highly susceptible to collisions. • It is recommended that the bat detectors at height remain active and collecting data so that it can be further		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								interrogated prior to the operational phase (typically > 3 years after environmental authorisation) so that adaptive mitigation can be refined prior to initiation operational procedures that may result in bat fatalities		
Artificial light	Direct	Area specific (WoM) Activity specific (WM)	Life of operation (WoM&WM)	-	-	Possible		• All artificial lights should be kept at a minimum with only civil aviation lights being used if possible. In cases where lighting is needed close to buildings the use of these lights must be limited	Highly unlikely	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								and directed only where needed. Non-UV emitting lights must be used. • Low intensity, directional lights • Buildings should be constructed atleast 200m from the turbines		
Aquatic										
Alteration of drainage	Direct	Activity specific (WoM & WM)	Life of operation (WoM) Long Term (WM)	-	-	Often/regularly/likely/possible	Yes	• The implementation of the buffer zones provided in this report; • Clean and dirty surface water separation and storm-	Almost never/almost impossible	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Alteration of surface water flow dynamics	Direct	Activity specific (WoM & WM)	Life of operation (WoM) Short Term (WM)	-	-	Often/regularly/likely/possible	Yes	water management plan must be put into place via standard best practice methods; • An effective storm-water management plan for each turbine must be implemented; • The revegetation of disturbed non active cleared areas must take place within 1 month of completing the construction phase; • The above must be audited within 3 months of completing the phase;	Almost never/almost impossible	Low
Establishment of alien plants on disturbed areas	Direct	Activity specific (WoM & WM)	Life of operation (WoM)	-	-	Often/regularly/likely/possible			Almost never/almost impossible	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• No discharge of domestic water must occur if possible. Domestic water must be reused for dust suppression. Should domestic water be required to be discharge, the management of nitrogen concentrations is imperative. • All stockpiles and hazardous waste storage areas must be bunded by either a cut-off trench directed to a Pollution Control Dam or via a berm.		
Visual										

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Change in visual/landscape character and sense of place due to the presence of the wind turbines and ancillary infrastructure	Direct	Regional / neighbouring areas (5 km to 50 km) (WoM&WM)	Life of the activity (long term) (WoM&WM)	-	-	Great / harmful	Yes management measures can be implemented.	• Retain and maintain natural vegetation within and around the development footprint where possible. • Wind turbines should be painted plain white, and not brightly coloured with logos. • Natural colours should be used on ancillary infrastructure so that they blend into the surrounding landscape. • If a wind turbine/s	Significant / slightly harmful	Medium
Visual intrusion from the wind turbines dominating the skyline in a largely natural area	Direct	Regional / neighbouring areas (5 km to 50 km) (WoM&WM)	Life of the activity (long term) (WoM&WM)	-	-	Great / harmful	Yes management measures can be implemented.		Significant / slightly harmful	Medium

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Visual intrusion from the movement of construction vehicles and heavy machinery	Direct	Regional / neighbouring areas (5 km to 50 km) (WoM&WM)	Life of the activity (long term) (WoM&WM)	-	-	Great / harmful	Yes management measures can be implemented.	needs replacement, it should be replaced with a turbine of the same model/height to maintain uniformity. • Non-reflective surfaces should be utilized where possible. • Implement dust suppression activities. • All inoperable wind turbines should be repaired as soon as possible. • All infrastructure should	Significant / slightly harmful	Medium
Light pollution due to night lighting, security lighting and navigational lighting	Direct	Regional / neighbouring areas (5 km to 50 km) (WoM&WM)	Life of the activity (long term) (WoM&WM)	-	-	Great / harmful	Yes management measures can be implemented.		Significant / slightly harmful	Medium
Dust pollution from operation and	Direct	Regional / neighbouring areas (5	Life of the activity (long	-	-	Great / harmful	Yes management measures		Significant / slightly harmful	Medium

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
maintenance vehicles.		km to 50 km) (WoM&WM)	term) (WoM&WM)				can be implemented.	be always kept in a presentable condition. • Regulate the speed of vehicles on and off site. • Use existing roads where possible. • Ensure ongoing housekeeping. • Choose lighting types that reduce spill light and glare. • - Only focus light where it is needed		
Light pollution due to night lighting, security lighting and navigational lighting	Direct	Regional / neighbouring areas (5 km to 50 km) (WoM&WM)	Life of the activity (long term) (WoM&WM)	-	-	Great / harmful	Yes management measures can be implemented.		Significant / slightly harmful	Medium
Visual impact on the identified sensitive receptors	Direct	Regional / neighbouring areas (5 km to 50 km) (WoM&WM)	Life of the activity (long term) (WoM&WM)	-	-	Great / harmful	Yes management measures can be implemented.		Significant / slightly harmful	Medium
Noise										

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Daytime operation of WTG considering the worst-case SPL	Direct	Regional (WoM & WM)	Long-term (WoM & WM)	High	No	Improbable	Yes	The significance of the noise impact is low and no additional mitigation is recommended.	Improbable	Low
Night-time operation of WTG considering the worst-case SPL	Direct	Regional (WoM & WM)	Long-term (WoM & WM)	High	No	Possible	Yes	The significance of the noise impact is low and no additional mitigation is recommended.	Possible	Low
Potential Cumulative Noise Impacts	Direct	Regional (WoM & WM)	Long-term (WoM & WM)	High	No	Possible	Yes	The significance of the noise impact is low and no additional mitigation is recommended.	Possible	Low
Social										

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Renewable energy infrastructure and clean renewable energy	Direct and Cumulative	Local, Regional and National (WoM&WM)	Long term (WoM&WM)	Yes	Reduced CO_2 emissions and impact on climate change	Highly Probable	Yes	• Implement a skills development and training programme aimed at maximizing the number of employment opportunities for local community members. • Maximise opportunities for local content, procurement, and community shareholding. • Maximise opportunities for local content and procurement.	Definite	High Positive

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Creation of employment and business opportunities	Direct and Cumulative	Local and Regional (WoM) (WM)	Long term (WoM) (WM)	-	No	Highly Probable	N/A	• Local employment • On the job training and development • Local business development	Highly Probable	Medium Positive
Generation of income for landowner	Direct	Local (WoM&WM)	Long Term (WoM&WM)	-	-	Probable	N/A	Agreements with affected landowners should be in place before WEF becomes operational	Probable	Medium Positive
Social Economic Development and Enterprise Development	Direct and Cumulative	Local and Regional (WoM&WM)	Long term (WoM&WM)	Yes	-	Probable	N/A	• The proponents should liaise with the KMM to identify projects that can be supported by SED contributions. • Clear criteria for identifying and funding	Definite	High Positive

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								community projects and initiatives in the area should be identified. The criteria should be aimed at maximising the benefits for the community as a whole and not individuals within the community. • Strict financial management controls, including annual audits, should be instituted to manage the SED contributions.		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Visual impacts and associated impact on sense of place	Direct	Local (WoM&WM)	Long term (WoM&WM)	-	-	Probable	Yes	The visual impact mitigation measures should be implemented	Probable	Low-Medium
Impact on property values	Indirect	Local (WoM&WM)	Long term (WoM&WM)	Yes	No	Probable	N/A	Due to the limited prospect of this occurring no mitigation measures are suggested	Probable	Low
Impact on tourism	Direct	Local (WoM) (WM)	Long term (WoM&WM)	Yes	No	Probable	Yes	• The possible impact is low no mitigation is required • Marketing area as a tourist attraction	Probable	Low
Traffic										
Increase in traffic volumes on the	Direct	Local	Short Term (WoM&WM)	-	-	Highly Probable	Yes	• Routine road maintenance by the relevant Roads Authority.	Probable	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
surrounding road network during the operational phase.										
DECOMMISSIONING										
Terrestrial Biodiversity										
The ecological impacts associated with the decommissioning phase will be similar to those listed in the construction phase and the associated mitigations measures must be updated and implemented to reduce potential adverse impacts.										
Agriculture										
Protection of soil resources	Direct	Local	Long Term (WoM) Short Term (WM)	-	-	Medium	Yes	• Implement an effective system of storm water runoff control, where it is required that is at any points where run off water might accumulate. The	Low	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact **WoM-** Without Mitigation **WM-** With Mitigation	Can impact be prevented/ reversed or managed? **WoM-** Without Mitigation **WM-** With Mitigation	Will irreplaceable resources be lost? **WoM-**Without Mitigation **WM-** With Mitigation	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
								system must effectively collect and safely disseminate any runoff water from all accumulation points and it must prevent any potential down slope erosion. • Maintain where possible all vegetation cover and facilitate revegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for respreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.		
Visual										

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Visual intrusion and dust creation from the movement of construction vehicles and heavy machinery	Direct	Local (within 5km) (WoM) Whole site (WM)	One year to 10 years (WoM&WM)	-	-	-	Significant / slightly harmful	• Limit the decommissioning footprint to only the development area. • Carefully plan to minimize the decommissioning duration. • Inform receptors of the decommissioning programme and schedule. • Regulate the speed of vehicles on and off site. • Use existing roads where possible.	Small / potentially harmful	Low
Change in landscape character due to the removal of infrastructure	Direct	Local (within 5km) (WoM) Whole site (WM)	One year to 10 years (WoM&WM)	-	-	-	Significant / slightly harmful		Small / potentially harmful	Low
Light pollution due to night lighting.	Direct	Local (within 5km) (WoM)	One year to 10 years (WoM&WM)	-	-	-	Significant / slightly harmful		Small / potentially harmful	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
		Whole site (WM)						• Limit the number of vehicles travelling to and from site. • Implement dust suppression activities. • Ensure ongoing housekeeping. • Revegetate areas with suitable indigenous vegetation. • Where possible, reshape the area so that the resembles the pre-construction landscape.		
Dust pollution due to infrastructure removal and movement of construction vehicles and heavy machinery.	Direct	Direct	Local (within 5km) (WoM) Whole site (WM)	One year to 10 years (WoM&WM)	-	-	Significant / slightly harmful		Small / potentially harmful	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM**- With Mitigation	**WoM**- Without Mitigation **WM**- With Mitigation	**WoM**-Without Mitigation **WM**- With Mitigation					
								• Remove as much infrastructure as possible. • Ensure that residual infrastructure remains in good condition. • Choose lighting types that reduce spill light and glare. • Only focus light where it is needed. • Ensure monitoring of rehabilitated areas for at least a year after decommissioning		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								activities are completed.		
Social										
Social impacts associated with decommissioning	Direct	Local (WoM&WM)	Short term (WoM&WM)	-	-	Probable	Yes	• The proponent should ensure that retrenchment packages are provided for all staff retrenched when the plant is decommissioned. • All structures and infrastructure associated with the proposed facility should be dismantled and	Probable	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								transported off-site on decommissioning.		
Traffic										
Gravel loss and possible damage to the road layer works as a result of additional truck traffic and heavy load truck traffic during the decommissioning phase.	Direct	Local	Short Term (WoM&WM)	-	-	Highly Probable	Yes	• Resurfacing of sections along the R358, where required and regular road maintenance i.e. grading of the road once every two weeks during the decommissioning phase. • The road can also be sprayed with water (grey water if available) once a day to limit dust	Probable	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								pollution and gravel loss.		

8. CUMULATIVE IMPACT ASSESSMENT

The National Environmental Management Act (107 of 1998) Section 24(7) requires the consideration of cumulative effects in the assessment process. It should be noted that cumulative impacts are considered as far as possible in the assessment of each impact.

The cumulative impacts will fall mainly in the spheres of land use change, visual, bats and avifauna impacts.

The specialist studies undertaken have considered the cumulative impacts that the proposed WEF will have on the surrounding WEFs within a 30km radius of the proposed site. These impacts include:

Terrestrial Biodiversity:

- Vegetation and habitat loss,
- Increased habitat fragmentation,
- Loss of critical habitat for flora SCC as well as endemic species,
- Loss of provincially protected species which require a permit,
- Surface water impacts and associated ecological processes,
- Increased erosion due to flooding (not a yearly event but longer term),
- Increased alien flora and fauna species.

Aquatic Biodiversity:

- Operation of equipment and machinery
- Clearing vegetation
- Stockpiling of and placement construction materials
- Excavating/shaping landscape
- Final landscaping, backfilling and postconstruction rehabilitation
- Alteration of drainage
- Alteration of surface water flow dynamics
- Establishment of alien plants on disturbed areas

Avifauna:

- Habitat loss: The destruction of highly sensitive habitat (for example sandy substrates for Red Lark) will potentially increase. The Red Lark exists within a narrow ecological and distributional belt and loss of its ecologically specific habitat may be highly significant.
- Road-kills: Many birds are commonly killed on roads, especially nocturnal species such as Spotted Eagle-Owl.
- Regional saturation of turbines: This has implications for several priority species, both in terms of collision mortality for some species, especially Bustards, Vultures and Raptors, and displacement due to transformation of habitats
- Powerlines: Numerous existing and new power lines are significant threats to large terrestrial priority species in the region as powerlines may kill significant numbers of all large terrestrial bird species.

Bats:

- Loss or destruction of foraging and roosting habitat
- Bat fatalities due to collision or barotrauma
- Disruption and increased fatalities due to artificial lighting

Noise:

The distance between the wind turbine positions means there is no significant cumulative effect of the additional noise sources with the noise level at the noise sensitive receptors increasing by a negligible amount.

Visual:

Cumulatively, the proposed WEF and surrounding renewable energy developments are expected to cause cumulative visual impacts and alter the study areas current sense of place and visual character. However, it is anticipated that the identified cumulative visual impacts can be lowered to acceptable levels provided that the recommended mitigation measures mentioned in this report and within the surrounding project's VIA's be adhered to.

Social:

- Loss of Sense of Place and Landscape
- Increased pressure on local services and accommodation
- Downstream business opportunities / supporting local community

Palaeontological and Archaeological Resources:

The cumulative impact on the area is increasing as a result of the expansion of renewable energy facilities in the surrounding area. Indirect impacts occur where the sense of place have been altered at these sites.

Agricultural

- Regional loss (including by degradation) of future agricultural production potential.

Transportation

There are other planned renewable energy projects within a 50km radius from the WEF. The construction and decommissioning phases of these projects are the only significant traffic generators. These are short term phases and the impacts on the surrounding road network is temporary. Even if all projects are constructed and decommissioned simultaneously, the road authority will evaluate the applications for the abnormal loads associated with these projects and liaise with the developers to ensure that loads on the public roads are staggered to ensure that the traffic impact is acceptable.

- Increase in traffic volumes on the surrounding road network as a result of construction traffic
- Gravel loss and possible damage to the road layer works as a result of additional truck traffic and heavy load truck traffic during the construction phase
- Increase in traffic volumes on the surrounding road network during the operational phase.
- Gravel loss and possible damage to the road layer works as a result of additional truck traffic and heavy load truck traffic during the decommissioning phase

There is the potential for a **HIGH** cumulative impact of multiple wind farms in the region on avifauna populations. However, this does not necessarily represent a fatal flaw, because if post-construction monitoring results confirm that the impact is **HIGH** and fatality thresholds are exceeded, this impact could be reduced to an acceptable level by applying appropriate curtailment measures and other industry appropriate measures at the De Rust South WEF.

With the implementation of the mitigation measures as indicated in **Table** 7-4 in this report, the proposed impacts can be minimised. Each renewable energy project within a 30 km radius will be responsible for monitoring its impacts on the surrounding environments. Furthermore, it is important to understand that although there are local losses, there are also other local, regional and national environmental, social and economic gain.

Table 8-1: Potential Cumulative Impacts.

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
PLANNING AND CONSTRUCTION										
Terrestrial Biodiversity										
Vegetation and habitat loss Increased habitat fragmentation Loss of critical habitat for flora SCC as well as endemic species	Cumulative	Regional/neighbouring areas (WoM) Whole site/plant/mine (WM)	Post closure (WoM) Life of operation (WM)	With appropriate mitigation the impact can be ameliorated, but some residual impacts will remain (loss	Possible	Often/regularly/likely/possible	To a degree	Implementation of all mitigation measures suggested within the Terrestrial Biodiversity Assessment Report	Infrequent/unlikely/seldom	Low-Medium

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Loss of provincially protected species which require a permit				of vegetation) (WoM) With appropriate mitigation the impact can be ameliorated (WM)						
Surface water impacts and associated ecological processes,										
Increased erosion due to flooding (not a yearly event but longer term),										

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Increased alien flora and fauna species.										
Avifauna										
Habitat loss Road Kills Regional Saturation of turbines Powerlines	Cumulative	Regional/neighbouring areas	Life of operation	Yes	No (WoM) Possibly (WM)	Daily/highly likely/definitely	Yes	Apply necessary buffers for roost and foraging sites and other sensitive bird habitat features, avoiding the construction of turbines and access roads in these areas. Roads must utilise or upgrade existing farm roads as far as possible.	Daily/highly likely/definitely	High
Bat										

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact **WoM-** Without Mitigation **WM-** With Mitigation	Can impact be prevented/ reversed or managed? **WoM-** Without Mitigation **WM-** With Mitigation	Will irreplaceable resources be lost? **WoM-**Without Mitigation **WM-** With Mitigation	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
Loss or destruction of habitat	Cumulative	Area specific (WoM) Activity specific (WM)	One year to ten years (WoM & WM)	-	-	Definite	Yes	• Follow mitigation measures applicable to direct and indirect impacts • Communication between surrounding WEFs as one WEF may detect warning signs of large bat activities, enabling other WEFs to implement adaptive mitigation before excessive fatalities occur. • Post construction monitoring	Definite	Low
Bat fatality due to collision	Cumulative	Regional/neighbouring areas (WoM & WM)	Life of operation (WoM & WM)	-	-	Highly likely	Yes		Likely	Medium- High
Artificial lighting	Cumulative	Area specific (WoM) Activity specific (WM)	Life of operation (WoM & WM)	-	-	Possible	Yes		Highly unlikely	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Aquatic										
Operation of equipment and machinery	Cumulative	Activity specific	One year to ten years	-	-	Often/regularly/likely/possible	Yes	• The implementation of the buffer zone stipulated in this report; • Clean and dirty surface water separation and a storm-water management plan must be put into place via standard best practice methods; • A clear storm-water management plan for hardened surfaces must be implemented;	Almost never/almost impossible	Low
Clearing vegetation	Cumulative	Activity specific	One year to ten years	-	-	Often/regularly/likely/possible	Yes		Almost never/almost impossible	Low
Stockpiling of and placement construction materials	Cumulative	Activity specific	One year to ten years	-	-	Often/regularly/likely/possible	Yes		Almost never/almost impossible	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Excavating/shaping landscape	Cumulative	Activity specific	One year to ten years	-	-	Often/regularly/likely/possible	Yes	Water Resource Study • The revegetation of disturbed non-active cleared areas must take place within the first growing season between September and March following completion of the activity; • The above must be audited within 3 months of completing the phase; • No discharge of domestic water must occur if possible. Domestic water must be	Almost never/almost impossible	Low
Final landscaping, backfilling and postconstruction rehabilitation	Cumulative	Activity specific	One year to ten years	-	-	Often/regularly/likely/possible	Yes		Almost never/almost impossible	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM**- With Mitigation	**WoM**- Without Mitigation **WM**- With Mitigation	**WoM**-Without Mitigation **WM**- With Mitigation					
								reused for dust suppression. • All stockpiles and hazardous waste storage areas must be bunded by either a cut-off trench or berm directed to a Pollution Control Dam inline with best practice surface water management guidelines. • Any materials excavated must not be deposited in the river channel or valley slopes where it is prone to being washed		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact **WoM-** Without Mitigation **WM-** With Mitigation	Can impact be prevented/ reversed or managed? **WoM-** Without Mitigation **WM-** With Mitigation	Will irreplaceable resources be lost? **WoM-**Without Mitigation **WM-** With Mitigation	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
								downstream or impeding natural flow; • The installation of sedimentation/erosion protection measures must be implemented before the start of construction, e.g., several rows of silt traps and fences (this is particularly important in the access roads leading or adjacent to the watercourse);		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• Stockpiling or storage of materials and/or waste must be placed beyond the defined buffers in this report for each respective activity; • No vehicles shall enter watercourse buffer zones outside of construction footprints; • No vehicles shall be serviced on site; a suitable workshop with appropriate pollution control facilities should be utilised offsite;		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM**- With Mitigation	**WoM**- Without Mitigation **WM**- With Mitigation	**WoM**-Without Mitigation **WM**- With Mitigation					
								• Hydrocarbons for refuelling purposes must be stored in a suitable storage device on an impermeable surface outside of the delineated wetland buffer zone; • Disturbed areas must be re-vegetated after completion of the phase; o A one-month timeframe for the initiation of this action;		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								o Ripping of the soils should occur in two directions; and o Removed vegetation and topsoil can be harvested and applied here. • Drainage channels constructed for the access roads must be constructed so as not to result in erosion; • An inspection of the drainage channels must be completed within 1 month		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								following the end of activities and within a month after the first rainfall event which exceeds 5mm. Should excessive sediment be transported down the channels it is recommended that sediment screens are implemented; • An alien vegetation removal and management plan must be implemented along the verges of the roads and crossing points;		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• General storm-water management practices should be included in the design phase and implemented during the construction phase of this project; and • Following the completion of the phase, all construction materials and debris should be removed and disposed of in a suitable off-site area. An inspection should be completed within a week		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM**- With Mitigation	**WoM**- Without Mitigation **WM**- With Mitigation	**WoM**-Without Mitigation **WM**- With Mitigation					
								after the phase is completed. • All contractors and staff are to be familiarised with the method statement and have undergone an induction / training on the location of sensitive No-Go areas and basic environmental awareness using the mitigation provided in this report. • Access routes into or adjacent to the washes must make use of existing		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								road ways and crossings where possible; • Areas where construction is to take place must be clearly demarcated. Any areas not demarcated must be avoided; • Storm-water generated from roadways must be captured and buffered, where flow velocities are to be significantly reduced before discharge into the environment.		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• Storm-water verges as well as other denuded areas must be grassed (revegetated) with local indigenous grasses to protect against erosion;		
Agricultural										
Regional loss (including by degradation) of future agricultural production potential.	Cumulative	Local	Medium term (WoM) Short Term (WM)	-	-	Medium	Yes	Implement dust control measure A system of storm water management	Low	Low
Heritage										

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Increasing as a result of the expansion of renewable energy facilities in the surrounding area	Cumulative	Local	Permanent (WoM and WM)	Not reversible (WoM and WM)	Yes (WoM and WM)	Improbable	-	• Implementation of a Chance Find Procedure for the project; • Sites of high significance will be preserved in no-go areas and have been recorded resulting in a low cumulative impact by the project.	Improbable	Low
Noise										
Increased Noise Levels for the nearest Noise sensitive receptors	Cumulative	Regional	Long-term (WoM & WM)	Yes (WoM & WM)	No	Low	Yes	The significance of the noise impact is low and no additional mitigation is recommended.	Low	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM**- With Mitigation	**WoM**- Without Mitigation **WM**- With Mitigation	**WoM**-Without Mitigation **WM**- With Mitigation					
Visual										
Change in visual/landscape character and sense of place, due to the presence of additional renewable energy facilities, from a largely undeveloped landscape to a more industrial type of landscape.	Cumulative	National	Life of the activity (long term) (WoM & WM)	-	-	Great / harmful	Yes	• The recommended mitigation measures for the operational phase visual impacts, provided in Table 10-4, should be implemented. • Where necessary, liaise with the neighbouring renewable energy facility's management to mutually decrease visual impacts on	Significant / slightly harmful	Moderate

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM**- With Mitigation	**WoM**- Without Mitigation **WM**- With Mitigation	**WoM**-Without Mitigation **WM**- With Mitigation					
Additional levels of visual intrusion due to the presence of additional renewable energy facilities and from the movement of additional maintenance vehicles and heavy machinery.	Cumulative	National	Life of the activity (long term) (WoM & WM)	-	-	Great / harmful	Yes	visually impacted sensitive receptors.	Significant / slightly harmful	Moderate
Additional dust pollution due to	Cumulative	National	Life of the activity (long	-	-	Great / harmful	Yes			Moderate

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
increased traffic.			term) (WoM & WM)							
Additional light pollution due to additional night lighting, security lighting and navigational lighting.	Cumulative	National	Life of the activity (long term) (WoM & WM)	-	-	Great / harmful	Yes		Significant / slightly harmful	Moderate
Increased visual impact on the identified sensitive receptors.	Cumulative	National	Life of the activity (long term) (WoM & WM)	-	-	Great / harmful	Yes		Significant / slightly harmful	Moderate
Social										

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Impact on Sense of Place	Cumulative	Regional/neighbouring areas	Long term (WoM & WM)	Yes. REF components and other infrastructure can be removed. (WoM & WM)	-	Probable	Yes	Recommendations of VIA should be implemented	Highly Probable	Moderate
Pressure on local services and accommodation	Cumulative	Local & Regional/neighbouring areas	Long term (WoM & WM)	Yes. REF components and other infrastructure can be removed.	No	Probable	Yes	The proponent should liaise with the KMM to address potential impacts on local services.	Highly Probable	Medium / Low negative
Job Creation, Skills	Cumulative	Local	Long term	Yes. REF components	No	Highly Probable	Yes	The proposed establishment of suitably	Highly Probable	High Positive

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Development, training opportunities and creation of downstream business opportunities			(WoM & WM)	and other infrastructure can be removed (WoM & WM)				sited renewable energy facilities and associated projects, such as the proposed WEF, within the KMM should be supported.		
Traffic										
Increase in traffic volumes on the surrounding road network as a result of construction traffic	Direct	Local	Short Term (WoM&WM)	-	-	Highly Probable	Yes	• Construction traffic should not be allowed on the public road network during the typical weekday a.m. and p.m. peak hours in built up areas.	Probable	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								These measures will be included in the Transport Management Plan		
Gravel loss and possible damage to the road layer works. as a result of additional truck traffic and heavy load truck traffic	Direct	Local	Short Term (WoM&WM)	-	-	Highly Probable	Yes	• Resurfacing of sections along the R358, where required and regular road maintenance i.e. grading of the road once every two weeks during the construction phase. The road can also be sprayed with water (grey water if available) once a	Probable	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM**- With Mitigation	**WoM**- Without Mitigation **WM**- With Mitigation	**WoM**-Without Mitigation **WM**- With Mitigation					
								day to limit dust pollution and gravel loss.		
OPERATION										
Avifauna										
Road-kills	Cumulative	Regional/neighbouring areas	Life of operation	No	Yes	Daily/highly likely/definitely	Yes	Avoid placement of turbines near sensitive bird breeding and roosting habitats. Where service road intersect with semi natural or natural habitat, all fences must be set back at least (strictly) 75 metres from the edge of every service road in order to allow for vulnerable	Daily/highly likely/definitely	High

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								species such as cranes and korhaans to obtain adequate height after being flushed by vehicle traffic. Alternatively, the fences must be placed completely adjacent to the roads with a maximum of 3 metres buffer and marked with fence flappers in order to reduce flush related collisions.		
Regional saturation of turbines	Cumulative	Regional/neighbouring areas	Life of operation	No	Yes	Daily/highly likely/definitely	Yes	Formal post construction monitoring. The exact scope, nature and frequency of the post-	Daily/highly likely/definitely	High

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								construction monitoring will be informed on an ongoing basis by the results of the monitoring through a process of adaptive management.		
Powerlines	Cumulative	Regional/neighbouring areas	Life of operation	No	Yes	Daily/highly likely/definitely	Yes	Apply necessary buffers for roost and foraging sites and other sensitive bird habitat features, avoiding the construction of turbines and access roads in these areas. Roads must utilise or upgrade existing farm roads as far as possible.	Daily/highly likely/definitely	High

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								Formal post construction monitoring		
Bats										
Bat fatalities due to collision or barotrauma	Cumulative	Regional/neighbouring areas (WoM & WM)	Life of operation (WoM & WM)	-	-	Highly likely	Yes	• Follow mitigation measures applicable to direct and indirect impacts	Unlikely	Low-Medium
Disruption and increased fatalities due to artificial lighting	Cumulative	Regional/neighbouring areas (WoM & WM)	Life of operation (WoM & WM)	-	-	Possible	Yes	• Communication between surrounding WEFs as one WEF may detect warning signs of large bat activities, enabling other WEFs to implement adaptive mitigation before	Highly unlikely	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								excessive fatalities occur. • Post construction monitoring		
Aquatic										
Alteration of drainage	Cumulative	Activity specific	Life of operation			Often/regularly/likely/possible		• The implementation of the buffer zones provided in this report; • Clean and dirty surface water separation and storm-water management plan must be put into place via standard best practice methods; • An effective storm-water management plan for	Almost never/almost impossible	Low
Alteration of surface water flow dynamics	Cumulative	Activity specific	Life of operation			Often/regularly/likely/possible			Almost never/almost impossible	Low
Establishment of alien plants on disturbed areas	Cumulative	Activity specific	Life of operation			Often/regularly/likely/possible			Almost never/almost impossible	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								each turbine must be implemented; • The revegetation of disturbed non active cleared areas must take place within 1 month of completing the construction phase; • The above must be audited within 3 months of completing the phase; • No discharge of domestic water must occur if possible. Domestic water must be reused for dust		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM**- With Mitigation	**WoM**- Without Mitigation **WM**- With Mitigation	**WoM**-Without Mitigation **WM**- With Mitigation					
								suppression. Should domestic water be required to be discharge, the management of nitrogen concentrations is imperative. • All stockpiles and hazardous waste storage areas must be bunded by either a cut-off trench directed to a Pollution Control Dam or via a berm. • The implementation of the buffer zones provided in this report;		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• Clean and dirty surface water separation and storm-water management plan must be put into place via standard best practice methods; • An effective storm-water management plan for each turbine must be implemented; • The revegetation of disturbed non active cleared areas must take place within 1 month of completing the		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								construction phase; • The above must be audited within 3 months of completing the phase; • No discharge of domestic water must occur if possible. Domestic water must be reused for dust suppression. Should domestic water be required to be discharge, the management of nitrogen concentrations is imperative. • All stockpiles and		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								hazardous waste storage areas must be bunded by either a cut-off trench directed to a Pollution Control Dam or via a berm.		
Traffic										
Increase in traffic volumes on the surrounding road network during the operational phase.	Direct	Local	Short Term (WoM&WM)	-	-	Highly Probable	Yes	Routine road maintenance by the relevant Roads Authority.	Probable	Low
DECOMMISSIONING										

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM- Without Mitigation **WM-** With Mitigation	**WoM-** Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Traffic										
Gravel loss and possible damage to the road layer works as a result of additional truck traffic and heavy load truck traffic during the decommissioning phase.	Direct	Local	Short Term (WoM&WM)	-	-	Highly Probable	Yes	• Resurfacing of sections along the R358, where required and regular road maintenance i.e. grading of the road once every two weeks during the decommissioning phase. The road can also be sprayed with water (grey water if available) once a day to limit dust pollution and gravel loss.	Probable	Low

9. ENVIRONMENTAL IMPACT STATEMENT

9.1. IMPACT ANALYSIS

The potential impacts associated with the proposed De Rust South WEF and associated infrastructure are summarised below in Table 9-1. Should the mitigation provided in the tables in Section 7, and detailed in the EMPr be implemented, post-migration impacts are anticipated to range between very low to medium negative significance, and up to highly positive.

Table 9-1: Summary of Impact Assessment

Aspect	Impact	Post Mitigation
	Planning and Construction	
Terrestrial Biodiversity	Habitat Loss and Fragmentation	Low – Medium
	Loss of species of conservation concern	Low
	Alien and invasive plant species	Low
	Increased risk of erosion and flash floods.	Low
Avifauna	Habitat destruction	Low
	Destruction or disturbance of bird roosts	Low
Bats	Habitat destruction	Low
Aquatic	Operation of equipment and machinery	Low
	Clearing vegetation	Low
	Stockpiling of and placement construction materials	Low
	Excavating/shaping landscape	Low
	Final landscaping, backfilling and postconstruction rehabilitation	Low
Agricultural	Loss of agricultural potential by occupation of land	Medium
	Loss of agricultural potential by soil degradation	Low
	Dust impact	Low
	Enhanced agricultural potential through increased financial security for farming operations	High Positive
	Improved security against stock theft and other crime	High Positive
Visual	Visual intrusion due to the removal of vegetation, movement of construction vehicles and heavy machinery, presence of laydown areas and site clearance	Low
	Light pollution due to night lighting	Low
	Dust pollution due to site clearance and movement of construction vehicles and heavy machinery	Low
Heritage	Impact on the cemetery at PD002	Low
Noise	Daytime WTG construction activities	Low
	Night-time WTG construction activities	Low

Social	Employment, business opportunities and skills development impact rating	High Positive
	Construction workers on site and in local area impact rating	Low
	Risk to safety, livestock, and damage to farm infrastructure	Low
	Increased risk of grass fires	Low
	Nuisance impacts associated with construction related activities	Low
Traffic	Increase in traffic volumes on the surrounding road network as a result of construction traffic	Low
	Heavy Loads during the construction phase	Low
General	Stormwater Management	Low
	Hunting / Fishing by construction workers.	Low
	Degradation and contamination of the surrounding environment by construction activities, cement, hydrocarbons and other hazardous materials.	Low
	Potential disturbance or unearthing of graves or disturbance to other heritage resources during the construction phase.	Low
	Improper storage and disposal of solid waste.	Low
	Littering around the site.	Low
	Improper disposal of rubble i.e.: burying or neglecting building rubble resulting in direct mechanical damage to surrounding vegetation and untidiness of the site.	Low
	Lack of toilet facilities resulting in unsanitary conditions.	Low
	Improper disposal of toilet waste from chemical toilets resulting in contamination of the surrounding environment	Low
	Increase waste to landfill site.	Low
	Risk of spills from construction equipment (oils, fuels, cement etc.) contaminating soil and the watercourse.	Low
	Dust Generation and control	Low
	Degradation of existing service infrastructure, e.g. roads, electricity.	Low
	Operation	
Terrestrial Biodiversity	Direct faunal impacts due to operation.	Low
	Alien and invasive plant species	Low
Avifauna	Bird mortalities (turbine collision)	Medium-High
	Bird Mortalities powerline and fence collision	Low-Medium
	Disruption of bird migratory pathways	Low-Medium
	The attraction of some bird species	Low-Medium
Bats	Bat mortalities due to collision or barotrauma	Medium-High
	Artificial light	Low

Aquatic	Alteration of drainage	Low
	Alteration of surface water flow dynamics	Low
	Establishment of alien plants on disturbed areas	Low
	Alt 3	Medium
Visual	Change in visual/landscape character and sense of place due to the presence of the wind turbines and ancillary infrastructure	Medium
	Visual intrusion from the wind turbines dominating the skyline in a largely natural area	Medium
	Visual intrusion from the movement of construction vehicles and heavy machinery	Medium
	Light pollution due to night lighting, security lighting and navigational lighting	Medium
	Dust pollution from operation and maintenance vehicles..	Medium
	Light pollution due to night lighting, security lighting and navigational lighting	Medium
	Visual impact on the identified sensitive receptors	Medium
Noise	Daytime operation of WTG considering the worst-case SPL	Low
	Night-time operation of WTG considering the worst-case SPL	Low
Social	Renewable energy infrastructure and clean renewable energy	High Positive
	Creation of employment and business opportunities	High Positive
	Generation of income for landowner	Medium Positive
	Social Economic Development and Enterprise Development	High Positive
	Visual impacts and associated impact on sense of place	Low-Medium
	Impact on property values	Low
	Impact on tourism	Low
Traffic	Increase in traffic volumes on the surrounding road network	Low
Decommissioning		
Terrestrial Biodiversity	The ecological impacts associated with the decommissioning phase will be similar to those listed in the construction phase and the associated mitigations measures must be updated and implemented to reduce potential adverse impacts	
Agriculture	Protection of soil resources	Low
Visual	Visual intrusion and dust creation from the movement of construction vehicles and heavy machinery	Low
	Change in landscape character due to the removal of infrastructure	Low
	Light pollution due to night lighting.	Low
	Dust pollution due to infrastructure removal and movement of construction vehicles and heavy machinery.	Low
Social	Social impacts associated with decommissioning	Low

Traffic	Gravel loss and possible damage to the road layer works. as a result of additional truck traffic and heavy load truck traffic during the decommissioning phase	Low

Table 9-2: Summary of Cumulative Impact Assessment

Aspect	Impact	Post Mitigation
	Planning and Construction	
Terrestrial Biodiversity	Vegetation and habitat loss	Low – Medium
	Increased habitat fragmentation	Low - Medium
	Loss of critical habitat for flora SCC as well as endemic species	Low - Medium
	Loss of provincially protected species which require a permit.	Low - Medium
	Surface water impacts and associated ecological processes.	Low - Medium
	Increased erosion due to flooding (not a yearly event but longer term)	Low - Medium
	Increased alien flora and fauna species	Low - Medium
Avifauna	Habitat loss	High
	Road-kills	High
	Regional saturation of turbines	High
	Powerlines	High
Bats	Loss or destruction of foraging and roosting habitat	Low
	Bat fatality due to collision	Medium-High
	Artificial lighting	Low
Aquatic	Operation of equipment and machinery	Low
	Clearing vegetation	Low
	Stockpiling of and placement construction materials	Low
	Excavating/shaping landscape	Low
	Final landscaping, backfilling and postconstruction rehabilitation	Low
Agricultural	Regional loss (including by degradation) of future agricultural production potential	Low-Medium
Heritage	Increasing as a result of the expansion of renewable energy facilities in the surrounding area	Low
Social	Impact on Sense of Place	Moderate
	Pressure on local services and accommodation	Medium/Low Negative
	Job Creation, Skills Development, training opportunities and creation of downstream business opportunities	High Positive
Noise	Increased Noise Levels for the nearest Noise sensitive receptors	Low

Aspect	Impact	Post Mitigation
Visual	Change in visual/landscape character and sense of place, due to the presence of additional renewable energy facilities, from a largely undeveloped landscape to a more industrial type of landscape.	Moderate
	Additional levels of visual intrusion due to the presence of additional renewable energy facilities and from the movement of additional maintenance vehicles and heavy machinery.	Moderate
	Additional dust pollution due to increased traffic.	Moderate
	Additional light pollution due to additional night lighting, security lighting and navigational lighting.	Moderate
	Increased visual impact on the identified sensitive receptors.	Moderate
Traffic	Increase in traffic volumes on the surrounding road network as a result of construction traffic	Low
	Gravel loss and possible damage to the road layer works as a result of additional truck traffic and heavy load truck traffic	Low
	Operation	
Avifauna	Road-kills	High
	Regional saturation of turbines	High
	Powerlines	High
Bats	Bat mortalities	Low Medium
	Artificial light	Low
Aquatic	Alteration of drainage	Low
	Alteration of surface water flow dynamics	Low
	Establishment of alien plants on disturbed areas	Low
Traffic	Increase in traffic volumes on the surrounding road network during the operational phase.	Low
	Decommissioning	
Traffic	Gravel loss and possible damage to the road layer works. as a result of additional truck traffic and heavy load truck traffic during the decommissioning phase	Low

9.2. VISUAL REPRESENTATION OF ALTERNATIVE AND SITE SENSITIVITY

The combined sensitivity map was based on the findings from all specialist assessments and inputs from all stakeholders. The following relevant features were included, which are considered “no-go” areas (i.e. no development make occur in these areas):

- Avifauna: 4.6 and 5 km nest buffers, 200 m buffer around seasonally inundated watercourses

- Watercourses: 40m buffer for Washes and 100m buffer on Depressions
- Bats: Sensitive and important habitats, including a 200m buffer, 500m buffer for potential Bat Roosts
- Plants: 200m buffer around sensitive species.

This report is based on a project description and site plan, provided to by the applicant, which has not been approved by DFFE at this stage of the project. The project description and site plan may undergo refinements before being regarded as final. Since only a few stakeholders participated in the process, the buffers could not be finalised.

The Preferred Alternative is considered the most suitable alternative, however micro-siting might be necessary to move some turbines during the construction phase.

specialists. The temporary laydown area is located within the bat buffer and martial eagle nest buffer, but these buffers are specific to turbines and accordingly the temporary laydown area can be located within this location.

The Preferred Alternative is considered the most suitable alternative, however micro-siting might be necessary to move some turbines during the construction phase. The placement of turbines from the preferred alternative is preferable but still require some micro-siting, removing turbines within the No-Go area.

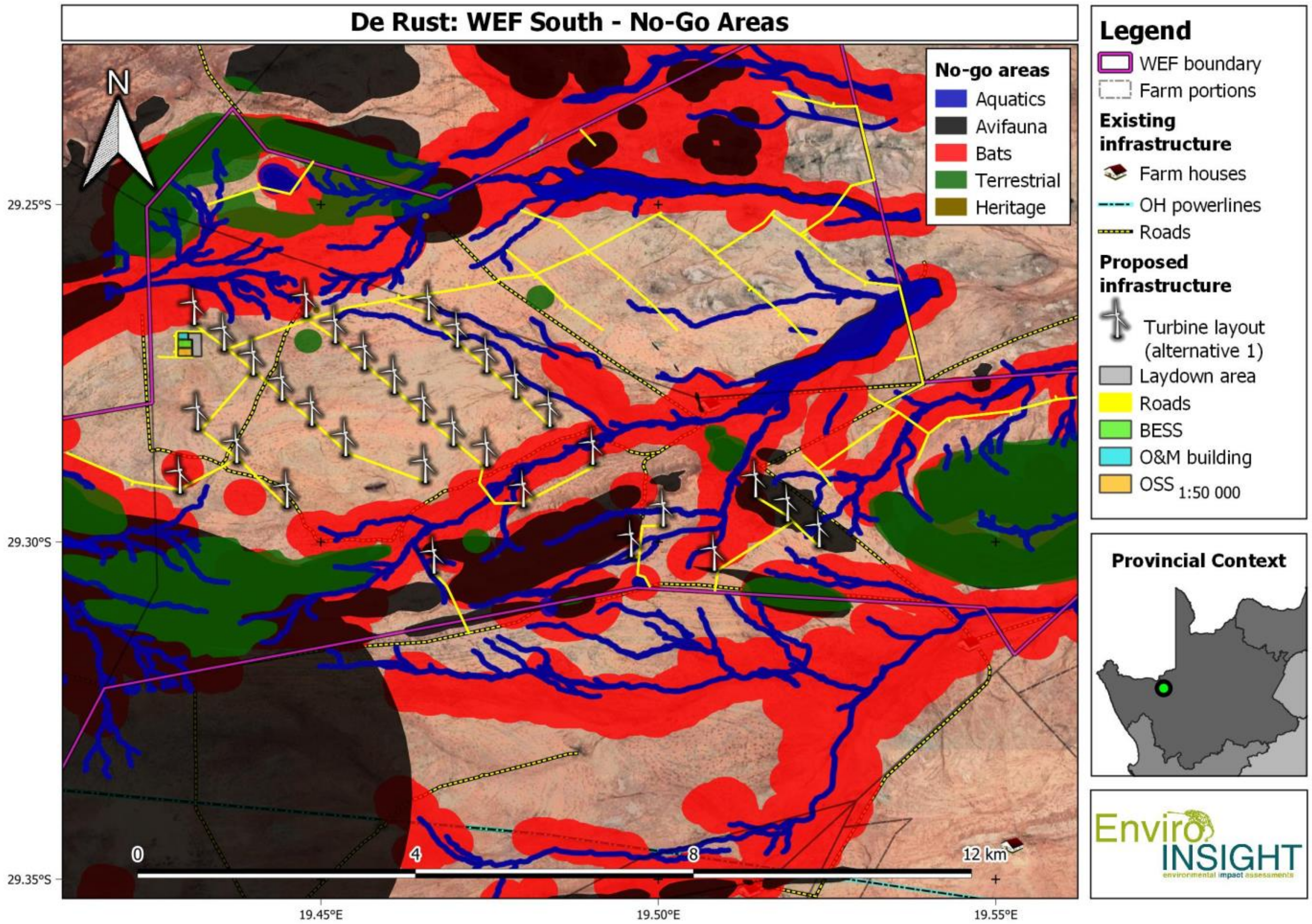

Figure 9-1: Sensitivity analysis indicating no-go areas for alternative 1 layout considered.

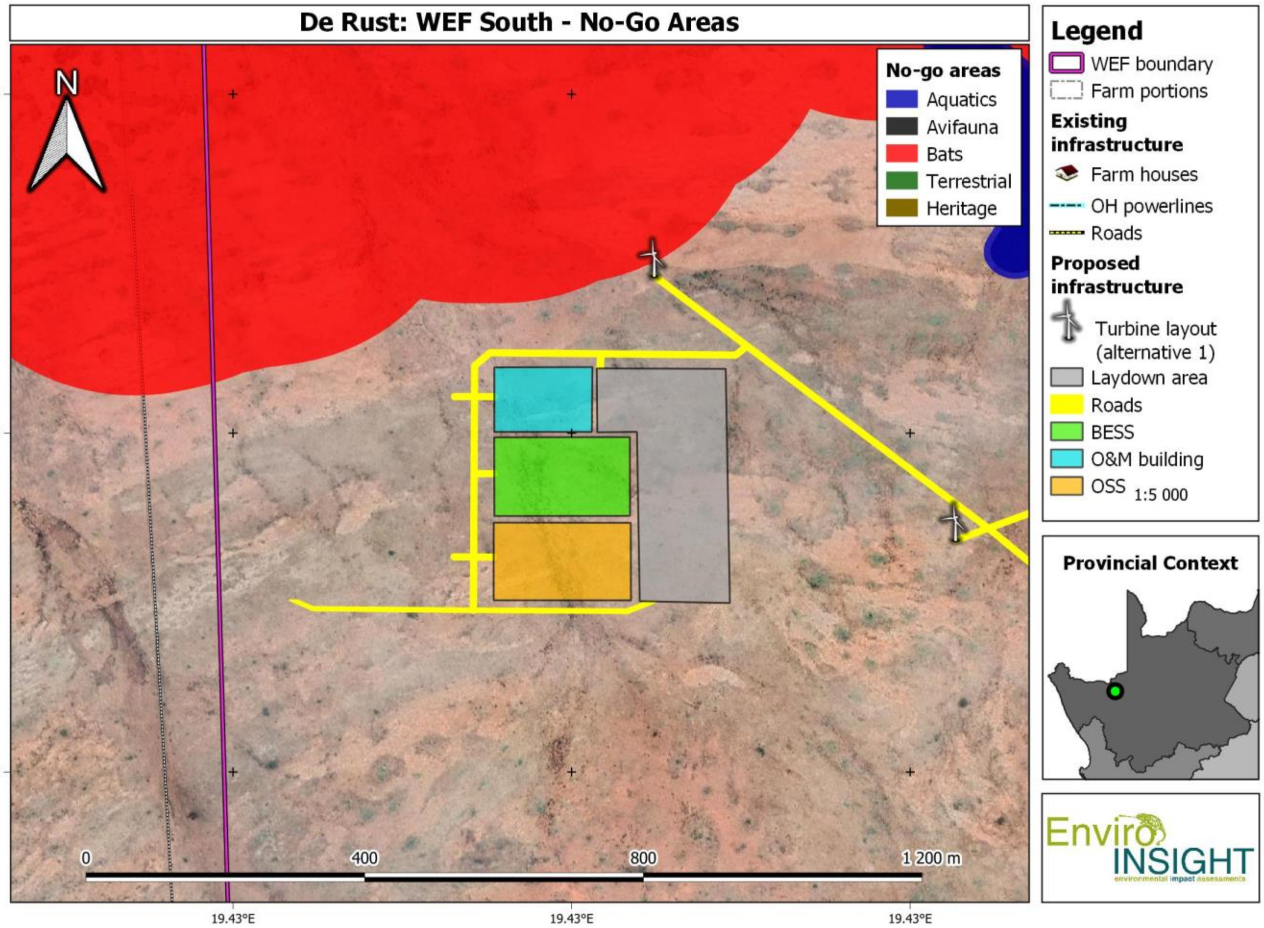

Figure 9-2: Sensitivity analysis indicating no-go areas for alternative 1 infrastructure layout.

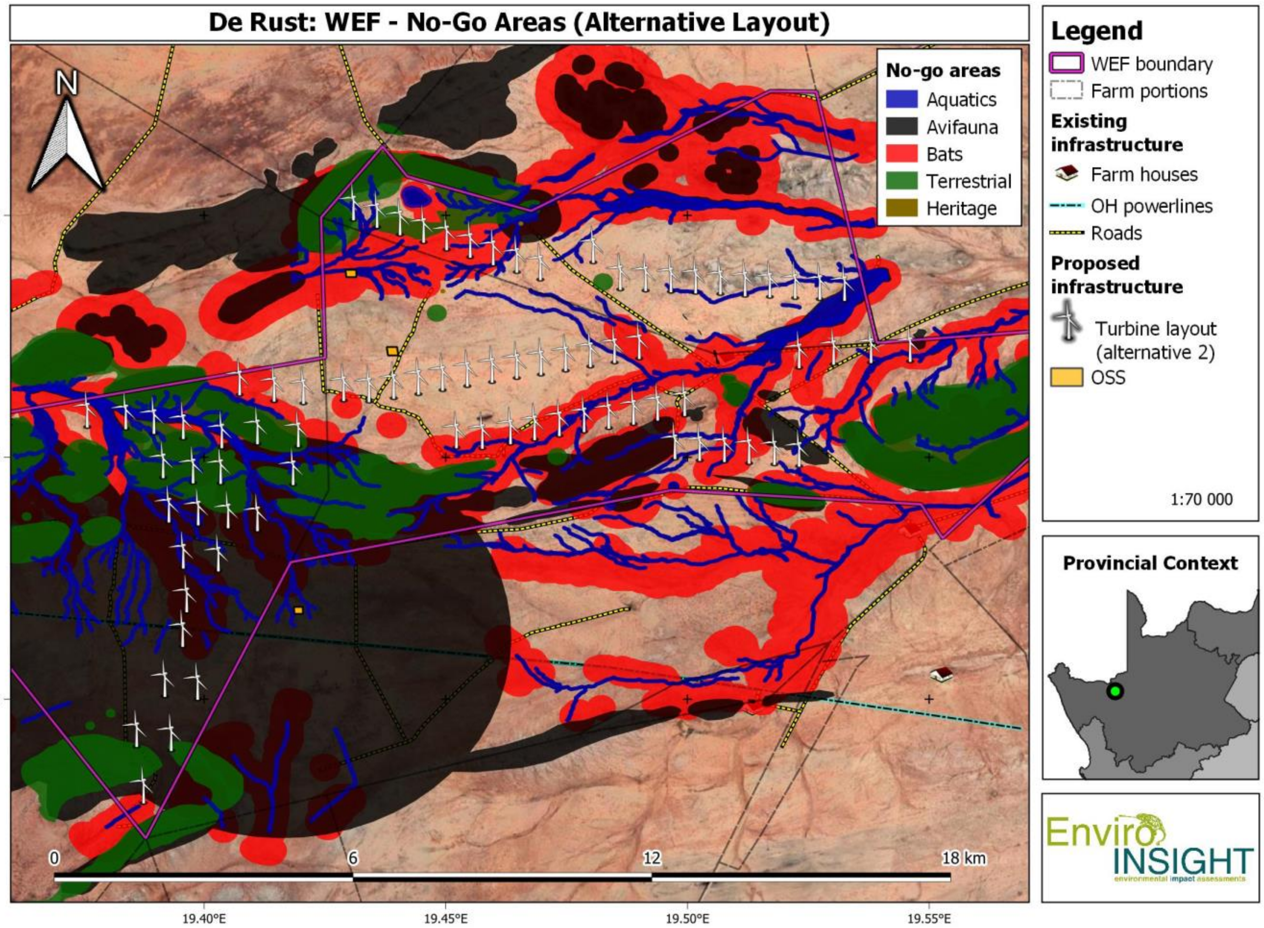

Figure 9-3: Sensitivity analysis indicating no-go areas for alternative 2 layout.

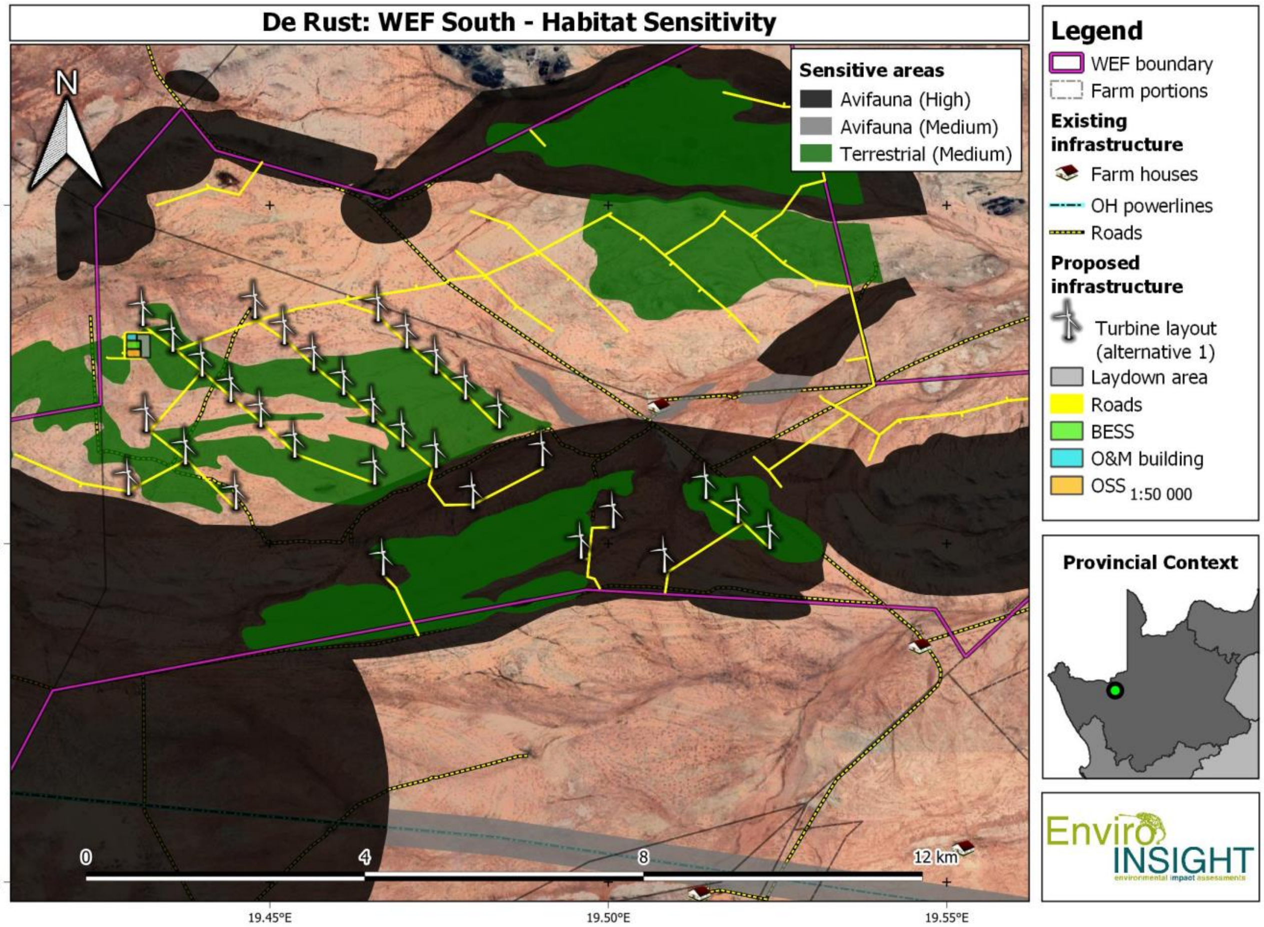

Figure 9-4: Sensitivity analysis indicating high sensitivity areas for alternative 1 layout.

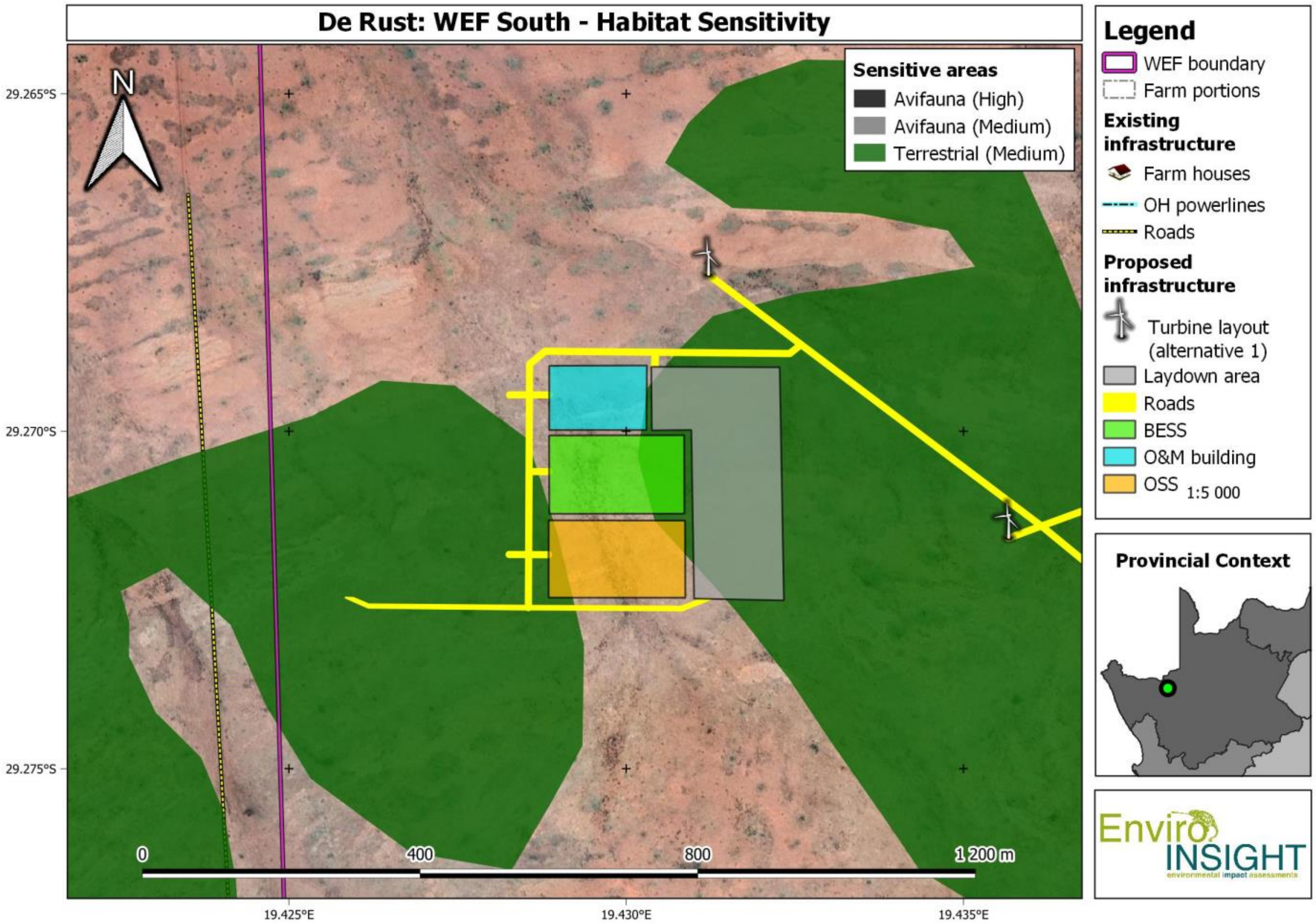

Figure 9-5: Sensitivity analysis indicating high sensitivity areas for alternative 1 infrastructure layout.

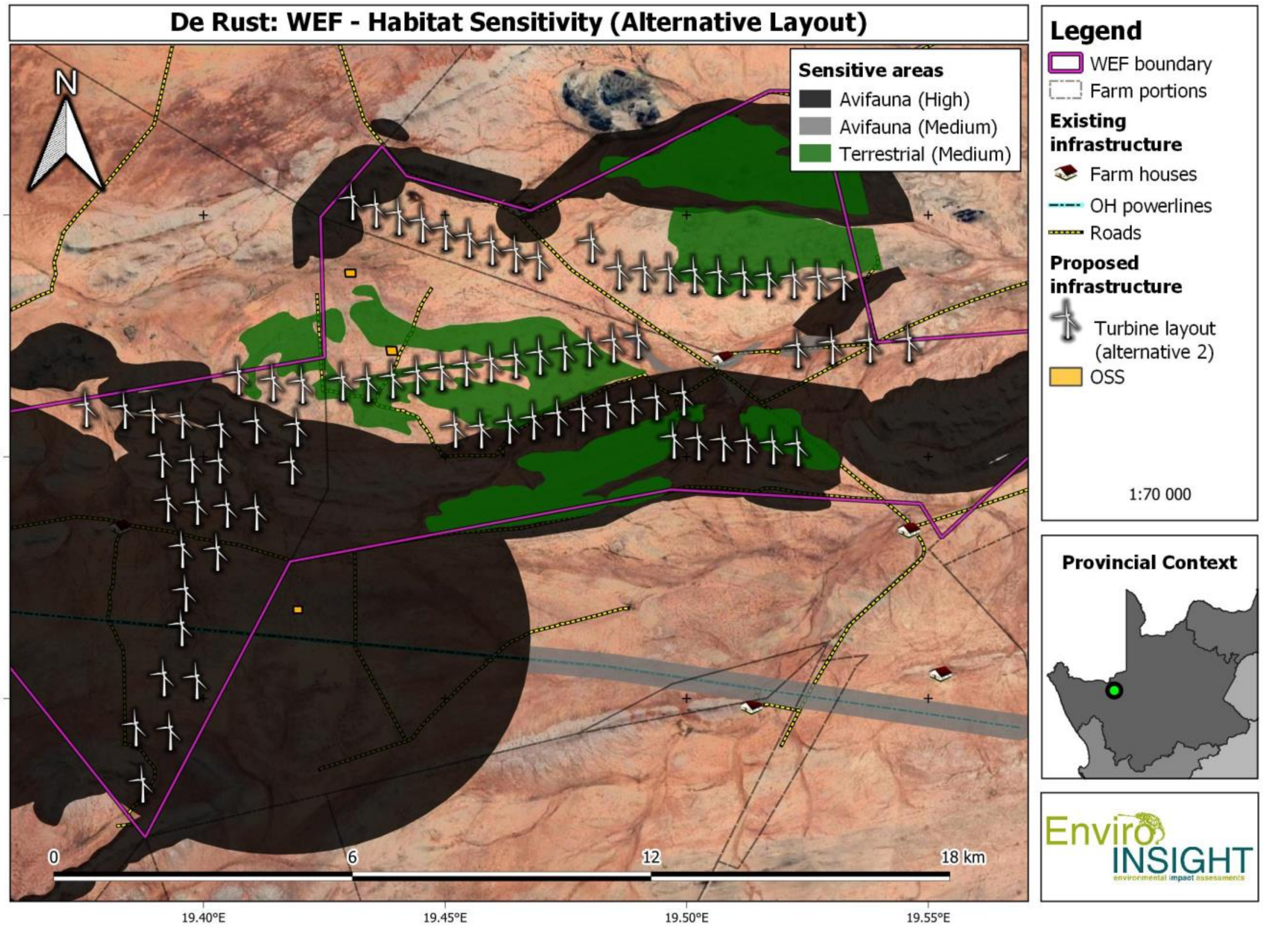

Figure 9-6: Sensitivity analysis indicating high sensitivity areas for alternative 2 layout considered

This report is based on a project description and site plan, provided to by the applicant, which has not been approved by DFFE at this stage of the project. The project description and site plan may undergo refinements before being regarded as final.

Turbines 29 and 30 are to be micro-sited out of the buffers. Even though the infrastructure onsite is located within a terrestrial sensitive area, the area is of medium sensitivity and not considered a fatal flaw. Mitigation measures within the Terrestrial report are to be implemented.

The Preferred Alternative, Alternative 1, is considered the most suitable alternative, however micro-siting might be necessary to move some turbines during the construction phase. The placement of turbines from the preferred alternative is preferable but still require some micro-siting, removing turbines within the No-Go area.

9.3. SPECIALIST RECOMENDATIONS

Summary of specialist opinions and recommendations

Table 9-3: Summary of Specialist Recommendations.

Specialist	Recommendation	Opinion
Terrestrial Biodiversity	No fatal flaws are evident for the proposed project should the latest layout be incorporated which has taken sensitivities into account. It is the opinions of the specialists that the project, may be considered for authorisation, on condition all prescribed mitigation measures and supporting recommendations are implemented. Should the layout be amended and significant changes occur which impacts on sensitive features, all necessary protocols need to be followed to ensure all highly sensitive areas are avoided.	Project can proceed with the implementation of the recommended mitigation measures
Avifauna	The presence of nesting and breeding Ludwig's Bustard, Martial Eagles and Red Lark within the PAOI are of particular concern. Avoidance mitigation must be implemented in conjunction with the aforementioned micro siting as well as technological applications such as Shutdown on Demand. Thus, the author will look to support Environmental Authorisation (EA) based upon the following conditions: • Shutdown on Demand (both automated and human-mediated) will be required to mitigate negative impacts on Ludwig's Bustard and Martial Eagle; • All recommended No-Go buffering must be strictly adhered to; • Micro siting of turbine placement must occur prior to construction and should be supervised by a specialist zoologist in order to mitigate habitat loss and collision risks for Red Lark; • All recommended mitigation measures described above must be applied;. • The EMPr must be updated every three years in order to revaluate the potential distributional population changes of species such as Martial Eagles and Vultures. Thus, technological mitigations such as AI, radar and camera technology may have to be re-positioned, re-calibrated and updated.	Project can proceed with the implementation of the recommended mitigation measures
Bat Assessment	Based on the available data collected, the construction of a WEF on the proposed WEF boundary will have a Low-Medium Risk of impacting the bat population in the area before mitigation measures have been applied. Currently, after mitigation measures have been implemented this risk will be reduced to Low.	Project can proceed with the implementation of the recommended mitigation measures

Aquatic Biodiversity	Considering the type of development proposed, a WEF, and the implementation of the recommendations and mitigation measures, the development is not likely to impact on the FEPA catchment classification associate with the study area.	Project can proceed with the implementation of the recommended mitigation measures
Agriculture	The proposed development will not have substantial 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 low agricultural potential, the amount of agricultural land loss is within the allowable development limits, and that the proposed development poses a low risk in terms of causing soil degradation, if the recommended mitigation measures are implemented.	Project can proceed with the implementation of the recommended mitigation measures
Noise	there exists a low potential for a noise impact and that no further Scoping or other acoustical studies would be required for the proposed WEF. No specific mitigation measures regarding noise or additional noise measurements are recommended. No additional conditions regarding noise are recommended for inclusion in the EMPr. It is therefore recommended that the development of the WEF be approved from a noise perspective.	Project can proceed with the implementation of the recommended mitigation measures
Visual	Overall, the proposed WEF is expected to alter the study areas current sense of place. However, considering the municipality's objectives and the surrounding approved wind and solar projects, an alteration to the area's current sense of place is expected. Therefore, the proposed WEF is expected to blend in with the areas future sense of place, which is expected to include additional renewable energy projects. Considering the analysis, including the results of the viewshed and visual exposure analysis, shadow flicker analysis, impact assessments, future land use trends and low density of identified sensitive receptors, the proposed De Rust South WEF project can proceed from a visual and shadow flicker perspective provided that the recommended mitigation measures are adhered to.	Project can proceed with the implementation of the recommended mitigation measures
Heritage	The alternatives are all considered to be acceptable since the turbines avoid significant heritage sites and the impact of the proposed project on heritage resources can be mitigated to an acceptable level. The socio-economic benefits also outweigh the possible impacts of the development if the correct mitigation measures are implemented for the project. It is recommended that the proposed project can commence on the condition that the recommendations are implemented as part of the EMPr and based on approval from SAHRA.	Project can proceed with the implementation of the recommended mitigation measures
Social	The development of the proposed WEF will create employment, training and business opportunities during both the construction and operation phases of the project. The	Project can proceed with the implementation of the

	potential negative impacts associated with the construction phase can be mitigated. The proposed WEF is an investment in clean, renewable energy infrastructure for the country which will go some way to offset the negative environmental and socio-economic impacts associated with a coal-based fossil fuel energy generation. Renewable energy, including WEF, also addresses climate change and assists the country in meeting climate change reduction goals. The development of the WEF is supported as the project will have significant positive impacts. These positive impacts relate to the economy by providing clean energy which will reduce South Africa's carbon footprint.	recommended mitigation measures
Traffic	The existing road network has sufficient spare capacity to accommodate the proposed WEF, without any road upgrades required to the existing road infrastructure. It is recommended that the proposed WEF be approved from a transport impact perspective.	Project can proceed with the implementation of the recommended mitigation measures

10. CONCLUSION AND RECOMMENDATIONS

FE De Rust (Pty) Ltd (hereafter the Applicant) is proposing the development of a wind energy facility (WEF) and associated infrastructure on a site located approximately 18 kilometers (km) south of Pofadder in the Northern Cape province of South Africa. The proposed development will have a generation capacity of up to 240MW which will feed into the National Grid.

The proposed study area for the WEF located approximately 18km south of the town of Pofadder within the Khâi-Ma Local Municipality, in the Northern Cape Province of South Africa. The site can be reached via the R358, which branches off the N14.

The De Rust South WEF footprint is approximately 6 919ha hectares (ha) and will be located on Portion 9 of the Remaining Extent of the Farm Houmoed 206.

The De Rust South WEF will consist of up to 32 wind turbines, with a generation capacity of between up to 7.5 MW per turbine, depending on the available technology at the time. Each turbine will have a hub height of up to 150m and a rotor diameter of up to 175m. The final turbine model to be utilised will only be determined closer to the time of construction, depending on the technology available at the time. Additional ancillary infrastructure to the WEF would include underground and above-ground cabling between project components, onsite substation/s, Battery Energy Storage Systems (BESS), foundations to support turbine towers, internal/ access roads linking the wind turbines and other infrastructure on the site, and permanent workshop area and office for control, maintenance and storage. As far as possible, existing roads will be utilised and upgraded (where needed) with the relevant stormwater infrastructure and gates constructed as required. The perimeter of the proposed WEF may be enclosed with suitable fencing. A formal laydown area for the construction period, containing a temporary maintenance and storage building along with a guard cabin will also be established.

The findings of the specialist studies undertaken within this EIA provide an assessment of both the benefits and potential negative impacts anticipated as a result of the proposed wind farm project. The findings conclude that there are no environmental fatal flaws that should prevent the proposed project from proceeding. Areas of special concern have however been identified which will require site specific mitigation measures.

It was determined during the EIA that the proposed project will result in limited potential negative impacts and certain positive impacts. A preferred site layout has been identified which is less environmentally sensitive and will result in the least environmental impact.

A detailed public participation process was followed during the EIA process which conforms to the public consultation requirements as stipulated in the EIA Regulations. In addition, all issues raised by I&APs will be captured in the FEIAR and where possible, mitigation measures provided in the EMPr to address these concerns.

The two (2) proposed layout alternatives were assessed based on the viability and impact to the environment. Alternative 1 and Alternative 2 were under consideration, however taking into consideration the recommendations, buffers and no-go areas by the specialist Alternative 1 was deemed the Preferred Layout. Kindly refer to Figure 8-1 for the sensitivity analysis in regard to the various alternatives. This report is based on a project description and site plan, provided to by the applicant, which has not been approved by DFFE at this stage of the project. The project description and site plan may undergo refinements before being regarded as final. A project description based on the final design will be concluded once all stakeholders have provided feedback on the layout provided in this report.

It is the opinion of the EAP that the information and data provided in this EIAR is sufficient to enable the DFFE to consider all identified potentially significant impacts and to make an informed decision on the application. Further, it is the opinion of the EAP that based on the findings of the EIA that the proposed project should be granted an EA and allowed to proceed provided that the conditions as stipulated in this report are adhered to.

When deciding whether the activity should or should not be authorised in terms of NEMA, the EAP has evaluated and considered all identified impacts (positive and negative) as listed in Table 7-8. Where impacts cannot be avoided, the significance of these impacts was measured. The EAP has included specialist recommendations and prescribed mitigation measures into the EMPr.

10.1. PROPOSED CONDITIONS OF THE ENVIRONMENTAL AUTORISATION

Considering all the information presented in this EIR, a number of conditions for environmental authorisation can be prescribed. These conditions include:

- The applicant must ensure that the construction and post-construction mitigation measures and controls specified in the EMPr are adhered to. An independent ECO must be appointed to assess compliance with these measures and to enforce the EMPr.
- Turbines 29 and 30 are to be micro-sited out of the buffers.
- The Environmental Authorisation is recommended to be valid for a period of 10 years.

- Environmental audits during the construction phase should be conducted on a monthly basis by an independent ECO in addition to a post-construction audit (PCA), Avifauna and Bat Monitoring.
- The post-construction avifauna monitoring reports must be submitted to BirdLife South Africa and DFFE as per the guidelines and as per recommendations by the Avifauna Specialists
- The post-construction bat monitoring reports must be submitted to SABAA and DFFE as per the guidelines and as per recommendations by the Bat Specialists.
- Mitigation measures provided by all specialists are to be adhered to.
- Inclusions, additions and adaptations of the EMPr, as well as all final plan drawings and maps must be submitted to DFFE for final approval.
- The final layout must exclude all no-go areas.

This report is based on a project description and site plan, provided to by the applicant, which has not been approved by DFFE at this stage of the project. The project description and site plan may undergo refinements before being regarded as final. Layout Alternative 1 remains the preferred alternative, as micro-siting was necessary to move some turbines out of sensitive buffer areas. No turbines are located inside no-go areas. Only the temporary accommodation and laydown area occurs within the Martial Eagle buffer, but this is not relevant to this type of infrastructure and therefore is not a risk to the project.

The following mitigation measures must be implemented as part of the planning and design, and pre-construction phases:

- All turbines and associated infrastructure must be located outside no-go areas. The Martial Eagle nest buffer is only applicable for turbine placement, and temporary infrastructure may be constructed within this area.
- Project planning must include a plan for traffic control that will be implemented, especially during the construction phase of the development. Consultation with the local Road Traffic Unit in this regard must be done early in the planning phase. The necessary road traffic permits must be obtained for transporting parts, containers, materials and construction equipment to the site.
- Careful planning of the routes taken by heavy vehicles must highlight areas of road that may need to be upgraded in order to accommodate these vehicles. Once identified, these areas must be upgraded if necessary.
- The construction of surface stormwater drainage systems during the construction phase must be done in a manner that would protect the quality and quantity of the downstream system.
- A Stormwater Management Plan must be designed and implemented for the road network to prevent roads from serving as concentrated conduits for water run-off, significantly increasing erosion potential and sediment transport capacity. Water diversions along the road should be placed at regular intervals in order to divert water back into the natural veld on the downstream side of the road.
- It is recommended that all final positions of watercourse crossings be appropriately “fine-tuned” through field verification in order to minimise potential impacts and reduce road construction cost.

- An effective 40m and 100m watercourse Buffer Zone which include all riparian habitat must be established prior to any construction activities taking place. No person or vehicle will be allowed within the Buffer Zone, except for officially marked crossings. Management should be vigilant in preventing personnel taking short-cuts across the Buffer Zones between construction sites.
- A Waste Management Plan must be developed for handling onsite waste. This plan must designate an appropriate area where waste can be stored before disposal. All general waste must be disposed of at a registered landfill site.
- A plant search and rescue programme must be followed by a suitably qualified SACNASP registered botanist to identify all nationally and provincially protected species. The species already identified in the Terrestrial Biodiversity Assessment (Appendix D1) require a flora permit from the provincial competent authority for relocation prior to the commencement of construction activities.
- All sensitive areas must be clearly demarcated prior to construction activities.
- The illegal collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden by anyone except by individuals with the appropriate permits
- Where sensitive features occur close to laydown areas or permanent structures, these sensitive features need to be fenced off (or a similar method used) to protect it from construction activities. This includes *A. dichotomum*, watercourses, and avifauna nests.

The following mitigation measures must be implemented during the construction phase:

- Sensitive Terrestrial Biodiversity features must be avoided. In order to minimise the loss of vegetation and faunal habitat, several mitigation measures are proposed.
- A Rehabilitation Management Plan must be developed and implemented during the construction phase as construction is complete at each site.
- Rehabilitate disturbed areas that are no longer required by the operational phase of the development. Inadequate rehabilitation could result in limited revegetation and/or an invasion of alien vegetation which will result in long term ecological degradation and damage.
- The clearance of vegetation, at any given time, must be kept to a minimum to reduce the possibility of soil erosion.
- A site-specific Alien Invasive Species (AIS) Management Plan must be implemented during the construction phase and continued monitoring and eradication needs to take place throughout the life of the project.
- Newly cleared and exposed areas must be managed for dust and landscaped with indigenous vegetation to avoid soil erosion. Where necessary, temporary stabilisation measures must be used until vegetation establishes.

- Apply necessary buffers for roost sites and other sensitive bird habitat features, avoiding the construction of turbines and access roads in these areas. Roads must utilise or upgrade existing farm roads as far as possible.
- Avoid placement of turbines near sensitive bird breeding and roosting habitats.
- Increase turbine cut in speed as this has been shown to reduce collisions. The risk is not considered to be high, and the annual collision risk is estimated at less than 5 birds per year.
- High value target species such as Martial Eagle should be tracked using telemetry systems in order to more accurately monitor movement patterns, especially in conjunction with turbines. These programs should be implemented during and post construction.
- A 5km buffer must be implemented for the Martial Eagle nest in the absence of mitigation measures. Avoidance measures in adherence to the 5 km recommended buffers is the most preferred option of mitigation.
- Based on the current preferred layout, 5 turbines lie between 4.6 and 5 km away from one of the two martial eagle nests. Without moving the turbine positions, this immediately triggers the requirement for the application of radar-based shutdown on demand technology. AI-based technology such as cameras may be implemented on higher risk turbines (determined through the monitoring programs and telemetry-based tracking of local eagles) as the preferred hybridised solution.
- Apply 500m buffer for bat roost sites and sensitive bat features, avoiding the construction of turbines, other infrastructure, clearing or laydown areas and access roads in these areas.
- Increase turbine cut in speed as this has been shown to reduce bat collisions. This is especially relevant in the eastern section of the site which has higher bat activity.
- Measures must be put in place to control the flow of surface water so that it does not impact on the vegetation, i.e., energy dissipaters and canal flow designs must be used to prevent scouring and erosion.

The following conditions are recommended for post-construction/operation phase:

- The post-construction and operational requires of the EMPr must be adhered to and an Independent ECO appointed to ensure compliance.
- All construction materials and waste must be removed from the site at the end of construction.
- Waybills must be produced showing the removal of waste / spoil / rubble to a registered waste site.
- A separate Post Construction audit must be carried out for the activities on completion to ensure compliance with the authorisation, if awarded, and this must be submitted to DFFE for review.
- A Complaints Register should be maintained onsite. All complaints should be recorded and addressed accordingly.
- The development must be in compliance with the following legislation: National Health Act, 2003 (Act 61 of 2003), the National Environmental Management Act, 1998 (Act 107 of 1998), the National Water Act, 1998 (Act 36 of 1998), the Occupational Health and Safety Act, 1993 (Act 85 of 1993), SABS 0400-1990, Hazardous Chemical Substances

Regulations of 1995, The Environment Conservation Act of 1989, The National Forests Act of 1998, The National Heritage Resources Act of 1999 and the Environmental Regulations for Workplaces of 1987.

- Rehabilitation of areas disturbed by construction activities or earthworks must commence immediately after the completion of construction activities, utilising indigenous species.
- Hazardous materials that require disposal (paints, solvents, old fuel / oil etc.) must be disposed of to a registered hazardous landfill site. These materials may be removed by an appropriate hazardous waste contractor. Proof of appropriate disposal must be available to the ECO for scrutiny and kept on record.
- Measures must be put in place to control the flow of surface water so that it does not impact on the vegetation, i.e., energy dissipaters and canal flow designs must be used to prevent scouring and erosion.
- Formal post-construction avifauna monitoring must be resumed once the turbines have been activated, as per the most recent edition of the best practice guidelines (Jenkins et al. 2015). The exact scope and nature of the post-construction monitoring will be informed on an ongoing basis by the result of the monitoring through a process of an establishment of available new technology and adaptive management. The purpose of this would be to establish if and to what extent displacement of priority species has occurred through the altering of flight patterns post-construction, and to search for and identify carcasses at turbines (mortality). The Avifauna Specialist has recommended post-construction monitoring for the site, which has been included in the EMPr, these recommendations will have to revaluated once the turbines have been activated.
- Formal post-construction bat monitoring must be resumed once the turbines have been activated, as per the most recent edition of the best practice guidelines (MacEwan et al., 2020). The exact scope and nature of the post-construction monitoring will be informed on an ongoing basis by the result of the monitoring through a process of an establishment of available new technology and adaptive management. It is recommended that mortality search effort is increased throughout the post-construction during the months of April and November in an attempt to obtain a more reliable estimate of bat mortalities during these periods of higher activity. In addition, apply adaptive mitigation measures according to post-construction monitoring results (counted strikes) informed by environmental correlates of bat activity, such as slowing or curtailment of strategic turbines during certain times or conditions.

Decommissioning Phase:

- All recyclable materials must be repurposed in an environmentally friendly way

APPENDICES