GENESIS ENERTRAG KOUP 1 WIND FARM (PTY) LTD

Proposed Development of the Koup 1 Wind Energy Facility (WEF) and Associated Infrastructure near Beaufort West in the Western Cape Province

Draft Environmental Impact Assessment Report

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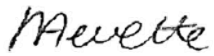
Signature:	
Client:	Genesis Enertrag Koup 1 Wind Farm (PTY) LTD

Confidentiality Statement

KEY PROJECT INFORMATION

Component	Description / Dimensions
Location of site (centre point)	32°51'41.01"S 22°27'24.65"E
Application site area	4279,398492 ha
Turbine development area	Hard standing Area = 60m*30m*28 turbines = 5.4 Ha
SG codes	C06100000000023100000 C00900000000037400011 C00900000000037400015 C00900000000038000005 C00900000000038000010 C00900000000038000011
Export capacity	Up to 140MW
Proposed technology	Wind turbines and associated infrastructure
Hub height from ground	Up to 200m
Rotor diameter	Up to 200m
Substation and O&M building area	Approximately 2.25 hectare (ha)
Construction laydown area	Approximately 22 500m²
Permanent laydown area	To be determined based on final layout
Hard stand areas	Approximately 4 500m^2
Battery Energy Storage System (BESS)	A Battery Energy Storage System (BESS) will be located next to the onsite 33/132kV substation. Up to 40MW of batteries using solid state / liquid flow batteries with hazardous material of more than 80m^3 will be used but most likely will comprise an array of containers, outdoor cabinets and/or storage tanks
Width of internal access roads	Between approximately 8m and 10m
Length of internal access roads	±25km of existing road 31.27km of new roads to be constructed
Site Access	Access to the Koup 1 WEF site will be from the existing access, located ±1 430m west from the surfaced N12 National Road (Road No: TR03305) and falls under the jurisdiction of the Western Cape Provincial Administration. The existing access is located at Km 51.80 and provides access to the farms situated on both east and west of the N12 Freeway. The access to this development is towards the west from the N12 Freeway and traverses over the Remainder of Portion 4 of the farm 374 as a gravel access road up to the existing farm access.
2.25Proximity to grid connection	Approximately 1km from application site
Height of fencing	Approximately 1m – 1.5m high
Type of fencing	Galvanized steel

CO-ORDINATES OF PREFERRED ALTERNATIVE

The coordinates for the preferred substation and BESS alternative are as follows:

KOUP 1 SUBSTATION AND BESS		
SITE ALTERNATIVE	**SOUTH**	**EAST**
OPTION 1	S32° 52' 42.085"	E22° 32' 1.356"

The coordinates for the preferred construction laydown / operation and maintenance building alternative are as follows:

KOUP 1 CONSTRUCTION LAYDOWN / OPERATION AND MAINTENANCE BUILDING		
SITE ALTERNATIVE	**SOUTH**	**EAST**
OPTION 1	S32°52'37.88"	e22°32'3.24"

GENESIS ENERTRAG KOUP 1 WIND FARM (PTY) LTD

KOUP 1 WIND ENERGY FACILITY (WEF)

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

EXECUTIVE SUMMARY

INTRODUCTION AND PROJECT DESCRIPTION

Genesis Enertrag Koup 1 Wind Farm (Pty) Ltd (hereafter referred to as 'Genesis Koup 1 Wind Farm') is proposing to construct the Koup 1 Wind Energy Facility (WEF) and associated infrastructure near the town of Beaufort West in the Beaufort West and Prince Albert Local Municipalities, which falls within the Central Karoo District Municipality (**Figure 1**) (**DFFE Reference Number**: **14/12/16/3/3/2/2120**). The overall objective of the proposed development is to generate electricity by means of renewable energy technologies capturing wind energy to feed into the national grid. The proposed development will have a maximum total generation capacity of up to a 140 megawatt (MW).

SiVEST Environmental Division has subsequently been appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the EIA process for the proposed construction of the Koup 1 WEF and associated infrastructure.

The proposed development requires an EA from the National Department Forestry, Fisheries and the Environment (DFFE). The EIA for the proposed development will be conducted in terms of the EIA Regulations, 2014 (as amended) promulgated in terms of Chapter 5 of the NEMA. In terms of these regulations, a full EIA process is required for the proposed development. All relevant legislation and guidelines will be consulted during the EIA process and will be complied with at all times.

The above-mentioned proposed development forms one (1) of two (2) WEFs that are being proposed on adjacent properties by Genesis. The other WEF being proposed includes the following:

- 140MW Koup 2 WEF – **DFFE Reference Number:** 14/12/16/3/3/2/2121 (part of a separate EIA process / application).

In addition, a 132kV overhead power line and on-site switching substation and/or combined collector substation (namely the associated grid connection infrastructure) is also being proposed to feed the electricity generated by the proposed Koup 1 WEF into the national grid. Two grid connection infrastructure developments linked to the WEFs are proposed. These projects, which from a part of separate applications, are as follows:

- Koup 1 WEF Substation and Power Line – **DFFE Reference Number:** To be Allocated (part of separate BA process / application).
- Koup 2 WEF Substation and Power Line – **DFFE Reference Number:** To be Allocated (part of separate BA process / application).

The associated grid connection infrastructure will however require a separate Environmental Authorisations (EA) and is subject to a separate Basic Assessment (BA) processes to allow for handover to Eskom. The on-site switching and/or collector substation will include an Eskom portion and an Independent Power Producer (IPP) portion, hence the substation has been included in the WEF EIA and in the associated electrical infrastructure BA to allow for handover to Eskom. Following construction, the substation will be owned and managed by Eskom. The current applicant will remain in control of the low voltage components (i.e. 33kV components) of the substation, while the high voltage components (i.e. 132kV components) of this substation will likely be ceded to Eskom shortly after the completion of construction.

Although the WEF and associated electrical infrastructure will be assessed separately, a single public participation process is being undertaken to consider all of the proposed developments [i.e. two (2) WEF EIAs and two (2) grid connection infrastructure BAs]. The potential environmental impacts associated with all of the developments will be assessed as part of the cumulative impact assessment.

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

The following activities are applied for:

Activity No(s):	Relevant Basic Assessment Activities as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended
11 (i)	**GN R. 983 (as amended) Item 11:** The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.
12 (ii) (a) (c)	**GN R. 983 (as amended) Item 12:** The development of: ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.
14	**GN R. 983 (as amended) Item 14:** The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80m^3 or more but not exceeding 500m^3.
19	**GN R. 983 (as amended) Item 19**: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;
24 (ii)	**GN R. 983 (as amended) Item 24:** The development of a road - ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres.
28 (ii)	**GN R. 983 (as amended) Item 28:** Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;
31 (i)	**GN R. 983 (as amended) Item 31:** The decommissioning of existing facilities, structures or infrastructure for -

	(i) any development and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014;
48 (i) (a) (c)	**GN R. 983 (as amended) Item 48:** The expansion of- (i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; where such expansion occurs— (a) within a watercourse; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;
56 (ii)	**GN R. 983 Item 56:** The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre - (ii) where no reserve exists, where the existing road is wider than 8 metres –
Activity No(s):	**Relevant Scoping and EIA Activities as set out in Listing Notice 2 of the EIA Regulations, 2014 as amended**
1	**GN R. 984 (as amended) Item 1:** The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more,
15	**GN R. 984 (as amended) Item 15:** The clearance of an area of 20 hectares or more of indigenous vegetation.
Activity No(s):	**Relevant Basic Assessment Activities as set out in Listing Notice 3 of the EIA Regulations, 2014 as amended**
4 i. (ii) (aa)	**GN R. 985 (as amended) Item 4:** The development of a road wider than 4 metres with a reserve less than 13,5 metres. **i. Western Cape** ii. Areas outside urban areas; (aa) Areas containing indigenous vegetation;
12	**GN R. 985 (as amended) Item 12:** The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. **i. Western Cape** ii. Within critical biodiversity areas identified in bioregional plans;
14	**GN R. 985 (as amended) Item 14:** The development of— (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. **i. Western Cape** i. Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;
18 i. ii. (aa)	**GN R. 985 (as amended) Item 18:** The widening of a road by more than 4 meters, or the lengthening of a road by more than 1 kilometer-

	i. Western Cape ii. All areas outside urban areas: (aa) Areas containing indigenous vegetation
23	**GN R. 985 (as amended) Item 23:** The expansion of— (ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more; where such expansion occurs— (a) within a watercourse; (b) in front of a development setback adopted in the prescribed manner; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. **i. Western Cape** i. Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;

DETAILS OF ALTERNATIVES CONSIDERED

No activity alternatives are being considered. Renewable Energy development in South Africa is highly desirable from a social, environmental and development point of view. Wind energy installations are more suitable for the site because of the high wind resource. The choice of technology selected for the Koup 1 WEF was based on environmental constraints and technical and economic considerations. The size of the wind turbines will depend on the development area and the total generation capacity that can be produced as a result. Therefore, no technology alternatives will be considered. Based on the outcomes of the Scoping Phase, the option of not implementing the activity, or the “no-go” alternative, has not been considered in the EIA phase.

All constraints identified during the scoping phase have been taken into account to inform the final layout for the Koup 1 WEF (**Figure 34**) which is the preferred alternative assessed in this report. This includes the locations of the turbines. Based on the results of the comparative assessment of alternatives for the substation and construction laydown / operation and maintenance building, it is requested that Option 1 is authorised as it is preferred for the substation and construction lay down area / operation and maintenance building. Whilst the cultural heritage specialist has identified Option 1 as favourable, Option 1 for the substation and construction laydown / operation and maintenance building is located within a 300m farm road buffer recommended by the cultural heritage specialist. This is not fatally flawed, however, the cultural heritage specialist has recommended that this be removed from the buffer and placed on the same side of the road. This is currently not the case.

- All turbines (except for turbine 11) are place outside of the no-go areas identified by specialists.
- Turbines have been in most cases moved to areas classified as low sensitivity;
- Where turbines have remained in areas classified as medium / high-medium sensitivity, specialists have provided recommendations and mitigation in order to minimise the impact to the environment;

- In terms of the cultural landscape assessment, one turbine is within the Platdooring Historic Farmstead buffer of 800m (the turbine is approximately 750m from this farmstead). The cultural landscape specialist has recommended that a pre-construction micro-survey for turbines and other infrastructure be undertaken, during which time the feasibility of moving this turbine outside the 800m will be investigated.
- The BESS, substation, construction laydown / operation and maintenance buildings have been removed from no-go areas;
- The associated roads, cables and other infrastructure do cross drainage lines, however the existing crossings will be used for most parts and the specialist recommendations and mitigation will be applied.

PUBLIC PARTICIPATION PROCESS TO BE UNDERTAKEN FOR THE EIA PHASE

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

- The I&AP database will be updated as and when necessary during the execution of the EIA.
- A 30-day period will be provided to IAPs to review the Draft EIA Report. Copies of the Draft EIA Report will be provided to the regulatory and commenting authorities as well. The Draft EIA Report will also be available for download on a link to be provided.
- All parties on the IA&P database will be notified via email, sms or fax of the opportunity to review the Draft EIA Report, the review period and the process for submitting comments on the report.
- All comments received from I&APs and the responses thereto will be included in the final EIA Report, which will be submitted to DFFE.
- A Comments and Responses Report will be updated and included in the EIA Report, which will record the date that issues were raised, a summary of each issue, and the response of the team to address the issue. The Final EIA report with all comments included will be submitted to DFFE for review and approval.
- All I&APs will be notified via email, sms or fax after having received written notice from DFFE on the final decision on the application. These notifications will include the process required to lodge an appeal, as well as the prescribed timeframes in which documentation should be submitted.

POSITIVE AND NEGATIVE IMPACTS OF THE PROPOSED KOUP 1 WEF

Impact	Pre-mitigation	Post-mitigation
Impacts on Biophysical Systems / Components during the planning phase		
Avifaunal – none identified.		
Ecological – none identified.		
Bat – none identified.		
Geotechnical – none identified.		
Surface Water – none identified.		
Impacts to Socio-Economic Component during the planning phase		
Heritage		
The graves and burial grounds are mostly localised near farm roads within the proposed development area. The expansion of existing farm roads may impact these sites.	Negative Medium	Negative Low
One structure (KO-05) is located near farm roads within the proposed development area. The expansion of existing farm roads may impact the site.	Negative Medium	Negative Low

Impact	Pre-mitigation	Post-mitigation
Due to the size of the area assessed, there's a possibility of encountering heritage features in un-surveyed areas does exist.	Negative Medium	Negative Low
Disturbance, damage or destruction of fossils at or beneath the ground surface due to surface clearance and bedrock excavations	Negative Medium	Negative Low
Archaeological		
The graves and burial grounds are mostly localised near farm roads within the proposed development area. The expansion of existing farm roads may impact these sites.	Negative Medium	Negative Low
One structure (KO-05) is located near farm roads within the proposed development area. The expansion of existing farm roads may impact the site. Two sites (Kh001 and Kh001b) are located within the proposed grid corridor area.	Negative Medium	Negative Low
Due to the size of the area assessed, there's a possibility of encountering heritage features in un-surveyed areas does exist.	Negative Medium	Negative Low
Cultural Landscape		
Inappropriate infrastructure layout planning degrades ecological elements of the cultural landscape.	Negative Medium	Negative Low
Inappropriate infrastructure layout planning negates aesthetic and sense of place requirements of the cultural landscape.	Negative High	Negative Medium
Inappropriate infrastructure layout planning degrades historic elements of the cultural landscape.	Negative Medium	Negative Low
Non-landowner residents' lack of representation in planning and public participation process leads to loss of local knowledge, socio-economic empowerment and character of the cultural landscape.	Negative Very High	Positive Low
Noise		
Light delivery vehicles moving around onsite.	Negative Low	Negative Low
Paleontological – none identified.		
Social– none identified.		
Transportation – none identified.		
Visual – none identified.		
Impacts on Biophysical Systems / Components during the construction phase		
Avifaunal		
Displacement due to disturbance associated with the construction of the wind turbines and associated infrastructure.	Negative Medium	Negative Low
Displacement due to habitat transformation associated with the construction of the wind turbines and associated infrastructure.	Negative Low	Negative Low
Ecological		
Vegetation clearing for access roads, turbines and their service areas and other infrastructure will impact on vegetation and protected plant species.	Negative Medium	Negative Low
Increased levels of noise, pollution, disturbance and human presence during construction will be detrimental to fauna. Sensitive and shy fauna are likely to move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed.	Negative Medium	Negative Medium
Bat		
The destruction of active bat roosts and/or features that could serve as potential roosts, such as rock formations and the removal of trees on site. The destruction of derelict holes, such as aardvark holes and any fragmentation of woody habitat which include dense bushes. The removal of limited trees and bushes would have an impact on all bats that could potentially roost in trees and on the foraging of clutter and clutter-edge species.	Negative Medium	Negative Low
Creating new habitat amongst the turbines which might attract bats. This includes buildings with roofs that could serve as roosting space or open water sources from quarries or excavation where water could accumulate.	Negative Low	Negative Low
Construction noise, especially during night-time, as well as lightening disturbance.	Negative Low	Negative Low
Geotechnical		

Impact	Pre-mitigation	Post-mitigation
Displacement of natural earth material and overlying vegetation. • Increase stormwater velocity • Increase in soil and wind erosion due to clearing of vegetation. • Construction and earthmoving vehicles may displace soil during operations. • Creation of drainage paths along access tracks. • Potential oil spillages from heavy plant. • Sedimentation of nonperennial features and excessive dust. • Potential groundwater and drainage feature contamination.	Negative Low	Negative Low
Surface Water		
During construction activities within watercourses could result in the disturbance or destruction of any listed and or protected plant or animal species. However none of these aquatic obligate species were observed during this assessment	Negative Low	Negative Low
Construction could result in the loss of drainage systems that are fully functional and provide an ecosystem services within the site especially where new access roads are required or road upgrades will widen any current bridges or drifts. Loss can also include a functional loss, through change in vegetation type via alien encroachment for example	Negative Medium	Negative Low
During construction earthworks will expose and mobilise earth materials, and a number of materials as well as chemicals will be imported and used on site and may end up in the surface water, including soaps, oils, grease and fuels, human wastes, cementitious wastes, paints and solvents, etc. Any spills during transport or while works area conducted in proximity to a watercourse has the potential to affect the surrounding biota. Leaks or spills from storage facilities also pose a risk and due consideration to the safe design and management of the 30 000l fuel storage facility must be given. Although unlikely, consideration must also be provided for the proposed Battery Energy Storage System (BESS), with regard safe handling during the construction phase. This to avoid any spills or leaks from this system	Negative Medium	Negative Low
Impacts to Socio-Economic Component during the construction phase		
Heritage – none identified.		
Archaeological – none identified.		
Cultural Landscape		
Fragmentation and destruction of the landscape degrading the environment and thus continuous relationship between man and environment	Negative High	Negative Low
WEF infrastructure construction and decommissioning activity degrades the character of the cultural landscape and the sense of place	Negative High	Negative Medium
Integrity of farmsteads and farm roads degraded by insensitive construction or decommissioning activities.	Negative High	Negative Low
Integrity of local residents to continue their patterns of land use is degraded by the construction and decommissioning activities.	Negative Very High	Positive Low
Paleontological		
Disturbance, damage or destruction of fossils at or beneath the ground surface due to surface clearance and bedrock excavations	Negative Medium	Negative Low
Noise		
Construction activities relating to hardstand areas, digging of foundations for wind turbines, civil works as well as erection of wind turbines	Negative Low	Negative Low
Construction activities relating to civil works as well as erection of wind turbines	Negative Medium	Negative Low
Construction of access roads	Negative Medium	Negative Low
Noises relating to construction traffic	Negative Medium	Negative Low
Social		
Air quality	Negative Low	Negative Low

Impact	Pre-mitigation	Post-mitigation
Noise	Negative Low	Negative Low
Increase in crime	Negative Low	Negative Low
Increased risk of HIV infections	Negative High	Negative Medium
Influx of construction workers	Negative Low	Negative Low
Hazard exposure	Negative Low	Negative Low
Disruption of daily living patterns	Negative Low	Negative Low
Disruptions to social and community infrastructure	Negative Low	Negative Low
Job creation and skills development	Positive Medium	Positive Medium
Socio-economic stimulation.	Positive Medium	Positive Medium
Transportation		
Increase in Traffic	Negative Low	Negative Low
Increase of Incidents with pedestrians and livestock	Negative Medium	Negative Low
Increase in Dust from gravel roads	Negative Low	Negative Low
Increase in Road Maintenance	Negative Low	Negative Low
Additional Abnormal Loads	Negative Low	Negative Low
Increase in Dust from gravel roads	Negative Low	Negative Low
Increase in Traffic	Negative Low	Negative Low
Visual		
• Large construction vehicles, equipment and construction material stockpiles will alter the natural character of the study area and expose visual receptors to impacts associated with construction. • Construction activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. • Dust emissions and dust plumes from increased traffic on gravel roads serving the construction site may evoke negative sentiments from surrounding viewers. • Surface disturbance during construction would expose bare soil resulting in visual scarring of the landscape and increasing the level of visual contrast with the surrounding environment. • Vegetation clearance required for the construction of the proposed substation is expected to increase dust emissions and alter the natural character of the surrounding area, thus creating a visual impact. • Temporary stockpiling of soil during construction may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact.	Negative Low	Negative Low
Impacts to Biophysical Systems/components during the operational phase		
Avifaunal		
Mortality of priority species due to collisions with the wind turbines.	Negative Medium	Negative Medium
Ecological		
Fauna will be negatively affected by the operation of the wind farm due to the human disturbance, the presence of vehicles on the site and possibly by noise generated by the wind turbines as well.	Negative Medium	Negative Low
Following construction, the site will remain vulnerable to soil erosion for some time due to the disturbance created by site clearing and likely low natural revegetation of disturbed areas thereafter. It is important to note that while the site is arid, such areas can experience significant soil erosion as plant cover is low and occasional heavy showers generate large amounts of runoff.	Negative Medium	Negative Low
Increased alien plant invasion during operation	Negative Medium	Negative Low
Transformation and presence of the grid connection and associated infrastructure will contribute to cumulative habitat loss within CBAs, ESAs and impact on broad-scale ecological processes such as fragmentation.	Negative Medium	Negative Low

Impact	Pre-mitigation	Post-mitigation
Bat		
Fatality through direct collision or barotrauma of resident bats occupying the airspace amongst the turbines. The turning blades of the turbines during operation are the most important aspect of the project that would impact negatively on bats. High flying species have predominantly been confirmed at the proposed Koup 1 WEF site.	Negative High	Negative Medium
Bat fatality during migration. A limited number of calls like Miniopterus natalensis (Natal Long-fingered bat), a Near Threatened migration species, have been recorded. Not much research has been conducted on migration of bats in South Africa, and some of the other species occurring on site could also migrate.	Negative Medium	Negative Low
Loss of bats of conservation value. A limited number of calls like the red *data Miniopterus natalensis* have been recorded, as well as the endemic *Eptesicus hottentotus.*	Negative Medium	Negative Low
Bat mortality due to the attraction of bats to wind turbines. Bats have been shown to sometimes be attracted to wind turbines out of curiosity or reasons still under investigation.	Negative Low	Negative Low
Loss of habitat and foraging space during operation of the wind turbines.	Negative High	Negative Medium
Reduction in the size, genetic diversity, resilience and persistence of bat populations. Bats have low reproductive rates and populations are susceptible to reduction by fatalities other than natural death. Furthermore, smaller bat populations are more susceptible to genetic inbreeding.	Negative High	Negative Medium
Geotechnical		
Displacement of natural earth material. 1) Increase in soil erosion. 2) Potential oil spillages from maintenance vehicles. 3) Sedimentation of non-perennial features caused by soil erosion.	Negative Medium	Negative Low
Surface Water		
Increase in hard surface areas, and roads that require stormwater management will increase through the concentration of surface water flows that could result in localised changes to flows (volume) that would result in form and function changes within aquatic systems, which are currently ephemeral. This then increases the rate of erosions and sedimentation of downstream areas.	Negative Medium	Negative Low
Impacts to Socio-Economic component during the operational phase		
Archaeological – none identified.		
Heritage – none identified.		
Cultural Landscape		
Inappropriate operational activities degrade the significant ecological elements of the cultural landscape	Negative High	Negative Low
Inappropriate operational activities degrade the significant aesthetic elements of the cultural landscape altering the character and sense of place	Negative High	Negative Medium
Inappropriate operational activities degrade the significant historic elements of the cultural landscape altering the character and sense of place	Negative Very High	Negative Medium
Inappropriate operational activities degrade the significant socio-economic opportunities of the cultural landscape	Negative Very High	Positive Medium
Noise		
Noise Impacts during the day from operating wind turbines	Negative Low	Negative Low
Noise Impacts at night from operating wind turbines	Negative Low	Negative Low
Paleontological – none identified.		
Social		
Noise WEF only	Negative Low	Negative Low
Shadow flicker WEF only	Negative Low	Negative Low
Blade glint WEF only	Negative Low	Negative Low
Electromagnetic field and RF interference	Negative Low	Negative Low
Hazard exposure	Negative Low	Negative Low

Impact	Pre-mitigation	Post-mitigation
Transformation of the sense of place	Negative High	Negative High
Job creation and skills development	Positive Medium	Positive Medium
Socio-economic stimulation.	Positive Medium	Positive Medium
Transportation		
Increase in Traffic	Negative Low	Negative Low
Increase of Incidents with pedestrians and livestock	Negative Low	Negative Low
Increase in Dust from gravel roads	Negative Low	Negative Low
Increase in Road Maintenance	Negative Low	Negative Low
Additional Abnormal Loads	Negative Low	Negative Low
New / Larger Access points	Negative Low	Negative Low
Increase in Traffic	Negative Low	Negative Low
Visual		
• The development may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. • The proposed WEF and associated infrastructure will alter the visual character of the surrounding area and expose potentially sensitive visual receptor locations to visual impacts. • Dust emissions and dust plumes from maintenance vehicles accessing the site via gravel roads may evoke negative sentiments from surrounding viewers. • The night time visual environment will be altered as a result of operational and security lighting at the proposed WEF.	Negative Medium	Negative Medium
Impacts to Biophysical Systems/components during the decommissioning phase		
Avifaunal		
Displacement due to disturbance associated with the dismantling of the wind turbines and associated infrastructure.	Negative Low	Negative Low
Ecological		
Fauna will be negatively affected by the decommissioning of the wind farm due to the human disturbance, the presence and operation of vehicles and heavy machinery on the site and the noise generated.	Negative Medium	Negative Low
Following decommissioning, the site will be highly vulnerable to soil erosion due to the disturbance created by the removal of infrastructure from the site.	Negative Medium	Negative Low
Increased alien plant invasion following decommissioning	Negative Medium	Negative Low
Bat		
Bat disturbance due to decommissioning activities and associated noise, especially during night-time.	Negative Low	Negative Low
Geotechnical		
Decommissioning of the structure will disturb the geological environment. • Increase in soil and wind erosion due to clearance of structures. • Construction and earthmoving vehicles will displace the soil. • Creation of drainage paths. • Potential oil spillages from vehicles. • Excessive sediments in non-perennial features.	Negative Low	Negative Low
Surface Water – same as construction		
Impacts to Socio-Economic component during the decommissioning phase		
Heritage – none identified.		
Archaeological – none identified.		
Cultural Landscape – same as construction		
Noise		
Decommissioning activities relating to removal of infrastructure and wind turbines, rehabilitation of disturbed areas	Negative Low	Negative Low
Paleontological – none identified.		

Impact	Pre-mitigation	Post-mitigation
Social– none identified.		
Transportation		
Increase in Traffic	Negative Low	Negative Low
Increase of Incidents with pedestrians and livestock	Negative Medium	Negative Low
Increase in Dust from gravel roads	Negative Low	Negative Low
Increase in Road Maintenance	Negative Low	Negative Low
Additional Abnormal Loads	Negative Low	Negative Low
Increase in Dust from gravel roads	Negative Low	Negative Low
New / Larger Access points	Negative Low	Negative Low
Visual		
• Vehicles and equipment required for decommissioning will alter the natural character of the study area and expose visual receptors to visual impacts. • Decommissioning activities may be perceived as an unwelcome visual intrusion. • Dust emissions and dust plumes from increased traffic on the gravel roads serving the decommissioning site may evoke negative sentiments from surrounding viewers. • Surface disturbance during decommissioning would expose bare soil (scarring) which could visually contrast with the surrounding environment. Temporary stockpiling of soil during decommissioning may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact.	Negative Low	Negative Low
Cumulative – biophysical		
Avifaunal		
• Mortality due to collisions with the wind turbines • Displacement due to disturbance during construction and operation of the wind farm • Displacement due to habitat change and loss at the wind farm • Mortality due to electrocution on the electrical infrastructure	Negative Medium	Negative Low
Ecological		
Wind energy development in the wider area around the Koup 1 site will generate cumulative impacts on habitat loss and fragmentation for fauna and flora.	Negative Medium	Negative Low
Bat		
Cumulative bat mortality due to direct collision with the blades or barotrauma during foraging of resident bats at several WEF sites.	Negative High	Negative High
Cumulative bat mortality of migrating bats due to direct blade impact or barotrauma during foraging of migrating bats on several wind farms	Negative High	Negative Medium
Habitat loss over several wind farms	Negative High	Negative Medium
Cumulative reduction in the size, genetic diversity, resilience and persistence of bat populations	Negative High	Negative High
Geotechnical – none identified.		
Surface Water		
The cumulative assessment considers the various proposed renewable projects that occur within a 35km radius of this site, where the author has either been involved in the assessment of these projects (Enertrag SA) and or review of the past assessments as part of any required Water Use Licenses (Atlantic Energy Partners & Mainstream projects).	Negative Low	Negative Low
Cumulative – Socio-economic		
Heritage		

Impact	Pre-mitigation	Post-mitigation
The extent that the addition of this project will have on the overall impact of developments in the region on heritage resources.	Negative Medium	Negative Low
Disturbance, damage or destruction of fossils at or beneath the ground surface due to surface clearance and bedrock excavations	Negative Medium	Negative Low
Archaeological		
The extent that the addition of this project will have on the overall impact of developments in the region on heritage resources.	Negative Medium	Negative Low
Cultural Landscape		
Inappropriate cumulative development degrade the significant ecological elements of the cultural landscape	Negative Very High	Negative Medium
Inappropriate cumulative development degrades the significant aesthetic elements of the cultural landscape altering the character and sense of place	Negative Very High	Negative Medium
Inappropriate cumulative development degrades the significant historic elements of the cultural landscape altering the character and sense of place	Negative Very High	Negative Medium
Inappropriate cumulative development degrade the significant socio-economic opportunities of the cultural landscape	Negative Very High	Positive Medium
Noise		
Cumulative noises due to operating wind turbines from other wind energy facilities in the area	Negative Low	Negative Low
Paleontological – n/a		
Social		
Noise	Negative Low	Negative Low
Shadow flicker	Negative Low	Negative Low
Blade glint	Negative Low	Negative Low
Risk of HIV and AIDS	Negative High	Negative Medium
Sense of place	Negative High	Negative High
Service supplies and infrastructure	Negative Low	Negative Low
Job creation and skills development	Positive Very high	Positive Very high
Socio-economic stimulation	Positive Medium	Positive Medium
Transportation		
Increase in Traffic	Negative Low	Negative Low
Increase of Incidents with pedestrians and livestock	Negative High	Negative Medium
Increase in Dust from gravel roads	Negative Medium	Negative Low
Increase in Road Maintenance	Negative Low	Negative Low
Additional Abnormal Loads	Negative Medium	Negative Low
Increase in Dust from gravel roads	Negative Medium	Negative Low
New / Larger Access points	Negative Low	Negative Low
Visual		
• Additional renewable energy developments in the broader area will alter the natural character of the study area towards a more industrial landscape and expose a greater number of receptors to visual impacts. • Visual intrusion of multiple renewable energy developments may be exacerbated, particularly in more natural undisturbed settings. • Additional renewable energy facilities in the area would generate additional traffic on gravel roads thus resulting in increased impacts from dust emissions and dust plumes.	Negative Medium	Negative Medium

Impact	Pre-mitigation	Post-mitigation
• The night time visual environment could be altered as a result of operational and security lighting at multiple renewable energy facilities in the broader area.		

SPECIALIST STUDIES

The following specialist studies have been undertaken for the project:

Specialist Study	Findings	Recommendations
Agricultural	The site has low agricultural potential because of, predominantly, rainfall constraints, but also due to soil constraints. It is totally unsuitable for cultivation, and agricultural land use is limited to low density grazing. The land is predominantly of low agricultural sensitivity.	The recommended mitigation measures are implementation of an effective system of storm water run-off control; maintenance of vegetation cover; and stripping, stockpiling and re-spreading of topsoil.
Avifaunal	It is estimated that a total of 155 bird species could potentially occur in the broader area. Of these, 16 species are classified as priority species for wind development.	The avifaunal post-construction monitoring at the proposed WEF must be conducted in accordance with the latest version (2015) of the *Best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa.*
Bat	Bat droppings of insectivorous bats were found at most of the farm dwellings and one small roost with less than 20 bats was identified. Derelict buildings, koppies with rocky ridges, low trees with associated denser vegetation along the riverbeds and livestock water points, could potentially attract bats to the study area. The sporadic rainfall seasons that sometimes occur in arid areas like the Karoo reflect on periods of insect emergence and accompanying higher bat activity. One should bear in mind that we are in a dry spell at present and that this could change during periods of higher precipitation in future. These changes could result in changes in the bat activity which have not been accounted for in this report. Four turbines are still situated within sensitivity zones, two in High-medium and two in Medium sensitivity zones.	It is recommended that no turbines or associated infrastructure are allowed in the High sensitivity areas. High-medium sensitivity zones should preferably be avoided, but due to the general low bat activity in certain areas, could be developed with strict mitigation measures. Medium sensitivity zones could be developed, but with mitigation. It is therefore recommended that turbines will be shifted from High sensitivity areas and that curtailment is applied to the turbines situated in the High-medium sensitivity zone. Close observation during the bat monitoring to be conducted during the post-construction phase should inform the curtailment schedule and apply it to more turbines, as necessary. Should curtailed turbines show consistent low activity through static recordings, as well as mortality in the low threshold range, the bat specialist could adapt curtailment again. It is recommended that curtailment be applied during the specified time periods when the relevant temperatures and wind speeds prevail for the turbines situated in the High-medium

Specialist Study	Findings	Recommendations
		sensitivity zones and Medium sensitivity zones, if the latter deemed necessary during operation, see the table below. If the developer decides to reduce the number of turbines, the first option, after the wind regime has been considered, should be to reduce the turbines in the High-medium sensitivity zones. Operational monitoring and carcass searches will have to inform this decision.
Biodiversity	The Koup 1 site falls entirely within the Gamka Karoo vegetation type and consists of open gravel plains and low hills dissected by numerous drainage lines. Vegetation cover is generally very low and dominated by low shrubs and scattered low trees. In general, the vegetation of the Koup 1 site is considered low sensitivity and there are few species of concern present. In terms of fauna, the diversity of mammals, reptiles and amphibians is considered relatively low, even by Karoo standards. Although the site falls within the broad distribution of the Riverine Rabbit, the drainage lines of the site do not have extensive floodplains with dense riparian vegetation that represent the typical habitat of this species in the area. The Koup 1 site is therefore considered unsuitable for this species and the development is considered highly unlikely to have any impact on the Riverine Rabbit. The site also falls within the range of the Karoo Padloper and if present it would be associated with the hills of the site with sufficient loose rock and coarse rubble to provide shelter. The low vegetation cover and paucity of such habitat suggests that the site is not an important area for this species and no evidence of this species was observed on the site.	The specialist has recommended that all mitigation be adhered to.
Geotechnical	The area is underlain by rock units of the Abrahamskraal Formation (Pa) and Teekloof Formation (Pt) of the Adelaide Subgroup, forming part of the Beaufort Group of the Karoo Supergroup. Competent, founding conditions are anticipated at relatively shallow depths in slightly weathered bedrock conditions, although this will have to be	It is recommended that the turbines be constructed on relatively flat to gentle, open areas (0-8.7˚ slopes) in areas with maximum wind exposure. It recommended that a detailed geotechnical investigation be undertaken during the detailed design phase of the project. The detailed

Specialist Study	Findings	Recommendations
	confirmed during the detailed investigation stage. The bedrock geology is overlain by relatively thin transported soil deposits. The geological map 3222 Beaufort West indicates seven-fault features in the study area. Regional borehole data indicates relatively low aquifer yields in the range of 0.1-0.5l/s for the south eastern portion and 0.5-2l/s over the major proportion of the site.	geotechnical investigation must entail the following: • Profiling and sampling exploratory trial pits to determine founding conditions for the substation, the construction laydown area and the BESS. An investigation for determining the subgrade conditions for internal roads and a materials investigation (if required) is also recommended; • Profiling rotary core to determine foundation conditions for the turbines. • Geotechnical investigation for construction material – gravel and rock. • Thermal resistivity and electrical resistivity geophysical testing for electrical design and ground earthing requirements; • Groundwater sampling of existing boreholes to establish a baseline of the groundwater quality for construction purposes; • Dynamic Probe Super Heavy (DPSH) tests and rotary core drilling may be required depending on the soil profiles and imposed loads of the structures.
Heritage – Archaeological	The fieldwork conducted for the evaluation of the possible impact of the new Koup 1 WEF and associated grid connection infrastructure has revealed the presence of 18 tangible cultural heritage resources. One archaeological site (KO_18) was rated as having low heritage significance. Four graves, burial grounds, and possible graves (KO-06 – KO-09) were rated as having high heritage significance. Two structures (KO-03, KO-05) were rated as having medium heritage significance, 1 structure (KO-02) was rated as having low heritage significance and 2 structures (KO-01; KO-04) were rated as having no heritage significance. Three farmsteads or the remains of farmsteads were identified and constitutes the extent that of physical remains of current and historical adaptation to the challenging landscape. The farms of Platdorings (KO-04-06), Arbeid (KO_19) and Kareerivier (KO_01-03 and KO_07-08)	• The proposed substation should be located to the north of the farm entrance road; • The laydown area and substation should be located outside the 300m farm road buffer without impacting on the riverine corridor flood line and slopes over 3%; • New access roads must be relocated to avoid slopes over 10% and visually sensitive slopes impacting on the views from the historic farm roads. The following mitigation measures will be required: • 50m buffer zones around grave sites • 30m buffer zone around farmsteads • 30 buffer zone around historical structures • Monitor find spot areas if construction is going to take place through them. • A management plan for the heritage resources then needs to be compiled and approved for implementation during construction and operations.

Specialist Study	Findings	Recommendations
	are located close to areas where historically water could be sources and, in most cases, these are dry riverbeds with cultivatable floodplains. Associated with all three farmsteads several burial grounds and graves (KO-06 – KO-09) were identified. Although the various heritage elements in each of these farmsteads do not all constitute having a high or medium significance. The combination of the build environment, burial grounds and graves, as well as the utilisation off the landscape create a cultural landscape and all three cases a medium to high cultural significance. Eight find spots (KO_10 – KO_17) comprise several low-density Stone Age surface artefact scatters and were rated as having low heritage significance. These are primarily from the MSA, although both LSA and earlier ESA material was identified. All the artefact assemblages (including KO-18) occur in heavily deflated and eroded areas, so their scientific potential and heritage significance is somewhat lowered.	
Heritage – Palaeontological	Palaeontological Impact assessment (PIA) determined that the study area is underlain by continental (fluvial / lacustrine) sediments of the Abrahamskraal and Teekloof Formations (Lower Beaufort Group, Karoo Supergroup) which are of Middle to Late Permian age. These bedrocks contain sparse, unpredictable to locally concentrated vertebrate fossils as well as rare trace fossils (e.g. tetrapod burrows) and plant material of scientific and conservation value. A substantial number of new fossil vertebrate sites (cranial and post-cranial material of large-bodied dinocephalians, small dicynodonts, rare tetrapod burrow casts) have been recorded during within the WEF project area during the short site visit, while several more sites have previously been mapped shortly outside its margins. These palaeontological sites, together with their sedimentological context, provide	• A specialist palaeontological walk-down of the final WEF and grid connection project area in the pre-construction phase, • Implementation of a Chance Fossil Finds Protocol (See Appendix 4) by the ECO / ESO during the construction phase. The specialist palaeontologist responsible will need to submit a Work Plan for approval by Heritage Western Cape.

Specialist Study	Findings	Recommendations
	important data for on-going research into the pattern and causes of the Middle Permian Mass Extinction Event on land around 260 million years ago. Scientifically-valuable and legally-protected fossil heritage resources preserved at or beneath the ground surface within the project footprint are potentially threated by clearance and bedrock excavations during the construction phase of the WEF and grid connection (e.g. for access roads, wind turbine foundations). The majority of the recorded fossil sites lie outside the project footprint but most of the WEF and grid connection footprint has yet to be palaeontologically surveyed on foot. A significant number of unrecorded sites almost undoubtedly lies within of very close to the project footprint. No Very High Sensitivity or No-Go palaeontological sites or areas have been identified within the Koup 1 WEF or grid connection project areas. Since all known fossil sites can be readily mitigated through professional recording and collection of fossil material in the pre-construction phase, no recommendations for micro-siting of infrastructure such as wind turbine, pylon positions or access roads are therefore made at this stage.	
Heritage – Cultural Landscape	The Koup region is a significant cultural landscape that reflects the relationship between man and nature over a period of time. This relationship has generally been sustainable, where biodiversity and ecological systems have been maintained in the utilisation of the landscape expressed in specific land use patterns. The surrounding land use indicates a social appreciation of the natural environment with low impact stock farming with limited farmstead crop cultivation. The vastness and relative homogenous nature of the cultural landscape is, however, often undervalued. If careful contextual planning is not followed, it will rapidly result in a cluttered wasteland. This	• The findings, coupled with the proposed layout for development of wind turbines, which considers appropriate placement in terms of wind energy capacity, concludes that the development can be permitted within the site if the report's recommendations are followed. The mitigating recommendations in this report consider the ecological, aesthetic, historic and socio-economic value lines that underpin the layers of significance that combine to create the character of the place and the cultural landscape of the Koup. • These recommendations include road and farmstead complex buffers which incorporate cultivated areas and graves, steep slope and ridgeline no-go areas as

Specialist Study	Findings	Recommendations
	does not mean that development is discouraged, but rather that the implementation of wind and solar energy farms should be planned holistically. It is the duty of the planning department to consider this application in terms of other renewable energy developments that are planned/proposed for the Koup area, notably the proposed RE developments included in the cumulative impact section of this report.	well as consideration of the unique land form of the site, CBA and ESA no-go areas, as well as mechanisms to support the non-landowner residents that live on the site in being bale to continue their indigenous land use patterns, knowledge and social systems. These mitigations will reduce the impact on the surrounding landscape and heritage resources but due to the high visual impact of the turbines, largely a result of their height, the negative impact to the cultural landscape cannot be removed, only reduced from very high to moderate. • In terms of the cultural landscape assessment, one turbine is within the Platdooring Historic Farmstead buffer of 800m (the turbine is approximately 750m from this farmstead). The cultural landscape specialist has recommended that a pre-construction micro-survey for turbines and other infrastructure be undertaken, during which time the feasibility of moving this turbine outside the 800m will be investigated.
Noise	All the data indicated an area with a high potential to be quiet both day and night. The visual character of the study area is rural and it was accepted that the SANS 10103 noise district classification could be rural during low wind conditions. Considering sound level data measured in similar areas, ambient sound levels will increase as wind speeds increase, and noise limits were proposed considering all available data and guidelines.	• While the total projected noise levels are less than 45 dBA, active noise monitoring is recommended because the projected noise levels are higher than 42 dBA (which is 7 dB higher than the night-time rural rating level). It is recommended that the developer: • implement a noise monitoring program that will define the residual levels before the construction of the WEF, as well as to confirm noise levels once the WEF is operational. Residual and noise monitoring is recommended at NSDs 1, 2 and 3. • investigate any reasonable and valid noise complaint if registered by a NSD staying within 2,000 m from the location where construction or operational activities are taking place; • evaluate the potential noise impact should the layout be revised where any proposed wind turbines are located closer than 1,000 m from a confirmed NSD; or • if the developer decides to use a different wind turbine that has a sound power emission level higher than that of the WTG

Specialist Study	Findings	Recommendations
		used in this report (sound power emission level exceeding 108.3 dBA re 1 pW).
Social	While the project will create employment for local communities during the construction and operational phases, the more significant positive impact of the project will be the contribution it will make towards renewable energy infrastructure. Research recently published by Meridian Economics, in collaboration with the CSIR, indicates that "[i]n all realistic mitigation scenarios, the majority of new build capacity is wind and solar PV" (Roff, et al., 2020, p. 52), and highlights an urgent need for the country to accelerate the RE build pathway. In addition, the South African Climate Change Coordinating Commission, is considering a more ambitious emissions target and is suggesting changes to the country's energy plan (Paton, 2021).	None.
Surface Water	The study area does contain a variety of aquatic features associated, and were characterised as follows: • Non perennial rivers alluvial dominated channels with or without riparian vegetation. These ranged from narrow channels within small canyons with steep cliffs to broad flood plain areas in the lower valleys. Some of these did contain small seeps/fountains which sustained small pools of water inhabited by invertebrates and amphibians. However, broad riparian zones are only found within the lower valley areas, dominated by a small number of trees, while obligate instream vegetation is limited to a small number of sedges (nut grasses). • Minor drainage lines, with no obligate aquatic vegetation and were mostly 2 – 8m in width • Dams or weirs with no wetland or aquatic features, although not many of these were located within the study area.	Noteworthy areas, that should be avoided, include the Very High Sensitivity areas as shown in this report. Existing crossings may be used and/or upgraded that intersect these systems however, detailed monitoring plan must be developed in the pre-construction phase.

Specialist Study	Findings	Recommendations
Transportation	The construction phase of this development will typically generate the highest number of additional vehicles. Existing access from the N12 Freeway has sufficient sight distance in both directions and hence an upgrade to the existing access will be required from the Western Cape Department of Transport & Public Works.	• Existing access from the N12 Freeway has sufficient sight distance in both directions and hence an upgrade to the existing access will be required from the Western Cape Department of Transport & Public Works. • The layout of the internal infrastructure should be such that the impact to the environment is kept to a minimum. We therefore propose that both Koup 1 & 2 share a central access to both facilities and that all other proposed temporary and permanent buildings and construction infrastructure be located close to the access point. • An internal network of minimum 5m wide gravel roads will connect all the WTG and ancillary equipment to each other. The roads will have a horizontal and vertical alignment to accommodate vehicles and more specifically abnormal vehicles intended to use these roads for the delivery of the WTG equipment. A typical intersection and horizontal alignment would consist of radii and clearances similar to the requirements in Figure 8.1. We note that the larger WTG's are planned for these facilities and will need to be simulated once additional information becomes available. • All internal access roads should be designed to have a minimum impact to the environment and thus are in most cases parallel to the contours and keep drainage line crossings to a minimum. The use of roads perpendicular to the contours for long sections should be avoided, as the risk of possible erosion is increased. Existing gravel roads should also be used to reduce the overall impact on the environment.
Visual	The VIA has determined that the study area has a largely natural visual character with some pastoral elements. The area has however seen very limited transformation or disturbance and as such the proposed Koup1 WEF development is expected to alter the visual character of the area and contrast significantly with the typical land use and / or pattern and form of human elements present.	None.

ENVIRONMENTAL IMPACT STATEMENT

Genesis Enertrag Koup 1 Wind Farm (Pty) Ltd is proposing to construct the Koup 1 Wind Energy Facility (WEF) and associated infrastructure. The overall objective of the proposed development is to generate electricity by means of renewable energy technologies capturing wind energy to feed into the national grid. It is anticipated that the proposed Koup 1 WEF will comprise twenty-eight (28) wind turbines with a maximum total energy generation capacity of up to approximately 140MW. The electricity generated by the proposed WEF development will be fed into the national grid via a 132kV overhead power line. The 132kV overhead power line will however require a separate EA and is subject to a separate BA process, which is currently being undertaken in parallel to the EIA process.

The implementation of the Koup 1 WEF and associated infrastructure will assist expected growth in demand for installed power generation capacity. This in turn will assist with the increasing economic growth and social development within South Africa. Coupled with this, is the growing awareness of environmental impact, climate change and the need for sustainable development. At present, more than 90% of South Africa's energy is generated by coal-fired power stations. Apart from the fact that these are finite resources that will eventually run out, fossil fuels are also harmful to the environment when used to produce electricity. Wind is a free and infinite resource that occurs naturally in the environment. The Koup 1 WEF will assist by converting wind energy into electricity, thereby releasing no harmful by-products into the environment which will in turn reduce the dependency on fossil fuels.

The following specialist studies have been undertaken for the project:

- Agriculture and Soils Impact Assessment (desktop)
- Avifaunal Impact Assessment
- Bat Impact Assessment
- Biodiversity Impact Assessment
- Heritage Impact Assessment
    - Paleontological Impact Assessment
    - Archaeological Assessment
    - Cultural Landscape Assessment
- Geotechnical Assessment (desktop)
- Noise Impact Assessment
- Social Impact Assessment (desktop)
- Surface Water Impact Assessment
- Transportation Impact Assessment
- Visual Impact Assessment

The specialist assessments were conducted to address the potential impacts relating to the proposed development in order to ascertain the level of each identified impact, as well as mitigation measures which may be required. The main findings of the specialists are included in **Section 15**.

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

The avifaunal assessment (refer to **Appendix 6**) concluded that the proposed Koup 1 WEF will have a moderate impact on avifauna which, in most instances, could be reduced to a low impact through appropriate mitigation. The alternative substation and laydown locations are all situated in essentially the same habitat, i.e. Karoo scrub. The habitat is not particularly sensitive, as far as avifauna is concerned, therefore any of the alternative locations will be acceptable. No fatal flaws were discovered in the course of the onsite investigations. The development is therefore supported, provided the mitigation measures listed in this report are strictly implemented.

According to the bat assessment undertaken for the project (refer to **Appendix 6**), the construction phase is rated as medium before mitigation and low after mitigation. The highest rating before mitigation is the impact of clearing and excavation of bat habitat. The operational phase is rated as medium before and after mitigation. Three significant ratings are high before mitigation and are reduced to medium after mitigation. These include direct collision and barotrauma, the foraging space occupied by turbine blades and the impact on bat populations. More research is needed concerning fatal curiosity due to bats being attracted to turbines, so this component has a low significant rating before and after mitigation during operations. The impact of the decommissioning phase where turbines are removed after the lifespan of the WEF, rates low before and after mitigation. The cumulative impact rating before mitigation is high before mitigation and medium after mitigation. Cumulative bat mortality due to direct collision or barotrauma during foraging of resident bats is rated high before mitigation (51 in range 43 to 61) and decreases to borderline medium/high after mitigation (42 in range 24 to 42). The potential cumulative reduction in bat population size remains high before and after mitigation. The cumulative impacts on migratory bats and habitat loss are reduced from high before mitigation to medium after mitigation. The overall significance rating before mitigation is Medium and Low after mitigation. The assessment concluded that if the applicant adheres to the proposed mitigation measures, the potential impact on bats from the proposed Koup 1 Wind Farm is therefore predicted to be Negative Low. Considering the findings of the one-year pre-construction monitoring undertaken at the proposed Koup 1 WEF site, this specialist is of the opinion that no fatal flaws exist, and environmental authorisation may be granted.

The biodiversity assessment (refer to **Appendix 6**) revealed that there are no impacts associated with the Koup 1 Wind Energy Facility that cannot be mitigated to an acceptable level. With the application of relatively simple mitigation and avoidance measures, the impact of the Koup 1 Wind Farm on the local environment can be reduced to a low and acceptable magnitude. The contribution of the Koup 1 Wind Farm development to cumulative impact in the area would be low and is considered acceptable. Overall, there are no specific long-term impacts likely to be associated with the development of the Koup 1 wind farm that cannot be reduced to a low significance. As such, there are no fatal flaws associated with the development and no terrestrial ecological considerations that should prevent it from proceeding.

According to the geotechnical assessment undertaken for the project (refer **Appendix 6**), no fatal flaws, from a geotechnical perspective, were identified during the desktop study. However, the conclusions presented in the report will have to be more accurately confirmed during the detailed geotechnical investigation phase. The impact of the WEF was found to be negative low impact as the anticipated impact will have negligible negative effects and will require little to no mitigation. The site from a desktop level geotechnical study perspective is considered suitable for the proposed WEF.

According to the archaeological impact assessment (refer to **Appendix 6**), the overall impact of the Koup 1 WEF, on the heritage resources, is seen as acceptably low after the recommendations have

been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be authorised.

The cultural impact assessment (refer to **Appendix 6**) recommended that the substation and laydown area locations require some layout alteration to accommodate the farm road buffer. The access roads need to avoid slopes over 10% and visually sensitive slopes impacting on the historic farm roads. The collector substation for proposed Gridline Option 2 requires relocation out of the N12 scenic road buffer and the CBA. With these buffers in place and all other recommendations followed, the overall impact to the cultural landscape for the proposed Koup 1 WEF and associated grid connection and infrastructure can be reduced from very high to moderate. There are no fatal flaws and the development can proceed with CLA recommendations and mitigation in place.

The paleontological impact assessment (refer to **Appendix 6**) concluded that in terms of palaeontological heritage resources, the proposed Koup 1 WEF and associated grid connection developments are assigned a similar overall impact significance rating (Construction Phase) of negative medium without mitigation and negative medium following mitigation. No significant further impacts on fossil heritage resources are anticipated in the planning, operational and decommissioning phases. The No-Go Option might have a negative low impact significance. Anticipated cumulative impacts in the context of several planned or authorized renewable energy projects in the region are assessed as negative medium without mitigation and negative low after mitigation. The proposed WEF and grid connection developments are not fatally flawed and, on condition that the recommended mitigation measures are included within the EMPr and implemented in full, there are no objections on palaeontological heritage grounds to their authorization.

The noise assessment (refer to **Appendix 6**) concluded that considering the low significance of the potential noise impacts (with mitigation, inclusive of cumulative impacts) for the proposed WEF and associated infrastructure, it is recommended that the proposed Koup 1 WEF be authorized.

According to the Social Impact Assessment (refer to **Appendix 6**), with regard to all social impacts associated with the project, it is evident that, at the social level, the positive elements outweigh the negative and that the project carries with it a significant social benefit at a national level and is therefore supported. In addition, no compelling preference emerges in respect of the alternatives and it would be socially acceptable for the authorisation of either power line alternative.

The aquatic impact assessment (refer to **Appendix 6**) revealed that the nature of the wind farm is such that it carries a low intensity impact on aquatic resources. A wind farm typically targets the higher lying areas where wind resources are best, thus keeping the turbines away from freshwater resources for the most part, however, the associated roads, cables and other infrastructures must cross the site, and these come in more frequent contact with the drainage lines and associated features. The project also has a small footprint spread out over a large area, allowing for retention of much of the natural environment so that the systems should remain largely unaffected. The current layout has, to a large degree, avoided these sensitive features and buffer areas, greatly reducing the potential overall impact and risk to aquatic resources. The overall and cumulative impacts, as assessed, are linked to instances where complete avoidance was not possible, or the nature of the activities involve a potential risk to aquatic resources even at great distance. Overall, it is expected that the impact on the aquatic environment would be negative low. Based on the findings of the assessment, the specialist has found no reason to withhold to an authorisation of any of the proposed activities, assuming that key mitigations measures are implemented.

According to the transportation assessment (refer to **Appendix 6**), the Koup 1 Wind Energy Facility and associated infrastructure will have a nominal impact on the existing traffic network. The project is therefore deemed acceptable from a transport perspective, provided the recommendations and mitigations measures in this report are implemented, and hence authorisation should be granted for the EIA application.

The visual impact assessment (refer to **Appendix 6**) concluded that the potential visual impacts associated with the proposed Koup 1 WEF and associated grid infrastructure development are negative and of moderate significance. The impacts associated with the construction, operation and decommissioning phases can be mitigated to acceptable levels provided the recommended mitigation measures are implemented. Given the low level of human habitation and the absence of sensitive receptors however, the project is deemed acceptable from a visual perspective and authorisation should be granted.

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

GENESIS ENERTRAG KOUP 1 WIND FARM (PTY) LTD

KOUP 1 WIND ENERGY FACILITY (WEF)

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

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KOUP 1 WIND ENERGY FACILITY (WEF)

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

1. INTRODUCTION

Genesis Enertrag Koup 1 Wind Farm (Pty) Ltd (hereafter referred to as 'Genesis Koup 1 Wind Farm') is proposing to construct the Koup 1 Wind Energy Facility (WEF) and associated infrastructure near the town of Beaufort West in the Beaufort West and Prince Albert Local Municipalities, which falls within the Central Karoo District Municipality (**Figure 1**) (**DFFE Reference Number**: 14/12/16/3/3/2/2120). The overall objective of the proposed development is to generate electricity by means of renewable energy technologies capturing wind energy to feed into the national grid. The proposed development will have a maximum total generation capacity of up to 140 megawatt (MW).

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

The above-mentioned proposed development forms one (1) of two (2) WEFs that are being proposed on adjacent properties by Genesis. The other WEF being proposed includes the following:

- 140MW Koup 2 WEF – **DFFE Reference Number:** 14/12/16/3/3/2/2121 (part of a separate EIA process / application).

In addition, a 132kV overhead power line and on-site switching substation and/or combined collector substation (namely the associated grid connection infrastructure) is also being proposed to feed the electricity generated by the proposed Koup 1 WEF into the national grid. Two grid connection infrastructure developments linked to the WEFs are proposed. These projects, which from a part of separate applications, are as follows:

- Koup 1 WEF Substation and Power Line – **DFFE Reference Number:** To be Allocated (part of separate BA process / application).
- Koup 2 WEF Substation and Power Line – **DFFE Reference Number:** To be Allocated (part of separate BA process / application).

The associated grid connection infrastructure will require a separate Environmental Authorisations (EA) and is subject to a separate Basic Assessment (BA) processes to allow for handover to Eskom. The on-site switching and/or collector substation will include an Eskom portion and an Independent Power Producer (IPP) portion, hence the substation has been included in the WEF EIA and in the associated electrical infrastructure BA to allow for handover to Eskom. Following construction, the substation will be owned and managed by Eskom. The current applicant will remain in control of the low voltage components (i.e. 33kV components) of the substation, while the high voltage components (i.e. 132kV components) of this substation will likely be ceded to Eskom shortly after the completion of construction.

Although the WEF and associated electrical infrastructure will be assessed separately, a single public participation process is being undertaken to consider all of the proposed developments [i.e. two (2) WEF EIAs and two (2) grid connection infrastructure BAs]. The potential environmental impacts associated with all of the developments will be assessed as part of the cumulative impact assessment.

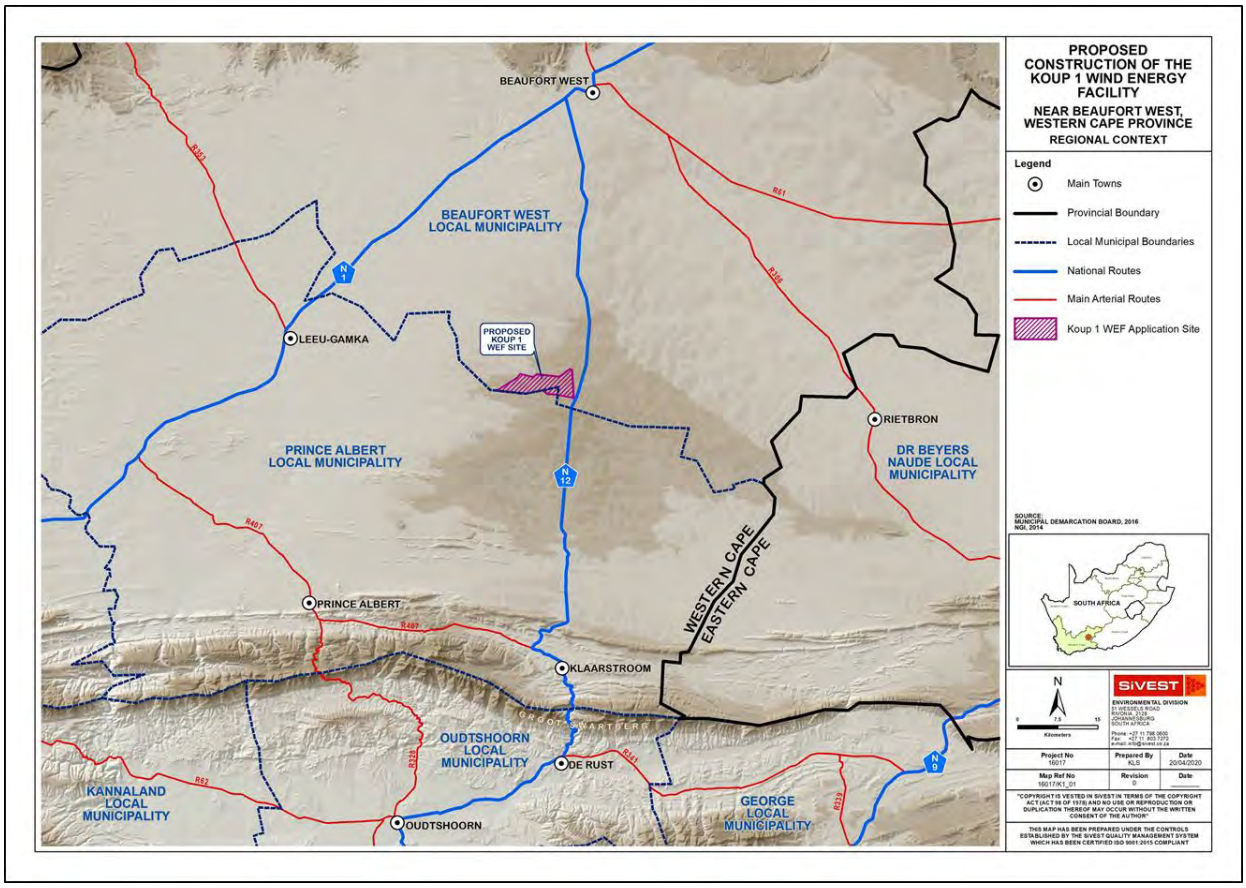


Figure 1: Koup 1 Regional Context

1.1 Content Requirements for an Environmental Impact Assessment Report

An Environmental Impact Assessment Report must contain the information that is necessary for the competent authority to consider and come to a decision on the application. The content requirements for an Environmental Impact Assessment Report (as provided in Appendix 3 of the EIA Regulations 2014, as amended), as well as details of which section of the report fulfils these requirements, are shown in Table 1 below.

Table 1: Content requirements for an Environmental Impact Assessment Report

Content Requirements	Applicable Section
(a) details of- (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae;	4.2
(b) the location of the activity, including- (i) the 21-digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	5
(c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is- (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	5
(d) a description of the scope of the proposed activity, including- (i) all listed and specified activities triggered; (ii) a description of the activities to be undertaken, including associated structures and infrastructure;	6.2
(e) a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;	10
(f) a motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report;	12
(g) a motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report;	13
(h) a full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including: (i) details of all the alternatives considered; (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	14

Content Requirements	Applicable Section
(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts— (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks; (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (viii) the possible mitigation measures that could be applied and level of residual risk; (ix) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and (x) a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;	
(i) a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including— (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	14.3
(j) an assessment of each identified potentially significant impact and risk, including— (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be mitigated;	14.3
(k) where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	16
(l) an environmental impact statement which contains— (i) a summary of the key findings of the environmental impact assessment:	17

Content Requirements	Applicable Section
(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	
(m) based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	18
(n) the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	19
(o) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	20
(p) a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	21
(q) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	22
(r) where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;	22
(s) an undertaking under oath or affirmation by the EAP in relation to- (i) the correctness of the information provided in the report; (ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	Appendix 1
(t) where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	n/a
(u) an indication of any deviation from the approved scoping report, including the plan of study, including— (i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and (ii) a motivation for the deviation;	24
(v) any specific information required by the competent authority; and	25
(w) any other matter required in terms of section 24(4)(a) and (b) of the Act.	All requirements have been met in this report.
(2) Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to an environmental impact assessment report, the requirements as indicated in such notice will apply.	Noted and applied with.

2. PROJECT TITLE

Proposed Development of the Koup 1 Wind Energy Facility (WEF) and Associated Infrastructure near Beaufort West in the Western Cape Province.

3. DETAILS OF APPLICANT

3.1 Name and contact details of the Applicant

Table 2: Name and contact details of the applicant

Business Name of Applicant	Genesis Enertrag Koup 1 Wind Farm (Pty) Ltd
Physical Address	39 de Villiers Street, Kommetjie
Postal Address	P.O. Box 363, Newlands, Cape Town
Postal Code	7725
Telephone	083 460 3898
Fax	086 689 0583
Email	davin@genesis-eco.com

4. DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTIONER AND SPECIALISTS

4.1 Name and contact details of the Environmental Consultant

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

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

Business Name of EAP	SiVEST SA (PTY) Ltd
Physical Address	4 Pencarrow Crescent, La Lucia Ridge Office Estate
Postal Address	PO Box 1899, Umhlanga Rocks
Postal Code	4320
Telephone	031 581 1500
Fax	031 566 2371
Email	michelleg@sivest.co.za

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

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

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

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

Michelle Nevette *(Cert.Sci.Nat.)*	MEnvMgt. (Environmental Management)	SACNASP Registration No. 120356 EAPASA Registration No. 2019/1560 IAIA	19
Michelle Guy *(Pr.Sci.Nat)*	MSc Environmental Science	SACNASP Registration No. 126338 EAPASA Registration No. 2019/868 IAIA	9
Luvanya Naidoo *(Pr.Sci.Nat)*	BSc Honours Environmental Monitoring and Modelling	SACNASP Registration No. 126107 EAPASA Registration No. 2019/1404 IAIA	12

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

4.3 Names and expertise of the specialists

The table below provides the names of the specialists involved in the project:

Table 5: Names of specialists involved in the project

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

Company	Name of representative of the specialist	Specialist	Educational Qualifications	Experience (years)
			APHP, ASAPA	
JG Afrika (Pty) Ltd	Khuthadzo Bulala	Desktop Geotechnical Assessment	BSc (Hons) (Geology)	5
Johann Lanz Consulting	Johann Lanz	Agriculture and Soils Impact Assessment (desktop)	M.Sc. (Environmental Geochemistry)	24
Enviro Acoustic Research	Morné de Jager	Noise Impact Assessment	B. Ing (Chemical) SAAI, ASA	14
Dr. Neville Bews & Associates	Dr Neville Bews	Social Impact Assessment (desktop)	D Litt et Phil	20
EnviroSci (Pty) Ltd	Dr Brian Colloty	Surface Water Impact Assessment	Ph D (Botany – Estuaries & Mangroves) Pr. Sci. Nat. 400268/07	25
3Foxes Biodiversity Solutions	Simon Todd	Biodiversity Impact Assessment	MSc (Conservation Biology) Pr.Sci.Nat 400425/11	20
Chris Van Rooyen Consulting	Chris van Rooyen	Avifaunal Impact Assessment	BA LLB	22
	Albert Froneman	Avifaunal Impact Assessment	MSc (Conservation)	22
Stephanie Dippenaar Consulting	Stephanie Dippenaar	Bat Impact Assessment	MEM (Masters in Environmental Management)	22

5. LOCATION OF THE ACTIVITY

The proposed development is located approximately 55 km south of the town of Beaufort West, within the Beaufort West and Prince Albert Local Municipalities, in the Central Karoo District Municipality of the Western Cape Province (**Figure 2**). The nearest waste disposal site is in the town of Beaufort West

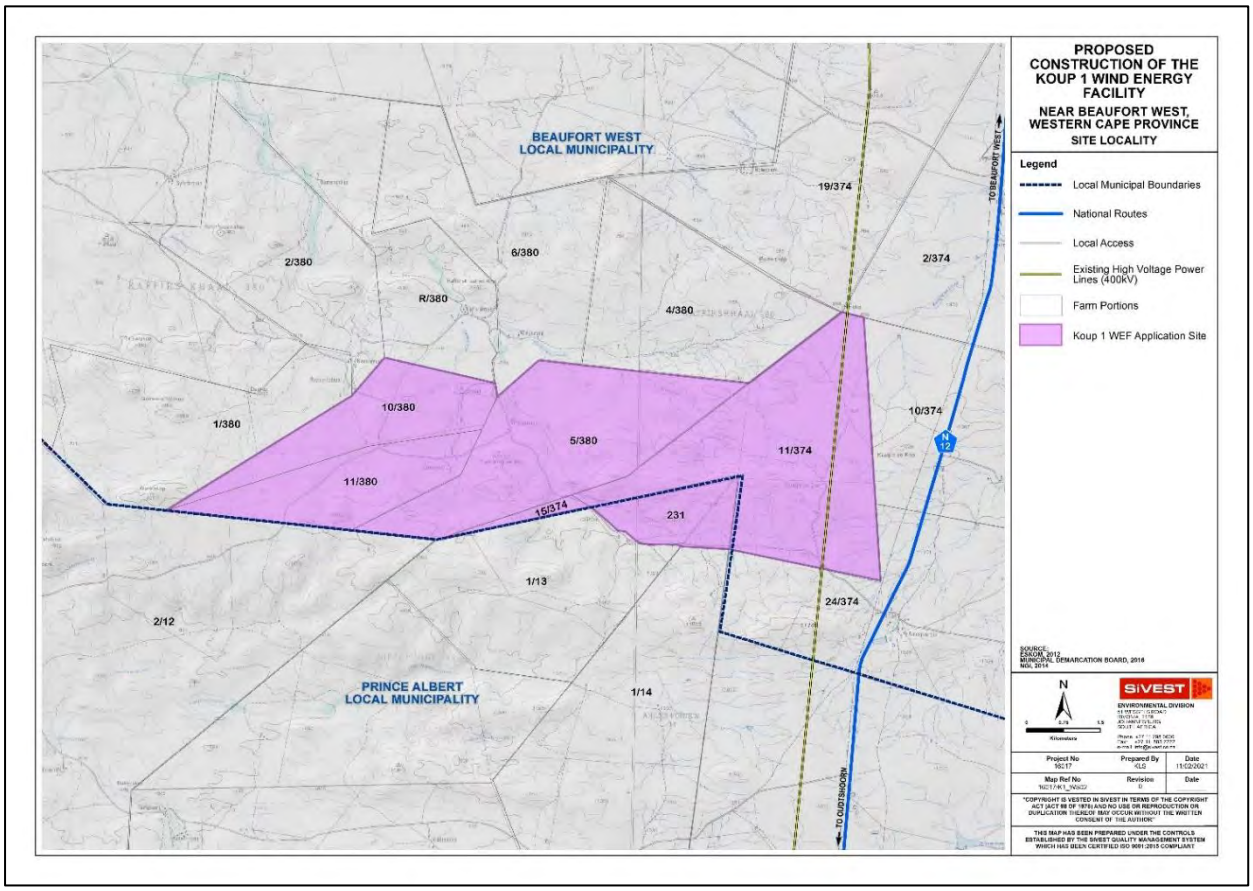


Figure 2: Site locality

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

Table 6: 21 Digit Surveyor General Code

SG CODE	DESCRIPTION
C06100000000023100000	FARM RIET POORT NO 231
C00900000000037400011	PORTION 11 OF THE FARM BRITS EIGENDOM NO 374
C00900000000037400015	PORTION 15 OF THE FARM BRITS EIGENDOM NO 374
C00900000000038000005	PORTION 5 OF THE FARM KAATJIES KRAAL NO 380
C00900000000038000010	PORTION 10 OF THE FARM KAATJIES KRAAL NO 380
C00900000000038000011	PORTION 11 OF THE FARM KAATJIES KRAAL NO 380

5.2 Coordinates of the site

The centre point coordinates for the sites are as follows:

- Latitude: 32°51'41.01"S
- Longitude: 22°27'24.65"E

All bend points have been included below:

Table 7: Coordinates at corner points

KOUP 1 WEF: APPLICATION SITE		
COORDINATES AT CORNER POINTS (DD MM SS.sss)		
POINT	**SOUTH**	**EAST**
1	S32° 50' 36.020"	E22° 26' 37.756"
2	S32° 50' 51.961"	E22° 28' 4.418"
3	S32° 51' 0.932"	E22° 28' 6.002"
4	S32° 50' 36.319"	E22° 28' 38.215"
5	S32° 50' 49.589"	E22° 31' 22.688"
6	S32° 50' 1.777"	E22° 32' 34.613"
7	S32° 50' 5.053"	E22° 32' 51.295"
8	S32° 52' 58.325"	E22° 33' 7.497"
9	S32° 52' 39.135"	E22° 31' 9.123"
10	S32° 52' 37.782"	E22° 30' 31.526"
11	S32° 52' 36.445"	E22° 30' 27.738"
12	S32° 52' 36.917"	E22° 30' 6.930"
13	S32° 52' 36.054"	E22° 30' 0.458"
14	S32° 52' 28.521"	E22° 29' 47.703"
15	S32° 52' 27.937"	E22° 29' 41.656"
16	S32° 52' 12.336"	E22° 29' 19.904"
17	S32° 52' 35.465"	E22° 27' 20.433"
18	S32° 52' 18.646"	E22° 23' 48.772"
19	S32° 51' 1.495"	E22° 26' 12.579"

The coordinates for the substation and BESS are as follows:

Table 8:Coordinates for substation and BESS

KOUP 1 SUBSTATION AND BESS		
SITE ALTERNATIVE	**SOUTH**	**EAST**
OPTION 1	**S32° 52' 42.085"**	**E22° 32' 1.356"**
OPTION 2	S32° 52' 39.987"	E22° 31' 29.090"

Highlighted option represents the preferred alternative.

The coordinates for the construction laydown / operation and maintenance building are as follows:

Table 9: Coordinates for the construction laydown / operation and maintenance building

KOUP 1 CONSTRUCTION LAYDOWN / OPERATION AND MAINTENANCE BUILDING		
SITE ALTERNATIVE	**SOUTH**	**EAST**
OPTION 1	**S32°52'37.88"**	**E22°32'3.24"**
OPTION 2	S32°52'35.13"	E22°31'26.39"

Highlighted option represents the preferred alternative.

6. ACTIVITY INFORMATION

6.1 Project Description

The proposed Koup 1 WEF will comprise of twenty-eight (28) wind turbines with a maximum total energy generation capacity of up to approximately 140MW. The electricity generated by the proposed WEF development will be fed into the national grid via a 132kV overhead power line. The 132kV overhead power line will however require a separate EA and is subject to a separate BA process, which is currently being undertaken in parallel to the EIA process. In summary, the proposed Koup 1 WEF will include the following components:

- A total of 28 wind turbines, each between 5.6MW and 6.6MW, with a maximum export capacity of approximately 140MW. This will be subject to allowable limits in terms of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP).
- Each wind turbine will have a hub height and rotor diameter of up to approximately 200m;
- Permanent compacted hardstanding areas / platforms (also known as crane pads) of approximately 90m x 50m (total footprint of approx. 4 500m^2) per turbine during construction and for on-going maintenance purposes for the lifetime of the proposed development. A crane hardstand at each turbine position where the main lifting crane will be erected and/or disassembled;
- Temporary laydown areas will be established for the storage of wind turbine components, including the cranes required for tower/turbine assembly and civil engineering construction equipment. Laydown areas will also accommodate building materials and equipment associated with the construction of buildings.
- Each wind turbine will consist of a foundation of up to approximately 15m x 15m in diameter. In addition, the foundations will be up to approximately 3m in depth;
- Electrical transformers adjacent to each wind turbine (typical footprint of up to approximately 2m x 2m) to step up the voltage to 33kV;
- One (1) new 33/132kV on-site substation and/or combined collector substation, occupying an area of approximately 1.5 ha.
- The wind turbines will be connected to the proposed substation via medium voltage (33kV) cables. Cables will be buried along access roads wherever technically feasible.
- A Battery Energy Storage System (BESS) will be located next to the onsite 33/132kV substation. Up to 40MW of batteries using solid state / liquid flow batteries with hazardous material of more than 80m^3 will be used, but most likely will comprise an array of containers, outdoor cabinets and/or storage tanks;

- Internal roads with a width of between 8m and 10m will provide access to each wind turbine. Existing site roads will be used wherever possible, although new site roads will be constructed where necessary. Turns will have a radius of up to 50m for abnormal loads (especially turbine blades) to access the various wind turbine positions. It should be noted that the proposed application site will be accessed via an existing gravel road from the N12 National Route (±25km of existing road, 31.27km of new roads to be constructed);
- One (1) construction laydown / staging area of up to approximately 2.25ha. It should be noted that no construction camps will be required in order to house workers overnight as all workers will be accommodated in the nearby town;
- One (1) permanent Operation and Maintenance (O&M) building, including an on-site spares storage building, a workshop and an operations building to be located on the site identified for the construction laydown area.
- A wind measuring lattice (approximately 120m in height) mast has already been strategically placed within the wind farm application site in order to collect data on wind conditions;
- No new fencing is envisaged at this stage. Current fencing is standard farm fence approximately 1-1.5m in height. Fencing might be upgraded (if required) to be up to approximately 2m in height; and
- Water will either be sourced from existing boreholes located within the application site or will be trucked in, should the boreholes located within the application site be limited.
- No borrow pits will be required, infilling or depositing materials will be sourced from licenced borrow pits within the surrounding areas;
- A temporary concrete batching plant extent to facilitate the concrete requirements for turbine foundations.

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

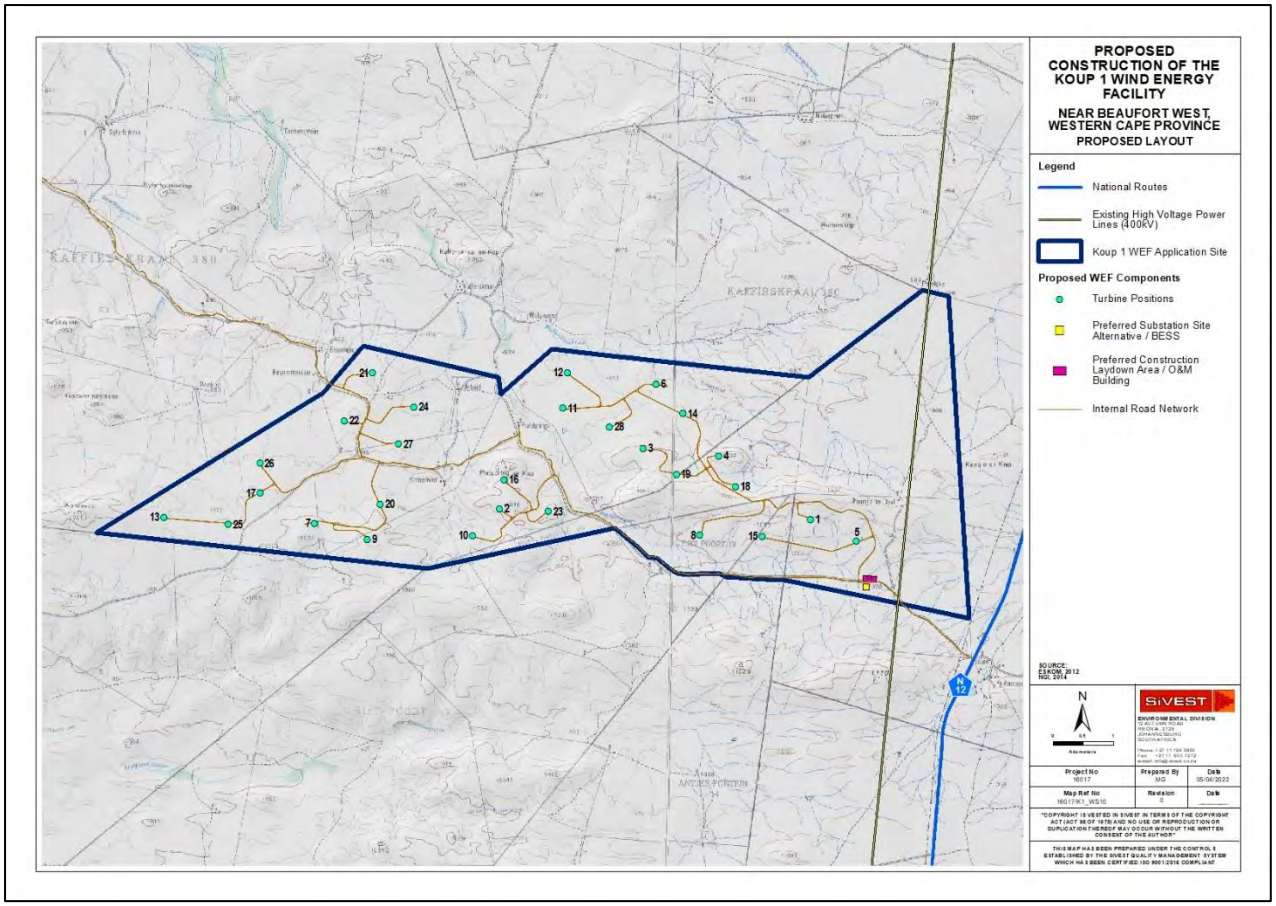


Figure 3: Final layout showing proposed location of wind turbines

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

Please refer to **Figure 4** below for the typical components of a wind turbine.

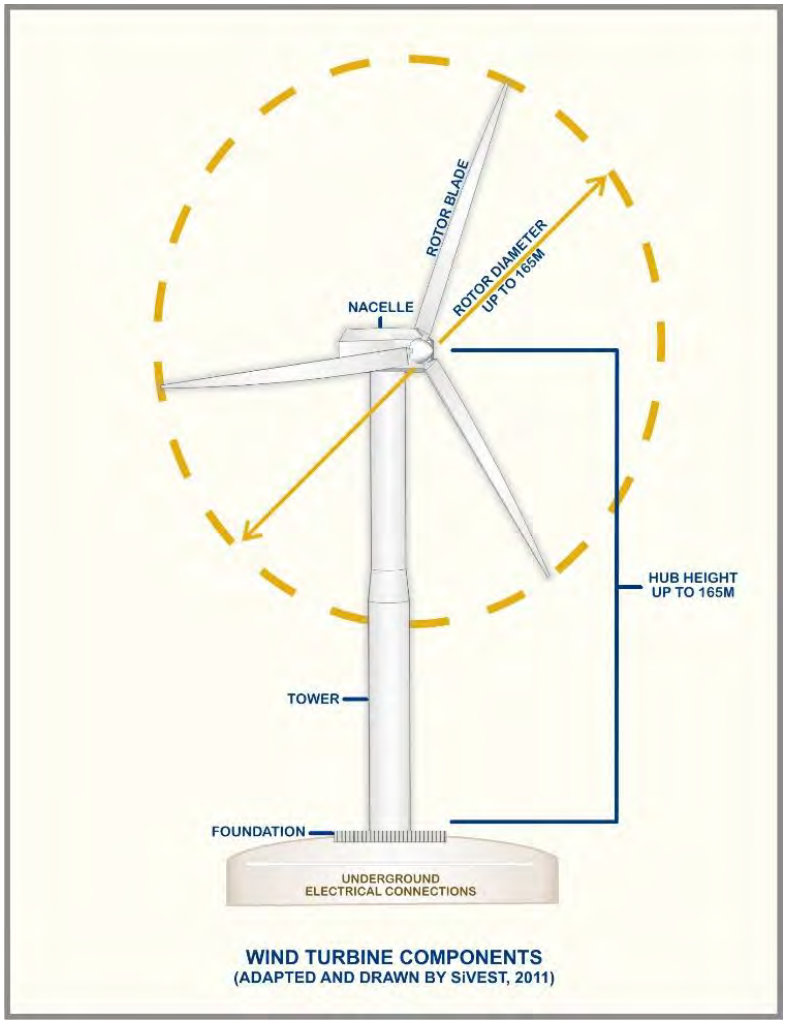


Figure 4: Typical components of a Wind Turbine

A summary of the project technical details is provided in **Table 10** below.

Table 10: Technical Detail Summary

Component	Description / Dimensions
Location of site (centre point)	32°51'41.01"S 22°27'24.65"E
Application site area	4279,398492 ha
Turbine development area	Hard standing Area = 60m*30m*28 turbines = 5.4 Ha
SG codes	C06100000000023100000 C00900000000037400011 C00900000000037400015 C00900000000038000005 C00900000000038000010 C00900000000038000011
Export capacity	Up to 140MW
Proposed technology	Wind turbines and associated infrastructure
Hub height from ground	Up to 200m
Rotor diameter	Up to 200m
Substation and O&M building area	Approximately 2.25 hectare (ha)

Component	Description / Dimensions
Construction laydown area	Approximately 22 500m²
Permanent laydown area	To be determined based on final layout
Hard stand areas	Approximately 4 500m²
Battery Energy Storage System (BESS)	A Battery Energy Storage System (BESS) will be located next to the onsite 33/132kV substation. Up to 40MW of batteries using solid state / liquid flow batteries with hazardous material of more than 80m³ will be used, but most likely will comprise an array of containers, outdoor cabinets and/or storage tanks.
Width of internal access roads	Between approximately 8m and 10m
Length of internal access roads	±25km of existing road 31.27km of new roads to be constructed
Site Access	Access to the Koup 1 WEF site will be from the existing access, located ±1 430m west from the surfaced N12 National Road (Road No: TR03305) and falls under the jurisdiction of the Western Cape Provincial Administration. The existing access is located at Km 51.80 and provides access to the farms situated on both east and west of the N12 Freeway. The access to this development is towards the west from the N12 Freeway and traverses over the Remainder of Portion 4 of the farm 374 as a gravel access road up to the existing farm access.
Proximity to grid connection	Approximately 1km from application site
Height of fencing	Approximately 1m – 1.5m high
Type of fencing	Galvanized steel

6.2 NEMA Listed Activities

The amended EIA Regulations promulgated under Section 24(5) of the National Environmental Management Act, Act 107 of 1998 and published in Government Notice No. R. 326 list activities which may not commence without environmental authorization from the Competent Authority. The proposed activity is identified in terms of Government Notice No. R. 327, 325 and 324 for activities which must follow a full Environmental Impact Assessment Process. The project will trigger the following listed activities:

Table 11: Listed activities in terms of NEMA: EIA Regulations 2014 (as amended in 2017), applicable to the proposed project

Activity No(s):	Relevant activities as set out in Listing Notices 1, 2 and 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
Relevant Basic Assessment Activities as set out in Listing Notice 1		
11 (i)	**GN R. 983 (as amended) Item 11:** The development of facilities or infrastructure for the transmission and distribution of electricity—	One (1) new on-site substation and/or collector substation will be constructed within the proposed application site as part of the proposed development. The proposed substation will be located outside urban areas and will have a

Activity No(s):	Relevant activities as set out in Listing Notices 1, 2 and 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
	(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.	capacity of 33/132kV (33kV yard subject to this EIA / application). In addition, the substation will occupy a footprint of up to approximately 1.5 hectares (ha). The proposed development will also involve the construction of medium voltage (i.e. 33kV) cables which will connect the wind turbines to the proposed substation. These cables will be located outside an urban area and will be buried along access roads, wherever technically feasible.
12 (ii) (a) (c)	**GN R. 983 (as amended) Item 12:** The development of: ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.	The proposed development will entail the construction of a WEF and associated infrastructure (including an on-site substation and BESS) within the proposed application site which will have a physical footprint of approximately 100m^2 or more and will occur within some of the surface water features / watercourses identified within the application site or within 32m of some of the surface water features / watercourses identified within the application site. The infrastructure associated with the proposed development will avoid the surface water features / watercourses identified within the application site where possible, although some structures (such as internal site roads) will occur within some of the surface water features / watercourses identified within the application site and/or within 32m of some of the surface water features / watercourses identified within the application site.
14	**GN R. 983 (as amended) Item 14:** The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80m^3 or more but not exceeding 500m^3.	The proposed development will include the construction of an on-site Battery Energy Storage System (BESS). Up to 40MW of batteries using solid state / liquid flow batteries with hazardous material of more than 80m^3 will be used during the development phase and will most likely comprise an array of containers, outdoor cabinets and/or storage tanks. The preferred technology is Lithium Ion.

Activity No(s):	Relevant activities as set out in Listing Notices 1, 2 and 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
		It should be noted that no stand-alone facilities for the storage of dangerous goods external to the BESS will be constructed as part of the proposed development.
19	**GN R. 983 (as amended) Item 19**: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;	The proposed development involves the construction of a WEF as well as other associated infrastructure (including an on-site substation and BESS) within the proposed application site. The Surface Water Impact Assessment revealed that there are surface water features / watercourses located within the application site. As such, the proposed development will involve the infilling or depositing of any material of more than $10m^3$ into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than $10m^3$ from some of the identified surface water features / watercourses. Although the layout of the proposed development has been designed to avoid the identified surface water features / watercourses as far as possible, some of the internal site roads to be constructed (as required) will need to traverse some of the identified surface water features / watercourses. In addition, during construction of these roads (as required), soil will need to be removed from some of the identified surface water features / watercourses.
24 (ii)	**GN R. 983 (as amended) Item 24:** The development of a road - ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres.	Internal roads are required within the application site in order to provide access to each wind turbine, the on-site and/or collector substation and the BESS, as well as to facilitate access throughout the WEF. Existing site roads will be used wherever possible, although new site roads will be constructed where necessary. In addition, turns will have a radius of up to approximately 50m for abnormal loads (especially turbine blades) to access the various wind turbine positions. As such, the proposed development will involve the construction of new internal roads within the application

Activity No(s):	Relevant activities as set out in Listing Notices 1, 2 and 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
		site, as required. It is proposed that these new internal access roads will be between approximately 8m and 10m wide.
28 (ii)	**GN R. 983 (as amended) Item 28:** Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;	The proposed development site is currently zoned for agricultural land use, however, the property is no longer actively used for agricultural activities. The proposed development will result in special zoning being required, as an area greater than 1ha will be transformed into industrial / commercial use.
31 (i)	**GN R. 983 (as amended) Item 31:** The decommissioning of existing facilities, structures or infrastructure for - (i) any development and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014;	Should the proposed development's Power Purchase Agreement (PPA) not be renewed after 20 years (anticipated operational lifespan of proposed development), the proposed development would need to be decommissioned. This would include the decommissioning of the entire WEF, including the medium voltage lines connecting the wind turbines to the on-site substation.
48 (i) (a) (c)	**GN R. 983 (as amended) Item 48:** The expansion of- (i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; where such expansion occurs— (a) within a watercourse; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;	Internal roads are required within the application site in order to provide access to each wind turbine, the on-site and/or collector substation and the BESS, as well as to facilitate access throughout the WEF. Existing site roads will be used wherever possible, and will be upgraded and expanded where necessary. The Surface Water Impact Assessment revealed that there are surface water features / watercourses located within the application site. Although the layout of the proposed development has been designed to avoid the surface water features / watercourses identified within the application site as far as possible, some of the internal roads to be upgraded and expanded will need to traverse some of the surface water features / watercourses identified within the application site and construction will occur within some of the surface water features / watercourses identified within the application site and/or be within 32m of some of the surface water features

Activity No(s):	Relevant activities as set out in Listing Notices 1, 2 and 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
		/ watercourses identified within the application site. As such, the proposed development will entail the expansion (upgrading) of roads and other infrastructure by 100m^2 or more within some of the surface water features / watercourses identified within the application site or within 32m from the edge of a surface water features / watercourses identified within the application site.
56 (ii)	**GN R. 983 Item 56:** The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre - (ii) where no reserve exists, where the existing road is wider than 8 metres –	Internal roads are required within the application site in order to provide access to each wind turbine, the on-site and/or collector substation and the BESS, as well as to facilitate access throughout the WEF. Existing site roads will be used wherever possible, although new site roads will be constructed where necessary. The existing internal roads will need to be upgraded by widening them more than 6m, or by lengthening them by more than 1km.
Relevant Scoping and EIA Activities as set out in Listing Notice 2 of the EIA Regulations, 2014 as amended		
1	**GN R. 984 (as amended) Item 1:** The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more,	The proposed development will entail the development of a WEF, on-site substation and BESS with a maximum generation capacity of up to 140MW. In addition, the proposed development will be located outside an urban area.
15	**GN R. 984 (as amended) Item 15:** The clearance of an area of 20 hectares or more of indigenous vegetation.	The proposed WEF development will involve the clearance of more than 20ha of indigenous vegetation. Clearance will also be required for the proposed on-site substation, BESS, internal roads and other associated infrastructure.
Relevant Basic Assessment Activities as set out in Listing Notice 3 of the EIA Regulations, 2014 as amended		
4 i. (ii) (aa)	**GN R. 985 (as amended) Item 4:** The development of a road wider than 4 metres with a reserve less than 13,5 metres. **i. Western Cape** ii. Areas outside urban areas; (aa) Areas containing indigenous vegetation;	Internal roads are required within the application site in order to provide access to each wind turbine, the on-site and/or collector substation and the BESS, as well as to facilitate access throughout the WEF. Existing site roads will be used wherever possible, although new site roads will be constructed where necessary. It is proposed that these new internal access roads will be between

Activity No(s):	Relevant activities as set out in Listing Notices 1, 2 and 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
		approximately 8m and 10m wide. In addition, turns will have a radius of up to approximately 50m for abnormal loads (especially turbine blades) to access the various wind turbine positions. The above-mentioned internal roads (existing and new roads to be constructed, where required) within the application site will occur within the Western Cape Province, outside urban areas. In addition, the proposed development site contains indigenous vegetation.
12	**GN R. 985 (as amended) Item 12:** The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. **i. Western Cape** ii. Within critical biodiversity areas identified in bioregional plans;	The proposed WEF development will involve the clearance of more than 300 square metres or more of indigenous vegetation. Clearance will also be required for the proposed on-site substation, BESS, internal roads and other associated infrastructure.
14	**GN R. 985 (as amended) Item 14:** The development of— (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. **i. Western Cape** i. Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	The proposed energy facility will entail the development of roads and other infrastructure with a physical footprint of 10m^2 or more within a watercourse or within 32m from the edge of a watercourse. Although the layout of the proposed development will be designed to avoid the identified surface water features as far as possible, some of the internal and access roads, will likely need to traverse the identified surface water features.

Activity No(s):	Relevant activities as set out in Listing Notices 1, 2 and 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
18 i. ii. (aa)	**GN R. 985 (as amended) Item 18:** The widening of a road by more than 4 meters, or the lengthening of a road by more than 1 kilometer- **i. Western Cape** ii. All areas outside urban areas: (aa) Areas containing indigenous vegetation	Internal roads are required within the application site in order to provide access to each wind turbine, the on-site and/or collector substation and the BESS, as well as to facilitate access throughout the WEF. Existing internal roads will need to be upgraded as part of the proposed development (where required). Internal roads will be widened by more than 4m or lengthened by more than 1km. These roads located within the application site will occur within the Western Cape Province, outside urban areas. In addition, the proposed development site contains indigenous vegetation.
23	**GN R. 985 (as amended) Item 23:** The expansion of— (ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more; where such expansion occurs— (a) within a watercourse; (b) in front of a development setback adopted in the prescribed manner; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. **i. Western Cape** i. Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	The proposed development will entail the development and expansion of roads and other infrastructure by 10m^2 or more within a watercourse or within 32m from the edge of a watercourse. Although the layout of the proposed development will be designed to avoid the identified surface water features as far as possible, some of the existing internal and access roads may likely need to traverse some of the identified surface water features. The proposed development occurs within CBAs, and is located outside an urban area.

7. NATIONAL WEB-BASED ENVIRONMENTAL SCREENING TOOL

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

7.1 Koup 1 WEF

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

Figure 5: Site Sensitivity Verification

Theme	Sensitivity	Comment
Agriculture Theme	High (WEF) Medium (Substation)	The Agricultural Compliance Statement is included in **Appendix 6** of the Draft Environmental Impact Assessment Report. The high agricultural sensitivity, as identified by the screening tool, is disputed by the specialist. The motivation for disputing the sensitivity is that the climate data (very low rainfall of approximately 155 mm per annum and high evaporation of approximately 1,400 mm per annum) proves the area to be too arid for viable rain fed cultivation, and a high sensitivity is not therefore justified. In addition, the land type data shows the soils to be dominated by shallow soils on underlying rock, which are also totally unsuitable for cultivation.
Animal Species Theme	High (WEF) Medium (Substation)	The Terrestrial Ecological Report is included in **Appendix 6** of the Draft Environmental Impact Assessment Report. According to the specialist, the outputs of the Screening Tool are based on existing biodiversity information, which for many areas such as the Koup area, is very sparse and not well-populated, with the result that this consists largely of modelled data and the potential presence of species of concern which then need to be verified through the field assessment and site verification exercise. Apart from the Padloper, the site also falls within the broader distribution of the Riverine Rabbit (CR) raising potential concern that this species could be impacted by the development. The results of the site verification indicate that the site can be considered low sensitivity for both the Padloper and Riverine Rabbit. The riparian habitat at the site is sparse and rocky and is not considered suitable for the Riverine Rabbit. The low sensitivity of the site for the Riverine Rabbit was also confirmed through communication with the EWT Drylands Programme which confirmed that there are no records from the Koup area. In terms of the Padloper, this species would occur on the rocky hills of the site, but despite extensive searching for this species, it was not found within the

Theme	Sensitivity	Comment
		site. As the vegetation cover and extent of rocky crevices where this species could shelter are limited, the site is considered low sensitivity for the Karoo Padloper.
Aquatic Biodiversity Theme	Very High (WEF) Low (Substation)	The Aquatic Report is included in **Appendix 6** of the Draft Environmental Impact Assessment Report. The DFFE Screening Tool identified two sensitivity ratings within the development study area, very high and low. Although there is some overlap with the findings on site and the Screening Tool's outcome, the extent of the Very High sensitivity areas was found to be greater than the extent in the Screening Tool. However and appropriate layout has been developed to minimise the impact on the Very High areas and is presently deemed acceptable by the aquatic ecologist.
Archaeological and Cultural Heritage Theme	Low (WEF & Substation)	The Heritage Report is included in **Appendix 6** of the Draft Environmental Impact Assessment Report. According to the Archaeological Report, the Archaeological and Cultural Heritage sensitivity of the Koup 1 WEF project areas has been evaluated, based on desktop studies and a 3-day site visit. It is concluded that the low rating as provided by the Environmental Screening Tool likely reflects the scarcity of heritage reports conducted in the region.
Avian (Wind) Theme	Low (WEF)	The Avifaunal Report is included in **Appendix 6** of the Draft Environmental Impact Assessment Report. The classification of low sensitivity in the DFFE screening tool is not considered accurate as far as the proposed WEF 1 is concerned, based on the habitat and species observations made during the field surveys to date. The classification should be high sensitivity, based on the presence of the Martial Eagle nest within 850m from the application site.
Bats (Wind) Theme	High (WEF)	The Bat Report is included in **Appendix 6** of the Draft Environmental Impact Assessment Report. According to the specialist, the screening tool sensitivity is correct for a large part of the site, if bat activity data is taken into account, but is inaccurate in the central part, which has been identified respectively as areas of No-go and High sensitivity.

Theme	Sensitivity	Comment
Civil Aviation (Wind) Theme	High (WEF) Medium (Substation)	The closest airport is the Oudtshoorn Airport, located approximately 144 km from the site.
Defence (Wind) Theme	Low (WEF & Substation)	The entire site has a low sensitivity in terms of the defence theme. No further specialist study required.
Flicker Theme	Very High (WEF)	The Visual Report is included in **Appendix 6** of the Draft Environmental Impact Assessment Report. According to the specialist, although the Screening Tool identifies significant areas of very high landscape and flicker sensitivity, the site sensitivity verification exercise conducted in respect of the VIA found little evidence to support this sensitivity rating. The desktop topographic assessment of the area did not indicate the presence of mountaintops, high ridges or any significantly steep slopes. This assessment, confirmed by the field investigation, showed the presence of a few ridges in a largely flat to gently undulating landscape. The sensitivity analysis above has recognised these ridges and identified the higher ridges as zones where development would be least preferred.
Landscape (Wind) Theme	Very High (WEF)	The Visual Assessment is included in **Appendix 6** of the Draft Environmental Impact Assessment Report. According to the specialist, although the Screening Tool identifies significant areas of very high landscape and flicker sensitivity, the site sensitivity verification exercise conducted in respect of the VIA found little evidence to support this sensitivity rating. The desktop topographic assessment of the area did not indicate the presence of mountaintops, high ridges or any significantly steep slopes. This assessment, confirmed by the field investigation, showed the presence of a few ridges in a largely flat to gently undulating landscape. The sensitivity analysis above has recognised these ridges and identified the higher ridges as zones where development would be least preferred.
Palaeontology Theme	Very High (WEF & Substation)	The Heritage Report is included in **Appendix 6** of the Draft Environmental Impact Assessment Report. The palaeontological heritage site sensitivity of the combined Koup 1 WEF and associated grid connection project areas has been verified on the basis of desktop studies as well as a 5-day site visit. Applying the Precautionary Principle, an overall

Theme	Sensitivity	Comment
		High Palaeontological Sensitivity is inferred for the WEF and grid connection project areas.
Noise Theme	Very High (WEF)	The Noise Site Sensitivity Verification Report is included in **Appendix 6** of the Draft Environmental Impact Assessment Report. The project could impact on several noise sensitive areas. A full noise impact assessment has been undertaken as part of the EIA Process as outlined in the Plan of Study.
Plant Species Theme	Medium (WEF & Substation)	The Terrestrial Ecological Report is included **Appendix 6** of the Draft Environmental Impact Assessment Report. According to the specialist, the plant species theme sensitivity map for the site indicates that the site is mapped is mapped as Medium sensitivity for the plant theme due to the potential presence of three plant species of conservation concern. The un-named species identity was obtained from SANBI and is a small succulent. None of these species were observed at the site during the numerous site visits and it is concluded that these species are not present within the site or if present are highly localised and not likely to be impacted by the development. Due the failure to detect any plant species of conservation concern at the site, the site is considered low sensitivity for flora.
RFI (Wind Theme)	Low (WEF)	The screening tool described the study area as low Radio Frequency Interference Theme (RFI) sensitivity as the cluster does not fall within the Square Kilometre Array (SKA) Karoo Central Radio Astronomy Advantage Area buffer. No further specialist study required.
Terrestrial Biodiversity Theme	Very High (WEF) Low (Substation)	The Terrestrial Ecological Report is included **Appendix 6** of the Draft Environmental Impact Assessment Report. According to the specialist, the overall combined Terrestrial Biodiversity theme for Koup site indicates that the site consists largely of low sensitivity areas with occasional areas of Very High sensitivity associated with the CBAs, NFEPA Catchments and drainage features of the site. While the conservation planning features of the site are difficult to confirm or dispute based on the site verification, the development entirely avoids this area, with the result that the Very High sensitivity status of that part of the site does not need to be confirmed or disputed. As

Theme	Sensitivity	Comment
		such, the study takes a conservative approach and does not dispute the Very High sensitivity of this area, and confirms the general low sensitivity of the rest of the site. The development does not encroach near to the very high sensitivity area and would not directly impact on this area in any way.

8. DESCRIPTION OF THE PHYSICAL ENVIRONMENT

8.1 Geographical

The proposed WEF is located approximately 55km south of Beaufort West in the Western Cape Province and is within the Beaufort West and Prince Albert Local Municipality, in the Central Karoo District Municipality. The regional context of the proposed application site is shown in **Figure *6*** below.

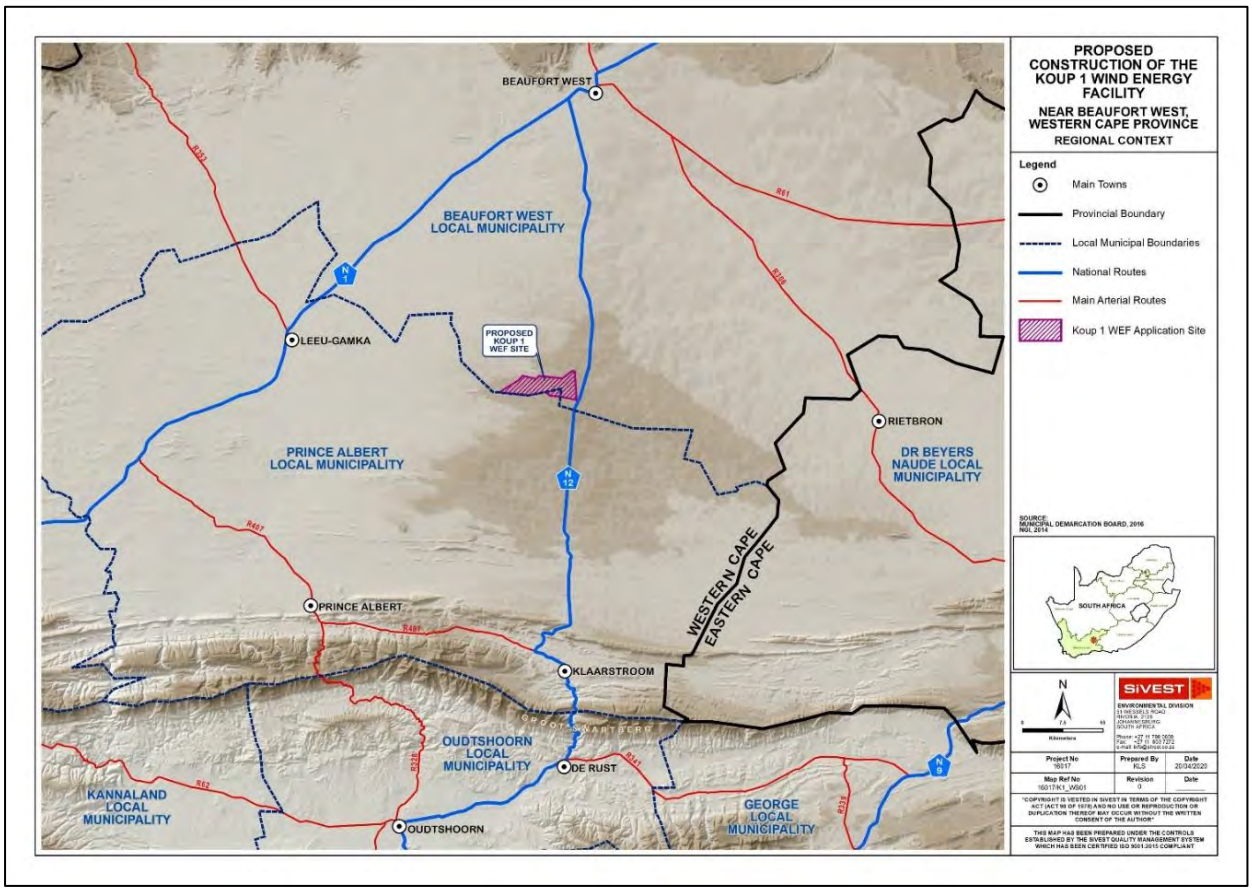


Figure 6: Regional context

8.2 Land Use

According to the South African National Land Cover dataset (Geoterraimage 2018), much of the assessment area is classified as “Bare / Barren Land”, interspersed with patches of low shrubland. While some of these bare / barren areas are representative of transformation due to human activity,

in most cases these patches of land are merely undisturbed areas with very sparse vegetation cover. Small tracts of grassland and forested land occur along drainage lines throughout the study area (**Figure 6**).

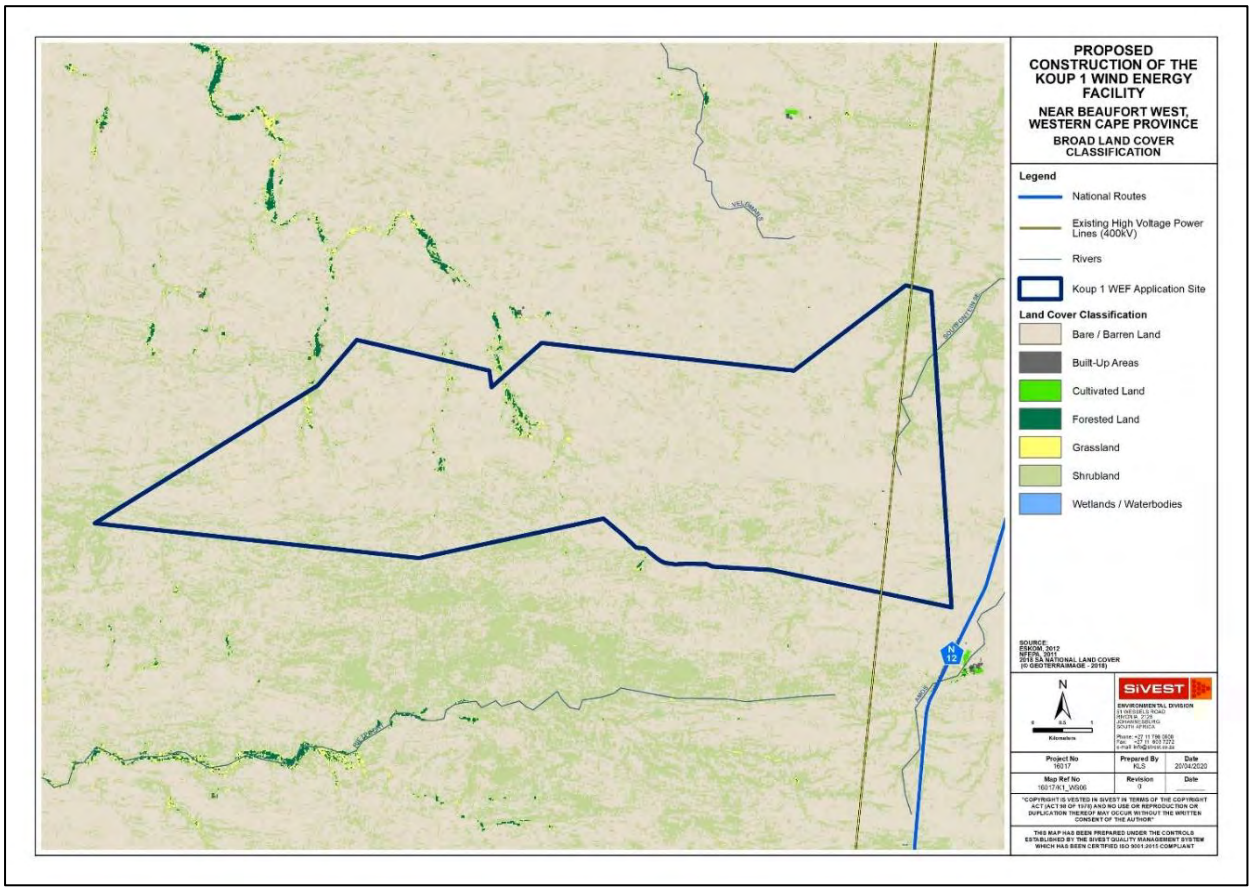


Figure 7: Land Cover Classification

Agricultural activity in the area is restricted by the arid nature of the local climate and areas of cultivation are largely confined to relatively limited areas distributed along drainage lines. As such, the natural vegetation has been retained across much of the study area. Livestock (mostly sheep) and game farming (**Figure 8**) is the dominant activity although the climatic and soil conditions have resulted in low densities of livestock and relatively large farm properties across the area. Thus the area has a very low density of rural settlement, with relatively few isolated farmsteads in evidence (**Figure *9***). Built form in much of the study area is limited to isolated farmsteads, including farm worker's dwellings and ancillary farm buildings, gravel access roads, telephone lines, fences and windmills (**Figure 10**).

Figure 8: Game farm just south of the Koup 1 WEF

Figure 9: Isolated farmsteads typical of the Koup 1 WEF study area

Figure 10: Farm buildings and associated infrastructure south-west of the Koup 1 WEF application site.

Further human influence is visible in the area in the form of the N12 national route which traverses the study area in a north to south direction (**Figure 11**). In addition, existing, power lines, both 22kV (**Figure 12**) and 400kV power lines (**Figure 13**) in this area are also significant man-made features in an otherwise undeveloped landscape. These lines bisect the study area in a north to south alignment, relatively close to the N12.

Figure 11: View southwards along the N12 National Route on the eastern boundary of Koup 1 WEF application site.

Figure 12: 22kV power lines and associated substation south of the Koup 1 WEF application site, adjacent to the N12.

Figure 13: View of 400kV power lines to the east of the Koup 1 WEF application site.

The closest built-up area is the town of Beaufort West which is situated approximately 55km north of the Koup 1 application site. The town is well outside the study area for this project and is thus not expected to have an impact on the visual character of the study area.

8.3 Climate

The study area is characterized by a hot semi-arid climate with a "BSk" classification according to the Köppen-Geiger climate classification. Beaufort West receives a relatively low mean annual precipitation of 392 mm. The average lowest rainfall is received in June (15 mm) and the highest in March (57 mm), which is a seasonal variation of 42 mm. The maximum midday temperatures for Beaufort West ranges from 31.7°C in January to 18°C in July. The minimum temperatures for Beaufort West ranges from 16.6°C in February to 4.4°C in July. The average temperatures vary during the year by 12.9°C.

8.4 Topography

The site proposed for the Koup 1 WEF development is located in an area largely characterised by flat to gently undulating plains interspersed with low ridges and dry river courses. Areas of greater relief are largely concentrated to the south east of the study area. According to by the slope gradient map prepared by JG Afrika (July 2021) as part of the Geotechnical Report (**Figure *14***), *the site is characterised by flat to gentle terrain (0.40˚ – 8.7˚ slopes). Spot heights indicate elevation values in the range of 901m to 1060m above mean sea level. Flat to undulating terrain prevails across much of the WEF development site, although steep slopes associated with a low ridge in the south-eastern sector of the site result in some areas of greater relief.*

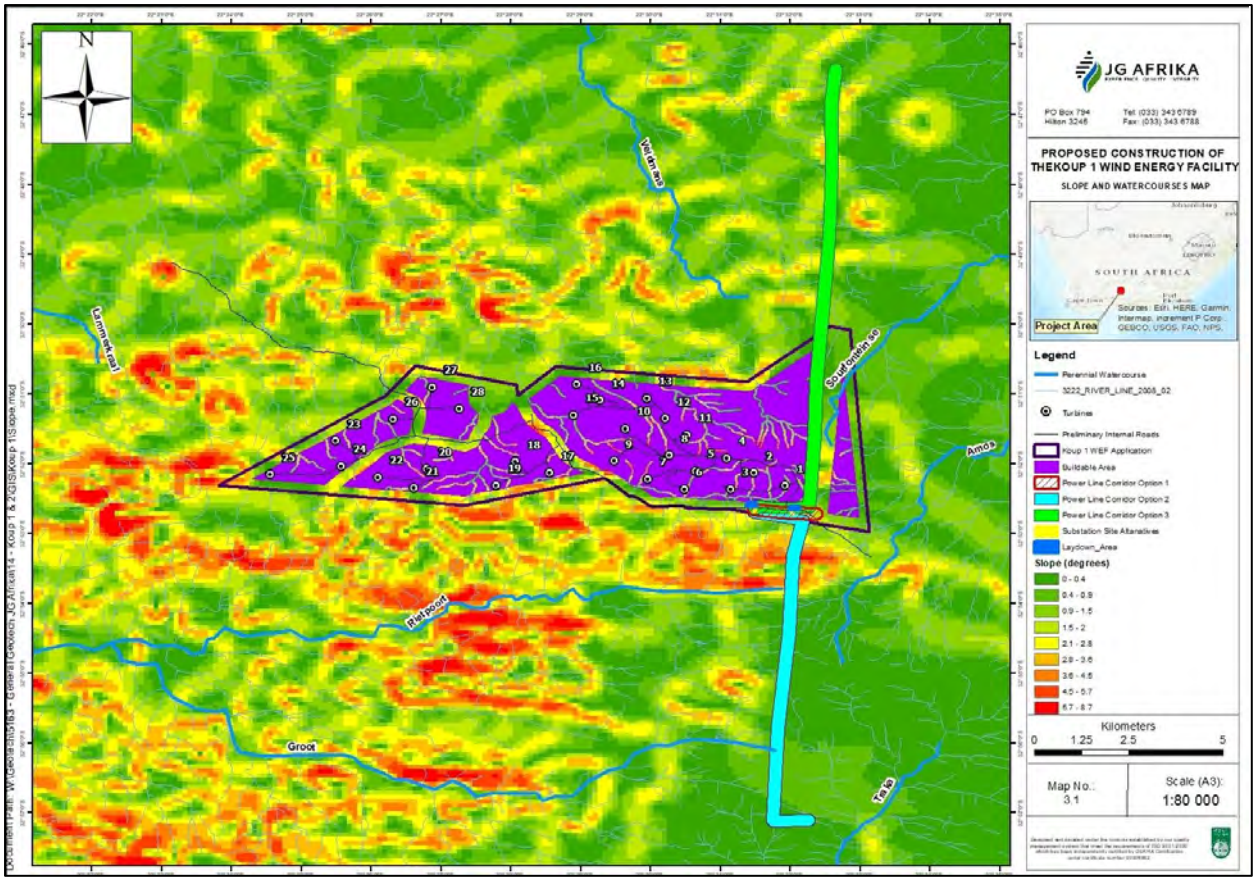


Figure 14: Topography

8.5 Geology and Soils

A desktop geotechnical report was undertaken by JG Afrika (Pty) Ltd (April 2022). According to the report, *the study area is underlain by rock units of the Teekloof Formation (Pt), which is underlain by rock units of the Abrahamskraal (Pa) Formation* (**Figure *15***). *These rock units form part of the Adelaide Subgroup of the Beaufort Group, of the greater Karoo Supergroup.*

The Abrahamskraal Formation (Pa) is represented by grey and green mudstone, siltstone and subordinate sandstone. Thin chert beds are common on the lowermost red mudstones of the Abrahamskraal Formation. These rock units are overlain by the Teekloof Formation (Pt) which is represented by mudstone, siltstone and fine to very fine grained wackes and arenites.

Quaternary alluvial deposits overlie the geological formations over localised areas in the east and south east of the site.

Regional measurements indicate that the Teekloof sedimentary strata dip at between 10° and 12° in an easterly direction. The Abrahamskraal sedimentary bedding displays axial dips of 9° in a westerly and 20° in an easterly direction. The sedimentary rocks in the area have been acted upon by numerous tectonic forces associated with fold features. Based upon the geology map, one reverse fault occurs in the centre of the site trending east to west. Six axial fault features are located within the study area. The faults trend in an E-W direction and represent localized synclines and anticlines.

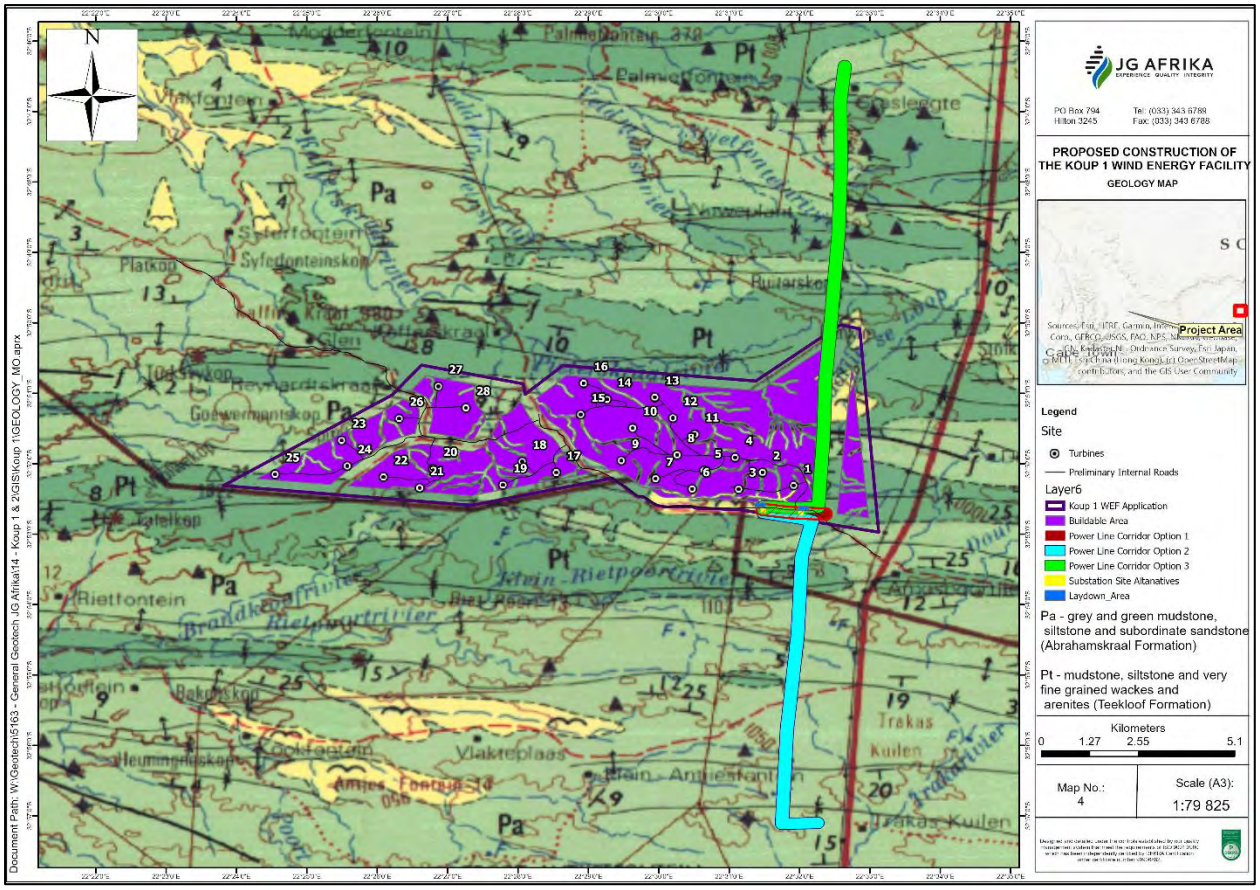


Figure 15: Geology

8.6 Geohydrology

According to the desktop geotechnical report undertaken by JG Afrika (Pty) Ltd (April 2022), *the study area lies within the L12C catchment area which receives a mean annual precipitation of 152mm.*

According to the 1: 3 000 000 scaled Groundwater Harvest Potential Map of South Africa, Regional yields of sustainable groundwater abstraction rates, indicate values of 2500 - 4000 m3/km2/annum.

Regional hydrogeological data indicate that the area is characterised by fractured aquifer types. The south eastern aquifer is classed as 'b2' which indicate relatively low yields, estimated to be in the range of 0.1-0.5 l/s. The major proportion of the site is classed as "b3" which indicates low yields of 0.5-2.0l/s. Fractured aquifer (designation b) form as a result of discontinuities, such as faults, fractures and joints, in hard bedrock. These form the primary porosity in which groundwater moves.

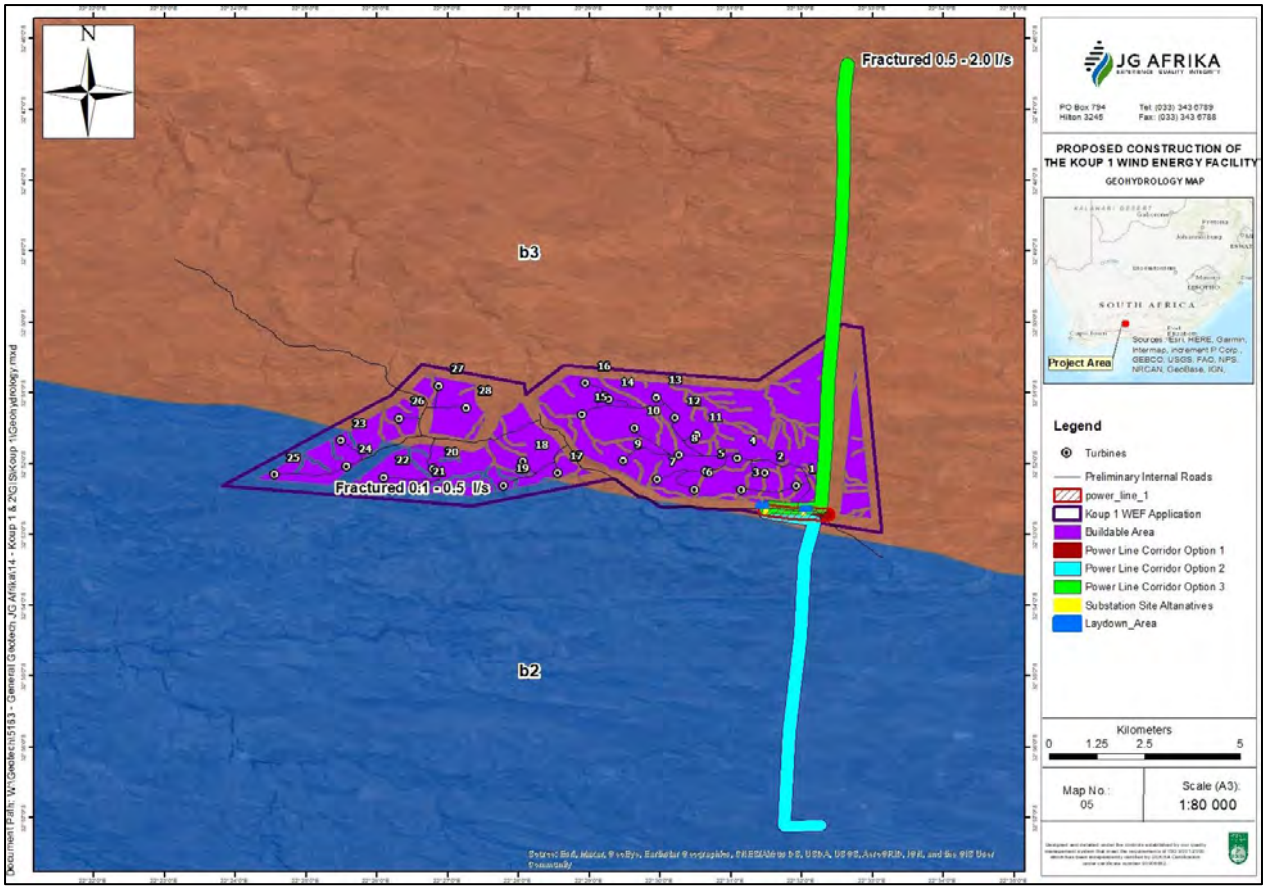


Figure 16: Geohydrology

8.7 Surface Water

An Aquatic Impact Assessment was undertaken by EnviroSci (Pty) Ltd (April 2022). According to the assessment, the study area contains variety of aquatic features associated, characterised as follows:

- *Non perennial rivers alluvial dominated channels with or without riparian vegetation (***Figure 18** & **Figure *19*)**. *These ranged from narrow channels within small canyons with steep cliffs to broad flood plain areas in the lower valleys. Some of these did contain small seeps/fountains which sustained small pools of water inhabited by invertebrates and amphibians. However, broad riparian zones are only found within the lower valley areas, dominated by a small number of trees, while obligate instream vegetation is limited to a small number of sedges (nut grasses).*
- *Minor drainage lines (***Figure *20***), with no obligate aquatic vegetation and were mostly 2 – 8m in width*
- *Dams or weirs (**Figure *21***) with no wetland or aquatic features, although not many of these were located within the study area.*

The features listed above, drain the study area in a north westerly region, forming part of a tributary of the Veldmans River (J21E) Quinary Catchment of the Great Karoo Ecoregion in the Breede-Gouritz Catchment Management Agency (George Regional Office). The Veldmans River in turn drains into the Gamka River.

Figure 22 *indicates the available spatial data with regard potential wetlands and or riverine systems within the study area (van Deventer et al., 2020). During the field work, the site was then*

groundtruthed as well as compared to 1: 50 000 topocadastral surveys mapping data and that which was observed on site. A baseline map was then refined using the May 2021 survey data, noting that due to the complex nature of the topography and geology, the features were digitised at a scale of 1:10 000 to provide greater accuracy when in close proximity to the proposed infrastructure (**Figure 23**).

As indicated previously, two main natural aquatic systems were observed within the study area, namely the broader non-perennial rivers and the minor drainage lines. The fine scale delineation of the broader systems was focused on the proposed wind farm infrastructure, to ensure that turbines, buildings and any new internal access roads (as far as possible) avoided these areas. Due to the nature of the landscape, the small drainage lines are unavoidable, but these have also been avoided by the turbines and most of the proposed buildings.

Substation Option 2 and Laydown Options 1 & 2 are however located within minor drainage lines, and for this reason should be relocated and or avoided in the selection process (**Figure 24**).

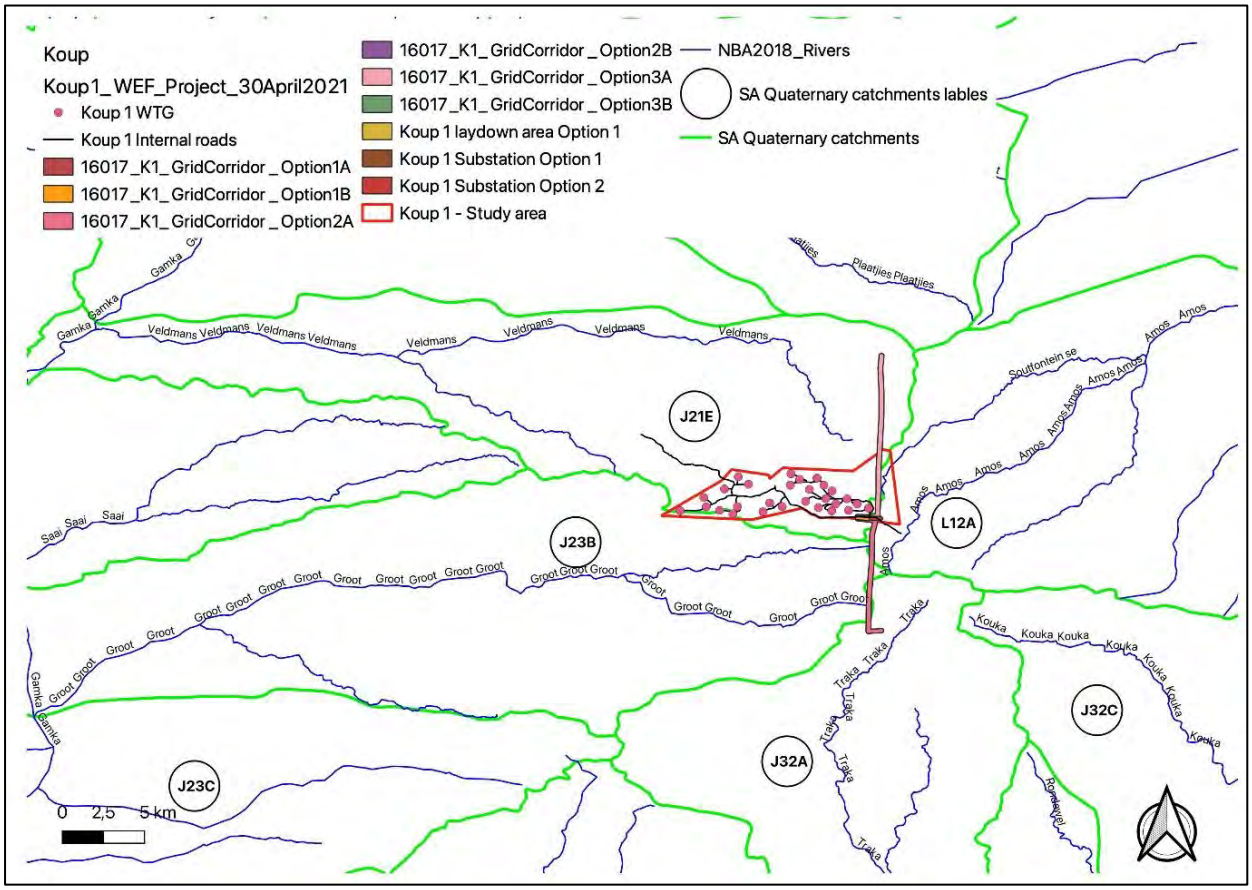


Figure 17 Project locality map indicating the various quaternary catchments and mainstem rivers (Source DWS and NGI) within the project boundary

Figure 18: A broad alluvial watercourse with defined riparian zone

Figure 19: Alluvial channel with undefined channel and or riparian zon

Figure 20: A view of a minor drainage line observed on the upper plateaux where most of the proposed internal roads are located, thus crossings will mostly occur in these areas of the aquatic systems

Figure 21: Several small weirs were found within the steeper valleys through-out the study area, most no longer functional

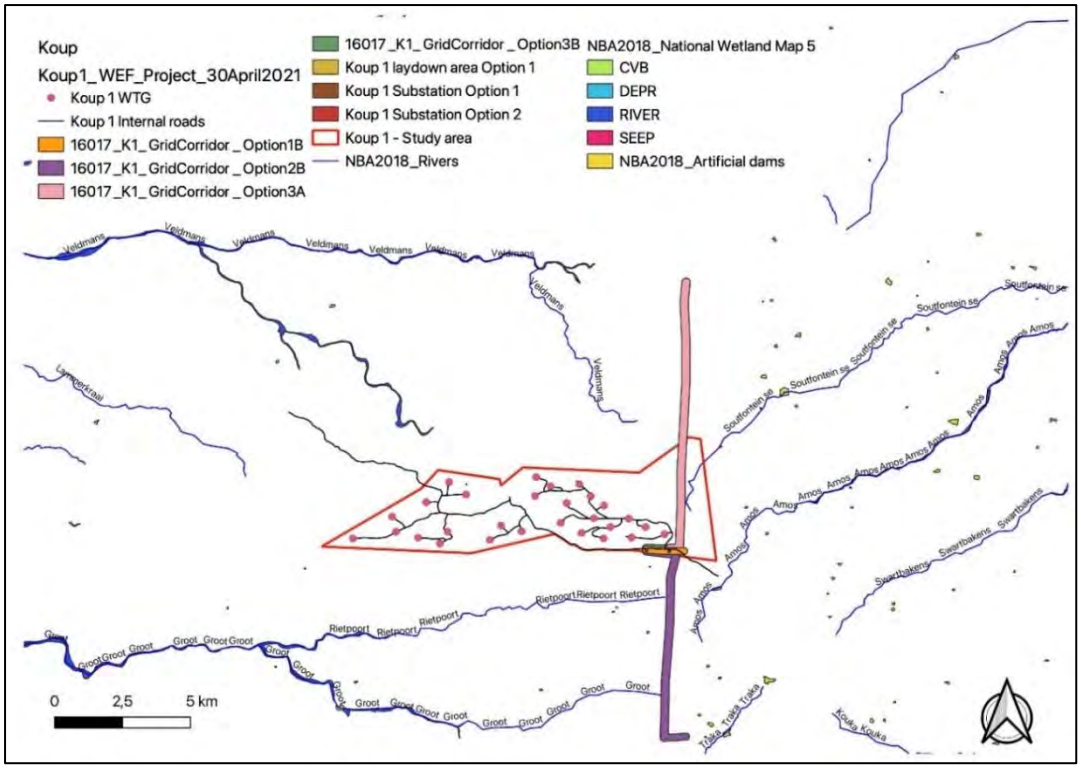


Figure 22: National Wetland Inventory wetlands and waterbodies (van Deventer et al., 2020)

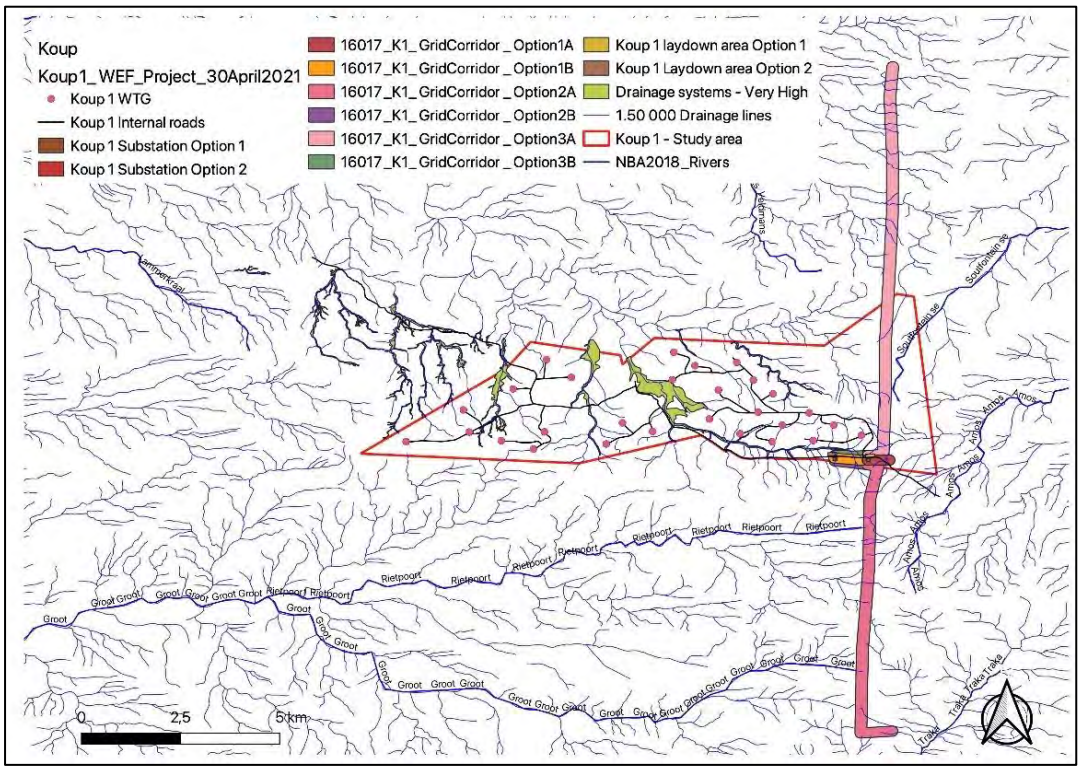


Figure 23: Waterbodies delineated in this assessment based on groundtruthing information collected

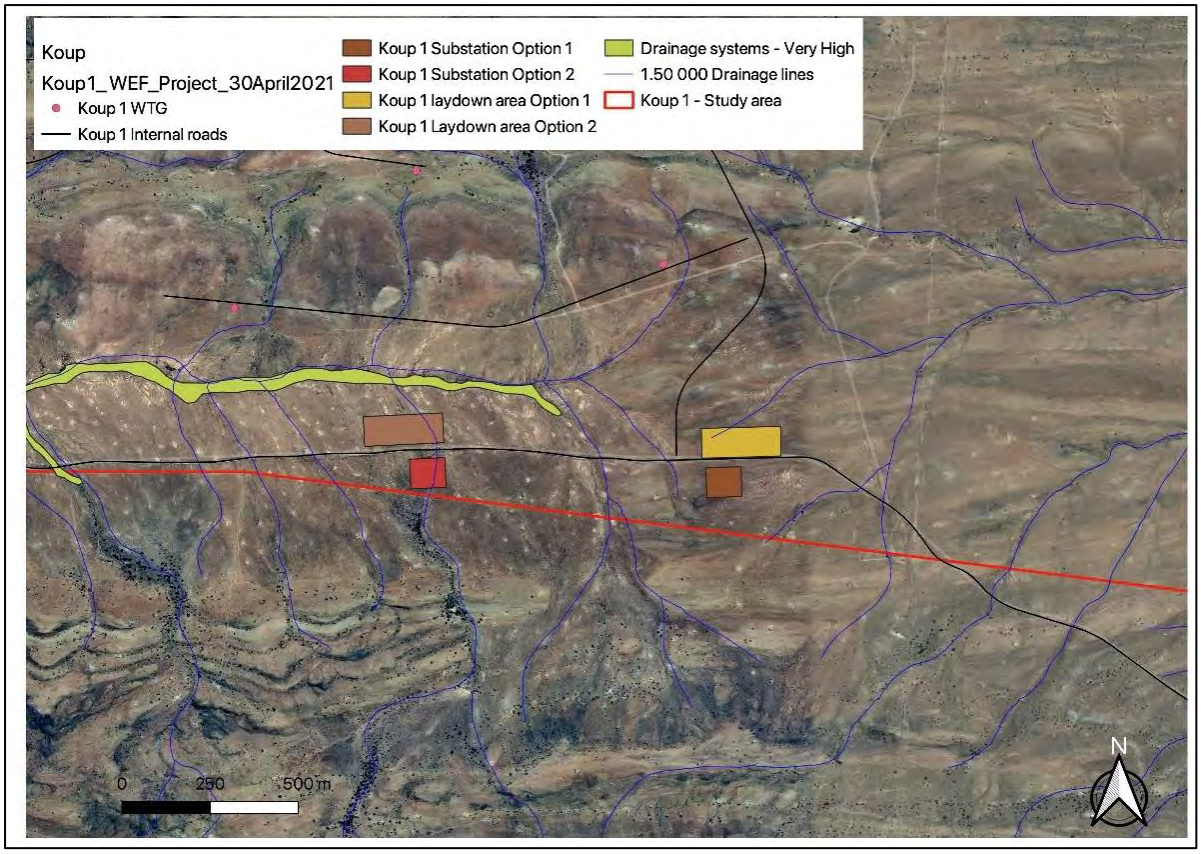


Figure 24: Confirmed and delineated waterbodies in relation to the proposed Substation and laydown area localities.

8.8 Biodiversity

An Ecological Study was underatekn by Simon Todd (April 2022). According to the report, *the Koup 1 site falls entirely within the Gamka Karoo vegetation type and consists of open gravel plains and low hills dissected by numerous drainage lines. Vegetation cover is generally very low and dominated by low shrubs and scattered low trees. In general, the vegetation of the Koup 1 site is considered low sensitivity and there are few species of concern present. In terms of fauna, the diversity of mammals, reptiles and amphibians is considered relatively low, even by Karoo standards. Although the site falls within the broad distribution of the Riverine Rabbit, the drainage lines of the site do not have extensive floodplains with dense riparian vegetation that represent the typical habitat of this species in the area. The Koup 1 site is therefore considered unsuitable for this species and the development is considered highly unlikely to have any impact on the Riverine Rabbit. The site also falls within the range of the Karoo Padloper and if present it would be associated with the hills of the site with sufficient loose rock and coarse rubble to provide shelter. The low vegetation cover and paucity of such habitat suggests that the site is not an important area for this species and no evidence of this species was observed on the site.*

While the smaller drainage features of the site are classified as Ecological Support Areas, there is only one small area of CBA in the east of the site that would be minimally impacted by the development. As such impacts on CBAs are considered acceptable. In terms of cumulative impacts, the wider area currently has a low development impact from renewable energy and the contribution of the Koup 1 WEF to cumulative impact at 50ha is considered relatively low and would not generate significant broad-scale impact and as such is considered acceptable.

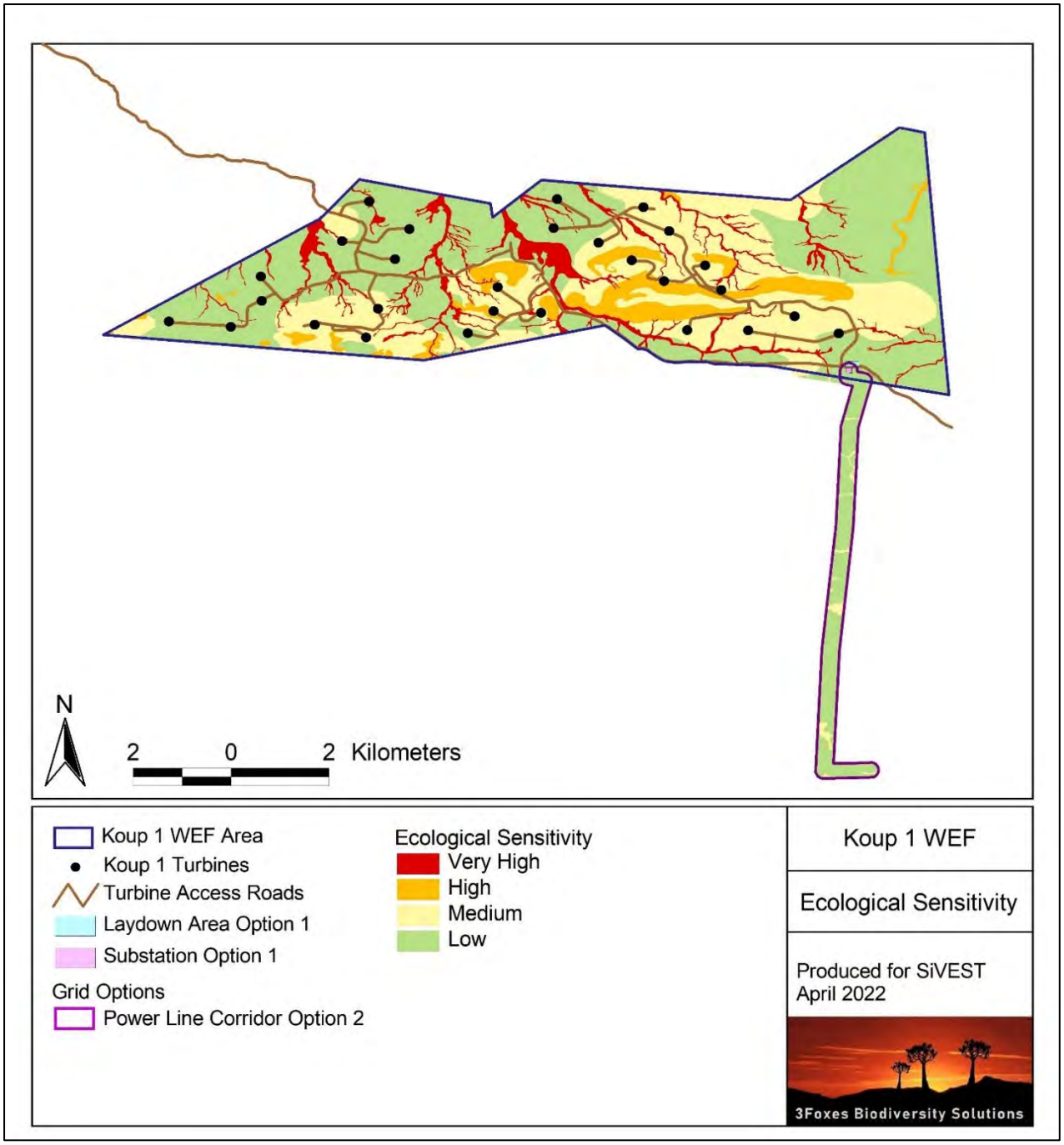


Figure 25: Ecological Sensitivity Map

From an ecological perspective, the footprint within the Very High sensitivity areas is considered acceptable and given that this would be restricted to river crossings of the wind farm access roads, most of which are at existing road crossing points, the potential to mitigate impacts on these features is high. Overall, it is clear that the development is within the stated limits of acceptable change and is considered acceptable from an ecological point of view. In terms of the sensitivity mapping and the set limits of acceptable change, the development is within the limits of acceptable change for all of the sensitivity categories. Consequently, the development is considered to meet the proposed limits of acceptability in terms of the distribution of impact across the different sensitivity categories of the site and there are no fatal flaws in this regard.

Figure 26: the extent of the development footprint within the different sensitivity categories of the Koup 1 site

Sensitivity	Acceptable Loss (%)	Extent within site (ha)	Acceptable Loss (ha)	Predicted Loss (ha)
Low	5	2093.62	104.68	20.28
Medium	2	1495.79	29.92	19.90
High	1	376.66	3.77	1.58
Very High	0.5	352.7	1.76	1.42
Totals			140.13	43.18

8.9 Agricultural

An agricultural compliance statement and site sensitivity verification was undertaken by Johann Lanz (April 2022). According to the report, *the site has low agricultural potential because of, predominantly, rainfall constraints, but also due to soil constraints. It is totally unsuitable for cultivation, and agricultural land use is limited to low density grazing. The land is predominantly of low agricultural sensitivity.*

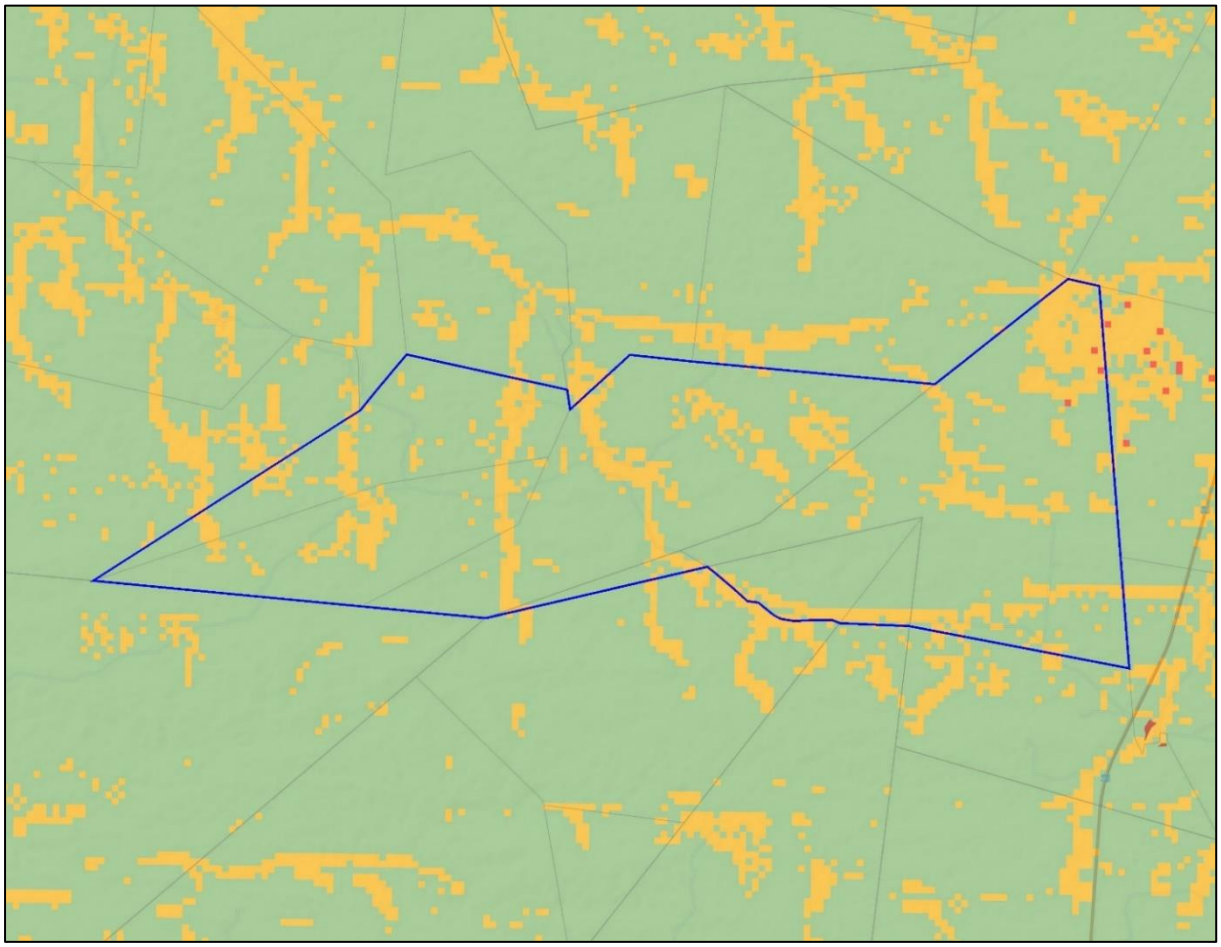


Figure 27: Agricultural sensitivity as given by the screening tool (green = low; yellow = medium; red = high; dark red = very high).

8.10 Avifauna

An Avifaunal Assessment was undertaken by Chris van Rooyen Consulting (April 2022). According to the assessment, *it is estimated that a total of 155 bird species could potentially occur in the broader area. Of these, 16 species are classified as priority species for wind development. The Karoo National Park Important Bird Area (IBA) SA102 is the closest IBA and is located approximately 50km north of the application site at its closest point (Marnewick et al. 2015). The development is not expected to have any impact on the avifauna in this IBA due to the distance from the project site.* **Table 12** *below list all the priority species and the possible impact on the respective species by the proposed WEF.*

LC = Least Concern
NT = Near threatened
VU = Vulnerable
EN = Endangered

H = High
M = Medium
L = Low

Table 12: Wind energy priority species recorded in the broader area.

Species	Taxonomic name	Reporting rate		Status		Recorded during surveys	Likelihood of occurrence	Habitat		
		Full protocol	Ad hoc protocol	Global status	Regional status			Nama Karoo	Surface water	HV lines
Kori Bustard	Ardeotis kori	5.17	0.68	NT	NT		M	x	x	
Ludwig's Bustard	Neotis ludwigii	12.07	2.05	EN	EN	x	H	x		
Common Buzzard	Buteo buteo	1.72	0.00				L	x	x	x
Jackal Buzzard	Buteo rufofuscus	1.72	0.00				L	x	x	x
Blue Crane	Grus paradisea	1.72	0.00	VU	NT		L	x	x	
Booted Eagle	Hieraaetus pennatus	3.45	0.00				M	x	x	x
Martial Eagle	Polemaetus bellicosus	5.17	0.00	EN	EN	x	H	x	x	x
Verreaux's Eagle	Aquila verreauxii	3.45	1.37	LC	VU		L	x	x	x
Spotted Eagle-Owl	Bubo africanus	8.62	2.05				M	x		
Lanner Falcon	Falco biarmicus	1.72	0.00	LC	VU		M	x	x	x
Pale Chanting Goshawk	Melierax canorus	50.00	14.38			x	H	x	x	x
Black Harrier	Circus maurus	3.45	0.00	EN	EN		L	x	x	
Yellow-billed Kite	Milvus aegyptius	1.72	0.00				L	x	x	
Karoo Korhaan	Eupodotis vigorsii	72.41	25.34	LC	NT	x	H	x		
Southern Black Korhaan	Afrotis afra	0.00	0.68	VU	VU		L	x		
Secretarybird	Sagittarius serpentarius	3.45	0.00	EN	VU		M	x	x	

The results of preconstruction bird monitoring conducted at the application site and control area are presented below:

8.10.1 Transects

The results of the transect counts are displayed in the tables below:

Table 13: The results of the drive transects

DRIVE TRANSECTS				
	Total number of records - all species	*Total number of records – wind priority species only*	*Total number of species*	*Total number of wind priority species*
Wind farm	*658*	*31*	*56*	*2*
Control site	*389*	*10*	*39*	*2*

Table 14: The results of the walk transects

WALK TRANSECTS				
	Total number of records - all species	*Total number of records – wind priority species only*	*Total number of species*	*Total number of wind priority species*
Wind farm	*934*	*49*	*39*	*2*
Control site	*1065*	*42*	*49*	*1*

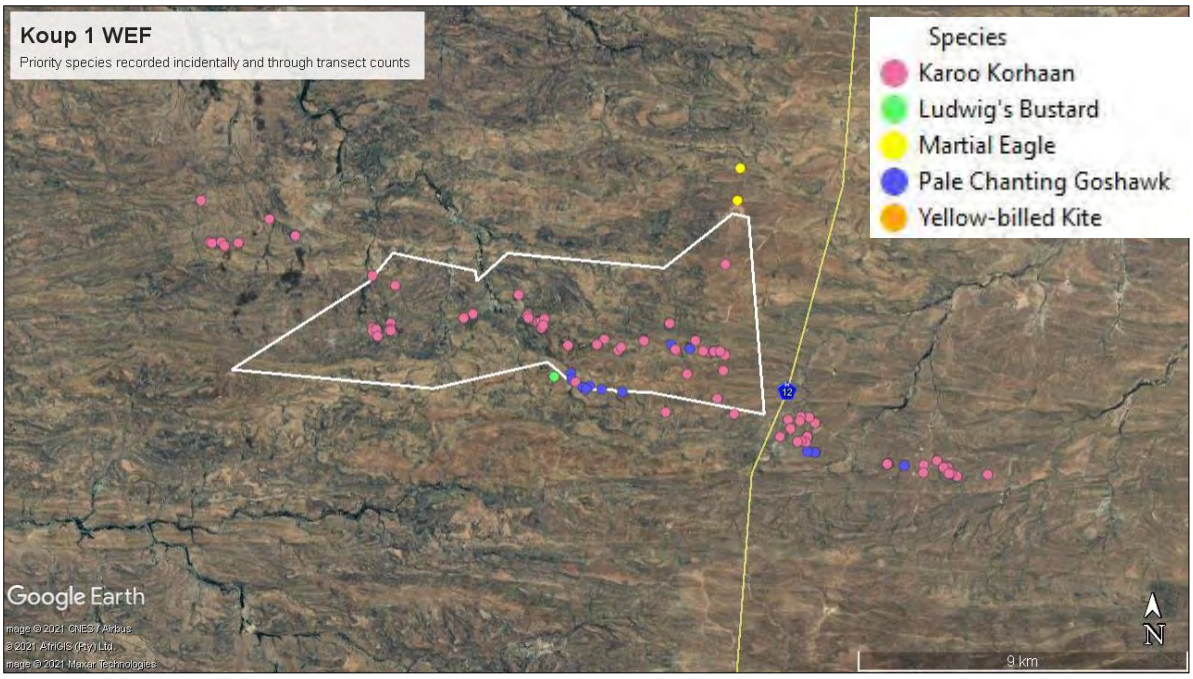


Figure 28: The location of priority species recorded at the proposed WEF through transect counts and incidental sightings.

8.10.2 Focal points

The Martial Eagle nest on Tower 108 was identified as a focal point and monitored over a period of four seasonal surveys. The nest was inactive during the spring monitoring surveys period (September - October 2019). The nest was still inactive during the summer monitoring surveys (January 2020), which is to be expected as it fell outside the breeding season. In May 2020, both adult birds were observed perching on the towers around the nest, indicating that the territory is active, and that breeding may take place that year. However, the birds were not observed at the nest during the

winter surveys in July 2020, indicating that breeding did not happen. The most likely reason for the absence of breeding was the exceptionally dry conditions that year. Martial Eagles do not necessarily breed every year, therefore the absence of breeding should not be interpreted as a sign that the territory has been abandoned. Nests may remain vacant for several years just to be re-occupied again when conditions are favourable (personal observation).

A focal point was identified at the control site, namely a farm dam, and monitored over four seasons. All the dams were dry during the spring monitoring survey period; therefore, no birds were recorded. During the summer surveys in January 2020, the dam was full after the area received some rain. During the autumn surveys in May 2020, the dam was about 60% full. In July 2020, the dam was about 30% full. No wind priority species were recorded in the course of four seasons of monitoring, but the following non-priority species were recorded:

- *South African Shelduck*
- *Egyptian Goose*
- *African Spoonbill*
- *Pied Avocet*
- *Black-winged Stilt*
- *Three-banded Plover*
- *Cape Teal*
- *Red-billed Teal*
- *Little Grebe*

8.10.3 Vantage point observations

A total of 192 hours of vantage point watches were completed at four vantage points in order to record flight patterns of priority species. In the four sampling periods, the duration of priority species flights amounted to 9 minutes and 30 seconds. A total of 11 individual flights were recorded, all at low altitude i.e. below rotor height. The passage rate for priority species was 0.06 birds/hour, which is the fourth lowest passage rate measured for the 50 instances where we did a year vantage point watches at a project site. This amounts to less than one bird per day.

8.10.4 Site specific collision risk rating

A site-specific collision risk rating for each priority species recorded during VP watches was calculated to give an indication of the likelihood of an individual of the specific species to collide with the turbines at these sites. This was calculated taking into account the following factors:

- *The duration of flights;*
- *The susceptibility to collisions, based on morphology (size) and behaviour (soaring, predatory, ranging behaviour, flocking behaviour, night flying, aerial display and habitat preference) using the ratings for priority species in the Avian Wind Farm Sensitivity Map of South Africa (Retief et al. 2012); and*
- *The number of turbines.*

This was done in order to gain some understanding of which species are likely to be most at risk of collision. The formula used is as follows:

Duration of flights (in decimal hours) x collision ratings in the Avian Wind Farm Sensitivity Map x number of turbines ÷100.

The results are presented in **Table 15** and **Figure 29** below.

Table 15: Site specific collision risk rating

Species	*Duration of all flights (hr)*	*Avian Wind Farm Sensitivity Map collision susceptibility rating*	*Site specific collision risk rating*
Karoo Korhaan	*0.005*	*70*	*0.08*
Pale Chanting Goshawk	*0.002*	*65*	*0.04*
Average	*0.003*	*67.5*	*0.06*

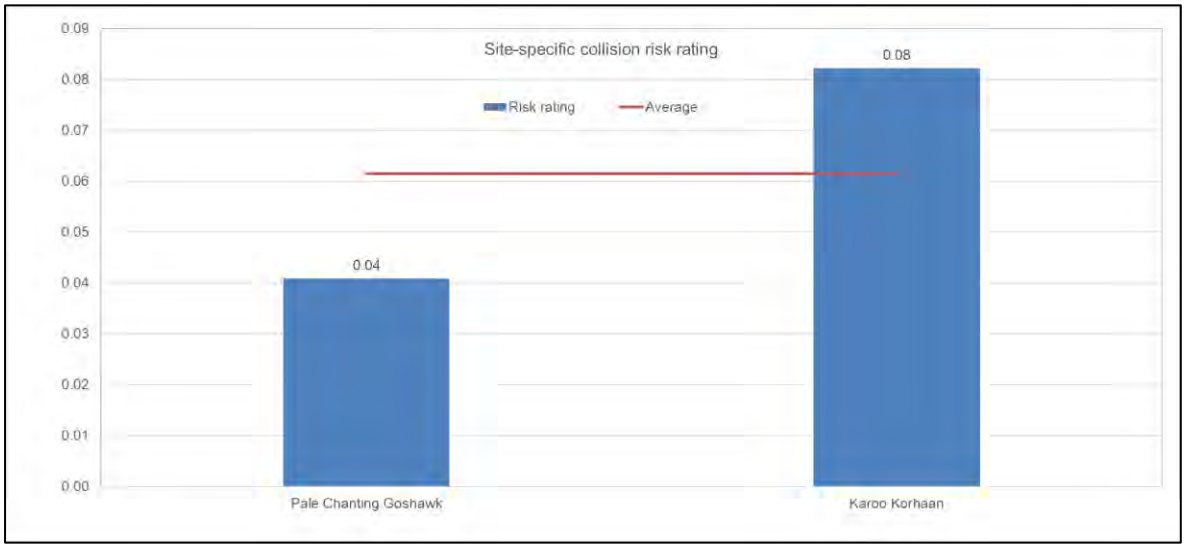


Figure 29: Site specific collision risk rating for priority species. The red line indicates the average collision risk rating for priority species at the application site, based on recorded flight behaviour in four seasonal surveys.

8.10.5 Spatial distribution of flights over the turbine area

Flight maps were prepared for the species with higher than zero collision risk indices, indicating the spatial distribution of flights observed from the various vantage points. This was done by overlaying a 100m x 100m grid over the survey area. Each grid cell was then given a weighting score (Very High; High; Medium; Low) taking into account the flight intensity i.e. the duration and distance of individual flight lines through a grid cell and the number of individual birds associated with each flight crossing the grid cell, in order to give an indication where the observed flight activity was most concentrated (see **Figure 30** and **Figure 31**).

Figure 8.: Intensity of flight activity of Karoo Korhaan over four seasons of monitoring

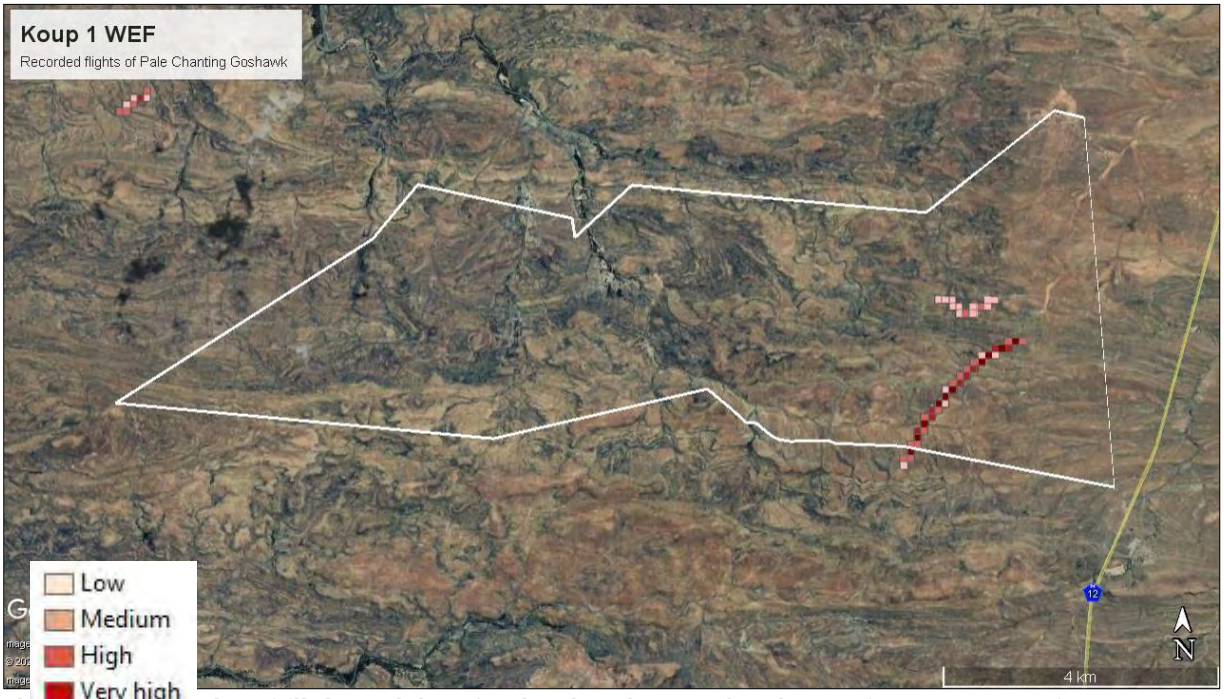


Figure 8.: Intensity of flight activity of Pale Chanting Goshawk over four seasons of monitoring

8.11 Bat

A bat specialist study was undertaken by EkoVler (April 2022). *Bats are adversely affected by the wind turbines that encroach on air space where they forage and commute. The most important aspect of the project that would affect bat populations negatively is the wind turbines themselves, through direct collisions and barotrauma. Other potential negative impacts to bats due to WEF developments*

include loss of existing and potential roosts and foraging area. The extent to which bats may be affected by the proposed wind farm will depend on the extent to which the proposed development area is used as a foraging site or as a flight path by local bats.

A summary of bat species distribution, their feeding behaviour, preferred roosting habitat, and conservation status is available in the report attached in Appendix F. The bats mentioned in the report have distribution ranges covering the Koup 1 WEF development and bats that had been confirmed up to now on the site itself or other wind farms in the area, are marked as such. The proposed wind farm falls within the distributional ranges of six families and approximately 12 species.

Of the 12 species which have distribution maps overlaying the proposed development area, four have a conservation status of Near Threatened in South Africa and one Vulnerable, while three have a global conservation status of Near Threatened. Eptesicus hottentotus (the Long-tailed serotine) and Cistugo seabrae (the Angolan wing-gland bat) are endemic to Southern Africa, mainly due to agricultural activities and have limited suitable habitat left (Monadjem, 2010).

According to the likelihood of fatality risk, as indicated by the latest pre-construction guidelines (Sowler, et al., 2017), two species, namely Tadarida aegyptiaca (Egyptian free-tailed) and (Sauromy petrophilus) Roberts's flat-headed bat, have a high risk of fatality due to its foraging habitat at high altitudes. Five more species, Miniopterus natalensis (Natal long-fingered bat), Neoromicia capensis (Cape serotine bat) and Myotis tricolor (Temminck's myotis bat), and the two fruit bat species, Eidolon helvum (African straw-coloured fruit bat) and Rousettus aegyptiacus (Egyptian rousette), have a medium to high risk of fatality. Fruit bats are not considered a high risk in the dry Koup area, but the proximity of the mountains towards the south, and the possibility that they might migrate over the development area, should not be ruled out.

9. DESCRIPTION OF THE SOCIO- ECONOMIC ENVIRONMENT

9.1 Socio economic characteristics

9.1.1 Central Karoo District Municipality

Central Karoo is the largest district in the province, making up a third of its geographical area and covering an area of 39 073.1 km^2 in 2016. The district is bordered by the Pixley Ka Seme DM in the north, Namakwa DM in the north-west, Garden Route DM in the south, Sarah Baartman DM in the east and Cape Winelands DM in the west and incorporated the following local municipalities.

- Beaufort West Local Municipality
- Laingsburg Local Municipality
- Prince Albert Local Municipality.

The following cities/towns are also located within the Central Karoo district.

- Beaufort West
- Klaarstroom
- Laingsburg
- Leeu Gamka
- Matjiesfontein
- Merweville

- Murraysburg
- Nelspoort
- Prince Albert
- Welgemoed

The main economic sectors of the district are:

- Agriculture (47%)
- Finance and business services (22%)
- Community services (19%)
- Construction (7%).

With a population of 74 247 people, the Central Karoo district has a population density of 1.9/km^2. According to the Community Survey, 2016; the district has a sex ratio of 93.8 with 25.4% of the population being under 15 years; 67.4% being between 15 and 65 years and 7.2% being over 65 years of age.

9.1.2 Prince Albert Local Municipality

The Prince Albert Local Municipality covers a geographical area of 8 156.9/km^2 making it the smallest of the 3 municipalities in the district. The following towns are within the municipal area.

- Klaarstroom
- Leeu Gamka
- Prince Albert and
- Prince Albert Road.

The main economic sectors of the municipality are.

- Agriculture and
- Tourism.

With a population of 14 272 people, the Prince Albert LM has a population density of 1.7/km^2. According to Census, 2016 the district has a sex ratio of 94.8 with 23.5% of the population being under 15 years; 69% being between 15 and 64 years and 7.5% being over 65 years of age.

9.1.3 Beaufort West Local Municipality

The Beaufort West Local Municipality covers a geographical area of 21 931.6/km2 making it the largest of the 3 municipalities in the district. The following towns are within the municipal area.

- Beaufort West
- Merweville
- Murraysburg and
- Nelspoort.

The main economic sectors of the municipality are:

- Transport and communication (25.3%)

- Wholesale and retail trade (16.8%)
- General government services (14.4%)
- Manufacturing (10.9%)
- Agriculture (7.7%).

With a population of 51 080 people, the Beaufort West LM has a population density of 2.3/km^2. According to Census, 2016 the district has a sex ratio of 92.7 with 26.6% of the population being under 15 years; 66.5% being between 15 and 64 years and 6.9% being over 65 years of age.

9.2 Cultural/Historical Environment

9.2.1 Archaeological

An Archaeological Impact Assessment was undertaken by PGS Heritage Pty Ltd (April 2022). *The fieldwork conducted for the evaluation of the possible impact of the new Koup 1 WEF and associated grid connection infrastructure has revealed the presence of 20 heritage resources.*

The find spots were only documented where more than 5 identifiable modified lithics were observed within a 5-metre radius. Most of the find spots were found to coincide with ridges and sheet wash plains which were characterised by low density scatters of lithics consisting mainly of flakes, debitage and cores. This observation also correlates with the findings of the previous heritage studies undertaken in the Beaufort West region. Raw materials utilised included silicified mudstone, siltstone and sandstones. Mostly MSA flakes and debitage were identified, although some ESA and LSA artefacts were observed within the study area. Additionally, single isolated artefacts were also observed across portions of the study area.

9.2.2 Cultural Landscape

A Cultural Landscape Assessment was undertaken by Hearth Heritage as part of the Heritage Impact Assessment (April 2022). *The cultural landscape is a composition of a series of natural layers that have both informed and been formed by the patterns of human use and habitation on that place over time. The nature and shape of the landscape has informed the way in which it has been used, in turn ascribing cultural values to these place-specific features. Through unpacking the layers, landscape character units can be identified which need to be carefully considered in proposed alterations to the landscape.*

Cultural landscapes are a significant factor in the evaluation of the impact of proposed development on cultural heritage resources, tangible (e.g. Historic settlements, landscapes, technological) and intangible (e.g. language, indigenous knowledge systems, oral traditions). The area investigated for the proposed Koup 1 WEF is considered as having a high cultural landscape heritage significance.

The Koup 1 site can be divided into landscape character areas with cultural heritage resource types. These units were determined by taking the larger landscape context into consideration in order to understand the character and cultural heritage values that underpin the proposed development site.

9.2.2.1 Regional Cultural Landscape Elements

A description of the regional cultural landscape elements are as follows:

- *"A magnificent natural setting" (Abrahamse, 2013) of arid plains with gently undulating ridges and koppies, framed by the dramatic mountain ranges of the Nieuweveld and Swartberg. This*

landscape element is the main drawcard for tourism to the area and a national narrative of identity for many South Africans. This scenic beauty and natural sense of place has been celebrated in no less than three national parks being proclaimed in the Koup region, the Karoo National Park, the Gamkapoort Nature Reserve and the Swartberg Nature Reserve, not to mention the various private nature reserves in the area.

- *Some of the world's most significant geological and palaeontological sites are located in the Great Karoo, specifically between Beaufort West and Nelspoort, and include ancient rock formations and Late Permian fossils which record the evolution from reptiles to mammals.*
- *The distinct remoteness of the semi-arid Karoo provided a refuge for the displaced San and later the Khoekhoen. The remote settings of mission settlements are associated with the role of religion and an emphasis on social engineering and self-sufficiency (Winter and Oberholzer, 2014). This remote desert wilderness is an essential element to the Central Karoo cultural landscape's sense of place.*
- *Low shrubby vegetation dominates the landscape allowing for distant views of mountain ranges, with taller clusters of trees marking historic points such as cemeteries or farmsteads. Many of the endemic species hold medicinal value for local communities, making these significant as cultural resources.*
- *Although not immediately apparent on travelling through the landscape, significant stone age archaeology, which includes petroglyphs and rock engravings, is common in the area; material cultural remnants of the prehistoric inhabitants of the landscape who lived in intimate dependence on and knowledge of the natural environment, shaping it and being shaped by it over time. This relatively undisturbed area is rich in archaeology, especially near dolorite outcrops due to the presence of underground water and includes stone tool scatters, rock engravings and herder kraals.*
- *Poorts and drifts which navigate the topography of ridges and riverine corridors. These natural crossing points, gaps between the mountain ranges, ridges and undulating hills, and shallower sections of river, have been used by animals and people as the places to traverse the landscape to water, forage, safety or settlements for centuries. These places, acting as funnels of movements across the landscape, therefore, may hold the material scatter of those who passed over them and, where identified historic tracks are still used, these are heritage elements of land use and one of the ways in which the landscape would have determined the movement and, therefore, settlement and interaction of people on the landscape.*
- *Scenic historic movement routes, tarred, gravel and rail, connect the regional towns over the Central Karoo landscape with distant dramatic viewscapes of mountain ranges. These movement routes and patterns to access have informed the settlement patterns of the region. Many of the roads and farm tracks in the study site as well as surrounding area are visible on maps dating back to the 18th and 19th centuries. As a landscape that maintains a dominant characteristic of survival, conflict and change, the roads and paths that cross this landscape are an essential element, connecting the significant points, places of refuge and conflict, trade and subsistence, to each other in a challenging space over time.*
- *A combination of the poort and scenic historic route elements, the historic Swartberg Pass, is an identified historic scenic route and declared Provincial Heritage Site. Further east on the N12 lies Meiringspoort Pass, which predates the Swartberg Pass, and connects Beaufort West with De Rust and Oudtshoorn. Other passes in the region include the Gamkasloof Pass, Seweweekspoort in the Swartberg and the Molteno Pass in the Nuweveld range to the north. Historic mountain passes provided access between coastal plains and the remote interior, and their gateway conditions are typically associated with historical patterns of settlement (Winter and Oberholzer, 2014).*
- *Historic farmsteads with their associated agricultural structures and linking farm roads. Many of the farm werfs include historic structures, built in the regional architecture of packed local stone,*

now converted into dwellings or sheds. These farmsteads are mostly situated at points of lower elevation, nestled against the hills and ridges where the soils are more suitable for agriculture, and where nearby springs or other water sources supply water for livestock and limited cultivation of crops. Amandelhoogte and Vlieefontein have been identified as "significant Cape farmsteads" in Abrahamse's Beaufort West Municipal Heritage Survey (2013).

- *Stone walls and kraals dot the landscape as remnants of stock keeping, road building and fortifications in the area.*
- *Agricultural landscape with livestock, mostly sheep and cattle; fencing and associated structures line and dot the landscape. These are evidence of the human landscape modifications and patterns of land use over millennia, including seasonal grazing and pastoral uses.*
- *Game and nature reserves with live game and associated high fencing, drawing tourists to the region for game viewing and hunting. Game hunting has been continuous on this landscape for millennia since pre-historic inhabitants to the most recent tourist hunters, and attests to the ongoing relationship between humans and the environment in this region. Although a sense of wilderness is experienced when travelling within these reserves, the height of the fences and their increased occurrence does detract from the 'wild' sense of place when travelling the roads around them.*
- *Historic town settlements and landscapes, such as Beaufort West, Prince Albert and Leeu-Gamka, associated to significant events in South Africa's history of survival, conflict and nation-building, including many provincial heritage sites which mark people and places of value to our national estate. Matjiesfontein and the isolated Gamkaskloof Cultural Landscape have Provincial Heritage Site status.*
- *Military posts and forts, historic and current, constructed of local stone; material remains to the frontier zone of conflict and survival that dominated this landscape for so long. Evidence of the Anglo-Boer War in the early 1900s still remains in the form of grave sites and blockhouses along the railway line, and places such as Matjiesfontein and Prince Albert were used as garrisons by the British.*
- *Uranium mining sites dot the region around Beaufort West. Historic gold and diamond prospecting in the region add an additional cultural layout to this element.*
- *Industrial elements of transmission lines and associated infrastructure are evident along the N12 and N1. Due to their limited scale and massing along the N12 currently, they do not overwhelm or detract from the rural and historic sense of place in the area.*

9.2.3 Palaeontological

A Palaeontological Heritage Report was undertaken Natura Viva cc (April 2022). According to the report, *the Koup 1 WEF project area is underlain by continental (fluvial / lacustrine) sediments of the Abrahamskraal and Teekloof Formations (Lower Beaufort Group, Karoo Supergroup) which are of Middle to Late Permian age and are provisionally assigned a Very High sensitivity on the SAHRIS palaeosensitivity map as well as the DFFE screening map. These bedrocks contain sparse, unpredictable to locally concentrated vertebrate fossils as well as rare trace fossils (e.g. tetrapod burrows) and plant material that are of scientific and conservation value. A significant number of new fossil vertebrate sites (cranial and post-cranial material of large-bodied dinocephalians, small dicynodonts, rare tetrapod burrow casts) have been recorded within the combined Koup WEF / grid connection project areas during a 5-day site visit, while several fossil sites have previously been mapped shortly outside its margins. These palaeontological sites, together with their sedimentological context, provide important data for on-going research into the pattern and causes of the Middle Permian Mass Extinction Event on land aroiund 260 million years ago.*

Scientifically-valuable and legally-protected fossil heritage resources preserved at or beneath the ground surface within the project footprint are potentially threated by surface clearance and bedrock

excavations during the construction phase of the WEF and grid connection (e.g. for access roads, wind turbine foundations). The majority of the recorded fossil sites lie outside the project footprint but most of the WEF and grid connection footprint has yet to be palaeontologically surveyed on foot. A significant number of unrecorded sites are likely to exist within or very close to the project footprint.

No Very High Sensitivity or No-Go palaeontological sites or areas have been identified within the WEF and grid connection. Since all known fossil sites can be readily mitigated through professional recording and collection of fossil material in the pre-construction phase, no recommendations for micro-siting of infrastructure such as wind turbine, pylon positions or access roads are therefore made here. There are no preferences on palaeontological heritage grounds for specific site options for the Koup 1 WEF on-site substation and construction laydown area.

9.3 Noise

A Noise Impact Assessment was undertaken by Enviro-Acoustic Research (April 2022). *Ambient (background) noise levels were measured during June 2021 in accordance with the South African National Standards, also considering the protocols defined in GG 43110.*

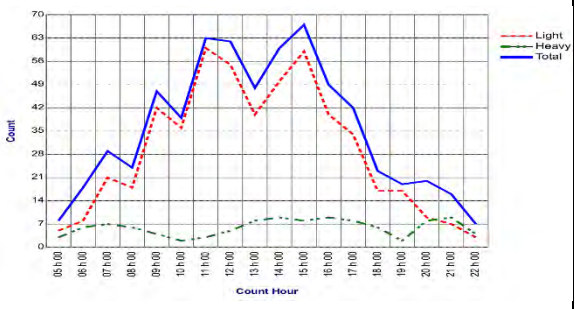
All the data indicated an area with a high potential to be quiet both day and night. The visual character of the study area is rural and it was accepted that the SANS 10103 noise district classification could be rural during low wind conditions. Considering sound level data measured in similar areas, ambient sound levels will increase as wind speeds increase, and noise limits were proposed considering all available data and guidelines.

9.4 Transport

A Transportation Impact Assessment was undertaken by SiVEST SA (Pty) Ltd (April 2022). According to the report, *the Western Cape Provincial Government makes use of a Traffic Counting System (TCS) and serves the Western Cape Provincial Network since 1999. The main emphasis of the system is on Trunk, Main and Divisional roads and at the present time only Minor roads that intersect with more important roads are on the system.*

The data indicated below are from two stations on the N12 Freeway, immediately north and south of the proposed development at Km 79.41 and Km 33.23 respectively.

Table 16: Traffic Station Data / Counts

	Light Vehicles	*Heavy Vehicles*	*Total Vehicles*	*Station Count Chart*
N12 @ DR02304 INTERCHANGE Km79.41 Station No: 2126A Date: 12/09/2016				
Morning 7:00-8:00	*19*	*6*	*25*	
Afternoon 16:00-17:00	*35*	*8*	*43*	
Average Annual Daily Trips	*629*	*136*	*765*	
N12 @ DR02301 INTERCHANGE Km33.23 Station No: 2125C Date: 25/10/2017				
Morning 7:00-8:00	*19*	*6*	*25*	
Afternoon 16:00-17:00	*35*	*8*	*43*	
Average Annual Daily Trips	*629*	*136*	*765*	

Based on the table above, it can be concluded that the existing peak traffic on this section of road is a 'Weekday Midday' peak hour traffic between 10:00 – 16:00.

9.5 Visual

A Visual Impact Assessment was undertaken by SiVEST SA (Pty) Ltd (April 2022). According to the report, *WEF and power line developments are not features of the natural environment, but are rather a representation of human (anthropogenic) alteration. As such, these developments are likely to be perceived as visually intrusive when placed in largely undeveloped landscapes that have a natural scenic quality and where tourism activities are practised that are dependent on the enjoyment of, or exposure to, the scenic or aesthetic character of the area. Residents and visitors to these areas could perceive the development to be highly incongruous in this context and may regard the development as an unwelcome intrusion which degrades the natural character and scenic beauty of the area, and which could potentially even compromise the practising of tourism activities in the area. In this instance however, the area is not typically valued for its tourism significance and no formal protected areas were identified in the broader area. In addition, very few, leisure-based tourism activities, and no recognized tourism routes were identified in the study area.*

In addition, it should be noted that the experience of the viewer is highly subjective and there are those who may perceive wind turbines, for example, as striking elements in an otherwise barren landscape.

The presence of other anthropogenic features associated with the built environment may not only obstruct views but also influence the perception of whether a development is a visual impact. In industrial areas for example, where other infrastructure and built form already exists, the visual environment could be considered to be 'degraded' and thus the introduction of a WEF and associated grid connection infrastructure into this setting may be considered to be less visually intrusive than if there was no existing built infrastructure visible.

10. POLICY AND LEGISLATIVE CONTEXT

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

10.1 The Constitution

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

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

Section 24 of the Constitution states that:

"Everyone has the right –

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

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

10.2 National Environmental Management Act (107 of 1998)

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

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

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

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

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

The proposed project triggers listed activities under Listing Notice 1, 2 and 3 (as detailed in Section 7 above), and thus requires an EA subject to an Environmental Impact Assessment (EIA) Process.

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

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

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

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

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

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

10.4 National Water Act (Act 36 of 1998)

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

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

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

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

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

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

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

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

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

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

a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
b) the construction of a bridge or similar structure exceeding 50 m in length;
c) any development or other activity which will change the character of a site—
   (i) exceeding 5 000 m2 in extent; or
   (ii) involving three or more existing erven or subdivisions thereof; or
   (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or

(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;

d) the re-zoning of a site exceeding 10 000 m2 in extent; or

e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,

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

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

A Notice of Intent to develop (NID) was submitted to HWC by PGS Heritage on the 6th October 2021.

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

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

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

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

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

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

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

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

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

A Biodiversity Assessment (**Appendix 6**) has been conducted to explore how the proposed development may impact on biodiversity as protected by the Act. Should the proposed development require offsets or permits, it will be determined and applied for separately prior to construction**.**

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

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

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

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

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

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

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

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

The NFA enforces the necessity for a license to be obtained prior to destroying any indigenous tree in a natural forest and, subject to certain exemptions, cutting, disturbing, damaging, destroying or removing any protected tree. The list of protected trees is currently contained in GN 908 of 21

November 2014. Licenses are issued by the Minister and are subject to periods and conditions as may be stipulated.

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

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

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

A Biodiversity Assessment (**Appendix 6**) has been conducted to explore how the proposed development may impact on vegetation as protected by the Act. Should the proposed development require offsets or permits, it will be determined and applied for separately prior to construction**.**

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

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

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

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

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

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

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

In terms of this Act, no degradation of natural land is permitted. Rehabilitation after disturbance to agricultural land is also managed by this Act. The CARA is relevant to the proposed development as the construction of a WEF as well as other components (such as the on-site switching substation and permanent guard house) may impact on agricultural resources and vegetation on the site. The Act

prohibits the spreading of weeds and prescribes control measures that need to be complied with in order to achieve this. As such, measures will need to be taken to protect agricultural resources and prevent weeds and exotic plants from invading the site as a result of the proposed development.

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

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

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

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

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

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

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

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

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

The Air Traffic and Navigation Services Company Limited (ATNS) and the SACAA will be consulted throughout the EIA process and the required approvals will be obtained, where necessary. It is not however anticipated that any approvals will be required.

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

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

- The preservation and protection of areas that are uniquely suited for optical and radio astronomy; and

- Intergovernmental cooperation and public consultation on matters concerning nationally significant astronomy advantage areas and matters connected therewith.

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

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

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

Even though the proposed development falls outside the respective AAAs, the relevant authorities, including the Square Kilometre Array (SKA) and South African Large Telescope (SALT), will be consulted throughout the EIA process.

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

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

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

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

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

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

The objectives of the regulations include:

- To facilitate planning for the establishment of new generation capacity;
- The regulation of entry by a buyer and a generator into a Power Purchase Agreement (PPA);
- To set minimum standards or requirements for PPAs;
- The facilitation of the full recovery by the buyer of all costs efficiently incurred by it under, or in connection with, a PPA including a reasonable return based on the risks assumed by the buyer

thereunder and to ensure transparency and cost reflectivity in the determination of electricity tariffs; and
- The provision of a framework for implementation of an Independent Power Producer (IPP) procurement programme and the relevant agreements concluded.

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

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

The Strategic Environmental Assessment (SEA) for Wind and Solar PV Energy in South Africa (CSIR, 2015) originally identified eight (8) formally gazetted[1] Renewable Energy Development Zones (REDZs) that are of strategic importance for large-scale wind and solar PV development in terms of Strategic Integrated Project 8: Green Energy in Support of the South African Economy, as well as associated strategic transmission corridors2, including the rollout of its supporting transmission and distribution infrastructure, in terms of Strategic Integrated Project 10: Electricity Transmission and Distribution.

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

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

[1] Formally gazetted on 16 February 2018 (Government Notice 114)

[2] Formally gazetted on 16 February 2018 (Government Notice 113)

[3] Formally Gazetted on 26 February 2021 (Government Notice 144)

Table 17: The SEA for Wind and Solar PV Energy in South Africa (Phase 1 and Phase 2) (CSIR, 2015; CSIR, 2019) identified the following eleven (11) geographic areas for REDZs

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

It should be noted that a portion of the proposed development is located within the Central Corridor of the Strategic Transmission Corridors, as defined and in terms of the procedures laid out in Government Gazette No. 41145 and No. 44191[4] Ultimately, the proposed development will be subject to a EIA process in terms of the NEMA, as amended, and the EIA Regulations, 2014 (as amended). Since the proposed project falls within one (1) of the Strategic Transmission Corridors, it is expected to contribute towards the requirement of renewable energy highlighted by the development of these zones. A map of the development in relation to the nearest REDZ has been included in **Appendix 3**.

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

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

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

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

10.18 Additional Relevant Legislation

- Occupational Health and Safety Act (Act No. 85 of 1993) [OHSA];

[4] Formally Gazetted on 26 February 2021 (Government Notice 145)

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

11. KEY DEVELOPMENT STRATEGIES AND GUIDELINES

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

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

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

The DoE gazetted its White Paper on Renewable Energy in 2003 and introduced it as a ‘policy that envisages a range of measures to bring about integration of renewable energies into the mainstream energy economy.’ At that time, the national target was fixed at 10 000GWh (0.8Mtoe) renewable energy contribution to final energy consumption by 2013. The White Paper proposed that this would be produced mainly from biomass, wind, solar and small-scale hydropower. It went on to recommend that this renewable energy should be utilised for power generation and non-electric technologies such as solar water heating and biofuels. Since the White Paper was gazetted, South Africa’s primary and secondary energy requirements have remained heavily fossil-fuel dependent, both in terms of indigenous coal production and use, as well as the use of imported oil resources. Alongside this, the

projected electricity demand of the country has led the National utility Eskom, to embark upon an intensive build programme to secure South Africa's longer-term energy needs, together with an adequate reserve margin.

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

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

A more efficient and competitive infrastructure is envisaged, particularly infrastructure that facilitates economic activity and is conducive to growth and job creation. The plan identifies key services that need strengthening; namely commercial transport, energy, telecommunications and water, while ensuring their long-term affordability and sustainability. The National Planning Commission maintains that South Africa has missed a generation of capital investment in many infrastructure opportunities including electricity. Therefore, one (1) infrastructure investment priority is in the procurement of at least 20000MW of renewable energy-efficiency (National Planning Commission, 2011).

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

- National Integrated Resource Plan for Electricity (2010-2030);
- Integrated Resource Plan (IRP 2019)
- National Infrastructure Plan 2012, as amended;
- Western Cape Strategic Plan 2019-2024 (refer section 10.1)
- The Western Cape Spatial Development Framework (SDF) 2014 (refer section 10.1.1)
- Central Karoo District Municipality Integrated Development Plan, 2020 – 2021 (refer section 10.2)

The proposed project is also well aligned with the Prince Albert Municipality IDP and the Beaufort West Local Municipality IDP (refer section 10.2.1-2).

11.1 Western Cape Strategic Plan 2019 - 2024

The Western Cape Strategic Plan 2019-2024, highlights the need for energy security and for diversification of the regional energy mix, emphasizing support for the Green Economy and stating that.

"*The growth of the renewable energy sector has the potential for high labour absorption and can also link to increased opportunities for SMMEs, especially for SSEG*" (Western Cape Government, 2020, p. 48).

11.1.1 The Western Cape Spatial Development Framework (SDF) 2014

The proposed project falls within the Western Cape Province. According to the Western Cape Spatial Development Framework (SDF), the Western Cape's energy sources are mostly drawn from the national grid which is dominated by non-renewable sources. According to the SDF, the Province has

a small emergent sustainable energy sector in the form of wind and solar generation facilities located in the more rural, sparsely populated areas. One of the key transitions in terms of the Western Cape Infrastructure Framework is to "*Promote the development of renewable energy plants in the Province and associated manufacturing capability*".

The SDF also mentions the challenges around Climate Change and that the focus areas for mitigation are energy efficiency, demand management and renewable energy. Through climate change mitigation they hope to "*encourage and support renewable energy generation at scale*".

The Western Cape Strategic Plan 2019-2024, also highlights the need for energy security and for diversification of the regional energy mix, emphasising support for the Green Economy and stating that: "*The growth of the renewable energy sector has the potential for high labour absorption and can also link to increased opportunities for SMMEs, especially for SSEG*" (Western Cape Government, 2020, p. 48).

11.2 Central Karoo District Municipality Integrated Development Plan, 2020 – 2021

The Central Karoo DM has identified the "potential and impact of renewable energy resource generation, as part of the district's economic profile (Central Karoo District Municipality, 2019, pp. 16, 79, 80 & 81)

The Municipality indicates that it will move to less carbon-intensive electricity production through procuring at least 20 000MW of renewable energy by 2030, increased hydro-imports from the region and increased demand-side measures, including solar water heating.

The IDP further mentions that the introduction of renewable energy generation and the Square Kilometer Array project in the greater Karoo region, as well as possible exploration for shale gas, will add value to the Gross Domestic Product (GDP) within certain economic sectors and, by implication, change the composition and character of the towns. Further suggestions are at developing an Alternative Energy Strategy for the Central Karoo.

11.2.1 Prince Albert Municipality Integrated Development Plan (2020/21 Draft Review)

With Eskom struggling to provide in all energy demands, the Municipality is in the process of exploring alternate energy sources for Commercial, Residential and Industrial use. This will have a direct impact on the Municipality's income and will need to be undertaken with careful consultations and input from the local communities.

In terms of access to electricity, the Prince Albert Municipality also mentions that it will investigate the possibility of renewable energy and the inclusion of Small-Scale Embedded Generation (SSEG) onto the electricity distribution network so that "*safety, power quality, grid operation and municipal revenue issues are adequately addressed, and that the local renewable energy industry and green economy is promoted at the same time, supporting job creation*".

The Prince Albert Local Municipality recognises that the area has " …*vast land, long Karoo sunshine days and high quality of sunrays inspires the development of solar parks* (Prince Albert Municipality, 2018, p. 123). Although not specifically mentioned in the IDP, the potential to expand this resource to encompass wind energy is likely to be a viable option.

11.2.2 Beaufort West Local Municipality Integrated Development Plan (2013 – 2016)

The Municipality has a responsibility to take care of the natural environment for future generations to enjoy a clean and safe environment, in which biodiversity is conserved and tourism is maximised. The Beaufort West Integrated Development Plan 2018/19 Review therefore lists Clean Energy as its Sustainable Development Goal 7 (Beaufort West District Municipality, 2018, p. 20 & 21).

The IDP indicates that natural resources should be used more efficiently and investment in green technologies pursued in order to ensure that there is enough water and energy for the growing economy. The Municipality needs to be more robust and resilient so that it can respond to the challenges of climate change and other natural hazards.

In terms of major infrastructure projects planned for the municipality, they also hope to "*Promote domestic and large wind and solar energy projects subject to appropriate guidelines and siting principles*".

12. NEED AND DESIRABILITY

12.1 National Renewable Energy Requirement

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

This growing demand, fuelled by increasing economic growth and social development within Southern Africa, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of environmental impact, climate change and the need for sustainable development. Despite the worldwide concern regarding Greenhouse Gas (GHG) emissions and climate change, South Africa continues to rely heavily on coal as its primary source of energy, while most of the countries renewable energy resources remain largely untapped (DME, 2003). There is therefore an increasing need to establish a new source of generating power in SA within the next decade.

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

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

12.2 National Renewable Energy Commitment

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

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

12.3 Wind Power Potential in South Africa and Internationally

Onshore wind energy technology is the most commonly used and commercially developed renewable energy technology in South Africa as wind is abundant and inexhaustible (DEA Guideline for Renewable Energy, 2015). Wind energy is one (1) of the lowest-priced renewable energy sources and is economically competitive (www.wasaproject.info).

12.4 Site Suitability

The location of the proposed Koup 1 WEF (this application) and proposed on-site Switching / Collector Substation and associated 132kV Power Line development that will serve the Koup 1 WEF (part of separate respective BA process), included several key aspects including wind resource, grid connection suitability as well as environmental, competition, topography and access.

1. Wind resource is the first of the main drivers of project viability across South Africa. The applicant has investigated the option of solar energy and based on the information provided on the solar irradiance on the site, it can be seen that there is suitable potential for solar energy. The total photovoltaic power output and Global tilted irradiation for the area is 187.286 GWh per year and 2358.3 kWh/m2 per year respectively. However, the applicant has chosen to go with the wind energy option.

2. Environmental suitability is the second key aspect that the Applicant considers when evaluating a wind energy project. The project should be developed in a sustainable and ecologically friendly manner ensuring its development has the least possible impact on the land on which it will be built.

   While the smaller drainage features of the site are classified as Ecological Support Areas, there is only one small area of CBA in the east of the site that would be minimally impacted by the development.

3. The third primary driver of site selection is capacity on the local transmission system to evacuate the power into the national grid. In this case, the applicant is in discussions with Eskom with regards to a Collector Substation that is envisaged. One scenario includes a Collector at the Koup 1 SS footprint. Should Eskom decide to place the Collector SS on the windfarm to the north or to the south; lines will run from Koup 1 on-site SS to the Collector. The Collector will then link into the 400kV line.

4. Other key criteria which refines the site selection on a micro level include competition, topography and access.

   The site proposed for the Koup 1 development is located in the scenic Karoo region of the Western Cape Province, which is generally associated with wide vistas and mountainous landscapes. The topography in the immediate vicinity of the site is however characterised by flat to gently undulating plains interspersed with areas of localised hills and koppies. The flat plains that make up the project area make it a good site to establish a WEF from a technical perspective.

   The farm is located in a sheep farming agricultural region, and grazing of sheep and game is the dominant agricultural land use on the site and surrounds. Grazing capacity of the site is low at 32 to 36 hectares per large stock unit. Due to the extreme aridity constraints as well as the poor soils, agricultural land use is restricted to low intensity grazing only. It should be noted that the area is not valued for its agricultural potential and the proposed development will only impact agricultural land which is of extremely low agricultural potential and is unsuitable for cultivation.

   Access to the Koup 1 WEF site will be from the existing access, located ±1 430m west from the surfaced N12 National Road (Road No: TR03305) and falls under the jurisdiction of the Western Cape Provincial Administration. The existing access is located at Km 51.80 and provides access to the farms situated on both east and west of the N12 Freeway. The access to this development is towards the west from the N12 Freeway and traverses over the Remainder of Portion 4 of the farm 374 as a gravel access road up to the existing farm access.

12.5 Reduce dependency on fossil fuels

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

12.6 Stimulate the economy

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

The proposed development has the potential to stimulate the demand for other industries, among others construction services, engineering service, transport services, steel structures, cement and other aggregates, and electrical equipment. At the local level, increase in demand for accommodation,

personal services, perishable and non-perishable goods is expected, which will stimulate the local economies of the towns and settlements, where labour will be procured from or where migrant workers will be temporarily located.

Some of the local businesses could benefit from sub-contracting opportunities, if the construction companies appointed by the developer implement a local community procurement policy, and consumer expenditure of the construction crew. Furthermore, the demand for hospitality services (including accommodation and catering in the towns Beaufort West and other nearby towns) is expected to increase and provide for much-needed stimulus for the local economy.
According to the Social Impact Assessment, *apart from jobs the project is also likely to stimulate the local economy, which is likely to be most significant at a cumulative level. Nevertheless, there will be a significant economic contribution attached to the Genesis Enertrag Koup 1 Wind Facility. This contribution will be in the form of disposable salaries and the purchases of services and supplies from the local communities in and around the towns of Beaufort West and Prince Albert. The capital expenditure on completion of the project is anticipated to be in the region of R 2.5 billion.*

Apart from job creation and procurement spend; the project will also have broader positive socio-economic impacts as far as socio-economic development contributions are concerned. Although, at the point of writing, the project developer had not as yet put a corporate social responsibility plan in place, the intention is to either fall in line with the REIPPP BID guidelines or to put an equivalent plan in place. This will create an opportunity to support the local community over the life span of the operational phase of the project, which will stretch over a 20-year period. At a national level the project also has the potential to contribute towards the national grid requirements as part of the Government's vision to source 15.1% of the country's energy through wind power (Department of Energy Republic of South Africa, 2018, p. 41).

12.7 Job opportunities and household livelihoods

Wind energy projects create both temporary and permanent job opportunities in South Africa for both skilled and unskilled workers. According to the Social Impact Assessment that was undertaken (May 2021), t*he project will lead to the creation of both direct and indirect jobs which will have a positive economic benefit within the region. In this regard, there are 300-400 jobs associated with the construction phase of the project and 20 with the operational phase. Of these jobs approximately 165-220 (55%) of the employment opportunities will be available to low-skilled workers (construction labourers, security staff etc.), 90-120 (30%) to semi-skilled workers (drivers, equipment operators etc.), and 45-60 (15%) for skilled personnel (engineers, land surveyors, project managers etc.). Many of the low and semi-skilled employment opportunities will probably be available to residents in the area, specifically residents from Beaufort West and Prince Albert. Many of the beneficiaries are likely to be historically disadvantaged members of the community and the project will provide opportunities to develop skills amongst these people. The operational phase will employ approximately 20 people full time for a period of up to 20 years. Of this, approximately 4 are low skilled, 10 are semi-skilled and 6 are skilled.*

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

Household earnings are linked closely with trends in employment and, as such, will be affected positively by the creation of jobs as discussed above. The creation of temporary jobs during the

construction period will temporarily increase affected households' income. Some of this income will be earned by workers from the local communities. Given that the average household income in the area is R29 400, a significant boost in household income may prevail. A temporary increase in living standards based on the additional monthly income will thus ensue. Employees working for local businesses that will be sub-contracted to supply goods and services to the WEF during construction are also expected to benefit indirectly.

12.8 Skills development

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

Those employed will either develop new skills or enhance current skills. This insinuates that inexperienced workers will have the opportunity to attain and develop new skills, while experienced workers will further improve their existing skills. Albeit the employment is temporary, the skills attained will be of long-term benefit to employees. However, as any skills set it will need to be supported and practised on a regular basis to maintain its currency.

12.9 Proximity to substation

The area is well situated, as described above, with good wind resources suitable for the installation of a large WEF. In addition to this, the project area is in close proximity to connectivity opportunities. The surrounding area is not densely populated and should therefore not impact on people's livelihoods living in the area.

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

The preliminary layout that was prepared for the Koup 1 Wind Farm (included in the Approved Scoping Report) has been assessed by specialists to identify potential impacts that may arise from the development. Based on the findings of the specialists and the potential impacts identified and the public participation undertaken during the scoping phase, the preliminary layout has been updated to include constraints (**Figure 32**).

All turbines (except for turbine 11) are place outside of the no-go areas identified by specialists. In terms of the bat assessment, there are two turbines situated within a high-medium sensitivity zone and two turbines situated within a medium sensitivity zone. The high-medium sensitivity zone is made up of buffer areas bordering the high sensitivity zones. Due to the low bat activity, these areas do not justify high sensitivity classification, but should be carefully monitored. The bat specialist has recommended that operational monitoring and mitigation are implemented upon construction of the WEFs.

In terms of the cultural landscape assessment, one turbine is within the Platdooring Historic Farmstead buffer of 800m (the turbine is approximately 750m from this farmstead). The cultural landscape specialist has recommended that a pre-construction micro-survey for turbines and other infrastructure be undertaken, during which time the feasibility of moving this turbine outside the 800m will be investigated.

The location for the BESS, substation and construction laydown/operation and maintenance building fall within the preferred development site boundary. Option 1 is preferred for the BESS, substation and construction laydown area / operation and maintenance building (based on the comparative assessment of alternatives undertaken by the specialists – refer to Section 14.3.6) as it does not fall within any no-go areas. Option 1 for the substation and construction laydown / operation and maintenance building is however located within a 300m road buffer recommended by the cultural heritage specialist. The cultural heritage specialist has recommended that this be removed from the buffer and placed on the same side of the road.

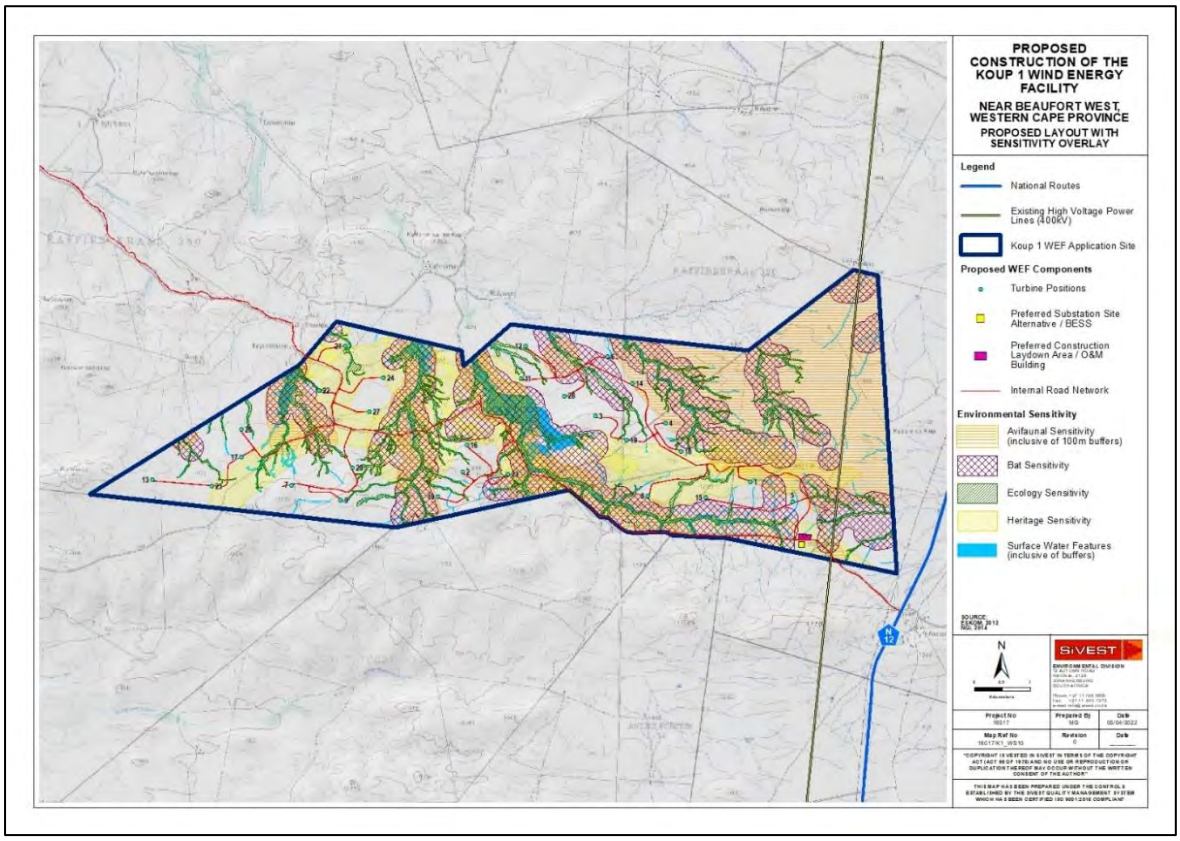


Figure 32: Final proposed layout with site sensitivities

The proposed final layout has therefore considered the sensitivities identified in the scoping phase, which has informed the preferred alternative and the preferred development footprint. It is for reasons stated above that the development footprint as reflected in the final proposed layout is preferred.

14. DETAILS OF PROCESS FOLLOWED TO REACH THE PREFERRED OPTION

14.1 Details of alternatives

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

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

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

14.1.1 Location/Site alternatives

Prior to the initiation of the EIA, alternative properties / sites were considered for the location of the proposed development. The selection of a potential wind project site includes several key aspects including wind resource, environmental, grid connection suitability as well as competition, topography and access. This proposed project site was selected based on the above criteria ahead of other regional properties / sites due to the cumulative assessment of all criteria. This internal process takes several weeks to complete and ensures that the least environmentally sensitive property / site is selected in the specific region of development.

No site alternatives have been considered during the EIA process for this proposed development. The placement of wind energy installations is dependent on the factors discussed above, all of which are favourable at the proposed site location. A met mast was installed on the project site and the proposed site has been deemed suitable in terms of wind resource. The proposed project site has topography which is suitable for the development of a WEF. In addition, the proposed project site also has a low agricultural intensity. The project site is easily accessible off the N12. Access to the Koup 1 WEF site will be from the existing access, located ±1 430m west from the surfaced N12 National Road (Road No: TR03305), the existing access is located at Km 51.80 and provides access to the farms situated on both east and west of the N12 Freeway. The site is therefore considered highly suitable for the proposed development of a WEF and no other locations have been considered.

14.1.2 The type of activity to be undertaken

No other activity alternatives have been considered. Renewable Energy developments in South Africa are highly desirable from a social, environmental and development perspectives respectively. Wind energy installations are more suitable for the proposed site because of the high wind resource.

14.1.3 The technology to be used in the activity

The choice of technology selected for the Koup 1 WEF was based on environmental constraints and technical and economic considerations. The size of the wind turbines will depend on the development area and the total generation capacity that can be produced as a result. Therefore, no technology alternatives will be considered.

14.1.4 Design or layout of the activity

The proposed final layout has been informed by screening and assessed by the specialists in their respective specialist studies in the scoping phase and has been further refined and assessed in this EIA Report. These included two alternatives for the Substation locations and two alternatives for the construction / laydown area.

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

The applicant has chosen to avoid the no-go areas identified by the bat specialist together with the sensitive areas identified by the other specialists to ensure that the least amount of harm to the environment. As a result of this avoidance, the applicant was able to achieve the number of turbines originally planned. By maximising the number of turbine placements on site, it allows for the great energy output available given the constraints. The disadvantage of having less turbines than planned would mean there is less power produced from the WEF, which has many financial implications for the developer, community at large.

14.1.5 No – go option

Based on the outcomes of the Scoping Phase, the option of not implementing the activity, or the “no-go” alternative, has not been considered in the EIA phase.

14.2 Details of Public Participation Process undertaken

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

14.2.1 Public Participation Process completed for the Scoping Phase

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

- Inform the stakeholders about the proposed project and the environmental assessment process to be followed;
- Provide opportunity to all parties to exchange information and express their views and concerns;

- Obtain contributions from stakeholders (including the client, consultants, relevant authorities and the public) and ensure that all issues, concerns and queries raised are fully documented;
- Evaluate the issues raised and identify the significant issues; and
- Provide comment on how these issues are to be assessed as part of the Environmental Impact Assessment Process.

The comment periods during the scoping phase were implemented according to the EIA Regulations, 2014 (as amended). The comment periods which have been implemented at this stage of the scoping phase (as set out by the EIA Regulations, 2014) were as follows:

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

- The DSR underwent a 30-day comment and review period that ran from Monday 22nd November 2021 until Wednesday 12th January 2022 (excluding public holidays).
- An I&AP database was compiled which includes all affected landowners, adjacent landowners, occupiers of affected and adjacent land, other I&APs, key stakeholders (such as OoS) and other surrounding project developers. The I&AP database is included in **Appendix 5**.
- Issuing of the notifications was circulated to all I&APs on the 22nd of November 2021 as part of the Draft Scoping Report (proof included in Appendix 5).
- Placement of site notices in English and Afrikaans (as per regulations) were placed along the entrance road to the application site and around the site itself on 2nd July 2021 (proof included in the Scoping Report).
- Public notification of the EIA process was advertised in a local newspaper (Die Courier) and a provincial newspaper (The Mercury) on the 19th of November 2021, as required according to Regulation 41(2) (c) of the EIA Regulations (2014), as amended. Proof is included in Appendix 5 of the Final Scoping.
- Reminder notifications of the closing of the DSR comment period were sent out on the 5th of January 2022, 11th January 2022 and 12th January 2022 respectively in order to ensure that comments and/or concerns were received from the OoS and/or registered I&APs.

Availability of report for review:

- The report was made available on SiVESTs website for download. (http://www.sivest.co.za/Download)
- Electronic copies were made available to parties upon request for the documentation.
- CDs / Flash drive to be posted to stakeholders, if requested.
- The Draft Scoping Report was available for review at the following locations:
  - Beaufort West Library, 15 Church Street, Beaufort West, Western Cape, South Africa
  - Price Albert Public Library, Church Street, Prince Albert, Western Cape.

Summary of issues raised

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

The Final Scoping Report was accepted by DFFE on the **23rd February 2022**.

14.2.2 Public Participation Process to be undertaken for the EIA Phase

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

- The I&AP database will be updated as and when necessary during the execution of the EIA.
- A 30-day period will be provided to IAPs to review the Draft EIA Report. Copies of the Draft EIA Report will be provided to the regulatory and commenting authorities as well. The Draft EIA Report will also be available for download on a link to be provided.
- All parties on the IA&P database will be notified via email, sms or fax of the opportunity to review the Draft EIA Report, the review period and the process for submitting comments on the report.
- All comments received from I&APs and the responses thereto will be included in the final EIA Report, which will be submitted to DFFE.
- A Comments and Responses Report will be updated and included in the EIA Report, which will record the date that issues were raised, a summary of each issue, and the response of the team to address the issue. The Final EIA report with all comments included will be submitted to DFFE for review and approval.
- All I&APs will be notified via email, sms or fax after having received written notice from DFFE on the final decision on the application. These notifications will include the process required to lodge an appeal, as well as the prescribed timeframes in which documentation should be submitted.

14.3 Impact Assessment

The potential impacts for the identified environmental aspects have been assessed and mitigation measures identified below. The detailed impact assessments on the preliminary layouts are in the respective specialist studies (**Appendix 6**).

14.3.1 Planning

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Avifaunal – none identified																				
Ecological – none identified																				
Bat – none identified																				
Geotechnical – none identified																				
Surface Water – none identified																				
Heritage																				
Damage to sites containing graves	The graves and burial grounds are mostly localised near farm roads within the proposed development area. The expansion of existing farm roads may impact these sites.	2	3	4	4	4	2	34	-	Medium	Demarcate sites as no-go areas (50m buffer) Demarcate and fence during construction if construction activities area to happened within 50 meters from a site. • A management plan, after a walkdown of the final layout, for the heritage resources needs then to be compiled and approved for implementation during construction and operations.	2	1	4	4	4	1	15	-	Low
Damage to one historical structures	One structure (KO-05) is located near farm roads within the proposed development area. The expansion of existing farm roads may impact the site.	2	2	4	4	4	2	32	-	Medium	• Demarcate sites as no-go areas (30m buffer)Demarcate and fence during construction if construction activities area to happened within 30 meters from a site. A management plan, after a walkdown of the final layout, for the heritage resources needs then to be compiled and approved for implementation during construction and operations.	2	1	4	4	4	1	15	-	Low
Unidentified heritage resources	Due to the size of the area assessed, there's a possibility of encountering heritage features in un-surveyed areas does exist.	1	3	4	2	4	2	28	-	Medium	• A management plan, after a walkdown of the final layout, for the heritage resources needs then to be compiled and approved for implementation during construction and operations.	1	3	4	2	4	1	14	-	Low
Fossil heritage resources	Disturbance, damage or destruction of fossils at or beneath the ground surface due to surface clearance and bedrock excavations	1	4	4	3	4	2	32	-	Medium	Pre-construction walkdown (with fossil recording / collection) of final footprint by specialist palaeontologist. • Chance Fossil Finds Procedure during construction phase.	1	2	4	2	4	1	13	-	Low
Archaeological																				

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Damage to 2 sites containing graves (**KO-06** and **KO-09)**	The graves and burial grounds are mostly localised near farm roads within the proposed development area. The expansion of existing farm roads may impact these sites.	2	3	4	4	4	2	34	-	Medium	• Demarcate sites as no-go areas (50m buffer) • Demarcate and fence during construction if construction activities area to happened within 50 meters from a site. • A management plan, after a walkdown of the final layout, for the heritage resources needs then to be compiled and approved for implementation during construction and operations.	2	1	4	4	4	1	15	-	Low
Damage to 3 historical farmsteads/structures (**KO-05; Kh001** and **Kh001b**).	One structure (KO-05) is located near farm roads within the proposed development area. The expansion of existing farm roads may impact the site. Two sites (Kh001 and Kh001b) are located within the proposed grid corridor area.	2	2	4	4	4	2	32	-	Medium	• Demarcate sites as no-go areas (30m buffer) • Demarcate and fence during construction if construction activities area to happened within 30 meters from a site. • A management plan, after a walkdown of the final layout, for the heritage resources needs then to be compiled and approved for implementation during construction and operations.	2	1	4	4	4	1	15	-	Low
Unidentified heritage resources	Due to the size of the area assessed, there's a possibility of encountering heritage features in un-surveyed areas does exist.	1	3	4	2	4	2	28	-	Medium	• A management plan, after a walkdown of the final layout, for the heritage resources needs then to be compiled and approved for implementation during construction and operations.	1	3	4	2	4	1	14	-	Low
Cultural Landscape																				
Ecological	Inappropriate infrastructure layout planning degrades ecological elements of the cultural landscape.	2	4	3	3	3	2	30	-	Medium	• Critical Biodiversity Areas, and Ecological Support Areas (along drainage lines), should be protected from development of the wind turbines or any associated development during all phases. • No wind turbines should be placed within the 1:100-year flood line of the watercourses. In the context of the sensitivity to soil erosion in the area, as well as potential archaeological resources, it would be a risk to include any structures close to these drainage lines. • Identified medicinal plants used for healing or ritual purposes should be conserved during all phases if threatened for use and continued access to these resources be maintained. • Careful planning should incorporate areas for stormwater runoff where the base of the structure disturbed the natural soil. Local rocks found on the site could be used to slow stormwater (instead of concrete, or standard edge treatments), and prevent erosion that would be an unfortunate consequence that would alter the character of the site. By using rocks from site it helps to sensitively keep to the character.	2	2	2	2	3	2	22	-	Low
Aesthetic	Inappropriate infrastructure layout planning negates aesthetic and sense of place requirements of the cultural landscape.	2	4	3	3	3	3	45		High	• Where additional infrastructure (i.e. roads) is needed, the upgrade of existing roads to accommodate the development should be the first consideration.	2	4	2	3	3	3	42		Medium

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											• Avoid development of infrastructure (such as buildings, wind turbines and power lines), on crests or ridgelines due to the impact on the visual sensitivity of skylines. The visual impact of turbines can be reduced by distancing them from viewpoints such as roads and farmsteads, and placing them in lower lying plains to reduce their impact on the surrounding sensitive cultural landscape. • Significant and place-making viewsheds of surrounding ridgelines and distant mountain should be maintained by limiting the placement of turbines or associated infrastructure on opposing sides of any of the regional roads, so that at any time a turbine-free view can be found when travelling through the landscape or at the historic farmsteads. • Retain view-lines and vistas focused on prominent natural features such as mountain peaks or hills, such as Platdoring se Kop and the Koup 1 poort, as these are important place making and orientating elements for experiencing the cultural landscape. • Prevent the construction of new buildings/structures/ new roads on visually sensitive, steep, elevated or exposed slopes, ridgelines and hillcrests. • Turbine and new road placement to avoid slopes steeper than 10% with existing farm roads to be used for access to turbines as far possible. • Due to the scenic and historic significance of the regional road, a buffer of 1000m to either side of the N12 should be maintained for no development associated with the WEF other than sensitive road upgrades, which must not impact on the views from the road. The visual impact of the turbines will be 50% less at 1km distance and therefore this distance will greatly reduce the negative visual impact of the turbines on the experience of the historic road and the values that give it significance. • Due to the nature of the landscape being largely devoid of high vertical elements such as the proposed turbines, and the introduction of these turbines fundamentally altering the sense of place and character of the landscape for those living there, location of majority of turbines should be limited to an 800m buffer around the farmsteads. The current turbine layout supports this recommendation in that there is nowhere more than a single turbine at the edge of these buffer zones. • Due to the historic and local experience of the landscape from the farm roads, which link the historically significant farmsteads across the region, a buffer of 300m from the farm roads should be maintained for no development associated with the								

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											WEF other than sensitive road upgrades which must not impact on the views from the road. • Alternatives Option 1(sub1) for the grid corridor and Option 1 for the laydown area, are preferred in terms of cultural landscape assessment as they limit the construction to a smaller footprint on the landscape and locate the infrastructure far enough from the N12 and out of the Koup 1 landscape as far possible. They should be moved out of the historic farm road buffer without impacting on a riverine corridor flood line or a slope over 3%. • The substation location should be located on the same side as other development infrastructure and to the north of the farm road so as to limit the visual impact to one viewshed. As there is a ridge behind this development area, for which turbine placement is proposed, location of the substation to the north of the farm road contains the impact to one side of the road and the infrastructure will not interrupt view lines of the mountain ranges in the distance. • The impact of WEF turbine night lighting on the wilderness landscape is intrusive and overwhelms the rural character of the landscape, giving it an industrial sense of place after dark. Reduce the impact of turbine night lighting by minimizing the number of turbines with lighting to only those necessary for aviation safety, such as a few identified turbines on the outer periphery, or use aircraft triggered night lighting. Due to the reduced receptors on the roads at night, the impact of the lighting at night is reserved mainly for farmsteads and other places of overnight habitation such as the surrounding tourist facilities, which would be heavily impacted by the light pollution on a long term and ongoing basis.								
Historic	Inappropriate infrastructure layout planning degrades historic elements of the cultural landscape.	2	4	3	2	3	3	42	-	Medium	• Due to the scenic and historic significance of the regional road, a buffer of 1000m to either side of the N12 should be maintained for no development associated with the WEF other than sensitive road upgrades, which must not impact on the views from the road. The visual impact of the turbines will be 50% less at 1000m distance and therefore this distance will greatly reduce the negative visual impact of the turbines on the experience of the historic road and the values that give it significance. • The integrity of the historic farmsteads and their associated cultivated areas and relationship to the riverine corridors and other natural elements, such as Platdoring se Kop, should be maintained and protected. Due to the nature of the landscape being largely devoid of high vertical elements such as the proposed turbines, the introduction of turbines will	2	2	2	1	3	2	20	-	Low

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											fundamentally alter the sense of place and character of the landscape for those living there. Location of proposed turbines should be limited to an 800m buffer around the farmsteads to limit impact to the farmsteads. The current turbine layout supports this recommendation in that there is nowhere more than a single turbine at the edge of these buffer zones. • Any development that impacts the inherent character of the werf component should be discouraged and a development buffer of 50m around the outer boundary of farm werfs and 200m around any graded heritage structure, must be maintained, including the associated cultivated areas, cemeteries and unmarked graves, for all new infrastructure. A preconstruction micro-survey for access roads, substations, laydown areas and gridlines should be completed with CLA specialist to ensure appropriate buffers are maintained. • No infrastructure or operational upgrades, such as boreholes, should impact negatively or reduce natural, on site water quality, quantity or access for the residents within or around the development site. Any borehole or other water resource upgrade should also be made freely accessible to the residents living on site. • Due to the historic and local experience of the landscape from the farm roads, which link the historically significant farmsteads across the region, a buffer of 300m from the farm roads should be maintained for no development associated with the WEF other than sensitive road upgrades which must not impact on the views from the road. A preconstruction micro-survey for access roads, substations, laydown areas and gridlines should be completed with CLA specialist to ensure appropriate buffers are maintained. • Buffers from identified stone markers and foundations should be in accordance with the AIA (PGS, 2021) where they are not directly associated with an historic farmstead. • The existing names of places, routes, watercourses and natural features in the landscape that are related to its use, history and natural character should be retained and used as heritage resources related to intangible heritage. • Burial grounds and places of worship are automatically regarded as Grade IIIa or higher. Any development that threatens the inherent character of family burial grounds must be assessed and should be discouraged. No development closer than 100m from the boundary of any burial grounds or unmarked graves. No turbines have been proposed for								

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											placement near known unmarked burials or family cemeteries. A preconstruction micro-survey for access roads, substations, laydown areas and gridlines should be completed with CLA specialist to ensure appropriate buffers are maintained. A preconstruction micro-survey of each turbine footprint should be conducted to ensure no further unmarked graves are threatened. • Commonages and outspans were located at water points, and these places were likely gathering points before the arrival of colonists and continued to provide communal resources. In the mid-20th century, many old commonages came under the ownership of the Municipality, and have since been rented out to private individuals or organisations. The Municipality should facilitate the use of common land in a way that promotes the well-being and quality of life of the public. These sites can play a restorative role within the community, for instance for those who have limited alternative opportunities for recreation. • Respect existing patterns, typologies and traditions of settlement-making by promoting the continuity of heritage features. These include: (a) indigenous; (b) colonial; and (c) current living heritage in the form of tangible and intangible associations to place. • Alterations and additions to conservation-worthy structures should be sympathetic to their architectural character and period detailing.									
Socio-economic	Non-landowner residents' lack of representation in planning and public participation process leads to loss of local knowledge, socio-economic empowerment and character of the cultural landscape.	2	4	4	3	4	4	68	-	Very High	• The findings of this report must be shared with identified interested and affected parties, including non-landowner residents on the development properties, in the EIA public participation process in order to further ascertain any intangible cultural resources that may exist on the landscape that have not been identified. A specialist qualified in recognising and discussing significance of intangible heritage resources should be present during the public meetings. The findings should inform the recommendations for appropriate mitigation for impacts to the cultural landscape. • The continued use of the landscape for human habitation and cultivation by historic residents of the area, should be retained and encouraged as far possible to sustain the continual use pattern and human-environment relationship which is the ultimate significance of this cultural landscape element. The WEF development must allow and support this, including financially, and not degrade this continued relationship. • The local community on and around the development should benefit from job opportunities created by the	2	2	1	2	4	2	22	+	Positive Low

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											proposed development and the development should not cause reduction in economic viability of surrounding properties in excess of those offered by the development. Short-term job opportunities at the expense of long term economic benefit and local employment opportunities must be prevented. • Local residents must be offered employment on the construction/ decommissioning and operational phases before 'importing' staff from elsewhere. • Local residents must be offered employment training opportunities associated with WEF developments at all phases.									
Noise																				
Noise impacts relating to planning activities	Light delivery vehicles moving around onsite.	1	1	1	1	1	1	5	-	Low	• No mitigation measures recommended for the planning stage	1	1	1	1	1	1	5	-	Low
Paleontological – none identified																				
Social– none identified																				
Transportation – none identified																				
Visual – none identified																				

14.3.2 Construction Phase

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Avifaunal																				
Avifauna	Displacement due to disturbance associated with the construction of the wind turbines and associated infrastructure.	1	4	2	3	1	3	33	-	Medium	• Construction activity should be restricted to the immediate footprint of the infrastructure as far as possible. Access to the remainder of the area should be strictly controlled to prevent unnecessary disturbance of priority species.	1	4	2	3	1	2	22	-	Low

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											• Measures to control noise and dust should be applied according to current best practice in the industry.									
Avifauna	Displacement due to habitat transformation associated with the construction of the wind turbines and associated infrastructure.	1	3	2	2	3	2	22	-	Low	• Removal of vegetation must be restricted to a minimum and must be rehabilitated to its former state where possible after construction. • Construction of new roads should only be considered if existing roads cannot be upgraded. • The recommendations of the ecological and botanical specialist studies must be strictly implemented, especially as far as limitation of the activity footprint is concerned.	1	2	2	2	3	2	20	-	Low
Ecological																				
Vegetation and protected plant species	Vegetation clearing for access roads, turbines and their service areas and other infrastructure will impact on vegetation and protected plant species.	2	4	2	2	3	3	39	-	Medium	• There should be no turbines within the Very High Sensitivity areas. • The footprint within drainage lines should be minimized as much as possible. • Preconstruction walk-though of the approved development footprint to ensure that sensitive habitats and species are avoided where possible. • Ensure that lay-down and other temporary infrastructure is within low sensitivity areas, preferably previously transformed areas if possible. • Minimise the development footprint as far as possible and rehabilitate disturbed areas that are no longer required by the operational phase of the development. • A large proportion of the impact of the development stems from the access roads and 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, as informed by a preconstruction walk-though survey. • Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes topics such as no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas etc. • Demarcate all areas to be cleared with construction tape or other appropriate and effective means.	2	4	2	1	3	2	24	-	Low

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											However, caution should be exercised to avoid using material that might entangle fauna.									
Faunal disturbance and habitat loss	Increased levels of noise, pollution, disturbance and human presence during construction will be detrimental to fauna. Sensitive and shy fauna are likely to move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed.	2	4	2	2	2	3	36	-	Medium	• Preconstruction walk-through of the facility to micro-site roads and turbines. • During construction any fauna directly threatened by the construction activities should be removed to a safe location by the ECO or other suitably qualified person. • The illegal collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the construction site. • No fires should be allowed within the site as there is a risk of runaway veld fires. • No fuelwood collection should be allowed on-site. • If any parts of site such as construction camps must be lit at night, this should be done with low-UV type lights (such as most LEDs) as far as practically possible, which do not attract insects and which should be directed downwards. • 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. • No unauthorized persons should be allowed onto the site and site access should be strictly controlled • All construction vehicles should adhere to a low-speed limit (40km/h for cars and 30km/h for trucks) to avoid collisions with susceptible species such as snakes and tortoises and rabbits or hares. Speed limits should apply within the facility as well as on the public gravel access roads to the site. • All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and snakes which are often persecuted out of fear or superstition.	2	4	2	1	2	3	33	-	Medium
Bat																				

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Clearing and excavation of natural habitat	The destruction of active bat roosts and/or features that could serve as potential roosts, such as rock formations and the removal of trees on site. The destruction of derelict holes, such as aardvark holes and any fragmentation of woody habitat which include dense bushes. The removal of limited trees and bushes would have an impact on all bats that could potentially roost in trees and on the foraging of clutter and clutter-edge species.	1	3	3	3	4	2	28	-	Medium	• Construction activities to be kept out of all high bat sensitive areas. • Rock formations occurring along the ridge lines in the should be avoided during construction, as these serve as roosting space for bats. • Destruction of limited trees should be avoided during construction. • Care should be taken if any dense bushes are destroyed. • Aardvark holes or any large derelict holes or excavations should not be destroyed before careful examination for bats. The Environmental Control Officer (ECO) or a responsible appointed person or site manager should contact a bat specialist before construction commences so that they know what to look out for during construction.	1	2	2	2	2	1	9	-	Low
Excavation and building new structures	Creating new habitat amongst the turbines which might attract bats. This includes buildings with roofs that could serve as roosting space or open water sources from quarries or excavation where water could accumulate.	1	3	2	2	3	2	22	-	Low	• Completely seal off roofs of new buildings (e.g., substations and site buildings). Note a small bat species could enter a hole the size of 1 cm2. • Roofs need to be regularly inspected during the lifetime of the wind farm and any new holes need to be sealed. • Excavation areas or artificial depressions should be filled and rehabilitated to avoid creating areas of open water sources which could attract bats during rainy spells.	1	1	1	1	3	1	7	-	Low
Noise and light disturbance	Construction noise, especially during night-time, as well as lightening disturbance.	1	3	2	2	1	2	18	-	Low	• Nightly construction activities should be avoided, or if necessary, minimised to the shortest period possible. • With the exception of compulsory civil aviation lightening, artificial lightening during construction should be minimised, especially bright lights or spotlights. • Lights should avoid skyward illumination. Turbine tower lights should be switched off when not in operation, where possible.	1	2	1	1	1	1	6	-	Low
Geotechnical																				
Removal of subsoils (soil, rock)	Displacement of natural earth material and overlying vegetation. • Increase stormwater velocity	1	4	2	2	2	2	22	-	Low	• Identify protected areas prior to construction. • Construction of temporary berms and drainage channels to divert surface water. • Minimize earthworks and fills.	1	2	2	1	4	2	20	-	Low

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
	• Increase in soil and wind erosion due to clearing of vegetation. • Construction and earthmoving vehicles may displace soil during operations. • Creation of drainage paths along access tracks. • Potential oil spillages from heavy plant. • Sedimentation of nonperennial features and excessive dust. • Potential groundwater and drainage feature contamination.										• Use existing road network and access tracks. • Rehabilitation of affected areas (such as regressing, mechanical stabilization). • Correct engineering design and construction of gravel roads and water crossings. • Correct construction methods for foundation installations and cut to fill configurations. • Vehicle repairs to be undertaken in designated areas. • Control stormwater flow.									
Surface Water																				
Loss of aquatic species of special concern	During construction activities within watercourses could result in the disturbance or destruction of any listed and or protected plant or animal species. However none of these aquatic obligate species were observed during this assessment	1	1	1	1	1	1	5	-	Low	• Develop and implement an Aquatic Rehabilitation and Monitoring plan post Environmental Authorisation. This must be developed following the finalisation of the turbine / road layout and a walk down has been completed.	1	1	1	1	1	1	5	-	Low
Damage or loss of riparian and or drainage line systems i.e. disturbance of the waterbodies in the construction phase	Construction could result in the loss of drainage systems that are fully functional and provide an ecosystem services within the site especially where new access roads are required or road upgrades will widen any current bridges or drifts. Loss can also include a functional loss, through change in vegetation type via alien encroachment for example	2	3	2	2	3	2	24	-	Medium	• A pre-construction walkthrough with an aquatic specialists is recommended and they can assist with the development of the stormwater management plan and Aquatic Rehabilitation and Monitoring plan, coupled to micro-siting of the final layout. • All alien plant re-growth, which is currently low within the greater region must be monitored and should it occur, these plants must be eradicated within the project footprints and especially in areas near the proposed crossings. Prosopis (alien invasive riparian tree) is prevalent in areas to the north of the site, thus care in transporting any material, while ensuring that such materials is free of alien seed, coupled with pre and post alien clearing must be stipulated in the EMPr. Where roads and crossings are upgraded, the following applies: • Existing pipe culverts must be removed and replaced with suitable sized box culverts, especially where road levels are raised to accommodate any large vehicles. • River levels, regardless of the current state of the river / water course must be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist during a pre-construction walkdown.	1	3	2	1	2	2	18	-	Low

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											• Where large cut and fill areas are required these must be stabilised and rehabilitated during the construction process, to minimise erosion and sedimentation. • Suitable stormwater management systems must be installed along roads and other areas and monitored during the first few months of use. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc). • A detailed monitoring plan must be developed in the pre-construction phase by an aquatic specialist, where any delineated system occurs within 50 m of existing crossings.								
Potential impact on localised surface water quality (construction materials and fuel storage facilities) during the construction and decommissioning phases	During construction earthworks will expose and mobilise earth materials, and a number of materials as well as chemicals will be imported and used on site and may end up in the surface water, including soaps, oils, grease and fuels, human wastes, cementitious wastes, paints and solvents, etc. Any spills during transport or while works area conducted in proximity to a watercourse has the potential to affect the surrounding biota. Leaks or spills from storage facilities also pose a risk and due consideration to the safe design and management of the 30 000l fuel storage facility must be given. Although unlikely, consideration must also be provided for the proposed Battery Energy Storage System (BESS), with regard safe handling during the construction phase. This to avoid any spills or leaks from this system	1	3	2	2	3	3	33	-	Medium	• All liquid chemicals including fuels and oil, including the BESS must be stored in with secondary containment (bunds or containers or berms) that can contain a leak or spill. Such facilities must be inspected routinely and must have the suitable PPE and spill kits needed to contain likely worst-case scenario leak or spill in that facility, safely. • Washing and cleaning of equipment must be done in designated wash bays, where rinse water is contained in evaporation/sedimentation ponds (to capture oils, grease cement and sediment). • Mechanical plant and bowsers must not be refuelled or serviced within 100m of a river channel. All construction camps, lay down areas, wash bays, batching plants or areas and any stores should be more than 50 m from any demarcated water courses. Note comment regards Camp A that requires micro-siting. • Littering and contamination associated with construction activity must be avoided through effective construction camp management; • No stockpiling should take place within or near a water course • All stockpiles must be protected and located in flat areas where run-off will be minimised and sediment recoverable;	1	3	2	1	2	2	18	-	Low
Heritage – none identified																				
Archaeological – none identified																				

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Cultural Landscape																				
Ecological	Fragmentation and destruction of the landscape degrading the environment and thus continuous relationship between man and environment	2	4	3	3	3	3	45	-	High	• Critical Biodiversity Areas, and Ecological Support Areas (along drainage lines), should be protected from development of the wind turbines or any associated development during all phases. • No wind turbines should be placed within the 1:100-year flood line of the watercourses. In the context of the sensitivity to soil erosion in the area, as well as potential archaeological resources, it would be a risk to include any structures close to these drainage lines • Remaining areas of endemic and endangered natural vegetation should be conserved. • Areas of critical biodiversity should be protected from any damage during all phases; where indigenous and endemic vegetation should be preserved at all cost. • Areas of habitat are found among the rocky outcrops and contribute to the character, as well as biodiversity of the area. Care should be taken that habitats are not needlessly destroyed. • Identified medicinal plants used for healing or ritual purposes should be conserved during all phases if threatened for use. • Careful planning should incorporate areas for stormwater runoff where the base of the structure disturbed the natural soil. Local rocks found on the site could be used to slow stormwater (instead of concrete, or standard edge treatments), and prevent erosion that would be an unfortunate consequence that would alter the character of the site. By using rocks from site it helps to sensitively keep to the character.	2	2	2	1	3	2	20	-	Low
Aesthetic	WEF infrastructure construction and decommissioning activity degrades the character of the cultural landscape and the sense of place	2	4	3	3	3	4	60	-	High	• Encourage mitigation measures (for instance use of vegetation) to 'embed' or disguise the proposed structures within the surrounding tourism and agricultural landscape at ground level, road edges etc; • The continuation of the traditional use of material could be enhanced with the use of the rocks on the site as building material. This would also help to embed structures into the landscape and should not consist of shipping containers or highly reflective untreated corrugated sheeting that clutters the landscape and is exacerbates the foreign intrusion on the natural matte landscape.	2	4	2	2	2	2	24	-	Medium

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											• Using material found on the site adds to the sense of place and reduces transportation costs of bringing materials to site. • The local material such as the rocks found within the area could be applied to address storm water runoff from the road to prevent erosion. • Duration and magnitude of construction/ decommissioning activity must be minimized to reduce the impact of heavy vehicles on the roads as well as the associated dust from the activity. Light vehicles should be used to reduce degradation to the farm roads and the need to upgrade roads to scale and extent that negatively impacts on the integrity of the historic farm roads. Construction/ decommissioning traffic must operate at speeds that reduce dust and noise. • Any new road network or widening must be returned to its original state at end of the operational time of the WEF, with full environmental and aesthetic rehabilitation to the approval of a qualified cultural landscapes assessment specialist. • Turbine sites, substation and laydown areas should be returned to their original state at the end of the operational time of the WEF, with full environmental and aesthetic rehabilitation to the approval of a qualified cultural landscapes assessment specialist.								
Historic	Integrity of farmsteads and farm roads degraded by insensitive construction or decommissioning activities.	2	4	4	2	4	3	48	-	High	• Historic farmsteads must be protected from the impacts of heavy construction vehicles and increased numbers of people. No construction traffic should pass through or closer than 50m to the outer boundaries of a farm werf, or 200m from graded structures, which includes the associated historically cultivated lands, cemeteries, unmarked burials. The most appropriate use of existing farm roads must be found to avoid farm werfs as far as possible and reduce construction impact on these heritage features. • A preconstruction micro-survey for turbines, access roads, substations, laydown areas and gridlines should be completed with CLA specialist to ensure appropriate buffers are maintained. • Duration and magnitude of construction/ decommissioning activity must be minimized to reduce the impact of heavy vehicles on the roads as well as the associated dust from the activity. Light vehicles	2	2	3	2	2	2	22	-	Low

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											should be used to reduce degradation to the farm roads and the need to upgrade roads to scale and extent that negatively impacts on the integrity of the historic farm roads. Construction decommissioning traffic must operate at speeds that reduce dust and noise. • No infrastructure or operational upgrades, such as boreholes, should impact negatively or reduce natural, on site water quality, quantity or access for the residents within or around the development site. Preferably any borehole or other water resource upgrade should also be made freely accessible to the residents living on site. • Accommodation of construction staff must not negatively impact on existing farm residents or degrade the integrity of the farmstead complexes and should, without negative impact to ecological or aesthetic resources, be located outside of the farmstead complexes or site. Farm residents should be consulted on the preferable location for construction staff accommodation. • Traditional planting patterns should be protected by ensuring that existing trees are not needlessly destroyed, as these signify traces of cultural intervention in a harsh environment. These planting patterns include the trees planted around the werfs and along travel routes. Interpretation of these landscape features as historic remnants should occur. A buffer of 50m around such planting patters should be maintained. • Burial grounds and places of worship are automatically regarded as Grade IIIa or higher. Any development that threatens the inherent character of family burial grounds must be assessed and should be discouraged. No turbines have been proposed for placement near known unmarked burials or family cemeteries. A preconstruction micro-survey of each turbine footprint and any new access roads should be conducted to ensure no further unmarked graves are threatened. A preconstruction micro-survey for access roads, substations, laydown areas and gridlines should be completed with CLA specialist to ensure appropriate buffers are maintained. • Mountain slopes have been used for traditional practices for many years, and care should be taken								

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											that any significant cultural sites, such as burials and veldkos/medicinal plant resources, are not disturbed. • Farms in the area followed a system of stone markers to demarcate the farm boundaries in the area. Where these structures are found on the site, care should be taken that they are not needlessly destroyed, as they add to the layering of the area. A preconstruction micro-survey for access roads, substations, laydown areas and gridlines should be completed with CLA specialist to ensure appropriate buffers are maintained. • Roads running through the area have historic stone way markers. Where these are found care should be taken that they are left in tact and in place. Road upgrades must not move or threaten their position and they should be visible from the road they are related to by passing travellers. A preconstruction micro-survey for access roads, substations, laydown areas and gridlines should be completed with CLA specialist to ensure appropriate buffers are maintained. • Where the historic function of a building/site is still intact, the function has heritage value and should be protected. • Surviving examples (wagon routes, outspans, and commonage), where they are owned in some public or communal way (or by a body responsible for acting in the public interest) and where they are found to be actively operating in a communal way, will have cultural and heritage value and should be enhanced and retained. The historic route running through Koup 1 should be maintained and integrity as a communal road for farm residents must be retained.								
Socio-economic	Integrity of local residents to continue their patterns of land use is degraded by the construction and decommissioning activities.	2	3	4	4	4	4	68	-	Very high	• An updated cultural landscapes impact assessment report must be completed should the WEF continue to be used after the term granted in this application. This report should include a detailed assessment of the socio-economic impacts to the cultural landscape and its outcomes and recommendations need to be considered in the decision for recommissioning and be implemented if recommissioning is approved. • The continued use of the landscape for human habitation and cultivation by historic residents of the area, should be retained and encouraged as far possible to sustain the continual use pattern and	1	3	3	1	3	2	22	+	Low

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											human-environment relationship which is the ultimate significance of this cultural landscape element. The WEF development must allow and support this, including financially, and not degrade this continued relationship. • The local community on and around the development should benefit from job opportunities created by the proposed development and the development should not cause reduction in economic viability of surrounding properties in excess of those offered by the development. Short-term job opportunities at the expense of long term economic benefit and local employment opportunities must be prevented. • Local residents must be offered employment on the construction/ decommissioning and operational phases before 'importing' staff from elsewhere. • Local residents must be offered employment training opportunities associated with WEF developments at all phases. • Sheep, cattle or game farming should be allowed to continue below the wind turbines, or be rehabilitated to increase biodiversity in the area.									
Paleontological																				
Fossil heritage resources	Disturbance, damage or destruction of fossils at or beneath the ground surface due to surface clearance and bedrock excavations	1	4	4	3	4	2	32	-	Medium	Pre-construction walkdown (with fossil recording / collection) of final footprint by specialist palaeontologist. • Chance Fossil Finds Procedure during construction phase.	1	2	4	2	4	1	13	-	Low
Noise																				
Noise impacts during the day	Construction activities relating to hardstand areas, digging of foundations for wind turbines, civil works as well as erection of wind turbines	2	1	1	2	1	1	7	-	Low	• No mitigation measures recommended for construction activities at the WTG locations or for substations	2	1	1	2	1	1	7	-	Low
Noise impacts at night	Construction activities relating to civil works as well as erection of wind turbines	2	2	1	2	1	4	32	-	Medium	• Night-time construction activities closer than 1,000 m from and NSD to be minimized.	2	1	1	2	1	1	7	-	Low
Noise impacts during the day	Construction of access roads	2	4	1	2	1	4	40	-	Medium	• Access routes to the relocated further than 240 m from dwellings used for residential purposes at night.	2	1	1	2	1	3	21	-	Low

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Noise impacts during the day	Noises relating to construction traffic	2	3	1	2	1	3	27	-	Medium	• Access routes to the relocated further than 240 m from dwellings used for residential purposes at night.	2	1	1	3	1	2	16	-	Low
Social																				
Health and social wellbeing	Air quality	1	3	1	1	1	2	14	-	Low	• Refer to the mitigation measures suggested by the air quality specialist.	1	3	1	1	1	1	7	-	Low
Health and social wellbeing	Noise	1	1	1	1	3	1	6	-	Low	• Refer to the mitigation measures suggested by the noise specialist.	1	1	1	1	1	1	6	-	Low
Health and social wellbeing	Increase in crime	2	2	3	2	2	2	18	-	Low	Ensure that construction workers are clearly identifiable. All workers should carry identification cards and wear identifiable clothing. Fence off the construction sites and control access to these sites. Appoint an independent security company to monitor the site; Encourage local people to report any suspicious activity associated with the construction sites through the establishment of a community liaison forum. • Prevent loitering within the vicinity of the construction camp as well as construction sites.	2	2	3	2	2	2	18	-	Low
Health and social wellbeing	Increased risk of HIV infections	3	4	3	3	3	3	48	-	High	Ensure that an onsite HIV Infections Policy is in place and that construction workers have easy access to condoms. Expose workers to a health and HIV/AIDS awareness educational program. • Extend the HIV/AIDS program into the community with a specific focus on schools and youth clubs.	3	3	2	2	3	2	26	-	Medium
Health and social wellbeing	Influx of construction workers	1	4	1	1	1	2	16	-	Low	Communicate the limitation of opportunities created by the project through Community Leaders and Ward Councillors. • Draw up a recruitment policy in consultation with the Community Leaders and Ward Councillors of the area and ensure compliance with this policy.	1	4	1	1	1	2	16	-	Low

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Health and social wellbeing	Hazard exposure	2	4	2	2	1	2	22	-	Low	Ensure that all construction equipment and vehicles are properly maintained at all times. Ensure that operators and drivers are properly trained and make them aware, through regular toolbox talks, of any risk they may pose to the community. Place specific emphasis on the vulnerable sector of the population such as children and the elderly. Ensure that fires lit by construction staff are only ignited in designated areas and that the appropriate safety precautions, such as not lighting fires in strong winds and completely extinguishing fires before leaving them unattended, are strictly adhered to. • Make staff aware of the dangers of fire during regular toolbox talks.	2	2	2	2	1	2	18	-	Low
Quality of the living environment	Disruption of daily living patterns	2	4	2	2	1	2	22	-	Low	• Ensure that, at all times, people have access to their properties as well as to social facilities.	2	3	2	2	1	2	20	-	Low
Quality of the living environment	Disruptions to social and community infrastructure	2	4	2	2	1	2	22	-	Low	Regularly monitor the effect that construction is having on infrastructure and immediately report any damage to infrastructure to the appropriate authority. • Ensure that where communities' access is obstructed that this access is restored to an acceptable state.	2	3	2	2	1	2	20	-	Low
Economic	Job creation and skills development	2	4	2	3	1	2	24	+	Medium	Wherever feasible, local residents should be recruited to fill semi and unskilled jobs. Women should be given equal employment opportunities and encouraged to apply for positions. • A skills transfer plan should be put in place at an early stage and workers should be given the opportunity to develop skills which they can use to secure jobs elsewhere post-construction.	2	4	2	3	1	2	24	+	Medium
Economic	Socio-economic stimulation.	3	4	2	3	1	2	26	+	Medium	• A procurement policy promoting the use of local business should, where possible, be put in place to be applied throughout the construction phase.	3	4	2	3	1	2	26	+	Medium
Transportation																				

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Additional Traffic Generation	Increase in Traffic	2	3	1	2	1	2	18	-	Low	• Ensure staff transport is done in the 'off peak' periods and by bus. • Stagger material, component and abnormal loads • Construction of an on-site concrete batching plant to reduce trips.	2	3	1	2	1	2	18	-	Low
Additional Traffic Generation	Increase of Incidents with pedestrians and livestock	2	4	2	4	1	2	26	-	Medium	• Reduction in speed of vehicles • Adequate enforcement of the law • Implementation of pedestrian safety initiatives • Regular maintenance of farm fences & access cattle grids • Construction of an on-site concrete batching plant to reduce trips.	2	3	2	4	1	1	12	-	Low
Additional Traffic Generation	Increase in Dust from gravel roads	2	3	2	2	1	2	20	-	Low	• Reduction in speed of the vehicles • Use of dust suppressant techniques • Implement a road maintenance program under the auspices of the respective transport department. • Construction of an on-site concrete batching plant to reduce trips.	2	3	2	2	1	2	20	-	Low
Additional Traffic Generation	Increase in Road Maintenance	2	3	2	2	2	2	22	-	Low	• Implement a road maintenance program under the auspices of the respective transport department. • Construction of an on-site batching plant to reduce trips.	2	3	2	2	1	2	20	-	Low
Abnormal Loads	Additional Abnormal Loads	3	2	1	2	1	1	9	-	Low	• Ensure abnormal vehicles travel to and from the proposed development in the 'off peak' periods or stagger delivery. • Adequate enforcement of the law	3	2	1	2	1	1	9	-	Low
Internal Access Roads	Increase in Dust from gravel roads	1	4	1	1	1	2	16	-	Low	• Enforce a maximum speed limit on the development Use of dust suppressant techniques • Adequate watering by means of water bowser	1	3	1	1	1	2	14	-	Low
Internal Access Roads	New / Larger Access points	1	4	1	2	1	1	9	-	Low	• Adequate road signage according to the SARTSM • Approval from the respective roads department	1	4	1	2	1	1	9	-	Low
Visual																				

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Potential alteration of the visual character and sense of place. Potential visual impact on receptors in the study area	• Large construction vehicles, equipment and construction material stockpiles will alter the natural character of the study area and expose visual receptors to impacts associated with construction. • Construction activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. • Dust emissions and dust plumes from increased traffic on gravel roads serving the construction site may evoke negative sentiments from surrounding viewers. • Surface disturbance during construction would expose bare soil resulting in visual scarring of the landscape and increasing the level of visual contrast with the surrounding environment. • Vegetation clearance required for the construction of the proposed substation is expected to increase dust emissions and alter the natural character of the surrounding area, thus creating a visual impact. • Temporary stockpiling of soil during construction may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact.	2	3	1	2	1	2	18	-	Low	• Carefully plan to mimimise the construction period and avoid construction delays. • Inform receptors within 500m of the proposed power line servitude of the construction programme and schedules. • Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. • Maintain a neat construction site by removing rubble and waste materials regularly. • Position storage / stockpile areas in unobtrusive positions in the landscape, where possible. • Make use of existing gravel access roads where possible. • Limit the number of vehicles and trucks travelling to and from the construction site, where possible. • Unless there are water shortages, ensure that dust suppression techniques are implemented: o on all access roads; o in all areas where vegetation clearing has taken place; o on all soil stockpiles.	2	2	1	1	1	2	14	-	Low

14.3.3 Operational Phase

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Avifaunal																				
Avifauna	Mortality of priority species due to collisions with the wind turbines.	1	3	2	4	3	2	26	-	Medium	• No turbines should be located in the buffer zones around major drainage lines, waterpoints and dams. • A 5km circular No-Go (no turbines) buffer zone must be implemented around the Martial Eagle nest on Tower 108 of the Droërivier Proteus 1 400kV transmission line. • Live-bird monitoring and carcass searches should be implemented in the operational phase, as per the most recent edition of the Best Practice Guidelines at the time (Jenkins et al. 2015) to assess collision rates. • If estimated annual collision rates indicate unacceptable mortality levels of priority species, i.e., if it exceeds the mortality threshold determined by the avifaunal specialist after consultation with other avifaunal specialists and BirdLife South Africa, additional measures will have to be implemented which could include shut down on demand or other proven measures.	1	2	2	4	3	2	24	-	Medium
Ecological																				
Faunal disturbance and habitat degradation	Fauna will be negatively affected by the operation of the wind farm due to the human disturbance, the presence of vehicles on the site and possibly by noise generated by the wind turbines as well.	2	3	2	2	3	3	36	-	Medium	• Management of the site should take place within the context of an Open Space Management Plan. • No unauthorized persons should be allowed onto the site. • Any potentially dangerous fauna such snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location. • The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden by anyone except landowners or other individuals with the appropriate permits and permissions where required. • If any parts of the site need to be lit at night for security purposes, this should be done with downward-directed low-UV type lights (such as most LEDs or HPS bulbs) as far as possible, which do not attract insects. • All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. • All vehicles accessing the site should adhere to a reduced speed limit (30km/h for heavy vehicles and 40km/h for light vehicles) to avoid collisions with susceptible species such as snakes and tortoises. • If parts of the facility such as the substation are to be fenced, then no electrified strands should be placed	2	3	2	2	3	2	24	-	Low

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											within 30cm of the ground as some species such as tortoises are susceptible to electrocution from electric fences as they do not move away when electrocuted but rather adopt defensive behaviour and are killed by repeated shocks. Alternatively, the electrified strands should be placed on the inside of the fence and not the outside.									
Increased potential for soil erosion	Following construction, the site will remain vulnerable to soil erosion for some time due to the disturbance created by site clearing and likely low natural revegetation of disturbed areas thereafter. It is important to note that while the site is arid, such areas can experience significant soil erosion as plant cover is low and occasional heavy showers generate large amounts of runoff.	2	3	2	2	3	3	36	-	Medium	• Erosion management at the site should take place according to the Erosion Management Plan and Rehabilitation Plan. This should make provision for annual monitoring and rehabilitation. • All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. • There should be follow-up rehabilitation and revegetation of any remaining bare areas with indigenous perennial shrubs, grasses and trees from the local area. • Alien management at the site should take place according to the Alien Invasive Management Plan. • Regular (annual) monitoring for alien plants during operation to ensure that no alien invasive problems have developed as result of the disturbance, as per the Alien Management Plan for the project. • Woody aliens should be controlled on at least an annual basis using the appropriate alien control techniques as determined by the species present.	2	2	2	2	2	2	20	-	Low
Ecological degradation due to alien plant invasion.	Increased alien plant invasion during operation	1	3	2	2	3	3	33	-	Medium	• There should be regular monitoring for alien plants within the development footprint as well as adjacent areas which receive runoff from the facility as there are also likely to be prone to invasion problems. Monitoring every 6 months for the first 2 years post-construction is recommended, followed by annual monitoring thereafter. • 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.	1	2	1	1	2	2	14	-	Low
Negative impact on ESAs, CBAs and broad-scale ecological processes.	Transformation and presence of the grid connection and associated infrastructure will contribute to cumulative habitat loss within CBAs, ESAs and impact on broad-scale ecological processes such as fragmentation.	2	3	3	2	3	2	26	-	Medium	• Minimise the development footprint within the high sensitivity areas. • There should be an integrated management plan for the development area during operation, which is beneficial to fauna and flora. • All disturbed areas that are not used such as excess road widths, should be rehabilitated with locally occurring shrubs and grasses after construction to reduce the overall footprint of the development. • Noise and disturbance on the site should be kept to a minimum during operation and maintenance activities.	1	2	2	2	3	2	20	-	Low
Bat																				

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Direct collision or barotrauma	Fatality through direct collision or barotrauma of resident bats occupying the airspace amongst the turbines. The turning blades of the turbines during operation are the most important aspect of the project that would impact negatively on bats. High flying species have predominantly been confirmed at the proposed Koup 1 WEF site.	2	4	3	4	3	3	48	-	High	• All turbines and turbine components, including the rotor swept zone, should be kept out of all High sensitivity zones, and preferably High-medium sensitivity zones. • Mitigation as proposed in Section 9 should be applied as soon as the turbines start turning. • Mitigation as proposed for High-medium sensitivity zones proposed in Section 9.2, Table 7 of the bat report, must be adhered to as soon as the turbines start operating. Close operational monitoring should inform whether mitigation for medium sensitivity zones, as described in Section 9.2, Table 8, should be applied. • A bat specialist should be appointed before the turbines start to turn and operational bat monitoring should start immediately when the turbines start to turn. Careful observation should take place during the operational phase and mitigation should be discussed between the bat specialist and developer. Mitigation should be adapted and implemented without delay. Where high bat mortality occurs, those turbines should be mitigated, using Section 9 of the bat report as a starting point for discussions. • Except for compulsory lightning required in terms of civil aviation, artificial lightning should be minimised, especially bright lights. Lights should rather be turned downwards. Turbine tower lights should be switched off when not in operation, if possible. • At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy facilities (Aronson, et.al., 2020) or later versions of the guidelines valid at the time of monitoring, as well as other relevant South African guidelines as applicable during the monitoring period. • It is understood that static bat monitoring equipment on turbines has a cost implication. Although it is not a requirement at this stage, as it depends on whether the Met mast will be deployed for the life span of the turbines but having more refined static data from sampling points at height, would aid in interpreting future bat fatality records of the Koup 1 WEF; therefore, the installation of more than one monitoring system at height, will be recommended. • The use of ultrasound as a mitigation measure to deter bats is now being used at two WEFs in South Africa. This should be investigated for use at turbines displaying high mortality at the Koup 1 WEF site.	2	3	2	3	3	2	26	-	Medium

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Bat migrations	Bat fatality during migration. A limited number of calls like *Miniopterus natalensis* (Natal Long-fingered bat), a Near Threatened migration species, have been recorded. Not much research has been conducted on migration of bats in South Africa, and some of the other species occurring on site could also migrate.	2	3	3	3	3	2	28	-	Medium	• Care should be taken during post construction monitoring to verify the activity of M. natalensis, especially within the rotor swept area of the turbine blades. Carcasses should be identified so as to establish the fatality of this species. • All turbines and turbine components, including the rotor swept zone, should be kept out of all High sensitivity zones, and preferably High-medium sensitivity zones. • Mitigation as proposed in Section 9.2 should be applied as soon as the turbines start turning. • Mitigation as proposed for high sensitivity zones proposed in Section 9.2, Table 7 of the bat report, must be adhered to as soon as the turbines start operating. Close operational monitoring should inform whether mitigation for medium sensitivity zones, as described in Section 9.2, Table 8 of the bat report, should be applied. • Careful observation should take place during the operational phase and mitigation should be discussed between the bat specialist and developer. Mitigation should be adapted and implemented without delay. Where high bat mortality occurs, those turbines should be mitigated, using Section 9 of the bat report as a starting point for discussions. • Except for compulsory lightning required in terms of civil aviation, artificial lightning should be minimised, especially bright lights. Lights should rather be turned downwards. Turbine tower lights should be switched off when not in operation, if possible. • At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy facilities (Aronson, et.al., 2020) or later versions of the guidelines valid at the time of monitoring, as well as other relevant South African guidelines as applicable during the monitoring period. • Although it is not a requirement at this stage, as it depends on whether the Met mast will be deployed, for the life span of the turbines but having more refined static data from sampling points at height, would aid in interpreting future bat fatality records of the Koup 1 WEF; therefore, the installation of more than one monitoring system at height, will be recommended. • The use of ultrasound as a mitigation measure to deter bats is now being used at two WEFs in South Africa. This should be investigated for use at turbines displaying high mortality at the Koup 1 WEF site.	2	2	1	2	2	2	18	-	Low

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											• Loss of bats of conservation value. A limited number of calls like the red data Miniopterus natalensis have been recorded, as well as the endemic Eptesicus hottentotus. Proven mitigation measures, such as curtailment, should be applied if high activity of bats of conservation value is recorded, or if high numbers of carcasses are collected, during post-construction. • All turbines and turbine components, including the rotor swept zone, should be kept out of all the High sensitivity zones, and preferably out of the High-medium sensitivity. • Mitigation as proposed in Section 9.2, should be applied for turbines situated in High-medium sensitivity zones as indicated. • Mitigation as proposed for medium sensitivity zones proposed in Section 9.2, Table 8 of the bat report, must be adhered to if bat fatality is high. The post construction bat specialist could adapt these as deemed necessary and as operational data becomes available. • Careful observation should take place during the operational phase and mitigation should be discussed between the bat specialist and developer. Mitigation should be adapted and implemented without delay. Where high bat mortality occurs, those turbines should be mitigated, with Section 9.2 of the bat report as a starting point for discussions. • Except for compulsory lightning required in terms of civil aviation, artificial lightning should be minimised, especially bright lights. Lights should rather be turned downwards. Turbine tower lights should be switched off when not in operation, if possible. • At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy facilities (Aronson, et.al., 2020) or later versions of the guidelines valid at the time of monitoring, as well as other relevant South African guidelines as applicable during the monitoring period. • Although it is not a requirement at this stage, as it depends on whether the Met mast will be deployed, for the life span of the turbines but having more refined static data from sampling points at height, would aid in interpreting future bat fatality records of the Koup 1 WEF; therefore, the installation of more than one monitoring system at height, will be recommended. • The use of ultrasound as a mitigation measure to deter bats is now being used at two WEFs in South Africa. This should be investigated for use at turbines displaying high mortality at the Koup 1 WEF site.								
Loss of bats of conservation value	Loss of bats of conservation value. A limited number of calls like the red *data Miniopterus natalensis* have been recorded, as well as the endemic *Eptesicus hottentotus*.	2	3	3	3	3	2	28	-	Medium		2	2	1	2	2	2	18	-	Low

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Fatal curiosity	Bat mortality due to the attraction of bats to wind turbines. Bats have been shown to sometimes be attracted to wind turbines out of curiosity or reasons still under investigation.	1	2	2	2	2	2	18	-	Low	• Bat mortality due to the attraction of bats to wind turbines (Horn, et al. 2008). Bats have been shown to sometimes be attracted to wind turbines out of curiosity or reasons still under investigation. • Except for compulsory lightning required in terms of civil aviation, artificial lightning should be minimised, especially bright lights. Lights should rather be turned downwards. Turbine tower lights should be switched off when not in operation, if possible. • Little is known about this impact and mitigation could be adapted if more research becomes available.	1	2	2	2	2	1	18	-	Low
Foraging space lost due to the turning of turbine blades	Loss of habitat and foraging space during operation of the wind turbines.	2	4	3	3	3	3	45	-	High	• Proven mitigation measures, such as curtailment, should be applied if high activity of bats of conservation value is recorded, or if high numbers of carcasses are collected, during post-construction. • All turbines and turbine components, including the rotor swept zone, should be kept out of all the High sensitivity zones, and preferably out of the High-medium sensitivity. • Mitigation as proposed in Section 9.2 of the bat report, should be applied for turbines situated in High-medium sensitivity zones as indicated. • Mitigation as proposed for medium sensitivity zones proposed in Section 9.2, Table 8 of the bat report, must be adhered to if bat fatality is high. The post construction bat specialist could adapt these as deemed necessary and as operational data becomes available. • Careful observation should take place during the operational phase and mitigation should be discussed between the bat specialist and developer. Mitigation should be adapted and implemented without delay. Where high bat mortality occurs, those turbines should be mitigated, with Section 9.2 of the bat report as a starting point for discussions. • Except for compulsory lightning required in terms of civil aviation, artificial lightning should be minimised, especially bright lights. Lights should rather be turned downwards. Turbine tower lights should be switched off when not in operation, if possible. • At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy facilities (Aronson, et.al., 2020) or later versions of the guidelines valid at the time of monitoring, as well as other relevant South African guidelines as applicable during the monitoring period. • Although it is not a requirement at this stage, as it depends on whether the Met mast will be deployed, for the life span of the turbines but having more refined static data from sampling points at height, would aid in	2	4	2	2	3	3	39	-	Medium

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											interpreting future bat fatality records of the Koup 1 WEF; therefore, the installation of more than one monitoring system at height, will be recommended. • The use of ultrasound as a mitigation measure to deter bats is now being used at two WEFs in South Africa. This should be investigated for use at turbines displaying high mortality at the Koup 1 WEF site.									
Smaller genetic pool	Reduction in the size, genetic diversity, resilience and persistence of bat populations. Bats have low reproductive rates and populations are susceptible to reduction by fatalities other than natural death. Furthermore, smaller bat populations are more susceptible to genetic inbreeding.	2	4	3	3	3	3	45	-	High	• Proven mitigation measures, such as curtailment, should be applied if high activity of bats of conservation value is recorded, or if high numbers of carcasses are collected, during post-construction. • All turbines and turbine components, including the rotor swept zone, should be kept out of all the High sensitivity zones, and preferably out of the High-medium sensitivity. • Mitigation as proposed in Section 9.2 of the bat report, should be applied for turbines situated in High-medium sensitivity zones as indicated. • Mitigation as proposed for medium sensitivity zones proposed in Section 9.2, Table 8 of the bat report, must be adhered to if bat fatality is high. The post construction bat specialist could adapt these as deemed necessary and as operational data becomes available. • Careful observation should take place during the operational phase and mitigation should be discussed between the bat specialist and developer. Mitigation should be adapted and implemented without delay. Where high bat mortality occurs, those turbines should be mitigated, with Section 9.2 of the bat report as a starting point for discussions. • Except for compulsory lightning required in terms of civil aviation, artificial lightning should be minimised, especially bright lights. Lights should rather be turned downwards. Turbine tower lights should be switched off when not in operation, if possible. • At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy facilities (Aronson, et.al., 2020) or later versions of the guidelines valid at the time of monitoring, as well as other relevant South African guidelines as applicable during the monitoring period. • Although it is not a requirement at this stage, as it depends on whether the Met mast will be deployed, for the life span of the turbines but having more refined static data from sampling points at height, would aid in interpreting future bat fatality records of the Koup 1 WEF; therefore, the installation of more than one monitoring system at height, will be recommended.	2	3	2	3	3	3	39	-	Medium

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											• The use of ultrasound as a mitigation measure to deter bats is now being used at two WEFs in South Africa. This should be investigated for use at turbines displaying high mortality at the Koup 1 WEF site.									
Geotechnical																				
Removal of subsoils (soil, rock)	Displacement of natural earth material. 1) Increase in soil erosion. 2) Potential oil spillages from maintenance vehicles. 3) Sedimentation of non-perennial features caused by soil erosion.	1	2	2	2	3	1	10	-	Low	• Use of existing roads and tracks where feasible. • Rehabilitation of affected areas (such as erosion control mats). • Correct engineering design and construction of roads and water crossings. • Vehicle repairs to be undertaken in designated areas. • Maintenance of stormwater system.	1	3	2	2	3	2	22	-	Low
Surface Water																				
Impact on aquatic systems through the possible increase in surface water runoff on form and function during the operational phase	Increase in hard surface areas, and roads that require stormwater management will increase through the concentration of surface water flows that could result in localised changes to flows (volume) that would result in form and function changes within aquatic systems, which are currently ephemeral. This then increases the rate of erosions and sedimentation of downstream areas.	2	3	2	2	3	3	36	-	Medium	• A stormwater management plan must be developed in the preconstruction phase, detailing the stormwater structures and management interventions that must be installed to manage the increase of surface water flows directly into any natural systems. This stormwater control systems must be inspected on an annual basis to ensure these are functional. Effective stormwater management must include effective stabilisation (gabions and Reno mattresses) of exposed soil and the re-vegetation of any disturbed riverbanks	1	1	1	1	1	1	5	-	Low
Archaeological – none identified																				
Heritage – none identified																				
Cultural Landscape																				
Ecological	Inappropriate operational activities degrade the significant ecological elements of the cultural landscape	1	4	4	2	3	4	56	-	High	• Areas of endemic and endangered natural vegetation should be conserved. • Critical Biodiversity Areas, and Ecological Support Areas (along drainage lines), should be protected. • Areas of habitat are found among the rocky outcrops and contribute to the character, as well as biodiversity of the area. Care should be taken that habitats are not needlessly destroyed. • Identified medicinal plants used for healing or ritual purposes should be conserved during all phases if threatened for use. Access to these resources should be made available to those who have had historic access to them.	1	1	4	2	3	2	22	-	Low

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Aesthetic	Inappropriate operational activities degrade the significant aesthetic elements of the cultural landscape altering the character and sense of place	2	4	3	3	3	3	45	-	High	• Infrastructure improvement or maintenance work, including new roads and upgrades to the road network, should be appropriate to the rural context (scale, material etc.) and avoid steep slopes over 10% as well as ridges. • Prevent the construction of new buildings/structures on visually sensitive, steep (over 10%), elevated or exposed slopes, ridgelines and hillcrests or within 800m of the farmsteads and N12 and 300m of the farm roads. • Avoid visual clutter in the landscape by intrusive signage, and the intrusion of commercial, corporate development along roads. • Duration and magnitude of operational activity must be minimized to reduce the impact of heavy vehicles on the roads as well as the associated dust from the activity. Light vehicles should be used to reduce degradation to the farm roads and the need to upgrade roads to scale and extent that negatively impacts on the integrity of the historic farm roads. Operational traffic must operate at speeds that reduce dust and noise. • The impact of WEF turbine night lighting on the wilderness landscape is intrusive and overwhelms the rural character of the landscape, giving it an industrial sense of place after dark. Reduce the impact of turbine night lighting by minimizing the number of turbines with lighting to only those necessary for aviation safety, such as a few identified turbines on the outer periphery, or use aircraft triggered night lighting. Due to the reduced receptors on the roads at night, the impact of the lighting at night is reserved mainly for farmsteads and other places of overnight habitation such as the surrounding tourist facilities, which would be heavily impacted by the light pollution on a long term and ongoing basis.	2	4	2	3	3	2	28	-	Medium
Historic	Inappropriate operational activities degrade the significant historic elements of the cultural landscape altering the character and sense of place	2	4	4	4	4	4	72	-	Very High	• Historic farmsteads must be protected from the impacts of operational facility vehicles and increased numbers of people. No WEF operations traffic should pass through or closer than 50m to the outer boundaries of a farm werf, or 200m from graded structures, which includes the associated historically cultivated lands, cemeteries, unmarked burials. The most appropriate use of existing farm roads must be	2	2	4	2	3	2	26	-	Medium

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											found to avoid farm werfs as far as possible and reduce construction impact on these heritage features. • No infrastructure or operational upgrades, such as boreholes, should impact negatively or reduce natural, on site water quality, quantity or access for the residents within or around the development site. Preferably any borehole or other water resource upgrade should also be made freely accessible to the residents living on site. • Traditional planting patterns should be protected by ensuring that existing trees are not needlessly destroyed, as these signify traces of cultural intervention in a harsh environment. These planting patterns include the trees planted around the werfs and along travel routes. Interpretation of these landscape features as historic remnants should occur. • Burial grounds and places of worship are automatically regarded as Grade IIIa or higher. Any development that threatens the inherent character of family burial grounds must be assessed and should be discouraged and a buffer of 100m around all burial ground or unmarked graves should be in place. No turbines have been proposed for placement near known unmarked burials or family cemeteries. A preconstruction micro-survey of each turbine footprint and any new access roads should be conducted to ensure no further unmarked graves are threatened. • Mountain slopes have been used for traditional practices for many years, and care should be taken that any significant cultural sites, such as burials and veldkos/medicinal plant resources, are not disturbed. • Farms in the area followed a system of stone markers to demarcate the farm boundaries in the area. Where these structures are found on the site, care should be taken that they are not needlessly destroyed, as they add to the layering of the area. • Roads running through the area may have historic stone way markers. Where these are found care should be taken that they are left in tact and in place. Road upgrades must not move or threaten their position and they should be visible from the road they are related to by passing travellers. • Where the historic function of a building/site is still intact, the function has heritage value and should be protected.									

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											• Surviving examples (wagon routes, outspans, and commonage), where they are owned in some public or communal way (or by a body responsible for acting in the public interest) and where they are found to be actively operating in a communal way, will have cultural and heritage value and should be enhanced and retained. The historic route running through Koup 1 should be maintained and integrity as a communal road for farm residents must be retained. • Accommodation of WEF staff must not negatively impact on existing farm residents or degrade the integrity of the farmstead complexes and should, without negative impact to ecological or aesthetic resources, be located outside of the farmstead complexes or site. Farm residents should be consulted on the preferable location for construction staff accommodation. • Light vehicles should be used to reduce degradation to the farm roads and the need to upgrade roads to scale and extent that negatively impacts on the integrity of the historic farm roads. Operational traffic must operate at speeds that reduce dust and noise. • A preconstruction micro-survey for access roads, substations, laydown areas and gridlines should be completed with CLA specialist to ensure appropriate buffers are maintained during operational activities.								
Socio-economic	Inappropriate operational activities degrade the significant socio-economic opportunities of the cultural landscape	2	4	3	4	4	4	68	-	Very High	• The local community on and around the development should benefit from job opportunities created by the proposed development and the development should not cause reduction in economic viability of surrounding properties in excess of those offered by the development. Short-term job opportunities at the expense of long term economic benefit and local employment opportunities must be prevented. • The continued use of the landscape for human habitation and cultivation by historic residents of the area, should be retained and encouraged as far possible to sustain the continual use pattern and human-environment relationship which is the ultimate significance of this cultural landscape element. The WEF development must allow and support this, including financially, and not degrade this continued relationship.	2	3	2	2	3	2	24	+	Medium

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											• No infrastructure or operational upgrades, such as boreholes, should impact negatively or reduce natural, on site water quality, quantity or access for the residents within or around the development site. Preferably any borehole or other water resource upgrade should also be made freely accessible to the residents living on site. • The local community on and around the development should benefit from job opportunities created by the proposed development and the development should not cause reduction in economic viability of surrounding properties in excess of those offered by the development. Short-term job opportunities at the expense of long term economic benefit and local employment opportunities must be prevented. • Local residents must be offered employment on the construction/ decommissioning and operational phases before 'importing' staff from elsewhere. • Local residents must be offered employment training opportunities associated with WEF developments at all phases. • Crop cultivation, sheep, cattle or game farming should be allowed to continue below the wind turbines, or be rehabilitated to increase biodiversity in the area.									
Noise																				
Noise Impacts during the day	Noises from operating wind turbines	2	1	1	2	3	1	10	-	Low	• No mitigation measures recommended for daytime operational activities	2	1	1	2	3	1	10	-	Low
Noise Impacts at night	Noises from operating wind turbines	2	1	1	2	3	2	18	-	Low	• No mitigation measures recommended for night-time operational activities	2	1	1	2	3	2	18	-	Low
Paleontological – none identified																				
Social																				
Health and social wellbeing	Noise WEF only	2	3	2	2	3	1	12	-	Low	• Refer to the mitigation measures suggested by the noise quality specialist.	2	2	2	1	3	1	10	-	Low

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Health and social wellbeing	Shadow flicker WEF only	1	2	1	2	3	2	18	-	Low	• Identifying receptor points and applying appropriate technical measures such as computer modelling in siting the wind turbines to limit the effect of shadow flicker. • Where necessary and appropriate apply tracking technology that will automatically shutoff and restart the affecting wind turbine to eliminate shadow flicker. • Consider the application of appropriate screening measures to reduce the effect of shadow flicker.	1	2	1	2	3	2	18	-	Low
Health and social wellbeing	Blade glint WEF only	2	2	1	2	3	2	20	-	Low	• Calculate and factor in the risk of blade glint in siting the wind turbines. • Coat wind turbine blades with non-reflective coating to reduce blade glint. • Where appropriate adjust the angle of turbine blades to reduce blade glint.	2	2	1	2	1	2	16	-	Low
Health and social wellbeing	Electromagnetic field and RF interference	2	2	1	2	2	2	18	-	Low	• Wind turbine mechanisms will be elevated and the risk of EMFs will be minimal. Notwithstanding this, it would be pertinent to regularly monitor the levels of EMFs emitted by the turbines and, if necessary, make the appropriate adjustments to ensure that these levels remain within acceptable parameters. • Ensure that power lines are not routed in close proximity (with 300 meters) of residential areas to limit the effect off EMFs. • Consult with the appropriate telecommunication authorities to ensure that the telecommunication installations identified within the vicinity of the project are not compromised through RFI.	2	2	1	2	2	2	18	-	Low
Health and social wellbeing	Hazard exposure	1	2	2	2	3	2	22	-	Low	• Install early detection techniques to avoid or reduce structural damage. • Install lighting protection systems. • Install fire prevention and control measures.	1	2	2	2	3	2	22	-	Low
Quality of the living environment	Transformation of the sense of place	3	4	3	3	3	3	48	-	High	• Apply the mitigation measures suggested in the Visual Impact Assessment Report. • Communicate the benefits associated with renewable energy to the broader community. • Ensure that all affected landowners and tourist associations are regularly consulted. • A Grievance Mechanism should be put in place and all grievances should be dealt with transparently.	3	4	3	3	3	3	48	-	High

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											• The mitigation measures recommended in the Heritage and Palaeontology Impact Assessment should be followed.									
Economic	Job creation and skills development	2	4	2	2	3	2	26	+	Medium	• Implement a training and skills development programme for locals. • Work closely with the appropriate municipal structures regarding establishing a social responsibility programme.	2	4	2	2	3	2	26	+	Medium
Economic	Socio-economic stimulation.	4	4	2	3	3	2	32	+	Medium	• Ensure that the procurement policy supports local enterprises. • Establish a social responsibility programme either in line with the REIPPP BID guidelines or equivalent. • Work closely with the appropriate municipal structures regarding establishing a social responsibility programme. • Ensure that any trusts or funds are strictly managed in respect of outcomes and funds.	4	4	2	3	3	2	32	+	Medium
Transportation																				
Additional Traffic Generation	Increase in Traffic	2	1	1	2	3	1	9	-	Low	• • The increase in traffic for this phase of the development is negligible and will not have a significant impact	2	1	1	2	3	1	9	-	Low
Additional Traffic Generation	Increase of Incidents with pedestrians and livestock	2	1	1	2	3	1	9	-	Low	• The increase in traffic for this phase of the development is negligible and will not have a significant impact	2	1	1	2	3	1	9	-	Low
Additional Traffic Generation	Increase in Dust from gravel roads	2	1	1	2	3	1	9	-	Low	• The increase in traffic for this phase of the development is negligible and will not have a significant impact	2	1	1	2	3	1	9	-	Low
Additional Traffic Generation	Increase in Road Maintenance	2	1	1	2	3	1	9	-	Low	• The increase in traffic for this phase of the development is negligible and will not have a significant impact	2	1	1	2	3	1	9	-	Low
Abnormal Loads	Additional Abnormal Loads	2	1	1	2	3	1	9	-	Low	• The increase in traffic for this phase of the development is negligible and will not have a significant impact	2	1	1	2	3	1	9	-	Low

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Internal Access Roads	New / Larger Access points	2	1	1	2	3	1	9	-	Low	• Adequate road signage according to the SARTSM	2	1	1	2	3	1	9	-	Low
Visual																				
Potential alteration of the visual character and sense of place. Potential visual impact on receptors in the study area. Potential visual impact on the night time visual environment.	• The development may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. • The proposed WEF and associated infrastructure will alter the visual character of the surrounding area and expose potentially sensitive visual receptor locations to visual impacts. • Dust emissions and dust plumes from maintenance vehicles accessing the site via gravel roads may evoke negative sentiments from surrounding viewers. • The night time visual environment will be altered as a result of operational and security lighting at the proposed WEF.	2	3	3	3	3	2	28	-	Medium	<u>Design Phase</u> • Ensure that wind turbines are not located within 1km of any farmhouses in order to minimise visual impacts on these dwellings. • Where possible, fewer but larger turbines with a greater output should be utilised rather than a larger number of smaller turbines with a lower capacity. • Where possible, the operation and maintenance buildings and laydown areas should be consolidated to reduce visual clutter. • Where possible, underground cabling should be utilised. <u>Operational Phase</u> • Turbine colours should adhere to CAA requirements. Bright colours and logos on the turbines should be kept to a minimum. • Inoperative turbines should be repaired promptly, as they are considered more visually appealing when the blades are rotating (or at work) (Vissering, 2011). • If turbines need to be replaced for any reason, they should be replaced with the same model, or one of equal height and scale to lessen the visual impact. • As far as possible, limit the number of maintenance vehicles which are allowed to access the site. • Ensure that dust suppression techniques are implemented on all gravel access roads. • As far as possible, limit the amount of security and operational lighting present on site. • Light fittings for security at night should reflect the light toward the ground and prevent light spill. • Lighting fixtures should make use of minimum lumen or wattage. • Mounting heights of lighting fixtures should be limited, or alternatively foot-light or bollard level lights should be used.	2	3	3	2	2	2	24	-	Medium

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											• If possible, make use of motion detectors on security lighting. • Where possible, the operation and maintenance buildings should be consolidated to reduce visual clutter. • The operations and maintenance (O&M) buildings should not be illuminated at night. • The O&M buildings should be painted in natural tones that fit with the surrounding environment.									

14.3.4 Decommissioning

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Avifaunal																				
Avifauna	Displacement due to disturbance associated with the dismantling of the wind turbines and associated infrastructure.	1	4	1	2	1	2	18	-	Low	• Dismantling activity should be restricted to the immediate footprint of the infrastructure as far as possible. Access to the remainder of the area should be strictly controlled to prevent unnecessary disturbance of priority species. • Measures to control noise and dust should be applied according to current best practice in the industry.	1	3	1	2	1	2	16	-	Low
Ecological																				
Faunal disturbance and habitat loss	Fauna will be negatively affected by the decommissioning of the wind farm due to the human disturbance, the presence and operation of vehicles and heavy machinery on the site and the noise generated.	1	4	1	2	1	3	27	-	Medium	• Any potentially dangerous fauna such as snakes or fauna threatened by the decommissioning activities should be removed to a safe location prior to the commencement of decommissioning activities. • All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. • All vehicles accessing the site should adhere to a low-speed limit (40km/h max) to avoid collisions with susceptible species such as snakes and tortoises.	1	3	1	1	1	3	21	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											• No excavated holes or trenches should be left open for extended periods as fauna may fall in and become trapped. • All above-ground infrastructure should be removed from the site. Below-ground infrastructure such as cabling can be left in place if it does not pose a risk, as removal of such cables may generate additional disturbance and impact, however, this should be in accordance with the facilities' decommissioning and recycling plan, and as per the agreements with the land owners concerned.									
Increased potential for soil erosion	Following decommissioning, the site will be highly vulnerable to soil erosion due to the disturbance created by the removal of infrastructure from the site.	2	3	2	2	3	3	36	-	Medium	• Any roads that will not be rehabilitated should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk. • There should be regular monitoring (annual) for erosion for at least 5 years after decommissioning by the applicant to ensure that no erosion problems develop as a result of the disturbance, and if they do, to immediately implement erosion control measures. • All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. • All disturbed and cleared areas should be revegetated with indigenous perennial shrubs and grasses from the local area.	2	2	2	2	2	2	20	-	Low
Ecological degradation due to alien plant invasion.	Increased alien plant invasion following decommissioning	1	3	2	2	3	3	33	-	Medium	• Wherever excavation is necessary for decommissioning, topsoil should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species. • Due to the disturbance at the site alien plant species are likely to be a long-term problem at the site following decommissioning and regular control will need to be implemented until a cover of indigenous species has returned. • Annual monitoring for alien plants within the disturbed areas for at least three years after decommissioning or until alien invasives are no longer a problem at the site. • 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.	1	2	1	1	2	2	14	-	Low
Bat																				
Removal of turbines	Bat disturbance due to decommissioning activities and associated noise, especially during night-time.	1	3	1	2	1	1	8	-	Low	• Except for compulsory lightening required in terms of civil aviation, artificial lightening during construction should be minimised, especially bright lights or spotlights. Lights should avoid skyward illumination.	1	1	1	1	1	1	5	-	Low
Geotechnical																				

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Removal of subsoils (soil, rock)	Decommissioning of the structure will disturb the geological environment. • Increase in soil and wind erosion due to clearance of structures. • Construction and earthmoving vehicles will displace the soil. • Creation of drainage paths. • Potential oil spillages from vehicles. • Excessive sediments in non-perennial features.	1	4	2	1	1	3	27	-	Low	• Use of temporary berms and drainage channels to divert surface water were feasible. • Minimize earthworks and demolish footprints. • Use of existing roads and tracks were feasible. • Rehabilitation of affected areas (such as regrassing). • Develop a chemical spill response plan. • Develop dust and demolition fly suppression plan. • Vehicle repairs to be undertaken in designated areas. • Reinstate channelized drainage features.	1	3	4	2	2	2	24	-	Low
Surface Water – same as construction																				
Heritage – none identified																				
Archaeological – none identified																				
Cultural Landscape – same as construction																				
Noise																				
Noise impacts during the day	Decommissioning activities relating to removal of infrastructure and wind turbines, rehabilitation of disturbed areas	2	1	1	2	1	1	7	-	Low	• No mitigation measures recommended for decommissioning activities for WTGs or substations	2	1	1	2	1	1	7	-	Low
Paleontological – none identified																				
Social– none identified																				
Transportation																				
Additional Traffic Generation	Increase in Traffic	2	3	1	2	1	2	18	-	Low	• Ensure staff transport is done in the 'off peak' periods and by bus. • Stagger material, component and abnormal loads • Construction of an on-site concrete batching plant to reduce trips.	2	3	1	2	1	2	18	-	Low
Additional Traffic Generation	Increase of Incidents with pedestrians and livestock	2	4	2	4	1	2	26	-	Medium	• Reduction in speed of vehicles • Adequate enforcement of the law • Implementation of pedestrian safety initiatives • Regular maintenance of farm fences & access cattle grids • Construction of an on-site concrete batching plant to reduce trips.	2	3	2	4	1	1	12	-	Low

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Additional Traffic Generation	Increase in Dust from gravel roads	2	3	2	2	1	2	20	-	Low	• Reduction in speed of the vehicles • Use of dust suppressant techniques • Implement a road maintenance program under the auspices of the respective transport department. • Construction of an on-site concrete batching plant to reduce trips.	2	3	2	2	1	2	20	-	Low
Additional Traffic Generation	Increase in Road Maintenance	2	3	2	2	2	2	22	-	Low	• Implement a road maintenance program under the auspices of the respective transport department. • Construction of an on-site batching plant to reduce trips.	2	3	2	2	1	2	20	-	Low
Abnormal Loads	Additional Abnormal Loads	3	2	1	2	1	1	9	-	Low	• Ensure abnormal vehicles travel to and from the proposed development in the 'off peak' periods or stagger delivery. • Adequate enforcement of the law	3	2	1	2	1	1	9	-	Low
Internal Access Roads	Increase in Dust from gravel roads	1	4	1	1	1	1	8	-	Low	• Enforce a maximum speed limit on the development • Use of dust suppressant techniques• Adequate watering by means of water bowser	1	3	1	1	1	2	14	-	Low
Internal Access Roads	New / Larger Access points	1	4	1	2	1	1	9	-	Low	• Adequate road signage according to the SARTSM • Approval from the respective roads department	1	4	1	2	1	1	9	-	Low
Visual																				
Potential visual intrusion resulting from vehicles and equipment involved in the decommissioning process; Potential visual impacts of increased dust emissions from decommissioning activities and related traffic; and Potential visual intrusion of any remaining infrastructure on the site.	• Vehicles and equipment required for decommissioning will alter the natural character of the study area and expose visual receptors to visual impacts. • Decommissioning activities may be perceived as an unwelcome visual intrusion. • Dust emissions and dust plumes from increased traffic on the gravel roads serving the decommissioning site may evoke negative sentiments from surrounding viewers. • Surface disturbance during decommissioning would expose bare soil (scarring) which could visually contrast with the surrounding environment. • Temporary stockpiling of soil during decommissioning may alter the flat landscape. Wind blowing over these	2	3	1	2	1	2	18	-	Low	• All infrastructure that is not required for post-decommissioning use should be removed. • Carefully plan to minimize the decommissioning period and avoid delays. • Maintain a neat decommissioning site by removing rubble and waste materials regularly. • Ensure that dust suppression procedures are maintained on all gravel access roads throughout the decommissioning phase. • All cleared areas should be rehabilitated as soon as possible. • Rehabilitated areas should be monitored post-decommissioning and remedial actions implemented as required.	2	2	1	2	1	2	16	-	Low

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
	disturbed areas could result in dust which would have a visual impact.																			

14.3.5 Cumulative

The proposed WEF is located adjacent to several other WEFs within 35km of Koup 1 WEF. SiVEST undertook every effort to obtain the information (including specialist studies, BA / EIA / Scoping and EMPr Reports) for the surrounding developments, however, many of the documents are not currently publicly available to download. The information that could be obtained for the surrounding planned renewable energy developments was taken into account as part of the cumulative impact assessment.

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

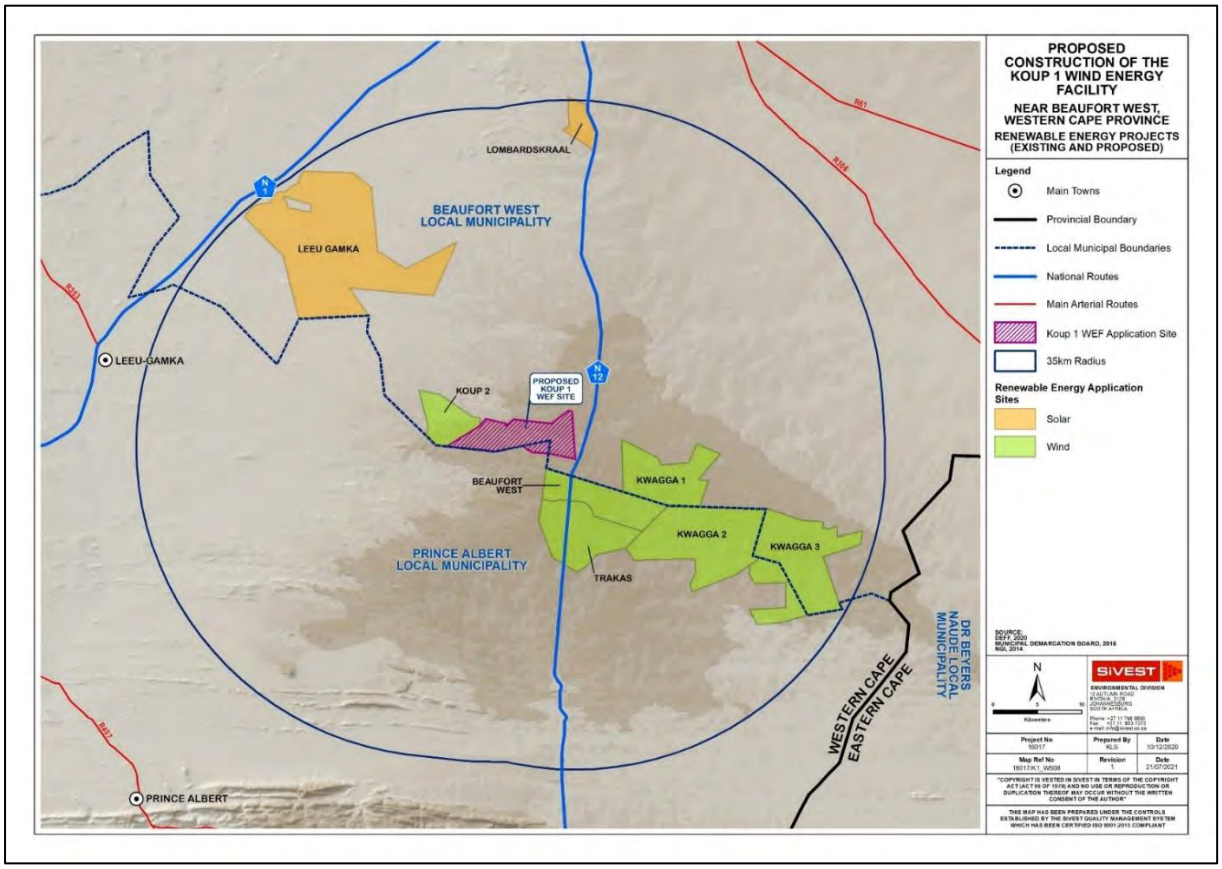

Figure 33: Renewable Energy Projects within 35km of the Koup 1 WEF

Cumulative Impacts

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Avifaunal																				
Avifauna	• Mortality due to collisions with the wind turbines • Displacement due to disturbance during construction and operation of the wind farm • Displacement due to habitat change and loss at the wind farm • Mortality due to electrocution on the electrical infrastructure	1	4	2	3	3	3	39	-	Medium	• All the mitigation measures listed in the various bird specialist studies compiled for the eight (8) renewable energy facilities within a 35km radius around the project.	1	2	2	3	3	2	22	-	Low
Ecological																				
Cumulative impacts on fauna and flora	Wind energy development in the wider area around the Koup 1 site will generate cumulative impacts on habitat loss and fragmentation for fauna and flora.	2	3	2	2	3	2	24	-	Medium	• There should be no turbines within the Very High Sensitivity areas. • The footprint within drainage lines should be minimized as much as possible. • Preconstruction walk-though of the approved development footprint to ensure that sensitive habitats and species are avoided where possible. • Ensure that lay-down and other temporary infrastructure is within low sensitivity areas, preferably previously transformed areas if possible. • Minimise the development footprint as far as possible and rehabilitate disturbed areas that are no longer required by the operational phase of the development. • A large proportion of the impact of the development stems from the access roads and 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, as informed by a preconstruction walk-though survey. • Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes topics such as no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas etc. • 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.	2	2	2	2	3	2	22	-	Low
Bat																				

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Direct collision and barotrauma	Cumulative bat mortality due to direct collision with the blades or barotrauma during foraging of resident bats at several WEF sites.	3	4	4	3	3	3	51	-	High	• Although not enforceable on the Koup 1 applicant, all REFs must adhere to their project specific mitigation measures, especially buffer zones and sensitivity areas and recommended mitigation, for each renewable energy project. • Post construction monitoring as per the relevant South African Bat Guidelines applicable at the time is of crucial importance.	3	2	3	3	3	3	42	_	High
Migrating bats	Cumulative bat mortality of migrating bats due to direct blade impact or barotrauma during foraging of migrating bats on several wind farms	3	3	3	3	3	3	45	-	High	• Although not enforceable on the Koup 1 applicant, all REFs must adhere to their project specific mitigation measures, especially buffer zones and sensitivity areas and recommended mitigation, for each renewable energy project. • Post construction monitoring as per the relevant South African Bat Guidelines applicable at the time is of crucial importance.	3	2	2	2	3	2	24	_	Medium
Several wind farms stretching over thousands of hectares	Habitat loss over several wind farms	3	4	2	3	3	3	45	-	High	• Although not enforceable on the Koup 1 applicant, all REFs must adhere to their project specific mitigation measures, especially buffer zones and sensitivity areas and recommended mitigation, for each renewable energy project. • Post construction monitoring as per the relevant South African Bat Guidelines applicable at the time is of crucial importance.	3	4	2	3	3	2	30	_	Medium
Several wind farms with the associated bat mortality over the lifespan of wind energy facilities	Cumulative reduction in the size, genetic diversity, resilience and persistence of bat populations	3	4	3	3	3	4	64	-	High	• Although not enforceable on the Koup 1 applicant, all REFs must adhere to their project specific mitigation measures, especially buffer zones and sensitivity areas and recommended mitigation, for each renewable energy project. • Post construction monitoring as per the relevant South African Bat Guidelines applicable at the time is of crucial importance.	3	4	3	3	3	3	48	_	High
Geotechnical – none identified																				
Surface Water																				
Cumulative Impact of various proposed wind farms and associated grid lines on the local aquatic resources	The cumulative assessment considers the various proposed renewable projects that occur within a 35km radius of this site, where the author has either been involved in the assessment of these projects (Enertrag SA) and or review of the past **assessments** as part of any required Water Use Licenses (Atlantic Energy Partners & Mainstream projects).	1	1	1	1	1	1	5	-	Low	• The premise of all the reviewed or assessed projects has been the avoidance of impacts on the aquatic environment, which have been achieved by the various proposed layouts. The only remaining impacts will be the crossing of internal roads over minor watercourse / drainage lines.	1	1	1	1	1	1	5	-	Low
Heritage																				
Tangible Heritage Resources	The extent that the addition of this project will have on the overall impact of developments in the region on heritage resources.	4	2	4	4	4	2	36	-	Medium	• It can clearly be noted that the area in general is abundant with Stone Age and historical remains. • However, until a regional detailed study is commissioned by HWC or SAHRA. No further mitigations measures can be proposed other than those already recommended for the site-specific mitigation of sites in this report.	4	1	4	4	4	1	17	-	Low
Fossil heritage resources	Disturbance, damage or destruction of fossils at or beneath the ground surface due to surface clearance and bedrock excavations	1	4	4	3	4	2	32	-	Medium	• (N.B. Vary between projects) • Pre-construction walkdown (with fossil recording / collection) of final footprint by specialist palaeontologist. • Chance Fossil Finds Procedure during construction phase.	1	2	4	2	4	1	13	-	Low
Archaeological																				

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Heritage Resources	The extent that the addition of this project will have on the overall impact of developments in the region on heritage resources.	4	2	4	4	4	2	36	-	Medium	• It can clearly be noted that the area in general is abundant with Stone Age and historical remains. • However, until a regional detailed study is commissioned by HWC or SAHRA. No further mitigations measures can be proposed other than those already recommended for the site-specific mitigation of sites in this report.	4	1	4	4	4	1	17	-	Low
Cultural Landscape																				
Ecological	Inappropriate cumulative development degrade the significant ecological elements of the cultural landscape	3	4	4	3	4	4	72	-	Very High	• In addition to the proposed recommendations of this CLA the cumulative negative impact of the proposed WEFs on the cultural landscape can be reduced with the following recommendations on WEF development for the regional cultural landscape. • To reduce the negative cumulative impact of the proposed WEFs on the N12 scenic route and the character and sense of place of the cultural landscape of the Koup region, it is recommended that WEF turbines be constructed either to the west or east of the N12 and not on either side along the same stretch of N12. • The WEFs should read as separate developments with vast spaces in between to continue the reading on the landscape of places amongst the vastness as is the historical trend of farmsteads in the Koup region. • Following the existing natural ridgelines that run east to west may reduce the impact of the cumulative WEF developments on the cultural landscape as the turbines, although out of scale and form with the surrounding area due to their verticality, may follow the skyline and break the views where they have historically been reduced already by the height of the ridges. The turbines, if placed sensitively and far away enough from the N12 and not on the ridgeline or steep slopes, so as not to feel overwhelming, can emphasise the experience of the poort elements of the cultural landscape if placed to follow the natural undulating landform. • These recommendations should allow for the continued opportunity by travellers to experience the vistas of the vast open wilderness spaces and views of the mountain ranges in the distance at all points along the N12 scenic drive.	3	2	3	2	3	2	26	-	Medium
Aesthetic	Inappropriate cumulative development degrades the significant aesthetic elements of the cultural landscape altering the character and sense of place	3	4	4	3	3	4	68	-	Very High		3	4	2	2	3	3	42	-	Medium
Historic	Inappropriate cumulative development degrades the significant historic elements of the cultural landscape altering the character and sense of place	3	4	4	4	4	4	76	-	Very High		3	2	3	2	3	2	26	-	Medium
Socio-economic	Inappropriate cumulative development degrade the significant socio-economic opportunities of the cultural landscape	3	4	3	4	4	4	72	-	Very High		3	3	1	1	4	2	24	+	Medium
Noise																				
Increased noise levels	Cumulative noises due to operating wind turbines from other wind energy facilities in the area	2	1	1	2	3	1	9	-	Low	• No mitigation measures recommended	2	1	1	2	3	1	9	-	Low

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Paleontological – none identified																				
Social																				
Health and social wellbeing	Noise	1	3	2	2	3	2	22	-	Low	• With regard to the cumulative impacts, mitigation can only be considered and implemented through a readiness action plan at a regional level and will need to be driven on a provincial and municipal basis; underpinned by national government, private sector and public support. In this regard the Draft Consolidated Intergovernmental Readiness Report for large development scenarios in the Central Karoo (Western Cape Government Environmental Affairs and Development Planning, 2019) acknowledges the need to prepare for large-scale, or regional, development proposals and to enlist national government, private sector and public participation.	1	3	2	2	3	2	22	-	Low
Health and social wellbeing	Shadow flicker	1	3	2	2	3	2	22	-	Low		1	3	2	2	3	2	22	-	Low
Health and social wellbeing	Blade glint	2	3	2	2	3	2	24	-	Low		2	3	1	2	3	2	22	-	Low
Health and social wellbeing	Risk of HIV and AIDS	4	3	4	3	4	3	54	-	High		2	3	3	3	3	3	42	-	Medium
Quality of the living environment	Sense of place	2	4	4	3	4	3	51	-	High		2	4	4	3	4	3	51	-	High
Quality of the living environment	Service supplies and infrastructure	2	3	2	2	2	2	22	-	Low		2	2	2	2	2	2	20	-	Low
Economic	Job creation and skills development	4	4	3	3	3	4	68	+	Very high		4	4	3	3	3	4	68	+	Very high
Economic	Socio-economic stimulation	2	4	2	2	3	2	26	+	Medium		2	4	2	2	3	2	26	+	Medium
Transportation																				
Additional Traffic Generation	Increase in Traffic	2	3	1	2	1	4	36	-	Low	• Ensure a large portion of vehicles traveling to and from the proposed development travels in the 'off peak' periods or by bus. • Construction of an on-site batching plant to reduce trips. • Coordination between all developers in the area	2	3	1	2	1	2	18	-	Low

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		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Additional Traffic Generation	Increase of Incidents with pedestrians and livestock	2	4	2	4	1	4	52	-	High	• Reduction in speed of vehicles • Adequate enforcement of the law • Implementation of pedestrian safety initiatives • Regular maintenance of farm fences, access cattle grids • Construction of an on-site batching plant to reduce trips. • Coordination between all developers in the area	2	3	2	4	1	2	24	-	Medium
Additional Traffic Generation	Increase in Dust from gravel roads	2	3	2	2	1	4	40	-	Medium	• Reduction in speed of the vehicles • Use of dust suppressant techniques • Implement a road maintenance program under the auspices of the respective transport department. • Construction of an on-site batching plant to reduce trips. • Coordination between all developers in the area	2	3	2	2	1	2	20	-	Low
Additional Traffic Generation	Increase in Road Maintenance	2	3	2	2	2	2	22	-	Low	• Implement a road maintenance program under the auspices of the respective transport department. • Construction of an on-site batching plant to reduce trips. • Coordination between all developers in the area	2	3	2	2	2	2	22	-	Low
Abnormal Loads	Additional Abnormal Loads	3	2	1	2	1	4	36	-	Medium	• Ensure abnormal vehicles travel to and from the proposed development in the 'off peak' periods. • Adequate enforcement of the law	3	2	1	2	1	2	18	-	Low
Internal Access Roads	Increase in Dust from gravel roads	1	4	1	1	1	3	24	-	Medium	• Enforce a maximum speed limit on the development • Use of dust suppressant techniques • Adequate watering by means of water bowser	1	3	1	1	1	2	14	-	Low
Internal Access Roads	New / Larger Access points	1	4	1	2	1	2	18	-	Low	• Adequate road signage according to the SARTSM • Approval from the respective roads department	1	4	1	2	1	1	9	-	Low
Visual																				
Potential alteration of the visual character and sense of place in the broader area. Potential visual impact on receptors in the study area. Potential visual impact on the night time visual environment.	• Additional renewable energy developments in the broader area will alter the natural character of the study area towards a more industrial landscape and expose a greater number of receptors to visual impacts. • Visual intrusion of multiple renewable energy developments may be exacerbated, particularly in more natural undisturbed settings. • Additional renewable energy facilities in the area would generate additional traffic on gravel roads thus resulting in increased impacts from dust emissions and dust plumes.	3	3	2	3	3	2	28	-	Medium	• Carefully plan to minimise the construction period and avoid construction delays. • Position laydown areas and related storage/stockpile areas in unobtrusive positions in the landscape, where possible. • Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. • Vegetation clearing should take place in a phased manner. • Where possible, the operation and maintenance buildings should be consolidated to reduce visual clutter. • As far as possible, limit the number of maintenance vehicles which are allowed to access the facility. • Ensure that dust suppression techniques are implemented on all gravel access roads.	3	3	2	2	2	2	24	-	Medium

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
	• The night time visual environment could be altered as a result of operational and security lighting at multiple renewable energy facilities in the broader area.										• As far as possible, limit the amount of security and operational lighting present on site. • Light fittings for security at night should reflect the light toward the ground and prevent light spill. • Lighting fixtures should make use of minimum lumen or wattage. • Mounting heights of lighting fixtures should be limited, or alternatively foot-light or bollard level lights should be used. • If possible, make use of motion detectors on security lighting. • The operations and maintenance (O&M) buildings should not be illuminated at night. • The O&M buildings should be painted in natural tones that fit with the surrounding environment.									

14.3.6 Comparative Assessment of Alternatives

A preliminary comparative assessment of the alternatives is provided in the table below and further detailed in the respective specialist studies:

Key:

PREFERRED	The alternative will result in a low impact / reduce the impact
FAVOURABLE	The impact will be relatively insignificant
LEAST PREFERRED	The alternative will result in a high impact / increase the impact
NO PREFERENCE	The alternative will result in equal impacts

Table 18: Preliminary Assessment of Layout Alternatives

	Substation and BESS Site		Construction Laydown and O&M Area	
	Option 1	**Option 2**	**Option 1**	**Option 2**
Geotechnical Assessment	No Preference	No Preference	No Preference	No Preference
Social Impact Assessment	No Preference	Least Preferred	No Preference	Least Preferred
Transport Assessment	No Preference	No Preference	No Preference	No Preference
Visual Assessment	Favourable	Favourable	Favourable	Favourable
Avifaunal Assessment	No Preference	No Preference	No Preference	No Preference
Bat Assessment	Preferred	Least Preferred	Preferred	Least Preferred
Agricultural Assessment;	No Preference	No Preference	No Preference	No Preference
Surface Water Assessment	Preferred	Favourable	Preferred	Least Preferred
Heritage Assessment – Archaeological	No Preference	No Preference	No Preference	No Preference
Heritage Assessment – Paleontological	No Preference	No Preference	No Preference	No Preference
Heritage Assessment – Cultural Landscape	Favourable	Least Preferred	Favourable	Least Preferred
Noise Assessment;	No Preference	No Preference	No Preference	No Preference

	Substation and BESS Site		Construction Laydown and O&M Area	
	Option 1	**Option 2**	**Option 1**	**Option 2**
Biodiversity Assessment	Preferred	Favourable	Preferred	Least Preferred

14.4 Concluding statement for preferred alternative

No activity alternatives are being considered. Renewable Energy development in South Africa is highly desirable from a social, environmental and development point of view. Wind energy installations are more suitable for the site because of the high wind resource. The choice of technology selected for the Koup 1 WEF was based on environmental constraints and technical and economic considerations. The size of the wind turbines will depend on the development area and the total generation capacity that can be produced as a result. Therefore, no technology alternatives will be considered.

All constraints identified during the scoping phase have been taken into account to inform the final layout for the Koup 1 WEF (**Figure 34**) which is the preferred alternative assessed in this report. This includes the locations of the turbines. Based on the results of the comparative assessment of alternatives of substation and construction laydown / operation and maintenance building, it is requested that Option 1 is authorised as it is preferred for the substation and construction lay down area / operation and maintenance building. Whilst the cultural heritage specialist has identified Option 1 as favourable, Option 1 for the substation and construction laydown / operation and maintenance building is however located within a 300m farm road buffer recommended by the cultural heritage specialist. This is not fatally flawed, however, the cultural heritage specialist has recommended that this be removed from the buffer and placed on the same side of the road. This is currently not the case.

The following updates have been made to the layout:

- All turbines (except for turbine 11) are place outside of the no-go areas identified by specialists.
- Turbines have been in most cases moved to areas classified as low sensitivity;
- Where turbines have remained in areas classified as medium / high-medium sensitivity, specialists have provided recommendations and mitigation in order to minimise the impact to the environment;
- In terms of the cultural landscape assessment, one turbine is within the Platdooring Historic Farmstead buffer of 800m (the turbine is approximately 750m from this farmstead). The cultural landscape specialist has recommended that a pre-construction micro-survey for turbines and other infrastructure be undertaken, during which time the feasibility of moving this turbine outside the 800m will be investigated.
- The BESS, substation, construction laydown / operation and maintenance buildings have been removed from no-go areas;
- The associated roads, cables and other infrastructure do cross drainage lines, however the existing crossings will be used for most parts and the specialist recommendations and mitigation will be applied.

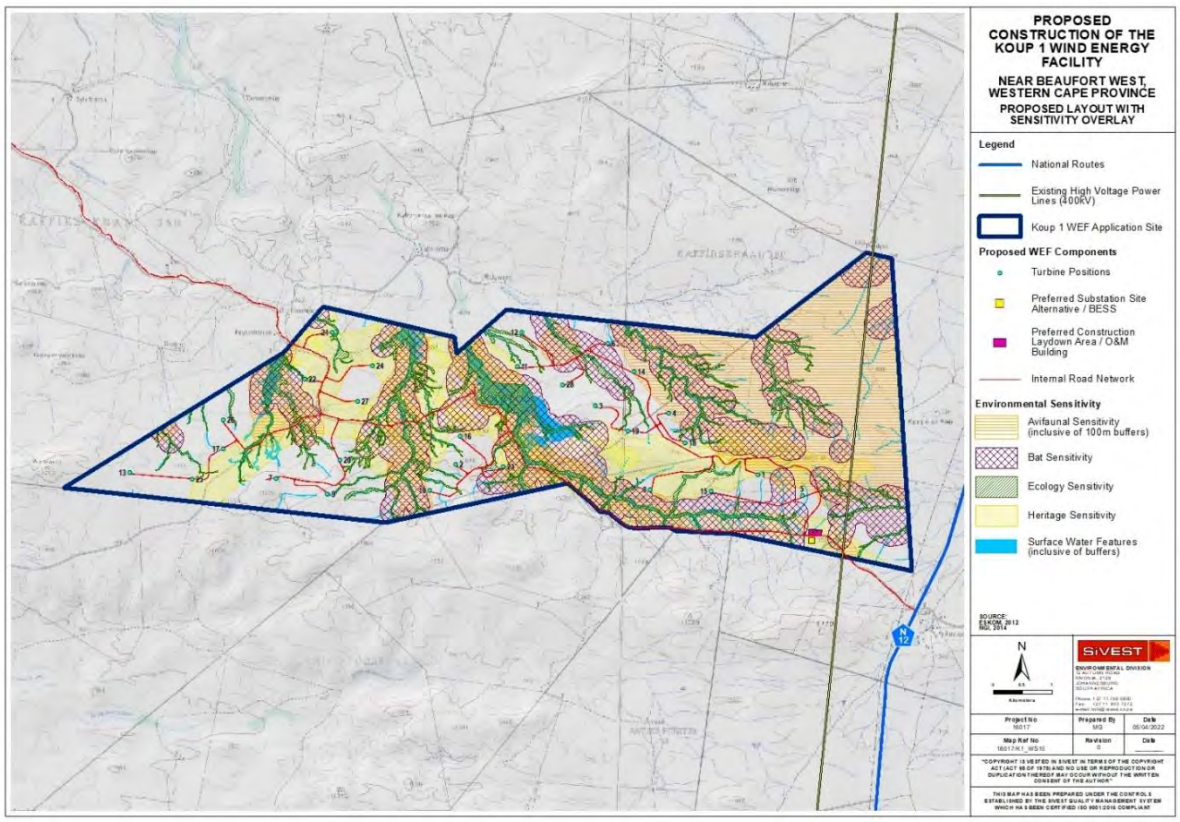

Figure 34: Sensitivity Mapping

15. POSITIVE AND NEGATIVE IMPACTS OF THE KOUP 1 WEF PROJECT

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

Table 19: Summary of positive and negative impacts

Impact	Pre-mitigation	Post-mitigation
Impacts on Biophysical Systems / Components during the planning phase		
Avifaunal – none identified.		
Ecological – none identified.		
Bat – none identified.		
Geotechnical – none identified.		
Surface Water – none identified.		
Impacts to Socio-Economic Component during the planning phase		
Heritage		
The graves and burial grounds are mostly localised near farm roads within the proposed development area. The expansion of existing farm roads may impact these sites.	Negative Medium	Negative Low
One structure (KO-05) is located near farm roads within the proposed development area. The expansion of existing farm roads may impact the site.	Negative Medium	Negative Low

Impact	Pre-mitigation	Post-mitigation
Due to the size of the area assessed, there's a possibility of encountering heritage features in un-surveyed areas does exist.	Negative Medium	Negative Low
Disturbance, damage or destruction of fossils at or beneath the ground surface due to surface clearance and bedrock excavations	Negative Medium	Negative Low
Archaeological		
The graves and burial grounds are mostly localised near farm roads within the proposed development area. The expansion of existing farm roads may impact these sites.	Negative Medium	Negative Low
One structure (KO-05) is located near farm roads within the proposed development area. The expansion of existing farm roads may impact the site. Two sites (Kh001 and Kh001b) are located within the proposed grid corridor area.	Negative Medium	Negative Low
Due to the size of the area assessed, there's a possibility of encountering heritage features in un-surveyed areas does exist.	Negative Medium	Negative Low
Cultural Landscape		
Inappropriate infrastructure layout planning degrades ecological elements of the cultural landscape.	Negative Medium	Negative Low
Inappropriate infrastructure layout planning negates aesthetic and sense of place requirements of the cultural landscape.	Negative High	Negative Medium
Inappropriate infrastructure layout planning degrades historic elements of the cultural landscape.	Negative Medium	Negative Low
Non-landowner residents' lack of representation in planning and public participation process leads to loss of local knowledge, socio-economic empowerment and character of the cultural landscape.	Negative Very High	Positive Low
Noise		
Light delivery vehicles moving around onsite.	Negative Low	Negative Low
Paleontological – none identified.		
Social– none identified.		
Transportation – none identified.		
Visual – none identified.		
Impacts on Biophysical Systems / Components during the construction phase		
Avifaunal		
Displacement due to disturbance associated with the construction of the wind turbines and associated infrastructure.	Negative Medium	Negative Low
Displacement due to habitat transformation associated with the construction of the wind turbines and associated infrastructure.	Negative Low	Negative Low
Ecological		
Vegetation clearing for access roads, turbines and their service areas and other infrastructure will impact on vegetation and protected plant species.	Negative Medium	Negative Low
Increased levels of noise, pollution, disturbance and human presence during construction will be detrimental to fauna. Sensitive and shy fauna are likely to move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed.	Negative Medium	Negative Medium
Bat		
The destruction of active bat roosts and/or features that could serve as potential roosts, such as rock formations and the removal of trees on site. The destruction of derelict holes, such as aardvark holes and any fragmentation of woody habitat which include dense bushes. The removal of limited trees and bushes would have an impact on all bats that could potentially roost in trees and on the foraging of clutter and clutter-edge species.	Negative Medium	Negative Low
Creating new habitat amongst the turbines which might attract bats. This includes buildings with roofs that could serve as roosting space or open water sources from quarries or excavation where water could accumulate.	Negative Low	Negative Low
Construction noise, especially during night-time, as well as lightening disturbance.	Negative Low	Negative Low

Impact	Pre-mitigation	Post-mitigation
Geotechnical		
Displacement of natural earth material and overlying vegetation. • Increase stormwater velocity • Increase in soil and wind erosion due to clearing of vegetation. • Construction and earthmoving vehicles may displace soil during operations. • Creation of drainage paths along access tracks. • Potential oil spillages from heavy plant. • Sedimentation of nonperennial features and excessive dust. • Potential groundwater and drainage feature contamination.	Negative Low	Negative Low
Surface Water		
During construction activities within watercourses could result in the disturbance or destruction of any listed and or protected plant or animal species. However none of these aquatic obligate species were observed during this assessment	Negative Low	Negative Low
Construction could result in the loss of drainage systems that are fully functional and provide an ecosystem services within the site especially where new access roads are required or road upgrades will widen any current bridges or drifts. Loss can also include a functional loss, through change in vegetation type via alien encroachment for example	Negative Medium	Negative Low
During construction earthworks will expose and mobilise earth materials, and a number of materials as well as chemicals will be imported and used on site and may end up in the surface water, including soaps, oils, grease and fuels, human wastes, cementitious wastes, paints and solvents, etc. Any spills during transport or while works area conducted in proximity to a watercourse has the potential to affect the surrounding biota. Leaks or spills from storage facilities also pose a risk and due consideration to the safe design and management of the 30 000l fuel storage facility must be given. Although unlikely, consideration must also be provided for the proposed Battery Energy Storage System (BESS), with regard safe handling during the construction phase. This to avoid any spills or leaks from this system	Negative Medium	Negative Low
Impacts to Socio-Economic Component during the construction phase		
Heritage – none identified.		
Archaeological – none identified.		
Cultural Landscape		
Fragmentation and destruction of the landscape degrading the environment and thus continuous relationship between man and environment	Negative High	Negative Low
WEF infrastructure construction and decommissioning activity degrades the character of the cultural landscape and the sense of place	Negative High	Negative Medium
Integrity of farmsteads and farm roads degraded by insensitive construction or decommissioning activities.	Negative High	Negative Low
Integrity of local residents to continue their patterns of land use is degraded by the construction and decommissioning activities.	Negative Very High	Positive Low
Paleontological		
Disturbance, damage or destruction of fossils at or beneath the ground surface due to surface clearance and bedrock excavations	Negative Medium	Negative Low
Noise		
Construction activities relating to hardstand areas, digging of foundations for wind turbines, civil works as well as erection of wind turbines	Negative Low	Negative Low
Construction activities relating to civil works as well as erection of wind turbines	Negative Medium	Negative Low
Construction of access roads	Negative Medium	Negative Low
Noises relating to construction traffic	Negative Medium	Negative Low

Impact	Pre-mitigation	Post-mitigation
Social		
Air quality	Negative Low	Negative Low
Noise	Negative Low	Negative Low
Increase in crime	Negative Low	Negative Low
Increased risk of HIV infections	Negative High	Negative Medium
Influx of construction workers	Negative Low	Negative Low
Hazard exposure	Negative Low	Negative Low
Disruption of daily living patterns	Negative Low	Negative Low
Disruptions to social and community infrastructure	Negative Low	Negative Low
Job creation and skills development	Positive Medium	Positive Medium
Socio-economic stimulation.	Positive Medium	Positive Medium
Transportation		
Increase in Traffic	Negative Low	Negative Low
Increase of Incidents with pedestrians and livestock	Negative Medium	Negative Low
Increase in Dust from gravel roads	Negative Low	Negative Low
Increase in Road Maintenance	Negative Low	Negative Low
Additional Abnormal Loads	Negative Low	Negative Low
Increase in Dust from gravel roads	Negative Low	Negative Low
Increase in Traffic	Negative Low	Negative Low
Visual		
• Large construction vehicles, equipment and construction material stockpiles will alter the natural character of the study area and expose visual receptors to impacts associated with construction. • Construction activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. • Dust emissions and dust plumes from increased traffic on gravel roads serving the construction site may evoke negative sentiments from surrounding viewers. • Surface disturbance during construction would expose bare soil resulting in visual scarring of the landscape and increasing the level of visual contrast with the surrounding environment. • Vegetation clearance required for the construction of the proposed substation is expected to increase dust emissions and alter the natural character of the surrounding area, thus creating a visual impact. • Temporary stockpiling of soil during construction may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact.	Negative Low	Negative Low
Impacts to Biophysical Systems/components during the operational phase		
Avifaunal		
Mortality of priority species due to collisions with the wind turbines.	Negative Medium	Negative Medium
Ecological		
Fauna will be negatively affected by the operation of the wind farm due to the human disturbance, the presence of vehicles on the site and possibly by noise generated by the wind turbines as well.	Negative Medium	Negative Low
Following construction, the site will remain vulnerable to soil erosion for some time due to the disturbance created by site clearing and likely low natural revegetation of disturbed areas thereafter. It is important to note that while the site is arid, such areas can experience significant soil erosion as plant cover is low and occasional heavy showers generate large amounts of runoff.	Negative Medium	Negative Low

Impact	Pre-mitigation	Post-mitigation
Increased alien plant invasion during operation	Negative Medium	Negative Low
Transformation and presence of the grid connection and associated infrastructure will contribute to cumulative habitat loss within CBAs, ESAs and impact on broad-scale ecological processes such as fragmentation.	Negative Medium	Negative Low
Bat		
Fatality through direct collision or barotrauma of resident bats occupying the airspace amongst the turbines. The turning blades of the turbines during operation are the most important aspect of the project that would impact negatively on bats. High flying species have predominantly been confirmed at the proposed Koup 1 WEF site.	Negative High	Negative Medium
Bat fatality during migration. A limited number of calls like Miniopterus natalensis (Natal Long-fingered bat), a Near Threatened migration species, have been recorded. Not much research has been conducted on migration of bats in South Africa, and some of the other species occurring on site could also migrate.	Negative Medium	Negative Low
Loss of bats of conservation value. A limited number of calls like the red *data Miniopterus natalensis* have been recorded, as well as the endemic *Eptesicus hottentotus.*	Negative Medium	Negative Low
Bat mortality due to the attraction of bats to wind turbines. Bats have been shown to sometimes be attracted to wind turbines out of curiosity or reasons still under investigation.	Negative Low	Negative Low
Loss of habitat and foraging space during operation of the wind turbines.	Negative High	Negative Medium
Reduction in the size, genetic diversity, resilience and persistence of bat populations. Bats have low reproductive rates and populations are susceptible to reduction by fatalities other than natural death. Furthermore, smaller bat populations are more susceptible to genetic inbreeding.	Negative High	Negative Medium
Geotechnical		
Displacement of natural earth material. 1) Increase in soil erosion. 2) Potential oil spillages from maintenance vehicles. 3) Sedimentation of non-perennial features caused by soil erosion.	Negative Medium	Negative Low
Surface Water		
Increase in hard surface areas, and roads that require stormwater management will increase through the concentration of surface water flows that could result in localised changes to flows (volume) that would result in form and function changes within aquatic systems, which are currently ephemeral. This then increases the rate of erosions and sedimentation of downstream areas.	Negative Medium	Negative Low
Impacts to Socio-Economic component during the operational phase		
Archaeological – none identified.		
Heritage – none identified.		
Cultural Landscape		
Inappropriate operational activities degrade the significant ecological elements of the cultural landscape	Negative High	Negative Low
Inappropriate operational activities degrade the significant aesthetic elements of the cultural landscape altering the character and sense of place	Negative High	Negative Medium
Inappropriate operational activities degrade the significant historic elements of the cultural landscape altering the character and sense of place	Negative Very High	Negative Medium
Inappropriate operational activities degrade the significant socio-economic opportunities of the cultural landscape	Negative Very High	Positive Medium
Noise		
Noise Impacts during the day from operating wind turbines	Negative Low	Negative Low
Noise Impacts at night from operating wind turbines	Negative Low	Negative Low
Paleontological – none identified.		
Social		

Impact	Pre-mitigation	Post-mitigation
Noise WEF only	Negative Low	Negative Low
Shadow flicker WEF only	Negative Low	Negative Low
Blade glint WEF only	Negative Low	Negative Low
Electromagnetic field and RF interference	Negative Low	Negative Low
Hazard exposure	Negative Low	Negative Low
Transformation of the sense of place	Negative High	Negative High
Job creation and skills development	Positive Medium	Positive Medium
Socio-economic stimulation.	Positive Medium	Positive Medium
Transportation		
Increase in Traffic	Negative Low	Negative Low
Increase of Incidents with pedestrians and livestock	Negative Low	Negative Low
Increase in Dust from gravel roads	Negative Low	Negative Low
Increase in Road Maintenance	Negative Low	Negative Low
Additional Abnormal Loads	Negative Low	Negative Low
New / Larger Access points	Negative Low	Negative Low
Increase in Traffic	Negative Low	Negative Low
Visual		
• The development may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. • The proposed WEF and associated infrastructure will alter the visual character of the surrounding area and expose potentially sensitive visual receptor locations to visual impacts. • Dust emissions and dust plumes from maintenance vehicles accessing the site via gravel roads may evoke negative sentiments from surrounding viewers. • The night time visual environment will be altered as a result of operational and security lighting at the proposed WEF.	Negative Medium	Negative Medium
Impacts to Biophysical Systems/components during the decommissioning phase		
Avifaunal		
Displacement due to disturbance associated with the dismantling of the wind turbines and associated infrastructure.	Negative Low	Negative Low
Ecological		
Fauna will be negatively affected by the decommissioning of the wind farm due to the human disturbance, the presence and operation of vehicles and heavy machinery on the site and the noise generated.	Negative Medium	Negative Low
Following decommissioning, the site will be highly vulnerable to soil erosion due to the disturbance created by the removal of infrastructure from the site.	Negative Medium	Negative Low
Increased alien plant invasion following decommissioning	Negative Medium	Negative Low
Bat		
Bat disturbance due to decommissioning activities and associated noise, especially during night-time.	Negative Low	Negative Low
Geotechnical		
Decommissioning of the structure will disturb the geological environment. • Increase in soil and wind erosion due to clearance of structures. • Construction and earthmoving vehicles will displace the soil. • Creation of drainage paths. • Potential oil spillages from vehicles. • Excessive sediments in non-perennial features.	Negative Low	Negative Low
Surface Water – same as construction		
Impacts to Socio-Economic component during the decommissioning phase		
Heritage – none identified.		

Impact	Pre-mitigation	Post-mitigation
Archaeological – none identified.		
Cultural Landscape – same as construction		
Noise		
Decommissioning activities relating to removal of infrastructure and wind turbines, rehabilitation of disturbed areas	Negative Low	Negative Low
Paleontological – none identified.		
Social– none identified.		
Transportation		
Increase in Traffic	Negative Low	Negative Low
Increase of Incidents with pedestrians and livestock	Negative Medium	Negative Low
Increase in Dust from gravel roads	Negative Low	Negative Low
Increase in Road Maintenance	Negative Low	Negative Low
Additional Abnormal Loads	Negative Low	Negative Low
Increase in Dust from gravel roads	Negative Low	Negative Low
New / Larger Access points	Negative Low	Negative Low
Visual		
• Vehicles and equipment required for decommissioning will alter the natural character of the study area and expose visual receptors to visual impacts. • Decommissioning activities may be perceived as an unwelcome visual intrusion. • Dust emissions and dust plumes from increased traffic on the gravel roads serving the decommissioning site may evoke negative sentiments from surrounding viewers. • Surface disturbance during decommissioning would expose bare soil (scarring) which could visually contrast with the surrounding environment. Temporary stockpiling of soil during decommissioning may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact.	Negative Low	Negative Low
Cumulative – biophysical		
Avifaunal		
• Mortality due to collisions with the wind turbines • Displacement due to disturbance during construction and operation of the wind farm • Displacement due to habitat change and loss at the wind farm • Mortality due to electrocution on the electrical infrastructure	Negative Medium	Negative Low
Ecological		
Wind energy development in the wider area around the Koup 1 site will generate cumulative impacts on habitat loss and fragmentation for fauna and flora.	Negative Medium	Negative Low
Bat		
Cumulative bat mortality due to direct collision with the blades or barotrauma during foraging of resident bats at several WEF sites.	Negative High	Negative High
Cumulative bat mortality of migrating bats due to direct blade impact or barotrauma during foraging of migrating bats on several wind farms	Negative High	Negative Medium
Habitat loss over several wind farms	Negative High	Negative Medium
Cumulative reduction in the size, genetic diversity, resilience and persistence of bat populations	Negative High	Negative High
Geotechnical – none identified.		
Surface Water		

Impact	Pre-mitigation	Post-mitigation
The cumulative assessment considers the various proposed renewable projects that occur within a 35km radius of this site, where the author has either been involved in the assessment of these projects (Enertrag SA) and or review of the past assessments as part of any required Water Use Licenses (Atlantic Energy Partners & Mainstream projects).	Negative Low	Negative Low
Cumulative – Socio-economic		
Heritage		
The extent that the addition of this project will have on the overall impact of developments in the region on heritage resources.	Negative Medium	Negative Low
Disturbance, damage or destruction of fossils at or beneath the ground surface due to surface clearance and bedrock excavations	Negative Medium	Negative Low
Archaeological		
The extent that the addition of this project will have on the overall impact of developments in the region on heritage resources.	Negative Medium	Negative Low
Cultural Landscape		
Inappropriate cumulative development degrade the significant ecological elements of the cultural landscape	Negative Very High	Negative Medium
Inappropriate cumulative development degrades the significant aesthetic elements of the cultural landscape altering the character and sense of place	Negative Very High	Negative Medium
Inappropriate cumulative development degrades the significant historic elements of the cultural landscape altering the character and sense of place	Negative Very High	Negative Medium
Inappropriate cumulative development degrade the significant socio-economic opportunities of the cultural landscape	Negative Very High	Positive Medium
Noise		
Cumulative noises due to operating wind turbines from other wind energy facilities in the area	Negative Low	Negative Low
Paleontological – n/a		
Social		
Noise	Negative Low	Negative Low
Shadow flicker	Negative Low	Negative Low
Blade glint	Negative Low	Negative Low
Risk of HIV and AIDS	Negative High	Negative Medium
Sense of place	Negative High	Negative High
Service supplies and infrastructure	Negative Low	Negative Low
Job creation and skills development	Positive Very high	Positive Very high
Socio-economic stimulation	Positive Medium	Positive Medium
Transportation		
Increase in Traffic	Negative Low	Negative Low
Increase of Incidents with pedestrians and livestock	Negative High	Negative Medium
Increase in Dust from gravel roads	Negative Medium	Negative Low
Increase in Road Maintenance	Negative Low	Negative Low
Additional Abnormal Loads	Negative Medium	Negative Low
Increase in Dust from gravel roads	Negative Medium	Negative Low
New / Larger Access points	Negative Low	Negative Low
Visual		
• Additional renewable energy developments in the broader area will alter the natural character of the study area towards a more industrial landscape and expose a greater number of receptors to visual impacts.	Negative Medium	Negative Medium

Impact	Pre-mitigation	Post-mitigation
• Visual intrusion of multiple renewable energy developments may be exacerbated, particularly in more natural undisturbed settings. • Additional renewable energy facilities in the area would generate additional traffic on gravel roads thus resulting in increased impacts from dust emissions and dust plumes. • The night time visual environment could be altered as a result of operational and security lighting at multiple renewable energy facilities in the broader area.		

16. SUMMARY OF SPECIALIST FINDINGS AND RECOMMENDATIONS

Table 20: Summary of specialist findings and recommendations

Specialist Study	Findings	Recommendations
Agricultural	The site has low agricultural potential because of, predominantly, rainfall constraints, but also due to soil constraints. It is totally unsuitable for cultivation, and agricultural land use is limited to low density grazing. The land is predominantly of low agricultural sensitivity.	The recommended mitigation measures are implementation of an effective system of storm water run-off control; maintenance of vegetation cover; and stripping, stockpiling and re-spreading of topsoil.
Avifaunal	It is estimated that a total of 155 bird species could potentially occur in the broader area. Of these, 16 species are classified as priority species for wind development.	The avifaunal post-construction monitoring at the proposed WEF must be conducted in accordance with the latest version (2015) of the *Best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa.*
Bat	Bat droppings of insectivorous bats were found at most of the farm dwellings and one small roost with less than 20 bats was identified. Derelict buildings, koppies with rocky ridges, low trees with associated denser vegetation along the riverbeds and livestock water points, could potentially attract bats to the study area. The sporadic rainfall seasons that sometimes occur in arid areas like the Karoo reflect on periods of insect emergence and accompanying higher bat activity. One should bear in mind that we are in a dry spell at present and that this could change during periods of higher precipitation in future. These changes could result in changes in the bat activity which have not been accounted for in this report. Four turbines are still situated within sensitivity zones, two in High-medium and two in Medium sensitivity zones.	It is recommended that no turbines or associated infrastructure are allowed in the High sensitivity areas. High-medium sensitivity zones should preferably be avoided, but due to the general low bat activity in certain areas, could be developed with strict mitigation measures. Medium sensitivity zones could be developed, but with mitigation. It is therefore recommended that turbines will be shifted from High sensitivity areas and that curtailment is applied to the turbines situated in the High-medium sensitivity zone. Close observation during the bat monitoring to be conducted during the post-construction phase should inform the curtailment schedule and apply it to more turbines, as necessary. Should curtailed turbines show consistent low activity through static recordings, as well as mortality in the low threshold range, the bat specialist could adapt curtailment again.

Specialist Study	Findings	Recommendations
		It is recommended that curtailment be applied during the specified time periods when the relevant temperatures and wind speeds prevail for the turbines situated in the High-medium sensitivity zones and Medium sensitivity zones, if the latter deemed necessary during operation, see the table below. If the developer decides to reduce the number of turbines, the first option, after the wind regime has been considered, should be to reduce the turbines in the High-medium sensitivity zones. Operational monitoring and carcass searches will have to inform this decision.
Biodiversity	The Koup 1 site falls entirely within the Gamka Karoo vegetation type and consists of open gravel plains and low hills dissected by numerous drainage lines. Vegetation cover is generally very low and dominated by low shrubs and scattered low trees. In general, the vegetation of the Koup 1 site is considered low sensitivity and there are few species of concern present. In terms of fauna, the diversity of mammals, reptiles and amphibians is considered relatively low, even by Karoo standards. Although the site falls within the broad distribution of the Riverine Rabbit, the drainage lines of the site do not have extensive floodplains with dense riparian vegetation that represent the typical habitat of this species in the area. The Koup 1 site is therefore considered unsuitable for this species and the development is considered highly unlikely to have any impact on the Riverine Rabbit. The site also falls within the range of the Karoo Padloper and if present it would be associated with the hills of the site with sufficient loose rock and coarse rubble to provide shelter. The low vegetation cover and paucity of such habitat suggests that the site is not an important area for this species and no evidence of this species was observed on the site.	The specialist has recommended that all mitigation be adhered to.
Geotechnical	The area is underlain by rock units of the Abrahamskraal Formation (Pa) and Teekloof Formation (Pt) of the Adelaide Subgroup, forming part of the Beaufort Group of the Karoo Supergroup. Competent, founding conditions are anticipated at relatively shallow depths in	It is recommended that the turbines be constructed on relatively flat to gentle, open areas (0-8.7˚ slopes) in areas with maximum wind exposure. It recommended that a detailed geotechnical investigation be undertaken during the detailed

Specialist Study	Findings	Recommendations
	slightly weathered bedrock conditions, although this will have to be confirmed during the detailed investigation stage. The bedrock geology is overlain by relatively thin transported soil deposits. The geological map 3222 Beaufort West indicates seven-fault features in the study area. Regional borehole data indicates relatively low aquifer yields in the range of 0.1-0.5l/s for the south eastern portion and 0.5-2l/s over the major proportion of the site.	design phase of the project. The detailed geotechnical investigation must entail the following: • Profiling and sampling exploratory trial pits to determine founding conditions for the substation, the construction laydown area and the BESS. An investigation for determining the subgrade conditions for internal roads and a materials investigation (if required) is also recommended; • Profiling rotary core to determine foundation conditions for the turbines. • Geotechnical investigation for construction material – gravel and rock. • Thermal resistivity and electrical resistivity geophysical testing for electrical design and ground earthing requirements; • Groundwater sampling of existing boreholes to establish a baseline of the groundwater quality for construction purposes; • Dynamic Probe Super Heavy (DPSH) tests and rotary core drilling may be required depending on the soil profiles and imposed loads of the structures.
Heritage – Archaeological	The fieldwork conducted for the evaluation of the possible impact of the new Koup 1 WEF and associated grid connection infrastructure has revealed the presence of 18 tangible cultural heritage resources. One archaeological site (KO_18) was rated as having low heritage significance. Four graves, burial grounds, and possible graves (KO-06 – KO-09) were rated as having high heritage significance. Two structures (KO-03, KO-05) were rated as having medium heritage significance, 1 structure (KO-02) was rated as having low heritage significance and 2 structures (KO-01; KO-04) were rated as having no heritage significance. Three farmsteads or the remains of farmsteads were identified and constitutes the extent that of physical remains of current and historical adaptation to the challenging landscape. The farms of Platdorings (KO-04-06), Arbeid (KO_19) and Kareerivier (KO_01-03 and KO_07-08) are located	• The proposed substation should be located to the north of the farm entrance road; • The laydown area and substation should be located outside the 300m farm road buffer without impacting on the riverine corridor flood line and slopes over 3%; • New access roads must be relocated to avoid slopes over 10% and visually sensitive slopes impacting on the views from the historic farm roads. The following mitigation measures will be required: • 50m buffer zones around grave sites • 30m buffer zone around farmsteads • 30 buffer zone around historical structures • Monitor find spot areas if construction is going to take place through them. • A management plan for the heritage resources then needs to be compiled and approved for implementation during construction and operations.

Specialist Study	Findings	Recommendations
	close to areas where historically water could be sources and, in most cases, these are dry riverbeds with cultivatable floodplains. Associated with all three farmsteads several burial grounds and graves (KO-06 – KO-09) were identified. Although the various heritage elements in each of these farmsteads do not all constitute having a high or medium significance. The combination of the build environment, burial grounds and graves, as well as the utilisation off the landscape create a cultural landscape and all three cases a medium to high cultural significance. Eight find spots (KO_10 – KO_17) comprise several low-density Stone Age surface artefact scatters and were rated as having low heritage significance. These are primarily from the MSA, although both LSA and earlier ESA material was identified. All the artefact assemblages (including KO-18) occur in heavily deflated and eroded areas, so their scientific potential and heritage significance is somewhat lowered.	
Heritage – Palaeontological	Palaeontological Impact assessment (PIA) determined that the study area is underlain by continental (fluvial / lacustrine) sediments of the Abrahamskraal and Teekloof Formations (Lower Beaufort Group, Karoo Supergroup) which are of Middle to Late Permian age. These bedrocks contain sparse, unpredictable to locally concentrated vertebrate fossils as well as rare trace fossils (e.g. tetrapod burrows) and plant material of scientific and conservation value. A substantial number of new fossil vertebrate sites (cranial and post-cranial material of large-bodied dinocephalians, small dicynodonts, rare tetrapod burrow casts) have been recorded during within the WEF project area during the short site visit, while several more sites have previously been mapped shortly outside its margins. These palaeontological sites, together with their sedimentological context, provide important data for on-going research into the pattern and causes of the Middle Permian Mass Extinction Event on land around 260 million years ago.	• A specialist palaeontological walk-down of the final WEF and grid connection project area in the pre-construction phase, • Implementation of a Chance Fossil Finds Protocol (See Appendix 4) by the ECO / ESO during the construction phase. The specialist palaeontologist responsible will need to submit a Work Plan for approval by Heritage Western Cape.

Specialist Study	Findings	Recommendations
	Scientifically-valuable and legally-protected fossil heritage resources preserved at or beneath the ground surface within the project footprint are potentially threated by clearance and bedrock excavations during the construction phase of the WEF and grid connection (e.g. for access roads, wind turbine foundations). The majority of the recorded fossil sites lie outside the project footprint but most of the WEF and grid connection footprint has yet to be palaeontologically surveyed on foot. A significant number of unrecorded sites almost undoubtedly lies within of very close to the project footprint. No Very High Sensitivity or No-Go palaeontological sites or areas have been identified within the Koup 1 WEF or grid connection project areas. Since all known fossil sites can be readily mitigated through professional recording and collection of fossil material in the pre-construction phase, no recommendations for micro-siting of infrastructure such as wind turbine, pylon positions or access roads are therefore made at this stage.	
Heritage – Cultural Landscape	The Koup region is a significant cultural landscape that reflects the relationship between man and nature over a period of time. This relationship has generally been sustainable, where biodiversity and ecological systems have been maintained in the utilisation of the landscape expressed in specific land use patterns. The surrounding land use indicates a social appreciation of the natural environment with low impact stock farming with limited farmstead crop cultivation. The vastness and relative homogenous nature of the cultural landscape is, however, often undervalued. If careful contextual planning is not followed, it will rapidly result in a cluttered wasteland. This does not mean that development is discouraged, but rather that the implementation of wind and solar energy farms should be planned holistically. It is the duty of the planning department to consider this application in terms of other renewable	• The findings, coupled with the proposed layout for development of wind turbines, which considers appropriate placement in terms of wind energy capacity, concludes that the development can be permitted within the site if the report's recommendations are followed. The mitigating recommendations in this report consider the ecological, aesthetic, historic and socio-economic value lines that underpin the layers of significance that combine to create the character of the place and the cultural landscape of the Koup. • These recommendations include road and farmstead complex buffers which incorporate cultivated areas and graves, steep slope and ridgeline no-go areas as well as consideration of the unique land form of the site, CBA and ESA no-go areas, as well as mechanisms to support the non-landowner residents that live on the site in

Specialist Study	Findings	Recommendations
	energy developments that are planned/proposed for the Koup area, notably the proposed RE developments included in the cumulative impact section of this report.	being bale to continue their indigenous land use patterns, knowledge and social systems. These mitigations will reduce the impact on the surrounding landscape and heritage resources but due to the high visual impact of the turbines, largely a result of their height, the negative impact to the cultural landscape cannot be removed, only reduced from very high to moderate. • In terms of the cultural landscape assessment, one turbine is within the Platdooring Historic Farmstead buffer of 800m (the turbine is approximately 750m from this farmstead). The cultural landscape specialist has recommended that a pre-construction micro-survey for turbines and other infrastructure be undertaken, during which time the feasibility of moving this turbine outside the 800m will be investigated.
Noise	All the data indicated an area with a high potential to be quiet both day and night. The visual character of the study area is rural and it was accepted that the SANS 10103 noise district classification could be rural during low wind conditions. Considering sound level data measured in similar areas, ambient sound levels will increase as wind speeds increase, and noise limits were proposed considering all available data and guidelines.	• While the total projected noise levels are less than 45 dBA, active noise monitoring is recommended because the projected noise levels are higher than 42 dBA (which is 7 dB higher than the night-time rural rating level). It is recommended that the developer: • implement a noise monitoring program that will define the residual levels before the construction of the WEF, as well as to confirm noise levels once the WEF is operational. Residual and noise monitoring is recommended at NSDs 1, 2 and 3. • investigate any reasonable and valid noise complaint if registered by a NSD staying within 2,000 m from the location where construction or operational activities are taking place; • evaluate the potential noise impact should the layout be revised where any proposed wind turbines are located closer than 1,000 m from a confirmed NSD; or • if the developer decides to use a different wind turbine that has a sound power emission level higher than that of the WTG used in this report (sound power emission level exceeding 108.3 dBA re 1 pW).
Social	While the project will create employment for local communities during the construction	None.

Specialist Study	Findings	Recommendations
	and operational phases, the more significant positive impact of the project will be the contribution it will make towards renewable energy infrastructure. Research recently published by Meridian Economics, in collaboration with the CSIR, indicates that "[i]n all realistic mitigation scenarios, the majority of new build capacity is wind and solar PV" (Roff, et al., 2020, p. 52), and highlights an urgent need for the country to accelerate the RE build pathway. In addition, the South African Climate Change Coordinating Commission, is considering a more ambitious emissions target and is suggesting changes to the country's energy plan (Paton, 2021).	
Surface Water	The study area does contain a variety of aquatic features associated, and were characterised as follows: • Non perennial rivers alluvial dominated channels with or without riparian vegetation. These ranged from narrow channels within small canyons with steep cliffs to broad flood plain areas in the lower valleys. Some of these did contain small seeps/fountains which sustained small pools of water inhabited by invertebrates and amphibians. However, broad riparian zones are only found within the lower valley areas, dominated by a small number of trees, while obligate instream vegetation is limited to a small number of sedges (nut grasses). • Minor drainage lines, with no obligate aquatic vegetation and were mostly 2 – 8m in width • Dams or weirs with no wetland or aquatic features, although not many of these were located within the study area.	Noteworthy areas, that should be avoided, include the Very High Sensitivity areas as shown in this report. Existing crossings may be used and/or upgraded that intersect these systems however, detailed monitoring plan must be developed in the pre-construction phase.
Transportation	The construction phase of this development will typically generate the highest number of additional vehicles. Existing access from the N12 Freeway has sufficient sight distance in both directions and hence an upgrade to the existing access will be required from the	• Existing access from the N12 Freeway has sufficient sight distance in both directions and hence an upgrade to the existing access will be required from the Western Cape Department of Transport & Public Works.

Specialist Study	Findings	Recommendations
	Western Cape Department of Transport & Public Works.	• The layout of the internal infrastructure should be such that the impact to the environment is kept to a minimum. We therefore propose that both Koup 1 & 2 share a central access to both facilities and that all other proposed temporary and permanent buildings and construction infrastructure be located close to the access point. • An internal network of minimum 5m wide gravel roads will connect all the WTG and ancillary equipment to each other. The roads will have a horizontal and vertical alignment to accommodate vehicles and more specifically abnormal vehicles intended to use these roads for the delivery of the WTG equipment. A typical intersection and horizontal alignment would consist of radii and clearances similar to the requirements in Figure 8.1. We note that the larger WTG's are planned for these facilities and will need to be simulated once additional information becomes available. • All internal access roads should be designed to have a minimum impact to the environment and thus are in most cases parallel to the contours and keep drainage line crossings to a minimum. The use of roads perpendicular to the contours for long sections should be avoided, as the risk of possible erosion is increased. Existing gravel roads should also be used to reduce the overall impact on the environment.
Visual	The VIA has determined that the study area has a largely natural visual character with some pastoral elements. The area has however seen very limited transformation or disturbance and as such the proposed Koup1 WEF development is expected to alter the visual character of the area and contrast significantly with the typical land use and / or pattern and form of human elements present.	None.

17. ENVIRONMENTAL IMPACT STATEMENT

Genesis Enertrag Koup 1 Wind Farm (Pty) Ltd is proposing to construct the Koup 1 Wind Energy Facility (WEF) and associated infrastructure. The overall objective of the proposed development is to generate electricity by means of renewable energy technologies capturing wind energy to feed into the national grid. The proposed Koup 1 WEF will comprise of twenty-eight (28) wind turbines with a maximum total energy generation capacity of up to approximately 140MW. The electricity generated by the proposed WEF development will be fed into the national grid via a 132kV overhead power line. The 132kV overhead power line will however require a separate EA and is subject to a separate BA process, which is currently being undertaken in parallel to the EIA process. A layout of the development and the environmental site sensitivities is included below:

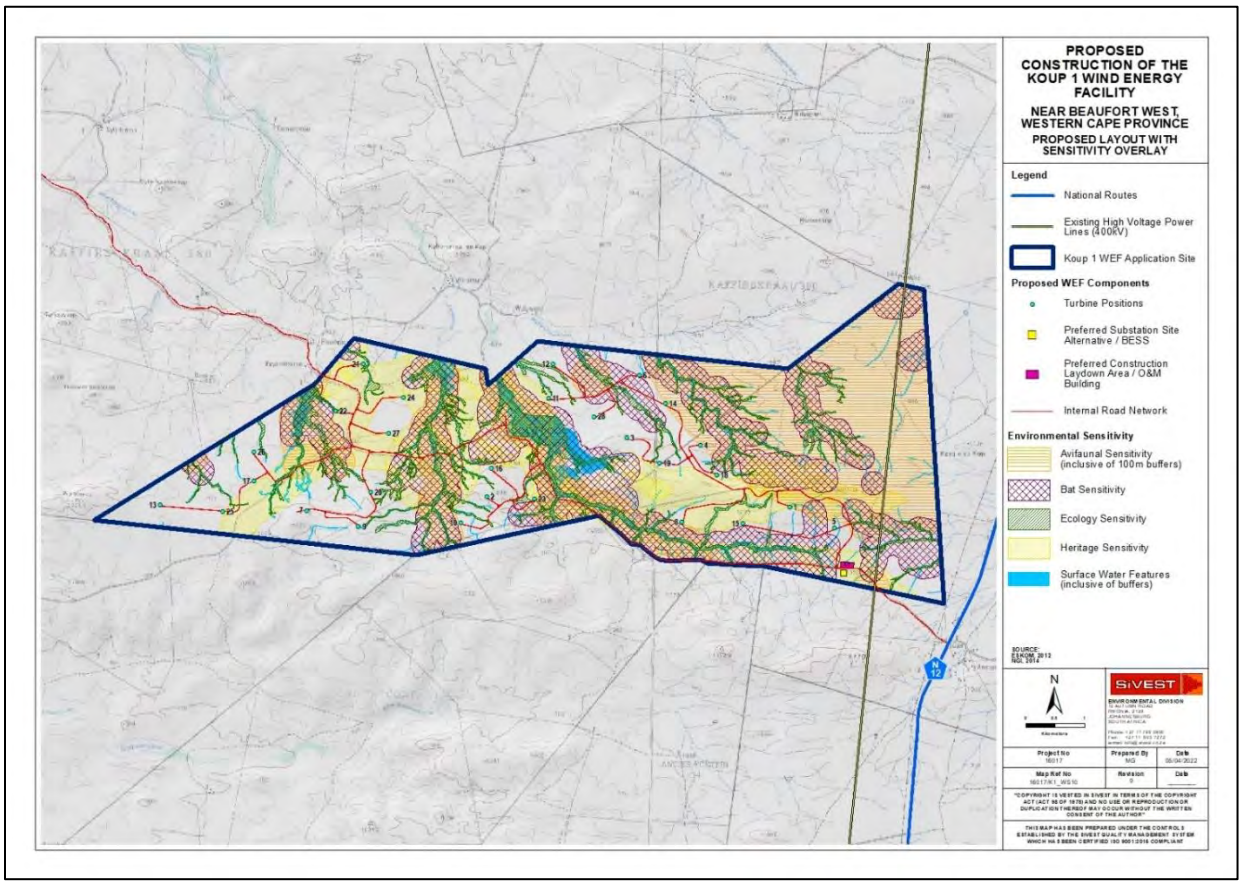

Figure 35: Final Proposed Layout with site sensitivities

The implementation of the Koup 1 WEF and associated infrastructure will assist expected growth in demand for installed power generation capacity. This in turn will assist with the increasing economic growth and social development within South Africa. Coupled with this, is the growing awareness of environmental impact, climate change and the need for sustainable development. At present, more than 90% of South Africa's energy is generated by coal-fired power stations. Apart from the fact that these are finite resources that will eventually run out, fossil fuels are also harmful to the environment when used to produce electricity. Wind is a free and infinite resource that occurs naturally in the environment. The Koup

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

The following specialist studies have been undertaken for the project:

- Agriculture and Soils Impact Assessment (desktop)
- Avifaunal Impact Assessment
- Bat Impact Assessment
- Biodiversity Impact Assessment
- Heritage Impact Assessment
    - Paleontological Impact Assessment
    - Archaeological Assessment
    - Cultural Landscape Assessment
- Geotechnical Assessment (desktop)
- Noise Impact Assessment
- Social Impact Assessment (desktop)
- Surface Water Impact Assessment
- Transportation Impact Assessment
- Visual Impact Assessment

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

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

The avifaunal assessment (refer to **Appendix 6**) concluded that the proposed Koup 1 WEF will have a moderate impact on avifauna which, in most instances, could be reduced to a low impact through appropriate mitigation. The alternative substation and laydown locations are all situated in essentially the same habitat, i.e. Karoo scrub. The habitat is not particularly sensitive, as far as avifauna is concerned, therefore any of the alternative locations will be acceptable. No fatal flaws were discovered in the course of the onsite investigations. The development is therefore supported, provided the mitigation measures listed in this report are strictly implemented.

According to the bat assessment undertaken for the project (refer to **Appendix 6**), the construction phase is rated as medium before mitigation and low after mitigation. The highest rating before mitigation is the impact of clearing and excavation of bat habitat. The operational phase is rated as medium before and after mitigation. Three significant ratings are high before mitigation and are reduced to medium after mitigation. These include direct collision and barotrauma, the foraging space occupied by turbine blades and the impact on bat populations. More research is needed concerning fatal curiosity due to bats being attracted to turbines, so this component has a low significant rating before and after mitigation during

operations. The impact of the decommissioning phase where turbines are removed after the lifespan of the WEF, rates low before and after mitigation. The cumulative impact rating before mitigation is high before mitigation and medium after mitigation. Cumulative bat mortality due to direct collision or barotrauma during foraging of resident bats is rated high before mitigation (51 in range 43 to 61) and decreases to borderline medium/high after mitigation (42 in range 24 to 42). The potential cumulative reduction in bat population size remains high before and after mitigation. The cumulative impacts on migratory bats and habitat loss are reduced from high before mitigation to medium after mitigation. The overall significance rating before mitigation is Medium and Low after mitigation. The assessment concluded that if the applicant adheres to the proposed mitigation measures, the potential impact on bats from the proposed Koup 1 Wind Farm is therefore predicted to be Negative Low. Considering the findings of the one-year pre-construction monitoring undertaken at the proposed Koup 1 WEF site, this specialist is of the opinion that no fatal flaws exist, and environmental authorisation may be granted.

The biodiversity assessment (refer to **Appendix 6**) revealed that there are no impacts associated with the Koup 1 Wind Energy Facility that cannot be mitigated to an acceptable level. With the application of relatively simple mitigation and avoidance measures, the impact of the Koup 1 Wind Farm on the local environment can be reduced to a low and acceptable magnitude. The contribution of the Koup 1 Wind Farm development to cumulative impact in the area would be low and is considered acceptable. Overall, there are no specific long-term impacts likely to be associated with the development of the Koup 1 wind farm that cannot be reduced to a low significance. As such, there are no fatal flaws associated with the development and no terrestrial ecological considerations that should prevent it from proceeding.

According to the geotechnical assessment undertaken for the project (refer **Appendix 6**), no fatal flaws, from a geotechnical perspective, were identified during the desktop study. However, the conclusions presented in the report will have to be more accurately confirmed during the detailed geotechnical investigation phase. The impact of the WEF was found to be negative low impact as the anticipated impact will have negligible negative effects and will require little to no mitigation. The site from a desktop level geotechnical study perspective is considered suitable for the proposed WEF.

According to the archaeological impact assessment (refer to **Appendix 6**), the overall impact of the Koup 1 WEF, on the heritage resources, is seen as acceptably low after the recommendations have been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be authorised.

The cultural impact assessment (refer to **Appendix 6**) recommended that the substation and laydown area locations require some layout alteration to accommodate the farm road buffer. The access roads need to avoid slopes over 10% and visually sensitive slopes impacting on the historic farm roads. The collector substation for proposed Gridline Option 2 requires relocation out of the N12 scenic road buffer and the CBA. With these buffers in place and all other recommendations followed, the overall impact to the cultural landscape for the proposed Koup 1 WEF and associated grid connection and infrastructure can be reduced from very high to moderate. There are no fatal flaws and the development can proceed with CLA recommendations and mitigation in place.

The paleontological impact assessment (refer to **Appendix 6**) concluded that in terms of palaeontological heritage resources, the proposed Koup 1 WEF and associated grid connection developments are assigned a similar overall impact significance rating (Construction Phase) of negative medium without mitigation and negative medium following mitigation. No significant further impacts on fossil heritage

resources are anticipated in the planning, operational and decommissioning phases. The No-Go Option might have a negative low impact significance. Anticipated cumulative impacts in the context of several planned or authorized renewable energy projects in the region are assessed as negative medium without mitigation and negative low after mitigation. The proposed WEF and grid connection developments are not fatally flawed and, on condition that the recommended mitigation measures are included within the EMPr and implemented in full, there are no objections on palaeontological heritage grounds to their authorization.

The noise assessment (refer to **Appendix 6**) concluded that considering the low significance of the potential noise impacts (with mitigation, inclusive of cumulative impacts) for the proposed WEF and associated infrastructure, it is recommended that the proposed Koup 1 WEF be authorized.

According to the Social Impact Assessment (refer to **Appendix 6**), with regard to all social impacts associated with the project, it is evident that, at the social level, the positive elements outweigh the negative and that the project carries with it a significant social benefit at a national level and is therefore supported.

The surface water impact assessment (refer to **Appendix 6**) revealed that there are no impacts associated with the Koup 1 Wind Energy Facility that cannot be mitigated to an acceptable level. With the application of relatively simple mitigation and avoidance measures, the impact of the Koup 1 Wind Farm on the local environment can be reduced to a low and acceptable magnitude. The contribution of the Koup 1 Wind Farm development to cumulative impact in the area would be low and is considered acceptable. Overall, there are no specific long-term impacts likely to be associated with the development of the Koup 1 wind farm that cannot be reduced to a low significance. As such, there are no fatal flaws associated with the development and no terrestrial ecological considerations that should prevent it from proceeding.

According to the transportation assessment (refer to **Appendix 6**), the Koup 1 Wind Energy Facility and associated infrastructure will have a nominal impact on the existing traffic network. The project is therefore deemed acceptable from a transport perspective, provided the recommendations and mitigations measures in this report are implemented, and hence authorisation should be granted for the EIA application.

The visual impact assessment (refer to **Appendix 6**) concluded that the potential visual impacts associated with the proposed Koup 1 WEF and associated grid infrastructure development are negative and of moderate significance. The impacts associated with the construction, operation and decommissioning phases can be mitigated to acceptable levels provided the recommended mitigation measures are implemented. Given the low level of human habitation and the absence of sensitive receptors, the project is deemed acceptable from a visual perspective and authorisation should be granted.

No location alternatives are being considered for the Koup 1 Wind Farm as these sites were selected prior to the commencement of the EIA Process. The preliminary layout that was prepared for the Koup 1 WEF has been assessed by specialists to identify potential impacts that may arise from the development. Based on the findings of the specialists, the potential impacts identified and the outcomes of the public participation process of the Scoping Phase, the layout has been updated to avoid environmental sensitivities where possible to produce a final layout. This final layout has been further assessed by all

specialists (refer to Impact Tables in **Section 13.3** and findings and recommendations in **Section 15**). No further layout alternatives have been considered as part of the EIA process. Impact assessments have been undertaken on the revised layout. No technology alternatives will be considered. The choice of turbine to be used will ultimately be determined by technological and economic factors at a later stage. The no-go alternative has not been assessed as part of the EIA phase.

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

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

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

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

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

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

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

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

None identified.

21. UNCERTAINTIES, ASSUMPTIONS AND GAPS IN KNOWLEDGE

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

- All the information provided by the Applicant is accurate and unbiased.
- The available data, including Topocadastral maps, Orthophotographs, geological maps and Google Earth images, are reasonably accurate.
- All information contained in the specialist studies provided is accurate and unbiased.
- Refer to specialist studies (**Appendix 6**) for their specific assumptions and limitations.
- It is not always possible to involve all Interested and/or Affected Parties (I&APs) individually, however, every effort has/will be made to involve as many interested parties as possible. It is also assumed that individuals representing various associations or parties convey the necessary information to these associations / parties.
- It is not possible to determine the actual degree of the impact that the development will have on the immediate environment without some level of uncertainties. Actual impacts can only be determined following construction and/or operation commences.

22. AUTHORISATION OF THE PROPOSED KOUP 1 WEF PROJECT

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

Based on the findings of the specialist studies and this assessment, provided further comments and concerns are not raised during the pending public participation process, the EAP has no reason to recommend that the project not be authorised, provided that the mitigation measures are adhered to. The

conditions to be included in the Environmental Authorisation for the construction phase are listed in **Section 18** above.

The environmental authorization should be valid for a period of 5 years.

23. EAP DECLARATION

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

24. DEVIATIONS FROM THE APPROVED SCOPING REPORT

There are no deviations from the approved Scoping Report. This EIA report has been prepared in line with the plan of study that was approved as part of the Scoping Report.

25. INFORMATION REQUIRED BY CA (IF APPLICABLE)

Currently n/a.

26. CONCLUSION

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

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

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